



# Piper Shores



# 2023 SUSTAINABILITY PLAN

Prepared by

**Thornton Tomasetti**

December 2023

# TABLE OF CONTENTS

Letter from the CEO..... 3

Executive Summary..... 4

Top Ten List..... 6

Sustainability Vision..... 9

Sustainability Objectives..... 10

Sustainability Achievements..... 11

Reporting Baseline..... 12

Sustainability Focus Areas..... 14

    Energy..... 15

    Water..... 19

    Transportation..... 22

    Waste and Purchasing..... 26

    Site and Landscape..... 29

    Food..... 33

    Education and Awareness..... 36

Appendix A: *HVAC Optimization Strategies Spreadsheet*

Appendix B: *Discovery Phase Report*



# LETTER FROM PHIL JEAN, CEO



Dear Piper Shores Community,

As an organization that cares deeply about our impact on people and the planet, we take our responsibility towards society and the environment very seriously. Our commitment to aiming for a sustainable future goes to the core of our culture and strategy – and is part of our aspirational goals for a better future.

After months of research and discussion, we are pleased to offer the attached Sustainability Plan, created in conjunction with the Piper Shores Sustainability Collaborative of residents, board and administration, along with community partners. As we take a retrospective look at our accomplishments and consider the seven focus and key objectives areas contained in the following pages of our plan, being an environmental leader is clearly inextricable from our long-term priorities. In the current economic climate, building a sustainable and resilient business is more important than ever.

At Piper Shores, we are convinced that we have a part to play in reducing the overall environmental footprint of our operations. The plan represents specific, measurable targets and the evaluation of new goals that can further support our sustainability priorities and advance our mission. Our path forward, which we will track and report on, is ambitious, and we remain committed to delivering on our long-term sustainability mission through human capital, financial resources and best practices.

My personal thanks to the many residents, staff, consultants and other stakeholders who contributed to the development of this comprehensive sustainability plan. A confident future requires a robust and thriving environment and a more inclusive and equitable society—and we are determined to be part of the solution. We are focused on what matters most to our residents, staff, and broader community, and believe sustainable solutions are a key to the future of our organization.

Sincerely,

A handwritten signature in black ink that reads "Philip D. Jean". The signature is written in a cursive, slightly informal style.

Philip D. Jean  
Chief Executive Officer

# EXECUTIVE SUMMARY

Climate change and its associated risks are among the greatest challenges facing our planet today. Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. To pursue sustainability is to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations. It is a complex problem that requires leadership and collaboration from all sectors. As the impacts of climate change continue to intensify and broad scientific consensus emphasizes the need for action, we have a responsibility to increase our efforts in reducing fossil fuel emissions and advancing sustainability.

The Piper Shores Sustainability Plan is a strategic response to these critical issues. Piper Shores stands uniquely positioned as a community capable of harnessing collective experience, knowledge, resources, and expertise to effect meaningful change. This initial Piper Shores Sustainability Plan was developed through a collaborative effort between Thornton Tomasetti and a core team of residents and staff. It aspires to set a new sustainability standard among Continuing Care Retirement Communities (CCRCs).

Piper Shores has made a commitment to procure **80% clean electricity by 2030 (100% by 2040)**, transition to **all-electric fleet vehicles by 2040**, achieve **carbon neutrality by 2040**, and transition to a **fossil fuel free campus by 2045**. These objectives align well with the state of Maine's targets to achieve an 80% clean electricity grid by 2030 (100% by 2040) and carbon neutrality by 2045.

In recent years, through the resident and staff partnership, Piper Shores has already made considerable strides in sustainability. It is important these achievements continue to grow and evolve, particularly in the face of the deepening climate crisis. This plan outlines a structured approach, suggesting the next crucial steps toward advancing Piper Shores' vision of a sustainable future. It serves as a foundational document for ongoing endeavors to effect tangible change. Realizing the Piper Shores Sustainability Plan will require a united effort across the entire Piper Shores community.

## ORGANIZATION OF THE REPORT

The 2023 Sustainability Plan outlines Piper Shores' sustainability goals, categorized into eight prioritized focus areas. These areas encompass Energy, Water, Transportation, Waste & Purchasing, Site & Landscape, Food, and Education & Awareness. Given that CCRCs consume substantial amounts of energy, leading to significant climate impacts and annual operating expenses, carbon emissions reduction strategies are prioritized in this plan. Short-term, mid-term and long-term energy-related recommendations are provided, along with proposed reduction targets. The other sections (Water, Transportation, Waste & Purchasing, Site & Landscape, Food and Education & Awareness) provide best practices for Piper Shores.

# EXECUTIVE SUMMARY - CONTINUED

This plan is designed to be a living document. Due to unpredictable changes in technology, economy, and the state of the world, sustainability targets may need to change and adapt. It is recommended that the targets in this document be **revisited every five years** to incorporate the findings from carbon footprint assessments and annual reporting.

## SUMMARY OF KEY PRIORITIES

This sustainability plan outlines a comprehensive array of sustainability recommendations spanning various topics and timelines, from 2024 into the subsequent 26 years. While acknowledging the equal importance of all sustainability topics, the reality is that Piper Shores will need to prioritize key actions for the next few years to establish a sustainable trajectory towards carbon neutrality. The following strategies represent the most critical next steps.

### 1. **Appoint a Sustainability Coordinator for Piper Shores by the end of 2025**

Designate a Sustainability Coordinator for Piper Shores prior to the end of 2025. This role could involve hiring a sustainability professional, assigning a part-time or full-time position to an existing staff member with a passion for leading sustainability efforts, or establishing a graduate student internship focused on tool development and annual carbon footprinting. The appointed individual will define the methodology for data collection, oversee data aggregation, ensure accuracy and consistency, and analyze the data to identify trends and improvement opportunities. They will report to the Piper Shores' leadership team, be an active member of the Sustainability Collaborative, and publish a yearly Sustainability Report. There are many recommendations in this plan that are well-suited for a Sustainability Coordinator to manage and has been identified as such in the "Responsible Party" column within each of the focus areas.

### 2. **Establish a Reporting Baseline**

A dedicated effort, potentially led by the Sustainability Coordinator, should be directed towards creating a centralized Piper Shores carbon footprinting tool. This tool will merge all data collection into a singular spreadsheet, serving as the basis for ongoing tracking and utilizing the 2024 data as the benchmarking baseline. Streamlining data collection into one comprehensive tool/spreadsheet will enhance the efficiency of sustainability tracking. Refer to the Reporting Baseline section for further details on this initiative.

### 3. **Implement the "Top Ten List"**

Starting with *quick wins* can offer relatively easy, immediate and cost-effective solutions to reduce energy consumption and achieve noticeable savings. The Top Ten List outlined on the following pages provides recommended next steps for Piper Shores (in order of priority), setting the course towards carbon neutrality and sustainable operations.

# THE TOP TEN LIST

The table below outlines the suggested next steps with brief descriptions, proposed responsible parties, projected costs, anticipated savings and preferred timelines for the Top Ten strategies in the context of executing the Sustainability Plan. A more detailed set of recommendations is available in the following sections (organized by topic) and is also included in **Appendix A**.

Proposed Next Steps (in order of priority)		High-level Description	Responsible Party	Estimated Costs	Estimated Savings	Timeline
1	<b>Adjust settings on current equipment at Oceanside (boilers, chillers and hot water heaters) to operate more efficiently and reduce operating costs</b>	<ul style="list-style-type: none"> <li>Optimize the temperature set-points (Delta T) for the boilers and chillers to operate current equipment more efficiently.</li> <li>Use the building automation system (BAS) to schedule temperature setbacks and reduce conditioning in spaces when not in use.</li> <li>Reduce the hot water temperature for the domestic hot water (DHW) heaters.</li> <li>Reduce boiler use during the summer months. Currently boilers are running in the summer at 30% of the peak winter load. This is high, especially with hot water needs served by a separate loop.</li> <li>See <b>Appendix A</b> for more detail.</li> </ul>	Piper Shores Facilities Team	N/A	<p>10-15% energy improvement could be feasible with optimized boiler and chiller setpoints</p> <p>5% savings on heating bill for 5 degF temperature setback from BAS</p> <p>6-8% savings on hot water energy by reducing the DHW temps</p>	Start in 2024
2	<b>Perform duct sealing at Oceanside</b>	Improve the performance of current equipment by sealing gaps, cracks and holes in the ductwork. Aero-barrier technology is recommended. Duct sealing prior to systems commissioning can help ensure ducts are operating properly before commissioning test are performed. Installers and quotes can be found at the following link: <a href="https://aero-seal.com/">https://aero-seal.com/</a>	Third-party Technician	Typically \$1.00-\$1.50 per cfm (Aeroseal to be contacted for quote)	10% savings on heating or cooling. Savings could be greater depending on duct conditions	By end of 2025
3	<b>Perform air balancing of HVAC systems at Oceanside</b>	Perform air balancing of all rooftop units to help eliminate temperature variations and provide more consistent and comfortable indoor conditions. Reduce and eliminate over-conditioning in some zones and under-conditioning in others. Recommended retro-commissioning (Cx) firms include Sparhawk Group, RFS Engineering and Epsten Group.	Third-party Retro-Cx firm	Typically \$0.50-\$1.50 per square foot for HVAC systems* (Cx firms to be contacted for quote)	5-15% savings on HVAC system efficiencies	Target 2025 or 2026, after duct sealing

\* Square footage for Oceanside is approximately 413,000 SF. Breakdown provided below.  
 Joselyn: 96,772 SF, Kirkwood: 95,772 SF, Checkly: 78,601 SF, Cammock: 79,821 SF and Wayland: 61,771 SF

# THE TOP TEN LIST - CONTINUED

Proposed Next Steps (in order of priority)		High-level Description	Responsible Party	Estimated Costs	Estimated Savings	Timeline
4	<b>Improve envelope air tightness and air sealing at Oceanside and Drake Cottages</b>	As part of the window replacement effort at Oceanside and residence turnovers at Oceanside and Drake, upgrade the sealant and caulking for doors and windows for improved air sealing and elimination of cold drafts. Utilize energy audits and/or aerobarrier for improved air tightness.	Third-party Contractor	Negligible for sealants and caulking. Roughly \$2-3/SF for aerobarrier applications to improve envelope air tightness.	10-15% savings on HVAC energy use	Start in 2023, ongoing
5	<b>Pilot plumbing fixtures with greater water savings at Oceanside and Drake</b>	Identify a cross-representation of residences and common spaces to pilot more water efficient fixtures. Consider WaterSense labeled fixtures with the following efficiency ranges: 1.5 or 1.75 gallons per minute (gpm) shower heads, 1.0 or 1.5 gpm residential kitchen faucets, 1.0 or 1.1 gallons per flush (gpf) toilets, 0.5 gpm residential lavatories and 0.35 gpm motion-sensored public lavatories. Once pilot complete, begin phased approach to fixture replacement.	Piper Shores Facilities Team	Negligible costs for pilot fixtures  Costs depend on the fixture. Lavatory aerators and shower heads are low cost but high reward. Kitchen faucets and toilets can be replaced at end of life as needed.	5% savings on hot water energy use	Pilot complete by end of 2025
6	<b>Pilot hybrid heat pump hot water heaters for all facilities and CERV-2 (or similar) packaged units for Joselyn, Kirkwood and Drake Cottage residences</b>	To align with carbon neutrality goals, pilot all-electric heat pump hot water heaters for targeted residences at end of life.  Similarly, pilot all-electric CERV-2 (or similar) systems at end of life to provide energy recovery, heating and cooling, dehumidification and humidification. These packaged units contribute towards greater comfort and energy efficiency as compared to current fan coil units, served by propane, which only provide heating/cooling to residences.	Third-party Technician	Heat pump hot water heaters: \$3,000 range for residential, \$10,000 range for commercial (excluding labor)  CERV-2 units: \$6,000 range for residential (excluding labor)  Contact technician for quote. Incentives available	40-50% savings on HVAC energy use and domestic hot water  Residential payback for heat pump hot water heaters is typically 3-5 years	Start in 2025, or end of life for systems

# THE TOP TEN LIST - CONTINUED

Proposed Next Steps (in order of priority)		High-level Description	Responsible Party	Estimated Costs	Estimated Savings	Timeline
7	<b>Create and implement a Sustainable Site Maintenance Plan</b>	This is a document outlining strategies, practices and guidelines for ongoing care and management of a site in an environmentally responsible and resource-efficient manner. The establishment of this plan is already underway (six to nine month project). Consider annual square footage targets for no mow areas and a requirement to substantially increase new plantings as native or adaptive.	Third party Consultant	N/A	Supports site and landscape goals	Start in 2023
8	<b>Conduct an annual transportation survey to gather information about resident and staff travel behaviors, preferences, challenges and concerns</b>	Surveying residents and staff can provide meaningful insights to help Piper Shores make informed decision about transportation infrastructure, services, preferences, and fossil fuel reduction strategies. This survey can be used to support the development of a comprehensive transportation management plan if desired.	Piper Shores Sustainability Coordinator	N/A	Supports transportation goals	Start in 2025
9	<b>Perform an infrastructure waste audit to optimize and standardize waste sorting, collection and disposal practices</b>	Infrastructure audits include data collection, bin placement assessment, waste sorting analysis, stakeholder engagement, pilot implementation and eventual roll out of standardized bins. See the Waste Audit Manual published by Post Landfill Action Network (PLAN) for more details.**	Piper Shores Sustainability Coordinator	N/A	Supports waste reduction goals	By end of 2028
10	<b>Purchase a new electric passenger van</b>	Piloting an all-electric passenger van allows for a measured evaluation of the van's suitability before making a larger commitment to electric fleet vehicles. It provides an opportunity for reduced fossil fuel use, increased community engagement, positive public relations, and lower operating costs. Limited options are available on the market at this time, especially with ramp options. Over the next five years, more options will become available. (Currently, Lightening eMotors makes an all electric transit van)	Piper Shores Leadership Team	\$100,000 range. Federal incentives available for EVs.	Annual fuel costs and maintenance costs for combustion engines	By 2030

\*\* <https://www.breakfreefromplastic.org/wp-content/uploads/2019/09/PLAN-Waste-Audit-Manual.pdf>



# SUSTAINABILITY VISION

Piper Shores values the earth and its environment, and desires to manage its resources in a sustainable way. The Piper Shores campus on the Maine coast abuts beaches, nationally protected marshes, and locally preserved woodlands. Piper Shores is committed to safeguarding our environment, conserving resources, preserving natural habitats, and preventing pollution.

