

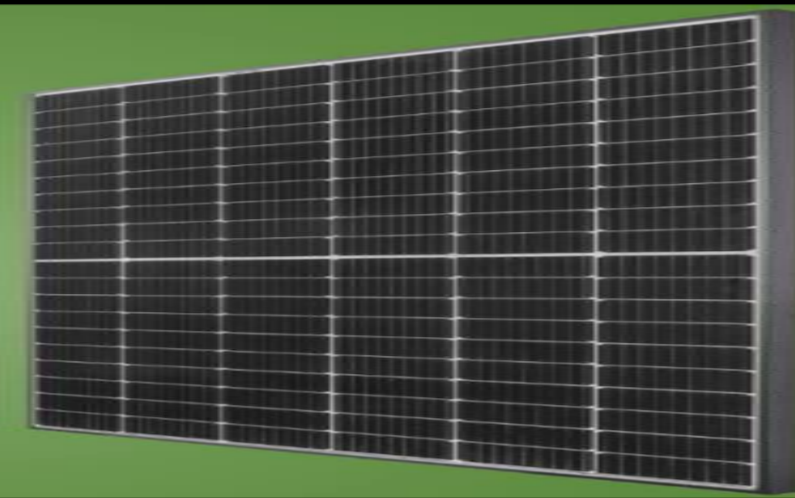
Cost analysis of solar (PV) Photovoltaic panels

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Aim of the Project

To carry out a cost analysis and estimated return on investment of an energy upgrade to a single detached dwelling house built in a rural location between the years 2003 to 2004.



Objectives

- Complete a literature review on solar panels.
- Create a 3D model of the house including the solar panels using a Building Information Modelling (BIM) software.
- Carry out a Domestic Energy Assessment Procedure (DEAP) calculation to find out the energy usage of the house before and after installation using <https://deap.seai.ie>
- Perform and document a number of case studies.
- Research the benefits to the environment as a result of the installation of solar panels.
- Carry out an estimate of the return on investment (ROI) for the upgrade to the dwelling.

Methodology

To carry out a cost analysis on solar Photovoltaic (PV) panels for an existing dwelling, data of the solar panels must be collected, such as the energy it generates in a year and the amount of money that is being saved in a year. By using this data, the payback period for the installation can be calculated.

This project is being carried out to give people a better insight of the benefits of installing solar panels. To get a more detailed analysis of the solar panels, the amount of energy the house uses per year will be calculated using the Domestic Energy Assessment Procedure (DEAP) software.

To help the reader visualize the solar panels on the dwelling a (BIM) Building Information Modelling model of the dwelling will be created on Revit.

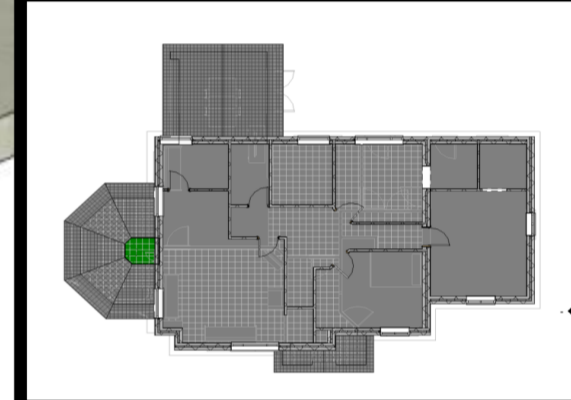
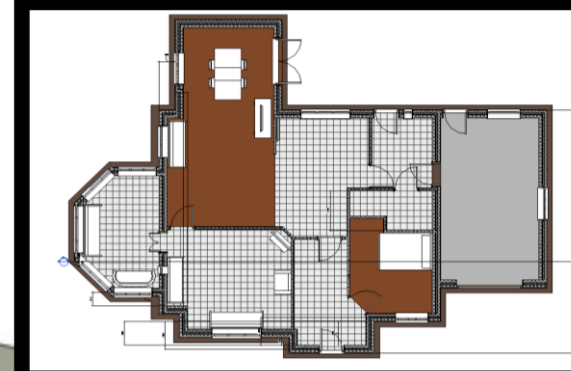
Background

Silicon is the most common material used for PV solar panels due to its availability and is very durable. The most common types of PV panels include Monocrystalline solar panels, Polycrystalline solar panels and thin film solar panels which are shown below.



Types of (PV) photovoltaic panels

Results



Total cost savings

€1,391.10

System cost

€12900

Estimated Payback

9.27324834

period (years)

Conclusion

The cost analysis estimate for the solar panels only took into account for one year of data that was collected. The payback period would be more accurate if there was data for 2 years or more. Financial savings, and environmental impact over an extended period will help the understanding of long-term performance. Technology continuous tracking of energy usage, energy production, advancements could be researched or if there is more efficient solar panels than the ones already installed on the dwelling.

References

- Chowdhury, M.S., Rahman, K.S., CTechato, K., Akhtaruzzaman, M., Tiong, S.K., Sopian, K. and Amin, N. (2020b) 'An overview of solar photovoltaic panels' end-of-life material recycling', *Energy Strategy Reviews*. Elsevier Ltd. Available at: <https://doi.org/10.1016/j.esr.2019.10.0431>.
- Dallaev, R., Pisarenko, T., Papež, N. and Holcman, V. (2023) 'Overview of the Current State of Flexible Solar Panels and Photovoltaic Materials', *Materials*. Available at: <https://howdhury, T., Nuthammachot, N., doi.org/10.3390/ma16175839>.