



2021
TCFD REPORT

TICKER SYMBOL: WTRG

Introduction

Essential Utilities understands the urgency of the Paris Agreement and the UN Intergovernmental Panel on Climate Change's science-based target of limiting the global temperature increase to well below 2 degrees Celsius. Addressing climate change requires a holistic management approach and tracking of our Scope 1, 2 and 3 greenhouse gas (GHG) emissions. Our executive and management teams understand there are two distinct elements of climate change: adaptation and mitigation. Essential is addressing both items and has implemented a robust management system to identify associated risks and opportunities.

Essential's management of climate change matters consists of significant board-level oversight of climate-related issues through various channels and reporting paths to review the risks facing the organization and evaluate our operations with respect to many issues, including the risk factors associated with climate change. At the management level, Essential's ESG Oversight Committee, a group of about a dozen of the company's senior leaders from across the organization as well as the CEO, meet at least once each quarter to discuss these topics and there are numerous other opportunities each month for various members of senior management to engage on climate change matters.

This Task Force on Climate-related Financial Disclosure (TCFD) report aims to provide our stakeholders with information about our climate change governance framework, strategy, risks and opportunities, relevant metrics and targets. We provide much more information on Essential's climate scenario analysis, board and executive oversight, risks, and opportunities in our CDP submission. This report outlines and specifies Essential's approach to evaluating and mitigating climate change risks and opportunities and is guided by the recommendations of the TCFD, presenting information for calendar year 2021.

About Us

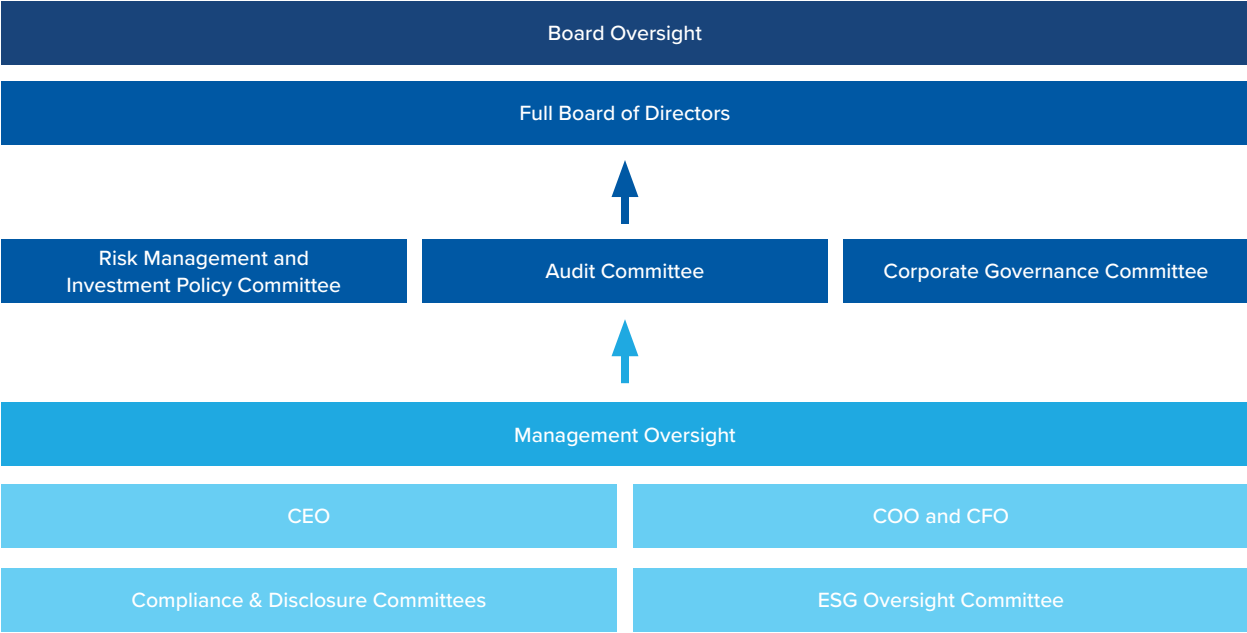
Essential Utilities, Inc. (referred to as Essential Utilities, Essential, the Company, we, us, or our), a Pennsylvania corporation, is the holding company for regulated utilities providing water, wastewater, or natural gas services to an estimated five million people in Pennsylvania, Ohio, Texas, Illinois, North Carolina, New Jersey, Indiana, Virginia, West Virginia, and Kentucky under the Aqua and Peoples brands. One of our largest operating subsidiaries, Aqua Pennsylvania, Inc., (Aqua Pennsylvania) accounted for approximately 55% of operating revenues and approximately 68% of income for our Regulated Water segment in 2021. As of December 31, 2021, Aqua Pennsylvania provided water or wastewater services to approximately one-half of the total number of water and wastewater customers we serve. Aqua Pennsylvania's service territory is located in the suburban areas in counties north and west of the City of Philadelphia and in 27 other counties in Pennsylvania. Our other regulated water or wastewater utility subsidiaries provide similar services in seven additional states. Additionally, pursuant to the Company's growth strategy, commencing on March 16, 2020 with the completion of the Peoples Gas Acquisition, the Company began to provide natural gas distribution services to customers in western Pennsylvania, Kentucky, and West Virginia. Approximately 93% of the total number of natural gas utility customers we serve are in western Pennsylvania. Lastly, the Company's market-based activities are conducted through Aqua Infrastructure, LLC and Aqua Resources Inc., and certain other non-regulated subsidiaries of Peoples. Prior to our October 30, 2020 sale of our investment in a joint venture, Aqua Infrastructure provided non-utility raw water supply services for firms in the natural gas drilling industry. Following the October 30, 2020 closing, Aqua Infrastructure does not provide any services to the natural gas drilling industry. Aqua Resources offers, through a third-party, water and sewer line protection solutions and repair services to households. Other non-regulated subsidiaries of Peoples provide utility service line protection services to households and operate gas marketing and production businesses.

