Wastewater Treatment Division

Energy Plan

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King County
Department of Natural Resources and Parks
Wastewater Treatment Division

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Acronyms and Abbreviations

CNG	compressed natural gas
CSO	combined sewer overflow
ECM	energy conservation measures
ESJ	equity and social justice
GHG	greenhouse gas
HVAC	heating, ventilation, and air conditioning
kWh	kilowatt hour
MMBtu	one million British thermal units
MWh	megawatt hour
O&M	operations and maintenance
PSE	Puget Sound Energy
RINs	renewable identification numbers
SCAP	Strategic Climate Action Plan
SCL	Seattle City Light
SEM	strategic energy management
SnoPud	Snohomish County Public Utility
SWOC	strengths, weaknesses, opportunities, and challenges
WTD	Wastewater Treatment Division

Executive Summary

The purpose of the Energy PIan is to sustainably improve King County's Wastewater Treatment Division's (WTD) overall use and production of energy and its carbon footprint. As a Water Resources Utility of the Future, WTD recognizes the role it has to play in being a holistic environmental steward for generations to come.[1] Reducing WTD's carbon footprint is a high priority for the division, as WTD's facilities are responsible for approximately 54 percent of King County government's total facility energy use. Putting into practice the Energy Plan will help WTD meet its energy efficiency targets, increase its production and consumption of renewable energy sources, and reduce its carbon footprint.

The Energy Plan was developed through a staff-driven internal effort to guide WTD in achieving specific energy goals and targets. The goals and targets were developed by WTD and some are a part of the King County Strategic Climate Action Plan. The plan builds on WTD's existing energy-related efforts and identifies strategies and recommendations through 2025.

The following four goals and targets serve as the foundation of WTD's Energy Plan:

- Goal 1: Holistically Integrate Energy Awareness across WTD
  A target for this goal is for energy to be considered upfront and throughout the various steps and decision-making processes of comprehensive planning; capital project development and implementation; asset management efforts; and ongoing facility operations and maintenance.
- Goal 2: Increase Energy Efficiency
  The overall target is to reduce normalized energy use in WTD facilities by at least 7.5 percent by 2020 and 10 percent by 2025, as compared to a baseline year of 2014.[2,3]
- Goal 3: Produce and Use Renewable Energy
  Targets for WTD's facilities include consuming renewable energy equal to 70 percent of energy consumption by 2020 and 85 percent by 2025.

[1] In 2016, WTD received recognition by the "Utility of the Future-Today Joint Recognition Program," which is supported by the U.S. Environmental Protection Agency. WTD was one of 61 recipients recognized nationally for optimizing operations, meeting or exceeding regulatory requirements, and engaging employees and communities.
[2] Normalized energy use for WTD is the amount of energy that would have been used in any given year to provide the same service under the same external conditions (weather and wastewater flow) as in the baseline year (currently 2014).
[3] The SCAP calls for an energy reduction goal of 5 percent by 2020; however, the County Climate Leadership Team changed the goal in 2017 to 7.5 percent.

- Goal 4: Achieve Carbon Neutrality in Operations and Purchasing
  The target for this goal is to achieve carbon neutrality in operations by 2017 and in operations and purchasing by 2025.

WTD is well on its way to achieve its energy goals and targets. Achieving these goals aligns with WTD's mission and vision.

Plan Development
Staff from across WTD participated in the work to complete the Energy Plan. An important product of the plan is the establishment of a WTD energy vision statement:

> ***A carbon neutral wastewater system that optimizes energy conservation and renewables generation.***

The plan includes a strengths, weaknesses, opportunities, and challenges analysis (SWOC) of energy integration in WTD. The SWOC served to inform recommendations, with a desired outcome of transforming identified weaknesses to strengths.

Plan Recommendations
Twenty-nine recommendations are included in the plan. Some may be achieved through better coordination and communication across the division; others are already included in the Energy Program's existing work plan; and several may result in the need for new capital projects. Some of the recommendations call for evaluations, which may result in future opportunities to help meet one or more of the plan's goals.

The scope of work for the Energy Plan did not include developing specific cost estimates, energy savings estimates, staffing plans, or detailed work plans associated with specific recommendations. Such work will take place during implementation of the Plan. Efforts to implement specific recommendations will be incorporated into annual work plan updates for the Energy Program and other work groups as appropriate.

Energy Program staff developed an impact-effort matrix to prioritize the recommendations based on how they advance goals and ease of implementation. The top five recommendations are as follows:

- **Evaluate Brightwater Odor Control Requirements.** The recommendation calls for developing a scope of work for this action in 2018-2019. Based on the evaluation, it is possible that proposed actions will emerge to optimize energy usage associated with Brightwater odor control and increase the plant's overall energy efficiency, while maintaining Brightwater's odor control commitment.
- **Insulate Brightwater Digester Walls.** The recommendation calls for formalizing a capital project request for this action. If budget is approved for such a project, the anticipated outcome is increased energy efficiency at the Brightwater

Treatment Plant and increased renewable energy opportunities by making more digester gas available for use. The proposed timeline to carry out this recommendation is 2018-2021.

- **Conduct Energy Audits of Specific Facilities.** The recommendation calls for conducting 10 audits through 2024, followed by implementation of prioritized actions. The anticipated outcome is increased energy efficiency at WTD's facilities that will help meet WTD's overall energy targets.
- **Establish Treatment Plant Specific Energy Targets.** The recommendation calls for Energy Program staff to work with treatment plant managers to develop targets in 2019. Having clear targets for each of the plants will help improve energy usage tracking and monitoring and inspire development of efforts to meet the targets.
- **Develop and Implement an Internal Energy Communications Plan.** The recommendation calls for completion of an internal communications plan in 2019. The purpose of this effort is to increase energy awareness across WTD, and for work groups to understand their role and responsibilities in meeting energy goals and targets.

The Energy Plan's goals, targets, and recommendations also align with the current King County Strategic Climate Action Plan (SCAP). The WTD Energy Reduction Plan completed in December 2016, a requirement of the SCAP, is provided in Appendix A, and the status of the WTD-related SCAP energy targets and goals is provided in Appendix B.

1.0. INTRODUCTION

As a Water Resources Utility of the Future, King County's Wastewater Treatment Division (WTD) recognizes the role it has to play in being a holistic environmental steward for generations to come.[4] Reducing WTD's carbon footprint is a high priority for the division. Putting into practice the Energy Plan will help WTD meet its energy efficiency targets, increase its production and consumption of renewable energy sources, and reduce its carbon footprint.

The purpose of the Energy Plan is to sustainably improve WTD's overall use and production of energy and its carbon footprint. The Energy Plan was developed through a staff-driven internal effort to guide WTD in achieving specific energy goals and targets. The plan builds on WTD's existing energy-related efforts and identifies strategies and recommendations through 2025. The Energy Plan's goals and targets are listed below:

1. Holistically integrate energy awareness across WTD to ensure energy is considered upfront and throughout the various steps and decision-making processes of comprehensive planning; capital project development and implementation; asset management efforts; and ongoing facility operations and maintenance
2. Increase energy efficiency to reduce normalized energy use in WTD facilities by at least 7.5 percent by 2020 and 10 percent by 2025, as compared to a baseline year of 2014[5]
3. Maximize the generation and use of renewable energy through increasing renewable biogas production at WTD's treatment plants and consuming renewable energy equal to 70 percent of energy consumption by 2020 and 85 percent by 2025
4. Achieve carbon neutrality in operations by 2017 and in operations and purchasing by 2025

The following sections provide background information on WTD's energy use, production, and consumption; present the methodology used for developing this plan; and lists the contents of the remaining chapters.

[4] In 2016, WTD was recognized by the "Utility of the Future-Today Joint Recognition Program," which is supported by the U.S. Environmental Protection Agency. WTD was one of 61 recipients recognized nationally for optimizing operations, meeting or exceeding regulatory requirements, and engaging employees and communities.

[5] Normalized energy use for WTD is the amount of energy that would have been used in any given year to provide the same service under the same external conditions (weather and wastewater flow) as in the baseline year (currently 2014).

1.1 Background

WTD protects water quality and prevents water pollution by providing wastewater conveyance and treatment services for 17 cities and 17 local sewer utilities.[6] WTD is a large utility that must have reliable systems and sources of power to ensure it meets its mission (Figure 1-1).

Figure 1-1. Wastewater Treatment Division Vision and Mission

WTD has three large regional wastewater treatment plants (West Point, South, and Brightwater), two small wastewater treatment plants (one on Vashon Island and one in the City of Carnation), 47 pump stations, 25 regulator stations, 4 combined sewer overflow (CSO) wet weather treatment facilities, and over 390 miles of pipes. It serves about 1.7 million people, including most urban areas of King County and parts of south Snohomish County and northeast Pierce County. The division owns and maintains $6 billion in assets that include more than 6,000 pieces of powered equipment, such as pumps, motors, drives, blowers, engines, boilers, turbines, and air handling units.

Of King County government's total facility energy use, approximately 54 percent is consumed to run WTD facilities (Figure 1-2). Almost 80 percent of WTD facility energy use is to run the three regional treatment plants (Figure 1-3). In 2016, energy use represented about 10 percent of WTD's operating budget, or more than $14 million dollars.

[6] Information on the local sewer utilities is available at http://www.kingcounty.gov/environment/wtd/About/SewerAgencies.aspx.

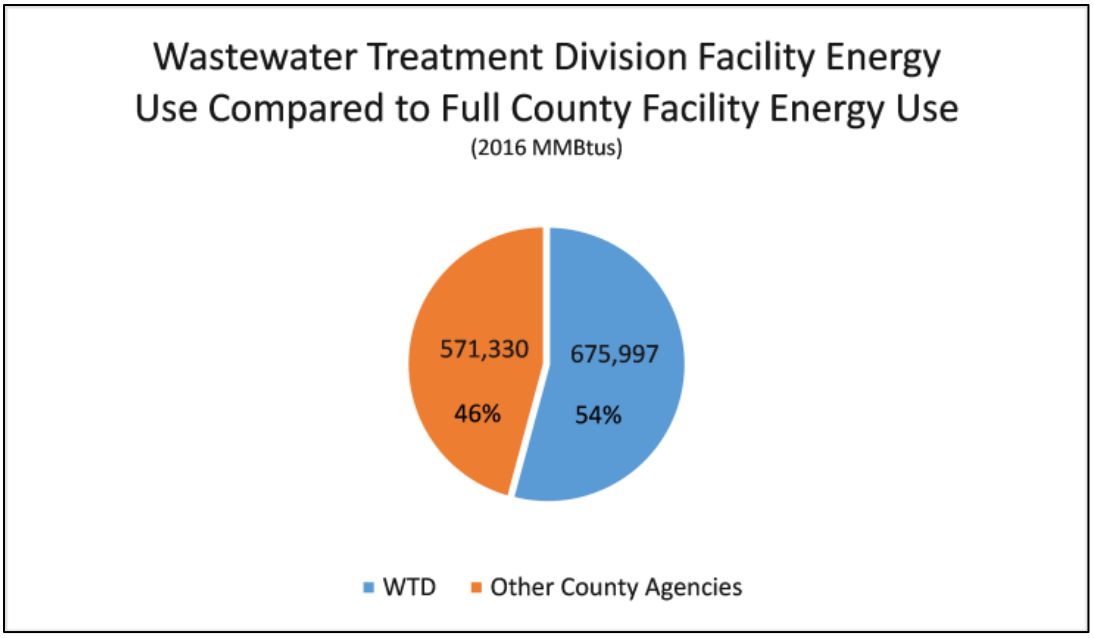

Figure 1-2.
Wastewater Treatment Division Facility Energy Use Compared to Full County Facility Energy Use

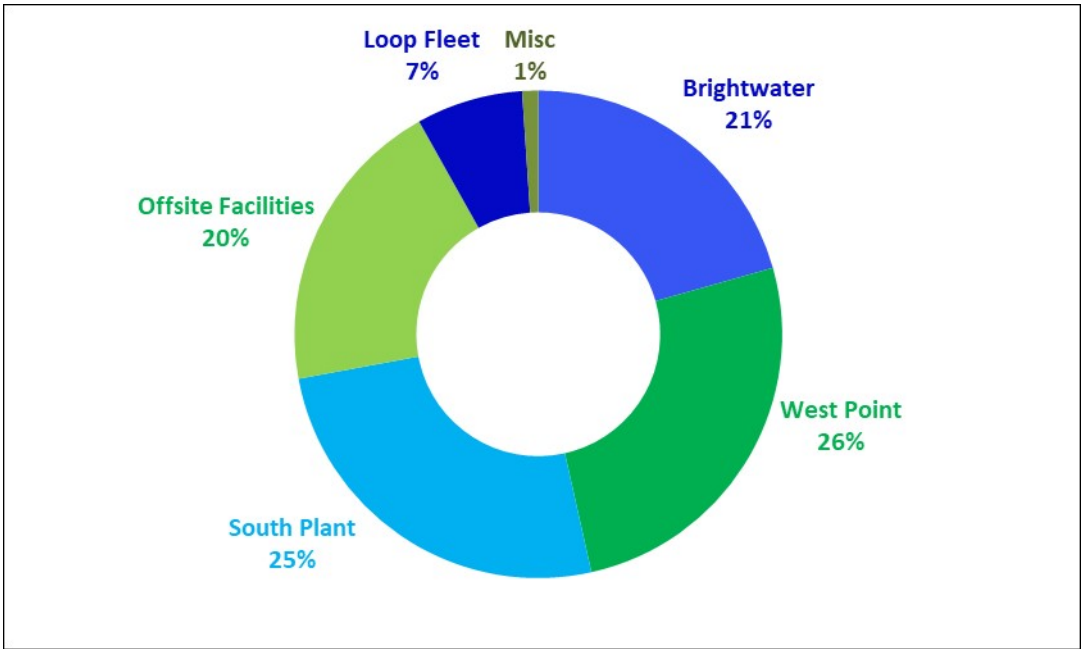

Figure 1-3. Percentage of Energy Consumed by WTD Operations in 2016 (purchased energy, MMBtus)

WTD is the largest facility energy user in King County government. The division has a long history of energy conservation, innovative energy management, and renewable energy generation. Implementing energy efficiency measures is part of WTD's core business and ethos. WTD recognizes it can do more and understands the urgency and

the significant role it has to play to help reduce or offset the County's greenhouse gas emissions and reduce energy costs.

WTD's energy efforts are also guided by industry standards and practices and King County plans and directives, such as the County's Strategic Climate Action Plan (SCAP). King County adopted the current SCAP in December 2015. The SCAP charts a pathway to achieve a clean energy future, guiding county work to meet ambitious greenhouse gas emissions reduction targets, prepare for the impacts of a changing climate, and ensure that King County continues to be a leader on climate action. Of particular importance to WTD are the SCAP's targets to reduce normalized energy use in county-owned facilities by at least 7.5 percent by 2020 and 10 percent by 2025, as compared to a baseline year of 2014.[7] The WTD 2017–2021 Energy Reduction Plan (December 2016) in Appendix A focuses on how WTD aims to meet the normalized energy goal, and Appendix B provides a status of SCAP energy targets and goals that pertain to WTD as of December 2016.

The SCAP and Ordinance 17971 specify that the King County Department of Natural Resources and Parks (DNRP), which includes WTD and three other divisions (Solid Waste, Parks and Recreation, and Water and Land Resources), achieve net carbon neutrality for its operations by 2017. DNRP announced in fall 2016 that it had achieved carbon neutrality a year ahead of schedule by offsetting more greenhouse gas emissions than its operations emit.[8] The SCAP also reinforces county legislation that states the Wastewater Treatment and Solid Waste divisions independently achieve carbon-neutral operations and purchasing by 2025.

1.2 Energy Plan Methodology

A project team (Figure 1-4) representing the various sections in WTD and the DNRP Energy Group participated in plan development.

WTD work groups represented on the Strategic Energy Plan

Energy Program	Biosolids Program
Technology Assessment	Finance
Project Management Unit	Operations and Maintenance
Engineering	Reclaimed Water Program
Environmental and Community Services	Director's Office
Comprehensive Planning	(also DNRP Energy Group)

Figure 1-4. WTD Work Groups Represented on the Strategic Energy Plan

[7] The SCAP calls for an energy reduction goal of 5 percent by 2020; however, the County Climate Leadership Team changed the goal in 2017 to 7.5 percent.

[8] More information on DNRP's achievement of carbon neutrality is available at http://www.kingcounty.gov/services/environment/climate/strategies/beyond-carbon-neutral.aspx.

The project team participated in a series of work sessions to discuss ways to meet the four goals of the plan, and interviews were conducted with key representatives from various work groups to better understand how energy considerations are incorporated into their work. Work sessions focused on the following topics:

- Development of a WTD-energy vision
- Identification and status of SCAP energy targets and goals that pertain to WTD
- Decision-making frameworks for financial benefit/cost decision-making
- Recommendations and next steps to meet the four goals of the plan

In addition, preparation of the Energy Plan overlapped with preparation of WTD's strategic planning efforts for the Biosolids, Reclaimed Water, and Technology Assessment programs; coordination among the planning efforts occurred where possible and will continue during implementation of all the plans.

