

Case Study

Case Study of Unilever's Zero-Emission Target Realization

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Abstract. This paper presents a detailed case study of Unilever's strategy and progress toward achieving zero carbon emissions, focusing on Scope 1, 2, and 3 emissions. The study analyzes a 10-year time series of both financial and non-financial data to assess the relationship between sustainability indicators, such as greenhouse gas (GHG) emissions, total and renewable energy use, and the company's operating profit. Forecasting techniques were applied to project future emission levels based on historical data, while correlation analysis was used to evaluate the relationships between key variables. The results show a strong positive correlation between total energy use and CO₂ emissions, highlighting the importance of energy efficiency in emission reduction efforts. However, no significant correlation was found between operating profit and CO₂ emissions or energy use, suggesting that sustainability initiatives have not yet had a measurable direct impact on profitability. Despite this, Unilever has demonstrated substantial progress toward its climate targets, including a 91% reduction in CO₂ emissions per ton of production (compared to a 2008 baseline) and the transition to 100% renewable electricity in many of its facilities. The study concludes that while sustainability measures may not immediately influence profit margins, they are essential for long-term competitiveness and corporate responsibility. This case provides valuable insights for firms aiming to integrate environmental performance into strategic decision-making.

Keywords: Zero-Emission; FMCG, Sustainability, Green Innovation

Introduction

The world's leading companies are more concerned about their corporate social responsibility nowadays than ever. There are concerns about creating a sustainable business along with creating value and incorporating effective ways of integrating the elements of corporate sustainability into their conventional business value chain. Sustainability is the driving force for innovation in business and responsible dealings that do not harm the climate and protect the environment [1, 2].

This research is conducted on one of the world's leading FMCG distributors Unilever, the data consisted of both financial and non-financial and the relationship between parameters like CO₂ production, forecasting the Scope 1,2, and 3 emissions scope for 10 years to validate the Company's 2030

sustainability goals, the relationship between financial parameters and non-financial sustainability parameters was analysed by correlation factor.

Goal

The goal of this research is to investigate the effects of sustainability data on the operating profit of the company by using the correlation factor in the SPSS data analysis tool. For this purpose, the company's 10-year data were analysed. This research is based on secondary data from the company's internet sources, as well as archived data and annual financial reports.

Research questions:

- Question(1): What statistical relationship can be observed between Unilever's sustainability performance indicators (such as energy use, CO₂ emissions, and renewable energy ratio) and its operating profit over ten years?
- Question(2): What progress has the company made to achieve its 2030 zero-emission goal?
- Question(3): What is the relationship between the sustainability parameters and the operating profit of the company?

Due to the lack of access to detailed sustainability-related investment data, the analysis focuses on publicly available indicators of environmental performance, such as CO₂ emissions (Scope 1–3), total energy use, and the share of renewable energy. These indicators are compared with operating profit to explore possible trends or associations using correlation analysis.

1. Literature review

1.1. Corporate Social Responsibility and Sustainability

1.1.1. Corporate Social Responsibility

Corporate social responsibility is defined as business self-regulation that aims toward being socially responsible in all its dealings. It is a considerable step companies are taking nowadays to mitigate the adverse effects on the environment, people, and the ecosystem altogether. It has become widely popular among stakeholders, consumers, and employees to adopt a conscious image and accountability by building a system that drives collective change in their business beliefs and practices [3].

There are various ways in which corporate social responsibility can be incorporated in the entire value chain of a company, such as setting sustainable and achievable goals, changes in the organization, and making responsible business choices, which can all lead to a better and less environmentally damaged world [4].

Many companies focus on a few of the major areas to achieve their sustainability goals; a few of them are given below:

- Environmental Responsibility

Many companies are realizing that it has become significantly important to measure, monitor, and control their carbon footprints. Any efforts a company takes against the GHG and Carbon emissions are to be counted as an environmentally responsible step.

- Philanthropy

Many companies practice corporate social responsibility by donating a small share of their profits to social causes and non-profit organizations. There are plenty of large enterprises that are working towards noble causes such as benefiting charities and local community programs.

- Ethical labour

It is very imperative for a socially responsible business to treat its employees ethically. This mostly refers to companies that are operating internationally to create labour laws that are justified and benefit the company and the employees, both in the long run.

- Volunteering

Participation in social causes, organizing community welfare events, and donating to causes such as health, food, and shelter count as a great aspect of a company's corporate dealings. This is a big picture presented by the companies about their empathetic outreach to the global community [5]. Corporate social responsibility has evolved through frameworks such as Carroll's CSR (Corporate Social Responsibility) Pyramid [6] and the Triple Bottom Line model proposed by Elkington [7], which stress the balance between economic, social, and environmental responsibilities.

1.1.2. Need for Corporate Social Responsibility

Researchers have argued that a resource-based view of companies drives innovation towards the allocation and usage of resources in the interest of customers. Inevitably, the present economic condition is quite compromising when it comes to preserving resources for the usage of future generations; as a result, companies are increasingly focused on sustainable development strategies rather than maximizing profit [8].

However, there can be a possibility for firms to consider CSR a business-driven strategy, this may not result in desired outcomes unless advocated by the media and thoroughly understood by all the parties involved, and it must not be taken as an invitation to corporatize CSR but to incorporate it in their mindset and overall business strategy, a shift in the attitude of business ethics is expected from the firms who are out there advocating sustainability and environment protection [9].

In Teece's view, the business value proposition must be closely aligned with the value offered by the firm in the form of services and products. Firms should focus on providing sustainable goods, products, and services to create a sustainable customer base and retain those customers by adhering to quality checks and setting standards and goals for improvement [10].

Connections are all examples of how businesses may include sustainability. The value production and delivery system is the second component of the business model. It concerns the company's resources, capabilities, and inter-organizational components [11].

