



Chapter 3 - Facilities and buildings

Metro Parks Tacoma facilities include a variety of attractions, indoor and outdoor pools, multi-use buildings such as community centers, and office buildings. There's potential for improved efficiency in energy and water use, and waste reduction. Future construction projects should prioritize sustainability.



3.1 Electricity

Current Practices:

Over the last five years, MPT has spent an average of \$583,000 on electricity annually.

Some buildings, such as headquarters, use electricity for heating, ventilation and air conditioning (HVAC) systems, while many buildings and facilities are heated with natural gas.

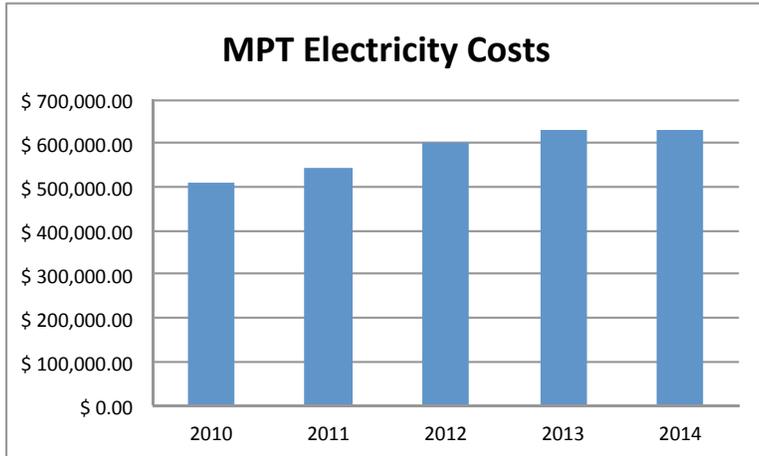


Figure 3.1. Metro Parks electricity expenses over the last five years.

Past efforts to reduce electricity use include multiple improvements resulting from the 2012 Johnson Controls project. Many buildings were retrofitted with more efficient lighting; 24 facilities got some kind of upgrade. A new HVAC system was installed in the headquarters building.

MPT also purchases more than 200,000 kilowatt hours (kWh) of green power annually in the form of Renewable Energy Certificates, also known as RECs, through Tacoma Public Utilities (TPU). The renewable power is wind energy generated in Washington and Oregon.

Overall electricity consumption has been inconsistent over the last ten years. It dropped in 2009 and 2010, but has increased more recently (see Figure 3.2).

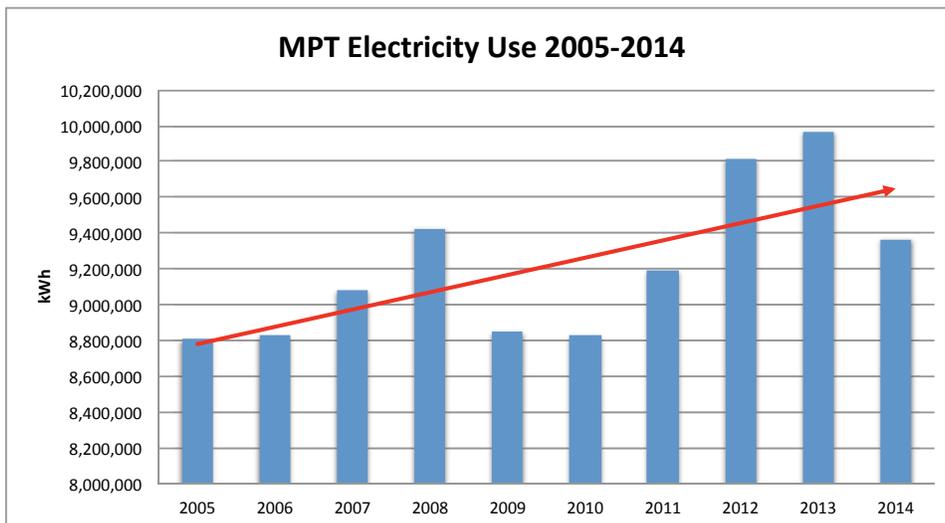


Figure 3.2. Total annual electricity use.