Corporate Profile*

- Revenue: \$1.88 billion
- Employees (full-time): More than 3,200
- People served: Approximately 5 million people from almost 1.8 million connections
- States: 10 – Illinois, Indiana, Kentucky, North Carolina, New Jersey, Ohio, Pennsylvania, Texas, Virginia and West Virginia
- Water systems: 1,518
- Water connections: 0.9 million
- Gallons of water produced: 85.1 billion
- Wastewater systems: 221
- Wastewater connections: 151,965
- Gallons of wastewater treated: 11.1 billion
- Gas connections: 0.8 million
- Gas delivered to customers: 147.6 billion cubic feet (Bcf)

*Please note that these figures are as of December 31, 2021

Governance



Board Oversight

The board of directors is briefed on ESG matters in its regularly scheduled meetings, through various channels and reporting paths. The corporate governance committee takes primary responsibility for providing board oversight for the company’s ESG profile, strategy, and activities. At least five times per year, both the chief of staff, who reports to the CEO and oversees the ESG program, and the ESG Manager present an update to the corporate governance committee of the board on ESG matters. Often joining them are various leaders from across the organization to speak to various subjects. Written reports are provided to the full board at each meeting and, for certain ESG matters, presentations are made to the full board. Climate-related matters are an area of particular attention throughout the year, and there is even one meeting solely dedicated to a deep dive on climate change and environmental sustainability. During this detailed review, there is analysis and discussion of climate change initiatives, strategies, peer and industry benchmarking, and progress towards related goals. These matters are discussed both in terms of impact to current operations as well as through the lens of future acquisition and expansion opportunities and resiliency.

Additionally, climate-related items are covered under the enterprise risk management (ERM) review conducted by the Risk Mitigation and Investment Policy Committee of the board and is reported to the full board at each of its regularly scheduled meetings. Also, there is additional oversight provided by the Audit Committee, which is informed about climate change risks through the Compliance and Disclosure Committees, comprised of the company’s management.

Our board members understand the significance of climate change and passionately believe it is their duty to provide active oversight on these matters and be well-educated on the subject. We are proud to have multiple board members with climate competence and believe this both enriches dialogue at meetings and helps inform our overall climate strategy.

Senior Management

Essential has various reporting pathways, touch points, and methods to actively manage climate-related issues. For example, climate-related issues through the ERM framework are reviewed by the General Counsel to determine risks related to both short term acute events and risk due to longer term climate change issues for both physical assets and production operations. Our CEO is responsible for the overall direction and strategy related to climate issues for operations and aligning corporate growth with consideration of climate-related issues. Further, the CEO is the most direct interface with current and future investors in addressing the company's alignment with ESG and climate goals.

Our Chief Financial Officer is responsible for monitoring the financial impact of climate-related events and projecting the financial risk of future events for current operations. The CFO assesses the financial impact of climate-related issues in both growth and expansion opportunities. Our Chief Operating Officer is responsible for ensuring physical assets are protected from climate-related issues and implementing operational procedures and efficiencies to reduce energy consumption. The Chief Environmental, Safety, and Sustainability Officer reports to the Chief Operating Officer and downward to each state president and corporate engineering functions to provide the overarching guidance and oversight in managing and evaluating climate-related risks.

