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Case Report

How do Water Companies Address Environmental Indicators in their ESG Reports?

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Abstract

As climate change is becoming an increasingly crucial issue, it has become critical for firms to report on their Environmental, Social, and Governance (ESG) aspects. In particular, this research analyzes how environmental indicators are dealt with and reported on. In the case study examined, namely the company American Water Works, GHG emissions and water management were the most important issues to the stakeholders according to the materiality assessment. It was found that the firm has significantly reduced its GHG emissions, and it is on track to meet its target of 40% reduction by 2025. This was achieved mostly through corporate power purchase agreements, although the Sustainability Report focuses on improvements to the energy efficiency of infrastructure. This underscores the possibility that companies represent ESG data in ways that are convenient to guarantee a more sustainable image in the long term, at the cost of a complete portrayal of their ESG practices. Moreover, Scope 3 emissions are not verified through a third party, which is key to ensuring the rigor and transparency of carbon emissions, and no Net Zero emissions target is mentioned in such report. For what regards water management, the Sustainability Report contains the target of reducing water per customer by 15% by 2035. Nevertheless, the report lacks a mention of Net Zero groundwater abstraction and a leakage reduction target.

Keywords
GHG emissions; carbon; water; ESG; climate change

1. Introduction

Over the last decade, climate change has become a growingly critical issue in political agendas worldwide. To avoid irreversible consequences on Earth's environmental system it is crucial to mitigate the emissions of greenhouse gases (GHG) in the atmosphere [1]. Therefore, private companies and corporations are called to restructure their businesses and shift towards low-carbon operations [2, 3]. Firms that successfully transform themselves are considered more reliable because they will be less subject to climate risks in the future [4]. Moreover, becoming sustainable under an environmental yet also economic and social point of view grants the social license to operate and general appreciation from stakeholders and customers [5]. To this extent, it has become crucial for companies to report their Environmental, Social and Governance (ESG) aspects: a transparent and comprehensive report helps firms to meet the demand for sustainable production, enhancing their ability to open new businesses and increasing financial investments [6]. This is because the ESG, when verified and validated from a reliable third party, can be seen as a proxy for a company's sustainability practices [7].

Although ESG reporting is a fairly recent phenomenon, existing academic research has already been conducted companies as case studies: Boldeanu [8] evaluated the trends concerning electricity companies. Kuo [9] focused on the importance of ESG reporting for financial improvement in the airline sector. Dinka [10] explored the same connection in the case of automotive industries. However, no research has yet been conducted regarding ESG practices in the water sector. Therefore, this paper contributes to filling this gap in the academic literature by analyzing the water supply company American Water Works. Existing literature has also shown that sustainability practices can relate to environmental indicators, such as GHG emissions, impact on biodiversity and wildlife, water usage or air pollution [11]. Otherwise, they can also regard social aspects such as gender or disability equality in the workforce, presence of ethnic minorities, injuries and casualties in the workplaces [12]. In light of this, the company American Water Works is an interesting case study because it is considered as a sustainable and accountable company: in 2021, it was ranked #9 on Corporate Knights' Global 100 Most Sustainable Corporations in the World index and #15 on Barron's 100 Most Sustainable Companies list worldwide, #1 in the water sector [13]. However, the social aspects are certainly those that stand out the most among American Water Works' awards and accomplishments: specifically, it is a top scoring (100%) company on the Disability Equality Index since three consecutive years [13]. It was included in the top 100 Best for Vets Employers by Military Times [13], and in the 2021 Bloomberg Gender-Equality Index [13]. Therefore, it is critical to analyze how American Water Works performs against environmental indicators. This could provide important insights regarding how different categories of indicators are weighed when evaluating ESGs. Another reason why American Water Works is a useful case study lies in the fact that it is one of the most important water supply companies in terms of number of employees, customers and revenue worldwide [13]. While water is still a public good in most countries, it has been undergoing privatization over the last few decades, thus the number of companies in the water market is

expected to grow [14]. Since American Water Works is ranked as a particularly sustainable company, analyzing its report in its most positive and negative aspects can provide insights for other water companies concerning how to improve both their sustainability practices and their reporting. Aside of these practical contributions, this paper fills a second gap in the current academic literature since no research has yet analyzed a case study company with such a clear focus on social ESG indicators.