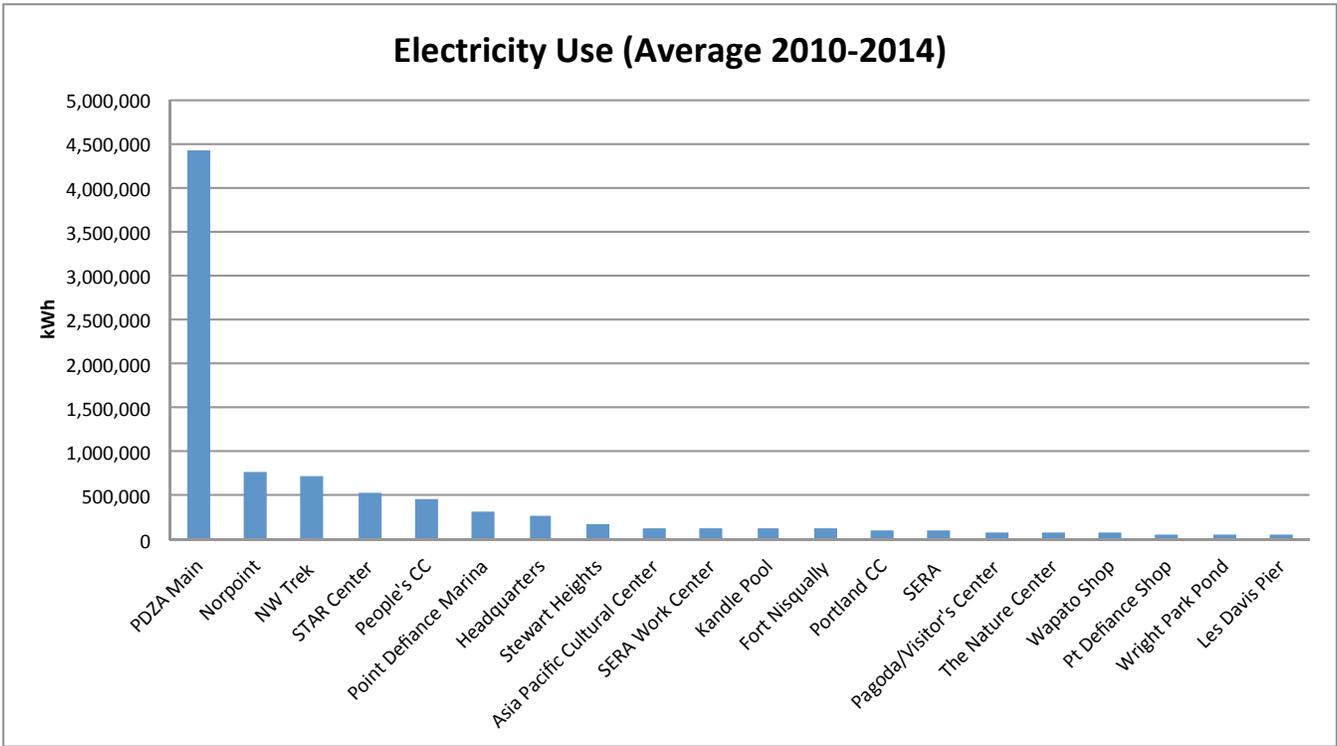


Figure 3.3. Electricity use by facility, average of years 2010-2014. This only includes facilities with an average usage of 50,000 kilowatt hours (kWh) or more. The amount shown for PDZA does not include the tally from separately metered maintenance buildings, which consume an additional average of 10,000 kWh annually.

As is clear from Figure 3.3, PDZA is the largest consumer of energy in the district, using nearly six times the electricity of the second largest consumer, The Center at Norpoint. However, by dividing electricity consumption by the facilities' area, we can see how much energy facilities are using independent of their size (see Figure 3.4). On a square foot basis, PDZA is not using significantly more than some others.

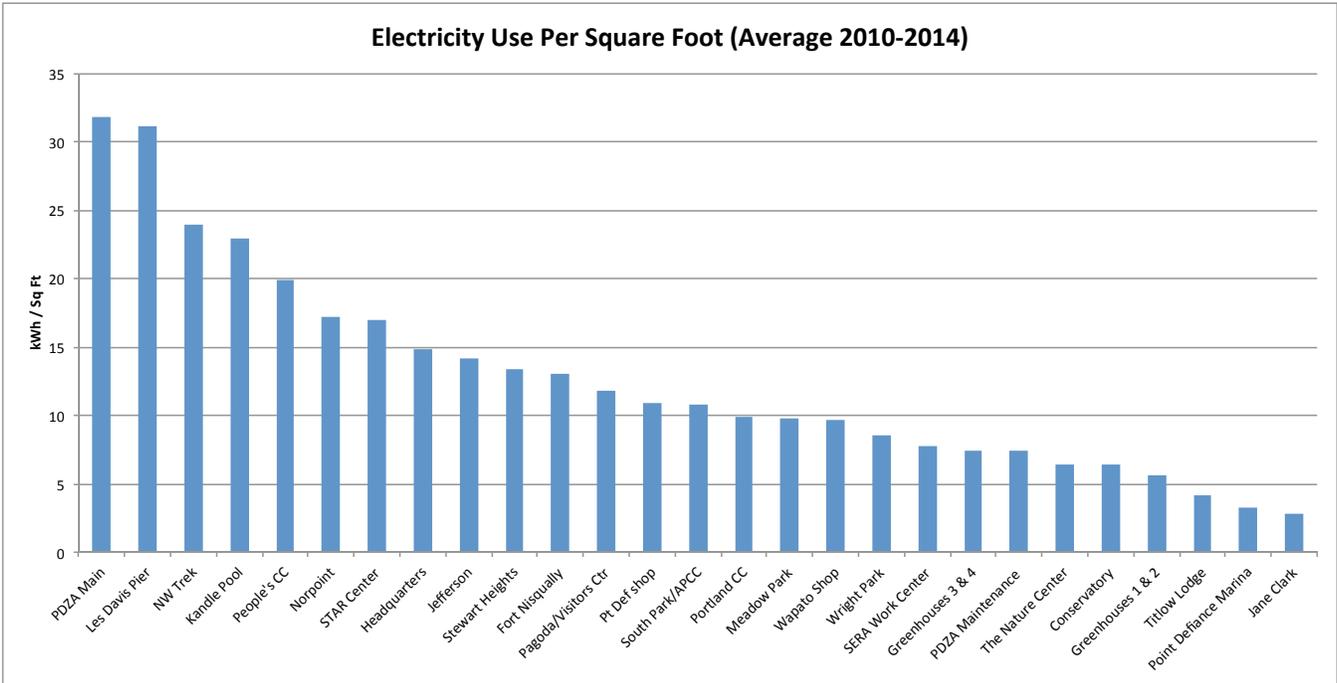


Figure 3.4. Average electricity per square foot.

