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Hello,

Thank you for the opportunity to provide input to this important topic.

Maine-based Nyle Water Heating Systems LLC is America's only commercial heat pump water heater manufacturer with 40-year track record of exclusively producing commercial and industrial refrigeration systems. 100% made in America and certified to UL 1995, Nyle heat pumps range from 25MBH-2,000MBH in heating capacity and are being utilized to produce domestic hot water for buildings such as Student Housing, Apartment Complexes, Luxury Condos, Laundry Facilities, Military Bases, Commercial Kitchens and more. Nyle Water Heating System's products are sold through a network of Manufacturers Representatives that cover territories encompassing most of North America, Pacific Rim countries and the UK.

Parent company, Nyle Systems LLC has a 40-year history of producing commercial and industrial processing equipment with refrigeration systems at their core which results in industry leading performance, reliability, warranties and service plans. We take pride in producing best-in-class equipment including Air-Source and Water-Source heat pump water heaters at our state-of-the-art manufacturing facility in Brewer, Maine.

In order to meet the high demands of our clients, Nyle maintains a staff of engineers, support technicians and field-support crews who are highly experienced and have been working on Nyle equipment for decades. Our staff of mechanical, electrical and controls engineers are dedicated to selecting the most up-to-date equipment while leveraging time-proven methods to create the most efficient and cost-effective systems possible. Lean manufacturing methods and a continuous improvement approach allow Nyle to remain competitive producing in the US while offering our clients unique and innovative solutions that wins jobs and builds business over time. Nyle has a reputation for the relationships we build and the service that we provide to our clients, from design, install and commissioning support to maintenance and product development to meet ever-changing demands in the marketplace.

Potable water heating accounts for between 18% and 35% of a building's energy consumption (https://energy.mo.gov/sites/energy/files/technology-data-characterizing-water-heating-in-commercial-buildings_lbnl.pdf). Nyle Water Heating Systems are being utilized in a growing array of applications as many parts of the world are making efforts to reduce carbon emissions by transitioning to electric systems powered by renewable sources of energy.

In British Columbia, there are goals in place to ensure that all new buildings producing zero emissions before 2030 and for all of Vancouver to be 100 percent powered by renewable energy by 2050. Heat pump water heaters are a key component of the plan to achieving these goals. See "Green Building Market Forecast" (Direct link to the document).

In California, there is a statewide effort to decarbonize all buildings through elimination of fossil fuels and efficiency improvements. The Building Decarbonization Coalition has created "A Roadmap to Decarbonize California's Buildings."

Cities in these regions are also beginning to limit or exclude fossil fuels from new construction projects:

- Berkeley, CA – July 17, 2019 Ban on Natural Gas
- Menlo Park – August 28, 2019 Announcement
- San Luis Obispo – September 3, 2019 All Electric Announcement
- Estimates of 60 cities and towns taking similar measures - Article

Heat pump water heaters represent the only emission-free method for heating water with an efficiency greater than 100% (resistive electric elements are 100% efficient) and are identified in the reports above as a critical component for a successful transition to efficient, all-electric buildings powered by renewable energy.

Commercial and industrial scale heat pump water heating systems will commonly incorporate a significant amount of heated water storage. Not only does this provide the most cost-efficient solution for meeting the typical surge-load of potable water heating, it also results in more efficient operation of the heat pumps.

A heat pump plus storage system that is connected to the internet can be manipulated through a utility demand response program, allowing the heat pump plus storage system to become an important distributed energy resource for the utility. For instance, if a utility operator has excess capacity during the night when loads are low or during the day when solar electricity production is highest, heat pump water heaters can be commanded to operate, storing excess electricity as heated water up to 160F that is later consumed in the building for potable use. Similarly, an appropriate amount of heated water storage provides a buffer, allowing the utility to prevent heat pump water heaters from running during times of peak electricity demand without impacting the building occupants.

Such systems and control regimes provide benefits to all levels:

- Benefits to the utility
  - Increased year-around customer demand
  - Provides the ability to shift demand and flatten demand profiles
  - Delivers a repeatable, predictable demand
  - Broad-based applicability – Nearly every structure needs hot water
  - Can become a significant component of a distributed energy resource balance sheet
  - Provides a "sink" to absorb excess generation in targeted locations (overloaded feeders)
  - VFDs eliminate surge loads of large electrical motors
  - Equipment and technology are time-tested, proven and reliable
- Benefits to the rate payer
  - Reduced operating cost due to efficiency
  - Long life
  - Low maintenance
  - Reduced demand charges due to low-amperage draw
  - Smaller electrical service (compared to resistive electric)
  - Low-risk, proven technology
  - Tariff from utility for participating in demand response or distributed energy program
  - Clean air
- Benefits to the environment
  - Zero-emissions
  - Nyle heat pump water heaters use a very small amount of refrigerant. Nyle Water Heating Systems will utilize low GWP refrigerants as they become available.
  - Human society cannot generate our way to zero emissions. While great strides are being made in producing energy without consuming fossil fuels, energy is still required to build the machines and equipment that can produce that energy. It is important that we also strive to use less energy to meet our growing needs.
- Improves efficiency of the electricity grid
  - As demand is shifted from fossil fuels to the electricity grid, the capacity of the electricity grid will become limited to accepting more demand. Operating at a coefficient of performance of 2.5 or higher, heat pump water heaters provide potable hot water at a fraction of the load of resistive electric water heating allowing more buildings to utilize clean electricity while limiting the load on the electricity grid.
  - Providing the utility the ability to dispatch commercial heat pump water heaters connected to large volumes of heated water storage allows utility operators to make decisions on the load side that can optimize operational efficiency.
  - If additional electricity demand that is caused by electrification requires the addition of transmission lines, feeders or beefed up infrastructure, some of the gains of electrification can be offset. By installing a highly efficient, dispatchable system for potable water heating, utility investment can be optimized toward energy efficiency and demand normalization.

