

2021 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 2021 Design Competition.

Utilities

Commercial rates are as follows for low voltage, 60 hertz power:

- Day Rate Period 06:00 to 15:59 – 0.069 US\$/kWh
- Peak Rate Period 16:00 to 21:59 – 0.077 US\$/kWh
- Night Rate Period 22:00 to 05:59 – 0.065 US\$/kWh

There are no seasonal rate periods nor demand charges.

Purchase guarantee renewables:

The share of renewable energy in Canada's energy system has increased significantly in the last decade, and growth has increased in recent years. Increased use of wind and tidal for heat and power production has been the main driver of growth in renewables. However solar and biomass is gaining in installations. The Canadian electrical grid has an installed capacity of 135 GW and is projected to reach 170 GW by 2035. Where renewables are available onsite, the minimum buy back rates shall be:

- Wind power plant, US\$0.093/kWh
- Biomass energy plant (including landfill gas), US\$0.132/kWh
- Solar power plant, US\$0.121/kWh

Natural gas is available at US\$0.349/therm or US\$0.012/kWh at 5 PSI [34.47 kPa] from the main at the street. The combined water and sewer rate is at a flat consumption rate of US\$0.55/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 3.9%
- Natural Gas cost will rise at the annual rate of 2.75%
- Water and Sewer will rise at the annual rate of 3.2%

Building Service Life

The Building is considered a “Long Life” service building and therefore is defined by ASHRAE Standard 189.1 (latest addition). 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.