

Consciousness of the Importance of Climate Accounting in Pursuing Sustainable Development Goals

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ABSTRACT

Global warming will result in significant changes to the world's climate, known as climate change. This climate change affects company practices. One form of a company's contribution to climate change and the surrounding environment, especially global warming, is the carbon emission disclosure system. The focus of this article is to describe the role of accounting on climate change, mainly carbon and GHG accounting. This research focuses on analyzing, synthesizing, and evaluating literature or written sources relevant to the topic raised. The evolution of carbon accounting provides an overview of emissions calculation to reach net zero with the possibility of comprehensive GHG estimates. This article concludes that the evolution of carbon accounting illustrates that the emissions calculation empowers businesses to reach net zero with the possibility of precise and comprehensive GHG estimates. Addressing climate change is outlined in 13 of the SDGs, requiring targets and actions that are planned and measured in a coordinated and consistent manner.

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INTRODUCTION

Over the last few decades, the concept of sustainability has become very important to the world, especially among companies. This is partly due to the many stakeholders who urge companies to consider sustainability (Gulluscio et al., 2020). Stakeholders urge companies to take action to reduce greenhouse gas (GHG) emissions from their activities and distribution (Kaplan & Ramanna, 2021). Greenhouse Gases (GHG) originating from global economic activities will cause global warming if the GHG is produced excessively and continues for an extended period in the atmosphere (Ramadhani et al., 2022). Global warming will result in significant changes to the world's climate, known as climate change (Zandalinas et al., 2021).

There is an opinion that says that in the 21st century, the biggest challenge is climate change (Pellegrino & Lodhia, 2012). Many scientists believe that the planet has reached a tipping point regarding climate change and that action and solutions are essential (Randall et al., 2007). The Carbon Disclosure (CDP) study states that almost three-quarters of the 3.6 billion metric tons of Greenhouse Gases (GHG) are the responsibility of 50 of the 500 largest companies in the world (CDP, 2013). Therefore, in 1997 several countries in the world came together to tackle global warming caused by carbon emissions (Zuhrufiyah & Anggraeni, 2019).

Countries worldwide have made many agreements and regulated provisions and regulations to deal with global warming, considering the low awareness of the parties to the climate change convention (Pratama, 2020). For example, this agreement is the signing of the Kyoto Protocol, which was held in December 1997 (Pradita, 2017). The Kyoto Protocol was formalized and is considered an international-level regulation that must be followed by the countries that ratified it (Darajati, 2020). This was then followed up with the signing of the Bali Roadmap which was held in 2007 to demonstrate the seriousness of these countries in overcoming global warming which is the most significant factor of climate change (United et al., 2012). Apart from the Kyoto Protocol and Bali Roadmap, at the end of 2015, the United Nations Framework Convention on Climate Change (UNFCCC) produced an agreement, namely the Paris Agreement, which was attended by 197 countries as participants with the aim of preventing an increase in global warming which causes climate change (Septiadi, 2021).

In facing climate change, strengthening system resilience in society to minimize the risk of dangerous climate change can be realized by developing adaptation and mitigation strategies (Purwanto et al., 2012). Adaptation and Mitigation as a whole are the central themes of climate change studies (Tang, 2019). Adaptation strategy is aligning natural systems with social systems in facing the adverse effects of climate change (Purwanto et al., 2012). Adaptation focuses on reducing damage from the impact of exploiting opportunities related to climate change, such as GHGs, through estimating trends and their effects (Martinez *et al.*, 2018). Mitigation is carried out to reduce adaptation costs because if GHG concentrations trigger climate change, the impact of

climate change will also increase, thus affecting adaptation costs (Mashur & Meiwanda, 2019). Types of climate change adaptation and mitigation activities can be carried out in various sectors of life, for example, the fisheries, marine, agricultural, and other sectors (Budiastuti, 2020).

Climate change and new carbon institutions influence corporate practices (Howard-Grenville et al., 2014). The carbon emissions disclosure system is part of a company's contribution to the environment and climate change, especially global warming (Hermawan et al., 2018). Carbon accounting is increasingly becoming a growing approach to supporting climate change mitigation, which is caused mainly by companies, governments, and organizations (Pacter, 2017). Carbon accounting has yet to be widely defined (Marlowe et al., 2022). This statement is consistent with Guenther et al. (2012) that there is no comprehensive definition of carbon accounting. A carbon accounting can be defined as a system using calculation methods and procedures aimed at collecting, summarizing, and analyzing climate change (He et al., 2022).