## SUSTAINABILITY VISION

The **2023 Sustainability Plan** for Piper Shores provides a roadmap for achieving the Sustainability Vision as developed by the Sustainability Collaborative. The Sustainability Vision for Piper Shores includes the following:

- Reducing greenhouse gas emissions
- Avoiding the impacts of inaction
- Reducing water usage
- Minimizing waste
- Adopting landscape and habitat stewardship best practices
- And further strengthening and improving resident engagement and management



# SUSTAINABILITY OBJECTIVES

Sustainability objectives were developed in 2022 by the Sustainability Collaborative to advance the sustainability vision for Piper Shores. These objectives are driving the sustainability goals, targets and recommendations outlined in the 2023 Sustainability Plan. A successful sustainability plan for Piper Shores will result in measurable performance improvements aligned with the key sustainability objectives outlined below. The plan will be a living document that serves as a point of reference and source of direction for Piper Shores.


## SUSTAINABILITY OBJECTIVES

1. Comply with local, state, and federal environmental laws, and participate in the development and implementation of overall governmental plans and goals wherever possible.
2. Members of the Piper Shores Board of Directors, Management, and Sustainability Collaborative will monitor the progress of Piper Shores toward its sustainability vision, values, goals, and objectives; increase green programs through government and other funding initiatives; and recommend new initiatives consistently with advancing knowledge and technology.
3. Achieve carbon neutrality by 2040 and fossil fuel free by 2045.
4. Be a leader among Continuing Care Retirement Communities (CCRCs) within sustainability resources
5. Minimize waste to the extent that technology and systems permit by recycling, reuse, and utilizing sustainable purchasing practices.
6. Develop environmental and ecological landscape best practices in all Piper Shores programs and services.
7. Reduce energy consumption and track progress in saving energy. Set yearly environmental goals, targets, and performance measures that are integrated into is annual budget plan.
8. Collaborate with residents, employees, board members, and the community at large to provide awareness of our environmental impact and manage a community which offers leadership in environmentally responsible living for retirement and Continuing Care Retirement Communities (CCRCs).
9. Engage residents by involving them with the efforts of the Piper Shores Sustainability Collaborative, enabling two-way exchanges and communications, providing guest speakers, utilizing expert consultants, and providing written policies and guidelines for residents concerning environmental issues, goals, strategies, and actions, developed with resident input.
10. Incorporate leadership in CCRC green living in the Piper Shores' marketing strategy and materials.
11. Broaden community partnerships.
12. Support health and well-being of staff and residents.

# SUSTAINABILITY ACHIEVEMENTS

The following initiatives were implemented by the Piper Shores Sustainability Collaborative over the past several years to support the Sustainability Vision and Objectives of Piper Shores. These achievements established the direction for Piper Shores' Sustainability Plan which includes the following focus areas: Energy, Water, Transportation, Waste & Purchasing, Site & Landscape, Food, and Education & Awareness.

### LED LIGHTS



Piper Shores replaced 98% of incandescent lights with LED lights


### COMPOSTING

Piper Shores added composting for the kitchen and residents at Oceanside, along with some compostable containers for takeout




### EV CHARGING STATIONS

EV Charging stations are located on the far end of the parking garage in the Wayland section



3 spaces are located in the parking garage and 3 spaces are adjacent to the parking garage


### AIR CONDITIONING UPGRADES



Piper Shores upgraded the units on apartment buildings with more efficient units

### BUILDING UPGRADES

Piper Shores reduced boiler hot water temperature to be more optimal from an energy efficiency standpoint, recently replaced the roof, and is in process of replacing all windows.



### NATURAL CLEANING AGENTS

Piper Shores uses some natural cleaning agents



### RECYCLING ROOMS

Oceanside now has recycling rooms on all floors



# REPORTING BASELINE

Establishing a reporting baseline for Piper Shores is a crucial first step to achieving targets outlined in the Sustainability Plan. It provides the data needed to establish meaningful targets, track progress, and take actions to reduce emissions and operational costs. The baseline inventory provides a snapshot of the current emissions and a starting point for tracking changes over time. It enables benchmarking, knowledge sharing, transparency and accountability.

With the addition of a new campus, The Meadows, in June 2023, it is recommended that the baseline data reflect the 2024 operating year. The Meadows added additional options for independent living, yet also increased Piper Shores' energy demand and carbon footprint. See below for a list of proposed data points to be collected as part of the baseline establishment and ongoing reporting.

## **Energy**

- Total energy consumption (electricity and propane)
- Greenhouse gas emissions (Scope 1 to start, which are direct GHG emissions that occur from sources controlled or owned by Piper Shores)
- Percentage of purchased electricity from renewable sources vs. fossil fuels
- On-site renewable energy production (once applicable)

## **Water**

- Potable water consumption (total water consumption and water use intensity)
- Non-potable water consumption, if any
- Irrigation water consumption
- Cooling tower efficiency

## **Transportation**

- Electric vehicle charging infrastructure and usage
- Fossil fuel consumption from Piper Shores' fleet vehicles
- Emissions from staff commuting to/from Piper Shores (surveys)
- Percentage of staff and visitors using alternative transportation

## **Waste and Purchasing**

- Total waste generation and waste per capita (solid waste, recycling, composting)
- Waste diversion rate (percentage of waste diverted from the landfills)
- E-waste recycling and hazardous waste management

## **Site and Landscape**

- Percentage of site as mowed vs unmowed area
- Amount of impervious surfaces vs permeable surfaces on-site
- Emissions from site maintenance equipment (run time hours, etc)
- Area (sf) of pollinator gardens

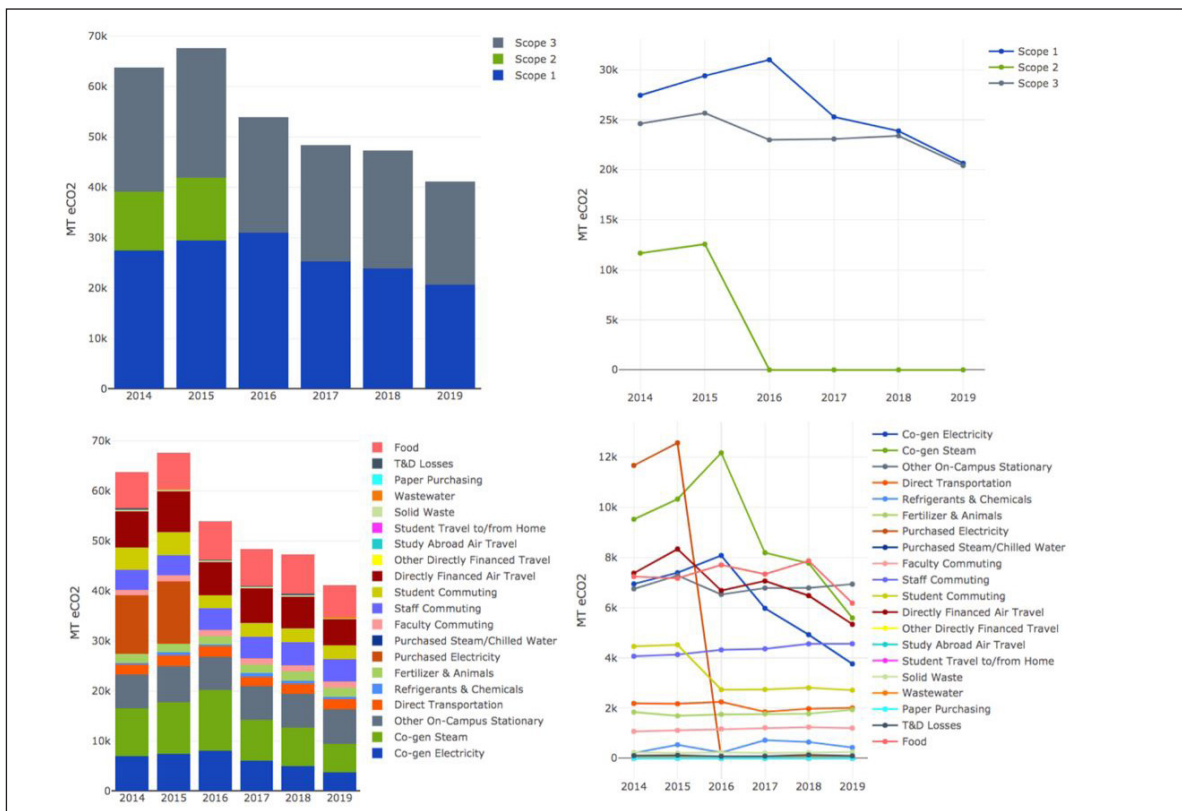
# REPORTING BASELINE

## Food

- Percentage of local food (i.e. State of Maine, New England & Hudson Valley)
- Percentage of organic food
- Percentage of sustainable sourced food
- Percentage of plant-based food

## Education and Awareness

- Quantity of local partnerships
- Number of sustainability-focused events
- % of residents involved in sustainability initiatives
- Quantity of funds issued as part of green grants, etc



The graphic above is a sample report from SIMAP (Sustainability Indicator Management & Analysis Platform). SIMAP is a tool created by the University of New Hampshire (UNH) Sustainability Institute and produces a carbon and nitrogen-accounting platform that offers campuses a simple, comprehensive, and affordable online tool to track, analyze, and improve campus-wide sustainability. The mission of SIMAP is to help institutions track their footprints so they can meet their sustainability goals as effectively and efficiently as possible.

Their proven algorithms are based on the standards in the Greenhouse Gas Protocol and nearly two decades of work supporting campus inventories with the Campus Carbon Calculator, CarbonMAP and Nitrogen Footprint Tool. SIMAP helps users create a baseline, benchmark performance, create reports, set goals, and analyze progress year over year. The Climate Action Clinic with UNH, recommended by TT for Piper Shores, provides a one-year free subscription to SIMAP and then shifts to \$500-750 annually depending on desired features.

# SUSTAINABILITY FOCUS AREAS

ENERGY 

WATER 

TRANSPORTATION 

WASTE & PURCHASING 

SITE & LANDSCAPE 

FOOD 

EDUCATION & AWARENESS 





In the United States, most of the human-caused Greenhouse Gas (GHG) emissions come from burning fossil fuels for energy use. Continuing Care Retirement Communities (CCRC), such as Piper Shores, consume substantial amounts of energy, leading to significant impacts on annual operating expenses. These impacts arise primarily from factors such as the building size, residential occupancy, round-the-clock healthcare services, and various recreational amenities like pools, spas, and fitness centers.

Some of the primary concerns faced by CCRCs include heating, ventilation, and air conditioning (HVAC) and internal loads. HVAC systems are very important for CCRCs with independent and assisted living facilities to provide residential comfort and good indoor environmental conditions. Internal loads impact mechanical systems sizing and efficiency. This refers to heat gain, cooling load, and electrical load generated by appliances, lighting, occupant usage and other building equipment. By reducing these loads, the demand on the mechanical system can be lowered and energy efficiency can be improved. Additionally, by reducing internal loads, excessive cooling can be minimized ensuring a more comfortable environment for residents.

Implementing strategies that reduce energy consumption not only mitigate the adverse environmental effects associated with climate change, but also lower Piper Shores' operational expenses, enabling financial resources to be allocated more effectively.

## Key Terms and Definitions:

- **100% Clean Electricity:** A goal to shift the entire energy supply for electricity to environmentally friendly, renewable and non-polluting sources. This target specifically focuses on the electricity generation sector, and can be achieved via off-site community solar, power purchase agreements, renewable energy credit (REC) purchases, or on-site renewable energy projects.
- **Carbon Neutrality:** Refers to achieving a state where the net amount of greenhouse gases (GHGs) emitted into the atmosphere is equal to the amount removed or offset. Achieving carbon neutrality involves reducing emissions and carbon offsetting.
- **Fossil Fuel Free:** Completely devoid of any reliance on or usage of fossil fuels and transitioning to alternative, cleaner and more sustainable sources of energy.
- **Carbon Offsets:** Investing in projects, such as renewable energy projects or energy efficiency initiatives, that remove or offset an equivalent amount of GHGs from the atmosphere. The ultimate goal should be to minimize emissions as much as possible and use carbon offsets as a supplementary tool to achieve carbon neutrality.
- **Net Energy Billing Credits Agreement (NEBCA):** Billing mechanism that allows solar panel owners to earn credits on their electricity bills for the excess electricity they generate and feed back into the grid. It is applicable to entities who own and operate solar panels.
- **Green Revolving Fund:** Internal capital pools dedicated to funding energy efficiency, renewable energy, and/or sustainable projects that generate cost savings. A portion of those savings are used to replenish the fund allowing for reinvestment in future projects of similar value. This establishes an ongoing funding vehicle that helps drive energy efficiency and sustainability over time.



# ENERGY – PROPOSED TARGETS

## Overarching Energy Goals:

1. 80% clean electricity by 2030, 100% by 2040
2. Carbon neutral by 2040
3. Fossil fuel free (or Zero Carbon) by 2045

## Interim Energy Goals:

1. Achieve targeted carbon emissions reductions at Oceanside and Drake Cottages
  - 40% reduction in carbon emissions by 2030
  - 60% reduction in carbon emissions by 2040
  - 80% reduction in carbon emissions by 2050
2. Achieve targeted carbon emissions reductions at the Meadows
  - 15% reduction in carbon emissions by 2040
  - 30% reduction in carbon emissions by 2050

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
1	<b>Establish a baseline for carbon emissions reporting, track annually and report on reductions</b>	2023 and 2024 electricity and propane consumption to serve as benchmarking baseline since it will include The Meadows. Annual sustainability reports to begin 2025.	TBD	Start in 2024
2	<b>Allocate funds for energy efficient projects</b>	Allocate a portion of Piper Shores' operational budget each year to support sustainability initiatives. For 2024, start with the Top Ten List on pages 6-8. Consider a green revolving fund to future initiatives.	Piper Shores Leadership Team	Start in 2024





## ENERGY – PROPOSED TARGETS

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
3	<b>Expand clean electricity agreements to support 80% clean electricity goal for 2030, and 100% by 2040</b>	Procure electricity from clean renewable sources. Options could include Net Energy Billing Credits Agreements (NEBCA), power purchase agreements (PPA), renewable energy credits (REC) purchases, and clean electricity provided the state of Maine's electrical grid. <u>Maine Green Power</u> is one company that offers program options, but there are many others.	Piper Shores Leadership Team	80% by 2030, Procurement can begin earlier
4	<b>Create High Performance Building Guidelines to guide future development</b>	Guidelines will minimize the negative impacts of construction and building operation on the environment and human health and serve as a roadmap for future development (i.e. LEED, WELL, etc).	Piper Shores Sustainability Coordinator or Third-party consultant	By 2030
5	<b>Purchase offsets for 100% of Piper Shores' carbon emissions to hit carbon neutrality target*</b>	Carbon offsets will help Piper Shores reach its carbon neutrality goal when complete elimination of emissions is not feasible. The ultimate goal is to minimize emissions as much as possible and use carbon offsets as a supplementary tool to achieve carbon neutrality. Carbon offsets with the following standards have a robust verification process and are recommended as preferred options: Climate Action Reserve (CAR), Verified Carbon Standard (VCS), American Carbon Registry (ACR) and Gold Standard (GS).	Piper Shores Leadership Team	100% by 2040, Procurement can begin earlier

\*The price of carbon offsets is ever-evolving. Current pricing for Carbon Credits is \$8.80/t CO2e and for RECs pricing is \$2.55/MWh.