Therefore, this report focuses on answering the following research question: how does American Water Works address environmental indicators in its ESG report? Specifically, the scope of this research is narrowed down to two main aspects: GHG emissions and water management. These were chosen according to the materiality assessment operated by American Water Works [15]. Following consultations with its stakeholders, American Water Works set out its material issues, as portrayed in Figure 1 below:

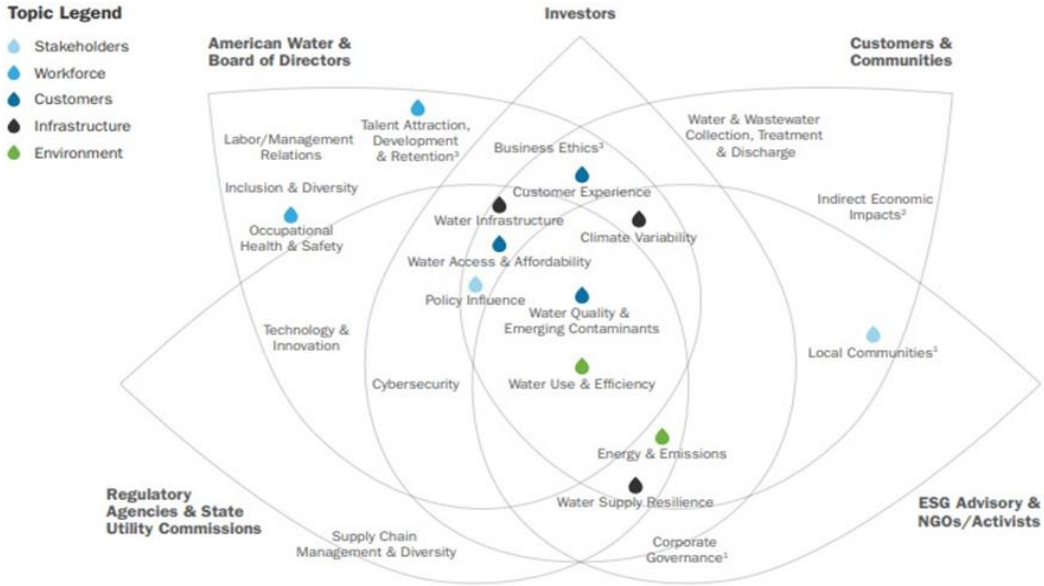

Figure 1 Material issues for American Water Works depending on the type of stakeholder [15].

Figure 1 clearly shows that the two environmental issues, namely "Energy & Emissions" and "Water Use & Efficiency" are material according to nearly all of the stakeholders involved. Water use is crucial since this company's core business is water supply, thus dealing with large quantities of water implies higher concerns regarding water efficiency and impacts on the environment [16]. For what regards energy and GHG emissions, it has been demonstrated that waste water emits GHGs due to the decomposition of organic material [17]. Moreover, CO_2 is emitted during the production of ammonia, which is necessary to purify water supply infrastructures such as reservoirs and pipelines [17]. Furthermore, a great amount of electricity is necessary to pump water, being another cause of GHG emissions [16]. Overall, drinking water has an emission intensity of 0.46 kg CO_2e/kl, while wastewater emits 0.38 kg CO_2e/kl [18]. Therefore, the objective of this article is to understand how GHG emissions are dealt with and reported on by water supply companies, which can be useful to inform climate mitigation policies along with future firms' carbon management practices. In fact, due to the required transition to a low-carbon economy, that of GHG emissions is a salient issue other than material for nearly all of the stakeholders. Aside of GHG emissions and water management, a brief overview of the rest of the ESG will also be provided.

To analyze how American Water Works deals with GHG emissions and water usage, this research is divided into five sections: first, it will present an overview of the firm. Second, it will outline the reporting framework for the ESG. Third, in the Findings section, it will summarize and contextualize the content of the ESG report. Fourth, in the Discussion section, the overall performance of American Water Works will be assessed in comparison with other companies. Lastly, in the conclusion, the findings will be summarized and the limitations will be presented.

2. Overview of the Firm

American Water Works is a publicly traded company, founded in 1886, that operates in the water supply sector [19]. It deals with both clean and wastewater [19]. Its core business consists of supplying water to households, yet industries, commercial customers and organizations are customers of American Water Works as well [19]. Although it only operates in the US, it provides water to 14 million people across 24 states [19]. Considering the companies that operate only in water sector and not in energy as well, American Water Works is one of the most important and influential: its revenue for 2021 was 3.93 billion USD [19]. Its revenue has constantly grown over time, as shown in Figure 2 below:

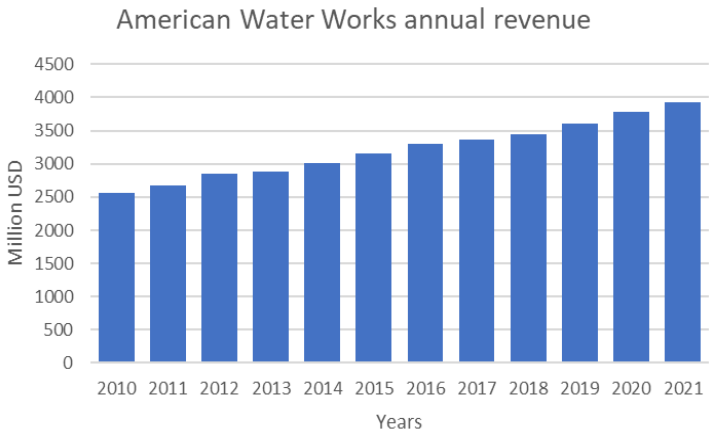

Figure 2 American Water Works annual revenue between 2010 and 2021 [19].