The topics of the remaining chapters are as follows:

- Chapter 2 provides more details on the four goals of the Energy Plan and the strategies to achieve them.
- Chapter 3 presents the prioritized recommendations, next steps, and anticipated outcomes to achieve the plan's goals.

2.0. THE FOUR GOALS OF THE ENERGY PLAN

Goals and strategies are important components of planning efforts. The Energy Plan's goals are broad and attainable, and align with WTD's vision and mission. Action-oriented strategies have been developed to help the division continue to strive toward the plan's goals.

This chapter focuses on the Energy Plan's four goals that were developed by WTD. The goals and the strategies to achieve them are listed below:

- Goal 1: Holistically integrate energy awareness across WTD
- Goal 2: Increase energy efficiency
- Goal 3: Maximize generation and use of renewable energy
- Goal 4: Achieve carbon neutrality in operations and purchasing

A description and status of each goal and the strategies to achieve the goal are provided in the following sections.

2.1 Goal 1: Holistically Integrate Energy Awareness across WTD

Since its inception in 2008, a major goal of WTD's Energy Program has been to foster a culture of energy efficiency across the division. Much progress has been made and more remains to be done.

The goal of full integration of energy awareness into WTD is an ambitious one. It involves incorporating energy considerations into decision-making processes upfront and throughout the various steps of comprehensive planning; capital project design, alternatives analyses, and construction; asset management, repair, and replacement efforts; and ongoing facility operations and maintenance.

The ability to meet energy efficiency targets relies on ongoing energy-focused discussions and engagement among staff from across the division. It requires continuous messaging and articulation of energy expectations from WTD's leadership. It means that meeting energy goals is viewed as a priority. It necessitates having staff with energy training and expertise whose job descriptions include carrying out energy efficiency projects at WTD's facilities. Full integration of energy awareness also implies that energy standards and specifications are required as part of consultant and construction contracts; energy engineers are part of consultant teams on projects that

involve energy use; and energy use is tracked and monitored so that refinements can be made as appropriate.

Integration of energy awareness also means that WTD is poised to embrace new advances in energy-efficient technologies and opportunities. Ongoing education is a key component to being able to integrate new ideas and activities in the division's daily work.

Decisions are continually being made throughout WTD that affect the division's consumption and production of energy. It is essential that energy considerations are a conscious part of the decision-making process, and not an afterthought. Decision documentation needs to include how energy goals have been considered along with a rationale when the most energy-efficient solution is not selected. Imbedding energy considerations in a mindful manner in decision-making processes is an important step toward holistically integrating energy awareness across WTD.

Strategies to achieve holistic integration of energy awareness across the division follow.

2.1.1 Strategy 1.1: Promote WTD Energy Vision

An energy vision statement is a way to build awareness and articulate WTD's energy focus across the division. WTD's management team approved the following energy vision statement during the development of this plan:

WTD Energy Vision: *A carbon neutral wastewater system that optimizes energy conservation and renewables generation.*

WTD's energy vision statement is designed to be inspiring, stretching, and achievable. The vision sets the stage for WTD to continually improve upon its carbon and energy-related performance, and strive to meet the challenging target to be carbon neutral in operations and purchasing by 2025. Recommendations to promote WTD's energy vision are included in Chapter 3.

2.1.2 Strategy 1.2: Address Strengths, Weaknesses, Opportunities and Challenges of Energy Integration in WTD

A Strengths, Weaknesses, Opportunities, and Challenges (SWOC) analysis is a tool that has long been used to assess characteristics within businesses, organizations and governments.[9] Strengths and weaknesses are internal factors within an organization, while opportunities and challenges are external factors stemming from community or societal forces. As part of this plan's development, WTD's Energy Program staff

[9] Some people also use the term SWOT analysis, which stands for assess Strengths, Weaknesses, Opportunities, and Threats. SWOC and SWOT are interchangeable.

conducted a SWOC analysis to assess the status of integration of energy considerations across the division. The SWOC analysis is provided in Table 2-1.

Chapter 3 includes recommendations to optimize strengths, transform weaknesses to strengths, and address opportunities and challenges.

Table 2-1. SWOC Analysis of Energy Integration in the Wastewater Treatment Division

Internal to WTD		External to WTD	
Strengths	**Weaknesses**	**Opportunities**	**Challenges**
• There are staff who display strong commitment to climate and energy-efficiency efforts • When beneficial business case is provided, budget is usually available • Carbon and Energy Fund is dedicated to operational energy efficiency efforts • Capital project teams that have energy impacts include energy representatives • Energy teams have been established at each regional treatment plant • More technical standards are being established to help meet energy goals • WTD owns standardized software for tracking and monitoring of energy use • WTD has clear energy and climate targets and goals • There is support for energy-related training for staff • Energy use is often considered in analyses and studies for system improvements or future upgrades • There is support for energy audits and energy-related studies	• WTD energy goals and targets are not always viewed as WTD priorities • Energy efficiency alternatives are viewed as less reliable, safe, or proven • Lack of process to address conflicts between energy initiatives and other priorities • Not all levels of division support or implement climate and energy efforts • Lack of energy-related internal communications plan • Inconsistent inclusion of energy considerations in planning, project chartering, and alternatives analyses • No direction for energy engineers to be part of consultant teams on projects that involve energy use • Lack of standardized process for energy analysis • Energy program lacks staffing resources to analyze available data and implement findings from energy audits • Limited staff resources to implement energy efficiencies at WTD facilities • Standardized software for tracking and monitoring energy use is not being utilized to its potential • Lack of clarity on how to intersect energy actions with equity and social justice (ESJ) priorities • Lack of racial diversity in Energy Program	• Local, regional, state-wide commitment and interest in energy efficiency and innovation • Wastewater industry is working to reduce technologies' energy costs • Washington State allows for procurement methods that encourage energy savings in projects • There are other innovative utilities to model • Strategic energy management programs are available to the treatment plants • Decision-making frameworks are available that could improve WTD decisions regarding energy • Utility grants are available to incentivize energy efficiency • Renewable Identification Numbers (RINs) provide financial opportunity for wastewater biogas project development	• Utilities are traditionally risk-averse, and energy innovation can be perceived as risky • Energy-efficiency does not have a sense of urgency in the industry and is not always seen as a priority • Permits may dictate what can be examined in terms of energy efficiency • National political climate could lead to fewer energy grant opportunities • As a utility in a large government, it is difficult to be nimble and respond quickly to opportunities • Industrial facilities do not lend themselves to standard approaches regarding energy use • Physical attributes of influent (temperature or rainfall) affect energy use • Energy markets are not predictable

2.2 Goal 2: Increase Energy Efficiency

WTD's goal is to increase energy efficiency in WTD facilities. Two main targets under this goal are to reduce normalized energy use in WTD facilities by at least 7.5 percent by 2020 and 10 percent by 2025, as compared to a baseline year of 2014[10]. Meeting the targets means assuring energy conservation and efficiencies are implemented in WTD's existing facilities and new construction projects. The WTD 2017–2021 Energy Reduction Plan in Appendix A was completed in December 2016, and focuses on how WTD aims to meet this goal. Projections completed in 2017 anticipate WTD's normalized energy use to decrease by 5.6% by 2020.

Strategies to achieve this goal are provided in the following sections.

2.2.1 Strategy 2.1. Track and Monitor Energy Usage

WTD tracks, monitors, and normalizes its energy use to verify energy efficiency gains and detect unexpected changes in energy use. The Energy Program reports results of these efforts on a quarterly basis. The types of information gathered through this work are shown in Figure 2-1 and Figure 2-2.

Figure 2-1 shows WTD's non-normalized site energy use and exported site energy from 2007 through 2016. [11] Although WTD is not required to track non-normalized site energy use, there is value in tracking this information, as it is an indicator of WTD's overall environmental impact.

[10] Normalized energy use for WTD is the amount of energy that would have been used in any given year to provide the same service under the same external conditions (weather and wastewater flow) as in the baseline year (currently 2014).
[11] Non-normalized energy does not take into account changes in flow, temperature, rainfall, or added services.

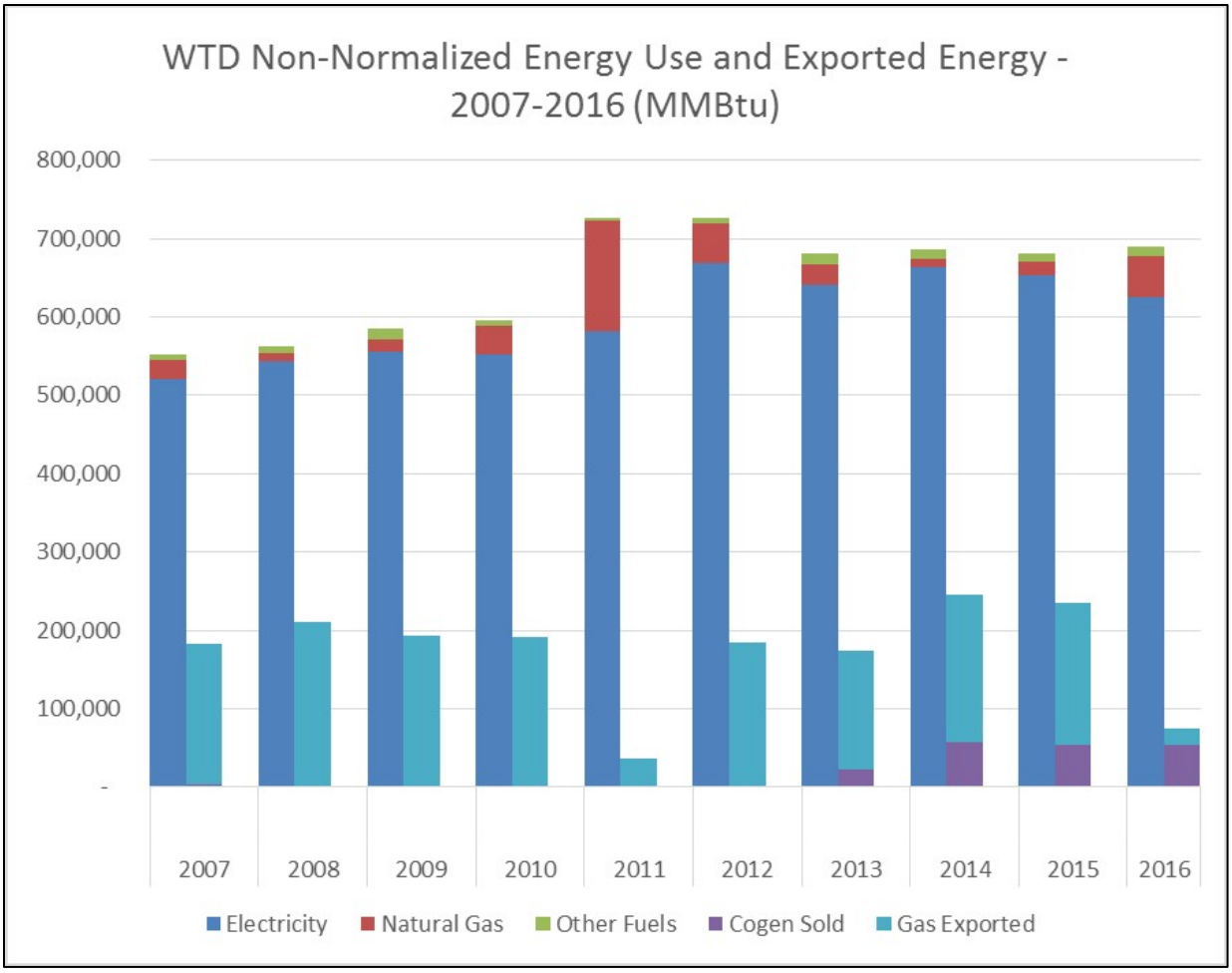

Figure 2-1. WTD Non-Normalized Site Energy Use and Exported Site Energy - 2007-2016 (MMBtu)

Figure 2-2 shows the combined impacts of planned energy conservation projects and planned capital projects that are expected to affect WTD's total energy use from 2016 through 2030. The two trend lines show the cumulative impact of all projects on WTD's actual energy use (dotted black line) and WTD's normalized energy use (solid black line). The projected energy efficiency gains from currently planned capital projects and O&M efforts show that WTD is projected to make significant progress toward the division's energy efficiency goal.

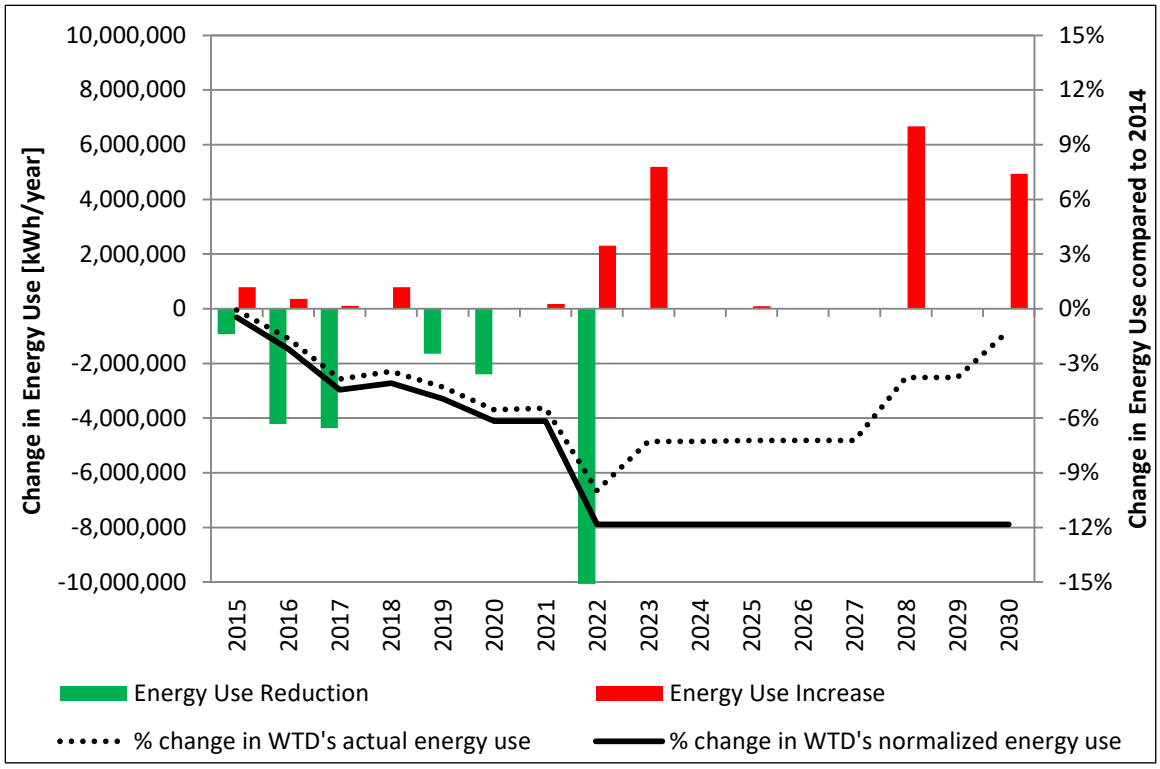

Figure 2-2. Projection of WTD's expected future energy use (2015–2030)

2.2.2 Strategy 2.3: Increase Energy Efficiency in Operations

As part of its continuous improvement ethos, WTD strives to find ways to increase energy efficiency in its operations. Some efficiencies are identified through energy audits, others are identified through participation in strategic energy management programs sponsored by local utilities, and others come directly from staff, including through WTD's Bright Ideas Program.

WTD conducts energy audits of its larger energy-consuming facilities at regular intervals to improve energy efficiency. The most recent energy audit was conducted on the Brightwater Treatment Plant in 2017. Energy audits identify energy conservation measures (ECMs), which can result in recommendations for both operational improvements and capital projects.[12]

ECMs can be replicated at similar facilities, so it is not necessary to conduct energy audits on every large energy-consuming facility. Examples of identified and implemented ECMs are minor lighting improvements and installation of automated temperature controls at some pump stations. The list of recommended facilities to undergo energy audits from 2017 through 2024 is provided in Chapter 3.

[12] In this context, the terms energy audit, energy analysis, and energy assessment are interchangeable.

WTD established a Carbon and Energy Fund as part of its operational budget to complete operational energy efficiency improvements that would otherwise likely not be funded as they are not considered critical to operations. The fund amount is based on a proportion of WTD's annual energy use. Some examples of operational improvements completed through the Carbon and Energy Fund are piloting the pump station dry well heating optimization effort, which saved over 800,000 kWh in 2016, and the West Point organics return eductor C3 water use optimization, which is estimated to save over 100,000 kWh annually once completed. The Carbon and Energy Fund will continue to serve as a vehicle to complete these often smaller but important efforts.