Baseline: The baseline for electricity use is the average from 2010-2014: 9,821,101 kilowatt hours (kWh). The total square footage of conditioned space for that time period was approximately 539,393. So the baseline is 18.21 kWh per square foot.⁷

Targets: Reduce electricity consumption by 3 percent, by December 2018 to 17.66 kWh per square foot. Once this goal is met, this will result in approximate savings of \$17,490 per year.

Recommendations: Re-evaluate remaining projects that were recommended by Johnson Controls. Continue to replace older, inefficient lighting with LED lights. Retrofit needs include: MPT headquarters flag light, South Park path, McKinley Park, and Stewart Heights Pool. Encourage reduced use of appliance such as personal printers and personal heaters (see Chapter 1). Add room occupancy sensors where appropriate. Research the feasibility of lighting individual work spaces rather than one switch managing entire rooms. Adding more sensors and zone controls to the headquarters' computerized heating-control system would make it easier to limit the use of individual electric floor heaters.



TARGET AREAS FOR ELECTRICITY:

PDZA

The PDZA Sustainability Plan adopted in 2014 states the goal of reducing the zoo's electricity use by 40 percent by 2025, with shorter term goals of 10 percent, 15 percent and 25 percent in 2017, 2019, and 2021, respectively. The baseline for the goal is the average usage from 2005 through 2009, and the goals are calculated per square foot. The zoo's electricity use has declined significantly over the past ten years, partly from energy efficiency upgrades including major LED retrofitting across the campus (see Figure 3.5). It is difficult to determine exactly which areas use the most electricity because individual buildings lack meters; currently only the gift shop and café buildings are metered separately so the contracted tenants pay their portion of costs. The new Pacific Rim Aquarium and Environmental Education building will have their own meters.

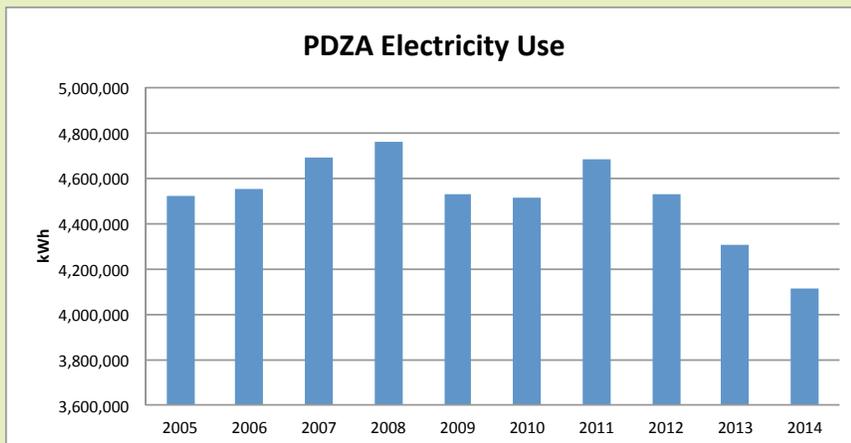


Figure 3.5. PDZA electricity use over the last 10 years.

Recommendations: Consider adding individual meters to specifically track usage by building at PDZA. At a minimum, all new buildings should have individual meters. Continue to use Tacoma Public Utilities' energy-conservation specialists' help in identifying ways to conserve energy.

⁷ In the past, the Tacoma School District paid the Eastside pool's electrical bills; responsibility shifted to MPT in fall 2014. Consequently, the pool's usage and square footage are not included in this baseline.



Northwest Trek Wildlife Park

Northwest Trek does not use natural gas for building or water heating; everything is powered by electricity purchased from Puget Sound Energy (PSE). Northwest Trek is now working with PSE to monitor and reduce electricity use.

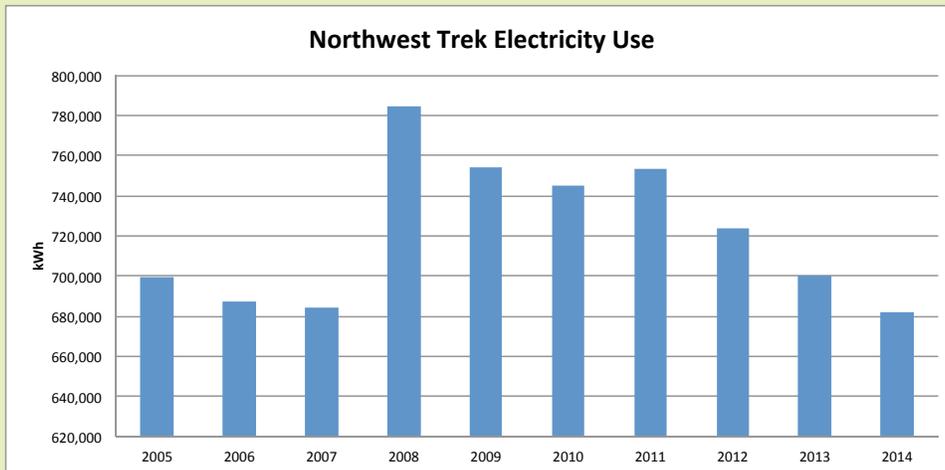


Figure 3.6. Electricity use at Northwest Trek over the last 10 years.