The Chief of Staff oversees the company's ESG program in concert with responsibilities pertaining to public and investor relations. In this capacity, the Chief of Staff coordinates with the various leaders across the organization on initiatives and also manages both internal and external communications on these matters. In May 2020, Essential Utilities created an ESG Manager position. This is a full-time role that is completely dedicated to further developing and maturing the ESG profile of the company, of which climate change matters and impacts are among the most critical.

Additional management oversight of climate-related matters is provided by the ESG Oversight Committee, which was formalized in 2020. Members of this group include over a dozen senior leaders from across the organization, each lending a unique and valued perspective. This group meets at least once per quarter to discuss recent progress of ESG initiatives, emerging industry topics and trends, strategic short and long-term planning, approval of various initiatives and policies and to recommend matters to be presented to the CEO and the board. We remain dedicated to continually strengthening our governance on climate-related matters in recognition of its critical importance to our society, planet, and company.

Strategy and Risk Management

Climate Change Impact on Business Strategy and Financial Planning

Climate change presents risks and opportunities to water, wastewater, and gas utilities. Designing and implementing efficient and resilient infrastructure and operational processes has a dual purpose of addressing climate change and reducing financial costs, and as we make improvements to our systems, we drive energy efficiency, conservation and waste minimization. As one example, we utilize automation and efficient pumping to help reduce the energy needed to operate our systems. Operational efficiency is monitored and managed through production metrics such as kWh/1,000 gallons to monitor trends and identify opportunities.

Essential is innovating our climate strategy by exploring and evaluating various technologies and renewable fuels that can reduce GHG emissions throughout the gas value chain. We are also exploring and evaluating the acquisition of combined sewer and stormwater systems and upgrading the infrastructure to be more resilient and environmentally sound. Changing weather patterns are further exposing the need to upgrade such systems to ensure associated runoff issues do not occur. We are continually thinking about how to engineer resilient infrastructure for sustainable communities.

Our financial planning process is influenced by climate change in several ways. We are creatively and proactively assessing our energy supply options, which involve forward purchasing of renewable energy and investments in various renewable energy projects. As a water utility operating in an energy-intensive industry, these decisions involve planning, coordination, and financial considerations to ensure we are increasing resiliency and maintaining affordability for customer. Similarly, improving our gas system infrastructure, which is the most impactful emissions-reducing initiative across Essential, requires significant capital investment. We assess about 450,000 segments of pipe and assign a relative risk ranking based on probability of failure times and consequences to help us determine prioritization of action. We are also utilizing various leak detection and operational technologies that carry additional costs but reduce methane leakage.

Determining Climate-Related Risks and Opportunities Through Scenario Analysis

Evaluating exposure to climate-related risks and opportunities over a range of time horizons allows for the development of a strategy consistent with the transition to a low-carbon economy recognized in the Paris Agreement and UN Sustainable Development Goals. This information offers stakeholders greater confidence that we understand and have properly assessed potential climate-related impacts to our business. In an effort to better incorporate the potential effects of climate change on our business, Essential has assessed climate-related risks and opportunities through the use of scenario analysis. This model was developed in conjunction with Villanova University and was performed for water and wastewater operations and, separately, gas operations. Villanova provided the facilitative guidance of an experienced and objective third-party.

The purpose of this is to prioritize climate-relevant risks and opportunities and evaluate the timeline for impact in order to make proactive management decisions. Guidance on conducting both qualitative and quantitative scenario analysis comes from 'Recommendations of the Task Force on Climate-Related Financial Disclosures' (2017) to identify our most pertinent climate-related business risks (transition and physical) and opportunities under the 2°C warming scenario (RCP 2.6) and the greater than 2°C Business-As-Usual (RCP 8.5) warming scenario.

Essential defines climate-related impacts through a model which weights likelihood, cost, magnitude of impact and time horizon. To perform qualitative scenario analyses, we implemented a multi-step scenario development process in which we identified potential risks and opportunities, key factors influencing those issues, driving forces, ranked them by importance and uncertainty, and created scenario matrices with narratives qualitatively analyzing the state of business

and economic forces that would result in each set of circumstances. The scoring methodology developed applies to both risks and opportunities. Financial impacts could be from a single event or occurrence or derive from an annualized cost impact of a specified time. While cost is a quantitative assessment of impact, it was also important to qualitatively assess the magnitude of impact and degree of likelihood. Results were lists of risks and opportunities that were ranked and graded, the most significant of which are detailed below.

