



METHANE REDUCTION PROGRAM

PGW'S ACTION PLAN WILL CUT METHANE EMISSIONS BY 80 PERCENT BY 2050.

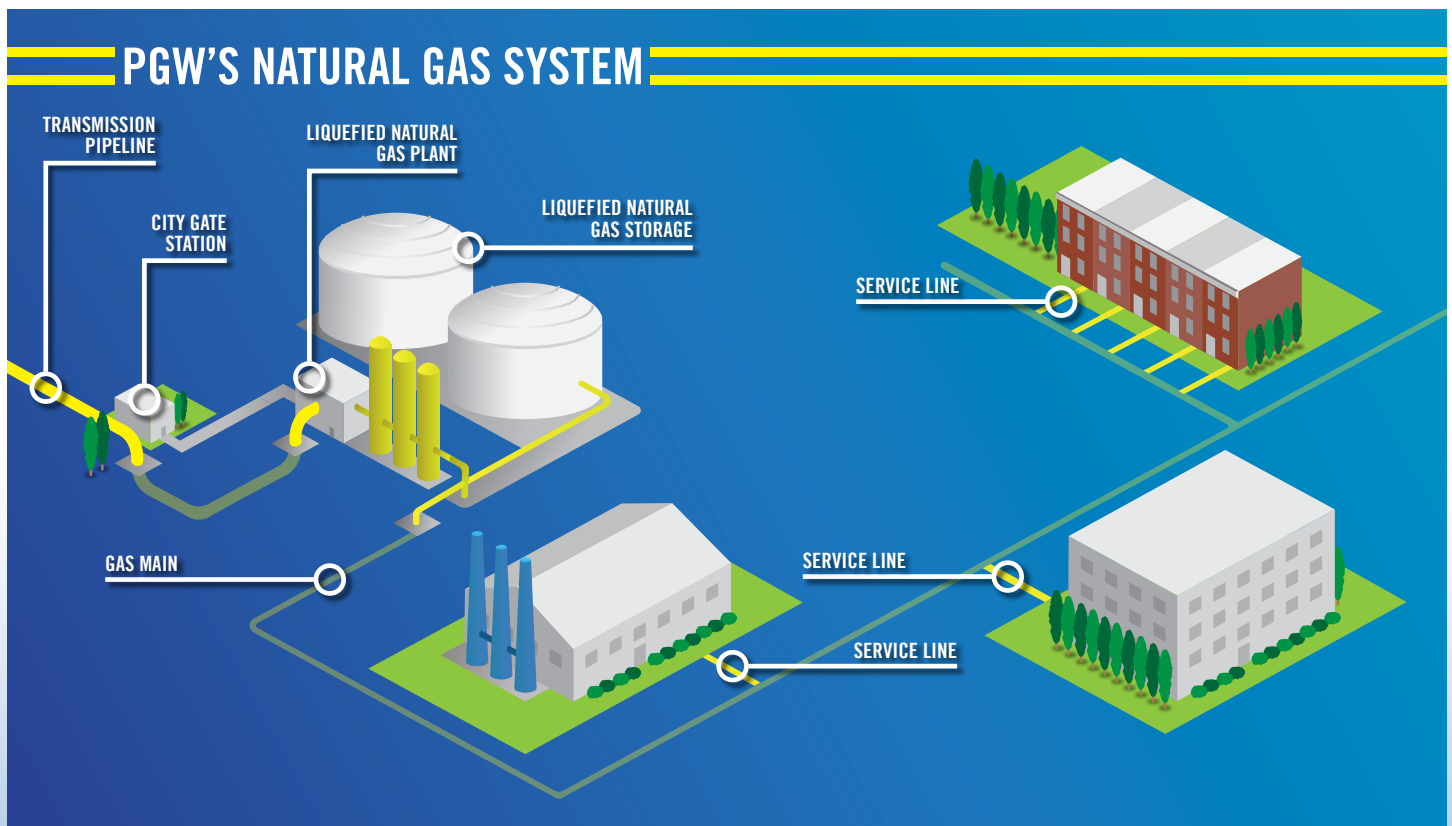


INTRODUCTION

Philadelphia Gas Works is strongly committed to achieving an 80 percent reduction in methane emissions from its natural gas distribution system by 2050.¹ The main pathway to this goal is PGW's accelerated main and service replacement program. Additionally, PGW is beginning a pilot program that will upgrade gate station valves to minimize natural gas vented to the atmosphere. These programs will accomplish most of PGW's goal and are complemented by the additional methane reduction measures that are outlined below.