Recommendations: Consider recommendations from PSE. Track data from PSE into the Environmental Protection Agency’s Portfolio Manager tool.

People’s Community Center

People’s was built in 1978 and is over 23,000 square feet. Electricity consumption has been erratic during the past ten years (see Figure 3.7), and it consumes almost as much energy as the STAR Center, which is almost 31,000 square feet. It is currently heated with 13 rooftop HVAC units, which struggle to keep up with the building’s demand and has an outdated thermostat control system.

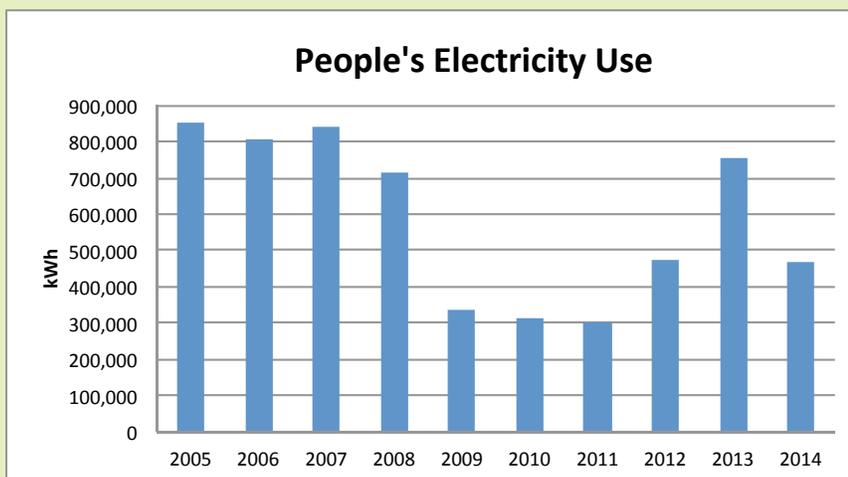


Figure 3.7. Electricity use in People’s Community Center over the last 10 years.

Recommendations: People’s is in need of upgrades to a more energy efficient HVAC system and new direct digital control (DDC). Also, it needs a new air conditioning unit on the roof of the old stage and a natural gas furnace in place of electric heat strips. Until that is possible, facility managers need to work with staff to ensure that thermostats are controlled properly and that windows and doors are only left open when appropriate. A hot water

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tank could be added to the kitchen and removed from the main domestic hot water tank/circulation pump that pulls hot water from men's locker room and custodial closet. An audit for remote sensors in rooms and offices could be completed and evaluated to see where additions or changes could be made.

SERA Work Center

The SERA Work Center was originally built in the 1970s as what was then Mount Tahoma High School's industrial arts building. It has had no upgrades in energy efficiency except for an HVAC rooftop package that services only part of the building. Some Natural Resources and Recreation department staff members have offices there and both departments use the building as a large storage facility. Although fewer than a dozen full-time employees work in the building, it uses almost as much electricity as the Point Defiance shops buildings, and as much as Wapato and Wright Park shops combined (See Figure 3.8).

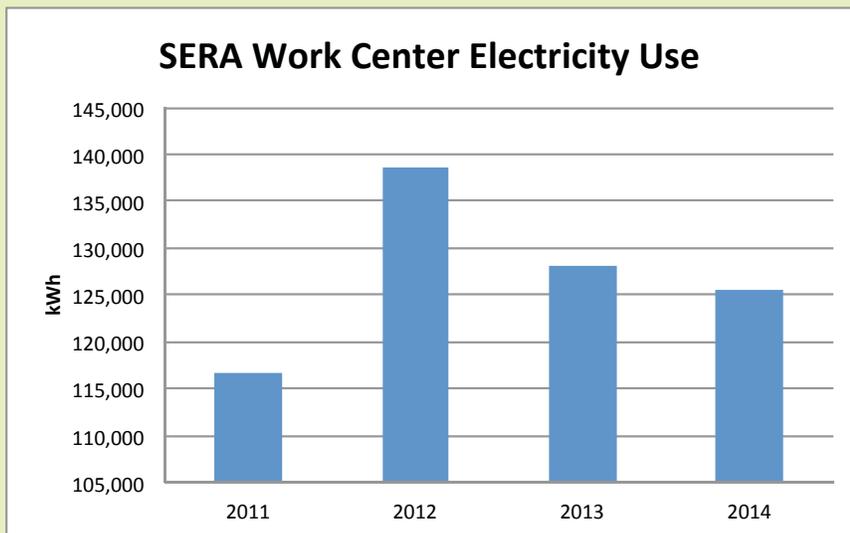


Figure 3.8. Electricity use at SERA Work Center

Recommendations: Audit the building to identify where lights and electric heating can be disconnected or modified depending on occupancy. Rows of fixtures could be removed from the circuit. Individual switches in strategic locations could energize specific work area lights. Heat should be channeled to the floor-level work areas where thermostats also should be located. Put timers on exhaust fans that now run constantly.