1.1.3. Environmental sustainability

Environmental sustainability is the technique of maintaining progress without jeopardizing our environment's future. Resource exploitation, technological growth, infrastructural improvement, and any other development should not deplete the Earth's resources. On the contrary, current resource extraction has already brought our planet to the brink of a global disaster. Environmental issues continue to mount around the world [12].

Businesses have done little or nothing to help save the environment from adverse effects for a significant amount of time. Unfortunately, several companies, whether small or big, are still contributing significantly to damaging the environment without facing any consequences [13].

However, the pressure on firms to be environmentally responsible is growing, whether from suppliers or investors. Knowledge about the environmental impact of carbon footprints and increased demand for tracing footprints throughout the lifecycle of products is gaining much heed among stakeholders [14].

The results of coercive sustainable outcomes may vary according to the size of the firm. They are also dependent on managerial performance and how the needs and requirements for CSR are communicated down the line. Some small and medium-sized enterprises in developed countries have also shown an interest in sustainable business practices and are introducing environmentally friendly and socially responsible approaches [15].

Researchers in previous studies have proved that taking environmental and social performance into consideration has had a significant impact on a firm's financial performance. Environmental, social, and financial performance characteristics have been used to operationalize sustainability. They have concluded that environmental management strategies and reporting are positively associated with financial and ecological factors. The concept of CSR has grown to challenge the status quo of how firms set their management and financial goals. It has become imperative to align the organization's goals with the CSR goals [16]. Several meta-analyses support a moderately positive relationship between CSR and financial performance, especially in stakeholder-oriented firms [17].

1.1.4. CSR and profit

The important discussion revolves around the fact that should the companies only operate to generate profit or should be concerned with the detrimental impact of carbon footprints and use of fossil fuel on the environment and ecosystem, it is still being debated by the stakeholders and investors point of view. CSR might not be as business friendly as deemed. Proponents of the notion that a company exists merely to make money believe that the final deciding factor of resource allocation is the market, and the distribution of resources solely depends on the needs of the market. Opponents of this viewpoint argue that everything cannot be left to the market and that a mechanism must be in place to address environmental and social concerns.

Meadows et al. emphasized that firms must realize their responsibility regarding the consequences of irresponsible and inept decisions regarding the environmental consequences of their businesses and operations [17]. The widely used term sustainability is becoming more associated with business sustainability and is not limited to environmental factors. Researchers Artiach and Pemer emphasized that Stakeholders' needs must be balanced for the business and investment to be meaningfully fruitful in terms of business and sustainability [18-20].

CSR practices are becoming more common in many companies, although they contradict the investor's idea of maximum profit delivery. Firms' CSR actions have also been criticized [21, 22]. According to Friedman, a private firm's adoption of CSR conduct is not its responsibility [21].

Companies that practice CSR are also observing a hike in their consumers' positive responses; however, the challenges faced by them in terms of the environment and green production must also be addressed. As PricewaterhouseCoopers (PwC) demonstrates, a company's environmental actions have risen to the forefront of CSR reporting [23].

1.1.5. Greenwashing, Corporate Spin, and CSR

The term "greenwashing" describes how the goals of CSR are perverted in superficial attempts to conduct CSR. Greenwashing is the practice of a firm declaring itself to be committed to environmentally friendly initiatives while failing to keep up. This outlook is problematic and must be avoided as much as possible, and it can be achieved only by accountability and more rigorous internal and external audits. The Corporate Governance Council is a committee based on the principles of core values that drive the compliance of all ethical practices around the operations and processes [24].

Opponents of CSR believe it is difficult to apply CSR during a recession since it focuses on reducing expenses and improving the company's overall economic performance. An article highlighting the importance of looking at business not only from the perspective of profit but also from a clear futurist view in terms of sustainability: "At the heart of these breakthroughs is a business philosophy that seeks to do more than just make money." Goodness, on the other hand, can be beneficial to the bottom line. Luckily, several companies are more concerned with the environment than just making a profit and being the front liners in times of economic crises due to pandemics [25].

In the meantime, it has now become necessary for organizations that promote clean and green practices throughout businesses to collaborate with government agencies and promote an accountability component that showcases the firm's performance based on reducing environmental effects and highlighting customer and ecosystem welfare [26].

1.1.6. EU Green Deal and CSR

The European Green Deal was launched by the European Commission in 2019 [27]. The EGD has a vision of promoting efficient and responsible use of resources and comes forth to deliver the rules and regulations for the firms to follow and promote circular economic growth. As a result, products marketed in the EU market will have to meet strict sustainability requirements. If you export to the EU, you'll want to know how the EGD policies will affect your firm and how you can prepare for them [28].

The Farm to Fork (F2F)'s main objectives:

- F2F has set five primary goals to achieve by 2030.
- Reduce the use of chemical pesticides by half and the risks associated with them.
- Reduce nutrient losses by 50% at the very least.
- Fertilizer use should be reduced by at least 20%.
- Antibiotic sales for agricultural animals should be cut in half.
- Organic farming will be implemented on 25% of agricultural land [29].

The EU has adopted a new Biodiversity strategy, which aims to promote nature and ecosystems and reduce the adverse effects on biodiversity by 2030. This strategy is part of better legislation and works towards the recovery of the ecosystem due to the pandemic [30].