SAFE, RELIABLE, AND AFFORDABLE ENERGY

Founded in 1836, PGW is the nation's largest municipally-owned gas utility, serving over 500,000 residential, commercial, and industrial customers within Philadelphia city limits. PGW's distribution system includes 3,000 miles of gas mains and 3,000 miles of service lines. PGW's system is directly connected to two pipelines that deliver natural gas to PGW's service territory through nine gate stations. PGW manages its gas supply through a mix of flowing pipeline gas, off-system underground storages, and on-system liquefied natural gas (LNG) facilities.



METHANE AS A GREENHOUSE GAS

Natural gas largely consists of methane, a greenhouse gas. The United States Environmental Protection Agency (EPA) reports that methane accounts for approximately 9.5 percent of all U.S. greenhouse gas (GHG) emissions from human activities and methane from natural gas distribution

[1] i.e. Scope 1 and 2 emissions, as defined by the Environmental Protection Agency (EPA).

systems account for only 0.2 percent of these GHG emissions. In addition to natural gas and petroleum systems, methane emissions are largely created from agricultural activities (i.e. enteric fermentation and manure management), landfills, and coal mining. While methane remains in the atmosphere for much less time than carbon dioxide, another greenhouse gas, methane is more efficient at trapping heat than carbon dioxide in the near term. Thus, PGW is committed to reducing its methane emissions by 80 percent by 2050 from 2011 emission levels.

METHANE EMISSIONS FROM NATURAL GAS DISTRIBUTION SYSTEMS

Distributing natural gas can result in two types of methane emissions: vented gas and fugitive emissions. PGW occasionally vents some natural gas as an industry standard practice in order to create safe working conditions for maintenance and repair, or as part of emergency testing procedures. Vented gas is more often associated with specific events or locations. By contrast, fugitive emissions are distributed across the gas system and are usually associated with minor leaks along low-pressure pipes, fittings, or valves. PGW mitigates fugitive emissions through robust system maintenance processes, leak survey, and repair, and the replacement of older, vintage materials and equipment. Nevertheless, these minor leaks do occur and result in fugitive gas.

PGW METHANE REDUCTION ACTIONS – ADDRESSING THE LARGEST SOURCE OF METHANE EMISSIONS

Fugitive emissions from PGW’s distribution mains and service lines and vented emissions from gate station valves (i.e. actuators and controllers) account for approximately 95 percent of PGW’s total methane emissions.² PGW is steadily reducing these emissions by replacing mains and services and implementing a pilot gate station valve retrofit program.