This scenario analysis process was conducted as a rigorous workshop across several weeks, with additional internal meetings to prepare for each workshop session and to discuss various opinions and ideas. Multiple members of management with climate-related responsibilities partake in this process and the findings and conclusions are shared and discussed with company leadership. We look forward to continually revisiting and updating our analysis in future years.

Climate-Related Risks and Opportunities

Essential considers climate change risks across three time horizons. We consider the next zero to five years to be our short-term horizon and view this period as an actionable and pertinent range, as both physical and transitional risks are likely to adjust and shift in this time. As a state-regulated utility this range aligns with our other business activities. We see six to 15 years as a medium-term horizon for strategic capital and infrastructure planning, and 16 to 30 years as our long-term time horizon. We believe that engaging in long-term planning cycles during which enterprise-wide issues are evaluated is important in addressing actions today, when outcomes pay dividends far into the future. As an organization focused on infrastructure renewal and advancement, we constantly strive to implement technologies that make our business practices more efficient for the customers we serve.

	Years	Risks	Opportunities
Short-term	0-5	<ul style="list-style-type: none"> Changes in precipitation patterns and extreme variability in weather patterns resulting in increased sewer overflow events (physical) Mandates on and regulations of existing services, in particular regulation of cyanotoxins and contaminants of emerging concerns (physical) 	<ul style="list-style-type: none"> Renewable energy (transitional) Acquisitions of smaller water and wastewater systems that cannot manage increased complexity and costs of operations (physical)
Medium-term	6-15	<ul style="list-style-type: none"> Mandates on and regulations of existing services, in particular drinking water disinfection by-products (physical) 	–
Long-term	16-30	<ul style="list-style-type: none"> Determining a safe hydrogen concentration (transitional) Implications of potential electrification (transitional) Late entry for renewable adoption (transitional) 	<ul style="list-style-type: none"> Acquisitions of smaller water and wastewater systems that cannot manage increased complexity and costs of operations (physical) Access to new markets, including wastewater discharge reuse (physical) Potential for hydrogen blending (transitional) Potential for alternate energy technologies, specifically adoption of carbon capture utilization and storage, adoption of combined cooling, heating, and power, and electric vehicles (transitional) Potential for renewable natural gas adoption (transitional)

In assessing climate change risks and opportunities, we consider current and emerging regulations, legal proceedings and likelihood of litigation, technological advances, market influences, and the physical impacts of a changing climate, both acute and physical. We assess and manage risks through our enterprise risk management process, which identifies opportunities to build both in our operations and our business model. Essential regularly updates risk management policies, standards, and programs to align with global best practices and regulatory requirements, and we aim to anticipate emerging risks and opportunities. As a result of our assessment, we have identified the following risks and opportunities with the most significant potential to have a substantive financial or strategic impact on our business:

Climate Risks

Changes in precipitation patterns and extreme variability in weather patterns resulting in increased sewer overflow events (short-term; physical)

Protecting the environment from untreated sewage is a top priority as the owner and operator of wastewater systems. However, our company acquires many systems that, due to historical lack of repair and investment, require time to make major infrastructure investments to prevent sewers from overflowing to the environment. Overflows can be caused during non-rain events by sewer collapses, electrical failures, and blockages. Also, extreme weather events such as hurricanes and tropical storms, increased frequency of extreme rainfall events, or climate-related trends can force a well-operated and maintained system to experience the occasional sanitary sewer overflow. Essential works to eliminate overflows through capital investments and operations, minimize and report overflows when they happen, and track the location, frequency, and duration of any overflows for future improvements.

Mandates on and regulations of existing services, including regulation of cyanotoxins and contaminants of emerging concerns (short-term; physical)

Blooms of toxin-producing cyanobacteria are expected to proliferate in surface water as global temperatures rise. These organisms produce cyanotoxins, a contaminant of emerging concern (CEC) that we have identified as a potential climate-related risk to our ability to provide safe and healthy drinking water to our customers. However, there is currently research being performed internally and externally to further assess this risk. Our company's response to regulations for CECs, and specifically cyanotoxins, depends on the speed and structure by which these regulations are implemented. The U.S. Environmental Protection Agency (EPA) has begun conducting studies to determine chronic and acute maximum contaminant level in humans and aquatic life for the pollutants. Once these studies are complete and potentially translated into regulatory policy, this could influence the regulations of water quality for surface water plants. How quickly these regulatory policies are adapted and implemented, and their results, will determine how soon and strict future CEC regulations in drinking water quality are. Our company's response to these future regulations depends on these results and we are actively monitoring the latest scientific and regulatory developments in this area. In addition, we have begun installing treatment upgrades to address cyanotoxins in our Ohio subsidiary.