Participation in strategic energy management (SEM) programs sponsored by local power utilities is another important tool to identify operational energy efficiencies. These programs focus on influencing behavioral changes and improving operational energy efficiency, and provide both technical expertise and performance-based incentives to improve plant efficiency. Each of the three regional treatment plants has participated in such a program with varying levels of success, depending on level of participation from both operations and maintenance staff. Although identified operational savings may not always amount to much on their own, when taken into account cumulatively, the result can be significant. Actions identified through these programs are largely implemented through the Carbon and Energy Fund. An example is the Brightwater Treatment Plant modified a biosolids cake leveler to operate as needed instead of continuously.

The plants will continue to identify and implement operational energy efficiencies in conjunction with the Energy Program.

2.2.3 Strategy 2.4: Integrate Energy Efficiency into Capital Projects

WTD incorporates energy efficiency into capital projects by completing energy analyses, which are used in the design of its facilities. For example, two changes were made to the design of the Brightwater Treatment Plant—installation of new aeration blower technology and implementation of sequential aeration for the membrane bioreactor treatment process, which resulted in $265,000 in energy rebates from SnoPUD. The project also saves an estimated 4.5 million kWh per year, or roughly the annual electrical energy use of 450 homes in the Pacific Northwest.

WTD has started to conduct energy analyses on all capital projects involving over $250,000 of powered equipment. The energy analysis is included in WTD's capital project sustainability requirements, and meets requirements outlined in the County's Energy Efficiency Ordinance 16927. One example is the South Plant Aeration Diffuser Membrane project, which reduced electrical energy usage in the secondary treatment aeration tanks (Figure 2-3). Initial energy savings estimates are between 2,500,000 to 3,000,000 kWh per year, which translate to $175,000 to $210,000 savings per year.

Figure 2-3. South Plant Aeration Diffuser Membrane Installation

WTD's Energy Program is in the process of creating a standard procedure for completing energy analyses so that project teams are able to evaluate the energy use projected for various alternatives. A standard procedure will help build confidence across the division in energy use estimates and streamline the analysis for project teams.

Table 2-2 shows projected energy savings from capital projects that are under way or recently completed.

Table 2-2. WTD Capital Projects and O&M Efforts Expected to Decrease Energy Use by more than 100,000 kWh per year (2015–2022)

Project Name	Expected Decrease [kWh/year]	Expected Year of Completion
South Plant Lighting Upgrade	850,000	2015
South Plant Aeration Diffuser Membrane	750,000	2016
Brightwater Lighting Replacement	290,492	2016
West Point Admin & Maintenance Building Heating Ventilation and Air Conditioning (HVAC) Controls	170,000	2016
Dry Well Heating Control Optimization	3,700,000	2017
South Plant Raw Sewage Pump Replacement	1,312,090	2017
West Point Liquids Control System Replacement	535,958	2017
West Point Lighting Upgrade	360,835	2017
West Point Mixed Liquor Channel Air Blowers	1,500,000	2019
West Point Intermediate & EPS VFD & Dewatering	150,000	2019
South Plant Biogas and Heat Systems Improvement	2,400,000	2021
West Point OGADS Replacement	11,000,000	2022

Chapter 3 includes recommendations to build on existing efforts and expand energy efficiency innovation in capital projects.

2.3 Goal 3: Produce and Use Renewable Energy

WTD expects to satisfy the target to meet 70 percent of its energy consumption with renewable sources by 2020. WTD will do this through the use of biogas generated from the division's anaerobic digesters and implementation of the Green Direct purchase agreement with Puget Sound Energy (PSE) for the purchase of renewable wind energy for a 10-year term beginning in 2019. This agreement pertains to all King County facilities that receive power from PSE, including South Treatment Plant. WTD also anticipates meeting the 2025 target for 85 percent of its energy consumption with renewable resources.

Two major strategies are in place to achieve WTD's goal to produce and use renewable energy and meet renewable energy targets:

- Maximize Production and Use of Biogas
- Increase Production and Use of non-Biogas Renewables

2.3.1 Strategy 3.1: Maximize Production and Use of Biogas

The South, West Point, and Brightwater treatment plants use digester gas to produce heat, electricity, and natural gas. Biogas generated from WTD's anaerobic digesters remains the division's most cost-effective and reliable energy source. The availability, use, and sale of biogas not only reduce the amount of energy WTD needs to purchase but also reduce WTD's carbon footprint:

- At the West Point Treatment Plant, two internal combustion engines fueled by digester gas provide power to generators that produce electricity and heat. The hot exhaust gasses from these engines are captured to heat water, and then sent to heat the plant's digesters and occupied spaces. This system produces about 18,000 megawatt hours (MWh) of electricity each year. Seattle City Light (SCL) purchases the power produced by the plant's cogeneration system, including the renewable energy credits. About $1.4 million in revenue is generated annually from the sale of this green electricity.

- Prior to 2017, South Plant processed biogas and used about 20 percent to fuel the boilers heating the digester tanks. The remainder of the biogas was "scrubbed" to remove the carbon dioxide and produce pipeline-quality natural gas and then sold to PSE for use in local homes and businesses.

- As of January 2017, South Plant is transitioning from selling gas to PSE to sell to another third party who will in turn use that gas in vehicle fleets using compressed natural gas (CNG). This will offset using fossil fuel-based diesel,

generating valuable renewable identification numbers (RINs) for WTD[13]. The resulting revenue will help to offset some of the energy operating costs and fund future efficiency, renewables and other carbon neutrality-related efforts.

WTD recently completed biogas utilization studies for each of its regional treatment plants (South, West Point, and Brightwater). The purpose of the studies was to evaluate each plant's digester gas management system and identify potential capital projects with the following objectives:

- Improve system component performance, efficiency, and reliability
- Maximize the cost-effectiveness and environmental benefit of the biogas end use
- Contribute to the applicable targets and goals established in King County plans and ordinances

Findings from the studies include the following:

- The South Plant Biogas and Heat Systems Improvement project resulted from the South Plant study. The project will install a more energy efficient gas scrubbing system, effluent heat pumps, and a boiler capable of using unscrubbed biogas to meet the plant's heating demand. The project is under way and is expected to be substantially complete in 2021.

- The West Point study identified a preferred alternative that would expand the existing combined heat and power system with an additional smaller internal combustion engine. Implementation of a new system has been deferred until more information can be obtained on operational improvements associated with the new waste gas burners, contract limitations on the power purchase agreement with SCL and value of additional power produced at the plant, and amount of surplus biogas available for a new system.

  In addition, WTD is looking at the possibility of replacing the raw sewage pumps with electrical pumps with RINs funding, as well as evaluating the possibility to expand the cogeneration system. These efforts could lead to reducing the amount of gas that is flared at the facility.

[13] Renewable identification number" means one of the mechanisms established to allow obligated parties to demonstrate compliance with renewable fuel volume obligations established under the Energy Policy Act of 2005 (Public Law 109-58) and the Energy Independence and Security Act of 2007 (Public Law 110-140) A renewable identification number is assigned to a unit of renewable fuel for purposes of tracking its production and use. Once the unit of fuel is consumed, the renewable identification number can be used to satisfy renewable fuel obligations and can be sold or traded to obligated parties to satisfy their renewable fuel obligations in current or future years.

- The Brightwater study looked at various options to optimize beneficial use of biogas. Based on the study, it is recommended that implementation of a new system be deferred until a formal alternatives analysis is conducted to determine whether inclusion of effluent-source heat pumps better meets the County's financial, environmental, and operational objectives and what technology for biogas upgrading best meets the County's needs.

Chapter 3 includes recommendations to re-assess study findings and to carry out additional actions to maximize the use and production of biogas.

2.3.2 Strategy 3.2: Increase Production and Use of non-Biogas Renewables

Increasing production and use of non-biogas renewables is key to WTD achieving the third goal of the Energy Plan. The Green Direct purchase agreement with PSE is an important action in meeting the 2025 target of consuming renewable energy equal to 85 percent of WTD's operational facility energy consumption. WTD is also looking at ways to incorporate solar and wind energy in its capital projects, and evaluating and planning for using additional renewable energy sources, including solar photovoltaics and alternative fuels in WTD's truck hauling fleet.

Examples of how WTD has incorporated or planned for the use of solar energy include the following:

- The design plans for the Georgetown Wet Weather Treatment Station include a small solar array at the operations support building, and the entire canopy over the Ultra-Violet disinfection area will be solar ready.
- The Juanita Bay Pump Station was designed and built with solar-ready infrastructure.
- The Brightwater Center has solar photovoltaic and solar thermal panels to generate renewable energy for the building as well as provide a vehicle for public awareness and education about renewable energy.
- An effort is under way in WTD's Project Formulation program to evaluate the feasibility of incorporating solar power at South and Brightwater treatment plants.[14]

WTD is considering ways to meet the SCAP target of increasing the percentage of alternative fuels used in fleets by 10 percent by 2025, compared to a 2014 baseline.

[14] WTD's Project Formulation Program is intended to provide decision makers with the information necessary to more fully evaluate proposed projects when considering funding requests and to reduce the differences between charter and baseline project costs, schedules and scopes.

Although the technology is not yet available for using alternative fuels in Class 8 high horsepower Loop trucks, it is anticipated to be in the next few years. Use of alternative fuels in the Loop fleet and grit hauling trucks will be evaluated prior to the purchase of a new fleet.

WTD is installing heat recovery systems to capture heat from South Plant's effluent for the plant's heating needs. WTD also recognizes the potential for partnerships to develop raw sewage heat recovery systems and create renewable energy for communities to use. WTD intends to continue to pursue such opportunities as they arise.

Chapter 3 includes recommendations that align with this strategy.

2.4 Goal 4: Achieve Carbon Neutrality in Operations and Purchasing

Recognizing the risks and impacts associated with carbon emissions, WTD is working to reduce its reliance on fossil fuels without jeopardizing its fundamental mission to protect public health and the environment. WTD has set targets to achieve and maintain carbon neutrality for WTD operations by 2017 and to be carbon-neutral for operations and purchasing by 2025.

As shown in WTD's 2016 carbon footprint Sankey diagram (Figure 2-4), WTD's major source of carbon emissions from its operations stems from the production of electricity supplied by PSE.[15,16] More than 30 percent of PSE's electrical energy currently comes from coal-fired plants, and 20–30 percent comes from natural gas, another non-renewable fuel source.

PSE supplies electricity to the South Treatment Plant and all of the offsite facilities on the east and south side of Lake Washington. The overall fuel mix PSE uses to generate its electricity varies from year to year, but coal and natural gas have always made up a significant portion during the last ten years. SCL, which supplies power to the West Point Treatment Plant and the offsite facilities on the west and north side of Lake Washington, sources over 90 percent of its electricity from renewable sources, largely hydropower. SCL also purchases annual offsets and considers its power supply greenhouse gas neutral. The Snohomish County Public Utility District (SnoPUD) supplies power to the Brightwater Treatment Plant and sources just under 90 percent of its power from mostly renewable energy sources as well.

[15] Sankey diagrams summarize all the energy transfers taking place in a process. The thicker the line or arrow, the greater the amount of energy involved.
[16] Figure 2-4 is draft until the Washington Utilities Trade Commission officially releases the energy fuel portfolio mixes for individual utilities for 2016, which is expected in 2018.

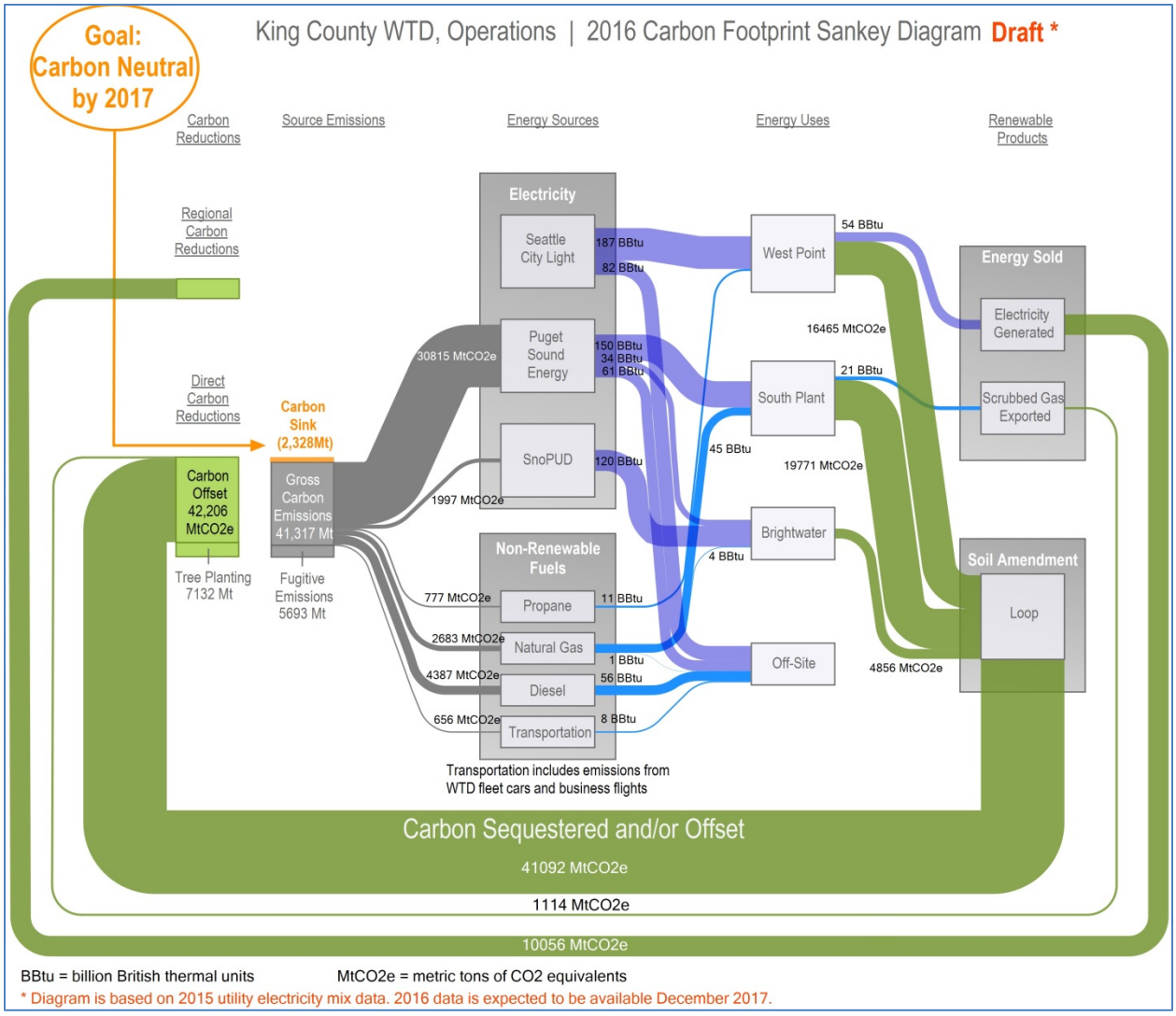

Figure 2-4. WTD 2016 Carbon Footprint Sankey Diagram

With this mix of electrical supply and on-site energy use, WTD's operations are responsible for emitting a certain amount of greenhouse gas emissions. However, other elements of WTD's operations reduce the division's overall carbon footprint by sequestering or offsetting carbon emissions.

The main way that WTD offsets its carbon emissions is by storing carbon in the soil with Loop® biosolids created during the treatment process. Loop is a natural soil amendment and fertilizer replacement, rich in organic matter and carbon. When Loop is applied to farmland, forests, gardens, and degraded soil, it reduces greenhouse gas emissions by replacing fossil-fuel-intensive synthetic fertilizer with biosolids—and by keeping carbon in the soil and out of the atmosphere. Most Loop is currently transported to farmland in Eastern Washington by trucks.

In recent years, WTD operations have achieved, or have been close to achieving, carbon neutrality (Figure 2-5).[17] This means the division has offset as much carbon emissions as its operations produced. Carbon neutrality is achieved through a combination of efforts including energy efficiency efforts at WTD facilities, applying Loop to soil, converting biogas produced at the treatment plants into renewable energy, decreasing emissions through more efficient Loop truck operations, reducing purchasing-related emissions, and planting trees.