1.1.7. United Nations and Global Impact

The UN Global Compact is an organization that works towards taking social and environmental responsibilities seriously and ensuring that all legislative bodies take accountability on the said topic seriously too. The UN Global Compact includes corporate signatories, making it the UN's first comprehensive and unified CSR project that directly addresses businesses. The UN Global Compact has several benefits, the most important of which is that it works toward the notion of the use of technology and innovation to make the monitoring and measuring of environmental and social factors easier and hassle-free, in other words, the UN endorses the mandate to monitor how well the sponsors of the Global Compact are endorsing CSR in their business operations. However, it is important to remember that the UN Global Compact is not legally binding, which means that members are under no legal responsibility to implement the Compact's goals. Furthermore, when Corporations decide to join the United Global Compact, they sign up to take responsibility for abiding by the laws outlined in the paperwork. As stated by the organization itself, after imposing the laws, the corporations have showcased a responsible attitude toward sustainable decision-making and making choices that benefit the welfare of the ecosystem and save resources for future generations' use. However, the members are in no way legally obligated to comply with the rules of the Global Compact [31].

1.1.8. Relationship between CSR and financial performance

Companies today are very concerned with their reputation and social media presence in good standing. It has become their priority to showcase the kind of business behaviour that not only benefits the company itself in terms of maximizing the profit but leaves an impact in the eyes of sponsors to be an advocate of sustainability [32].

Researchers have debated whether a sustainable value proposition has a positive impact on the firm's market-based financial performance. At the same time, marketing communication capabilities and sustainable employee relations practices reduce the financial performance effect of the sustainable value proposition, owing to marketing costs and a loss of employee interest while adopting the sustainable business model elements [33].

Finally, the findings show that, while sustainable lifestyles are becoming more significant and better recognized in firm strategies and practices, other aspects of running a successful business in a highly competitive market remain vital. As a result, the connecting factor between changing consumer behaviour and pro-environmental corporate practices is building legitimacy in a way that captures and justifies multiple methods [34].

The relationship between environmental and social/economic value is frequently mutually constitutive for rural, low-income groups. Income-constrained people's livelihoods are particularly sensitive to environmental deterioration and climate change [35].

Financial development is a key source of high carbon dioxide emissions in five Central and Eastern European countries. When it comes to environmental challenges, the macro evidence, together with the

micro evidence presented in this paper, clearly supports the case for sustainable finance. Finally, in terms of research methodologies, the framework for this study combines data structure and econometric approach to expose the impact of environmental performance on bank lending decisions systematically [36].

Addressing sustainability at the firm level involves the state of product recycling, sustainability challenges within operations, strategies, business routines, and business models. Customer perception is heavily influenced by sustainability reputation [37].

Industry 4.0 technology may be incorporated into value chains by collecting and actively exchanging data in real time about machines, factories, operations, and component flows. This allows managers to follow, monitor, and make long-term decisions about post-consumption product recoveries. These recovery-based initiatives replace the typical linear 'take, make, use, and dispose' attitude with a circular one that benefits organizations and supply chains in terms of social, economic, and environmental benefits [38].

1.2. Company's profile: Unilever

Unilever, one of the twin corporations Unilever PLC (headquartered in London) or Unilever NV (located in Rotterdam), which are the holding company for more than 500 firms across the world that make and sell soaps, foods, and other home products. The two firms' boards of directors are similar in terms of membership, and mutual agreements equalize dividends on ordinary capital, resulting in the corporations appearing to be dual in appearance but being unitary [39].

Every day, more than 25% of the world's population uses at least one Unilever product from a portfolio of 400 brands, including some of the most well-known in the world, such as Dove, Axe/Lynx, Lux/Radox, Becel/Flora, Knorr, Lipton, Magnum, Surf, and Ben & Jerry's. Unilever is dedicated to supporting sustainability and giving consumers across the world the products they need to look good, feel good, and get more out of life, thanks to its global reach: fourteen brands, each with a revenue of over one billion euros. Unilever's value chain is a critical competitive capability that allows people to enjoy their favourite Unilever brands. Two billion people use Unilever products daily in almost every country on the planet. Ten million outlets and 150,000 Unilever customer service representatives serve the public. Over 10,000 vehicles carry 60,000 goods from 440 distribution locations and 250 Unilever facilities daily [39].

Unilever's Climate Action

Unilever has a bold plan in place to achieve net-zero emissions by 2039. The company is switching to renewable energy across the board, looking for new low-carbon components, increasing its plant-based product line, and producing fossil-free cleaning and laundry products [39].

The company is utilizing its clout to advance in other areas of its value chain. Unilever's companies aim to lessen the environmental impact of their products when customers use them. The company also urges governments, businesses, and other stakeholders to step up their efforts and join the race to zero emissions [39].

2. Materials and methods

2.1. Data sources

This research is based on secondary data collected from Unilever's publicly available sustainability and financial reports. The primary sources include:

- Unilever Climate Transition Action Plan 2021
- Unilever Sustainability Reports (2015–2020)
- Unilever Annual Financial Reports (2011–2020)

These documents were retrieved from the official corporate website of Unilever (www.unilever.com) and supplemented with datasets referenced in industry publications and third-party sustainability assessments (e.g., CDP disclosures).

Variables and Data Series

The study focuses on key sustainability and financial indicators consistently reported over a multi-year period. An overview of the data series used is presented in Table 1.

Variable	Unit	Time Period	Source
Scope 1 CO ₂ emissions	Tons/year	2015–2020	Unilever Sustainability Reports
Scope 2 CO ₂ emissions	Tons/year	2015–2020	Unilever Sustainability Reports
Scope 3 CO ₂ emissions	Tons/year	2015–2020	Unilever Sustainability Reports
Total energy use	GJ/year	2011–2020	Unilever Annual Financial Reports
Renewable energy use	GJ/year	2011–2020	Unilever Annual Financial Reports, Sustainability Data
Operating profit	Million USD/year	2011–2020	Unilever Annual Financial Reports

Table 1. Variables and Data Series

2.2. Analytical methods

2.2.1. Forecasting

Forecasting was conducted using the Forecast Sheet function in Microsoft Excel, which is based on linear regression. Forecasts were generated to project Scope 1 CO₂ emissions and renewable energy usage up to 2030. This method was chosen due to the relatively short time series (6 data points for emission data, 10 for energy use) and the clarity of visual trends it produces. The SPSS model calculated Confidence intervals automatically to illustrate the projection ranges.