Mandates on and regulations of existing services, including drinking water disinfection by-products (medium-term; physical)

An unintended consequence of drinking water disinfection is the generation of disinfection by-products (DBPs). These chemical DBPs, either organic or inorganic depending on the context, form as part of normal chemical disinfection treatment through the interaction between naturally occurring organic materials present in the source water and the treatment technology being used. In the case of our operations, the disinfectant most prone to cause DBP is chlorine. Chlorine dosage, and by extension the prevalence of DBP, is highly dependent on temperature. Using scenario analysis,

we determined the potential implications to our business operations under an optimistic scenario (RCP 2.6) and a Business-as-Usual pathway (BAU, RCP 8.5). We have determined that there is a high likelihood that regulatory authority and requirements will also be highly dependent on similar climate-related trends. Our company may address increased DBPs as a result of treatment by implementing new filtration and treatment processes (e.g. organics removal, carbon treatment and membranes) for their effective removal prior to delivery, with the ability to scale these efforts based on the regulatory requirements, justified through the results of the scenario analysis.

Determining a safe hydrogen concentration (long-term; transitional)

Hydrogen blending as a sustainable fuel source is in an early stage of development and research across the gas industry. Thus, it is paramount to perform sufficient due diligence to ensure safety in distribution and processing. Lack of adequate protocols and safety measures, if we ever were to blend hydrogen in our gas supply, could lead to significant liability issues. Hydrogen is a highly combustible gas. As an operator of a gas distribution network with safety always of the utmost priority, we wished to capture this potential downside risk of hydrogen blending. Studies into whether hydrogen blending will be practical and safe for transport through distribution pipelines are in their infancy. We continue to monitor developments in understanding in both academic and industry circles.

Implications of potential electrification (long-term; transitional)

As climate change exacerbates and renewables comprise a higher proportion of electric generation, there may be a shift towards electrification of buildings and a shift away from natural gas usage to at least some degree. This may be market-driven or policy-driven in nature, or some combination of the two. This would constitute an inherent risk for our natural gas distribution business, absent of the potential to transition to economically and environmentally competitive technologies and alternative fuel sources. A potential decrease in natural gas demand could pose a financial impact to the company. Depending on the ultimate severity of the risk, which is difficult to assess at this time, there is a range of outcomes from a muted and limited adoption of electrification to some degree of stranded gas assets. If a move towards electrification occurs in the next few decades, it is difficult to assess today what primary drivers will contribute to this change, how regionalized it may be, and the pace at which it will occur. A highly variable political, social, and economic environment contributes to this uncertainty. We do not believe this is a short or medium-term risk and we forecast that natural gas demand will remain stable for quite some time.

Late entry for renewable adoption (long-term; transitional)

The risk of not adopting renewables could present a financial risk of late entry. The level of risk would be based on the economic comparison between future adoption and current premiums. The economic feasibility of acquiring renewable energy may fluctuate based on the market and policies. The market for alternative fuels like renewable natural gas, hydrogen, and responsibly sourced gas are currently developing and it is difficult to estimate at this time what the landscape will look like in several years. So much depends on volatile political, regulatory, and economic factors. As such, it is difficult to assess financial impact of the risk of late entry. Once a robust market for these alternative fuels develops, along with numerous production facilities, pricing forecasts will become more accurate and we will be able to revisit a financial assessment for this risk.

Climate Opportunities

Renewable energy (short-term; transitional)

We see renewable energy use as an opportunity to reduce our operating costs. Essential has installed solar panels at two treatment plant locations in Illinois. Through favorable grants for solar installations, Aqua Illinois is able to realize 25% to 50% savings for its retail power supply costs at both a water and wastewater treatment plant, while supplying 75% of the plants' annual electricity requirement. This an example of how solar can reduce operating costs with the right mix of incentives and comparative grid supplier power costs either under an own-and-operate or power purchase agreement (PPA). In 2019, we entered into an agreement which provides Aqua Texas, beginning in July 2020, with 25% solar power through an off-site PPA. This agreement provides a cost advantageous scenario as compared to 100% grid power. We continually evaluate the cost of retail power, available grants, land availability and PPA opportunities so we are ready to act with agility on advantageous opportunities.