## PROJECT SPOTLIGHT

Piper Shores has entered a long-term Net Energy Billing Credits Agreement (NEBCA) with Rumford Solar, LLC. Rumford Solar is a solar facility that generates power onto the utility distribution grid. Utility issues monetary credits that offset the costs on the utility bill. Piper Shores purchased a 11.43% share, which is expected to generate 1,088 MWHs annually. The agreement provides clean electricity to Piper Shores for the next 20 years.



*The Nexamp Rumford Solar project opening.*



According to the United State Geological Survey, approximately 71% of the Earth's surface is covered by water. Roughly 3% of Earth's water is fresh water, and of that, only 1.2% can be used as drinking water, with the remainder locked in ice formations such as glaciers, ice caps, and permafrost.

The need for water in Continuing Care Retirement Communities (CCRCs), like Piper Shores, can be significant, particularly when there are extensive landscaped areas or recreational features like swimming pools. Effectively reducing water consumption is critical, considering both environmental concerns and practical utility.

The production of heated water has a notable impact on energy consumption and utility expenses at Piper Shores. This encompasses not only residential water usage but also process water for dining and medical facilities, laundry facilities, and the water requirements for the pool and spa. The incorporation of water-conserving fixtures and appliances can play a pivotal role in reducing overall consumption. Simultaneously, enhancing water heating systems can bolster efficiency and lead to lowered operational costs.

## Key Terms and Definitions

- **Potable Water:** Also known as drinking water, potable water is filtered, treated, and free from contaminants, harmful bacteria, pathogenic microorganisms, carcinogens suitable for human consumption
- **Greywater:** Lightly used or non-potable water generated from washing machines, showers, and sinks. It is distinct from blackwater, which is wastewater from toilets and kitchen sinks that contain human waste or significant levels of organic matter.
- **Rainwater harvesting system:** Infrastructure designed to collect, store, and utilize rainwater runoff from roofs and other surfaces. The system is set up to gather rainwater and direct it to a storage tank or cistern, where it can be stored and later used for various purposes.
- **WaterSense:** WaterSense is an EPA national voluntary partnership program that offers a simple way for consumers to identify water-efficient products
- **Indoor Fixtures:** Permanently installed plumbing fixtures with running water, which includes sinks, toilets, showers/bathtubs, faucets, washing machines, and dishwashers.
- **Water Submeter:** Device used to measure and monitor water usage for a specific area, installed downstream from the main water meter. It allows for more detailed measurement of water consumption and can be installed at a unit level.
- **Water balance study:** Assessment of the inflow and outflow of water within a campus, analyzing usage patterns, and identifying opportunities to improve water efficiency and conservation. The goal is understand how water is used in the building, where it comes from, how it's distributed and where it goes after use.



# WATER - BEST PRACTICES

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
1	<b>Establish a water baseline and track annual water usage</b>	Gather water bills (i.e. monthly bills for one year of typical occupancy) to serve as a reference point for tracking water conservation efforts and measuring progress over time. 2024 water data to serve as the benchmarking baseline.	Piper Shores Sustainability Coordinator	Start in 2024
2	<b>Pilot low-flow and low-flush fixtures, and motion sensor lavatories in common spaces</b>	Identify a cross-representation of residences and common spaces to pilot more water efficient fixtures. Consider WaterSense labeled fixtures with the following efficiency ranges: 1.5 or 1.75 gallons per minute (gpm) shower heads, 1.0 or 1.5 gpm residential kitchen faucets, 1.0 or 1.1 gallons per flush (gpf) toilets, 0.5 gpm residential lavatories and 0.35 gpm motion-sensored public lavatories.	Piper Shores Leadership Team	By 2026
3	<b>Replace current fixtures with low-flow and low-flush fixtures</b>	Implement a phased approach to replacing low-flush and low-flow fixtures throughout the residences and common areas of Oceanside and Drake. Lavatory aerators and shower heads are low cost but high reward. Kitchen faucets and toilets can be replaced as needed at the end of life.	Piper Shores Leadership Team	By 2030, Procurement can begin once pilot initiative is complete



# WATER - BEST PRACTICES

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
4	<b>Install education signage focused on water-savings</b>	Install signage near water-saving strategies in common areas to educate staff, visitors and other occupants about the importance of water efficiency.	Piper Shores Sustainability Collaborative	By 2024 Similar timeline to fixture upgrades
5	<b>Install water-efficient irrigation systems</b>	Use smart irrigation controls and/or drip irrigation systems to reduce the water consumption and pair with native and drought-tolerant plants (see Site and Landscape section).	Piper Shores Leadership Team	By 2030
6	<b>Explore the feasibility of a greywater or rainwater harvesting system to offset potable water use</b>	Hire a consultant to perform a water balance study and assess the feasibility of greywater/rainwater harvesting systems. Rainwater systems tend to have lower upfront costs and complexity as compared to greywater systems.	Third-party consultant	By 2040
7	<b>Install water submeters to track ongoing water consumption</b>	The extent of metering will depend on desires of Piper Shores staff and residents. Water end uses include irrigation, pool/fitness demand, shared laundry, kitchen equipment, and domestic hot water. Additionally, individual water meters at the apartment level allow residents to monitor their own consumption and encourage responsible use.	Piper Shores Leadership Team	By 2040



The transportation sector is currently the largest contributor to greenhouse gas emissions (GHG) in the United States. In continuing care retirement communities (CCRCs), the environmental impact of transportation can be significant, particularly in terms of mobility and transportation infrastructure required to support the needs of residents. CCRCs also generally require bigger vehicles to accommodate items like wheelchairs.

Piper Shores has fleet vehicles, shuttles and vans to help transport residents to and from facilities, contributing to Piper Shores' transportation footprint. Due to limited access to public transportation, many residents, staff and residents use personal vehicles, which further contribute to air pollution and GHG emissions.

Piper Shores has already made strides to improve transportation related emissions through the installation electric vehicles (EV) charging stations. Additionally, 50% of the garage units at the Meadows have the ability to use charging stations. With the Fossil Fuel Free target outlined in this sustainability plan, transportation recommendations include reducing emissions, growing an **all-electric fleet by 2040**, expanding on-site EV charging infrastructure, and encouraging alternative transportation.

## Key Terms and Definitions

- **Transportation Footprint:** Total amount of greenhouse gas emissions and other environmental impacts generated by the movement of people, goods and service from one location to another. It encompasses various modes of transportation, including community-owned vehicles, employee commuting, shipping, etc.
- **Fleet Vehicles:** Group or collection of vehicles owned or operated by a business, government agency, or other organization for various purposes related to their operations. Fleet vehicles can range from cars, trucks, vans, buses, ATVs, to specialized vehicles tailored to specific tasks.
- **Transportation Survey:** Specialized research tool designed to collect data and information related to an organization's transportation habits, choices, and patterns in order to calculate and assess carbon emissions resulting from transportation activities. The primary goal is to measure environmental impact associated with organizational transportation and identify opportunities to reduce or offset these emissions.
- **Engine Monitoring Systems:** Specialized tools and devices to monitor, analyze and report various parameters and performance metrics of an internal combustion engine. They play a crucial role in providing real-time data to optimize engine performance, ensure efficiency, detect issues and support troubleshooting.
- **Idle Reduction:** Practice of minimizing or eliminating the unnecessary idling of vehicle engines or stationary equipment for extended periods when the vehicle is not in motion or actively performing its primary function. Goal is reduce fuel consumption, air pollution, and emissions.
- **Green Commuter Program:** Set of organized strategies aimed at promoting sustainable modes of transportation for commuting to/from work. Goal it to encourage the use of sustainable transportation options, such as biking, carpooling, electric vehicles, or public transit (if available).



# TRANSPORTATION - PROPOSED TARGETS

## Overarching Transportation Goal:

1. All-electric fleet vehicles by 2040

## Interim Transportation Goals:

1. Achieve targeted reductions in fossil fuel consumption for fleet vehicles:
  - 20% reduction in fossil fuel use by 2030
  - 50% reduction in fossil fuel use by 2035

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
1	<b>Establish transportation emissions baseline for fleet vehicles using a 2024 baseline and track annual fossil fuel consumption</b>	Assess current fleet's fuel consumption, vehicle type, and usage patterns to establish a 2024 baseline. Create a spreadsheet to track and monitor fossil fuel consumption on an annual basis, compare consumption across different vehicles and identify opportunities for reductions and improvements.	Piper Shores Sustainability Coordinator	Start in 2024
2	<b>Conduct an annual transportation survey to gather information about resident and staff travel behaviors, preferences, challenges and concerns.</b>	Surveying residents and staff can provide meaningful insights to help Piper Shores make informed decision about transportation infrastructure, services, preferences, and fossil fuel reduction strategies. This survey can be used to support the development of a comprehensive transportation management plan if desired.	Piper Shores Sustainability Coordinator	Start in 2024



## TRANSPORTATION - PROPOSED TARGETS

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
3	<b>Purchase a new electric passenger van</b>	Piloting an all-electric passenger van allows for a measured evaluation of the van's suitability before making a larger commitment, while providing an opportunity for reduced fossil fuel use, increased community engagement, positive PR, and lower operating costs.	Piper Shores Leadership Team	By 2030
4	<b>Replace older, less fuel-efficient vehicles with electric options</b>	Establish a phased approach to growing an electric vehicle fleet by replacing combustion fleet vehicles with electric vehicles at end of life.	Piper Shores Leadership Team	On-going 100% by 2040
5	<b>Implement an idle reduction policy</b>	By implementing a policy that limits engine idling time during stops, Piper Shores can conserve fuel, reduce emissions, decrease engine wear and promote sustainability. This policy can apply to both fleet and personal vehicles. For fleet vehicles, engine monitoring systems can be used to track and report on idling behaviors.	Piper Shores Leadership Team	Start in 2023, ongoing
6	<b>Organize electric vehicle (EV) awareness events</b>	EV awareness events promote the benefits of electric vehicles, sustainable transportation, and the latest technologies.	Piper Shores Sustainability Collaborative	On-going
7	<b>Expand EV charging infrastructure</b>	To meet the growing needs of electric fleet and personal vehicles, continue expanding EV charging infrastructure at Oceanside and Meadows. Consider the addition of a Level 3 charger.	Piper Shores Leadership Team	On-going





## PROJECT SPOTLIGHT

Piper Shores has installed six Electric Vehicle (EV) charging stations. The EV charging stations are located on the far end of the parking garage in the Wayland section. Three parking spaces are located in the parking garage and three parking spaces are adjacent to the parking garage. The charging stations are available to residents, visitors and staff members.



# WASTE AND PURCHASING

Efficient waste management plays a vital role in reducing the consumption of raw materials and resources, promoting a circular economy where materials are reused and recycled. This becomes particularly important in retirement communities like Piper Shores, given their distinct demographics, healthcare needs, and consumption patterns. Waste generation sources in these communities encompass resident households, dining facilities, common areas, healthcare units, resident move-outs and transitions, as well as e-waste.

Cost savings can be achieved by reducing waste and optimizing resource usage. When materials are used efficiently, organizations can significantly cut down on procurement and disposal costs. Piper Shores has already taken steps in this direction by establishing recycling rooms and introducing composting initiatives for both the kitchen and residents. The Compost and Recycling Committee that has developed successful composting programs, presented demonstration programs for reducing plastics, and offered EcoMaine presentations on recycling. To further minimize waste sent to landfills, Piper Shores can expand upon these programs and their phased reduction of single-use plastics and zero waste sustainability initiatives.

In addition to waste reduction efforts, purchasing practices are integral in addressing the waste issue. Traditional purchasing primarily focuses on cost, quality, and timely delivery,. Sustainable purchasing policies extend their focus to strengthen the environment, society, and economy. These policies advocate for the selection of products that are energy-efficient, generate minimal waste, and are crafted from recycled or renewable materials. This approach contributes to resource conservation and reduces the community's ecological footprint.

## Key Terms and Definitions

- **Zero Waste:** The goal of a Zero Waste initiative is to send little to no waste to landfills or incinerators. There are numerous Zero Waste programs and initiatives worldwide that can provide more detailed guidance.
- **Single-use Plastic:** Plastics that are only used once before being thrown away. These items include take out containers such as cups, plates, bowls, forks, spoons, knives, and plastic straws and stirrers.
- **Infrastructure Audits:** Infrastructure audits include data collection, bin placement assessment, waste sorting analysis, stakeholder engagement, pilot implementation and eventual roll out of standardized bins. Conducting audits and implementing standardized bins for trash, recycling and compost can encourage responsible waste sorting and increase waste management efficiency and effectiveness.
- **Circular Economy:** Economic system designed to minimize waste and maximize the efficient use of resources. The life cycle of products and materials is optimized to keep materials and products in use for as long as possible to minimize their environmental impact.