2.2.2. Correlation analysis

Pearson correlation coefficients were calculated using the SPSS to explore the statistical relationships between sustainability performance and financial outcomes. The variables included in the analysis were:

- Operating profit
- Total energy use

- Renewable energy use
- Total CO₂ emissions (Scope 1–3 combined)

The sample size was limited to 10 years (2011–2020), and p-values were also calculated to determine the significance of the results. No causal inference is implied from these correlations; the analysis aims only to identify observable associations.

2.3. Limitations

This study is constrained by the availability of only secondary, aggregate-level data. Specific investment data (e.g., capital expenditures on sustainability initiatives, R&D in green technologies) were not publicly disclosed, which limits the ability to assess direct financial returns from individual sustainability actions. Additionally, annual data may mask short-term effects and regulatory shocks that could be better analysed with quarterly or monthly data. Further studies with higher-resolution datasets and multivariate analysis could deepen the insights presented here.

3. Results

3.1. Unilever Sustainability Goals – CO₂ Emission goal by 2030

Unilever has vowed to reduce its greenhouse gas emissions to zero by the end of 2030, covering Scope 1, 2, and 3 value chain greenhouse gas (GHG) emissions. The organization has collected data for the past 5 years. The following table contains the data for all three scopes of GHG emissions throughout the value chain. The goal is to reduce greenhouse gas emissions by 100% compared to the 2015 baseline. Emissions from the energy and refrigerants used in operations are defined as Scope 1 and 2 emissions. These emissions are responsible for most of the company's CO₂ emissions.

Unilever is transforming the way its factories operate by introducing and investing in new technologies, such as hydrogen, which will increase energy efficiency and reduce Power Consumption.

Value chain GHG emissions	2020	2019	2018	2017	2016	2015
Unilever operations: Scope 1 GHG emissions (tons CO ₂)	606,771	659,028	758,232	820,355	882,973	890,801
Unilever operations: Scope 2 GHG emissions (tons CO ₂)	171,906	4443,897	893,825	938,944	1,007,953	1,071,076
Upstream and downstream of Unilever operations: Scope 3 GHG emissions (tons CO ₂)	60,388,592	61,020,357	62,017,585	59,823,314	61,118,867	57,758,578

Table 2. Scope 1–3 GHG Emissions by Year and Source (2015–2020) (Source of data:[34])

1. Firstly, the data for Scope 1 was analysed and forecasted. The data for the past six years, including the GHG emissions from 2015 to 2020, are given.
2. In this step, the data for the coming 10 years was predicted by clicking the data tab and the forecasting sheet.
3. The results were as follows: the estimated Scope 1, lower confidence, and upper confidence are shown in Table 3.

Year	Emission Scope [tons of CO ₂ per year]	Forecast (Emission Scope 1) [tons of CO ₂ per year]	Lower Confidence Bound (Emission Scope 1) [tons of CO ₂ per year]	Upper Confidence Bound (Emission Scope 1) [tons of CO ₂ per year]
2015	89081			
2016	882973			
2017	820355			
2018	758232			
2019	659028			
2020	606771	606771	606771	606771
2021		540822	486624	595019
2022		475810	402859	548762
2023		410799	322982	498617
2024		345788	245254	446322
2025		280777	168940	392614
2026		215766	93646	337886
2027		150755	19133	282377
2028		85744	-54758	226246
2029		20733	-128138	169604

Table 3. Results of forecasting (Source of data:[34])

4. The following graph (Figure 1) clearly shows the GHG emissions reaching almost zero, which is clearly one of Unilever's sustainability goals.

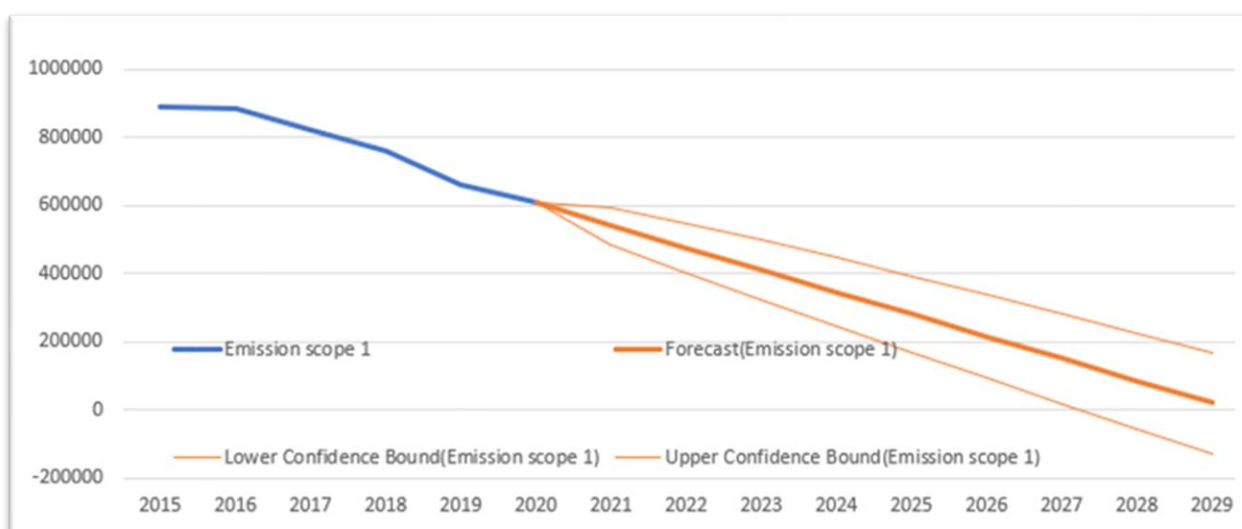


Figure 1. Graph of forecasted data

For Scope 2 emissions, the data comprises the summation of the CO₂ produced from the entire lifecycle of the product, which includes Ingredients and packaging, distribution, and retail and consumer use. The data was forecasted based on Unilever's 2039 plan to achieve zero emissions along the Scope 3 CO₂ production chain, aiming to halve its greenhouse gas impact by 2030. Table 4 shows the GHG emissions of the value chain.