Moreover, American Water Works currently counts 6427 full-time employees, divided by gender as portrayed in Figure 3:

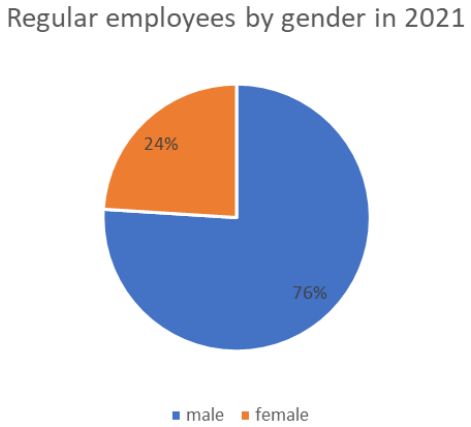

Figure 3 American Water Works employees by gender [19].

The sustainability issues related to American Water Works are GHG emissions and water for the reasons highlighted in the introduction, yet also product governance and occupational health and safety. These four are also the most critical issues mentioned in Morningstar [20] report, which rated American Water Works as "Medium" (27.76/50) in its ESG risk rating assessment.

These characteristics make American Water Works a peculiar case: most of the water supply companies with a similar revenue and number of employees operate simultaneously in the energy market, such as Essential Utilities and Veolia [21, 22]. Instead, companies that operate only as water suppliers tend generate smaller revenues, mostly because privatization of water is particularly occurring in developing countries [14]. Only a few companies, operating in either France or England, were found suitable for a comparison in terms of revenue and number employees, namely Thames Water, Anglian Water and Suez. Nevertheless, American Water Works' sustainability practices can be representative as well for smaller companies and future firms that will operate in the growing market of private water.

3. Reporting Framework

American Water Works set out its Sustainability Report according to the Global Reporting Initiative (GRI) Standards: Core option [23]. To this extent, this report will focus on GRI 302: Energy, GRI 305: Emissions and GRI 303: Water and Effluents [24]. American Water Works discloses as well various standards from the Sustainability Accounting Standards Board (SASB), and from the Edison Electric Institute (EEI) [23]. Furthermore, American Water Works refers to the Task Force on Climate-related Financial Disclosures (TCFD) recommendations to portray data regarding how it deals with climate risks [23], and it operates towards Sustainable Development Goals (SDGs). Lastly, American Water Works annually responds to the CDP Climate Change questionnaire [25].

American Water Works has reported its practices on sustainability issues for more than a decade: in its 2009 annual report there is a mention to GHG emissions, and a pledge to publish its first corporate responsibility report in 2011 [26]. When the report was released in 2011, it contained a brief review of climate risks, social issues such as safety in the workplaces and impacts on the environment derived from water management. GHG emissions will be first included in 2015 [27, 28]. Throughout these years, American Water Works' dedication to sustainability matters has grown from a few paragraphs in 2009 to having an entire section of their website dedicated to the ESG, containing the Sustainability Report, responses to CDP, stakeholders' engagement process and materiality assessment [25].

4. Findings

4.1 Social Practices

American Water Works' Sustainability Report includes a wide variety of social issues. First, it mentions the level of customers' satisfaction and the need to address it through surveys [23]. It also emphasized the need to educate customers to water saving, to improve water efficiency overall [23]. Regarding employees, it highlights the 67% reduction in workplace injuries since 2015 and the fact that the number of fatalities in the workplaces has been zero for the last five years [23]. Then, it describes the structure of employees by gender, age group and ethnic minorities [23]. The report also focuses on the percentage of veterans and military spouses, disabled employees, and LGBTQ+

employees, representing an overall workforce diversity of 43% [23]. For what regards the environmental standards, as aforementioned the report focuses on water management and GHG emissions, which will be analyzed in detail further in this section. There is no other mention of environmental issues. In particular, impacts on biodiversity and waste management are excluded from the narrative. In fact, only GHG emissions and water management were deemed as relevant in the materiality assessment process in first place [23].

4.2 GHG Emissions

American Water Works reported a total of 534927 tCO_2e emitted in 2021 [13]. Since Scope 3 emissions were not included, the breakdown by Scope comes as shown in Figure 4:

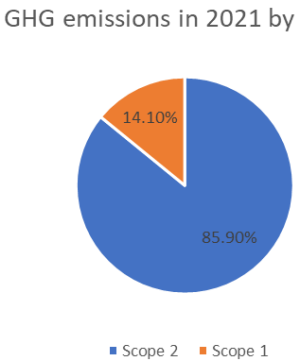

Figure 4 Scope 1 and Scope 2 GHG emission percentages [13].