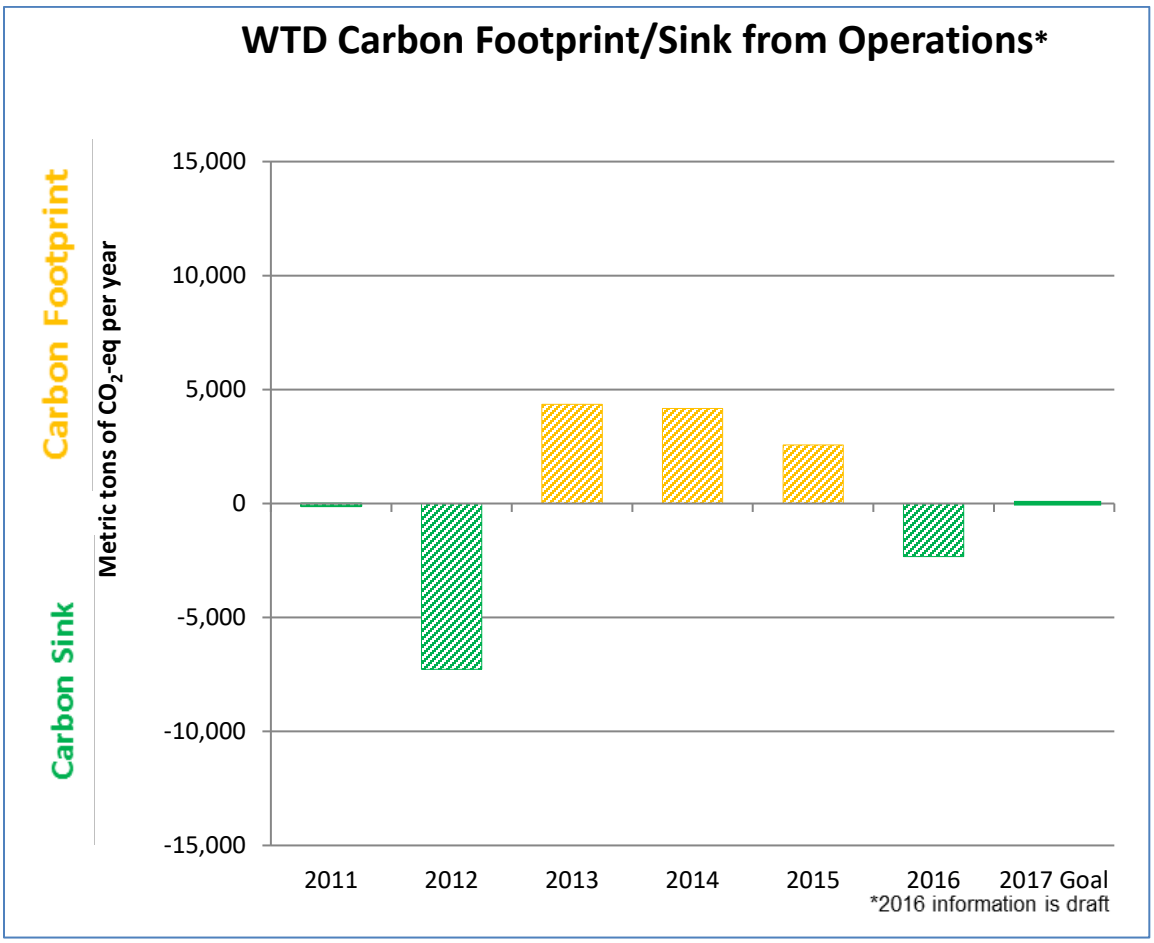

Figure 2-5. WTD Carbon Footprint/Sink from Operations 2011-2017

The current calculation used to achieve carbon neutrality does not include the impact of emissions produced in making equipment and materials purchased for the division's operations and construction-related activities. For example, the production of concrete is one of the largest sources of greenhouse gas emissions worldwide. WTD has started to calculate and include the effects of purchases in its carbon footprint as shown in Figure 2-6. The division is working closely with County climate staff and others to ensure the calculations for purchasing-related emissions are accurate. The notable

[17] Figure 2-5 is draft until the Washington Utilities Trade Commission officially releases the energy fuel portfolio mixes for individual utilities for 2016, which is expected in 2018.

decrease in 2019 and 2020 is due to an estimate of WTD-purchased renewable energy from PSE's Green Direct program.

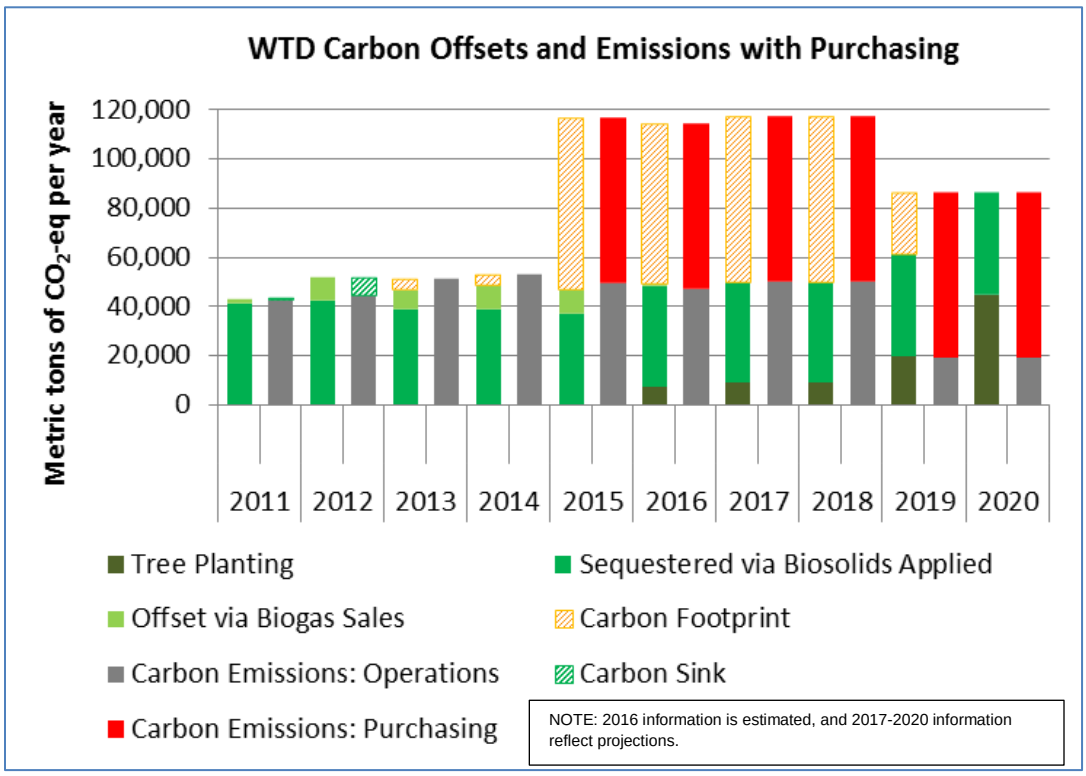

Figure 2-6. WTD Carbon Offsets and Emissions with Purchasing 2011–2020

Estimated purchasing-related emissions (Figure 2-7) account for over half of WTD's current overall emissions.

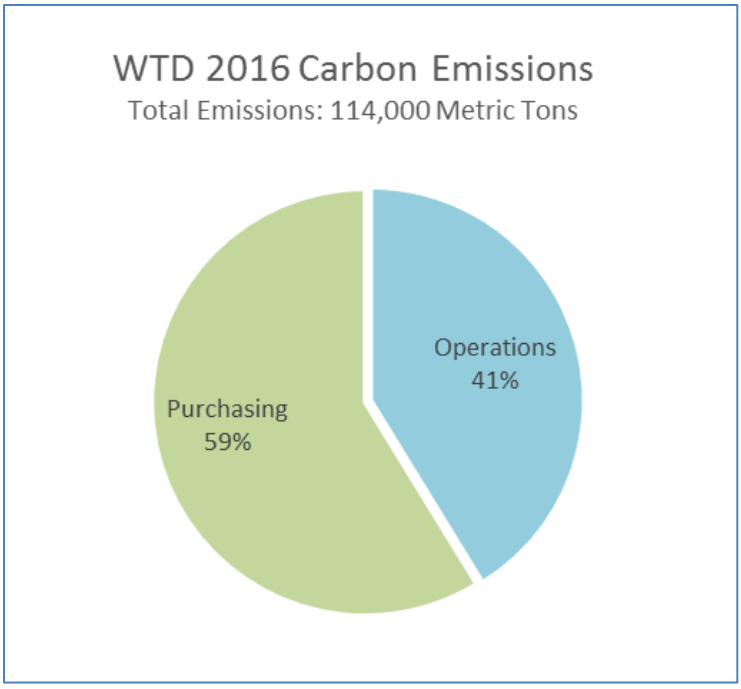

Figure 2-7. WTD 2016 Carbon Emissions Percentages

Achieving carbon neutrality when accounting for both operations and purchasing-related emissions will be a challenge because an accurate methodology for calculating greenhouse gas (GHG) emissions from purchasing is still under development. Additionally, WTD will be investigating potential GHG emissions associated with conveyance and nitrification. Implementation of the following strategies, along with the recommendations provided in Chapter 3, are expected to help WTD achieve this goal.

2.4.1 Strategy 4.1: Increase Energy Efficiency

All efforts to increase energy efficiency will help to reduce GHG emissions for either WTD or the region as a whole. The strategies outlined previously to achieve Goal 2 will also help the division reach and maintain carbon neutrality.

2.4.2 Strategy 4.2: Increase Production and Use of Renewables

All efforts to increase production and use of renewables will help to reduce GHG emissions for either WTD or the region as a whole. The strategies outlined previously to achieve Goal 3 will also help the division reach and maintain carbon neutrality.

WTD's participation in PSE's Green Direct program, which will begin in January 2019, will help to increase the division's use of renewables.

2.4.3 Strategy 4.3: Reduce Greenhouse Gas Emissions from Purchasing

A key element to reducing GHG emissions from purchasing is accurate accounting of such emissions. Continuing to work with other County climate, sustainability, and energy staff on a methodology is an important next step and is included as a recommendation in Chapter 3. In addition, changes in purchasing practices could result in inclusion of low or no emission alternatives where possible and based on consideration of several factors, including costs.

2.4.4 Strategy 4.4: Sequester Carbon with Loop®

Land application of Loop biosolids is an effective way to sequester carbon and helps WTD achieve its carbon-neutral targets.

2.4.5 Strategy 4.5: Plant Trees

WTD is participating in the County's initiative to plant 1 million trees by 2020 to help offset WTD's GHG emissions. Trees store carbon and contribute to clean air and water, healthy habitat for salmon and other wildlife, and more livable communities. In 2016, WTD was responsible for planting 2,800 trees.

3.0. RECOMMENDATIONS

This chapter presents the recommendations for WTD to implement through 2025 in order to achieve the four goals of the Energy Plan. Table 3-1 presents the recommendations in priority order, next steps, a general timeline to begin and complete next steps, and anticipated outcomes associated with each recommendation. In addition, a column that shows the goals and strategies (Figure 3-1) that correspond with each recommendation is included in the table.

Goal 1: Holistically Integrate Energy Awareness across WTD
- Strategy 1.1: Promote WTD Energy Vision
- Strategy 1.2: Address Strengths, Weaknesses, Opportunities and Challenges

Goal 2: Increase Energy Efficiency
- Strategy 2.1: Track and Monitor Energy Usage
- Strategy 2.2: Conduct Energy Audits
- Strategy 2.3: Increase Energy Efficiency in Operations
- Strategy 2.4: Integrate Energy Efficiency into Capital Projects

Goal 3: Produce and Use Renewable Energy
- Strategy 3.1: Maximize Production and Use of Biogas
- Strategy 3.2: Increase Production and Use of non-Biogas Renewables

Goal 4: Achieve carbon neutrality in operations and purchasing
- Strategy 4.1: Increase Energy Efficiency
- Strategy 4.2: Increase Production and Use of Renewables
- Strategy 4.3: Reduce GHG Emissions from Purchasing
- Strategy 4.4: Sequester Carbon with Loop
- Strategy 4.5: Plant Trees

Figure 3-1. Goals and Strategies of the Energy Plan

Figure 3-2 displays the plan's recommendations using an impact-effort matrix, rating the recommendations based on both overall expected outcome as well as ease of implementation. The best efforts to start with are the No Brainers, followed by Quick Wins, Strategic Efforts, and finally those to Re-Evaluate Later.[18] The recommendations in Table 3-1 are prioritized based largely on the results from this exercise.

[18] Strategic efforts refer to actions that may involve coordination with multiple groups, may require large investments, have a high potential for energy savings, and are associated with long-term, long-lasting results.

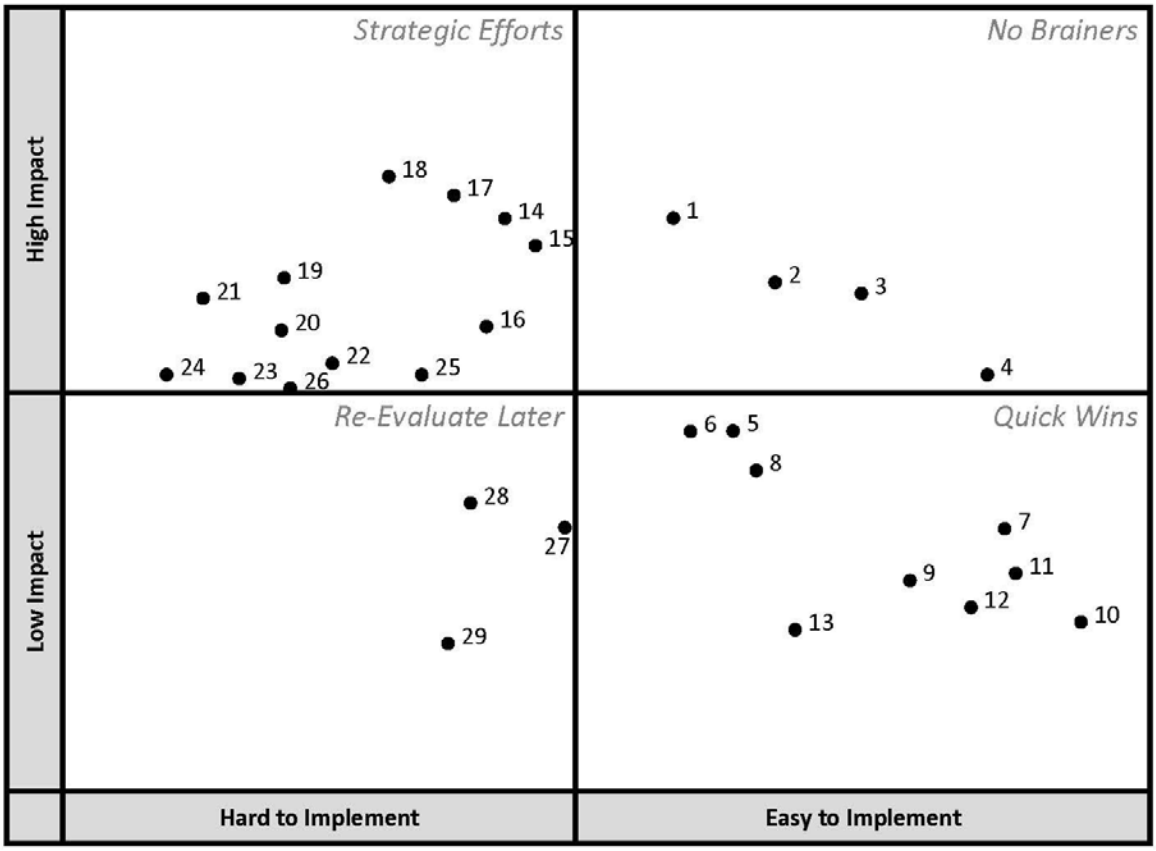

Figure 3-2. Impact-Effort Matrix for Energy Plan Recommendations

The plan includes 29 recommendations. Some of them could be achieved through better coordination and communication across the division and do not require additional staffing or financial resources; others are already included in the Energy Program's existing work plan; and several may result in the need for new capital projects and additional staff resources. In addition, some of the recommendations and next steps call for evaluations, which may result in future opportunities to help meet one or more of the plan's goals.

The scope of work for the Energy Plan did not include developing specific cost estimates, energy savings estimates, staffing plans, or detailed work plans associated with specific recommendations. Such work will take place during implementation of the plan. Efforts to implement specific recommendations will be incorporated into annual work plan updates for the Energy Program and other work groups as appropriate.