Acquisitions of smaller water and wastewater systems that cannot manage increased complexity and costs of operations (short-term; physical)

At Essential, we view access to new markets as an opportunity to grow our business without unnecessarily expanding our footprint through expanded infrastructure growth. Mergers and acquisitions as a growth strategy allows for Essential to expand into new markets through opportunities that in part result from the impacts of climate change. There are many factors that could lead municipalities to sell their systems, but as the climate changes water and wastewater systems become more complex to operate, require increased capital investment to meet change and regulatory compliance becomes more complex. While these are the same risks identified as risks to our business, they are also present opportunities for acquisition. Fair Market Value policies provide a mechanism for municipal systems to sell their water and wastewater systems. These municipalities seek a company such as Essential with broad expertise and experience, access to capital, and a strong understanding of current and future regulations and legislation. Through the use of scenario analysis, we have identified specific areas of operations and climate scenarios that would provide a strategic advantage on this front, leading to acquisitions that would improve service reliability and quality to local stakeholders.

Access to new markets including, in particular, wastewater discharge reuse (long-term; physical)

As climate change may alter precipitation patterns, a consequence may be the impact to groundwater and surface water quantity and quality in various regions. Reducing the demand for freshwater and reducing demand on less resilient sources of supply will require communities to consider alternatives sources and technologies. Irrigation is a significant demand on household water use and cooling for power generation and server farms requires significant water. If these uses for homes, businesses, technology, agriculture, and golf courses are to be maintained for growing populations, the treatment and reuse of wastewater for potable and other uses will need to be expanded. This may provide opportunities to add customers within a given service area or provide access to new communities and businesses that cannot meet their supply demands. We are currently involved in several agreements in which we treat wastewater and return the water to various fields, including golf courses, where the water is used for irrigation. This opportunity includes expanded services for wastewater effluent used in irrigation, as well as services to convert wastewater back to a fully potable source.

Potential for hydrogen blending (long-term; transitional)

Advancements taking place surrounding hydrogen blends present the opportunity to reduce GHG emissions by integrating natural gas with hydrogen. While academic and industry research is underway to determine a safe blending ratio, a hydrogen-natural gas blend could significantly reduce emissions. At this time, until further research and feasibility studies are performed in the coming years, assessment of the scale and nature of this opportunity remains challenging. Studies into whether hydrogen blending will be practical and safe for transport through distribution pipelines are in their infancy. We continue to monitor developments in understanding in both academic and industry circles. We believe a better understanding of what kind of adjustments to our infrastructure would be needed to transport hydrogen and to what degree it can be sourced across our footprint is still at least several years away, if not longer. There are many variables in a landscape that involves quickly changing political, legal, and economic factors.

Potential for alternate energy technologies, specifically adoption of carbon capture utilization and storage, adoption of combined cooling, heating, and power, and electric vehicles (long-term; transitional)

For purposes of brevity, this opportunity collectively includes adoption of carbon capture utilization and storage (CCUS), adoption of combined cooling, heating, and power (CCHP), and electric vehicles. CCUS will be paramount in reducing GHG emissions globally. Although further academic and industry research is necessary in the coming years, CCUS presents an opportunity in various respects, most notably if it can reduce emissions at the point of customer combustion. CCHP, particularly in cases where an alternative low or zero-emissions fuel source can be utilized, would be an opportunity that can be realized in the future. We could leverage our existing expertise in natural gas-powered combined heat and power systems. Lastly, rapid developments are being made in the auto industry to electrify certain classes of vehicles. Electrifying our light vehicles over the coming years would provide an opportunity to reduce emissions and possibly reduce operating costs. This is the most certain of the three technologies at this time but may have the smallest ultimate impact.

Potential for renewable natural gas adoption (long-term; transitional)

Renewable natural gas (RNG) or biomethane, is typically the result of anaerobic digestion of organic matter, such as manure, agricultural waste, food waste or landfill. RNG combines low or zero full-cycle carbon emissions with the high energy density and transportability of natural gas. It has the potential to reduce Scope 3 emissions when the utility owns the associated renewable credits. This opportunity reflects the potential for our company to source greater amounts of renewable natural gas in the coming years, especially if regulatory mechanisms are introduced to aid in this adoption.