3.2 Natural Gas

Current Practices:

Natural gas is used primarily throughout MPT to heat buildings and water. The District spent \$326,000 on natural gas in 2014. Costs from 2010-2013 needs to be acquired from Puget Sound Energy in order to calculate the average dollar amount spent each year.

Consumption of natural gas over the last eight years has been consistent, with use in 2007 almost the same as in 2014 (see Figure 3.9). (Data from usage prior to 2007 is not available.)

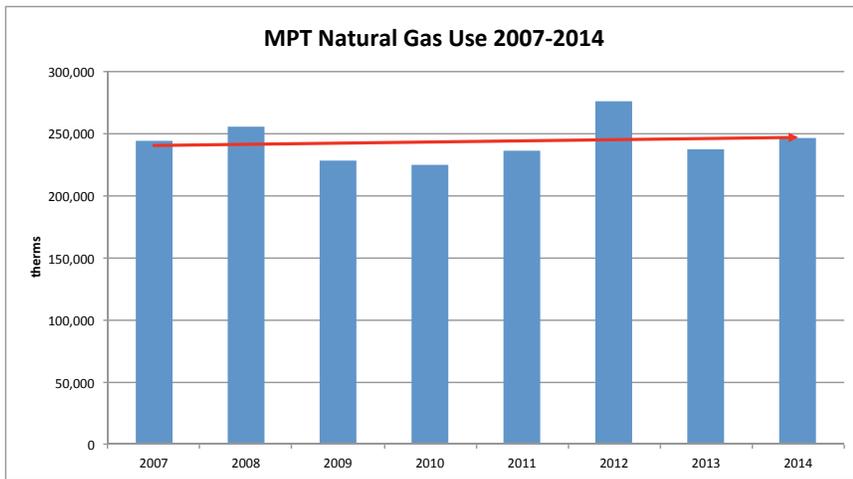


Figure 3.9. District wide natural gas use over the last eight years.

Past efforts to reduce natural gas consumption under contract with Johnson Controls have included a new HVAC systems and the addition of solar thermal systems at Kandle and Stewart Heights pools.

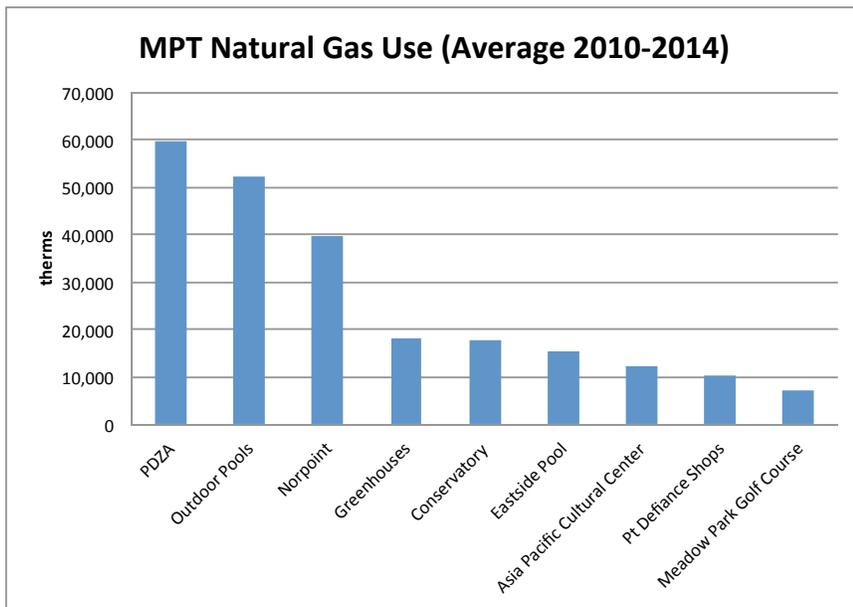


Figure 3.10. Natural gas in MPT facilities that used 7,000 or more therms in a year, based on average use from 2007 through 2014. Outdoor pools are Kandle and Stewart Heights. Norpoint has an indoor pool.

Not surprisingly, heated pools and greenhouses, including the W.W. Seymour Conservatory, are the largest consumers (see Figure 3.10). Natural gas usage also can be analyzed per square foot (see Figure 3.11).