Table 3-1. Recommendations to Achieve the Four Goals of the Energy Plan

Priority	Affected Goal/ Strategy	Recommendation	Anticipated Outcome	Next Steps	Begin Next Step	Complete Next Step
1.	2.2, 2.3, 4.1	Evaluate Brightwater odor control requirements	• Recommendations to optimize energy associated with Brightwater odor control, while maintaining current odor control commitment	• Develop scope, schedule, budget • Carry out evaluation and develop recommendations	2018 2019	2019 2020
2.	2.3, 2.4, 3.1, 4.1, 4.2	Insulate Brightwater digester walls	• Less natural gas will be used, increasing plant energy efficiency • More biogas will be available for renewable energy opportunities	• Formalize capital project request • Implement project (dependent upon budget approval)	2018 2020	2018 2021
3.	2.2, 2.3, 2.4, 3.1, 3.2, 4.1, 4.2	Conduct energy audits of treatment plants and pump stations, and implement prioritized recommendations	• Identified and prioritized energy efficiency recommendations • Implemented actions that increase energy efficiency at WTD facilities	• Complete the following energy audits, and develop prioritized recommendations: o Brightwater o South Plant o West Point o Carnation Treatment Plant o Interbay Pump Station o Elliott West CSO Facility o Carkeek Pump Station o Matthews Pump Station o Interurban Pump Station o Sunset Pump Station • Implement prioritized audit recommendations	 2017 2018 2019 2020 2020 2021 2021 2022 2023 2024 2017	 2017 2018 2019 2020 2020 2021 2021 2022 2023 2024 ongoing
4.	1.2, 2.1	Establish treatment plant-specific energy targets	• Clear targets for treatment plant management and staff to track energy usage over time	• Energy Program works with treatment plant managers to develop targets	2019	2019
5.	1.1, 1.2	Develop and implement an internal energy communications plan	• Internal energy communications plan • Increased awareness of importance of energy across	• Energy Program works with internal communications staff to develop plan • Implement plan	2018	2019

Priority	Affected Goal/ Strategy	Recommendation	Anticipated Outcome	Next Steps	Begin Next Step	Complete Next Step
			division, and how work groups have a role in meeting energy goals and targets	• Conduct continuous evaluation and improvements		
6.	1.2, 2.4, 4.1	Develop energy analysis templates for capital projects	• Completed standardized energy analysis templates and training • Energy use is evaluated consistently when considering capital project alternatives	• Energy Program develops templates and training • Energy Program delivers training to capital project managers and engineers	2018 2018	2018 2018
7.	1.2, 2.3, 2.4, 4.1	Identify a forum to mitigate or resolve conflicts and competing priorities with energy efficiency actions	• Process in place to address challenges and resolve conflicts • More energy efficiency work is completed	• Energy Program works with supervisor and section manager to develop next steps	2018	2018
8.	1.2, 2.4, 4.1	Develop requirement in RFPs for an energy engineer to be part of consultant team on projects that involve energy use	• An energy perspective is intentionally and consistently incorporated in alternatives development and analyses	• Energy Program staff work with Project Management and Project Control Unit managers to develop requirement	2019	2019
9.	1.2, 2.4, 4.1	Implement SCAP energy-related Technical Requirements: • Projects must meet the most stringent energy code in the county • SCAP strategies for construction and remodel projects • Motion sensors are designed and installed on all indoor lights • Photocells are designed and installed on all outdoor lights	• Written guidelines for engineering, design, project, and construction teams to follow	• Work with Engineering Unit Manager to ensure standards outlined in the SCAP are formalized in WTD's standards	2017	2019
10.	4.5	Finance tree-planting to offset greenhouse gas emissions	• WTD is closer to achieving carbon-neutrality in operations and purchasing	• Continue to ensure RINs funds are provided for the tree-planting efforts	2016	ongoing

Priority	Affected Goal/ Strategy	Recommendation	Anticipated Outcome	Next Steps	Begin Next Step	Complete Next Step
11.	1.1, 1.2	Apply ESJ lens to energy-related decisions	• WTD's energy-related decisions consider and help meet the county's ESJ Strategic Plan goals	• Energy Program staff take racial equity training that is under way for all WTD staff • Energy Program staff work with WTD's ESJ Committee to identify where energy actions can intersect ESJ priorities	2017 2018	2018 ongoing
12.	1.2	Develop program to diversify energy program hiring	• Increased representation of People of Color in environmental careers	• Work with Resource Recovery Section Manager and HR to determine next steps	2018	2019
13.	3.2, 4.2	Evaluate installation of solar photovoltaics on additional facilities	• Identified facilities where solar could be utilized to increase renewable energy generation and consumption	• Populate list of potential sites • Work with DNRP Director's Office to evaluate site potential	2018 2019	2018 2019
14.	1.2, 2.1, 2.2	Develop roles and responsibilities and allocate resources to (1) configure and maintain power monitoring software and (2) track energy usage	• Identified staff and roles • Improved tracking and monitoring of energy usage • Increased access to energy use data	• Energy Program work with appropriate staff at plants to identify a path forward	2019	2019
15.	1.2, 2.3, 2.4, 4.1	Develop or refine guidelines for design and operation of HVAC/odor control systems in new or upgraded facilities, including consideration of the following: o Programmable thermostats o Heating/cooling set points o Wet well ventilation o Demand-driven versus constant odor control o Combustion heating requirements	• Increased energy integration into WTD technical standards, design guidelines, and specifications • Increased energy efficiency in capital projects	• Energy Program and Engineering Unit Manager work together to determine next steps	2017	2019

Priority	Affected Goal/ Strategy	Recommendation	Anticipated Outcome	Next Steps	Begin Next Step	Complete Next Step
		o Heat recovery requirements				
16.	2.3, 2.4, 4.1	Modify Brightwater aeration basins to optimize denitrification	• Increased treatment plant energy efficiency	• Project team to evaluate alternatives and select preferred alternative • Implement preferred alternative as part of project	2017 2019	2018 2021
17.	1.2	Achieve better integration of energy considerations in planning	• Participation of Energy Program staff on planning project teams at initiation • Conceptual projects generated in planning include energy-innovative options and not just conventional options	• Energy Program and Planning supervisors discuss next steps	2018	ongoing
18.	1.2, 2.1, 2.2, 2.3, 2.4, 3.1, 3.2, 4.1, 4.2	Establish new staff positions to carry out energy-related work	• Secured budget authorization for new staff • New staff hired • Increased capacity to meet WTD's energy goals, targets, and commitments	• Hire new HVAC efficiency technicians and electricians to ensure sufficient staffing to implement energy-focused work with dedicated weekly maintenance staff time • Hire two new plant-specific energy engineers to develop and implement energy projects	2017 2017	2019 2019
19.	1.2, 2.3, 2,4, 3.1, 3.2, 4.1, 4.2	Revisit Portfolio Management Resource Recovery sub-portfolio criteria to better represent energy projects	• More projects with a positive life cycle cost are funded	• Energy Program staff work with sub-portfolio lead to determine next steps	2019	2020
20.	3.1, 4.2	Install additional cogen engine per West Point digester gas use evaluation	• Use of biogas produced at West Point is maximized	• Submit for approval as new project	2018	2018

Priority	Affected Goal/ Strategy	Recommendation	Anticipated Outcome	Next Steps	Begin Next Step	Complete Next Step
			• WTD is closer to meeting its renewable energy production targets			
21.	3.1, 4.2	Re-evaluate co-digestion of brown grease at South Treatment Plant	• Increased treatment plant renewable opportunities • WTD is closer to meeting its renewables targets	• Work with Technology Assessment to update business case • Work with management to plan FTEs to operate facility	2019 2019	2020 2020
22.	1.2, 2.3, 2.4, 3,1, 4,1, 4.2	Evaluate inclusion of effluent-source heat pumps at Brightwater Treatment Plant per digester gas evaluation	• Identified project to increase treatment plant energy efficiency • Increased treatment plant renewable energy opportunities	• Conduct evaluation	2020	2021
23.	2.2, 2.3, 4.1	Evaluate wet well level set points in terms of energy efficiency as well as reliable operations	• Identified actions to increase energy efficiency	• Evaluate if and how wet well level set points can be higher so less pumping is needed	2019	2020
24.	3.2, 4.2	Engage and support external projects to develop raw sewage heat recovery system	• Increased regional renewable energy opportunities	• Pursue development opportunities as they arise	2018	ongoing
25.	4.3	Work with King County climate, sustainability, and energy staff to develop an accurate methodology for calculating GHG emissions from purchasing, as well as collaborating on potential ways to reduce GHG from purchasing	• Better estimates of emissions from purchasing • Identified ways to reduce GHG emissions from purchasing	• WTD to work with King County climate, sustainability, and energy staff to develop next steps	2018	2020
26.	3.1, 4.2	Re-assess findings from Brightwater Biogas Utilization Study	• Potential actions to increase beneficial use of biogas	• Re-evaluate findings after the digesters are insulated	2021	2021

Priority	Affected Goal/ Strategy	Recommendation	Anticipated Outcome	Next Steps	Begin Next Step	Complete Next Step
			• WTD is closer to meeting its renewable energy consumption targets			
27.	2.3, 3.2, 4.1, 4.2	Convert grit hauling trucks to compressed natural gas (CNG)	• Increased truck fleet fuel efficiency • Potential increased use of renewables	• Evaluate benefit/costs of this action	2020	2020
28.	2.3, 4.1	Reduce fuel use in LOOP truck fleet	• Increased truck fleet fuel efficiency	• Work with Biosolids Program to evaluate options to reduce fuel use, including replacement of trucks	2016	2019
29.	2.3, 2.4, 4.1	Install smaller pumps at Brightwater Influent Pump Station	• Increased treatment plant energy efficiency • WTD is closer to meeting its energy efficiency targets	• Formalize capital project request • Implement project (dependent upon budget approval)	2019 2022	2019 2025

APPENDIX A

Wastewater Treatment Division
2017–2021 Energy Reduction Plan

December 2016

Department of Natural Resources and Parks
Wastewater Treatment Division

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Table of Contents

1 Introduction

This *2017–2021 Energy Reduction Plan* lays out the King County's Wastewater Treatment Division's proposed approach for helping the County meet its 2025 energy reduction goals as specified in the 2015 King County Strategic Climate Action Plan. In 2017, WTD will develop an energy strategic plan, which will include the information from this energy reduction plan along with other operational and programmatic strategies to optimize WTD's energy performance, meet additional SCAP targets, and continue to be an innovative and resilient water utility. Funding for efforts related to energy efficiency and renewables will come from a variety of sources including WTD's operational and capital budgets, the Carbon Neutral fund, gas-related renewable identification numbers (RINs) revenues, and grants.

1.1 Strategic Climate Action Plan

In December 2015, King County adopted a Strategic Climate Action Plan (SCAP) that charts a pathway to achieve a clean energy future. The plan envisions local governments, businesses, and communities working together toward an equitable, sustainable, and thriving King County for all who live, work, and play here. King County is already experiencing the impacts of a changing climate, and with the SCAP, it has made some bold commitments and lays out ambitious strategies to act on climate solutions.

1.2 Wastewater Treatment Division

King County's Wastewater Treatment Division (WTD) protects water quality and prevents water pollution by providing wastewater conveyance and treatment services for 17 cities and 17 local sewer utilities.[1] WTD has three large regional treatment plants, over 300 miles of pipes, and serves about 1.7 million people, including most urban areas of King County and parts of south Snohomish County and northeast Pierce County. Although WTD is one of the largest energy users in the county government, it is also one of the leaders in innovative energy management and renewable energy generation.

[1] http://www.kingcounty.gov/environment/wtd/About/SewerAgencies.aspx

Figure 1. The West Point Treatment Plant converts methane from wastewater into heat and electricity

1.3 SCAP Energy Reduction Goals

Strategy A.1 of the SCAP directs WTD to create an energy reduction plan:

> All County agencies that consumed an average of 50,000 or greater MMBTU per year in buildings between 2012 and 2015 shall develop energy reduction plans by January 1, 2017. Such plans shall be no more than five years old and shall be updated at least every five years. As of 2015, this strategy impacts the Facilities Management, Transit and Wastewater Treatment Divisions. Energy Plans shall detail key actions, implementation strategies, barriers, and methods for how the agency will contribute to the County's 2025 energy reduction goal. Among other details, the Energy Plans shall include sections addressing site facility assessments/audits, as well as facility recommissioning, generally following the guidance in Strategies A.2 and A.3.

This 2017–2021 Energy Reduction Plan responds to Strategy A.1 and focuses on how WTD aims to meet the SCAP's 2020 and 2025 energy reduction goals below:

> Measure 1: Normalized energy use at County facilities, measured in millions of British Thermal Units (MMBTU)
>
> Target 1: King County will reduce normalized energy use in County owned facilities by at least five percent by 2020 and 10 percent by 2025, as compared to a baseline year of 2014.

Normalized energy use for WTD is the amount of energy that would have been used in any given year to provide the same service under the same external conditions (weather and wastewater flow) as in the baseline year (currently 2014). This means that any new services/operations provided (which were not provided as of 2014) will not be included when calculating normalized energy use until a new baseline model is established.

The projected energy efficiency gains from currently planned capital projects and operations and maintenance (O&M) efforts show that **WTD is on track to meet both the 2020 and 2025 energy reduction goals**. This plan shows the projected changes to WTD's energy use, provides details on the specific planned capital investments with an impact on energy use, identifies potential barriers to meeting the goals, and describes WTD's approach to further increase energy efficiency past the SCAP goals, including a plan for facility energy assessments/audits and recommissioning.

2 WTD Actions to Meet Energy Reduction Goals

WTD is in various stages of progress on a number of capital projects and other focused efforts to reduce its energy use and meet the County's energy reduction goal. This chapter describes these efforts and WTD's projected future energy use through 2030.

2.1 Energy Reduction Efforts

This section describes ongoing and planned capital projects, operational efforts, and staffing to promote energy reduction goals in WTD.

2.1.1 Capital Projects

As of September 2016, there are 87 active capital projects in WTD. A number of these projects will either increase or decrease WTD's energy use. Complete lists of the specific projects with energy impacts can be found in Tables 1 and 2 (pages 6 & 7).

In addition to these active projects, WTD has combined sewer overflow (CSO) facilities in various stages of planning. These facilities are expected to increase the division's energy use. However, the facilities will provide additional service by helping protect water quality in the Puget Sound area. Thus, the energy use attributed to them will not be included in WTD's existing normalized energy use model because providing additional service would require a change to the energy baseline in terms of energy accounting. Their energy use will be included when a new baseline year is adopted after the facilities are operational and fully commissioned.

An example of capital projects that will decrease WTD's normalized energy use are the lighting upgrades at the South, West Point and Brightwater treatment plants. The plants are in the process of upgrading their lighting from fluorescent to a more energy efficient LED technology. These upgrades are projected to save over 1.5 million kilowatt-hours (kWh) of electricity every year for WTD. This estimate is expected to increase as more of WTD facilities transition to LED lighting.

WTD is in the process of creating a standard procedure for capital projects to follow for completing an energy analysis to better inform the project team of alternatives for reducing energy use. Through energy analysis, projects will be able to evaluate the energy use projected for various alternatives, and having the process standardized will help build confidence across the division in the estimates, as well as streamline the process for project teams.

The division has received nearly $11 million since 2008 in energy efficiency grants to promote innovative design on capital projects. It will continue to dedicate substantial energy program resources to pursuing and securing such grants.

2.1.2 Operational Efforts

WTD continually strives to find ways to increase energy efficiency in its operations. The division established a Carbon Neutral Fund to help complete operational energy efficiency improvements that would otherwise likely not get funded because of competing priorities. Some examples of operational improvements completed through this fund are piloting the pump station dry well heating optimization, which saved over 800,000 kWh in 2016, and the West Point organics return eductor C3 water use optimization, which is estimated to save over 100,000 kWh annually once completed. The Carbon Neutral Fund will continue to serve as a vehicle to complete these often smaller, but critical, efforts.

A technical standard was created in 2014 that requires power monitoring on individual equipment in new systems and facilities. As projects are completed over time, more granular power monitoring information will be available. WTD plans to focus on configuring the power monitoring software at each plant to allow for easier review of energy monitoring data.

Regular review of energy use data allows the plants to identify changes in energy use close to when they occur and assess whether improvements can be made.

The division will also continue to participate in strategic energy management (SEM) programs sponsored by local power utilities. These programs focus on influencing behavioral changes and improving operational energy efficiency, and provide both technical expertise and performance-based incentives to improve plant efficiency. Each of the three regional treatment plants participates in such a program: the High Performance Energy Management (HPEM) Program through Seattle City Light, the Resource Conservation Management (RCM) Program through Puget Sound Energy, and the Wastewater Energy Cohort (WEC) Program through Snohomish County Public Utility District.

2.1.3 Additional Staffing to Support Efforts

The division has plans to hire three new term-limited temporary (TLT) positions in 2017 to support capital and
operational energy efficiency efforts, including identifying additional energy savings opportunities. One position will be part of the energy unit at King Street Center, while the other two are additional O&M staff to allow the plants to dedicate
staff time to specific energy-related efforts. The O&M positions will consist of one industrial maintenance electrician and one HVAC efficiency technician to complete operational efforts such as dry well heating, other HVAC-related system optimizations and pump station exterior lighting upgrades.

2.2 Projections of WTD's Future Energy Use

This section outlines the expected changes in WTD's future electricity use (increases and decreases) as planned capital projects and energy efficiency efforts are implemented.