It is clear that Scope 2 emissions are significantly higher than Scope 1. This is because American Water Works consumes high amounts of electricity to pump water [13]. While this ratio approximately constant over the last five years, the total amount of GHG emissions has decreased, as portrayed in Figure 5:

Figure 5 Total GHG emissions reported over the last five years [29].

Taking a closer look to Scope 1 and Scope 2 separately reveals whether the overall emissions reduction is due to a declining trend in Scope 1 or Scope 2 (Figure 6 and Figure 7):

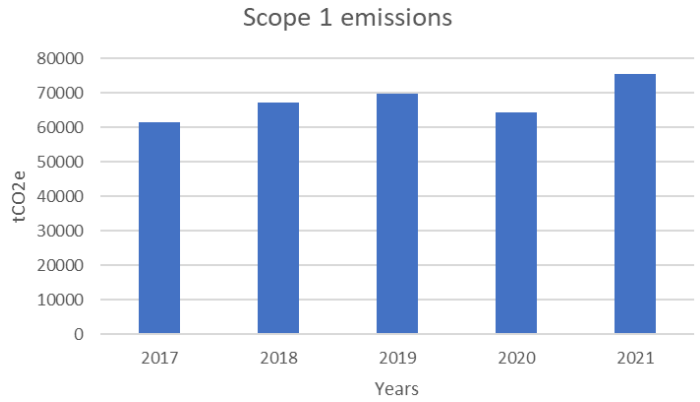

Figure 6 Scope 1 emissions over the last five years [29].

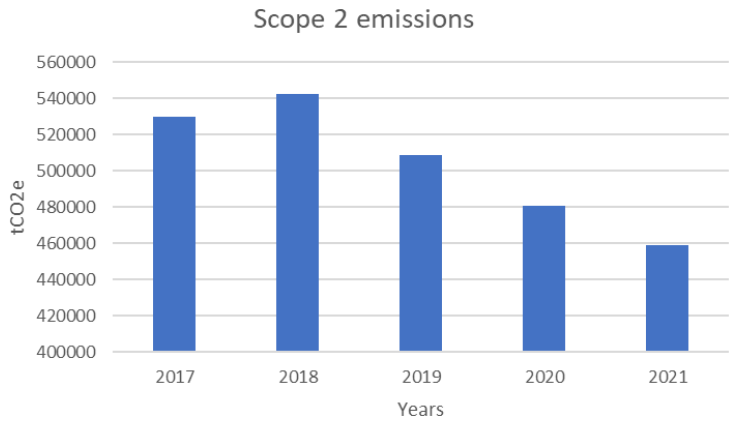

Figure 7 Scope 2 emissions over the last five years [29].

Figure 6 above shows that Scope 1 emissions witness a slightly increasing trend. For what regards Scope 2 emissions, the minimum value of the y-axis was increased to portray the significance of the reduction in comparison with the high amount of Scope 2 emissions.

It is thus clear that the reduction in total GHG emissions is due to a decrease in Scope 2 emissions particularly. This substantial reduction was operated by American Water Works to meet the ambitious target set in 2015 to reduce its Scope 1 + Scope 2 emissions by 40% by 2025 [15]. Thus far, American Water Works is well on track to meet such target since by 2021 it had reduced its emissions by 36% [15]. However, it must be mentioned that the baseline year set for this target is 2007, when GHG emissions were a total of 853 676 tCO_2e, nearly the 160% of the GHG emissions in 2021 [28]. Still, analyzing how American Water Works is achieving such a successful reduction in GHG emissions can provide insights for other companies that may want to reduce their GHG emissions as well. To conceptualize which factors contribute to GHG emissions, this research adopts the following model (Figure 8):

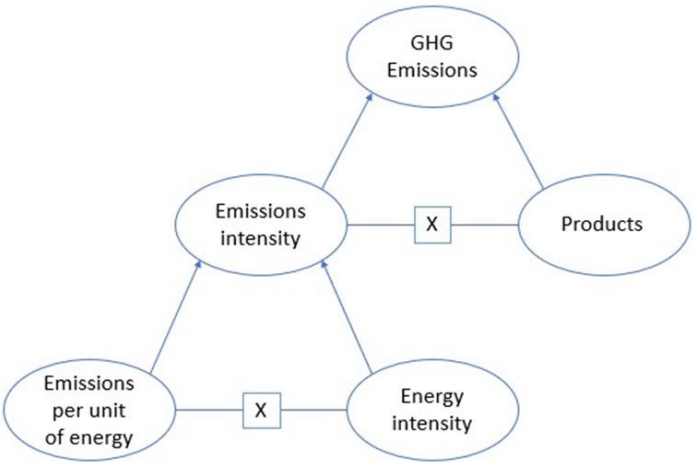

Figure 8 model representing the variables that contribute to GHG emissions.