Value chain GHG emissions	2020	2019	2018	2017	2016	2015
Upstream and downstream of Unilever operations: Scope 3 GHG emissions (tons CO ₂)	60,388,592	61,020,357	62,017,585	59,823,314	61,118,867	57,758,578
Ingredients and packaging:	14,239,918	14,897,174	15,367,491	16,539,559	17,903,182	17,083,186
Ingredients	11,270,833	11,782,483	12,416,204	13,409,638	14,534,101	13,787,055
Primary packaging	2,236,021	2,389,655	2,246,471	2,379,938	2,436,180	2,343,797
Secondary packaging	376,701	462,671	464,440	522,212	553,198	596,911
Inbound transport	266,363	262,365	240,376	227,771	379,703	355,423
Distribution and retail:	4,055,333	4,379,729	4,368,626	4,089,568	4,137,010	4,002,856
Distribution	1,661,608	1,602,885	1,553,549	1,115,600	1,136,666	1,115,609
Retail	2,393,726	2,776,845	2,815,077	2,973,968	3,000,344	2,887,247
Consumer use:	42,093,341	41,743,454	42,281,468	39,194,187	39,078,675	36,672,536
Consumer use	40,039,217	39,730,117	39,895,946	38,780,510	38,664,422	36,263,698

Table 4. Value chain GHG emission (Source of data:[39])

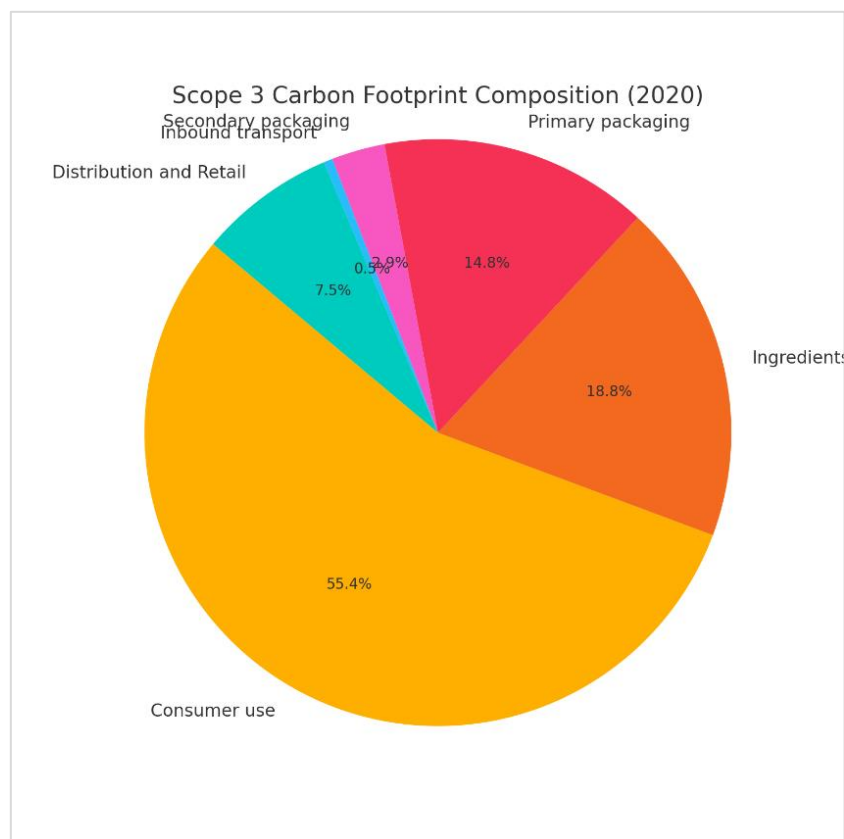


Figure 2. Relative Share of Emission Sources in Scope 3 GHG Emissions (2020)

Figure 2 illustrates the composition of Unilever's Scope 3 greenhouse gas emissions for the year 2020. The chart shows that the largest share of emissions (approximately 70%) originates from consumer use of products, followed by emissions related to ingredients and packaging. This highlights that a

significant proportion of emissions lie beyond the company's direct control, in the use phase and upstream supply chain. It suggests that achieving complete value-chain decarbonization will require operational changes, product innovation, supplier engagement, and a transformation in consumer behaviour.

Total waste vs Waste recycled

Figure 3 presents the trend of total waste generation and the amount of waste recycled by Unilever between 2011 and 2020. Over this period, the gap between total waste and recycled waste has significantly narrowed. In 2011, only about 50% of the generated waste was recycled, whereas by 2020, recycled waste nearly equaled the total amount generated. This trend reflects substantial progress in waste management practices and circular economy efforts.

