

# Greenhouse Gas Emission and Sustainability Reporting Strategy in Primary Energy Industry

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## ABSTRACT

The primary energy plays a vital role in human society and industry. With rising requirements in energy, it also draws continuous concerns in environmental issues and human health problems. One of the major concerns is greenhouse gas (GHG) emission. A company that fails to report its sustainability strategy can also fail the expectations from the community and its stakeholders. The consequence may further threaten the operation and profit of an organization. This paper reviews the primary energy industries at large and the significance of sustainability report. A reporting strategy according to GRI 101 standard is proposed in the end.

## Introduction

The global demand for energy will keep rising as the world economy remains growing, though the growth rate has declined after 2005 [1]. Australia's economy is closely associated with the world economy. Though it fell in 2020 due to the worldwide pandemic, Australia GDP annual growth rate rebounds back to 3.4% in 2021 [2]. The growing economy means increasing living standards and demand for energy consumption. Oil is still the leading primary energy source in the world and the demand for natural gas is huge as shown in Figure 1 [3]. Although the renewable energy grows rapidly in recent years, it is hard to take over the place of oil and natural gas in a short term. Energy is a necessary driving force to develop economy. However, CO<sub>2</sub> emissions are proved to increase with economy growth [4]. Tyndall discovered that CO<sub>2</sub> leads to greenhouse gas (GHG) effect [5]. The scientific study shows the greenhouse gas has induced global warming and climate change. Therefore, sustainable economy and regulations on GHG emissions has been seriously considered by governments

and investors. Countries work together under the Paris Agreement [6] and Australia government also announce strategies to mitigate climate change issues [7]. As a communication tool to show an organization's effort towards sustainable development, a successful sustainability report not only helps an organization gain support from local communities but also attract more investors.

## Greenhouse Gas Emissions

The GHG emission caused by energy consumption is a major issue that challenges the sustainable business of primary energy industries. The scientific data indicates that over 30% of total GHG concentration in the air increased from 1990 to 2013 [8]. Most importantly, energy supply sectors contribute the largest growth in global GHG emissions from 1970 to 2004 [9]. The carbon emissions due to consumption of oil still tends to increase [10]. Recent study shows that carbon emissions relating to energy sectors continues increasing [11]. GHG emissions in Australia has encountered a difficult situation, as well. The emissions continue rising after the

termination of carbon tax and CO<sub>2</sub> equivalent is increased by 3.5 million tons in 2018 [12]. Global warming is another issue impacting the company's sustainability goals significantly. This issue is induced by the GHG emissions. Compared to other atmospheric gases, CO<sub>2</sub> can absorb much greater amount of heat. Normally, the earth surface receives solar energy via sunshine and radiates parts of the heat back into space during night in different wavelength. GHG gas molecules can block the heat radiation from the earth and keep the earth surface temperature around a suitable value [13]. However, too much GHG molecules break out the balance. It leads to a rising temperature on earth, the phenomenon of which

is also called greenhouse gas effect. The scientific investigation has pointed out that earth surface temperature has direct relation with the carbon emissions, as the surface temperature increases with the rising carbon emissions since 1960 [13]. According to the research [14], the main components of emitted GHG are shown in Figure 2. In addition, global warming is also visible in Australia. The average surface temperature is increased by 0.9°C since 1910 and the south-west rainfall has decreased from 1970s in Australia [7]. The exposure to high temperature increases the death rate. There is strong evidence that mortality of a city is proportional to heatwaves [15].

