

# 2022 Student Design Competition: Utility and Service Life Overview

## General

The purpose of this document is to setup the utility rate structures and elements of the energy economy used in the system selection competition for life cycle costing. It should be noted that the stated situation and numbers may not reflect the reality of the actual energy situation or rates in this region. Regardless, teams should use the values below for the 2022 Design Competition.

## Utilities

Commercial rates in USD are as follows for low voltage, 50 hertz power:

- Day Rate Period 06:00 to 17:00 – 6.67 cent/kWh
- Peak Rate Period 17:00 to 22:00 – 7.55 cent/kWh
- Night Rate Period 22:00 to 06:00 – 6.15 cent/kWh

There are no seasonal rate periods nor demand charges.

### Purchase guarantee renewables:

With the 2020 targets being achieved, many of the Australian states and territories have committed to a greater than 40% target for renewable energy sources by 2030. The states committing to this target include Queensland, Victoria and the Northern Territory. In 2019, Australia met its 2020 renewable energy target of 23.5% and 33 terawatt-hours (TWh). Australia produced 378.7 Petajoules (PJ) of overall renewable energy (including renewable electricity) in 2018 which accounted for 6.2% of Australia's total energy use (6,146 PJ). Renewable energy grew by an annual average of 3.2% in the ten years between 2007-2017 and by 5.2% between 2016-2017. This contrasts to growth in coal (-1.9%), oil (1.7%) and gas (2.9%) over the same ten year period. It is estimated that Australia produced 55,093 gigawatt-hours (GWh) of renewable electricity in 2019, which accounted for 24.0% of the total amount of electricity generated in Australia. Share of Australian renewable electricity generation for 2019 is: Wind 19,525 GWh, Hydro 14,430 GWh, Small solar 12,455 GWh, Large solar 5,495 GWh, Bioenergy 3,576 GWh. Where renewables are on-site a minimum buy back rate has been set at for commercial rates at:

- Wind power plant, 8.6 cent/kWh
- Biomass energy plant (including landfill gas), 13.5 cent/kWh
- Solar power plant, 11.2 cent/kWh

Natural gas is available at \$2.139/therm at 5 PSI from the main at the street. The water and sewer rate is a flat consumption rate of \$3.36/cubic meter.

Utility rate structures shall be expected to rise at the following rates of escalation:

- Electrical cost will rise at the annual rate of 2.5%
- Natural Gas cost will rise at the annual rate of 1.5%
- Water and Sewer will rise at the annual rate of 2.2%

## Building Service Life

The Building is considered a “Long Life” service building and therefore is defined by ASHRAE Standard 189.1 (latest addition) to have an expected minimum service life of 50 years. All building decisions related to the building composition, building structural elements, building systems, and building operation shall include a 50-year life cycle study as the building owner expects a sustainable approach to all building design, construction and operational elements. Student teams shall include this basis with all building analysis. To complete the life cycle study, the building owner expects the following elements to be included with any analysis.

- General Inflation rate for future cost items (replacement items, maintenance and anticipated future costs) will be 3%
- Owner’s Rate of Return for monetary decisions (this is to be used for bringing future costs back to present net worth dollars) will be 4%.

The Life Cycle Analysis shall illustrate a 50-year study and bring all costs back to a total present value sum for each alternative so the building owner understands in present dollars which alternatives represent the best life cycle value.