GHG Emissions Reduction Efforts, Targets and Metrics

GHG Emissions Reduction Efforts and Climate Targets

In January of 2021, Essential announced a commitment to substantially reduce Scope 1 and 2 greenhouse gas emissions. By 2035, Essential will reduce its emissions by 60% from its 2019 baseline. This will be achieved by extensive gas pipeline replacement, renewable energy purchasing, accelerated methane leak detection and repair, and various other planned initiatives that are highly feasible with proven technology. This science-based commitment is consistent with the rate of reduction necessary over the next 15 years to keep on track with the Paris Agreement, which aims to limit the global temperature increase to well below 2 degrees Celsius. All our utilities- gas, water, and wastewater- across all 10 of our states will be contributing to this enterprise-wide target and building on important work and progress in recent years. Our water and wastewater operations as well as our new gas operations will each be contributing about a 60% Scope 1 and 2 emissions reduction individually.

Transparency is at the center of our ESG program and a core value of our company, so we will report on our progress toward this goal twice a year until we meet the target. This is a strong first step toward an ultimate aspiration of net zero emissions, which we acknowledge will only be possible with further technological and engineering innovation. While we're optimistic and excited about the pace of technological advancement, this initial 60% Scope 1 and 2 emissions reduction comes from projects and initiatives we have already planned or put into place. They utilize existing and proven technology and methods and are real and tangible. Importantly and uncommonly in the utilities space, the baseline is very recent, 2019.

Almost all of Essential's Scope 1 emissions are emitted by our gas operations. Of this, the large majority of such emissions relate to fugitive methane from pipeline leaks. As natural gas, which is primarily methane, travels through our network of underground pipes on its way to the customer, a very small portion of this volume leaks out and escapes into the atmosphere, often due to corrosion leaks, material defects or excavation damages. Our Long-Term Infrastructure Improvement Plan seeks to, over time, systematically replace older and more vulnerable sections of pipe made of materials that are leak-prone. Additionally, as is common across our industry and consistent with regulations, we utilize various leak detection technologies to proactively identify sources of fugitive methane and repair leaks as quickly as possible.

Almost all of Essential's Scope 2 emissions are driven by our water and wastewater operations. The physics of moving vast amounts of water and wastewater through networks of pipes to and from Essential's plants requires extensive amounts of energy. Our total energy consumption in this area of our operations has been relatively consistent over the last three years with increases attributed to acquisitions and the organic growth of our business. Essential contracted to source 25% of its electricity in Aqua Texas through an offsite solar power purchase agreement (PPA), which started in June 2020. We also contracted with a retail power supplier for 100% wind power through Green-e Renewable Energy Certificates beginning in 2022 for our water and wastewater operations in Illinois, New Jersey, Ohio, and Pennsylvania. These states feature deregulated energy markets which allow for this arrangement. We forecast these initiatives will increase our water and wastewater operations' energy derived from renewables from less than 10% today to about 60% in 2022. In volumetric terms of production, we expect renewable energy usage to cover about 60% of water and about 40% of wastewater treated in 2022.

Materially all of Essential's Scope 3 emissions are driven by our gas operations. The large majority of this is carbon dioxide emitted by customers upon combustion of natural gas in their home or business. The other material driver is related to upstream emissions during the production stage of the lifecycle of natural gas we procure. We continue to assess opportunities and initiatives to reduce these emissions, aware that Scope 3 emissions are more challenging to address directly than Scope 1 and 2 emissions, as is the case with other industries. Like most of our peer gas utilities, we are examining exciting opportunities for alternative fuels, such as renewable natural gas or hydrogen, which also serve to reduce Scope 3 emissions.

We have committed to transparent progress tracking towards our target.

Essential's Greenhouse Gas Emissions Target*

	2019 Baseline Scope 1+2 Emissions <i>(metric tons of CO₂e)</i>	2035 Baseline Scope 1+2 Emissions <i>(metric tons of CO₂e)</i>	Percentage Reduction
Essential	621,030	248,412	60.0%
Gas Distribution	489,849	198,331	59.5%
Water and Wastewater	131,181	50,081	61.8%

*Essential has recalculated its 2019 Scope 1 and 2 baseline from 616,652 metric tons CO₂e to 621,030 metric tons CO₂e. This decision was driven by changes to methodology for the calculation of emissions relating to our gas utility. These changes have led to a more complete and accurate representation of 2019 emissions. Essential's 60% Scope 1 and 2 emissions reduction commitment remains in place. Essential's 60% Scope 1 and 2 emissions reduction commitment remains confidently in place.