In the case of a company, emissions intensity is given by GHG emitted per product. Similarly, energy intensity represents the amount of energy consumed per product. Therefore, we have that emissions per unit of energy times the amount of energy per product gives the emissions per product. In turn, emissions per product times number of products gives the total amount of GHG emissions. It must be noted that, if GHG emissions are constant, emissions intensity and products are inversely proportional. Similarly, if emissions intensity is constant, emissions per unit of energy and energy intensity are inversely proportional as well.

Given this model, it could be argued that a reduction of GHG emissions might derive from a decrease in number of products, as it was the case for many firms during COVID-19 [30]. Nonetheless, American Water Works disclosed the data regarding its emissions intensity, as captured in Figure 9 below:

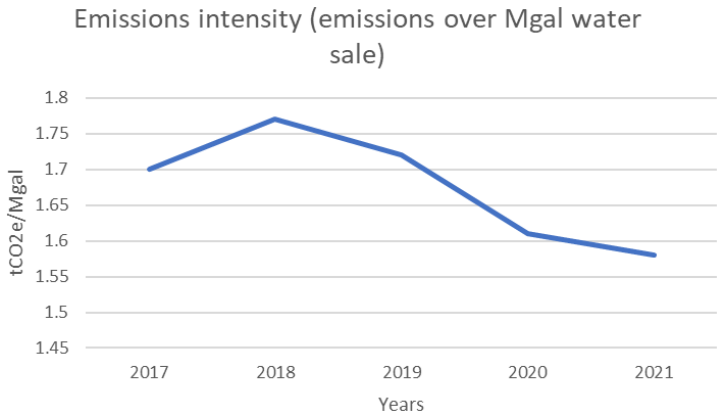

Figure 9 Emissions intensity over the last five years [29].

Therefore, a correlation was run between Scope 2 emissions and emissions intensity in the period 2017-2021. The formal computation of the correlation can be found in Appendix 1. It resulted that there is an extremely strong, positive correlation of 0.947 between the two variables, with a p-value of less than 0.0000026. Although this does not necessarily prove causation, such a strong correlation suggests that it is very unlikely that Scope 2 emissions decreased as a result of variables other than emissions intensity. Moreover, the annual revenue shown in Figure 2 increased between 2017 and 2021, which means the products sold did not decrease in number unless there was an outstandingly

high increase in price [13]. Therefore, it is possible to move further down the model in Figure 8 and understand why emissions intensity decreased. In fact, American Water Works claims in the Sustainability Report that it was able to reduce its emissions through "resiliency efforts, conservation, infrastructure improvements" that contributed to reduce energy intensity [13]. Moreover, the Sustainability Report mentions the recent trend of energy intensity, as portrayed in Figure 10 below:

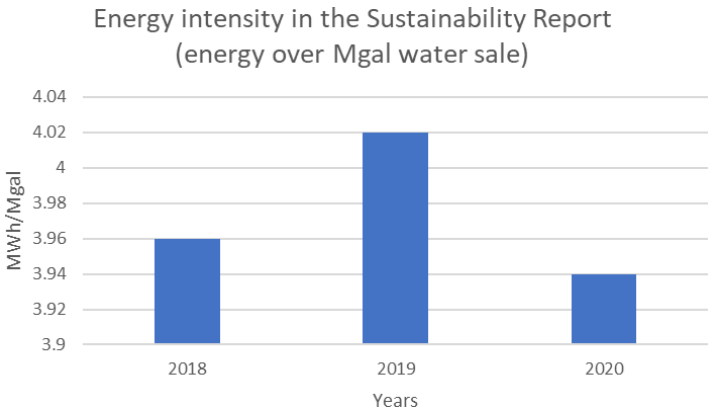

Figure 10 Energy intensity as disclosed in the Sustainability Report [29].

However, the data summary which is separated from the Sustainability Report, includes the data from 2017 and 2021 as well [23]. When these are included, the graph shows a different trend, as given in Figure 11:

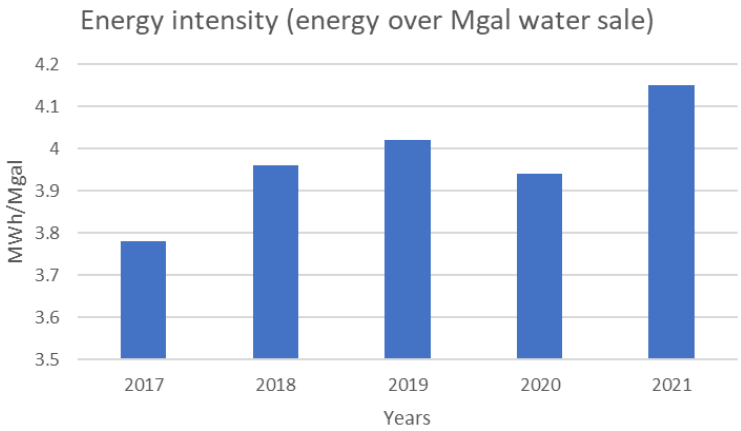

Figure 11 Energy intensity over the last five years [29].