# WASTE & PURCHASING - BEST PRACTICES

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
1	<b>Establish a waste baseline and track/monitor waste on an annual basis</b>	2023 waste data can be used to establish baseline. Utilize annual spreadsheets from waste hauler to track and monitor tonnage of municipal solid waste, single stream recycling and construction demo waste collected and removed from Piper Shores.	TBD	Start in 2024
2	<b>Create a Zero Waste Task Force for Piper Shores</b>	Establish a dedicated group of staff and residents with diverse expertise focused on driving zero waste initiatives, developing policies/plans and tracking progress.	Piper Shores Sustainability Collaborative	Start by 2024
3	<b>Provide a waste disposal strategy for batteries, mercury-containing lamps and electronic waste</b>	A plan that includes dedicated collection areas, vendor selection, resident education (including collection events or campaigns), and on-going tracking of responsible disposal.	Piper Shores Zero Waste Task Force	By end of 2023, ongoing
4	<b>Perform an infrastructure waste audit to optimize and standardize waste sorting, collection and disposal practices.</b>	Infrastructure audits include data collection, bin placement assessment, waste sorting analysis, stakeholder engagement, pilot implementation and eventual roll out of standardized bins. See the Waste Audit Manual published by Post Landfill Action Network (PLAN) for more details.*	Piper Shores Sustainability Coordinator (with the Zero Waste Task Force)	By end of 2025

\* <https://www.breakfreefromplastic.org/wp-content/uploads/2019/09/PLAN-Waste-Audit-Manual.pdf>



# WASTE & PURCHASING - BEST PRACTICES

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
5	<b>Develop a plan for reducing single-use plastics that includes short-term and long-term targets</b>	Assess current usage (i.e. types, quantities, areas of prevalent use, etc), research alternative solutions, implement pilot programs (i.e. compostable to-go containers, reusable mugs, zero plastic events, etc), and outline an implementation strategy to achieve targets.	Piper Shores Sustainability Coordinator (with Zero Waste Task Force)	By end of 2025
6	<b>Implement at least one Zero Waste event each year</b>	These events can showcase Piper Shores' commitment to responsible waste management, raise awareness about Zero Waste, encourage behavior change and serve as catalyst for positive change. Partnership opportunities with local companies like <a href="#">GoGo Refill</a> .	Piper Shores Zero Waste Task Force	Start in 2026, ongoing
7	<b>Develop a campus-wide purchasing policy focused on reducing waste</b>	Policy to include goals, objectives and guidelines for purchasing decisions, including a preferred supplier and vendor list that meet waste reduction criteria. Consider opportunities for continuous reuse, recyclability, durability, sustainable packaging and reduction of toxic chemicals.	Piper Shores Sustainability Coordinator (with Zero Waste Task Force)	By 2028
8	<b>Assess feasibility of certification programs focused on waste reduction</b>	Perform an assessment comparing programs like TRUE and Atlas Zero Waste that provide tools, resources and recognition for pursuing Zero Waste goals. This assessment will help establish a path towards Zero Waste for Piper Shores.	Piper Shores Sustainability Coordinator	By 2030



Regenerative site and landscape principles are aimed at restoring, renewing, and enhancing the natural environment, ecosystem services, and human well-being within a given site. These principles are based on the concept of regenerative design, which seeks to create systems that actively contribute to the health and vitality of their surroundings, rather than just mitigating harm. Key regenerative design principles include climate resilience, carbon sequestration ecosystem restoration, water management, water conservation, soil health, waste reduction, habitat creation, and education.

Piper Shores is located on approximately 200 acres of waterfront property with extensive green spaces, gardens, walking paths and other landscape features. In the management of these spaces, it is important to create ecologically resilient and regenerative landscapes that incorporate the key principles listed above. Landscaping choices can directly impact soil health, biodiversity, and overall climate resilience.

Piper Shores has designated areas for community gardens and has cultivated a strong partnership with the Scarborough Land Trust, a crucial collaborator in steering landscaping choices in the broader community. Additionally, the Landscape, Trails and Invasive Species workgroup within Piper Shores is actively working to promote and adopt best practices for managing the site and landscape. Piper Shores is poised to advance its positive impact by embracing actions such as increasing the use of native or adaptive plants, evaluating no mow zones, and decreasing a reliance on petrochemical fertilizers and pesticides. Through these deliberate efforts, Piper Shores can strive to embody regenerative principles, ensuring a sustainable and thriving landscape for its residents and the surrounding ecosystem.

## Key Terms and Definitions

- **Native or Adaptive Plants:** Native plants are indigenous species that have evolved and occur naturally in a particular region, ecosystem, and habitat. Native plants often regenerate and recover naturally when conditions are favorable. Adaptive plants are plants that have naturally evolved and adapt well to specific environmental conditions of a particular region or climate.
- **Dark Sky Compliant Light Fixtures:** A fixture that is fully shielded and emits no light above the horizontal plane
- **Biodiversity:** Biodiversity in plantings involves the presence of different plant species, as well as variations within those species. Promoting biodiversity in plantings is essential for creating sustainable and resilient ecosystems.
- **Carbon sequestration:** The process of capturing and storing CO<sub>2</sub> from the atmosphere in various natural or artificial reservoirs to prevent its accumulation in the atmosphere. It can occur naturally in processes like photosynthesis and absorption by oceans and soil.
- **Climate Resilience:** Landscapes that are designed and managed in a way that allows them to withstand and adapt to climate-related challenges, ensuring their durability, functionality and sustainability in the face of changing climate patterns.



## SITE & LANDSCAPE - BEST PRACTICES

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
1	<b>Create and implement a Sustainable Site Maintenance Plan</b>	Document that outlines strategies, practices and guidelines for ongoing care and management of a site in an environmentally responsible and resource-efficient manner. The establishment of this plan is already underway (six to nine month project). Consider annual reduction targets for no mow areas on-site.	Third-party consultant or Piper Shores Sustainability Coordinator	Start in 2023
2	<b>Track and monitor fossil fuel consumption of lawn care vehicles and equipment</b>	Collect equipment usage information from landscape contractors. This includes equipment type, run-time hours, fossil fuel consumption, etc. Begin tracking and monitoring to establish a 2024 benchmarking baseline.	Piper Shores Sustainability Coordinator	Start in 2025
3	<b>New plantings to be native or adaptive</b>	Native plants help maintain biodiversity and promote ecosystem health. Committing to substantially increasing new plants as native/ adaptive and drought-tolerant has benefits such as reduced water usage and maintenance, pollinator support, and climate resilience.	Landscape Contractor	Start in 2025
4	<b>Expand requirements for landscape contractors</b>	Establish a policy for landscape contractors that eliminates the use petrochemical fertilizers and pesticides, requires reporting on site maintenance equipment run-time hours, requires the use of electric lawn care vehicles/ equipment when feasible, and accreditation as a Sustainable Landcare or Organic Landcare Professionals (or approved equivalent), etc.	Piper Shores Leadership Team	By 2028



## SITE & LANDSCAPE - BEST PRACTICES

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
5	<b>Phased approach to replacing exterior light fixtures with dark sky compliant fixtures</b>	Replacement to occur for high priority fixtures with significant light pollution and other fixtures at end of life. Target 100% replacement of exterior light fixtures as dark sky compliant by 2040.	Piper Shores Leadership Team	Pilot by 2028, 100% by 2040
6	<b>Trainings and Course offerings to residents</b>	Provide grant opportunities or funding to residents interested in taking sustainable landscape courses at the <a href="#">Coastal Maine Botanical Gardens</a> .	Piper Shores Leadership Team	By 2030
7	<b>Participate in the Homegrown National Park System*</b>	This is a grassroots call-to-action initiative with the goal of regenerating biodiversity and ecosystem function by planting native plants and creating new ecological networks. The goal is to provide new HABITAT by planting native plants and removing invasives. There are partnership and education opportunities associated with the affiliation.	Piper Shores Sustainability Collaborative	TBD

\*<https://homegrownnationalpark.org/>



## PROJECT SPOTLIGHT

Piper shores has taken action to implement sustainable site practices over the past several years. Some measures include:

- Community garden space
- Lawn cutting levels raised to 3"
- Minimize use of pesticides that pollute and cause collateral insect damage







Food production, including livestock farming, deforestation, and food transportation, is a major greenhouse gas emissions source. Choosing sustainably sourced, plant-based diets significantly reduces the carbon footprint compared to animal-based diets. Plant-based diets require less land, water, and energy, offering relief to natural resources and contributing to a more sustainable food system.

Expanding local, organic, plant-based offerings at Piper Shores demonstrates a commitment to a reduced carbon footprint. Prioritizing local sourcing reduces transportation emissions and supports nearby farmers. The shift to plant-based diets aligns with Piper Shores' sustainability goals for carbon neutrality and complements organic farming, aiding climate change mitigation. The Food Committee at Piper Shores has spent countless hours advocating and promoting plant-based options and sustainable dining practices within the community.

For service-providing organizations like Piper Shores, responsible food sourcing, waste reduction, and promoting eco-friendly food choices are vital. By procuring local, sustainably-sourced food and adopting plant-based options, Piper Shores can significantly lessen the environmental impact. Additionally, integrating education on sustainable dietary choices and partnering with local food banks for surplus food donation further supports waste reduction and community well-being.

## Key Terms and Definitions

- **Plant-Based:** A food or a diet consisting largely or solely of vegetables, grains, legumes, nuts, seeds or other foods derived from plants, rather than animal products.
- **Local:** Food sourced from New England and the Hudson Valley.
- **Sustainably Sourced:** Food that is produced using practices that minimize environmental impact and promote social responsibility.
- **CoolFood Pledge:** The Coolfood Pledge helps an organization commit to and achieve a science-based target to reduce the climate impact of the food. Members are guided through a three-step approach: Pledge, Plan, and Promote. Pledge members confidentially report food purchase amounts by weight each year. Coolfood will determine the climate impact of food using the Coolfood Calculator. Additionally, they provide a Playbook to guide operational changes to encourage diners to choose more sustainable plant-rich options.
- **Meatless Monday:** Global movement and campaign that encourages people to refrain from consuming meat on Mondays and instead choose plant-based meals. The aim is to raise awareness about the benefits of reducing meat consumption for personal health and the environment.



## FOOD - BEST PRACTICES

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
1	<b>Create an annual reporting baseline of current food purchases, practices and service offerings to identify areas for improvement</b>	Meet with key stakeholders and review invoices, menus, recipes, and other relevant documentation to establish baseline metrics for tracking improvements (i.e. % local, % WMBE, % organic, % plant-based, etc).	TBD	Start in 2025
2	<b>Expand the plant-based menu and track quantity of plant-based food options</b>	Reduce purchase of red and processed meats. Offer a variety of plant-based menu options that emphasize fruits, vegetables, legumes and whole grains, and promote these options on the menu. Track quantity of plant-based meal offerings to monitor progress annually.	Piper Shores Leadership Team	Start in 2025
3	<b>Provide additional community garden space for residents</b>	With a growing campus, additional community garden space will benefit residents and expand knowledge about sustainable agriculture practices.	Piper Shores Leadership Team	By end of 2026
4	<b>Expand local food sourcing through partnerships with local farms or food producers</b>	Evaluate "farm-to-campus" partnerships with a local farmer(s) to source fresh, locally grown produce for dining services and/or resident purchases. This could be paired with weekly farmer's market on-site to increase access to fresh, locally grown foods.	Piper Shores Leadership team	By 2030



## FOOD - BEST PRACTICES

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
5	<b>Expand trainings and educational offerings for staff and residents</b>	Food education materials include cooking demonstrations, nutritional signage and ingredient lists, sustainable food guides, tasting events, and online webinars about health, nutrition and environmental impact of food decisions.	Piper Shores Sustainability Collaborative (w/ the Sustainability Coordinator)	Ongoing
6	<b>Align with partner organizations working to reduce climate impact of food service</b>	There are many organizations doing important work related to food and climate impact. Align with an organization(s) that can provide support, tools, guidance and accountability. One example is the <a href="#">Coolfood Pledge</a> . See Terms and Definitions section for more details.	Piper Shores Leadership team	2030+
7	<b>Pursue a third-party certification for sustainable dining practices</b>	Third-party certifications for sustainable dining, such a <a href="#">Green Restaurant Certification</a> , provide credibility, accountability and transparency. There are benefits from a leadership and marketing perspective.	Third-party consultant	2030+

# EDUCATION & AWARENESS

Climate education and awareness is a unifying force, bringing the Piper Shores community together with a shared purpose. It has created a sense of collective responsibility and has fostered collaboration among different groups and initiatives.

Through climate education, Piper Shores is cultivating leaders and innovators within its community. The Sustainability Interest Group (SIG) exists to educate Piper Shores residents about sustainability topics. Education initiatives such as speaker programs, a soon-to-be movie series, and an extensive communications program (which includes the use of resident apps and the establishment of a google group) help reach the over 80 members.

Climate education is an ongoing process to adapt to evolving environmental challenges. Piper Shores can keep its community updated on emerging sustainability trends, climate science, and best practices. This adaptability ensures that Piper Shores remains at the forefront of sustainable practices and addresses demands of an ever-changing world.

## Key Terms and Definitions

- **Corporate Social Responsibility (CSR):** Corporate Social Responsibility (CSR) refers to the ethical and responsible business practices and initiatives undertaken by corporations and organizations to positively impact society and the environment beyond their primary goal of generating profit. CSR encompasses a wide range of activities and commitments aimed at addressing various social, environmental, and ethical issues.
- **Environmental Justice:** Environmental Justice focuses on addressing the unequal distribution of environmental benefits and burdens, particularly among marginalized and disadvantaged communities
- **Green Grant Programs:** A program that offers grants to individuals or groups looking to undertake projects that promote sustainability, conservation, environmental education, climate action, or other green initiatives. The objective is to incentivize and accelerate efforts towards a more sustainable future by providing financial assistance to those striving to make positive environmental impacts. This could be a resident program for Piper Shores to incentivize action within individual residences and households.