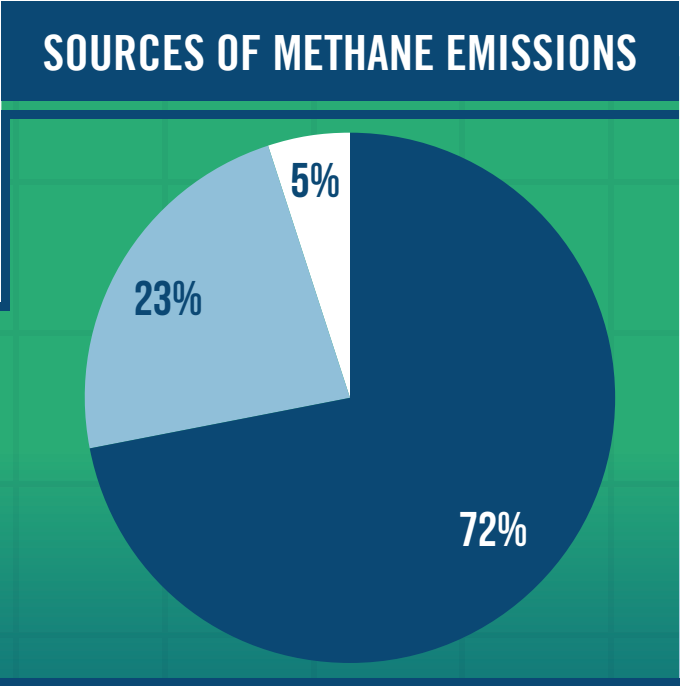


Figure 1: Sources of Methane Emissions, Based on 2011 GHG Inventory

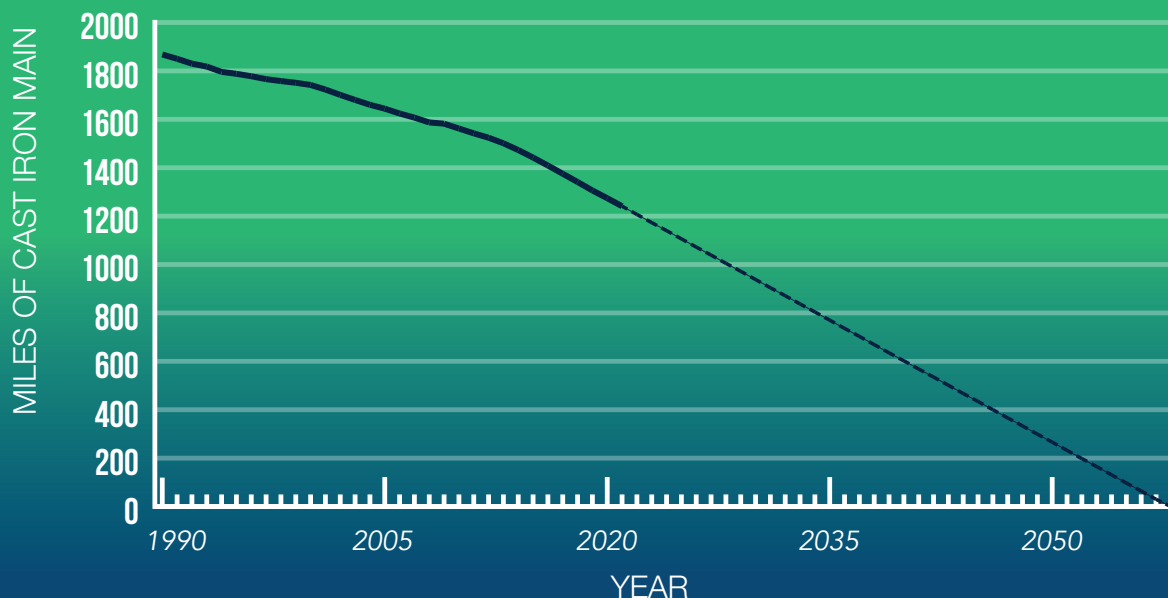
[2] Based on PGW CY 2011 Scope 1 and Scope 2 GHG Emissions Inventory.

CAST IRON MAIN INVENTORY REPLACEMENT AND REDUCTION PROGRAM

Distribution mains are the underground street pipelines that connect PGW's gate stations to the smaller service lines that deliver natural gas to individual customers. Historically, these mains were primarily constructed of cast iron, which is more susceptible to leaks, breaks, and the potential release of fugitive methane emissions. Since 1990, when PGW's cast iron main inventory totaled 1,868 miles, PGW has replaced or removed 594 miles of cast iron main. As of the end of 2020, PGW's cast iron main inventory is 1,274 miles. The following summarizes PGW's major replacement and reduction initiatives:

- Since 2001, PGW has implemented a program to replace a minimum of 18 miles of cast iron main each year using base rate funds.
- In 2012, PGW initiated its Long Term Infrastructure Improvement Program (LTIIP), a 5-year plan designed to accelerate the replacement of PGW's cast iron mains from the original baseline of 18 miles per year to 25 miles per year, prioritizing higher risk main. This was accomplished with funding from an additional \$22 million per year through the Pennsylvania Public Utility Commission (PUC) - authorized Distribution System Improvement Charge (DSIC). From 2012-2017, the first phase of LTIIP replaced a total of 146.17 miles of cast iron main inventory.
- The second phase of LTIIP, running from 2017-2022, continues these efforts by further accelerating cast iron main replacement to a rate of over 30 miles per year. The second phase is projected to replace an additional 158.29 miles of cast iron main inventory. To accomplish this, funding was further increased through a modification to the DSIC charge to \$33 million per year in 2016. As such, PGW's cast iron main inventory replacement is on track to be completed by 2058.

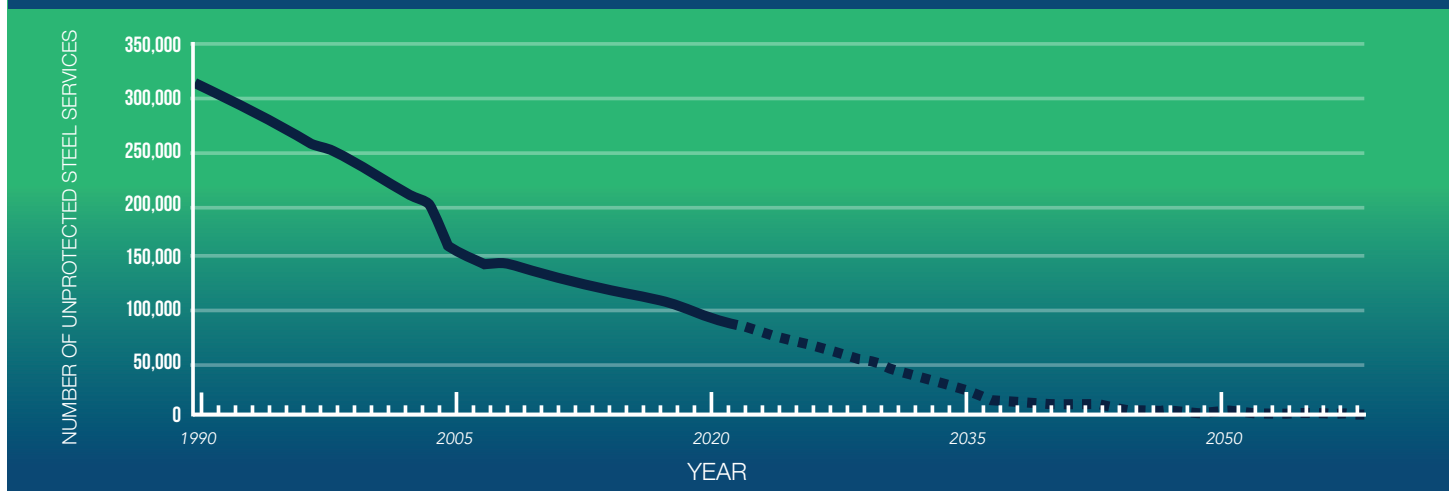
FIGURE 2 : REDUCTION IN MILES OF CAST IRON MAIN FROM 1990-2058



SERVICE LINE REPLACEMENT PROGRAM

Service lines deliver natural gas from the distribution mains to a customer's home or business. As part of the LTIP program, PGW has also been replacing unprotected steel services that are connected to the replaced cast iron main – this is acknowledged by the EPA as a best practice. The replacement of these unprotected steel service lines with plastic pipe significantly reduces the risk of fugitive emissions. Since 1990, PGW has replaced 218,000 unprotected steel services which has reduced the inventory of unprotected steel services from 309,000 to 91,000 at the end of 2020. Additionally, PGW projects the replacement of all unprotected bare steel services by 2038.