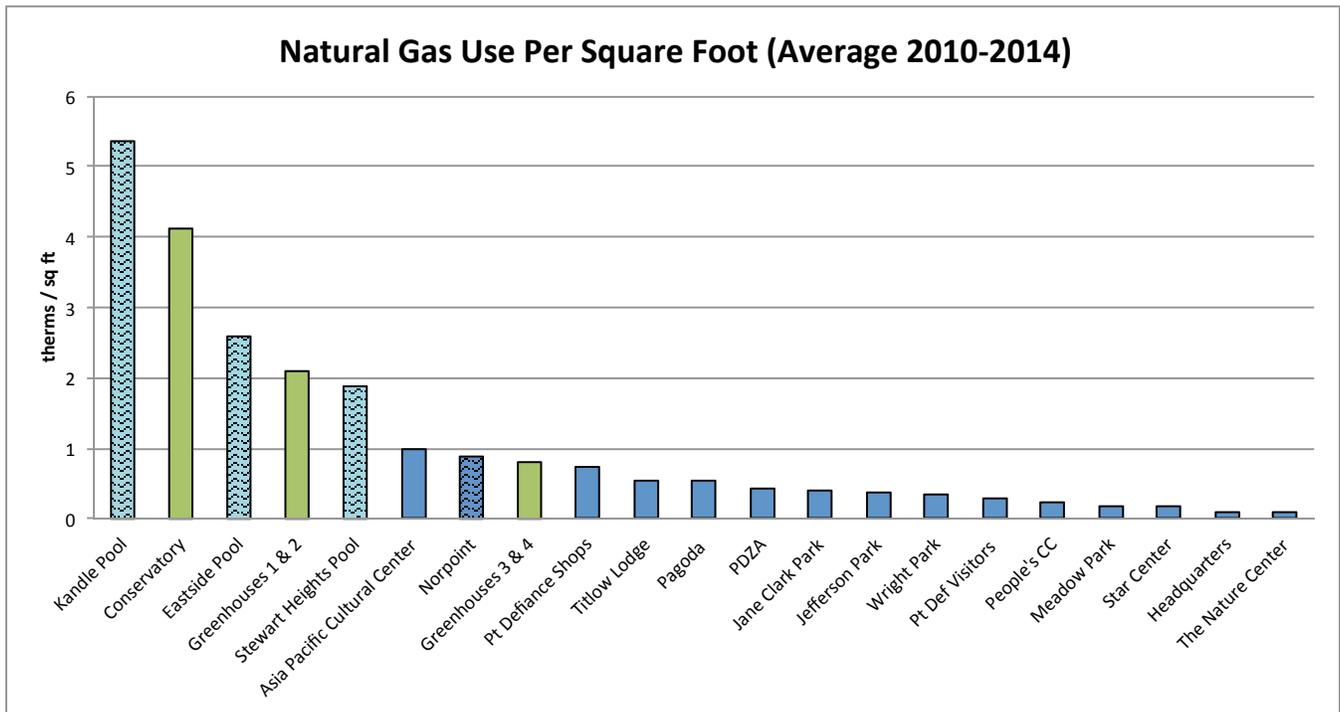


Figure 3.11. Pools are shown in light blue with waves; the conservatory and greenhouses are in green. These categories are the largest consumers, with pools representing three of the top five and plant facilities at three out of the top eight. Norpoint Community Center, seventh on the list, also has a pool.

Baseline: The baseline for natural gas usage is the average from 2010 through 2014. That is 258,435 therms to heat 379,992 square feet of buildings. That comes to .68 therms per square foot.

Targets: Reduce natural gas usage by 5 percent, to approximately .646 therms per square foot by December 2018. Achievement will result in savings of approximately \$16,300 annually.

Recommendations: Both facility upgrades and changes in staff behavior are needed to reduce use of natural gas. Encourage staff to turn down heat in areas that aren't often occupied and keep doors and windows closed whenever appropriate. MPT could benefit from audits of relevant facilities from our natural gas supplier Puget Sound Energy (PSE), especially the target facilities detailed below, to identify potential savings. Need to work with Puget Sound Energy in order to calculate the average dollar amount spent each year.

TARGET AREAS FOR NATURAL GAS:

PDZA

The PDZA Sustainability Plan sets the same goals for natural gas as electricity, reducing usage by 40 percent by 2025, with shorter term goals of 10 percent, 15 percent and 25 percent in 2017, 2019, and 2021, respectively. The baseline for this goal is the average consumption from 2005 through 2009, and the goals are calculated per square foot.

PDZA accounts for 25 percent of natural gas use within the district. Because there are individual meters for each zoo area, it is easy to identify those that use the most energy. The Asian forest sanctuary and elephant exhibits are



responsible for 50 percent of natural gas use. The South Pacific Aquarium (SPA) accounts for 32 percent. The new aquarium, scheduled to open in summer 2018, will replace the North Pacific Aquarium with a much more efficient design. Meanwhile, the SPA will continue to operate. The likely result will be an overall increase in natural gas usage.