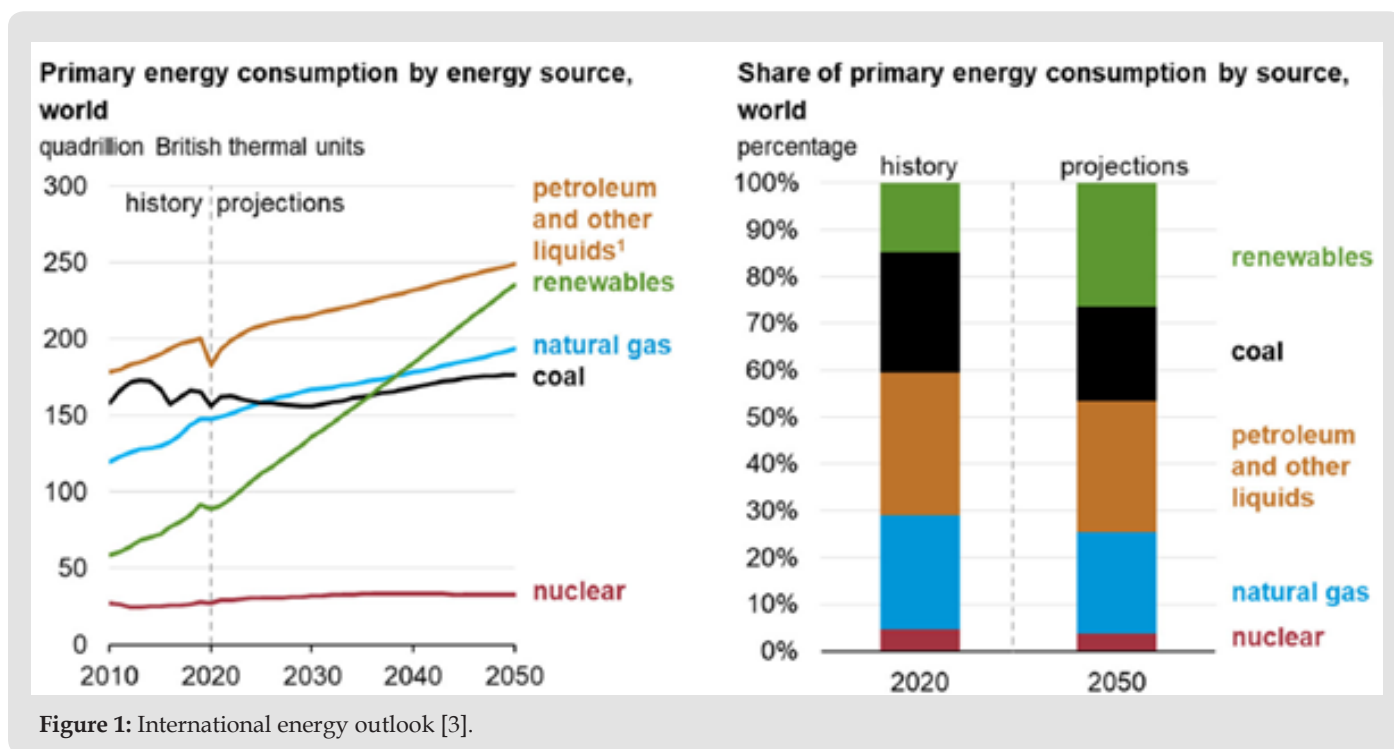


Figure 1: International energy outlook [3].