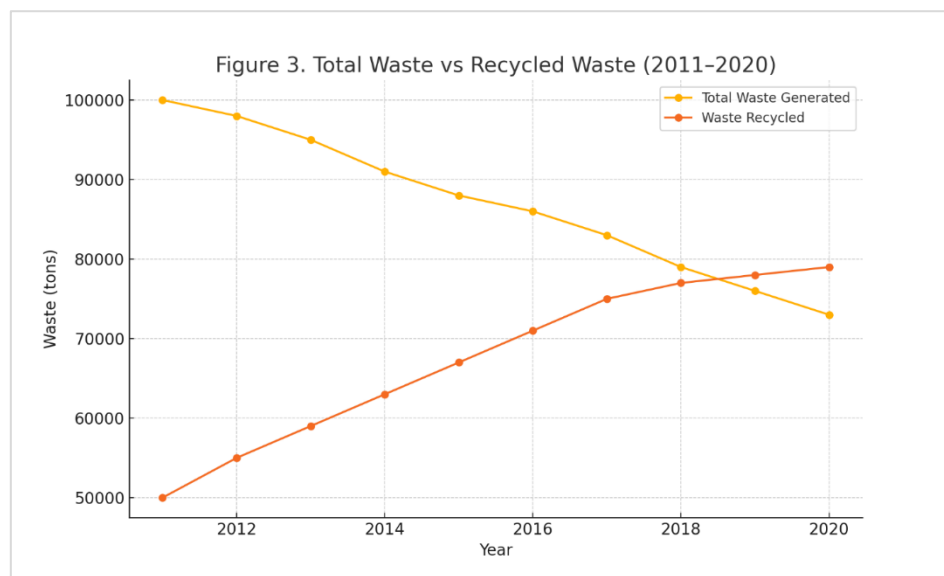


Figure 3. Graph of waste produced

Energy Use

In an attempt to switch to alternative energy sources such as wind, biomass, and solar, carbon dioxide emissions per ton were reduced by 91% in 2020 against the 2008 baseline. This was achieved through IREC's purchase of Grid electricity and solar capacity enhancement in Nashik, Chiplun, Khagan, DDF, Rajpura, and Hosur factories. Currently, 100% of electricity is derived from renewable sources. Coal was eliminated in Bhuj, Garden Reach, and Orai factories in 2020. Only the newly acquired nutrition units - Sonipat, Rajahmundry, and Nabha- use coal now. The aim is to eliminate coal in these three units during 2024 [39].

Total Energy Use Vs Renewable Energy Use

The data points from the last ten years have shown a significant increase in the use of renewable energy. The graph below shows that in the previous ten years, renewable energy has been incorporated into operations as well as the entire value chain, and half of the total energy used is renewable energy.

Figure 4 shows the data forecasted for the next 10 years to showcase Unilever's 2030 plan for energy use.

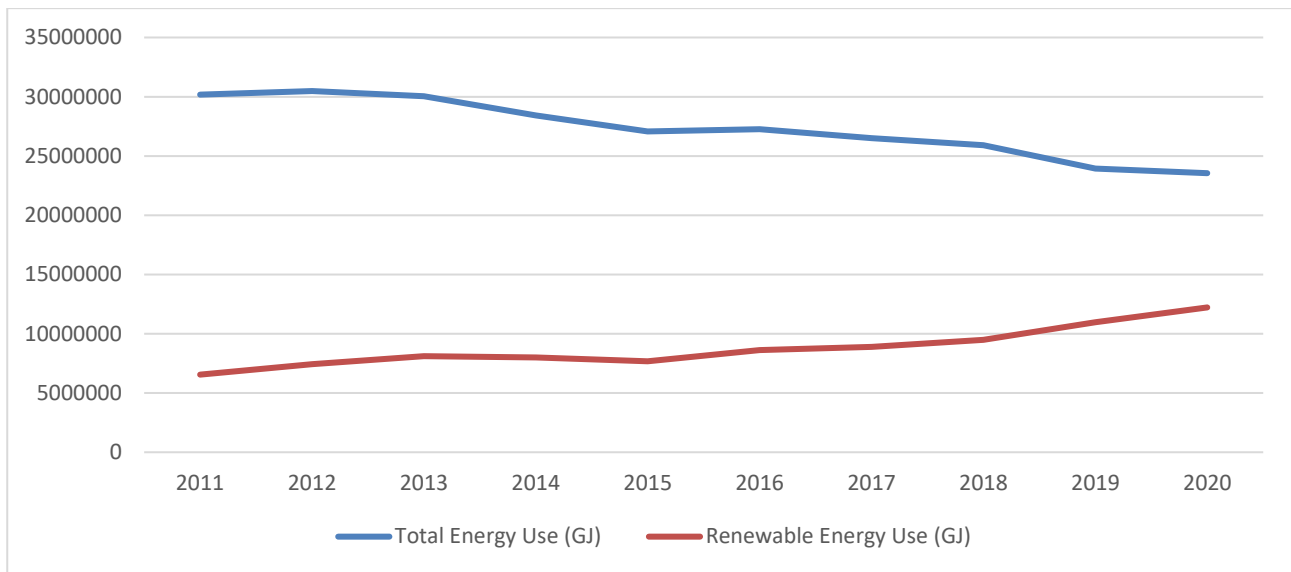


Figure 4. Graph of total and renewable energy use

Figure 5 presents a forecast of Unilever's renewable energy use (in GJ) from 2021 to 2030, based on historical data from 2011 to 2020. The projection was generated using Microsoft Excel's Forecast Sheet tool, which applies exponential smoothing or linear regression depending on the data structure. This method also provides a confidence interval (upper and lower bounds) to illustrate the potential range of future values. The chart shows a steadily increasing trend in renewable energy use, continuing the positive trajectory observed between 2015 and 2020. In 2020, the recorded use was over 12 million gigajoules (GJ), and the central forecast line predicts that this may reach nearly 18 million GJ by 2030, assuming current progress continues. The widening of the confidence bands over time reflects the inherent uncertainty in long-range forecasts. This forecast supports the hypothesis that Unilever is on track to significantly expand its renewable energy share across operations. However, achieving these targets will likely depend on continued investment, supply chain transformation, and favorable regulatory conditions. Future monitoring should verify whether actual values remain within the forecasted bounds.