Through the 2015 Paris Agreement on climate change, 197 countries committed to ambitious efforts to tackle climate change, adapt to its effects, and increase support for developing countries. The Paris Agreement has two main collective goals, namely controlling the increase in global average temperature below 2 °C and trying to limit warming to 15 °C and achieving the global target (Bang et al., 2016). In 2015, UN member states adopted the 2030 Agenda for Sustainable Development (Mishra et al., 2023). The 2030 Agenda consists of 17 Sustainable Development Goals (SDGs) which have been agreed upon by 193 member countries of the United Nations (UN), and 169 targets that must be achieved (Kroll et al., 2019).

Sustainable Development Goals (SDGs) continue the Millennium Development Goals called MDGs (Malihah, 2022). Of these 17 SDGs, the author focuses on the 13th development goal, namely, handling climate change or climate action. The aim of the 13th TPB/Sustainable Development Goals (SDGs) is to take immediate action to fight climate change and its impacts. There is not a single country in the world that does not experience direct dramatic impacts from climate change. This is the basis for climate action involved in one of the SDGs action plans, valid until 2030. These SDGs are a global development agreement document that is structured in goals and 169 targets to implement sustainable development in facing challenges in the development process (Hidayat, 2022)

Handling climate change, which has been outlined in 13 of the SDGs, really requires targets and actions that are planned, applied, and measured, which are carried out collaboratively, coordinated, and consistently. Several essential goals that must be achieved immediately include: 1). Strengthening capabilities in resilience and adaptation to natural and climate disasters; 2). Incorporating action in the form of climate change prevention into national policies, strategies, and planning; 3). Furthermore, it will increase education, awareness, and institutional and human capacity to minimize, adapt, and minimize the impact of climate change (Alisjahbana & Murniningtyas, 2018). The

focus of this article is to describe the role of accounting in climate change, primarily carbon and gas accounting greenhouse (GHG).

METHODOLOGY

This research method uses a literature review approach. The issue of climate change is a theme in this research, and many parties see this issue as a complex issue (Mäkelä, 2021). The complexity makes predicting the impact of climate change on the economy and future business conditions increasingly difficult. This research focuses on the analysis, synthesis, and evaluation of literature or written sources relevant to the research topic (Nightingale, 2009). This method is unrelated to essential data collection, such as interviews or surveys. Instead, this method focuses more on analyzing data found in scientific literature. In the literature review research method, the general steps used are: 1). The research topic was chosen according to the research objectives, and 2). The literature is collected in a relevant manner based on the research topic. The research sources are books, articles, journals, theses, dissertations, and other documents related to this matter, 3). This literature selection is related to the research focus. This is associated with reading and assessing the high quality of the literature as well as making decisions regarding which literature to include in the review, 4). This literature is arranged based on specific topics, concepts, or themes; compiling this literature can help with a structured review. 5). Literature analysis along with critical analysis was carried out; 6). A literature synthesis was carried out by stating the relationships and patterns in each piece of literature. This research method using a literature review is very useful in understanding the evaluation of knowledge and academic discourse about a particular topic (Snyder, 2019). This can help in planning further research or identifying areas of research that are not widely known and researched.

RESULTS AND DISCUSSION

Islamic Views or Perspectives on Climate Change

In the Islamic religion, it is not only related to God but also related and related to other humans and the universe. What has been written and explained in the Koran are *Hablun minallah* and *hablun minan nas*. This means that as Rabb and God, humans must always maintain a good relationship with their God and create positive relationships with other people and their natural environment. Therefore, humans must establish a relationship with nature. With an attitude like that, for the universe to give love, humans should also show love to the natural world (Hilabi, 2020).