It can be seen from Figure 11 that energy intensity has increased overall, with the only exception of 2020. Therefore, rather than the investments in infrastructures disclosed in the Sustainability Report, the amount of emissions per unit of energy has contributed most to the decline in emissions intensity. It is possible that a reduction in emissions per unit of energy was obtained through corporate power purchase agreements. However, the Sustainability Report only mentions that renewable energies were taken into consideration when discussing corporate power purchase agreements [23]. American Water Works might have decided to focus on disclosing their improvements in infrastructure as a sign of structural and internal transformation, rather than

reliance on external actors to reduce GHG emission through corporate power purchase agreements, yet this is just matter of speculation.

Lastly, it must be mentioned that the company has not yet pledged to go Net Zero. Moreover, there is no mention in the Sustainability Report of future targets other than reducing 40% of its emissions by 2025 as aforementioned [23].

4.3 Water Management

In the Sustainability Report American Water Works disclosed that the total water withdrawal over the last five years has remained approximately constant, as captured by Figure 12 below:

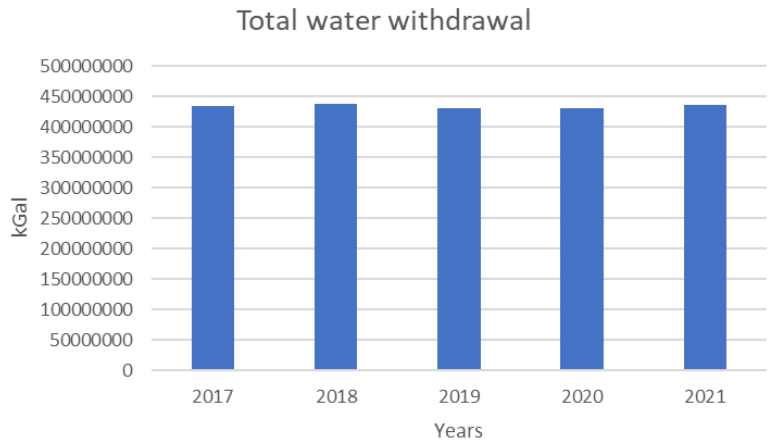

Figure 12 total water withdrawal 2017-2021 [29].

Notwithstanding this, the company was able to diminish the percentage of water retrieved from regions of scarcity, as shown if Figure 13:

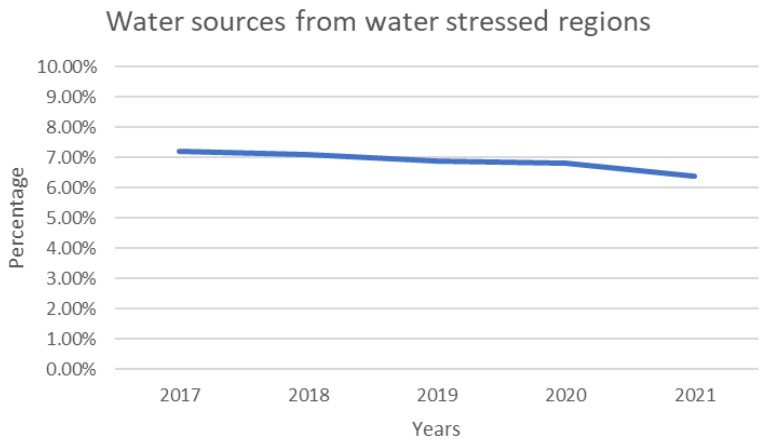

Figure 13 water retrieved from water stressed regions [29].

Moreover, American Water Works announced its goal of meeting customers' needs while saving 15% of water per customer by 2035, against a 2015 baseline [15]. Thus far, it has achieved a 4.3% reduction [15]. However, it must be mentioned that such goal was set in 2021, thus the reduction obtained depends more on which year was chosen as a baseline than on actual measures taken to reduce water per customer.

American Water Works is aware that its water management is indissolubly linked to climate risks, which are disclosed in an extensive section of the Sustainability Report [23]. Among these, acute physical risks are reported in the form of extreme weather events that could damage the infrastructures, such as wildfires, droughts, storm surges, floodings and saltwater intrusion into groundwater [23]. In light of this, American Water Works expects to invest approximately $25 billion USD between 2021 and 2030 to improve infrastructure resiliency [15]. Financial and strategic risks are disclosed as well: American Water Works foresees an increase in cost of water treatment, wastewater and water pumping due to higher fuel and electric energy costs [16]. Nonetheless, there is no mention of transitional risks, such as government policies that may introduce a cap to water withdrawal or water supply per customer. More generally, the Sustainability Report lack a mention of Net Zero Groundwater Abstraction target or a reference to the concept of sustainable yield, which is portrayed as a material topic even for companies that are not as directly related to water management issues as American Water Works is. Similarly, the Sustainability Report disregards targets concerning leakages and further reduction of water withdrawal from stressed regions.