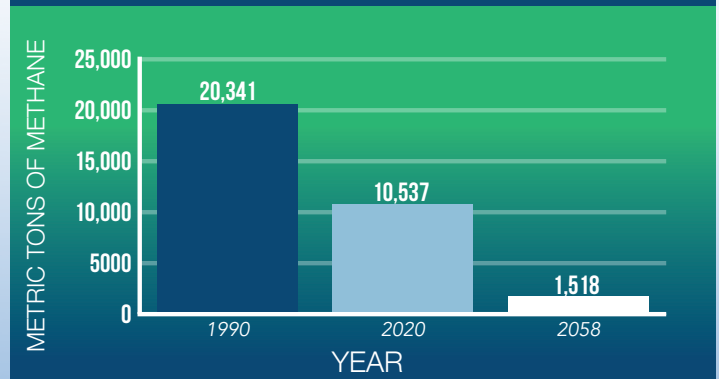
FIGURE 3: REDUCTION IN STEEL SERVICES INVENTORY FROM 1990-2058



MAIN AND SERVICE REPLACEMENT – METHANE REDUCTION ACCOMPLISHMENTS AND GOALS

PGW's mains and services are responsible for approximately 72 percent of PGW's distribution system methane emissions.³ To date, PGW's main and service replacement programs have reduced methane emissions from 20,341 metric tons in 1990 to 10,537 metric tons in 2020, a 48 percent reduction. PGW's goal is to further reduce methane emissions through all of its main and service replacement programs by 9,019 metric tons by 2058 (reducing it to 1,518 metric tons).⁴ Additionally, these main and service replacement programs are the biggest factor contributing to PGW's 2050 goal of reducing methane emissions by 80 percent. Additionally, PGW projects the replacement of all unprotected bare steel services by 2038.

FIGURE 4: REDUCTION IN METHANE EMISSIONS FROM MAINS AND SERVICES IN 1990, 2020, AND 2058



[3] Based on PGW CY 2011 Scope 1 and Scope 2 GHG Emissions Inventory. These data include all material types of mains and services, including cast iron and unprotected steel.

[4] As discussed above, all cast iron main replacement will be completed by 2058.

GATE STATION VALVE ACTUATORS AND CONTROLLERS – PILOT PROGRAM

PGW's gate station valves utilize gas-driven actuators and controllers to manage the flow of natural gas. During normal operation, these actuators and controllers vent natural gas into the atmosphere. PGW has sought solutions to mitigate this venting and intends to pilot a new "no-bleed" technology that prevents venting to the atmosphere by cycling the gas back into PGW's distribution system. PGW plans to begin installing this new technology at its Richmond Gas Processing facility as part of a pilot program that will begin in 2021. Depending on the success of the pilot, PGW will develop and invest in a long-term program to retrofit the remaining gas-driven actuators and controllers with this emissions-reducing equipment. PGW's goal is to complete this program before 2035.

GATE STATION VALVES – METHANE REDUCTION GOALS

PGW's gate station actuators and controllers are responsible for approximately 23 percent of PGW's distribution system methane emissions.⁵ PGW's objective is to invest in retrofitting all gas-driven actuators and controllers after the initial pilot program has been completed. This retrofit program is the second biggest step PGW is taking toward meeting its 2050 goal of reducing methane emissions by 80 percent (from 2011 emissions levels).

PGW METHANE REDUCTION ACTIONS – ADDITIONAL BEST PRACTICES THAT PREVENT AND MITIGATE METHANE EMISSIONS

DISTRIBUTION SYSTEM LEAK REDUCTION PROGRAM

PGW has accelerated leak reduction on its system in order to mitigate fugitive methane emissions. Since 2013, the number of distribution main leaks is trending downward because of the prioritized selection of leak repairs and the aggressive tracking and monitoring of minor leaks. PGW also conducts distribution system leak surveys. These programs make a significant contribution to leak reduction in addition to the accelerated replacement of PGW's mains and services.

BLOWDOWN MANAGEMENT

A natural gas blowdown is the act of emptying or depressurizing natural gas from a pipeline or section of pipeline for the purpose of maintenance, testing, or conducting other activities such as replacing gas mains. It is an example of emissions due to vented gas. While blowdowns are a normal and necessary work activity, PGW's Field Operations Department takes actions to minimize these instances of vented methane emissions.