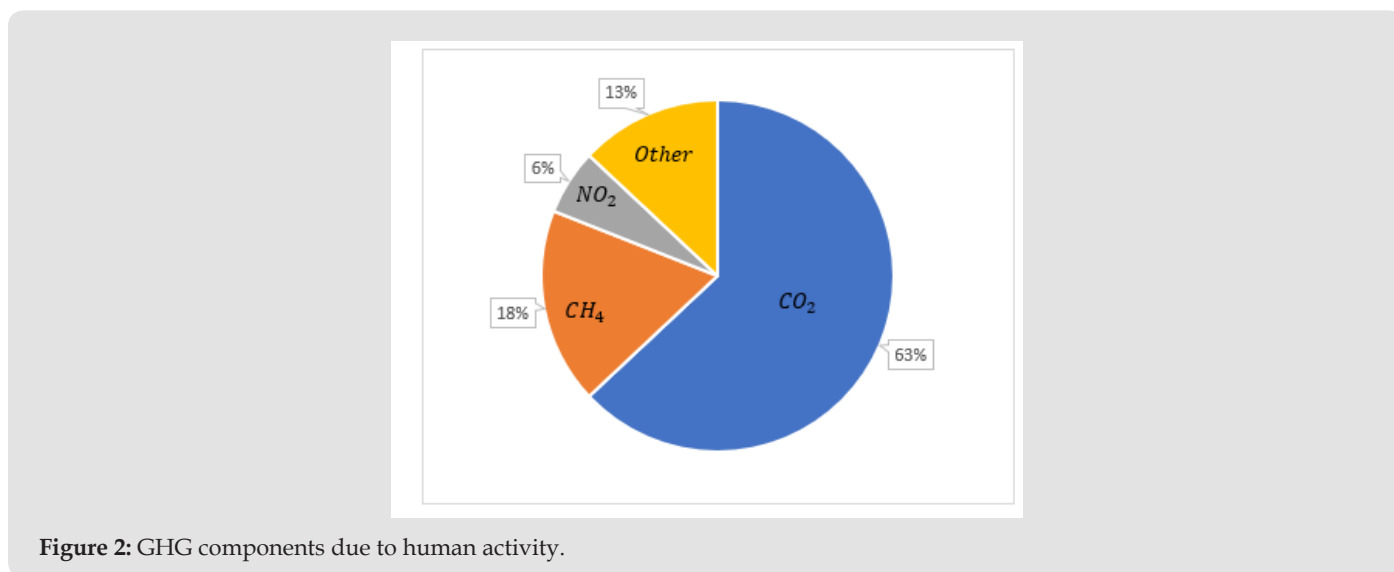


Figure 2: GHG components due to human activity.

## Manufacturing Process and Toxicity

Sustainability issues exist in multiple stages of manufacturing process, including extraction, refinement, and transportation. Two main categories are the indirect and the direct impact [16]. These issues cause more serious consequence in deep-water industry than those on land. During seismic surveys, the indirect impacts come from light emission and acoustic pollution. At construction stage, the direct impacts occur in drilling operations, anchor chains and sedimental resuspensions [16]. The research also found that the disturbance on sea habitats may increase after construction completed. Beside physical impacts, toxic chemicals also potentially leaked into sea water. They reduce dissolved oxygen and increase CO<sub>2</sub> and toxics concentration in water [17]. The affected zone is typically within 300m radius from a well-head and the radius

can extend to 2 km in sensitive cases [18,19]. The other factors challenging the organizational sustainable goals in primary energy industries include the toxicity of materials, trend in renewable energy and world-wide pandemic. For instance, the basic toxicity of crude oil is narcosis, and the detrimental compounds are mainly alkanes, MAHs and PAHs. Additionally, these components may require phase I metabolism to take effect [20]. It is also pointed out the toxicity needs sufficient exposure to initiate [21]. As for the trend in renewable energy, it may threaten the fundamental business of a company. Since more customers shift to electrical vehicles and restrictions come from political aspect, the demand of oil and natural gas is expected to decline in the future. The estimated value of oil and gas industry in 2040 is shown in Figure 3 [22]. However, the demand for primary energy is uncertain in short term due to the Covid19 pandemic and political factors.

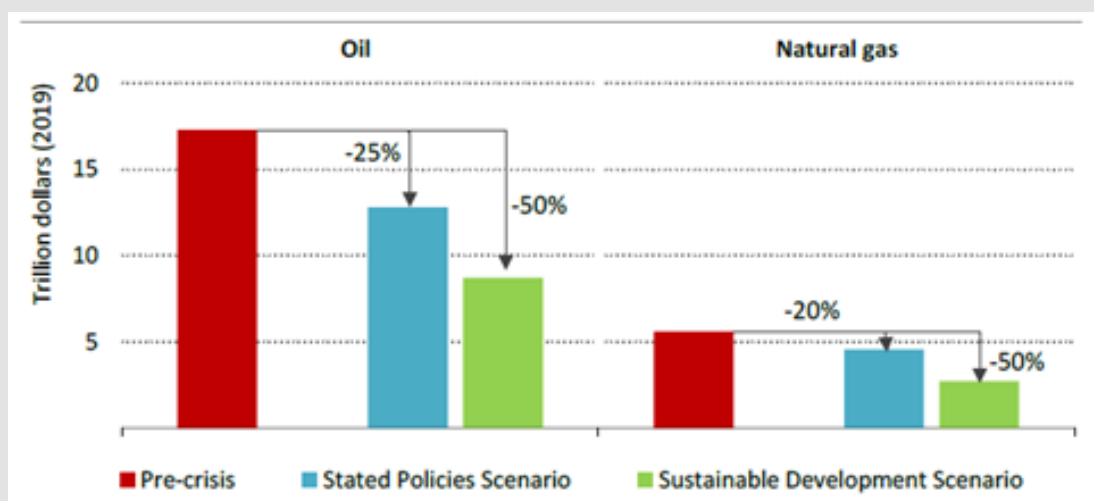


Figure 3: Estimated value of oil and gas industry in 2040 [22].