2.2.1 Expected Decreases to WTD's Electricity Use

Figure 2 shows the expected impact of planned capital projects and O&M efforts that will lead to a net decrease in WTD's energy use between 2015 and 2030. The impact of each energy conservation effort is shown during the year of the expected substantial completion. By 2030, the sum of all efforts will produce a 12.2 percent decrease in energy use when compared to the 2014 baseline year. This equals a total reduction in energy consumption of 23,700,000 kWh per year or approximately $3.5 million in annual energy cost savings.[2]

[2] This number is based on an average 2014 electricity price of $0.07785/kWh and an assumed annual increase of 4 percent.

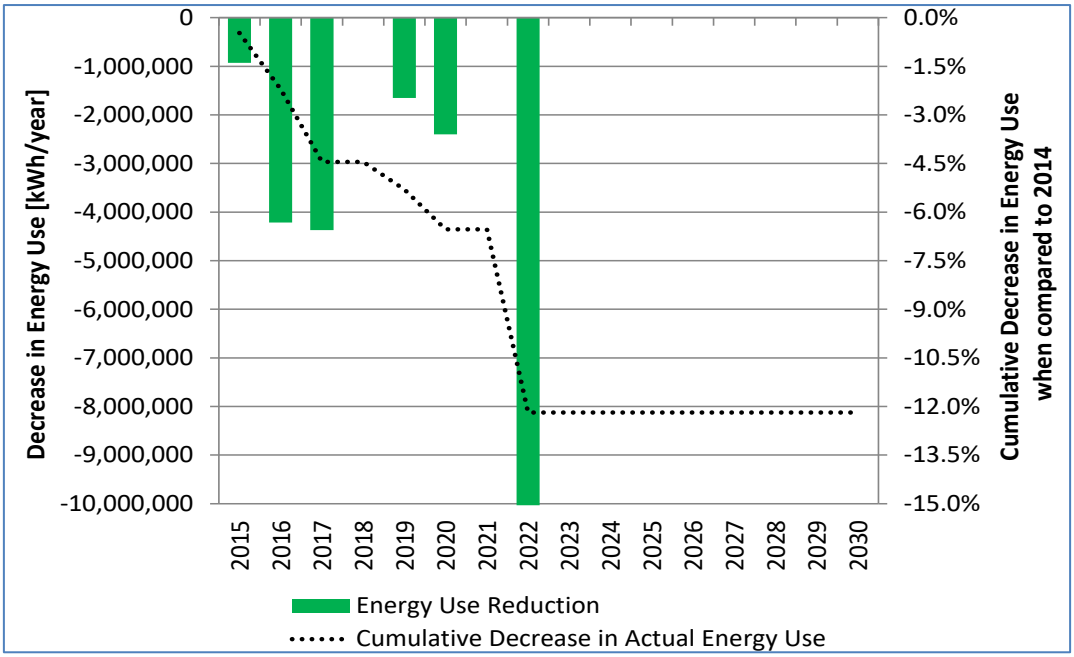

Figure 2. Expected decrease in WTD's energy use from planned capital projects and O&M efforts (2015–2030)

As shown in Table 1 on page 6, the expected reduction in energy use will come from a variety of projects:

- The Oxygen Generation and Dissolution System Replacement (OGADS) project is expected to significantly reduce the energy required to produce and distribute oxygen needed for West Point's secondary aeration process. This project will take advantage of new, more efficient oxygen generation technology, optimize the size of the oxygen generation system for daily use, and provide system turn-down capability for both oxygen generation and dissolution.
- The second largest decrease in energy use is expected to come from the installation of new controls for unit heaters installed in pump station dry wells. Most of WTD's 42 pump stations have electric resistance unit heaters, which are primarily used for freeze protection and to keep condensation from forming on electrical panels. The temperature set points on these heaters can shift upward over time and, in some cases, the heaters have been observed to operate year-round in these mostly unoccupied facilities, generating unnecessary heat. The new controls will ensure that temperature set points remain at 45°F and can only be increased temporarily while a space is occupied.
- Most of the efficiency improvements for the South Plant Biogas and Heat Systems Improvement project will come from a more efficient gas scrubbing system and a boiler capable of using unscrubbed biogas to meet the plant's heating demand.
- The South Plant Raw Sewage Pump Replacement project will replace old influent pumps that use eddy current clutches with more energy efficient variable frequency drive pumps that can turn down pumps as flow reduces for reduced energy demand.
- The West Point Mixed Liquor Channel Air Blower Replacement project will investigate various alternatives for efficiently keeping solids in suspension in the mixed liquor channel. The energy efficiency reductions from this project will be estimated after an alternative has been selected. Rough calculations indicate a 50 percent reduction in energy use could be achieved. The system currently uses about 3,000,000 kWh of electricity annually.

Table 1. Planned WTD projects and O&M efforts expected to decrease in WTD's energy use by more than 100,000 kWh per year (2015–2030)

Project Name	Expected Decrease [kWh/year]	Expected Year of Completion
South Plant Lighting Upgrade	850,000	2015
SP Aeration Diffuser Membrane	750,000	2015-2016
Elliott West Assess HVAC/Corrosion Issues	460,700	2016
Brightwater Lighting Replacement	290,492	2016
WP Admin & Maintenance Bldg HVAC Controls	170,000	2016
Dry Well Heating Control Optimization	3,700,000	2016-2017
SP Raw Sewage Pump Replacement	1,312,090	2017
WP Liquids Control System Replacement	535,958	2017
West Point Lighting Upgrade	360,835	2017
WP Mixed Liquor Channel Air Blowers	1,500,000	2019
WP Intermediate & EPS VFD & Dewatering	150,000	2019
SP Biogas and Heat Systems Improvements	2,400,000	2020
West Point OGADS Replacement	11,000,000	2022

All the energy efficiency projects in Table 1 will be taken into account when calculating WTD's normalized energy use because the projects will make existing systems more efficient without compromising effluent quality. The total energy savings of the planned capital projects and O&M efforts listed above equate to approximately 23,500,000 kWh, which will decrease WTD's normalized energy use by 12 percent under the 2014 baseline which helps the division meet the SCAP energy reduction targets for 2020 and 2025.

2.2.2 Expected Increases to WTD's Electricity Use

Figure 3 shows the expected impact on WTD's total energy consumption from planned capital projects that will add to WTD's energy use between 2015 and 2030. The impact of each project is shown during the year of expected substantial completion. The primary y-axis (left-hand side) shows the total added energy consumption during each year. The secondary y-axis (right-hand side) shows the cumulative change (percent) in WTD's energy use. By 2030, the energy use will have increased by 11 percent over the 2014 electricity use. In 2014, WTD used a total of 195,000,000 kWh of electricity. An additional use of 11 percent therefore equals 21,500,000 kWh per year or an additional $3.1 million in purchased energy in 2030.[3] Additional projects may be added based on various division studies and efforts under way which could further impact these projections.

Specific projects that constitute the energy increases in Figure 3 are identified individually in Table 2. Six of the seven projects with an expected energy use of more than 1 million kWh per year are CSO projects. The exception is the North Lake Sammamish Flow Diversion Project, where the expected energy increase does not come from the project but rather from treating wastewater at Brightwater rather than at South Plant. Brightwater has an energy footprint 4.6 times larger per gallon treated than South Plant because Brightwater uses a membrane bioreactor (MBR) technology, which produces higher quality effluent.[4] About 70 percent of the expected energy use in the CSO facilities is for ventilation and heating; the remaining 30 percent is for treatment and pumping.

[3] This number is based on an average 2014 electricity price of $0.07785/kWh and an assumed annual increase of 4 percent.

[4] When measured in source energy. Source energy represents the total amount of raw fuel required to generate and deliver purchased electricity, purchased natural gas, etc. to a facility.

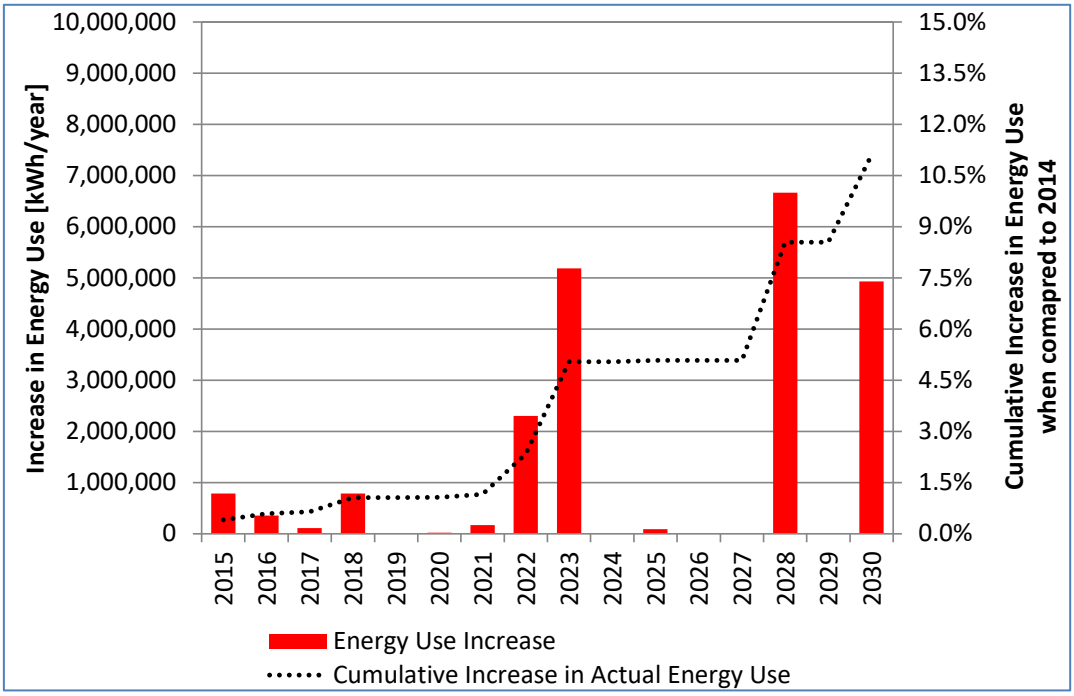

Figure 3. Expected increase in WTD's energy from operation of planned capital projects (2015–2030)

Of the planned capital projects shown in Table 2 that are expected to lead to a significant increase in WTD's total energy use, only the WTD Biosolids Fleet Repair and Maintenance Facility will have an impact on the normalized energy use calculation, because it will not provide additional service. Any new future services or facilities were not included in the 2014 baseline year, so they will not be part of the normalized energy calculation. The Biosolids Fleet Repair and Maintenance Facility is expected to have an annual electricity use of 240,000 kWh, which will increase WTD's normalized energy use by 0.12 percent over the 2014 baseline.

Table 2.
Planned WTD capital projects expected to increase WTD's energy use by more than 100,000 kWh per year (2015-2030)

Project Name	Expected Increase [kWh/year]	Expected Year of Completion
Influent Screening Improvements at the WPTP	780,000	2015
CSO Control & Improvements - Murray	350,000	2016
WTD Fleet Repair & Maintenance Facility	240,000	2018
Hanford at Rainier and Bayview North	500,000	2018
W Michigan/Terminal 115 GSI	170,000	2021
Georgetown Wet Weather Treatment Station	2,300,000	2022
North Lake Sammamish Flow Diversion	2,440,000	2023
North Mercer Island & Enatai Interceptors	500,000	2023
Chelan Ave CSO	1,080,000	2023
3rd Ave West CSO	1,170,000	2023
University CSO	4,470,000	2028
Montlake CSO	2,200,000	2028
Hanford #2/ Lander / King St/ Kingdom CSO	4,930,000	2030

2.2.3 Combined Impacts of Projected Energy Use

Figure 4 shows the combined impacts of planned energy conservation projects and planned capital projects that are expected to impact WTD's total energy use from 2015 through 2030. The two trend lines show the cumulative impact of all projects on WTD's actual energy use (dotted black line) and WTD's normalized energy use (solid black line). WTD is currently on track to meet the 2020 and 2025 SCAP energy conservation goals. Its normalized energy use is expected to decrease by 6.2 percent by 2020 and by 11.8 percent by 2025.

WTD is confident the projects planned will achieve the 2020 and 2025 SCAP energy conservation goals. The division also recognizes those goals are not the finish line, and will continue to identify, implement, monitor and track energy projects on a continual basis. In 2017, we are also completing a strategic energy plan to focus on ensuring this long-term continued energy reduction and renewables effort.

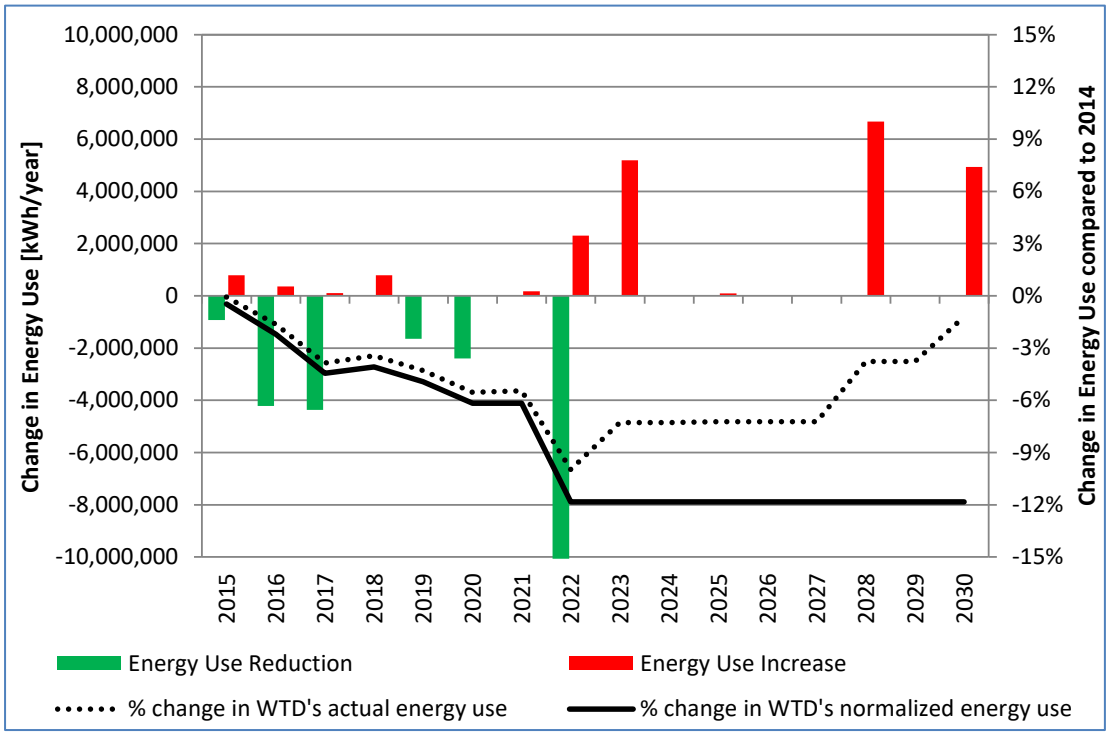

Figure 4. Projection of WTD's expected future energy use (2015–2030)

3 Constraints and Challenges

As WTD strives to improve its energy use, it will encounter critical obstacles. The following sections describe constraints and challenges. Despite these constraints and challenges, WTD believes plans are in place or under way that will enable the division to meet the ambitious energy reduction goals laid out in the SCAP.

3.1 Constraints

WTD's core mission is to convey and treat wastewater. While exploring energy conservation and innovation, the utility must be vigilant to ensure that its core mission is not compromised. One unyielding limitation is the need to meet regulatory permit requirements that help protect both the environment and public health. Permit conditions dictate what may be examined in terms of energy efficiency.

The division is also very committed to considering safety in all situations. Safety and energy innovation may appear at odds in various projects. An example of this is on the topic of pump station ventilation, whereby varying the airflow within allowable standards is not the industry or division's regular practice, thus raising safety concerns to be discussed and addressed. WTD is committed to fostering dialogue within the agency around this topic, and will continue to make efforts to allow energy efficiency efforts to succeed without compromising employee and public safety.

As understood today, the proposed actions that will enable WTD to meet the SCAP energy reduction goals are consistent with WTD's core mission, permit conditions, and safety values.

Figure 5. The Carnation Treatment Plant produces recycled water that is sent to the Chinook Bend Natural Area for wetland enhancement.

3.2 Challenges

WTD faces some challenges while striving to reduce its energy consumption:

- Treatment plant operational issues such as unexpected digester foaming and associated gas entrainment can affect both energy use and the ability to effectively capture digester gas.
- The federal consent decree issued to reduce occurrences of CSO events requires a significant amount of near-term investment, making capital budgets tight and potentially making it difficult to secure funding for energy efficiency or renewables projects.
- O&M staff is consistently pulled in many directions in order to keep our facilities operational and meet discharge permit requirements, often making it a challenge to

complete all work requests. The division will continue to work to identify and provide solutions to allow O&M to balance priorities and ensure all needs are addressed.