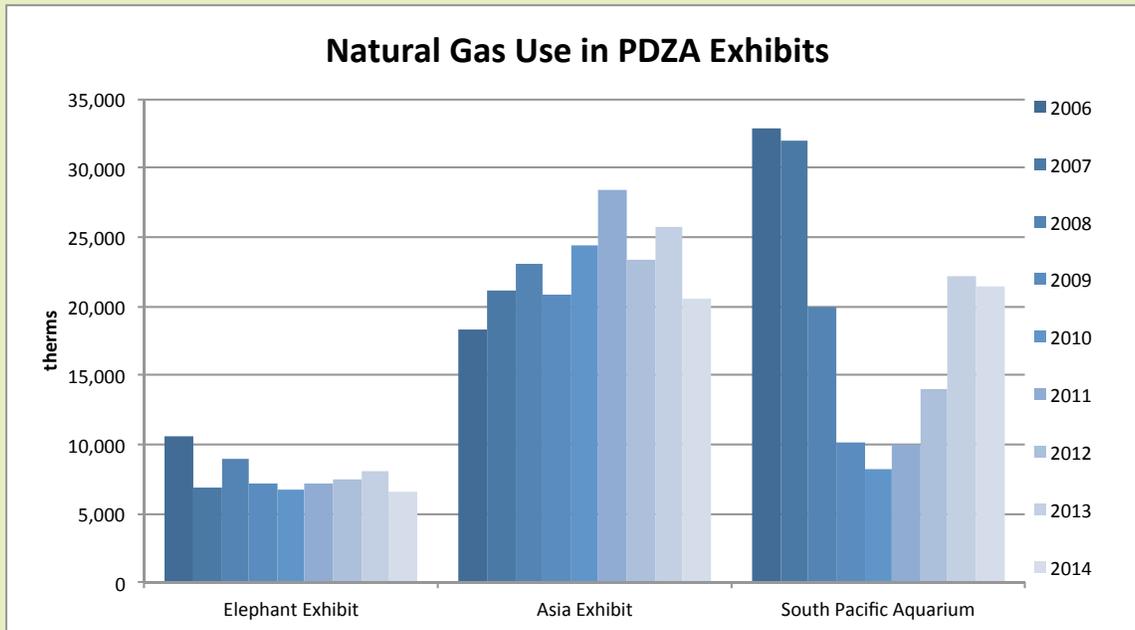


Figure 3.12. Natural gas use in PDZA’s three highest-use areas.

Staff members are regularly measuring radiant flooring temperatures in the Asian and Elephant exhibits to determine whether the heat can be lowered without jeopardizing the animals.

Recommendations: Invite Puget Sound Energy conservation specialists to audit the facility to identify potential savings, especially for the South Pacific Aquarium. Continue to study reduced heating of radiant floors in Asian and Elephant enclosures.

Pools

MPT pools, including The Center at Norpoint, with an indoor pool⁸, account for 42 percent of the district’s natural gas usage. Of that share, 63 percent is from the two outdoor pools, only open for 12 to 15 weeks annually. Outdoor pools are not covered to retain heat overnight. Pools are kept at 84 degrees and water heaters for the showers are set at 120 degrees. Comfortable temperatures attract pool users, while lowering temperatures to conserve energy risks losing them. It’s a delicate balance.

To find out what comparable agencies do to save energy, MPT inquired about operations at McCollum pool in Everett, an outdoor pool run by Snohomish County Parks and Recreation, and at Henry Moses Aquatic Center in Renton.

At McCollum, an Alta Thermal Pool Cover is used every night. Snohomish County based the purchase of the cover on savings of 9,310 therms annually, and spending about \$2,000 per year for to the staff time needed to place and remove the cover daily (a two-hour job). The \$10,000 cost of the cover was justified by an estimated \$8,379 annual savings. This is just based on heating cost and does not include additional savings from reduced water evaporation. McCollum also maintains showers at 88 degrees, a temperature that also limits showers to about two minutes.

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8 Norpoint uses natural gas to heat the building in addition to the pool. A single meter captures usage for the entire facility.



The Henry Moses Aquatic Center recreation coordinator said they use a pool cover on the facility's lap pool, which takes about 15 minutes to get on and off. Pool covers provide substantial savings on chemicals as well as heat, she said. This is also true for indoor pools, she said. For example, the Enumclaw indoor pool that she formerly managed saved approximately \$2,500 on chemicals alone in the first year of pool-cover use. Also, covers on indoor pools save additional money by cutting down on humidity otherwise removed by the HVAC system. PSE estimated that covering the indoor Enumclaw pool for an average of 10 hours per day would reduce natural gas usage by almost 40 percent, or 9,000 therms and more than \$10,000 annually. According to the Enumclaw aquatics supervisor, Enumclaw's cover cost \$13,000.

At Henry Moses, showers are set at 103-105 degrees, but turned down in hot weather. The showers are set to turn off after 3 minutes and don't get stuck in the "on" position.

Recommendations:

- Purchase pool covers for all existing MPT pools. All new pool facilities should include electric pool covers, even for indoor pools, which save money on chemicals, water and energy.
- Experiment with lower temperature settings for showers at all pool facilities.
- For newly constructed pools such as in the new Eastside Community Center, separate meters should be included to divide pool usage from the rest of the building for detailed analysis. Consider adding a separate meter for the Norpoint pool.

W.W. Seymour Conservatory

The conservatory is a 107-year-old glass building, so its inefficiency is not surprising. However, capital improvements could make a difference. The building would benefit from an efficient, new boiler and a thermal blanket for insulation.

Recommendations: The expected upgrades to the conservatory should prioritize heat savings whenever possible.

South Park Community Center (leased to the Asia Pacific Cultural Center)

This building was built during World War II in the early 1940s by the U.S. Army as a United Service Organizations (USO) facility, and was purchased by the District a few years later. Previously operated by MPT as the South Park Community Center, the building is leased to the Asia Pacific Cultural Center (APCC), a nonprofit. This building uses a very large amount of energy for its size. On a square foot basis, it uses more natural gas than any other MPT facility except for the pools and greenhouses. Even though the building is leased, MPT pays utilities costs. MPT needs to find out why APCC uses so much natural gas, particularly since the 2005 bond issue paid for a new HVAC system and weatherproofing.