1. Identify barriers to beneficial electrification in the transportation and heating sectors of the State;
   a. Specific to water heating with heat pumps – Ambient temperatures below 25F present a challenge for today's air-source heat pump water heaters. Heat pumps that can raise

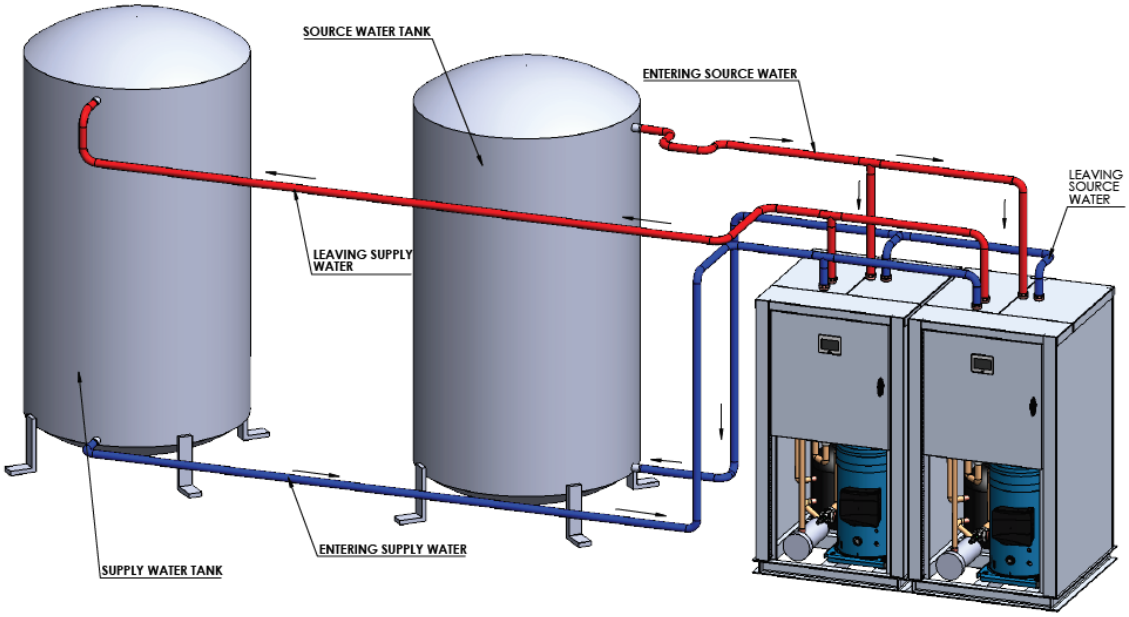
the temperature of water to 160F use a refrigerant that limits low-ambient performance. This can be overcome in several ways:

i. Locate air source heat pump water heaters indoors where they capture waste-heat from other mechanical systems.
ii. Utilize a hybrid heat pump that utilizes ambient air when the conditions allow and water when cold ambient conditions exist. Source heat from geothermal, VRF or boiler in cold conditions.
iii. Utilize water source heat pumps where possible in cold climates.
    1. Source heat from year-around cooling operations such as:
        a. Hospitals
        b. Breweries
        c. Bakeries
        d. Chilled/frozen food storage
        e. Industrial processes
        f. Manufacturing processes
        g. Seafood processing
        h. Fish farms
        i. Data centers
        j. Resorts
        k. Labs
        l. Indoor pools
    2. Geothermal
    3. Wastewater heat recovery – Every gallon of potable water that is heated goes down a drain. The average temperature of wastewater leaving a residential building has been found to average between 65F – 80F year around. There is enormous potential to capture heat from today's wastewater to heat tomorrow's water.

2. Identify additional information that the trust may require to make additional recommendations or analyses;
    a. Identify and understand products that are available today
    b. Understand various applications where heat pump water heaters will work and where they will not
    c. Identify proven system designs and configurations – Optimize for the largest set of target properties in Maine
    d. Improve state of awareness among consumers, engineers, building energy auditors and contractors
3. Consider potential roles of utilities in supporting beneficial electrification
    a. Creation of tariffs and incentives to overcome lack of awareness and early stage cost disparity common to new, efficient and/or renewable technologies.
    b. Engagement with private sector to design, pilot and roll-out distributed energy resources plans
    c. Support of legislative action to eliminate the use of fossil fuels over time
4. Identify areas or populations in the State less likely to benefit directly from beneficial electrification without additional policy development or utility intervention; and
    a. Electricity supply must be robust with a low likelihood of supply disruption.
5. Recommend opportunities for beneficial electrification
    a. See above.

Nyle Geyser C8 (8,000btu/hr) – Small Commercial / Residential, Retro-fit Heat Pump Water Heater


Nyle C540WM (540,000btu/hr) Heat Pump Water Heater Schematic



Nyle C810WM (810,000btu/hr) Heat Pump Water Heater Under Construction

Four Nyle C250A (250,000btu/hr) Heat Pump Water Heaters – UCSF - 590 and 600 Minnesota St., San Francisco, CA

4,400 Gallons of Heated Water Storage at UCSF, 590 Minnesota St, San Francisco, CA

Two Nyle C185W (185,000btu/hr) Heat Pump Water Heaters – Hawaiian Airlines, Honolulu, HI