Chapter 3
Conclusion

The project aimed to conduct an energy consumption survey and prepare EEIs for the industrial and commercial sectors. Although this project collected energy consumption data for 2 years (2018 and 2019) with a limited sample, a limited number of years of data, and constraints encountered during the survey due to the pandemic situation, which hampered the process of physical interaction and collection of data, the survey methodology, analyses, and development of EEI have provided valuable lessons for the collection of relevant data, and establishment of EEI and future benchmarking values when sufficient data and further in-depth indicators could be derived.

Due to the limitations and difficulties faced during the survey, and the lack of quality data, the estimates of average EUI data can be summarised as follows:

Commercial Sector

- Office building sector:
  - Range of average EUIs: 213–336 kWh/m^2/y
  - Median EUI: 275 kWh/m^2/y
- Retail building sector:
  - Range of average EUIs: 324–458 kWh/m^2/y
  - Median EUI: 391 kWh/m^2/y

Industrial Sector

- Cement sector average EUI: 3,097 MJ/MT/y
- Sugar sector average EUI: 42,058 MJ/MT/y
- Food sector average EUI: 3.14 MJ/kg
- Beverage sector average EUI: 0.61 MJ/litre

This project has provided some valuable lessons learned, such as the following:

1) This project has provided an opportunity to learn about the process and methodology of energy consumption surveys and subsequent analyses and computations of average EUIs.
2) The efficiency and effectiveness of the energy consumption survey can be improved if the awareness of stakeholders is enhanced in these areas:
   a) Knowledge on compilation of relevant data for EEI establishment and monitoring.
   b) The usefulness and benefits of EEIs.
   c) Trust and confidence in energy consumption survey.
3) Implementation of energy consumption survey for the establishment of EEI can be improved in these areas:
   a) Physical training on all aspects of energy consumption survey including dry runs, and methodology on analysis and validation of data is necessary.

b) Need to allocate time to review all preparatory work including energy consumption survey formats.
c) Focused survey effort should be made to achieve the planned objectives, programs, and targets.
d) Physical interviews and the collection of data are necessary.

Despite the difficulties brought about by the pandemic and the low acceptance and reluctance on the part of respondents due to their lack of familiarity, understanding, and confidence in such a survey exercise, the project has provided valuable experiences for everyone involved. However, more important is that this project has provided valuable insights and helpful information on data collection and computation of EUIs. This project can hopefully lead to future efforts in establishing and compiling more EUI data. The Singapore commercial building example has shown that tracking of EUIs for various categories of buildings can be used to track EUI trending and quantify energy savings in various energy end-use sub-sectors. Albeit the outcome of this project might not be ideal due to the said constraints, this project should not be detracted from its significance because it has provided several lessons learned, and it has demonstrated the methodology of energy consumption survey for the establishment of EUIs in industry and commercial sectors, including the dos and don'ts. Another significant outcome of compiling EUI data is the establishment of benchmarking EEI value once a sufficient number of years of data are collected. Benchmarking EEI values can drive the energy efficiency agenda for each sector and sub-sector.