## EDUCATION & AWARENESS - BEST PRACTICES

Proposed Next Steps (in order of priority)		Description	Responsible Party	Timeline
1	<b>Collaborate with Senior Stewards Acting for the Environment (SSAFE)</b>	SSAFE is an organization working to mitigate climate change through advocacy, education, implementation and partnerships. Partner with SSAFE to expand their reach, beyond Kendal.	Piper Shores Sustainability Collaborative	By end of 2024
2	<b>Continue sustainability-focused events for residents</b>	Continue implementing a regular cadence of events. Topics to include Earth Week, EV Awareness, Zero Waste, Climate Cafes, Cooking demonstrations & tastings, and more.	Piper Shores Sustainability Collaborative	Ongoing
3	<b>Expand partnerships with local organizations</b>	Local partnerships enable positive impact beyond Piper Shores' facilities. Camp Ketcha, within walking distance, offers Farmer Fridays, Golf Tournament teams, and Mentoring/ Tutoring programs. This is just one example. Consider pop-up shops for local organizations like GoGo Refill, Portland Gear Hub, and others.	Piper Shores Sustainability Collaborative	By 2030
4	<b>Implement a Resident Green Grant Program to reward action in individual residents</b>	Provide annual grants to residents to fund carbon reduction measures and sustainability initiatives within their own residences. Criteria to be developed and distributed. Celebrate successes.	Piper Shores Sustainability Coordinator	By 2030

# APPENDIX A

## HVAC Optimization Strategies Spreadsheet



**APPENDIX A:**  
**Piper Shores HVAC Optimization Strategies**

HVAC - Energy Efficiency Strategy	Description	Recommended Timeline	Location	Responsible Party	Estimated Funding Requirement
<b>Short-Term Recommendations (&lt;1-2 years)</b>					
<b>General Items - Short Term (&lt;1-2 years)</b>					
Utilize the carbon footprinting tool to track propane and electricity use on an annual basis.	TT recommends annual carbon footprinting for Piper Shores, to be completed by the Piper Shores Working Group. A tool and guidance will be provided by TT to support the carbon footprinting effort. The projections from CES can be used as the baseline for tracking energy improvements. The short-term recommendations will likely result in energy performance improvements, therefore should be accounted for in the first year of carbon footprint accounting. As a result, TT recommends using the 2023 fiscal year as the first year of carbon footprint tracking. CES projections and Drake Cottage utility data can be collected/used.		All Facilities	Piper Shores Sustainability Working Group (SWG)	
Review trend data regularly	<p>Implementing a regular review and cross-check of trend data from the HVAC equipment can help maintain optimal system performance, energy efficiency, comfort and overall building operation. Trend data provides insights into how HVAC systems are performing over time. Reviewing data regularly can help detect anomalies, deviations and declining performance in the systems. It will allow Piper Shores to take corrective action if any of these are detected.</p> <p>The trend data from the BAS should be capable of providing specific information about electricity use, pump energy consumption, DHW consumption, etc. Data about cooling, lighting and appliances can likely be extrapolated from the BAS system based on calculations and assumptions for heating and cooling degree days. Implementing an ongoing measurement &amp; verification (M&amp;V) scope would help the Piper Shores team gather the data needed to support ongoing monitoring. There is also a potential that this information could feed into a visual dashboard system to supply real-time performance data to building occupants (water, energy etc)</p>	<1 year	Oceanside and Meadows	Piper Shores HVAC Technician with potential M&V scope from third-party. TT could support if needed.	<p>N/A</p> <p>If additional meters are desired beyond the BAS, these could range between \$500-\$2,000 per meter depending on the desired capabilities.</p> <p>M&amp;V scope, if desired, could be an additional cost to help the HVAC technician gather data and monitor energy performance.</p>
<b>Optimize Boiler Efficiencies - Short Term (&lt;1-2 years)</b>					
Reduce boiler use during the summer months	Currently the boilers are running in summer at 30% of the peak winter load. This is high, especially with domestic hot water (DHW) needs being served by a separate loop. TT recommends further exploration by Piper Shores HVAC technician to determine the boiler usage during summer months. Ideally the boilers would not be running during the summer to save on operational expenses.	<1 year	Oceanside	Piper Shores HVAC Technician	N/A
Adjust control settings on the boilers to increase the Delta T to at least 40F.	<p>Delta T is the difference between supply and return water temperatures in a hydronic heating system. The boiler temperatures are currently operating at a Delta T of 20F and lower. The supply water temperature is 180F with a return temperature of 160F. The boiler will operate at condensing temperatures at 140F return or lower. This will improve the boiler efficiency. If the Delta T is increased so that the return temperatures are set between 110-140F, then heat can be extracted from flue gases. This adjustment should result in a 10-15% efficiency improvement since the current systems are most likely operating at just over 80% efficiency.</p> <p>In regards to victaulic fittings, we believe maximum pressure should not be affected and therefore the victaulic fittings impacted. If P.S. staff is concerned about the fittings, TT recommends the victaulic fitting company be contacted directly to confirm this adjustment. (Typical rating for victaulic fittings are 750 PSI)</p>	<1 year	Oceanside	Piper Shores HVAC Technician	N/A
Adjust domestic hot water setting from 135F to 120F	Water heaters continuously maintain the set temperatures, so reducing the temperature reduces the amount of energy needed to continuously maintain the water temperature. Most people will not notice a change in comfort with a set point of 120F since it is still comfortably warm. Given the extent of domestic hot water (DHW) use in the building, this change should result in greater efficiency and reduced operating costs.	<1 year	Oceanside	Piper Shores HVAC Technician	N/A
Provide retractable pool cover	Retractable pool covers help maintain water temperature by preventing heat loss through evaporation. They can serve as insulation, presenting heat from leaving the pool in cooler months and reducing the load on the heating system. This translates to increased energy savings and lower operating costs.	<1 year	Oceanside	Piper Shores facilities staff	~\$5,000 - \$10,000 for cover depending on the desired features. This does not include labor and installation.

Optimize Chiller Efficiencies - Short Term (<1-2 years)					
Adjust control settings on the chillers to increase the Delta T to 10F	Delta T is the difference between supply and return water temperatures in a chilled water system. Currently the chillers are running at 4F or below. The higher the Delta T, the better the chiller performance from a stability and efficiency standpoint. The temperature differential allows the chiller to operate more effectively because the heat exchange process becomes more effective. The chiller can extract more heat from the building's cooling load, reducing the energy required to achieve the desired cooling effect. Increasing the Delta T also leads to better temperature control and stability within the system.	<1 year	Oceanside	Piper Shores HVAC Technician	N/A
Provide outdoor air temperature reset controls	Implementing outdoor air based reset controls for modulating both chiller supply temperature and boiler supply temperature. The reset controls can modulate output based on the outdoor air temperature to match the cooling or heating load more closely to the building's actual needs. This modulation can prevent overcooling, over heating, reduce energy use during periods of lower demand, and stabilize indoor temperatures without experiencing excessive fluctuations. The condensers will operate at optimal efficiency levels, therefore reducing energy consumption. Once installed, the sequence of operation will happen automatically.	1-2 years	Oceanside	Piper Shores HVAC Technician	Cost for chiller reset controls for two large chillers - TBD
Optimize Distribution Systems - Short Term (<1-2 years)					
Schedule temperature setbacks for the non-regularly occupied spaces.	The building automation system (BAS) can be utilized to schedule temperature setbacks and reduce heating/cooling needs in the non-regularly occupied spaces when not in use. These setbacks can happen through adjustments in the BAS. To determine the optimal thermal comfort range, the Sustainability Workshop Group could implement a survey to Piper Shores residents to collect feedback on desired setback temperatures.  As an alternative to the BAS scheduling adjustment (and potential survey), smart thermostats are an option. These thermostats learn from typical occupancy and user preferences, and communicate with the system to adjust temperatures automatically.	1-2 years	Oceanside	Piper Shores HVAC Technician and Sustainability Working Group	N/A  Smart thermostats - \$250-400 per thermostat. This does not include labor.
Turn off radiant slab and rely on air system for the Great Room.	The radiant slab in the Great Room is currently covered by carpeting. The radiant slab circulates warm water through pipes embedded in the concrete slab to heat the space. The carpeting acts as insulation, preventing efficient heat transfer and delaying the heat response time. Both radiant heat and forced hot air are serving the Great Room. As a result, we recommend turning off the radiant slab system to reduce energy consumption and the inefficiencies of heat transfer with carpet in this space.	<1 year	Oceanside.	Piper Shores HVAC Technician	N/A
Duct sealing - Aero barrier	Aero barrier is technology and process used to increase air tightness of building envelopes and commercial ductwork. After a controlled pressure differential is created, silicone particles are sprayed via a carefully monitored application to improve the performance of ductwork by sealing gaps, cracks and holes. Typical installation will include an air sealing test before and after application, to help demonstrate the improved performance. Aero barrier will continue to run until desired air tightness target is achieved.  TT recommends utilizing Aero barrier before performing air balancing and commissioning of the HVAC systems. This will ensure that all ducts are operating properly before commissioning tests are performed, allowing the team to focus on problems associated with fans, motors, equipment etc. (and not ductwork inefficiencies)	<1-2 years	Oceanside	<a href="https://aeroseal.com/commercial/">https://aeroseal.com/commercial/</a> <a href="https://www.youtube.com/watch?v=heLz6BR_uYw&amp;feature=youtu.be">https://www.youtube.com/watch?v=heLz6BR_uYw&amp;feature=youtu.be</a>	Aero barrier installer will need to be contacted for quote. (~\$1.0-\$2.0 per square foot or higher)  Aero barrier applications for envelope air tightness are typically \$3/SF
Air balance all HVAC systems and relocate thermostats accordingly.	Air balancing ensures that conditioned air is distributed appropriately to all areas of the building, which prevents over-conditioning in some zones and under-conditioning in others. Unbalanced systems can lead to energy waste, inefficient operation and uncomfortable occupants. For example, RTU (rooftop unit) 11 is providing room neutral temps throughout the year, which is likely causing comfort issues. We recommend air balancing of all the rooftop units (RTUs) to help eliminate temperature variations between different rooms and areas and providing more consistent and comfortable indoor conditions. As noted above, TT recommends air balancing after duct sealing strategies are performed.	<1-2 years	Oceanside	Third-party retro-commissioning company. TT can provide recommendations if needed.	Building systems commissioning is typically \$1.5-2 per SF. If commissioning agent (CxA) only focuses on the HVAC system, ignoring lighting and electrical systems, this service will be less expensive. (Potentially ~\$0.5-1.5/SF)



Mid-Term Recommendations (2-5 years)					
Chiller heat exchanger to pre-heat the DHW and pool	Heat recovery from chillers condenser side involves utilizing the waste heat generated during the cooling process to provide useful heat elsewhere, maximizing energy efficiency of the chiller system and reducing demand for additional energy sources to provide heat. The pool and domestic hot water (DHW) system at Piper Shores have consistent loads throughout the year, therefore are good candidates for the waste heat. Heat exchangers can be installed to capture waste heat from the chillers to pre-heat the DHW boilers.	2-5 years	Oceanside	Mechanical contractor to visit site and generate a cost estimate	Material costs will likely include control valves, heat exchangers and additional pipers, plus labor costs.
Drain water heat recovery system for the stacked bathrooms	Drain water heat recovery systems capture and repurpose the heat from wastewater - typically from sinks, showers and other domestic sources. This captured heat is used to preheat cold water entering the hot water fixtures, reducing the energy needed to heat water. Typical systems can result in a ~25-35% energy savings. The installation and type of system will depend on the piping locations. TT has experience using Power Pipe on other residential projects. Horizontal and vertical installations are feasible with horizontal options often being more efficient.	2-5 years	All Facilities	Plumbing contractor to visit site and generate a cost estimate.	Payback is ~2-7 years (Roughly \$2,000 per stack, without labor)  There could be incentives, rebates or tax credits available - TT to cross-check.
Geothermal feasibility study	Third-party to visit the site. Options to do cursory assessment of geological conditions prior to a test bore based on the consultant's recommendation. Micro geological conditions could impact feasibility and therefore this might be preferred/recommended.	2-5 years	Oceanside	Third-party consultant can perform assessment and test bore. TT has worked with Tim Roos, geothermal expert in the Northern New England with WellSpring Geothermal.	Cursory level review could be \$10-15,000. Test bore could be \$40,000, but depends on the company.
Heat recovery for water source heat pumps in Wayland during the cooling season	Heat recovery from water source heat pumps (WSHPs) involves utilizing the waste heat generated during the cooling process to provide useful heat elsewhere, maximizing the energy efficiency of the cooling system and reducing demand for additional energy sources to provide heat. Before water moves from the WSHPs to the cooling tower, the heat can be captured via heat exchangers (locally, within the Wayland mechanical room). This captured waste heat can serve the DHW boilers in Wayland rather than getting dumped by the Cooling Tower. The current DHW boilers for Wayland are operating on propane, therefore this strategy could help to partially electrify the DHW needs (at least in the summertime).	2-5 years	Oceanside - Wayland	Plumbing contractor to visit site and generate a cost estimate	Material costs will likely include control valves, heat exchangers and additional pipers, plus labor costs.
Replace commercial clothes dryers with heat pump clothes dryers	Oceanside - Recommend energy star certified products. Heat pump dryers are typically twice as efficient as gas dryers.	End of life (~2-10 year+ range)	All Facilities.	Piper Shores Facilities staff	Cost for commercial units could range from \$5,000-\$10,000+ depending on the desired model.  Residential units are typically in the \$1,500-\$2,500 range.  There could be incentives, rebates or tax credits available.
Replace propane hot water heaters with Hybrid Heat pump hot water heaters.	Hybrid heat pump water heaters are significantly more energy-efficient compared to traditional electric or gas water heaters by utilizing the ambient air as a heat source and requiring less energy to raise the temperature of the water. TT recommends replacing all water heaters with hybrid heat pump water heaters at the end of their life. No heat pump water heaters have been observed on-site - Oceanside, Drake and Meadows. Given the extent of hot water generated for Piper Shores, this change could have a big impact on energy consumption. DHW heaters serving Oceanside, Wayland, Drake and Meadows. Recommend replacing throughout the facility.	End of life (~2-10 year+ range)	All Facilities	Plumbing contractor	Commercial scale hybrid heat pumps can be in the ~\$10,000 range, depending on the system. This does not include labor.  Residential units are in the \$2,000 to \$3,500 range. Residential payback is typical 3-5 years. This does not include labor.  There could be incentives, rebates or tax credits available.
Long-Term Recommendations (>5 years)					
Geothermal system (i.e. ground source heat pump system) for the campus central equipment	Switching to a geothermal system (from a propane-fired boiler system) would allow Piper Shores to achieve its Fossil Fuel free targets. Geothermal is a highly energy efficient heating and cooling system that utilizes the relatively constant temperature of the earth to provide energy-efficient climate control for buildings. TT is seeing many campuses shift over to geothermal to help achieve carbon neutrality and fossil fuel free goals. This would be a longer term strategy for Piper Shores after a feasibility assessment (with test bores) is performed. Distribution system can remain the same. Cooling towers to remain for heat balancing the ground temperatures.	10-20 years	All facilities	Geothermal contractor - Costs from geothermal assessment noted above	TBD

