**Exploratory Research Report**

The report is focusing on exploring potential avenues for development by defining the domain as sustainable environment. The resource comes from data.gov.au. Using the keyword is Greenhouse gas emission and the waste leading to this issue. The data will be included both qualitative and quantitative data. Furthermore, the planning is aiming to identify patterns, finding gaps and constraints from the data.  This report will be given the assumptions during analyzing the documents which is being interpreted and potential direction.

There are two data types which was researched including qualitative and quantitative data. The green house emission and Local Government Waste Collection Services between 2022 and 2023 have been chosen as the quantitative data. According to the figure 1 of the greenhouse emission data, is about emissions by the quarter between December 2010 to December 2021, includes three variables, namely every quarter, actual emissions, seasonally adjusted and weather normalized and trend. The variables:  seasonally adjusted and weather normalized will be analyzed since it removed the weather impaction.  Analyzing greenhouse gas emissions on a quarterly basis helps identify seasonal changes, trends and fluctuations. It prevents annual data from masking short-term anomalies and ensures that carbon markets and international emission reduction policies are more accurate and effective. Quarterly data provides more detailed trend analysis, which can identify whether there is long-term growth, cyclical fluctuations, or the impact of sudden events.Greenhouse gas emissions have continued to decline significantly since 2008. Comparing greenhouse gas emissions in different quarters of the year, it can be found that greenhouse gas emissions significantly decrease from December to March each summer. Greenhouse gas emissions increase significantly from March to June. The trend of greenhouse gas emissions from June to September is uncertain, with both growth and decline. From September to December, there is a downward trend. The peak of greenhouse gas emissions in the year is basically in June or September.

According to the figure 16 of the waste emission data, is about waste emissions by the quarter between December 2010 to December 2021, includes solid waste disposal on land，wastewater handling and waste incineration and biological treatment of solid waste.The data changes of the three variables are relatively slow.Even though solid waste disposal on land has slightly increased in some periods, it has generally decreased steadily, from 3.1 million tons of carbon dioxide equivalent in December 2010 to 2.5 million tons of carbon dioxide equivalent in December 2021. The greenhouse gases generated by wastewater handling were basically the same in 2010 and 2021. Solid waste disposal on land and wastewater handling have seen several increases between 2010 and 2021, all in June or September. As one of the factors affecting greenhouse gas emissions, solid waste disposal on land and wastewater handling have similar trends to those shown in figure 1.

Even though Australia's greenhouse gas emissions have been declining since 2008, the decline in solid waste disposal on land and wastewater handling has not been significant. Therefore, more efforts should be made in waste disposal to help reduce greenhouse gas emissions.

按季度研究温室气体排放可以识别季节性变化，如冬季供暖导致排放上升、夏季可再生能源利用增加。