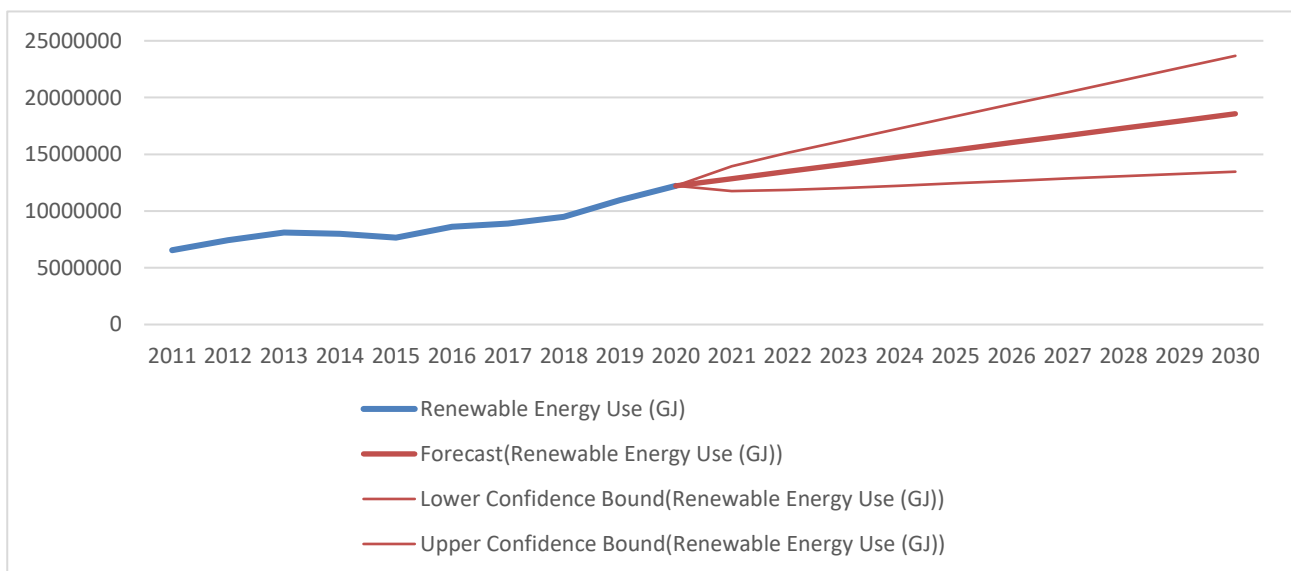


Figure 5. Renewable energy forecast

3.2. Correlation between Operating profit and Total energy use

Using correlation analysis, the relationship between operating profit and total energy use was analysed. The values are shown in Table 5.

Year	Operating profit (million \$)	Total Energy in Use (GJ)	Renewable energy use	Total CO ₂ (tons)
2011	6420	30181865	6549645	2211158
2012	6977	30480293	7442875	1952908
2013	7517	30054697	8114768	1953147
2014	7980	28422211	7986410	1850286
2015	7515	27080563	7666379	1770973
2016	7801	27267621	8616568	1705569
2017	8957	26507528	8899486	1567328
2018	12639	25907758	9495335	1438042
2019	8708	23932970	10967332	969498
2020	8303	23547483	12220132	717398

Table 5. Operating profit and energy used (Source of data:[34])

		Operating profit (million \$)	Total Energy in Use (GJ)	Renewable energy use	Total CO ₂ (tons)
Operating profit (million \$)	Pearson Correlation	1	-.522	-.116	-.441
	Sig. (2-tailed)		.122	.750	.202
	N	10	10	10	10
Total Energy in Use (GJ)	Pearson Correlation	-.522	1	-.123	.947**
	Sig. (2-tailed)	.122		.735	<.001
	N	10	10	10	10
Renewable energy use	Pearson Correlation	-.116	-.123	1	.023
	Sig. (2-tailed)	.750	.735		.949
	N	10	10	10	10
Total CO ₂ (tons)	Pearson Correlation	-.441	.947**	.023	1
	Sig. (2-tailed)	.202	<.001	.949	
	N	10	10	10	10

** Correlation is significant at the 0.01 level (2-tailed).

Table 6. Pearson Correlation Matrix of Operating Profit, Energy Use, Renewable Energy, and CO₂ Emissions (2011–2020)

The correlation table analysis (Table 6) allows us to examine the relationship between four key variables: operating profit, total energy use, renewable energy use, and total carbon emissions. The data highlights several interesting correlations suggesting important implications for the relationship between sustainability and business performance.

First, there is a negative correlation between operating profit and total energy use (-0.522), indicating that higher energy use may negatively impact profitability. However, this correlation is insignificant ($p = 0.122$), so no firm conclusion can be drawn. Likewise, there is a negative relationship between operating profit and CO₂ emissions (-0.441), but it is also insignificant ($p = 0.202$). This may suggest that companies that emit less carbon could potentially be more profitable; however, this relationship is not strong enough to draw definitive conclusions. The observed negative correlation between operating profit and both energy use and CO₂ emissions may suggest that as Unilever streamlined operations and adopted more efficient or renewable technologies, it simultaneously reduced costs and environmental impact. However, this association should not be interpreted as causation without controlling for other factors such as market expansion, pricing strategies, or external energy costs. Due to the lack of disaggregated investment or cost-saving data, the underlying processes driving this trend remain speculative.

The most significant relationship is between total energy use and CO₂ emissions. The strong positive correlation (0.947) shows that the increase in energy use is strongly correlated with the rise in carbon emissions, which is significant ($p < 0.001$). This result confirms that sustainability efforts should focus on reducing energy use if companies aim to reduce emissions.

The use of renewable energy did not show a strong or significant correlation with the other variables, suggesting that at its current level, renewable energy has no significant impact on profits, energy use, or CO₂ emissions. This may represent an opportunity for greater integration of renewable energy, which could bring long-term sustainability and business benefits.