PGW primarily performs blowdowns for the planned replacement and abandonment of cast iron mains and services. In order to minimize the volume of gas being released, PGW isolates sections of pipe using equipment such as valves, bags, and stoppers and follows all operational procedures and relevant codes.

By isolating sections of main and by having a low-pressure distribution system, PGW blowdown activities are consequently a minimal contributor to methane emissions. It is also important to note that reducing the pressure in a distribution system main before replacement is recognized as a best practice by the EPA in its Methane Challenge Program (please see the discussion below about PGW's commitment to the Methane Challenge Program).

[5] Based on PGW CY 2011 Scope 1 and Scope 2 GHG Emissions Inventory.

DAMAGE PREVENTION PROGRAM

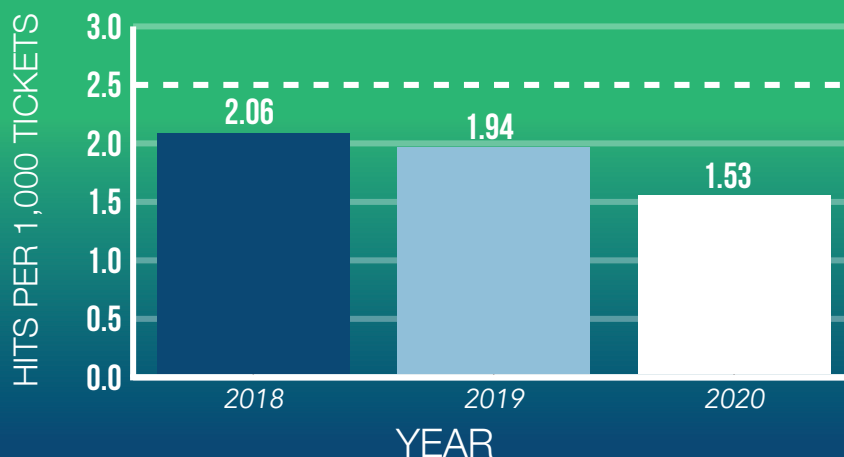
Pipeline safety is of the utmost importance to PGW, and PGW works diligently to protect natural gas infrastructure from damage during excavation and demolition projects throughout the city. However, sometimes third parties, like contractors and homeowners, cause unintentional damage to PGW's infrastructure, thereby causing the unintentional release of methane.

As advocates for damage prevention, PGW is a member of the Pennsylvania One Call System (PA One Call), which promotes safe digging. PGW assists contractors and other excavators with timely and accurate mark-outs, offers safety rechecks, observes contractor activities when necessary to safeguard PGW facilities during construction, and conducts an annual public awareness program for customers, residents, and businesses.

Additionally, PGW actively participates in and sponsors contractor awareness events in the Philadelphia area and communicates the need for a shared responsibility among the excavation community and the general public to dig responsibly and minimize costly delays, environmental damage, property damage, and personal injury. PGW also has an internal Damage Prevention Committee that promotes awareness and education, public outreach, and safety.

PGW's goal, through the measures described above, is to limit unintentional third-party hits to no more than 2.5 hits per 1,000 PA One Call tickets, which has been consistently achieved by the Company. In 2020, PGW had 1.53 hits per 1,000 PA One Call tickets, a reduction from 1.94 hits per 1,000 tickets in 2019 and 2.06 hits per 1,000 tickets in 2018.

FIGURE 5: HISTORIC REDUCTION IN PA ONE CALL HITS



GAS PROCESSING LEAK REDUCTION PROGRAM

PGW's Gas Processing Department operates and maintains PGW's LNG and natural gas facilities to ensure safe and reliable natural gas service to the City of Philadelphia.

The prevention of methane leaks at PGW's LNG plants and gate stations is a high priority. Natural gas equipment used at PGW's plants and its gate stations are routinely checked for leaks every time they are placed back in service by maintenance personnel. Additionally, potential leaks are surveyed by operations personnel at the plants and gate stations on a routine basis and all leaks are repaired.