According to Islam, the universe is proof of the power of Allah SWT. That is why everything on earth and in the sky, both inanimate and living objects, always glorifies and prostrates itself to Allah SWT. However, as a result of the creatures' negligence or carelessness regarding the natural surroundings, damage to nature occurs which results in climate change. So climate change has become a severe phenomenon, so it cannot be avoided. This has been explained through the words of Allah SWT regarding climate

change as stated in QS Ar-Rum verse 41 which means: " *We have seen damage on land and at sea caused by human actions; Allah wants them to feel some of the (effects of) their actions, so that they return (to the right path).* "

Humans, as living creatures, are endowed with reason and thoughts by Him. Humans should protect and respect nature (the environment) as in surah Al-A'raf (56), namely: " *And do not cause harm on the earth after it was (created) well. Pray to Him with fear and hope. Indeed, Allah's mercy is very close to those who do good.*" The verse above states that it is forbidden to cause damage to the earth; this act goes beyond the limits. Allah SWT has created his creatures in a state of harmony and harmony, this fulfills the needs of creatures on earth (Shihab, 2017).

The Transformative Journey of Carbon Accounting

Carbon Accounting is a complement to environmental accounting. This accounting aims to calculate, measure, record, report, and predict the amount of CO₂ released into the atmosphere. This accounting is essential for an entity because it is a form of concern for the environment. The following is the development of the evolution of Carbon Accounting in the world:

Table 1. Evolution of Accounting Carbon

Evolution	Information
Use of Double-Entry Bookkeeping-Pre-History of Carbon Accounting (1290s)	a. Amatino Manucci merchants and Florentine merchants used double-entry bookkeeping for the first time. This is the basis of carbon calculations or accounting.
Life Cycle Assessment (LCA) Publication (1970s)	a. RG Hunt published a method that aims to evaluate the environmental impact of commercial products and services, starting from the raw material extraction stage (initial stage) to the final disposal stage. Life Cycle Assessment is an integral part of future carbon accounting.
United Nations Framework Convention on Change (UNFCCC) adopted (1990s)	<p>a. In early May 1992, the UNFCCC at the Earth Summit in Rio de Janeiro was adopted which aims to stabilize GHG concentrations in the atmosphere at a level capable of preventing dangerous anthropogenic disturbances to the climate.</p> <p>b. Kyoto Protocol, the first meeting of the Conference of the Parties (COP1), was held in Berlin in 1995. This Conference of the Parties issued a commitment to climate change mitigation efforts</p>
Carbon Footprint Software and Issuance of Corporate Greenhouse Gas Standards (2000-2001)	a. The company's carbon footprint software, Enablon, was founded by Philippe Tesler in France.

Evolution	Information
Environmentally Extended Input-Output (EEIO) published – Green Delta Creates Open LCA and Bo P. Weidema Creates the Open Source Exiobase Database (2001-2011)	<ul style="list-style-type: none"> a. Janes Ranganathan, as lead author, published the Greenhouse Gas Protocol Corporate Standard. It sets standards for a company's carbon footprint and is an essential commitment to modern carbon accounting. b. EEIO was published by Thomas Weidemen, to predict industrial sector emissions. This lays the foundation for carbon accounting-based emissions measurements. c. Green Delta, under the leadership of Andreas Ciroth, created open-source LCA Software to store factor data and emissions data in carbon accounting. d. Bo P. Weidema and his members created the open-source Exiobase database to unify emissions factors across countries.
First Carbon Calculation Engine - Ongoing commitment to UNFCCC (2014-2015)	<ul style="list-style-type: none"> a. Kyoto Protocol, the first meeting of the Conference of the Parties (COP1), was held in Berlin in 1995. This Conference of the Parties issued a commitment to climate change mitigation efforts b. Paris Agreement, held in 2015 in Paris. To make the global response to climate change stronger.
European Commission Proposes CSRD, 2021 - Current Carbon Accounting	<ul style="list-style-type: none"> a. Proposed Corporate Sustainability Reporting Guidelines (CSRD) by the European Commission. 50,000 EU companies to report environmental and climate impacts b. Currently, Carbon Accounting is the dominant medium in fighting the current climate change phenomenon. Carbon Accounting is also a medium for entities to remain compliant with regulations and a source of competitive advantage.