5. Discussion

For the reasons mentioned in section 2.0, the only companies suitable for a comparison are Thames Water and Anglian Water operating in UK and Suez operating in France. However, Suez has not published an ESG report yet.

American Water Works certainly has successfully reduced GHG emissions and has reported it in an effective way in the Sustainability Report: it has a much longer history in ESG reporting compared to Thames Water and Anglian Water, which have published their first reports after 2020 and do not disclose previous years emissions to portray their trend over time [31, 32]. Moreover, achieving a reduction of 36% from 2007 to 2021 is certainly an outstanding effort since if such pace is maintained American Water Works would be on track to reach Net Zero by 2050. However, Scope 3 emissions were not mentioned in the ESG report, whereas Thames Water and Anglian Water did report on those as well [31, 32]. Hence, it is possible to give an estimation of how much American Water Works' Scope 3 emissions are by calculating the ratio between Scope 3 emissions and Scope 1 + 2 emissions for the other two companies and relating it to American Water Works: in the case of Thames Water Scope 3 emissions were the 10.9% of Scope 1 + 2 emission, whereas for Anglian water they were the 9.6% [31, 32]. For the sake of portraying the order of magnitude, Scope 3 emissions for American Water Works can be approximated to a 10% of Scope 1 + 2 emissions, which gives approximately 53493tCO_2e for 2021.

Another issue with how American Water Works reported on GHG emissions lies in the fact that there is neither a mention of going Net Zero in the future, nor even any target that extends beyond 2025. Oppositely, Thames Water has pledged to achieve "Net Zero carbon from our operations by 2030", which allegedly include Scope 1 + 2 emissions [31]. Similarly, Anglian Water set the target of becoming a "Net Zero carbon business by 2030" [32]. Thus, it seems that there is room for American Water Works as well to undertake another ambitious pledge in the near future. In the case emissions will be hard-to-abate for through corporate power purchase agreements and improvements in infrastructures' resiliency, American Water Works has two other options for further reductions: on the one hand it could invest in small-scale renewable energy projects such as photovoltaic panels to increase the self-generated share of electricity. On the other hand, it could

consider starting to buy carbon offsets, which are currently not a part of its GHG emissions reductions strategy.

Lastly, it must be mentioned that American Water Works' emissions estimates were not verified by a reliable and independent third-party [16]. Furthermore, American Water Works stated that it has used EPA's emissions factors to calculate GHG emissions [16]. In order to prevent this issue from undermining the completeness and accuracy of this research, Scope 2 emissions were recalculated with the same EPA's emissions factors in order to double-check the company's estimations. Since Scope 2 emissions only consist of purchased electricity, the number of kWh consumed by the company was used as input to calculate the corresponding tCO_2e. The calculation showed a different pattern from that disclosed in the Sustainability Report, as shown in Figure 14:

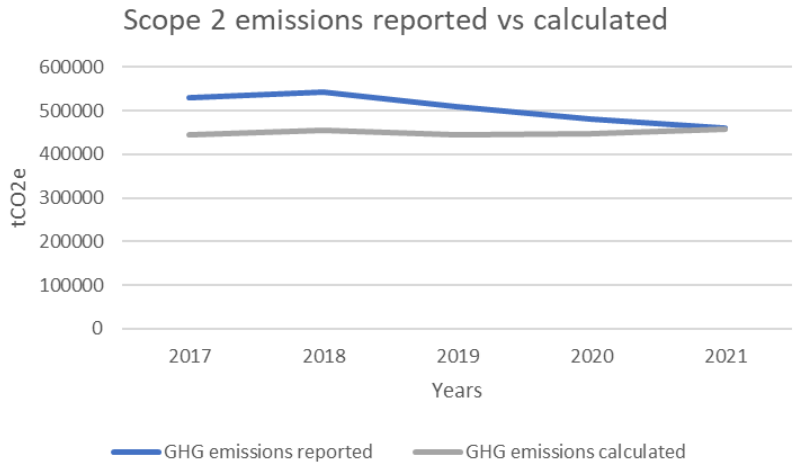

Figure 14 Scope 2 emissions as included in the report and Scope 2 emissions recalculated with EPA's emissions factors [33].

Figure 14 does not show a significant reduction of GHG emissions occurring over the last five years. However, the energy mix that generated electricity throughout the last five years may have changed considerably, thus the emissions calculated year by year would differ from those calculated all in 2022 as this research does. In sum, American Water Works has achieved great results in how it reduced and reported GHG emissions, yet it still has certain key areas to improve on, such as setting further targets, clarifying its reductions methods, involving a third-party verifier and including Scope 3 emissions. These may be the reasons why CPD rated its emissions reductions practices with a B.