## Sustainability Reporting Strategy and Decision Making

Sustainability report becomes a popular and critical tool to project a company's social responsibility and build up a healthy community, which helps attract potential investors and promote a company's business. It integrates business decisions with environment concerns. There is a trend in sustainability report among the world Fortune 1000 companies [23]. Since the environment issues keep rising, 80% of the companies around the world made sustainability report in 2020 [24]. The research indicates that investors has increasing interest in organizational strategies towards sustainability, especially those from large institutes [25]. They consider sustainability issues as business opportunities, rather than merely financial risks. Engaging the

company and communities at large in sustainability reports also helps the organization adapt to the shifts in social concerns [26]. However, a report fails to deliver its ideological persuasion to the audience without proper genre and information arranged. A study points out that there are two key moves in a sustainability related report [27]. One is establishing credentials, which mainly summarizes the company itself. The other is introducing sustainability initiatives, including demonstration of the company's plan and action.

Sustainability report requires a proper structure to deliver its perceptions and values to the audience efficiently. This helps strengthen the confidence of the employees and stakeholders in the company and make the company more compatible to others. Currently, there is no unified industry standard for sustainability

report. Three popular criteria are proposed by National Australian Building Environmental Reporting Scheme (NABERS), International Standards Organization (ISO) and Global Reporting Initiative (GRI). These standards have already been assessed by a few studies [28,29]. NABERS features a national rating system and provides convenient standards, but it highly depends on stakeholder

engagement [30]. ISO 14000 series standard offers details of environment management according to specific situations and areas. However, it is complex to initiate and not well integrated. GRI has an interrelated structure, and it is friendly to initiate, although transparency issues may still exist [31].