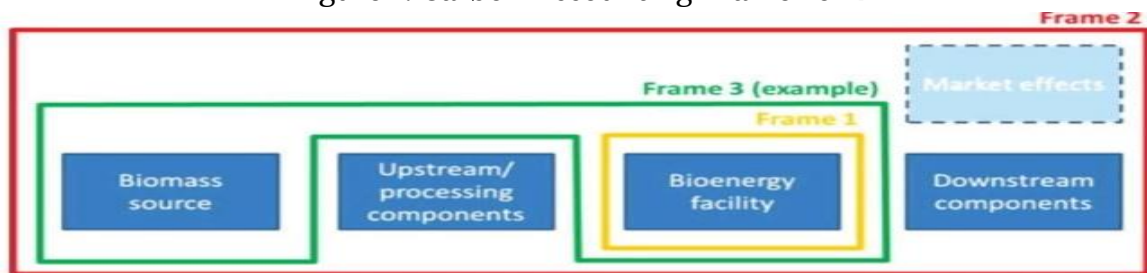
Source: (*The pioneers & history of carbon accounting*, 2022)

The evolution of carbon accounting illustrates that this emission calculation empowers the business world to arrive at a net zero with the possibility of accurate and comprehensive GHG estimates. Stakeholders increasingly urge entities to take preventive actions that could impact climate change.

Development of the Carbon Accounting Framework

With renewable energy in mind, several frameworks are possible for carbon accounting for a company. Figure 1 describes a potentially helpful framework for entity-scale carbon accounting.

Figure 1. Carbon Accounting Framework



Source: (Marland et al., 2013) *Accounting for Carbon Dioxide Emissions*

Frame 1 only covers the entity, frame 2 is the life cycle assessment that includes (frame 2b) or does not include (frame 2a) off-site market impacts, and Frame 3 includes several attributes of the fuel source (e.g., renewable energy) to consumer entities.

a. Operational control framework and financial responsibility

This framework estimates emissions that physically originate from a company because it contains physical emissions that a company or political entity can control. This includes emissions that an entity physically controls, which may be expected to pay tax if the emissions are subject to a tax rate. Furthermore, those who have the possibility of participating in carbon trading based on a "cap and trade" system. These carbon emissions can be considered corporate responsibility (Deloitte, 2009).

b. Atmospheric impact framework and comparative evaluation.

This framework is a CE calculation based on LCA representation, where carbon from construction, waste disposal, and material flow are essential considerations.

c. Resource renewal framework.

This framework is a carbon accounting that can be directly distributed and then evaluated for a company in the context of its pressure for several renewable resources, for example, the influence of biosphere materials on the use of biomass fuel. This biomass contains influences outside the context of the facility and is not expected in the regulatory renewal (Marland et al., 2013).

Carbon Emission Disclosure as One of the Actualizations of TBL

The Triple Bottom Line suggests that if an entity wants to maintain its survival, it must implement 3P. Apart from wanting profits (Profit), entities are also obliged to pay attention to and participate in fulfilling human welfare (People) and be active in preserving the environment or planet (Cotter et al., 2011). The 3P concept implies that an entity is obliged to prioritize the interests of participating parties affected by the activities carried out by the entity compared to the interests of shareholders.

The people concept prioritizes the protection of workers, for example not employing minors and providing appropriate wages. The planetary concept in CED is an emphasis on reducing production waste and carbon emissions as well as recycling waste that is safe for the environment. Profit is more than providing profits; profit in CED is fair trade and ethical trade in business practices (Hanifah, 2016). Until now, several entities

have seen that the *Triple Bottom Line program* (Profit, Planet, and People) is a program that is very detrimental to their entities because they have to incur costs to implement the *Triple Bottom Line program*.

CONCLUSION

Over the last few decades, sustainability has become very important worldwide, especially among companies. This is partly due to the many stakeholders who urge companies to consider sustainability. Stakeholders urge companies to take action to reduce carbon (CO₂) and GHG emissions arising from their operations and distribution. Climate change and new carbon institutions have an impact on corporate practices. Carbon accounting is increasingly becoming a growing approach in supporting climate change mitigation, mainly caused by companies, governments, and organizations. The conclusion of this article is that the development of carbon accounting provides an illustration that emissions calculations empower the business world to be able to achieve net zero with the possibility of accurate and comprehensive GHG estimates. Handling climate change is outlined in 13 of the SDGs regarding actions to deal with climate change, which requires targets and actions that are planned, applied, and measured and are carried out collaboratively, coordinated, and consistently.

The novelty of this article is that the researcher describes the 13th point of sustainable development goals (SDGs) with Carbon Accounting and its actualization of the Triple Bottom Line theory put forward by Elkington. Apart from that, what differentiates this research from previous research is that this research relates to the Islamic perspective on climate change. This research has limitations, such as some of the sources used as research references were taken from previous research, which allows for outdated information, and not all relevant sources to be used can be accessed.

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