Summary Report

# Context

As solar panel technology matures, the installation costs for residential solar panels have continued to decline. With the addition of government incentives for solar panel installation, it may be profitable to consider installing solar panels on primary residences or rental residences.

# Benefits

I will consider two primary benefits of solar panel installation: Energy Savings and Increased Property Value

## Energy Savings

**Annual Production**

According to the Global Solar Atlas, a small residential system, in the Greater Toronto Area, with an installed capacity of **1 kWp** would produce **1.323 MWh[[1]](#footnote-1).** Accounting for 15% output loss[[2]](#footnote-2), we could expect an output of 992 kWh.

**Price of Electricity**

Average household energy consumption in Ontario is 9500 kWh per year, costing an average of 0.141 dollars per kWh[[3]](#footnote-3). I estimate this number to rise by an average 4.3% per year based on a log linear regression based on historical data from the Ontario Energy Board.

**Lifetime Performance**

The average solar panel lasts 25-30 years and suffers an average of 0.5% rate of degradation per year[[4]](#footnote-4). Taking a conservative lifespan of 25 years and yearly degradation rate, a solar panel

**Conclusions**

Based on the expected annual production, a 1 kWp solar panel system is expected to generate yearly savings of approximately $140 dollars the first year and $281 the final year, totaling to cumulative savings upwards of $5,000 over 25 years. This value is further depressed if we set inflation t 5% resulting in a present value of approximately $2800.

## Increased Property Value

$20 per $ saved in yearly energy bills -> about $2800 / kWh

# Costs

Installation, Maintenance, Removal

$3 per kWh

# Additional Considerations

1. https://globalsolaratlas.info/map?c=43.899624,-79.099503,11&s=43.879583,-78.980713&m=site [↑](#footnote-ref-1)
2. https://www.pv-magazine.com/2023/03/02/guide-to-understanding-solar-production-losses/ [↑](#footnote-ref-2)
3. https://www.energyhub.org/electricity-prices/#:~:text=the%20two%20seasons.-,Ontario,monthly%20usage%20of%201%2C000%20kWh. [↑](#footnote-ref-3)
4. <https://www.forbes.com/home-improvement/solar/how-long-do-solar-panels-last/#:~:text=The%20industry%20standard%20for%20most,to%2010%20years%20after%20installation>. [↑](#footnote-ref-4)