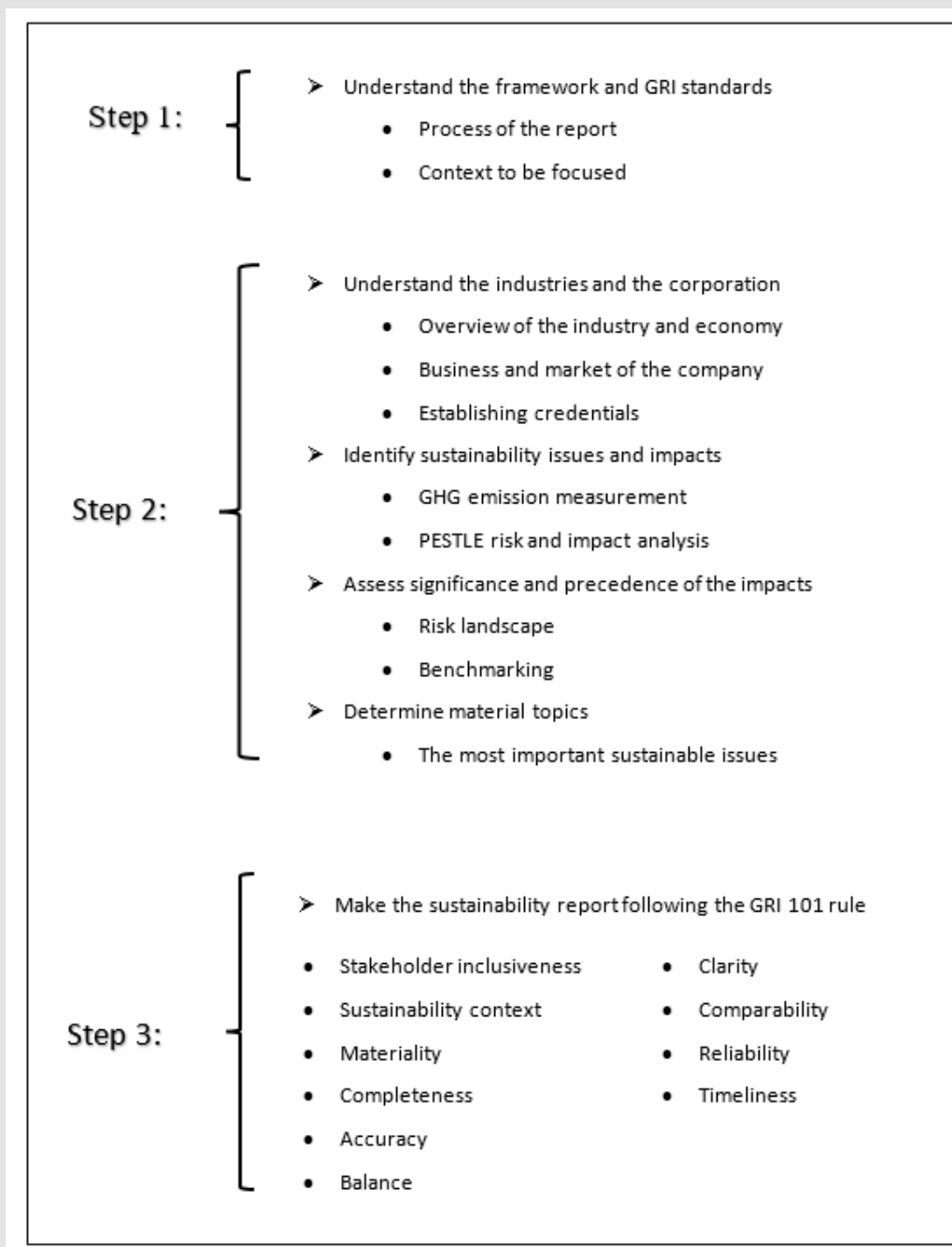


Figure 4: The process of a sustainability report.

Decision making is an action depending on the accessible information and sustainability reports offer the critical information of the sustainability index of a company. It has been pointed out that individuals and organizations possess limited intellectual capacities and evaluating the main features of a problem without accessing the whole complexities is rational action [32]. Sustainability report is a tool to simplify the complexity of sustainability problems. It aids to analysis exited sustainability issues from multi-dimensional aspects as shown in chapter 1 and 2. The report interacts with three basic phases of strategic decision making [33], including identifying specific issues, developing sustainable strategies and making social responsibility related decisions.

Sustainability reports also help a company to figure out the social conflicts and reduce the cost of conflict. Decision making can be biased and highly depend on the conation or cognition of upper echelons [33]. Leaders at higher position may make decisions due to limited information and cognition, which are stakeholder-based. However, large-scale primary energy companies profoundly impact environments, economies, and communities. Social issues are frequently raised by those companies [34]. According to Franks' research [34], failure of dealing with the social conflicts and building healthy socio-ecological system turns the conflicts into business cost. Thus, sustainable reports can enhance the process of strategic decision making and reduce the potential cost burden.

### Sustainability Reporting Guidelines

The GRI Universal Standards [35] are recommended to be the basic framework for the sustainability report of primary energy industries. The fundamental goal of the sustainability report is to use disclosed information to help the upper echelons assess the policies and make decisions. Additionally, it helps the stakeholders understand the value of a company. GRI standards are not only the most popular sustainability report guide [24], but also friendly to initiate. Once the organization has established explicit reporting strategies, it can move to GRI Sector Standards or Topic Standards to assess more details of different sectors in the company. The detail of the reporting strategy for a company is proposed in Figure 4. It has three basic steps and GRI 101 standard is involved [35]. The evaluation of sustainability is in step two, including identification of the sustainability issues, assessment of the issues and impacts. Generally, the issues may be detected according to GHG emission investigation. However, the emission itself may be hard to evaluate for large-scale corporations. Beside the significance of the impact on environment and the organization itself, GRI 101 standard points out that the concerns of stakeholders should be covered in the report as well.

### Conclusion

The proposal has briefly presented the overview of the energy industries, the sustainability issues within a corporation, the impacts of the issues, the significance of reporting sustainability and the recommended strategies. As more and more concerns are put into sustainability, energy industries should carefully deal with those concerns from the public, government, and stakeholders. The major concern within the primary energy industry is the GHG emission and related issues. A proper sustainability report helps a company to establish confidence among stakeholders and assist the leaders to make decision.

### Conflict of Interest

The Author declares that there is no conflict of interest.

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