Explore battery back up system in lieu of current fossil fuel based generator.	Battery backup aligns with fossil-fuel free and carbon neutrality goals. These systems will store excess energy during periods of low demand or high renewable energy production. They are paired well with on-site renewable energy production, if desired for Piper Shores in the future. There will be a payback, but further investigation will be needed. Increased resiliency for the campus.	10-20 years	All Facilities - In close proximity to future renewable energy systems	Electrical contractor	~\$100-\$500,000 range depending on desires. There could be incentives, rebates or tax credits available.
Replace FCUs with CERV2 or similar packaged units that provide heating, cooling, ventilation and heat recovery.	The fan coil units (FCUs) in Joselyn/Kirkwood and Drake Cottages are served by propane. To align with carbon neutrality goals, the all electric CERV-2 systems (conditioned energy recovery ventilators) or equivalent, are recommended as a replacement. These systems can contribute to improved comfort, energy efficiency and overall health and well-being because each unit provides energy recovery, heating and cooling, dehumidification and humidification. The current FCUs only provide heating and cooling to the spaces.	End of system life or during Drake Cottage renovations	Joselyn, Kirkwood and Drake Cottages	Mechanical contractor to visit site and generate a cost estimate	~\$5,000-6,000 per unit for the systems and control. This does not include labor.
Provide heat pump based AHUs with heat recovery.	Some of the air handling units (AHUs) are heat pump units and others are not. TT recommends transitioning to all heat pump based AHUs for greater energy efficiency. Heat pump AHUs are capable of both heating and cooling air.	End of system life	Oceanside	Mechanical contractor to visit site and generate a cost estimate	Each unit could be ~ \$50,000-\$100,000. Mechanical contractor would need to provide quote.
Transition air distribution to VAV system.	Variable air volume (VAV) systems adjust air supply based on actual cooling and heating needs of different zones in the building, resulting in reduced energy consumption as compared to constant volume (CV) systems which maintain a constant airflow regardless of demand. Each area can be maintained at its desired comfort level and as a demand-based ventilation system, fresh air is provided only where and when it's necessary which saves energy, maintains indoor air quality and often leads to higher occupant satisfaction.  To convert the CV system to VAV, VAV boxes and dampers would need to be installed in the ductwork of each zone. Additional air handling adjustments, fans, controls and sensors would need to be provided as well. This conversion requires a larger amount of effort and therefore has been noted as long-term strategy.	As AHUs are getting replaced, these changes could occur. Likely both as phased installations.  5-10+ years	Oceanside	Mechanical contractor to visit site and generate a cost estimate	Costs would include new VAV terminal boxes, variable speed drives, controls, sensors, etc. Mechanical contractor would need to provide quote.
Visual dashboard system to display real-time energy and water usage	A dashboard system provides real-time data for energy and water consumption in the building. Utilizing a dashboard system for Oceanside could be a great way to increase awareness, accountability, energy efficiency and cost savings in the building. The consumption data is visually engaging and can often lead to behavioral changes that promote conservation. Additionally, the residents could be more likely to adopt energy-efficiency habits, fostering a sense of collective responsibility within the Piper Shores community. TT has seen dashboards utilized on many of higher education projects to provide greater awareness and transparency among the building visitors and residents. Sometimes there are friendly competitions implemented to encourage greater energy and water conservation strategies.	5-10 years	Oceanside	Dashboard vendor. TT can provide recommendations if desired.	The costs could include hardware installation, software licensing, customization, ongoing support, etc. TT recommends getting quotes from multiple vendors. It could range be in the \$30,000-\$50,000 range depending on desires for the system. See additional information under BAS/Trend Data description above. Advanced metering might not be needed if display can pull directly from the BAS.

# APPENDIX B

## Discovery Phase Report





# **Thornton Tomasetti**

## **PIPER SHORES SUSTAINABILITY CONSULTING**

### **DISCOVERY PHASE ASSESSMENT REPORT**

MAY 19, 2023

PREPARED BY

**THORNTON TOMASETTI**

14 York Street, Suite 201  
Portland, ME 04101

PREPARED FOR

**PIPER SHORES**

15 Piper Road  
Scarborough, ME 04074

**TABLE OF CONTENTS**

OVERVIEW .....5

FOCUS ON ENERGY AND WATER.....7

ENERGY BENCHMARKING.....8

DRAKE COTTAGES..... 10

OCEANSIDE ..... 14

    CENTRAL BOILER/CHILLER PLANT ..... 15

    JOSELYN & KIRKWOOD..... 16

    CHECKLY AND CAMMOCK..... 17

    WAYLAND ..... 18

    HOLBROOK ..... 19

    AUXILIARY BUILDINGS.....20

THE MEADOWS.....21

NEXT STEPS .....22

## OVERVIEW

Thornton Tomasetti (TT) is a global engineering firm committed to establishing itself as a sustainable, diverse and enduring organization while also driving change and innovation within the building industry worldwide. The Portland Maine office serves as the central hub for TT's Sustainability Practice. Piper Shores has engaged the services of TT to oversee the development of a comprehensive Sustainability Plan specifically tailored to the Piper Shores campus. This collaborative effort spans six months and consists of three distinct phases -the Discovery Phase (2 months), Development Phase (3 months) and Socialize Phase (1 month).



During the initial Discovery Phase, TT has been working closely with Piper Shores staff and the dedicated Sustainability Working Group (SWG) to gather essential documents and data. These include building drawings, utility records, waste tickets, MEP design details and other key deliverables pertaining to the SWG's ongoing sustainability initiatives.

It is worth noting that the SWG's efforts have resulted in successful implementation of various sustainability measures at Piper Shores thus far. Some notable accomplishments include:

1. Monthly gatherings of the Sustainability Interest Groups.
2. Facilitation of an Open Forum, engaging residents to establish sustainability goals and priorities on-campus.
3. Development of a Sustainability Strategic Plan, integrating sustainability as a crucial component of Piper Shores' identity and marketing strategy.
4. Replacement of incandescent light bulbs with energy-efficient LEDs.
5. Installation of six electric vehicle charging stations.
6. Implementation of composting and recycling programs.
7. Upgrades to more efficient HVAC systems
8. Adoption of green cleaning protocols.
9. Investigation into solar power purchase agreement (PPA) to offset electrical consumption with cleaner renewable energy.

This Discovery Phase report serves as an initial step towards formulating a comprehensive Sustainability Plan tailored to Piper Shores. It includes a concise summary of TT's on-site visit and evaluation of the documents received from the Piper Shores team. This report is the first step to create a Sustainability Plan. It captures the current conditions and outcomes observed during the site walk through, providing high-level recommendations to stimulate further discussions during the subsequent Development Phase.

The primary focus for this report revolves around energy and water systems. Notably, resource conservation, reduction of greenhouse gas emissions, and exploration of alternative energy sources emerged as the highest priorities during the Open Forum Discussion with Piper Shores residents (facilitated by the SWG). TT aligns with these priorities and believes that optimizing energy and water systems will be instrumental in achieving Piper Shores' ambitious goal of carbon neutrality. For more information about this topic, refer to page 7.

Throughout the Discovery Phase, TT has found inspiration in the dedication of Piper Shores residents who strive to create a more sustainable future for generations to come. We eagerly anticipate the next phase of this process, where TT will delve into more specific targets and objectives for the Sustainability Plan. For further information about subsequent steps, please refer to the conclusion of this report summarizing next steps.

## FOCUS ON ENERGY AND WATER

Critical Care Retirement Communities such as Piper Shores consume substantial amounts of energy and water, leading to significant impacts on annual operating expenses. These impacts arise primarily from factors such as the building size, residential occupancy, round-the-clock healthcare services, and various recreational amenities like pools, spas, and fitness centers. By reducing energy and water consumption, not only can the adverse environmental effects associated with climate change be mitigated, but also Piper Shores can lower its operational expenses and allocate financial resources more effectively.

Considering Piper Shores' objective of achieving carbon neutrality by 2050 and the residents' keen interest in energy conservation, alternative energy sources, and electric vehicles (as derived during the Open Forum), Thornton Tomasetti prioritized energy and water conservation measures during their on-site visit.

Some of the primary concerns faced by CCRCs include:

- 1. Heating, ventilation and air conditioning (HVAC):** Residential comfort and indoor environmental conditions are very important for CCRCs with independent and assisted living facilities. Given the factors listed above, HVAC systems can consume a significant amount of energy. TT focused their assessment on the proper usage, maintenance schedule, on-going commissioning and energy efficiency upgrades (with focus on transition to electrical sources at the end of life) for the HVAC systems.
- 2. Domestic Hot Water:** The production of hot water significantly impacts the energy use and utility bills for Piper Shores. This includes residential water use, process water from dining and medical facilities, laundry facilities and water needs for the pool/spa. Implementing water-saving fixtures and appliances can help drive down usage, while upgrading water heating systems can increase efficiency and reduce operational costs.
- 3. Building Envelope:** The performance of the building envelope plays a critical role in energy efficiency and occupant comfort. The building envelope refers to the walls, roof, windows, doors, and foundation and forms the primary thermal barrier between the interior and exterior environments. For buildings in colder climates like Maine, air tightness and durability is important to reducing the amount of energy needed to heat and cool a building. Energy savings from reduced utility bills can often offset the initial investments in envelope upgrades and air sealing.
- 4. Internal Loads:** Internal loads impact mechanical systems sizing and efficiency. This refers to heat gain, cooling load, and electrical load generated by appliances, lighting, occupant usage and other building equipment. By reducing these loads, the demand on the mechanical system can be lowered and energy efficiency can be improved. Additionally by reducing internal loads, excessive cooling can be minimized ensuring a more comfortable environment for residents.

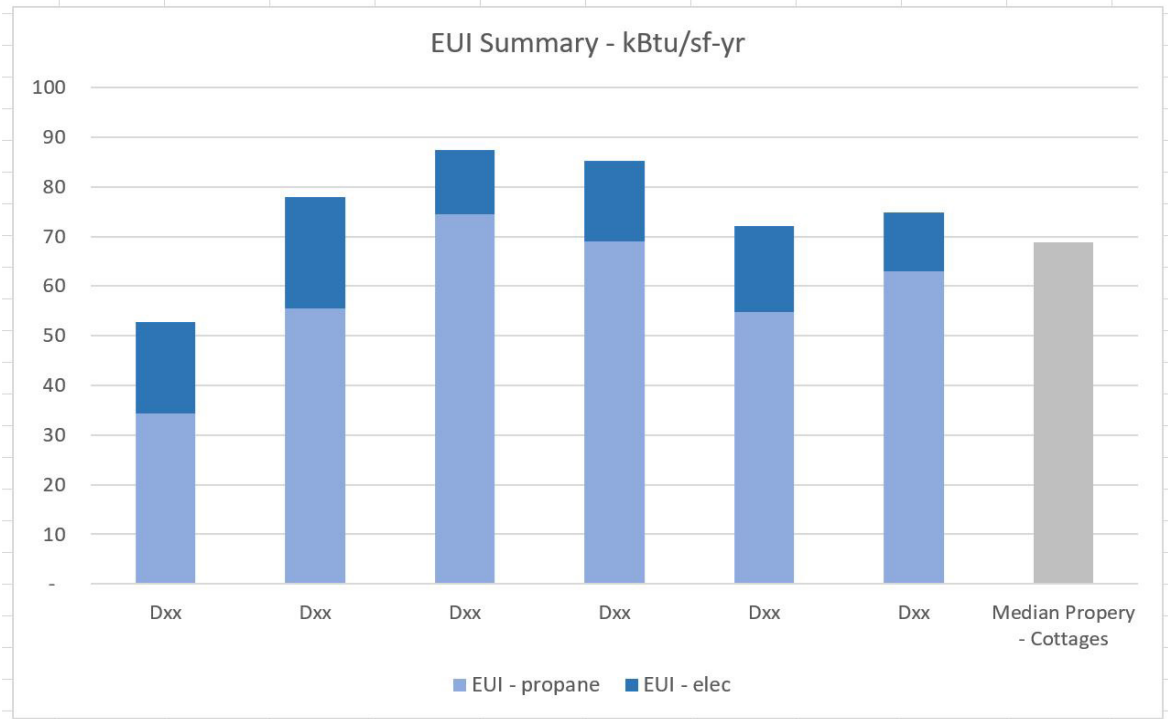


# ENERGY BENCHMARKING

TT initiated the Discovery Phase by conducting an evaluation of utility records pertaining to Piper Shores, encompassing both Drake Lane Cottages and the Oceanside building. The Sustainability Working Group (SWG) gathered a year's worth of utility bills from 2022 for a representative sample of Drake Lane Cottages. Additionally, projected energy costs for the Oceanside building were derived from an assessment conducted by Competitive Energy Services (CES).

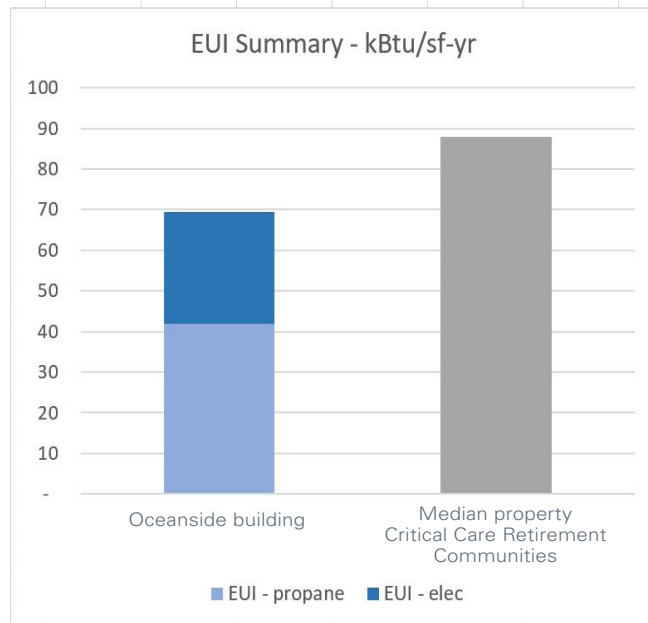
This benchmarking exercise uses Energy Use Intensity, or EUI, as the metric to measure and compare the energy efficiency of buildings. It is expressed as energy consumption per unit (i.e. kBtu/sf/year) over a specified time period. It is a standardized way to compare energy performance across similar buildings to identify outliers and assess relative efficiency of Piper Shores' buildings.

## DRAKE COTTAGES



This chart summarizes the Energy Use Intensity (EUI) from six different cottages on Drake Lane as compared to a median property from Energy Star Target Finder (i.e. regional multi-family residences). The EUI of Drake Cottages varies between 53 and 87 depending on resident usage patterns and set points. The best performing and worst performing cottages were visited as part of the site visit to collect resident usage information and investigate building system efficiencies. Please note that identification has been hidden for privacy purposes.