Overall, the data suggests that sustainability efforts should focus on energy efficiency and emissions reduction. The impact on operating profits is not yet significant, but considering environmental considerations could give companies a competitive advantage in the long term.

Although these findings offer initial insights, it is important to recognize certain methodological limitations. As the dataset is time series in nature, the correlations observed may be influenced by underlying time trends rather than genuine causal relationships. This limitation is acknowledged, and the results should be interpreted accordingly. Future research should consider higher-frequency data (quarterly or monthly) and methods such as time-detrended regression or Granger causality testing to isolate dynamic relationships more effectively.

It should be noted that total energy use and total CO₂ emissions exhibit a high degree of multicollinearity (correlation coefficient > 0.9), which is expected given the physical dependence between energy consumption and emission output. Therefore, interpretation of their correlation with other variables must be treated with caution. To address this limitation, future analysis should employ multivariate regression models with variance inflation factor (VIF) diagnostics to control for multicollinearity effects.

Although the correlation analysis revealed a strong positive relationship between energy use and CO₂ emissions, this result is expected and reflects the physical linkage between the two. A case of multicollinearity is evident here, which limits the explanatory power of individual correlations in isolation. Additionally, the negative correlation between operating profit and both energy use and CO₂ emissions may point to efficiency improvements or sustainability-driven cost savings; however, without controlling for external variables, such interpretations remain indicative rather than conclusive. Future

studies should apply multivariate techniques, such as regression with VIF diagnostics, to better isolate effects.

Conclusions

Unilever's sustainability efforts and zero emissions targets are a model for companies that want to integrate environmental sustainability into their operations. The article provided a comprehensive overview of the company's achievements and the obstacles it has faced. The analysis highlighted that the steps taken to achieve the zero emissions target, such as switching to renewable energy sources, have made significant progress in reducing emissions and promoting sustainability goals.

Correlation analysis has shown a strong positive relationship between energy use and CO₂ emissions, which underlines the importance of energy efficiency measures to reduce emissions. At the same time, the relationship between renewable energy use and business performance was not significant, suggesting an opportunity for further expansion of renewable energy. Although energy use and CO₂ emission reductions did not show a direct link to operating profit, in the long term, the pursuit of sustainability can provide a competitive advantage for the company.

Unilever's example shows that sustainability is not only an ethical responsibility but also a strategic choice that can bring economic benefits in the future. The company's switch to 100% renewable energy and significant investments in green technologies demonstrate its commitment to sustainable development. However, reducing emissions throughout the value chain remains challenging, particularly for Scope 3 emissions from the supply chain and consumer use.

Unilever's case demonstrates how a multinational company can embed sustainability into its strategic operations and make measurable progress toward long-term climate goals. The analysis of key indicators—such as CO₂ emissions, energy use, and renewable energy adoption—shows clear trends of environmental improvement over ten years. While the financial impact of these efforts remains statistically inconclusive, the company's performance suggests that sustainability and profitability are not mutually exclusive.

Summary of Research Questions

RQ1. How does the firm's sustainability data affect the company's operating profit?

The correlation analysis indicated a weak negative relationship between operating profit and both CO₂ emissions and total energy use. However, these correlations were not statistically significant, and causality could not be established. This suggests that, so far, Unilever's sustainability efforts have not had a direct, measurable impact on profitability.

RQ2. What is the progress made by the company to achieve its 2030 zero-emission goal?

The data show consistent reductions in Scope 1 and Scope 2 emissions, primarily due to the adoption of renewable energy and implementation of energy efficiency measures. Although Scope 3 emissions remain relatively high, primarily due to consumer use and upstream supply chain factors, Unilever is making progress in aligning its practices with the 2030 target, particularly in operational emissions.

RQ3. What is the relationship between sustainability parameters and the company's operating profit?

The statistical analysis did not reveal a significant relationship between sustainability parameters, such as renewable energy use, and operating profit. However, a downward trend in emissions, coupled with stable or increasing profits, suggests a decoupling of environmental impact from business growth. Further data would be needed for stronger conclusions.

Future Research Directions

- Apply multivariate regression models that include controls for external variables (e.g., market conditions, production volumes) to isolate the effect of sustainability performance.
- Use higher-frequency data (e.g., quarterly or monthly) to better capture the effects of policy changes or operational shifts, and detect short-term outliers.
- Collect and integrate investment-level data, such as capital expenditures on energy efficiency and sustainability innovations, to assess the return on green investments.
- Extend the analysis to a cross-company or cross-sector panel to enhance generalizability and enable benchmarking against peers.
- Assess the full value of sustainability initiatives by including qualitative dimensions, such as stakeholder engagement or brand reputation effects.

The study emphasizes that companies must prioritize innovation and technological advancements to achieve sustainability. The use of green technologies not only brings environmental benefits but can also increase brand loyalty and positive consumer perception. The study can serve as an example for other multinational companies striving to achieve sustainability goals.

Overall, Unilever's results demonstrate that achieving zero emissions is possible with ambitious targets, practical strategies, and a strong commitment. This study highlights the need for sustainability efforts and demonstrates that future business success is closely tied to environmental and social responsibility initiatives.

Abbreviation	Meaning
CO ₂	Carbon Dioxide
CSR	Corporate Social Responsibility
F2F	Farm to Fork
FMCG	Fast Moving Consumer Goods
GHG	Greenhouse Gas
IREC	International Renewable Energy Certificate
EU	European Union
EGD	European Green Deal
UN	United Nations
PLC	Public Limited Company (UK legal form)

Table 7 List of common abbreviations used in the study

Conflicts of Interests

Judit T. Kiss is member of the Editorial Board of the journal, therefore she did not take part in the review process in any capacity and the submission was handled by a different member of the editorial board. The submission was subject to the same process as any other manuscript and editorial board membership had no influence on editorial consideration and the final decision.

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