As for water, American Water Works has presented a detailed and quite comprehensive report, compared to the other firms. Anglian Water focused on broad guidelines for the future rather than specific targets [32]. Moreover, its report does not include quantitative data on what the company has achieved thus far, it rather highlights examples and narratives [32]. Differently, American Water Works included the percentage of water sourced from stressed regions, the total withdrawal of water and the reduction of water per customer [15]. This latter target is relatable to that of Thames Water of reducing per capita consumption to 136.8 liters per day by 2025 [31]. However, Thames Water also included a goal of protecting water resources and the target of reducing overall leakage by 20% by 2025, which could be incorporated in American Water Works' following Sustainability Reports [31]. Moreover, American Water Works lacks a target on Net Zero groundwater abstraction, or at least a goal of striving to maintain sustainable yields of water sourced.

More generally, the climate risk assessment is comprehensive of both acute physical risks in the form of extreme weather events and of long-term strategic and financial risks, though it lacks a mention of transitional risks such as government policies [16]. Furthermore, the ESG does not include neither a section regarding the impacts on biodiversity nor concerning waste management, since these two issues were not considered material to American Water Works during the engagement of stakeholders [16]. Certainly though, these two fields do cause environmental impacts that may be worth mentioning in the following ESG reports. Still, notwithstanding these shortcomings, those mentioned regarding GHG emissions and water management, and the lack of future targets, the Sustainability Report quite comprehensively discloses the solid sustainable business practices undertaken by American Water Works throughout the years. Rather than presenting unmeetable pledges, the ESG reports focuses on what has been achieved thus far and communicates it in a concrete and measurable manner.

6. Conclusion

This research analyzed how American Water Works dealt with and reported the issues of GHG emissions and water management in its ESG report. It resulted that American Water Works has significantly reduced its GHG emissions and it is on track to meet its target of 40% reduction by 2025. It was shown as well that such reduction was obtained through corporate power purchase agreements rather than improvements to the energy efficiency of infrastructure, although the Sustainability Report focuses on the latter approach. It was argued as well that it is critical for American Water Works to work with a third-party to verify its GHG emissions over the last five years to increase the reliability of its report. Moreover, American Water Works should include Scope 3 emissions and a Net Zero target as similar firms do. To achieve it, two recommendations would be to increase the share of self-generated renewable energy and to buy carbon offsets. Similarly, the company achieved substantial goals in terms of water management, yet it lacks long-term targets to improve: water is well incorporated in the climate risk report in the form of both acute physical risks and financial risks in the long run, and American Water Works has reduced the percentage of water sourced from stressed regions. In line with this, the Sustainability Report contains the target of reducing water per customer by 15% by 2035. However, the report lacks a mention of Net Zero groundwater abstraction and a leakage reduction target. Similarly, the ESG report does not mention the impacts on wildlife and biodiversity, nor waste management practices, which may be worth including in the next reports.

These findings have several implications. First, companies can be considered particularly sustainable in rankings solely due to the social component, without including Scope 3 emissions or a Net Zero target. Second, a third-party validation is key to ensuring the rigor and transparency of carbon emissions. Third, ESG reports can be used to conveniently misrepresent data, as it was the case for the energy efficiency of infrastructure for American Water Works. This way, companies highlight the measures of improvement that guarantee a more sustainable image in the long term.

One main limitation of this research is the lack of competitors or firms similar to American Water Works, except for Thames Water and Anglian Water. This means that there is no benchmark to properly contextualize American Water Works' sustainable business practices. Moreover, this undermines the representativeness of the findings: companies from different sectors may manage environmental indicators differently depending on the nature of their businesses. This must be

taken into account while generalizing these results. However, this research may still be useful to provide insights to emerging and smaller existing water companies regarding how to improve on and report the issues of GHG emission and water management. From an environmental perspective, American Water Works was found to be a suitable case study because it paves the way with great efforts in certain aspects, while it simultaneously lacks other fundamental features of an ESG report. This leaves plenty of room for further analysis: for instance, as a greater number of case studies on companies such as American Water Works is being published, it would be possible to integrate all the findings in a wider analysis to evaluate trends in how environmental indicators are managed, both within and across sectors. Such a research project will also address the issue of generalization of the findings, since it can provide accurate statistical analysis in a broader and more representative context.

Author Contributions

Edoardo Sperone: data collection, data analysis, interpretation of results, drafting the manuscript, addressing reviewers' comments. Tom Deweerdt: editing, research design, proofreading.

Competing Interests

The authors have declared that no competing interests exist.

Additional Materials

The following additional material is uploaded at the page of this paper.

1. Appendix 1.

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