Recommendations: Meet with APCC managers and explain the excessive natural gas usage problem. Discuss possible behavior changes and the possibility of automated controls. Regularly report energy consumption to APCC staff.

3.3 *Renewable energy*

Current Practices: Currently the only renewable energy used by the District is solar hot water to aid in the heating of the Stewart Heights and Kandle pools. This was a project completed by Johnson Controls in 2012 and has saved each pool thousands of therms of natural gas each year, with each pool reducing its natural gas use by a third since 2012.

Although renewable energy, such as solar, is popular, energy conservation combined with energy-efficient technologies, almost always makes more sense financially. However, small renewable energy demonstration projects can be a great way to educate public about the potential of renewable energy, especially residential solar in Washington (see Chapter 1),

Recommendations: Review options for renewable energy during the design of new buildings and facilities. If possible, build to allow addition of solar at a later date. Consider partnering with TPU or other agencies to install small demonstration projects at popular attractions or parks with high visibility as a way to educate and engage the public about sustainability.

3.4 *Waste management*

Current Practices: Recycling is currently available in all office spaces and at most MPT facilities. But public facilities lack interpretive signs to explain recycling to visitors. Internally, employees lack consistent information about recycling (see Chapter 1). Many facilities have water fountains, but few water bottle filling stations exist. Unfortunately, the volume of garbage and recycling is not measured at every facility, so tracking waste is more difficult than energy or water.

Baseline: More tracking is necessary in order to establish a quantifiable baseline for waste at MPT. Currently landfill waste or material that is recycled is not measured.

Targets: Reduce the amount of waste sent to the landfill by using fewer disposable products, such as paper, and recycling whenever possible. Ensure that recycling is always an alternative to waste disposal at MPT buildings and attractions, for both guests and employees.

Recommendations:

- **Monitor waste and recycling:** Record or estimate how much waste is going to the landfill and how much is being recycled by employees. This can be done by impromptu audits of staff waste bins or by more thorough, planned waste audits of entire facilities. For example, because recycling is not weighed at PDZA, regular waste audits have helped to provide information about the diversion rate of recyclables across the zoo. Staff members estimate the volume of recycling to track the success of newly introduced bins.
- **Recycling:** Audit recycling opportunities at all MPT facilities, internally and externally, and add bins where necessary. Add consistent signs bearing the MPT brand. Consider using open source graphics from Seattle Public Utilities. Customize signs based on location and target audience so people clearly understand what can be recycled.
- **Waste reduction:** Install water-bottle filling stations at all MPT facilities, to encourage staff and guests to avoid using disposable plastic water bottles. Replace vending machines with filling stations whenever possible.

3.5 **Water usage**

Current Practices: Included in the Johnson Controls upgrades were water-efficient fixtures, irrigation controls and pipe replacement at various facilities. Besides domestic water use for kitchens and bathrooms, PDZA uses a lot of fresh water to clean pools and power wash walkways and animal enclosures.

Baseline: Domestic water used in buildings is not a large part of water consumption of overall use at MPT and doesn't need separate baseline and targets. The baseline for total water consumption is 266,000 CCF (based on the average consumption from 2010-2014).

Targets: Reduce water use district wide by 9 percent by December 2018. Most of these savings will come from irrigation rather than domestic water.

Recommendations: Include grey water or rainwater collection systems in designs for new construction whenever practical. Implement low-flow technology wherever appropriate in MPT buildings and facilities. Use salt water rather than domestic water whenever possible at PDZA.

Target Areas for water: See chapter 2

3.6 **New construction and building operations**

Current Practices: MPT lacks sustainability requirements for new construction, although sustainability is almost always taken into consideration.

Some MPT facilities are monitored for temperature by a web-based building control system called MetaSys. It tracks zone temperatures for employee comfort and energy efficiency. It can control occupied and unoccupied settings. This ability to monitor remotely saves on fuel otherwise used to check on facilities in person. It is currently used to monitor MPT headquarters, Kandle and Stewart Heights pools, The Center at Norpoint, Titlow Lodge, Point Defiance visitors' center, and Northwest Trek.

Targets: Ensure that every new construction project, whether a new building, facility or renovation, prioritizes sustainability. Establish benchmark information for every MPT building or facility by entering all utility information into the Environmental Protection Agency's Portfolio Manager tool by the end of 2016.

Recommendations: New buildings will be certified Leadership in Energy & Environmental Design (LEED) Silver or equivalent. Current buildings will be certified Energy Star⁹ buildings whenever possible. Use the EPA's Portfolio Manager tool to compare MPT buildings and facilities with other similar buildings nationwide. Consider environmentally friendly features such as:

- Renewable energy, such as solar, thermal or geothermal
- Passive cooling designs, which limit the need for air conditioning, options for areas like gyms
- Daylight harvesting to offset the need for electric lights
- Rainwater collection and grey-water systems
- Green roofs, which are covered with vegetation to absorb rain, lower temperatures, insulate and create wildlife habitat
- Electric vehicle charging stations in parking lots

Incorporate MetaSys in all newly constructed buildings and facilities, and consider adding to existing buildings as necessary. Buildings that could benefit from MetaSys additions include People's Community Center, the Pagoda, and more controls at Kandle Pool.

⁹ An Energy Star score of 75 or higher indicates a building's energy efficiency is within the top 25 percent of similar buildings nationwide.