Climate Metrics

Essential Utilities

Greenhouse Gas Emissions (Metric Tons CO₂e)*

	2021	2020	2019
Scope 1 emissions (metric tons CO ₂ e)	468,734	494,835	503,637
Scope 2 emissions (market-based; metric tons CO ₂ e)	117,723	111,262	117,393
Total Scope 1 and 2 emissions (metric tons CO ₂ e)	586,457	606,097	621,030
Total Scope 3 emissions	8,659,255	8,653,218	Not disclosed

*2019 was the first year for which Essential disclosed Scope 1 and 2 GHG emissions for its combined water, wastewater, and natural gas utilities. This served as the baseline for the company's emissions reduction target. 2020 is the first year for which Essential disclosed Scope 3 emissions for its combined water, wastewater and gas utilities.

Essential has recalculated its 2019 Scope 1 and 2 baseline from 616,652 metric tons CO₂e to 621,030 metric tons CO₂e, with all of the increase due to a corresponding change in Scope 1 emissions. The company has also recalculated its 2020 Scope 1 emissions from 483,214 metric tons CO₂e to 494,835 metric tons CO₂e. These decisions were driven by changes to methodology for the calculation of emissions relating to our gas utility and a more complete operational boundary. These changes have led to a more consistent and accurate representation of historical emissions.

Gas Operations

Greenhouse Gas Emissions (Metric Tons CO₂e)*

	2021	2020	2019
Scope 1 emissions (metric tons CO ₂ e)	452,740	478,684	487,580
Scope 2 emissions (market-based; metric tons CO ₂ e)	4,502	3,156	2,269
Total Scope 1 and 2 emissions (metric tons CO ₂ e)	457,242	481,840	489,849
Total Scope 3 emissions	8,534,299	8,533,075	Not disclosed

* Essential chooses to present Scope 2 emissions using the market-based method, as this approach incorporates the impact of various sourcing decisions, such as its procurement of renewable energy. In contrast, the location-based method reflects the average emissions intensity of electric grids on which energy consumption occurs. Essential's gas operations' location-based Scope 2 emissions (measured in metric tons CO₂e) are as follows: 4,332 (2021) and 3,951 (2020). This figure and the value of Scope 3 emissions were not calculated in 2019.

Breakdown of Material Scope 3 Emissions

Downstream Scope 3 emissions represent the only significant and material source for Essential's gas operations. This total, 8,534,299 metric tons CO₂e, is produced from customer combustion of natural gas delivered by the company.

Water and Wastewater Operations

Greenhouse Gas Emissions (Metric Tons CO₂e)*

	2021	2020	2019
Scope 1 emissions (metric tons CO ₂ e)	15,994	16,151	16,057
Scope 2 emissions (market-based; metric tons CO ₂ e)	113,221	108,106	115,124
Total Scope 1 and 2 emissions (metric tons CO ₂ e)	129,215	124,257	131,181
Total Scope 3 emissions	124,956	120,143	110,675

* Essential chooses to present Scope 2 emissions using the market-based method, as this approach incorporates the impact of various sourcing decisions, such as its procurement of renewable energy. In contrast, the location-based method reflects the average emissions intensity of electric grids on which energy consumption occurs. Essential's water and wastewater operations' location-based Scope 2 emissions (measured in metric tons CO₂e) are as follows: 110,970 (2021) and 120,776 (2020).

Breakdown of Scope 3 Emissions

	Metric Tons CO ₂ e	Percentage of Total
Capital goods	50,614	40.5%
Purchased goods and services	40,862	32.7%
Fuel-and-energy-related activities	26,643	21.3%
Other (upstream)	4,345	3.5%
Employee commuting	1,682	1.3%
Waste generated in operations	810	0.6%
Total Scope 3 emissions	124,956	100.0%

Forward-Looking Statements

This report contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, which generally include words such as “believes,” “expects,” “intends,” “anticipates,” “estimates” and similar expressions. The company can give no assurance that any actual or future results or events discussed in these statements will be achieved. Any forward-looking statements represent its views only as of today and should not be relied upon as representing the company’s views as of any subsequent date. Readers are cautioned that such forward-looking statements are subject to a variety of risks and uncertainties that could cause the company’s actual results to differ materially from the statements contained in this document. Such forward-looking statements include, but are not limited to, statements relating to the capital to be invested by the water, wastewater, and gas distribution divisions of the company. There are important factors that could cause actual results to differ materially from those expressed or implied by such forward-looking statements including the factors discussed in our Annual Report on Form 10-K and our Quarterly Reports on Form 10-Q, which are filed with the Securities and Exchange Commission. For more information regarding risks and uncertainties associated with the company’s business, refer to the company’s annual, quarterly and other SEC filings. The company is not under any obligation — and expressly disclaims any such obligation — to update or alter its forward-looking statements whether as a result of new information, future events or otherwise.



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