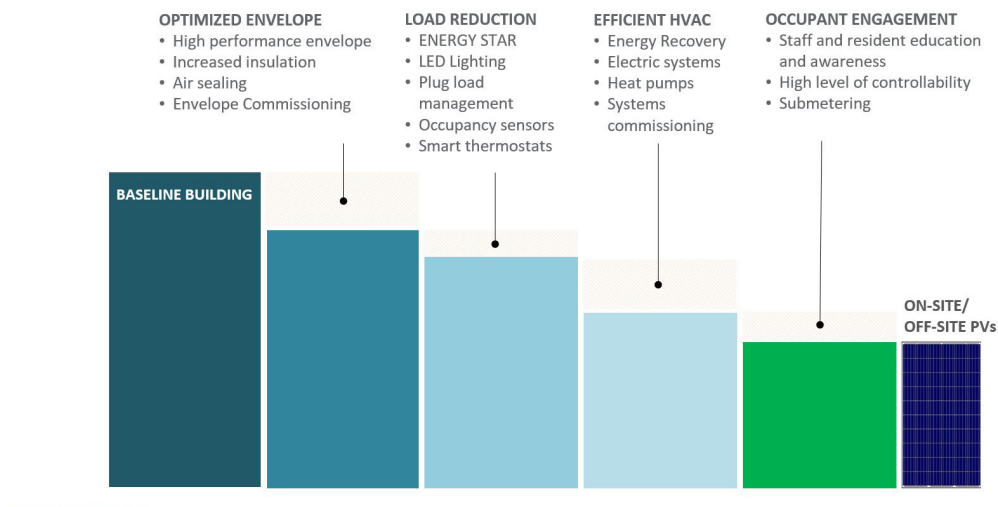
## OCEANSIDE BENCHMARKING



This chart summarizes the Energy Use Intensity (EUI) of Oceanside (69) as compared to Energy Star's median property (88). The Energy Star Target Finder baseline utilizes data from retirement communities in the same climate zone that include both assisted living and independent living facilities, similar to Piper Shores.

Regarding next steps, TT will collaborate with the Piper Shores SWG during the Plan Development Phase to establish Energy Use Intensity (EUI) targets for Drake Cottages and Oceanside. A key priority will involve minimizing the reliance on propane and transitioning towards electric systems that can be powered by sustainable and renewable sources such as solar and geothermal energy. Propane, a finite non-renewable fossil fuel, emits carbon dioxide (CO<sub>2</sub>) and other greenhouse gases when combusted and exhibits pricing variability and unpredictability. The Sustainability Plan will concentrate on reducing propane consumption at Piper Shores

See below for a typical path to decarbonization in buildings. TT will utilize these principles to support preliminary recommendations in this assessment.



## DRAKE COTTAGES

Thornton Tomasetti (TT) visited the following cottages during their on-site visit: D1, D2, D8, D14 and D34. These cottages were prioritized for the following reasons:

1. One of the cottages was the worst performing from an energy standpoint based on 2022 utility data, and one of the cottages was the best performing. TT wanted to investigate differences in construction, operation and occupancy of these two residences.
2. One of the cottages was typical occupancy with typical performance.
3. One of the cottages was recently vacated and at the early stages of demolition.
4. One of the cottages was finalizing upgrades and close to completion.

The majority of Drake Cottages have been renovated, which typically occurs at the time of resident turnover. There are still a few original cottages requiring renovation, making them the most desirable candidates for implementing additional efficiency upgrades following the completion of the Sustainability Plan process.

To summarize TT's review and assessment of the Drake Lane cottages, see below for a table documenting the current conditions and preliminary recommendations. Please note that more detailed recommendations with timeline and estimated payback will be provided as part of the Sustainability Plan deliverable in September.



### DRAKE COTTAGES - SUMMARY

BUILDING COMPONENTS	CURRENT CONDITIONS	PRELIMINARY RECOMMENDATIONS
<b>HVAC SYSTEMS</b>	<ul style="list-style-type: none"> <li>• Direct heat furnaces in attic supplied by propane. Set points range from 62F to 74F during heating months</li> <li>• Gas fireplaces in living room, sometimes used as a heating source</li> <li>• Dx Cooling serving air handling units (AHUs) in attic</li> <li>• Manual dampers allow fresh air intake into AHU</li> <li>• Bathrooms and kitchen hoods have direct exhaust fans</li> </ul>	<ul style="list-style-type: none"> <li>• Add airflow deflectors to diffusers in all units to increase air distribution efficiency</li> <li>• Incorporate energy recovery ventilation (ERV) to increase efficiency by preconditioning the incoming outdoor ventilation air</li> <li>• Consider replacing the air handling units (AHUs) with an electric system (like CERV2 or equivalent) that provides energy recovery, heating and cooling, dehumidification and humidification</li> </ul>

## DRAKE COTTAGES (CONTINUED)

BUILDING COMPONENTS	CURRENT CONDITIONS	PRELIMINARY RECOMMENDATIONS
<b>DOMESTIC HOT WATER</b>	<ul style="list-style-type: none"> <li>On-demand Rinnai propane water heaters with hot water booster pump under kitchen sink</li> <li>Showerheads: 2.0 - 2.5 gpm</li> <li>Kitchen faucets: 1.5 - 2.0 gpm</li> <li>Lavatories: 1.0 - 1.5 gpm</li> </ul>	<ul style="list-style-type: none"> <li>Replace propane water heaters with electric heat pump water heaters. (Efficiency Maine incentives available)</li> <li>Pilot WaterSense labeled fixtures                             <ul style="list-style-type: none"> <li>Showerheads: 1.5 gpm</li> <li>Kitchen faucets: 1.0 gpm</li> <li>Lavatories: 0.5 (0.35) gpm</li> </ul> </li> </ul>
<b>BUILDING ENVELOPE</b>	<ul style="list-style-type: none"> <li>Wall insulation: 4" batt</li> <li>Roof Insulation: 6-8" batt topped w/varying levels of cellulose</li> <li>Floor: Slab on-grade (insulation unknown)</li> <li>Basement: 10" batt between basement &amp; 1st floor with 1.5-2" XPS in rim joists</li> <li>Windows: Double-pane IGU (windows do not get upgraded at time of renovation)</li> </ul>	<ul style="list-style-type: none"> <li>Implement energy audits during cottage renovations (blower door &amp; infrared imaging)</li> <li>Perform targeted air sealing</li> <li>Provide additional attic insulation (R-49+)</li> <li>Upgrade window and doors to improve efficiency at their end-of-life (pair with exterior siding replacement when possible)</li> <li>Provide additional venting/insulation in mudroom to prevent kitchenette pipes from freezing</li> </ul>
<b>INTERNAL LOADS</b>	<ul style="list-style-type: none"> <li>Kitchen Appliances: Frigidaire Gallery series (ENERGY STAR)</li> <li>Lighting: 98% of incandescent lights have been replaced with LEDs</li> <li>Windows and skylights have operability to allow for natural ventilation when desired</li> </ul>	<ul style="list-style-type: none"> <li>Consider smart thermostats that adjusts heating/cooling based on a household's patterns.</li> <li>Choose ENERGY STAR appliances whenever feasible</li> </ul>
<b>OTHER (OCCUPANT HEALTH)</b>	<ul style="list-style-type: none"> <li>Significant amount of moisture observed in bathroom sheathing (D8 unit)</li> <li>Materials palette includes LVT and other products with chemicals of concern</li> </ul>	<ul style="list-style-type: none"> <li>Consider probing sheathing condition in other units to verify if this moisture condition exists elsewhere</li> <li>Pilot healthier baseline products to be free of PFAS and Red List chemicals</li> </ul>

## DRAKE COTTAGES (CONTINUED)

In regard to resident health and well-being, the selection of interior finishes can have a dramatic effect on the indoor air quality of a space. As a result, Thornton Tomasetti reviewed the baseline finishes for Drake Cottages and summarized preliminary review comments relative to material health, transparency and proposed alternatives. See below for more information.

### REVIEW OF BASELINE MATERIALS LIST

PRODUCT CATEGORY	PRODUCT MANUFACTURER / NAME	REVIEW COMMENTS	PROPOSED ALTERNATIVES
<b>Carpet</b>	Standard Berber	Shaw is one of the few carpet manufacturers with a viable take back program and offers products with CRI Green Label Plus. Carpet backing is the main driver for material health.	<ul style="list-style-type: none"> <li>Shaw (Ecoworx Tile Backing with Solution Q, Ecosolution Q or Solution Q Extreme Fiber)</li> <li>Interface (Carpet Tile with CQuestBio or CQuest Biox backing)</li> </ul>
<b>Luxury Vinyl Tile</b>	Mannington Adura Max	The main ingredient is PVC which is on the Red List. Recommend avoiding PVC for environmental and human health concerns	<ul style="list-style-type: none"> <li>Parador Modular One</li> <li>Forbo Marmoleum</li> <li>Tarkett LinoFloor</li> <li>Shaw/Patcraft Biobased PU Resilient Flooring</li> </ul>
<b>Paint</b>	Benjamin Moore	Good manufacturer. Low or no VOC paint when possible	
<b>Cabinets</b>	Showplace Maple Wood - Pendleton	Pendleton does not appear to have FSC wood or material with health/chemical disclosure	<ul style="list-style-type: none"> <li>Crystal Cabinet Works</li> <li>Bradco Kitchen</li> </ul>
<b>Hardware</b>	Amerock	Amerock does not have sustainability information on their website	<ul style="list-style-type: none"> <li>Allegion</li> <li>PBA</li> <li>Schaub</li> </ul>
<b>Counter tops</b>	Daltile	Daltile brand stoneware slabs have a Red List Free Declare label. Good product	

## DRAKE COTTAGES (CONTINUED)

### COTTAGE RESIDENT FEEDBACK/OBSERVATIONS:

- Some residents are using the fireplace in the winter as heat source
- Hot water delivery can be slow and noticeable to residents
- Some residents are interested in further reducing their utility costs
- Room partitions are being used to reduce extent of conditioned area in the winter and reduce utility bills
- Issues with pipes freezing in the mudroom – residents are being requested to leave cabinet doors open during cold months.



*Additional attic insulation recommended*



*HVAC system in the attic (propane system)*



*Moisture noticed in bathroom sheathing and insulation*



*Mudroom faucet susceptible to pipes freezing*

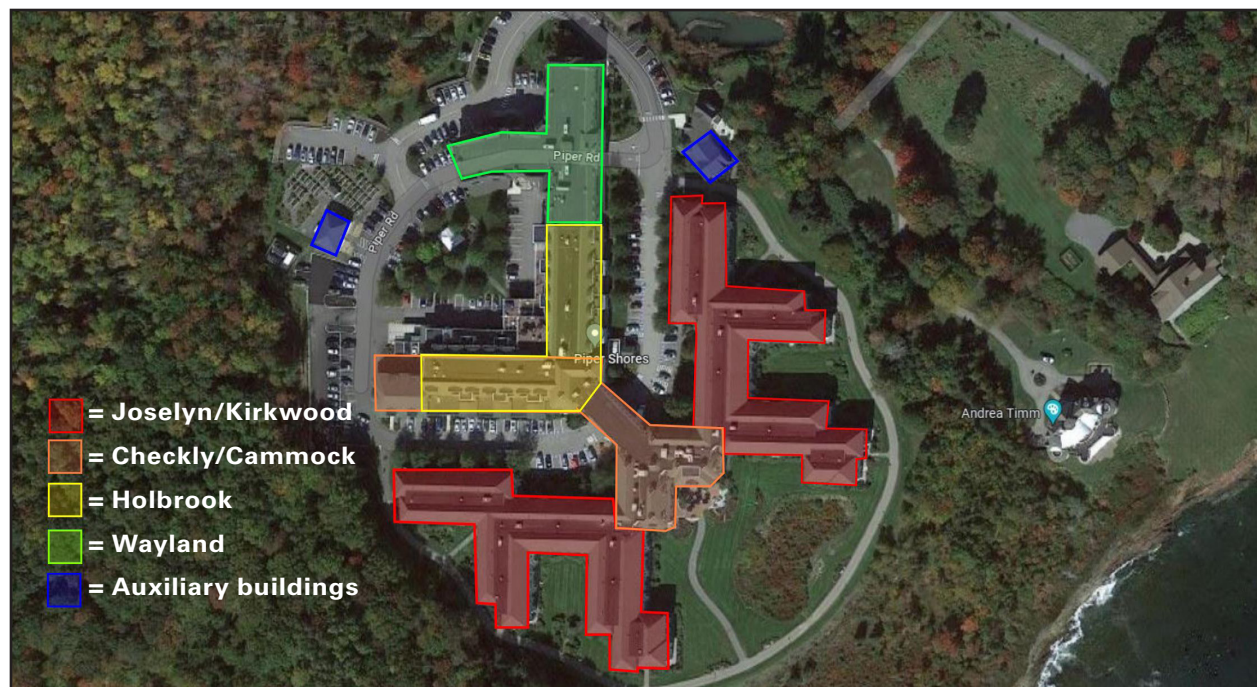


*Rinnai on-demand hot water heater (propane system)*

## OCEANSIDE

The Oceanside building is comprised of several facilities with varying program and HVAC needs. For purposes of this assessment, we will be grouping the Oceanside building into the following categories:

- 1. Joselyn and Kirkwood:** These two wings are home to the independent living apartments at Piper Shores. These apartments include sixteen different styles with studios, one-bedroom units and two-bedroom units with dens.
- 2. Checkly and Cammock** - Checkly and Cammock represent the common spaces. They include the Main Lobby, Great Room, Founders Room, Cafe, Offices/Mail Room, and Multi-media Room. Cammock includes the Fitness Center, Pool, Spa, Hair Salon, Massage Therapy, and Laundry Room.
- 3. Holbrook Healthcare Center:** This wing is home to assisted living units. These units are private one-bedroom apartments. Amenity spaces include kitchens, dining rooms, common rooms and other multi-purpose spaces. 24-hour skilled nursing is provided to these spaces.
- 4. Wayland:** This wing is a new addition to the Holbrook Healthcare Center and home to the private memory care units. Amenity spaces include kitchens, dining rooms, common rooms and other multi-purpose spaces. 24-hour skilled nursing is provided to these spaces.
- 5. Auxiliary Buildings:** Two auxiliary buildings are located on the oceanside campus, the Wood Shop and Art Center. These building are stand-alone amenity buildings for Piper Shores residents.