- Several new large facilities will come online as the CSO projects are completed. Because these facilities will be providing additional services to the region, they will not be included in WTD's existing energy normalization model, and a new model will need to be developed once the facilities are fully commissioned and operating as intended. While this additional energy use is excluded from the current energy use estimates, WTD is committed to designing these projects with energy efficiency in mind throughout the process.
- Energy markets and regulations can dramatically affect conditions and project outcomes. Market prices for diesel, natural gas, electricity, and environmental attributes such as those associated with RINs[5] can be volatile and are outside WTD's control. Changes in these markets and regulations may lead King County and WTD to modify their approach to energy reduction in the future.

[5] Renewable Identification Numbers (RINs) were developed under the federal Renewable Fuel Standard Program. RINs represent the positive environmental benefit associated with using a renewable fuel, such as digester gas created through the wastewater treatment process, to offset traditional carbon-based transportation fuels, such as diesel or gasoline.

4 Strategic Energy Audit Plan

WTD recognizes the importance of facility energy audits (assessments) to improve energy efficiency. It has completed numerous facility and system energy audits in recent years, identifying many energy conservation measures (ECMs) at various sites. Some of these recommended measures have been successfully implemented, such as minor lighting improvements at pump stations. WTD intends to focus efforts on implementing the remaining identified measures, particularly at pump stations, before focusing on identifying efforts through new audits for these facilities. The remaining ECMs include recommissioning a dry well air handling unit for unoccupied operation at a pump station, and installing automated temperature controls at all of the existing pump stations.

Because the ECMs identified through energy audits at pump stations can be replicated at many, if not all, pump stations or similar facilities, WTD will not perform audits at each pump station. It will determine appropriate representative stations to audit and apply the findings to the remaining facilities.

Table 3 shows the list of planned energy audits for WTD facilities through 2024. The facilities were selected based on a combination of energy use and the representative nature of the facility. The list includes an existing CSO facility, older pump stations, and planned new pump stations. The pump station audits are ordered according to when an audit was last completed at the site, with the exception of stations under design or construction (Sunset Pump Station).

O&M staff participation will be necessary for the energy audits, and WTD will allow adequate time and resources for planning and scheduling.

In early 2017, WTD may identify additional specific audits as part of a strategic planning process. Consequently WTD may add to this list of audits based on the energy program strategic plan.

Table 3. Planned energy audits of WTD facilities through 2024

Facility Name	Expected Year of Audit
Brightwater Treatment Plant	2017
Brightwater Influent Pump Station	2017
South Treatment Plant	2018
West Point Treatment Plant	2019
Carnation Treatment Plant	2020
Interbay Pump Station	2020
Elliott West CSO Facility	2021
Carkeek Pump Station	2021
Matthews Pump Station	2022
Interurban Pump Station	2023
Sunset Pump Station	2024

5 Moving Forward

WTD is excited to implement the actions identified in this plan in order to help King County and the region reduce their impact on climate change and consumption of natural resources, and **meet both the 2020 and 2025 SCAP energy reduction goals.**

In 2017, WTD will be developing an energy program strategic plan and also strategic plans for three other WTD programs. The energy strategic plan will include the information from this energy reduction plan along with other operational and programmatic strategies to optimize WTD's energy performance, meet additional SCAP targets, and continue to be an innovative and resilient water utility.

Appendix B. Status of SCAP Energy Targets and Goals that Pertain to WTD
as of December 2016

King County adopted the Strategic Climate Action Plan (SCAP) in December 2015. The plan charts a pathway to achieve a clean energy future, guiding County work to achieve ambitious greenhouse gas emissions reduction targets, prepare for the impacts of a changing climate, and ensure that King County continues to lead on climate action. The Wastewater Treatment Division's (WTD) Strategic Energy Plan team identified 40 SCAP energy-related targets and goals that pertain to WTD's Energy Program. Many are already incorporated into WTD's core business.

This appendix provides the status as of December 2016 of SCAP energy targets and goals that pertain to WTD. The order of the SCAP targets and goals in the table matches the order outlined in the SCAP, which is available at http://www.kingcounty.gov/services/environment/climate/strategies/strategic-climate-action-plan.aspx.

Status of SCAP Energy Targets and Goals that Pertain to WTD
as of December 2016

Item #	SCAP Page #	SCAP Energy-Related Target or Goal	Status (✓ = on target/underway or ongoing; ⇨ = future action/more information needed)
		County Operations Targets:	
1.	24	King County shall reduce total greenhouse gas emissions from government operations, compared to a 2007 baseline, by at least 15 percent by 2015, 25 percent by 2020, and 50 percent by 2030.	✓ WTD met the 2015 target. WTD plans to start incorporating emissions from production of purchased materials, such as cement needed for a capital project, into future calculations of greenhouse gas (GHG) emissions. When including emissions from purchased materials, WTD expects to reduce total emissions by 25 percent by 2019. This reduction is largely due to the implementation of the "Green Direct" purchase agreement with Puget Sound Energy (PSE) for the purchase of renewable wind energy for a 10-year term. This agreement pertains to all King County facilities that receive power from PSE, including South Treatment Plant. More information on this agreement is available on the County's Legislation website: http://mkcclegisearch.kingcounty.gov/LegislationDetail.aspx?ID=2947005&GUID=867E06AB-28B5-4399-BAB0-4017EAE0BF69&Options=ID|Text|&Search=2017-0035
2.	24	King County's DNRP, including the Wastewater Treatment Division, Solid Waste Division, Parks, and WLRD, shall achieve net carbon neutrality for its operations by 2017.	✓ DNRP achieved carbon neutrality in October 2016. (Details are provided at http://www.kingcounty.gov/services/environment/climate/strategies/beyond-carbon-neutral.aspx.)
3.	24	WTD and SWD shall each independently achieve carbon-neutral operations by 2025.	✓ This target is intended to include emissions from both operations and purchasing. WTD intends to meet the 2025 target of carbon neutrality. The PSE Green Direct purchasing agreement mentioned previously will significantly contribute to meeting this target. Other contributors are the production of methane gas for beneficial use at WTD's regional treatment plants and carbon sequestration through use of Loop® biosolids. In 2016, 41,092 MtCO2e (metric tons of carbon dioxide equivalents) was offset through land application of Loop biosolids (the equivalent of taking 8,000 cars off the road) and over 33 million kilowatt hours of electricity were produced from methane gas and used at the West Point and South treatment plants. In addition, the following energy efficiency and carbon sequestration efforts will help meet this goal: • Tree planting is part of the County's commitment to plant one million trees by the end of 2020. As of December 2016, WTD is responsible for the planting of over 2,800 trees. • Light-emitting diodes (LED) lighting upgrades.

Status of SCAP Energy Targets and Goals that Pertain to WTD
as of December 2016

Item #	SCAP Page #	SCAP Energy-Related Target or Goal	Status (✓ = on target/underway or ongoing; ⇨ = future action/more information needed)
			• Projects such as the one under way to replace mixed liquor channel air blowers at West Point Treatment Plant with energy efficient high turbo blowers.
		Goal Area 1: Transportation and Land Use: County Operations Goal: King County will increase the efficiency of its vehicle fleets and minimize their greenhouse gas emissions.	
		Measure 1: Energy Use by County Vehicles	
4.	46	Target 1: In its vehicle operations (excluding Metro Transit fleet vehicles), King County will reduce normalized net energy use by at least 10 percent by 2020, compared to a 2014 baseline.	⇨ In 2016, WTD identified this target as part of its SCAP Line of Business (LOB) planning, focusing on Loop haul trucks because they consume the most fuel in the biosolids fleet. Three recommendations came out of the LOB process to help meet the 2020 target: • Reduce fuel use through driver training. Implementation is expected to achieve 5-10 percent reduction in fuel use through changes in driver behavior (such as speed, idling, use of cruise control). This action requires installation of instrumentation on trucks, staff time to monitor and train drivers, and a driver incentive program. *Since the LOB process, it was found that this program is not feasible to implement as conceived. Other options are being looked at to achieve fuel reduction and truck optimization.* • Evaluate ways to reduce idling of trucks at treatment plant. • Produce a drier Class B biosolids cake. Two options to do this are recommended for further evaluation in the future: o Instrumentation upgrade to optimize centrifuge machine performance at West Point and South plants o Capital upgrade to increase withdrawal pump size for one South Plant digester; operate four digesters in series instead of three The Biosolids Program has a strategic planning process under way, which may result in more details on these recommendations or identify additional recommendations to meet this target.
5.	46	Target 3: Across all vehicle operations, King County will increase the usage percentage of alternative fuels in its fleets by ten percent by 2025, compared to a 2014 baseline. Alternative fuels include electricity, biofuels, compressed natural gas, liquefied natural gas, hybrid, plug-in hybrid, battery drive, or propane.	⇨ Specific actions have not yet been identified for WTD's vehicle operations. This target will also be considered in the Biosolids Strategic Planning process. Actions that may be looked at include using trucks that run on compressed natural gas (CNG) to haul grit and materials from the screenings process. Because the trucks in use today are expected to reach the end of their useful life in the near future, WTD will consider the potential to incorporate alternative fuels in the future fleet of these trucks.

Status of SCAP Energy Targets and Goals that Pertain to WTD
as of December 2016

Item #	SCAP Page #	SCAP Energy-Related Target or Goal	Status (✓ = on target/underway or ongoing; ⇨ = future action/more information needed)
		Goal Area 2: Buildings and Facilities Energy: County Operations Goal: King County will reduce energy use in County facilities and operations and will produce and consume more renewable energy	
		County Facilities Goal:	
6.	56	Strategy A. County agencies shall identify and implement cost effective energy efficiency projects in existing buildings and new construction projects.	✓ WTD implements this strategy as part of its core business. All new capital projects incorporate energy efficiencies where possible. Two examples follow: • The Oxygen Generation and Dissolution System Replacement (OGADS) project is expected to significantly reduce the energy required to produce and distribute oxygen needed for West Point's secondary aeration process. This project will take advantage of new, more efficient oxygen generation technology, optimize the size of the oxygen generation system for daily use, and provide system turn-down capability for both oxygen generation and dissolution. The project is expected to be complete in 2022. • The design of the Georgetown Wet Weather Treatment Station incorporates energy conservation and efficiency features, including: o Minimized heating, ventilating, and air conditioning (HVAC) requirements (processes/equipment will be located outdoors as much as possible in order to minimize the need for air-conditioned space) o Energy efficient lighting (LED) and lighting controls o Facility design that minimizes the need for odor/corrosion control fans o Variable frequency drives on all variable motors o Right-sized processes and systems for maximum efficiency
7.	56	Strategy B. For all projects installing over $250,000 of energy-using equipment (total construction cost), perform a resource life-cycle cost analysis on at least two technologies that can meet the programmatic need, and choose the option with the highest net present value, per Ordinance 16927.	✓ As a general rule, WTD implements this strategy. The use of life cycle cost analysis on all alternatives is the norm, and most often the option that costs less over the life of the project is selected. WTD seeks options that balance safety, risk, and operational costs and meet energy targets. Because of these considerations, the division may not always choose the option with the highest net present value. The following two projects are examples of where WTD selected alternatives that save energy over the life of the project: • The South Plant Aeration Diffuser Membrane Replacement project was completed in 2016 and is expected to result in 755,157 kilowatt hours per year of energy savings, and approximately $52,000 per year in electricity cost savings. • The South Plant Raw Sewage Pumps/Motors/Drives Replacement project was substantially complete in 2017. The project is expected to result in 1,978,960 kilowatt hours per year of energy savings, and approximately $135,000 per year in electricity cost savings.

Status of SCAP Energy Targets and Goals that Pertain to WTD
as of December 2016

Item #	SCAP Page #	SCAP Energy-Related Target or Goal	Status (✓ = on target/underway or ongoing; ⇨ = future action/more information needed)
8.	56	Strategy C. Report quarterly on energy reduction and renewable energy progress for communication to county staff.	✓ WTD provides a quarterly report to the DNRP Energy Program Manager. The report includes information on normalized energy use, normalized energy footprint, and the amount of biogas beneficially used for the regional treatment plants and offsite facilities.
9.	56	Strategy D. Conduct an annual communications campaign that encourages County employees to minimize energy and other resource use at work and at home.	✓ DNRP and countywide energy savings and reduction messages are shared with WTD employees. Signage to encourage such action is posted in office buildings and conference rooms. WTD's Sustainability Team also promotes these kinds of communications across the division. Additionally, the treatment plants participate in strategic energy management (SEM) programs, which focus on helping Operations identify low- and no-cost ways to save energy by operating the plant more efficiently.
10.	56	Strategy E. Train staff on green operations and maintenance practices that focus on reducing energy and other resource usage.	✓ There are a variety of training opportunities for staff in these areas: • WTD's sustainability team provides sustainability training to capital program staff. • Treatment plant energy teams work to ensure that energy efficiency practices are integrated in day-to-day operations. • Training in Envision, a holistic sustainability rating system associated with the Institute for Sustainable Infrastructure, is also offered to staff, and staff is encouraged to become certified as an Envision Sustainability Professional (ENV SP). • Staff is encouraged to take advantage of countywide trainings offered through programs such as the County's GreenTools program. • WTD's green stormwater infrastructure (GSI) projects include ensuring that staff is available to maintain associated roadside rain gardens. Incorporating GSI into WTD's combined sewer overflow (CSO) program reduces the risk of CSOs on rainy days and the size of traditional projects required to control CSOs.
11.	56	Strategy F. Meet the energy reduction requirements of the Federal Department of Energy Better Buildings Challenge.	⇨ More information on this strategy is needed. WTD Energy Program staff will follow-up with DNRP Energy Program Manager.
		Renewable Energy and Waste-to-Energy Production	
12.	57	Strategy A. Increase renewable biogas production at the wastewater treatment plants and Cedar Hills Regional Landfill as a percentage of total available biogas, prioritizing opportunities that reduce GHG emissions and maximize effective utilization of the biogas.	✓ This strategy is being implemented through the following manners: • A South Plant Biogas and Heat Systems Improvement project is under way. Most of the energy efficiency improvements of this project will come from a more efficient gas scrubbing system and a boiler capable of using unscrubbed biogas to meet the plant's heating demand. The project is expected to be complete in 2020. Although this project will not increase

Status of SCAP Energy Targets and Goals that Pertain to WTD
as of December 2016

Item #	SCAP Page #	SCAP Energy-Related Target or Goal	Status (✓ = on target/underway or ongoing; ⇨ = future action/more information needed)
			renewable biogas production, it will reduce GHG emissions by maximizing effective use of the biogas. • A West Point Treatment Plant Biogas Utilization Study was completed in September 2016. The preferred alternative from this study is to expand the existing combined heat power (CHP) system with a single internal combustion (IC) engine. However, the results of the evaluation are particularly sensitive to the sales price of electricity produced from a new CHP system and the quantity of surplus biogas available for use in the new system. As a result, it is recommended that implementation of a new system be deferred until the following assumptions can be better defined: o Operational improvements associated with the implementation of the new waste gas burners, expected in 2017 o Contract limitations associated with the County's Power Purchase Agreement with Seattle City Light and the potential value of additional power produced at West Point o The amount of surplus biogas available for a new system and specifically the results of a pending study to investigate the feasibility of replacing one or more of the existing gas-fired raw sewage pump engines with electric motors • A Brightwater Biogas Optimization Study was completed in September 2017. Various options were looked at to optimize beneficial use of biogas. Based on the study, it is recommended that implementation of a new system be deferred until the following assumptions can be better defined: o Assumptions regarding the operability of the technologies considered, the biomethane quality requirements, and the RINs market value can be confirmed through the implementation of the biogas upgrading system and effluent heat source heat pumps at South Plant o A formal alternatives analysis is conducted to determine whether inclusion of effluent-source heat pumps better meets the County's financial, environmental, and operational objectives and what technology for biogas upgrading best meets the County needs • WTD intends to revisit an evaluation on co-digestion of brown grease to increase biogas production.
13.	57	Strategy B. All new facilities over 200 square feet shall be designed in a manner that considers, and as appropriate installs, the basic	✓ • This strategy is being considered in WTD's capital projects, as appropriate. For example, the Georgetown Wet Weather Treatment Station is including solar ready infrastructure in its design. The plans include a small solar array at the

Status of SCAP Energy Targets and Goals that Pertain to WTD
as of December 2016

Item #	SCAP Page #	SCAP Energy-Related Target or Goal	Status (✓ = on target/underway or ongoing; ⇨ = future action/more information needed)
		infrastructure for the future integration of on-site solar power production and storage.	operations support building and the entire canopy over the ultraviolet disinfection area will be solar ready. • This strategy has been conveyed to WTD Engineering to see how it can be best incorporated as a specification for future projects. • The Brightwater Center achieved the U.S. Green Building Council's LEED Platinum. Solar panels made in Washington state are included in this building's sustainable elements. • The Juanita Pump Station Replacement project was designed and constructed to be solar ready. The project was completed in 2009.
14.	57	Strategy C. Pursue outside grants and other funding opportunities that support integrating renewable energy generation into construction projects, where life-cycle cost-effective.	✓ WTD's Energy Program and capital project teams continue to look for grants to help meet or exceed the County's energy reduction and renewable generation targets and goals.
15.	57	Strategy D. Encourage and support community renewable energy projects on County property that are in the best interest of the public and reduce community energy use.	⇨ The DNRP Energy Program is the lead for this strategy. WTD will support these efforts as appropriate.
		Renewable and GHG-Neutral Energy Consumption	
16.	57	Strategy A. Work with local energy utilities and solar energy project developers to increase the generation of County-consumed electricity derived from renewable sources. Create a framework with Puget Sound Energy and Snohomish PUD for the electricity supplied to King County facilities to be carbon neutral.	⇨ The DNRP Energy Program is the lead for this strategy. WTD will support these efforts as appropriate.
17.	57	Strategy B. In coordination with local energy utilities, cities and community partners, pursue County development of small (kilowatt scale) and large (megawatt scale) County-owned off-site renewable energy generation projects, where life-cycle cost-effective.	✓ The DNRP Energy Program is the lead for this strategy. WTD is pursuing this goal through the PSE Green Direct agreement for renewable power.
18.	57	Strategy C. Pursue power supply agreements for the consumption of renewable electricity by County government, when cost effective.	✓ The DNRP Energy Program is the lead for this strategy. The PSE Green Direct purchasing agreement mentioned previously will significantly contribute to the implementation of this strategy.