PGW has also conducted annual optical leak detection surveys at the gate stations and LNG plants since 2010. These surveys are performed by a third party and utilize specialized optical gas imaging equipment. Any leaks that are identified are subsequently repaired by PGW personnel.

EPA METHANE CHALLENGE PROGRAM

In April 2020, PGW became a partner in the Methane Challenge, a voluntary program sponsored by the EPA that encourages natural gas companies to promote and track their commitments to reduce methane emissions. Starting in 2022, PGW has committed, on an annual basis, to replace at least 2 percent of its cast iron inventory and also replace all unprotected steel services that are connected to the mains that are being replaced. PGW operations have already exceeded this target in 2018 and 2019.

OTHER EMISSION REDUCTION EFFORTS – PGW'S ENERGY EFFICIENCY PROGRAMS

PGW has been a leader among Pennsylvania natural gas distribution companies with respect to offering robust energy efficiency programs to both low-income and non low-income customers. PGW's energy efficiency programs reduce emissions by offering rebates for energy efficient appliances and implementing energy savings measures in low-income homes, such as providing appliances that are more energy efficient, and weatherizing homes. The following provides some key highlights of these programs:

- The conservation measures that PGW has installed in low-income households and other properties has saved an estimated 15.4 BCF of natural gas over its lifetime. The related CO₂e reductions total 929,400 metric tons.⁶
- From fiscal years 2011 through 2020, PGW weatherized 23,660 low-income customers' homes and 25 multi-family buildings (in which a majority of the tenants are low-income) at a cost of \$66 million.
- On average, low-income customers are estimated to experience a first year 13 percent usage reduction from pre-weatherization usage.
- From fiscal years 2011 through 2020, PGW awarded 6,753 efficiency rebates and grants to residential, commercial, and industrial customers at a cost of \$10.3 million. On average, residential customers who received a rebate to replace heating equipment are estimated to save over \$150 in utility costs during the first year after installation.

[6] CO₂e = carbon dioxide and carbon dioxide equivalents.

PLANS FOR THE FUTURE

METHANE REDUCTION GOAL

PGW's current plans to reduce its methane emissions by 80 percent by 2050 will also lead to a 95 percent reduction of methane emissions by 2058. PGW will continue to explore ways to determine if this timeline can be shortened. Additionally, PGW has identified the remaining sources of methane emissions (i.e. 5 percent) and will seek to implement measures to address these smaller sources.

NON-METHANE GHG REDUCTION GOALS

Most of PGW's greenhouse gas inventory is comprised of methane that comes from its distribution system and gate stations as described above.⁷ The other type of emissions in PGW's GHG inventory is mostly carbon dioxide which comes from stationary combustion sources, mobile combustion sources, facility refrigerant use, and electricity usage.⁸ PGW has identified the sources of these carbon dioxide emissions and the Company's next step will be to develop and implement programs to reduce these emissions.

RENEWABLE NATURAL GAS

Renewable natural gas (RNG) is a biogas that is produced from the breakdown of organic materials such as food waste and can be used in the same way as conventional natural gas. RNG can significantly reduce emissions by capturing the methane that would have otherwise been released into the atmosphere from landfills, farms, or wastewater treatment plants through natural decomposition processes. PGW is currently seeking RNG sources for gas supply, along with other RNG development opportunities.

PGW'S METHANE EMISSIONS REDUCTION COMMITMENT

PGW is committed to reducing emissions and continuing to explore how the Company can establish and expand future commitments. As demonstrated above, PGW has incorporated substantial measures into its daily operations in order to reach its 2050 goal of reducing methane emissions by 80 percent from 2011 emissions levels. The Company looks forward to doing more and as it expands its sustainability programs, you'll be able to find additional information on PGW's sustainability efforts at pgworks.com/sustainability.

[7] Methane makes up 92 percent of PGW's 2011 Scope 1 and Scope 2 GHG Inventory.

[8] Carbon dioxide makes up approximately 8 percent of PGW's 2011 Scope 1 and Scope 2 GHG Inventory.