## CENTRAL BOILER/CHILLER PLANT

The central boiler and chiller plant provides heating, cooling and domestic hot water to the facilities within the Oceanside building to varying degrees. Consequently, we developed a dedicated table focusing on the central boiler/ chiller plant, outlining both the present conditions and preliminary recommendations. Further deliberation and assessment will be conducted once TT receives trending data from the HVAC technician at Piper Shores. *(Update: trending data received 5/18 and will be reviewed in the next phase)*

For the HVAC systems pertaining to specific facilities within Oceanside, namely Joselyn/Kirkwood, Checkly/Cammock, Holbrook, and Wayland, we have compiled comprehensive summaries in separate tables presented in the subsequent sections.

BUILDING COMPONENTS	CURRENT CONDITIONS	PRELIMINARY RECOMMENDATIONS
<b>HVAC SYSTEM</b>	<ul style="list-style-type: none"> <li>• Four Cleaver Brooks condensing boilers, approximately 10 years old, are located in the MEP room. Each boiler has 2,500 MBH max capacity and a minimum turn down ratio of 28%</li> <li>• Boilers are supplied by Liquid Propane, and maintained in the fall</li> <li>• Boilers are running @ 180F supply Water Temp. 89.5% Efficiency. 200% Redundancy</li> <li>• Boilers have reset capabilities but are not being used</li> <li>• Boilers must run year around at a min of 150F due to vitalic fittings (fittings leak if temperature gets below 150F)</li> <li>• HVAC team has not yet tried trimming temperature back, but would be willing to try in the summer months</li> <li>• Air cooled chillers located adjacent to the wood shop provide chilled water to the Fan Coil Units</li> <li>• Chillers are turned off in October and back on in April. Typically one chiller operates at a time. One of the chillers is much louder and therefore does not get used as frequently.</li> </ul>	<ul style="list-style-type: none"> <li>• Explore opportunities to reduce Hot Water (HW) temp to ~160F during in lieu of 180F (in a way that works with the vitalic fittings). This allows the system to run more efficiently</li> <li>• Reduce HW supply reset based on outside air. (Pending trend data review)</li> <li>• Explore battery backup options in lieu of propane generators. IRA has 30% tax credits</li> <li>• Commission a study for geothermal campus system at the end-of-life for condensing boilers</li> <li>• Review trend data to optimize strategies. This includes:               <ul style="list-style-type: none"> <li>• Boiler output capacity</li> <li>• Ventilation rates from the AHU</li> <li>• Hot water supply and return temperatures and flow rates</li> </ul> </li> </ul>
<b>HOT WATER</b>	<ul style="list-style-type: none"> <li>• Domestic HW is provided by high efficiency condensing boilers (in boiler room) served by propane.</li> </ul>	<ul style="list-style-type: none"> <li>• Consider hybrid heat pump hot waters that recover heat from the water source heat pumps in the cooling season</li> </ul>



## JOSELYN & KIRKWOOD

BUILDING COMPONENTS	CURRENT CONDITIONS	PRELIMINARY RECOMMENDATIONS
<b>HVAC SYSTEM</b>	<ul style="list-style-type: none"> <li>Utilizes central boiler plant for hot water (HW). <i>See central plant recommendations.</i></li> <li>HW baseboard heating controlled by thermostat in each unit.</li> <li>Fan coil unit (FCU) with chilled water coils only and recirculating air. FCUs are at their end of life (~20 years old and need to be replaced soon)</li> <li>No direct outside air (OA) into the apartment units</li> <li>Bathroom exhaust draws fresh air from corridor via door undercut. Exhaust fans are currently being replaced.</li> </ul>	<ul style="list-style-type: none"> <li>Add heat recovery for ventilation art (i.e. CERV2 smart ventilation system or exhaust air to central energy recovery ventilation (ERV))</li> <li>Consider replacing FCUs with electric system (i.e. CERV2 or equivalent) that provides energy recovery, heating, cooling, dehumidification and humidification</li> </ul>
<b>HOT WATER</b>	<ul style="list-style-type: none"> <li>Domestic hot water from the central plant. <i>See central plant recommendations.</i></li> <li>Showerheads: 2.0 - 2.5 gpm</li> <li>Kitchen faucets: 1.5 - 2.0 gpm</li> <li>Lavatories: 1.0 - 1.5 gpm</li> </ul>	<ul style="list-style-type: none"> <li>Pilot WaterSense labeled fixtures               <ul style="list-style-type: none"> <li>Showerheads: 1.5 gpm</li> <li>Kitchen faucets: 1.0 gpm</li> <li>Lavatories: 0.5 (0.35) gpm</li> </ul> </li> </ul>
<b>BUILDING ENVELOPE</b>	<ul style="list-style-type: none"> <li>Roof replacement was recently completed</li> <li>Windows: Low-e IGU that meet state energy code requirements</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade sealant and caulking for doors and windows for air sealing and elimination of cold drafts</li> </ul>
<b>INTERNAL LOADS</b>	<ul style="list-style-type: none"> <li>Lighting: LED fixtures (98% replacement for entire facility)</li> </ul>	<ul style="list-style-type: none"> <li>All new appliances to be ENERGY STAR certified</li> </ul>

### RESIDENT FEEDBACK/OBSERVATIONS:

- Winter drafts flow through medicine cabinets in the following units: J213, J225, J320, K219, K319, K321, and K322. It occurs when there is a ventilation vent in the same wall as the cabinet
- Residents are experiencing air flow through electrical vents, first floor exterior doors, and gaps at bottom of apartment doors to the halls.

## CHECKLY AND CAMMOCK

BUILDING COMPONENTS	CURRENT CONDITIONS	PRELIMINARY RECOMMENDATIONS
<b>HVAC SYSTEM</b>	<ul style="list-style-type: none"> <li>Constant air volume units provide heating and cooling.</li> <li>Reheat coils downstream of air handling units (AHUs) served by the condensing boilers</li> <li>One AHU is serving all three levels so it tends to be cooler on the upper level.</li> <li>Hot water is being provided from the central plant. <i>See central plant recommendations.</i></li> <li>Fitness area is served by four-pipe fan coil unit + mini split back up.</li> <li>Great room is served by radiant slab heating with carpeting</li> </ul>	<ul style="list-style-type: none"> <li>Air balance the AHUs and hire a third-party commissioning agent to test them.</li> <li>Commission and pressure test ductwork to assess for any plugged ducts and determine if air sealing ductwork would be beneficial. Utilize Aeroseal to seal ductwork if needed.</li> <li>Evaluate heat recovery ventilation air handling unit (AHU) as alternative system option</li> <li>Transition to variable air volume (VAV) system or chilled beams at the end of unit life (i.e. constant air volume units)</li> <li>Explore heat pump clothes dryers for laundry room.</li> <li>Replace Trane AHUs (gas heating) with heat pump units (electric heating) at the end of useful life</li> <li>Consider removing carpet from spaces with radiant heating (i.e. Great room and others) to increase radiant system efficiency and provide greater comfort</li> </ul>
<b>HOT WATER</b>	<ul style="list-style-type: none"> <li>Domestic hot water from the central plant. <i>See central plant recommendations.</i></li> </ul>	<ul style="list-style-type: none"> <li>Review sealants and caulking for doors and windows to ensure appropriate air sealing and eliminate cold drafts.</li> </ul>
<b>BUILDING ENVELOPE</b>	<ul style="list-style-type: none"> <li>Roof replacement was recently completed</li> <li>Existing windows are being replaced with low-e double pane IGU that meet IECC 2021 requirements</li> </ul>	
<b>POOL SYSTEM</b>	<ul style="list-style-type: none"> <li>Dedicated pool humidification system</li> <li>Space is maintained at 91F and 50-55 relative humidity (RH). Pool temp is 84F</li> <li>Pool pak replacement units are being evaluated</li> </ul>	<ul style="list-style-type: none"> <li>TT to review and assess pool pak replacement options</li> <li>Add pool cover to help maintain water temperature and reduce dehumidification</li> </ul>

## WAYLAND

BUILDING COMPONENTS	CURRENT CONDITIONS	PRELIMINARY RECOMMENDATIONS
<b>HVAC SYSTEM</b>	<ul style="list-style-type: none"> <li>Water source heat pumps (WSHP) connected to tempered loop served by two condensing boilers and one cooling tower</li> <li>Dedicated outside air system (DOAS) w/heat recovery ventilation</li> </ul>	<ul style="list-style-type: none"> <li>Long term: Geothermal wells could temper the loop at the end of life for the boilers. Cooling towers to stay to help balance</li> <li>Consider relocation of thermostat and air balancing to mitigate the issue of cool air getting dumped into residence</li> <li>TT to review trend data on hot water pump usage and chilled water in/out temps to WSHP. Trend data received 5/18 - review to occur in next phase</li> </ul>
<b>HOT WATER</b>	<ul style="list-style-type: none"> <li>Domestic hot water (DHW) is provided by high efficiency condensing boilers, served by propane</li> </ul>	<ul style="list-style-type: none"> <li>Consider hybrid heat pump hot waters that recover heat from the water source heat pumps in the cooling season</li> <li>Pilot WaterSense labeled fixtures               <ul style="list-style-type: none"> <li>Showerheads: 1.5 gpm</li> <li>Kitchen faucets: 1.0 gpm</li> <li>Lavatories: 0.5 (0.35) gpm</li> </ul> </li> </ul>
<b>BUILDING ENVELOPE</b>	<ul style="list-style-type: none"> <li>Windows: Low-e IGU that meet state energy code requirements</li> </ul>	<ul style="list-style-type: none"> <li>Review sealants and caulking for doors and windows to ensure appropriate air sealing and eliminate cold drafts, as needed</li> </ul>

### RESIDENT FEEDBACK/OBSERVATIONS:

- When one residential unit requests heat, cold air is dumped into other residences that are not asking for heat given the current HVAC design. This can lead to thermal comfort complaints.

# HOLBROOK

BUILDING COMPONENTS	CURRENT CONDITIONS	PRELIMINARY RECOMMENDATIONS
<b>HVAC SYSTEM</b>	<ul style="list-style-type: none"> <li>Hot water baseboards and radiant flooring serve as primary heating with hot water from the condensing boilers in the Boiler/Chiller plant.</li> <li>Dx cooling on the roof provides the chilled water</li> <li>Daikin heat pump energy recovery unit serves the healthcare and common spaces.</li> <li>No make up air for the kitchen</li> </ul>	<ul style="list-style-type: none"> <li><i>See central plant recommendations.</i></li> </ul>
<b>HOT WATER</b>	<ul style="list-style-type: none"> <li>Domestic hot water from the central plant. <i>See central plant recommendations.</i></li> </ul>	
<b>BUILDING ENVELOPE</b>	<ul style="list-style-type: none"> <li>Roof replacement was recently completed</li> <li>Existing windows are being replaced with low-e double pane IGU that meet IECC 2021 requirements</li> </ul>	<ul style="list-style-type: none"> <li>Review sealants and caulking for doors and windows to ensure appropriate air sealing and eliminate cold drafts</li> </ul>

## AUXILIARY BUILDINGS

BUILDING COMPONENTS	CURRENT CONDITIONS	PRELIMINARY RECOMMENDATIONS
<b>WOOD SHOP</b>	<ul style="list-style-type: none"> <li>• Forced air system - propane fired furnace</li> <li>• No cooling - operable windows for natural ventilation</li> <li>• Fresh air intake provided</li> <li>• Small water heat</li> <li>• Dust collection system and several woodworking tools</li> </ul>	<ul style="list-style-type: none"> <li>• Expansion is planned for the near future. Consider radiant floor heating for the expansion</li> </ul>
<b>ART CENTER</b>	<ul style="list-style-type: none"> <li>• Radiant slab heating</li> <li>• Cooling provided by Dx unit</li> <li>• Fresh air and cooling provided by the duct system</li> <li>• Boiler has reset based on the outside air (OA) temperature</li> <li>• Continuous insulation provided in the walls. (Thickness is unclear)</li> </ul>	<ul style="list-style-type: none"> <li>• Review set points/ set backs and occupancy schedule. This will help identify potential efficiencies. Further discussion in next phase</li> </ul>

## THE MEADOWS

As part of the on-site visit, TT toured the Meadows. The Meadows is a new independent living development across Rt 77 from Oceanside. It includes Apartment Homes, Cottage Homes and Estate Homes. This new development is currently under construction and anticipated to be complete in June 2023. Based on our review, there are no immediate needs to address from an energy efficiency standpoint. **However, we would like to find out if the rooftops are being designed and constructed in a way that will allow future rooftop solar PV installations.**

The Cottages and Estates are utilizing all electric systems with high performance windows and wall assemblies. The apartments are utilizing propane for heating and hot water, which could be studied as part of a longer-term phase out plan. See below for a brief summary of the systems:

- **Homes and Estates:** Heating and cooling provided by multi-zone air handler (AHU) served by air source heat pumps (electric). Propane fireplace in each unit. Windows are high-performance IGUs by Andersen with a U-factor of 0.29 and SHGC of 0.37 and Tviz of 64% for a typical window size. Outdoor air provided through the AHUs.
- **Apartments:** Three condensing boilers provide hot water for the baseboards and gas fired water heaters provide HW for the apartment complex. Cooling is provided by multi zone air handling units served by air source heat pumps via a ducted system. Outdoor air is provided through the AHUs. Windows same as above.



## NEXT STEPS

The goals for the Piper Shores Sustainability Plan are to reduce greenhouse gas emissions, avoid the impacts of inaction, reduce water use, minimize waste, adopt landscape and habitat stewardship best practices, and further strengthen/ improve resident engagement and management.

As we move into the Development Phase of this process, Thornton Tomasetti will be focused on the following actions:

1. Establish more specific targets for reducing energy consumption on an annual basis. Outline short-, mid- and long-term performance improvements with estimated paybacks to support Piper Shores' annual budget plan.
2. Evaluate current waste, purchasing, and land stewardship practices in greater detail to help the SWG develop specific targets with associated environmental and occupant health benefits.
3. Engage with residents and integrate them into the process as part of an interim presentation during the Development Phase.
4. Continue ongoing meetings with the SWG, expand topics and focus areas, and confirm desired outcomes for the Sustainability Plan and other key deliverables.

## THORNTON TOMASETTI TEAM



**AMANDA GARVEY**  
LEED AP BD+C, LFA  
Vice President



**VAMSHI GOOJE**  
LEED AP BD+C  
Associate Principal  
Building Analytics Lead



**MIKE PULASKI**  
LEED AP BD+C, LFA  
Vice President  
Portland Office Leader