Status of SCAP Energy Targets and Goals that Pertain to WTD
as of December 2016

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19.	57	Strategy D. Pursue progress toward the renewable energy consumption target in the following order of priority: 1) energy efficiency projects; 2) cost-effective renewable energy generation projects and 3) renewable and carbon reduction offset purchases.	✓ This strategy reflects WTD's ongoing practices.
		Measure 1: Normalized energy use at County facilities, measured in millions of British Thermal Units (MMBTU) (The SCAP notes that WTD energy use will be normalized for consumed energy, adjusted for weather and wastewater flow.)	
20.	58	Target 1. King County will reduce normalized energy use in County owned facilities by at least five percent by 2020 and 10 percent by 2025, as compared to a baseline year of 2014.	✓ WTD is on track to meet the original 2020 and 2025 targets. More details are provided in Appendix A, Wastewater Treatment Division 2017-2021 Energy Reduction Plan. *Note: The SCAP calls for an energy reduction goal of 5 percent by 2020; however, the County Climate Leadership Team changed the goal in 2017 to 7.5 percent.*
		Measure 3: Amount of renewable and GHG neutral energy produced and consumed as part of government operations.	
21.	59	Target 3. Renewable Energy Production - Produce renewable energy equal to 100 percent of total County government net energy requirements by 2017 and each year thereafter, excluding the public Transit fleet.	✓ The renewable energy produced through WTD's operations is playing a significant role in meeting this target; however, the largest portion is generated from the Cedar Hills Landfill gas. The DNRP Energy Program tracks the details of this target.
22.	59	Target 4. Renewable energy consumption - King County government shall consume renewable energy equal to 70 percent of government operation facility energy consumption by 2020 and 85 percent by 2025.	✓ In 2016, WTD identified this target as part of its LOB planning. WTD currently meets 70 percent of energy consumption generated by renewable sources. *Note: Because of the change in 2017 to transition South Plant from selling gas to PSE to sell to another third party who will in turn use that gas in vehicle fleets using compressed natural gas (CNG), WTD may not meet the target in 2017-2018. With the Green Direct purchase agreement going into effect in 2019, WTD intends to meet the target by 2020, as directed.* The ability to meet the 2025 target depends somewhat on the electricity mix of PSE, which supplies energy to the South Treatment Plant. The Green Direct purchase agreement with PSE will be the main action to help meet the 2025 target. Four recommendations came out of the LOB process to help meet the 2025 target: • Contract to develop new renewable energy projects through PSE (such as solar, wind, organics digester). The DNRP Energy Program is taking the lead on this, and WTD will support efforts as appropriate. The Green Direct purchase agreement with PSE is an important component in meeting this target. • Find internal use for excess biogas at West Point and Brightwater treatment plants. A biogas optimization study has been completed for the

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			West Point Treatment Plant and one is under way for Brightwater Treatment Plant. (See Item #12) • Look at possibility of replacing one or more raw sewage pump gas engines with electric motors and reduce the use of propane at the West Point Treatment Plant. These items are being looked at in the biogas optimization studies mentioned above and a separate capital project work request. • Own an off-site renewable energy generation facility. The DNRP Energy Program may take lead on this recommendation. WTD is currently evaluating the feasibility of some form of a WTD-owned renewable generation project at its facilities.
23.	60	Target 5. Greenhouse gas neutral electricity - By 2025, King County shall ensure all electricity supplied for its government operations is greenhouse gas neutral.	✓ Achieving this target depends on the source of energy used by our suppliers: Seattle City Light (SCL), PSE, and Snohomish County PUD (SnoPUD). SCL is 100 percent GHG neutral; a large portion of PSE's and a small portion of SnoPUD's sources are not GHG emissions neutral. WTD's Green Direct purchase agreement with PSE will contribute toward meeting this target.
		Goal Area 3: Green Building County Operations Goal: King County-owned buildings and infrastructure will be built, maintained and operated consistent with the highest green building and sustainable development practices.	
		Measure 1: Percentage of King County-owned capital projects achieving a Platinum level certification using LEED, the Sustainable Infrastructure Scorecard, or an alternative green building rating system that demonstrates the same performance.	
24.	70	Target 1. By 2020, 100 percent of King County projects achieve Platinum certification or better.	✓ • WTD uses its own WTD Sustainability Process and Scorecard to achieve and track sustainability-related design elements in capital projects. The division strives to achieve Platinum rating as often as possible. For example, 12 projects that were completed in 2016 achieved Platinum rating. • In addition, WTD is piloting Envision certification for two of its projects. Envision is a holistic sustainability rating system associated with the Institute for Sustainable Infrastructure.
25.	70	Target 2. By 2030, 100 percent of King County projects achieve certifications that demonstrate a net zero GHG emissions footprint for new facilities and infrastructure.	⇨ Work has not begun on this target. WTD will further discuss target specifics with the DNRP Energy Manager. Work to achieve greater energy efficiency in projects and future work to reduce emissions associated with purchasing will likely have the largest effect.
26.	73	Green Building and Development Standards: Reduce County water use. King County will establish a water use baseline and reduction target for County facilities and operations that are currently monitored for water usage by the end of 2015 and will obtain comprehensive water data	⇨ WTD will be working with DNRP's Director's Office to set targets. WTD pursues efforts to reduce potable water usage in its treatment process. For example, in 2016, 771 million gallons of recycled water were used in place of potable water at the treatment plants. The division is continually evaluating efforts to increase usage of recycled water and offset potable water where possible.

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		and set reduction targets for County accounts and facilities not currently monitored by end of 2020. To meet these water use reduction targets, each King County division will develop water conservation plans, including considering use of non-potable water supplies, by end of 2017.	
27.	73	Net Positive County buildings and infrastructure: Develop net zero energy and Living Building challenge projects. By 2020, King County will identify and will make substantial progress in the design, construction or certification process for at least 10 new County construction or retrofit projects that will achieve Net Zero Energy or Living Building Challenge certification.	✓ WTD is in the initial stages to identify projects that may be able to achieve this target. Multiple buildings have been discussed as potential viable alternatives for helping King County achieve this target. They include the Jamieson Arc Weld facility, the biosolids truck hauling facility, and the South Plant heat and energy recovery building as part of South Plant's heat and biogas system upgrade project. However, the only WTD building that still holds the potential is the Jamieson Arc Weld facility.
		Goal Area 5: Forests and Agriculture County Operations Goal: King County will manage and restore its parks and other natural lands in ways that maximize biological carbon storage and increase resilience to changing climate conditions.	
		Measure 2: Number of native trees planted by King County and public and private partners.	
28.	94	Target 2. Plant one million native trees between 2015 and 2020 and develop a sustainable 30-year plan to maintain and enhance tree cover countywide that identifies specific approaches, including public and private partnerships, geographic focus areas, and number of trees.	✓ WTD has provided payment for the planting of over 2,800 trees as of December 2016. The Water and Lands Resource Division is in charge of the actual plantings. WTD-funded tree planting is expected to continue, which will further offset the division's carbon emissions.
		Appendix C: Energy Strategy Details	
		Strategy A. 1, Energy Plans	
29.	138	All County agencies that consumed an average of 50,000 or greater MMBTU per year in buildings between 2012 and 2015 shall develop energy reduction plans by January 1, 2017. Such plans shall be no more than five years old and shall be updated at least every five years. As of 2015, this strategy impacts the Facilities Management, Transit and Wastewater Treatment Divisions. Energy Plans shall detail key actions, implementation strategies, barriers, and methods for how the agency will contribute to the County's 2025 energy reduction goal. Among other details,	✓ WTD completed its 2017–2021 Energy Reduction Plan by January 1, 2017, which is provided in Appendix A.

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		the Energy Plans shall include sections addressing site facility assessments/audits, as well as facility recommissioning, generally following the guidance in Strategies A.2 and A.3.	
		Strategy A.4: Source vs. Site Energy Use	
30.	139	Beginning in 2016, King County's energy tracking shall be calculated using a source energy approach to align with measurements in the EPA Portfolio Manager tool and the DOE Better Buildings Challenge.	✓ WTD uses a source energy approach to account for energy usage. WTD will continue discussions with the DNRP Energy Manager regarding any needs associated with the EPA Portfolio Manager tool and DOE Better Buildings Challenge.
		Strategy A.5: Energy Investment Cost Effectiveness	
31.	136	By December 31, 2016, King County shall adopt cost effectiveness criteria for investments in resource-using and renewable energy generating equipment. The criteria shall provide guidance for when to make investments in replacement equipment for resource efficiency purposes, and when project managers and staff are expected to secure and expend additional dollars for capital projects, with a goal of minimizing resource-using equipment life cycle cost effectiveness to the County, using Ordinance 16927 (relating to achieving greater energy efficiency as well as reductions in greenhouse gas emissions in capital improvement projects) as a guiding document.	⇨ WTD uses LCCA (Life-Cycle Cost Analysis) in its energy-related decisions, and will seek guidance from DNRP Energy program on this strategy. The division currently evaluates cost-effectiveness of investments and will consider implementation of those which have a negative life cycle cost (i.e. save money) over the life of an evaluated system.
		Strategy A.6: Capital Project Energy Performance	
32.	139	In addition to meeting the County's requirements for the internal Sustainable Infrastructure Scorecard, Leadership in Energy and Environmental Design (LEED) or other green building requirements, all capital and major maintenance projects that trigger energy code requirements shall meet the prescriptive or modeled energy code requirements of the most stringent city energy code within the county. As of 2015, the most stringent energy code is the City of Seattle's code.	✓ This strategy has been conveyed to WTD's Engineering group to see how it can be best incorporated into the design of future projects.

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		Strategy A.7: Prioritization of Energy Projects	
33.	139-140	Prioritize electrical renewable energy projects in the service territory of buildings served by Puget Sound Energy, unless financially advantageous opportunities arise in other areas.	⇨ This strategy will be implemented if the situation arises; however, no opportunities have presented themselves to date regarding this strategy.
34.	139-140	Prioritize electric energy efficiency projects to be completed first in Puget Sound Energy's service territory, when a County agency does not have other prioritization for the completion of specific efficiency projects and has the need to prioritize projects.	⇨ This strategy will be implemented if the situation arises; however, no opportunities have presented themselves to date regarding this strategy.
		Strategy A.8: Technologies to be avoided	
35.	140	Construction and remodel projects shall: • Not include any lighting with an efficacy of under 95 lumens per watt. • Not include combustion heating systems with combustion efficiency of under 86 percent, as engineered for the reference project, or electric heating with a Coefficient of Performance of under 2.5, unless the total space to be heated with such equipment is under 400 square feet. • Not waste available "waste energy" and shall have heat recovery of 50 percent or greater, for ventilated spaces with both over 5,000 cubic feet per minute (CFM) and 70 percent or greater outside air requirements, where allowed by code. • Shall as appropriate integrate wording into construction and procurement documents to ensure these strategies are followed.	✓ WTD has been implementing portions of this strategy, and the strategy has been conveyed to WTD's Engineering group to see how it can be best incorporated into the design of future projects.
		Strategy A.9: Energy Star Appliances	

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36.	140	o All appliance purchases by King County government shall be Energy Star qualified appliances, if an Energy Star rating is available for the type of appliance. o To ensure both safety and resource efficiency, employees are not allowed to bring, or accept for donation, heaters or other electrical appliances for use in County facilities, unless specifically approved by the county. When an energy-using device is deemed necessary for an employee's comfort or to perform his/her work, appliances will be purchased by County agencies and shall be Energy Star qualified, if an Energy Star category exists. The Procurement and Payable Section of the Department of Executive Services and the Department of Natural Resources and Parks will work to ensure compliance with this strategy.	✓ This strategy is incorporated into WTD's ongoing business practices.
		Strategy A.10: Greenhouse Gas Emissions and Purchased Energy Use Cap	
37.	140	o Remodeled or replaced facilities shall consider the former (baseline) facility as the total energy budget for the new facility, on a total GHG and BTU basis. o Additional GHG emissions can be consumed for the new facility operation, if the outcome of the completed facility results in equal or a net reduction in GHG emissions on a regional basis (e.g. a more energy intensive transfer station that increases recycling and results in a net GHG emissions reduction from the materials recycled). o Additional energy use, on a BTU basis, can be consumed if the facility project meets one of the following criteria: ▪ Reduces total net County energy use on a BTU basis (e.g. a transfer station	⇨ More discussion and guidance from DNRP's Energy Program is needed for this strategy. It is difficult for WTD to meet an energy use cap when adding additional services. For example, pump stations may be remodeled or replaced to meet future capacity needs. This is the situation with the Sunset/Heathfied Pump Station Replacement project that is under way. The project identified the need for a small oxygen energy generation facility to mitigate corrosion. Reducing the risk of corrosion is key to ensuring WTD's assets perform as needed and meet regulatory standards. WTD strives to ensure all its projects are as energy efficient as possible, minimizes GHG emissions, and seeks options that balance safety, risk, and operational costs and meet energy targets.

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		compactor that measurably reduces truck fuel consumption). ▪ Pays for energy efficiency work equal to the additional energy use in other County facilities in the same division, on a BTU basis. ▪ Does not purchase such additional power from an electricity provider and generates any additional power beyond the cap through onsite or through funding of other County-owned renewable energy generation. ▪ Meets regulatory requirements for odor control. ▪ If the energy per unit of work is equal to or less than the baseline (e.g. a wastewater pump station that has greater wastewater flow, but reduced energy per unit pumped). o After the first year of operation, remodeled or replaced facilities that exceed the calculated GHG and/or energy use cap, after factoring in any efficiency work paid for by the project per the bullet above, shall either 1) pay for energy reduction projects that will provide an equal or greater reduction in energy use above the cap within that agency, or 2) purchase carbon neutral offsets for all GHG emissions above the cap.	
		Strategy A.11: Occupied Lease Facilities	
38.	141	Beginning in 2017, when consistent with the operational needs of the function, King County shall seek to lease facilities, for leases of employee occupied space of longer than five years, which are certified through the LEED rating system level of silver or higher or are Energy Star Certified. Facilities that do not meet these standards can be leased by the County if plans and funding are in place at the time of	✓ This strategy has been conveyed to WTD's Engineering group to see how it can be best incorporated into the design of future projects. Participants in the work session on the SCAP targets, goals, and strategies for the WTD strategic energy plan noted that the Facilities Management Division is the agency to lead this strategy. There were also comments that this strategy is implemented with construction trailers where possible.

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		signing that will enable a facility to meet this standard within 24 months of lease signing.	
		Strategy A.12: Renewable Energy Generation and Use	
39.	141	King County will set renewable energy generation targets and track progress toward such targets at the Cedar Hills Regional Landfill and at the Wastewater Treatment Division's Brightwater, South and West Point Treatment Plants. These targets are to help optimize use of available biogas for the most beneficial uses. Two targets should be tracked for each facility: Percent of total gas sent to beneficial end use vs. percent sent to flares, and percent utilization of the energy content of the biogas toward beneficial uses, as measured by available input BTU vs. BTU output.	✓ WTD has been using biogas for beneficial uses for nearly 30 years, and its goal is to put the gas to as best use as possible. Progress is tracked and reviewed on an ongoing basis. Specific targets for each treatment plant have not been established and WTD will be looking into this in the future.
		Strategy A.15: Computer Energy Management	
40.	141	Staff from the Department of Natural Resources and Parks and the Department of Information Technology shall work together to ensure computer energy management tools are optimized for energy efficiency on all County computers.	✓ WTD follows the lead and rules established by DNRP and King County Department of Information Technology in this area.