Benefits of Solar Panels Installation

The costs savings created by installing solar panels can be determined by:

$$\text{Cost Savings} = \text{Energy Production} \times \text{Energy Cost}$$

Energy Production

The energy production of solar panels can be determined by:

$$\text{Energy Production} = \text{Insolation} \times \text{Installed Capacity}$$

Insolation and Efficiency

According to the Global Solar Atlas, a small residential system with an installed capacity of **1 kWp** would produce **1.323 MWh.** Accounting for output losses, we could expect an output of 992 kWh.

- kWp = Kilowatt peak per hour
- Assuming a 25% output loss due to exogenous factors.

https://www.pv-magazine.com/2023/03/02/guide-to-understanding-solar-production-losses/#:~:text=Light-induced degradation occurs when,of the new panel's exposure.

Global Solar Atlas

The Global Solar Atlas provides a summary of solar power potential and solar resources globally. It is provided by the World Bank Group as a free service to governments, developers and the general public, and allows users to quickly obtain data and carry out a simple electricity output calculation for any location covered by the solar resource database.

https://globalsolaratlas.info/map?c=43.899624,-79.099503,11&s=43.879583,-78.980713&m=site

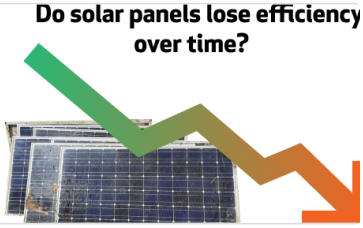
Degradation

- Solar panels degrade over time at a rate of 0.5% to 0.8% per year.
- Solar panes last around 25 to 30 years.

Do solar panels lose efficiency over time? Should you replace it at the end?

Find out if solar panels lose efficiency over time and whether its worth it to replace it.

https://www.evergreenelectrical.com.au/blog/solar-panels-efficiency-over-time#:~:text=The



Energy Production of 1 kWp System Over 25 years

Year	Panel Efficiency	Yearly Output (kWh)
0	100%	1323
5	96%	1271
10	92%	1221
15	89%	1173
20	85%	1127
25	82%	1082
30	79%	1040

Energy Costs

Current Electricity Rates

Effective Date	Off-Peak	Mid-Peak	On-Peak
01-Nov-22	7.4	10.2	15.1

Electricity Inflation Rate

The average Electricity Inflation Rate is 4.3% from a log linear regression.

Historical electricity rates | Ontario Energy Board

On this page:

https://www.oeb.ca/consumer-information-and-protection/electricity-rates/historical-electricity-rates

Average Energy Use

The average household uses 753 kWh per month which is 9036 kWh in a year.

Home Value

- Average 4% to home value
- Or $20 per $1 energy savings.

Do Solar Panels Increase Your Home's Value?

Get expert advice on improvements to your home, including design tips, how much you'd expect to pay for a pro and what to ask when hiring experts.

https://www.forbes.com/home-improvement/solar/does-solar-increase-home-value/#:~:text=appeal%20and%20value.-,How%20Does%20Solar%20Increase%20Home%20Value%3F,higher%20than%20those%20without%20them

Conclusions

For each 1 kWp of capacity installed, we would expect to save:

- $109 the first year and an average of $172 a year for 25 years.
- A total of $4,488 over 25 years.

https://www.oeb.ca/sites/default/files/uploads/Report_Defining_Typical_Elec_Customer_20160414.pdf

- In addition it adds ~$2000 to home value.

Year	Panel Efficiency	Yearly Output (kWh)	Energy Price	Yearly Savings	Cumulative Savings
0	100%	992	$0.11	$109.15	$109.15
5	96%	953	$0.14	$129.42	$714.32
10	92%	916	$0.17	$153.45	$1,431.87
15	89%	880	$0.21	$181.95	$2,282.69
20	85%	845	$0.26	$215.74	$3,291.51
25	82%	812	$0.32	$255.81	$4,487.69
30	79%	780	$0.39	$303.31	$5,906.01