



# IJRASET

International Journal For Research in  
Applied Science and Engineering Technology



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# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

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**Volume:** 11    **Issue:** V    **Month of publication:** May 2023

**DOI:** <https://doi.org/10.22214/ijraset.2023.51990>

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# Eco House

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**Abstract:** *Eco- house sees buildings as part of the larger ecology of the planet and the building as part of a living habitat. This contrasts with the more common notions of many architects, who see a building as a work of art, perhaps on exhibition in a settlement or as ‘frozen music’ in the people-less pictures of glossy magazines. Some architects see the process of design as a production line with the building as a product to be deposited on a site, regardless of its particular environment or qualities. You will see from the case studies at the end of the book that eco-houses are closely connected to their site, society, climate, region and the planet. Because the alternative is not acceptable and ‘modern buildings’ are literally destroying the planet. It does not help that the numbers of people on the planet are growing so rapidly (5.3 billion in 1990; 8.1 billion by 2020; 10.7 billion in the 2080s).that we have increasingly sophisticated technologies to exploit the Earth’s natural resources. But it should be widely known that buildings are the single most damaging polluters on the planet, consuming over half of all the energy used in developed countries and producing over half of all climate-change gases. The shift towards green design began in the 1970s and was a pragmatic response to higher oil prices. It was then that the first of the oil shocks, in 1973, sent fossil fuel prices sky high and the ‘futurologists’ began to look at the life history of fossil fuels on the planet and make claims about how much oil and gas were left. Their predictions were alarming and, 30 years on, we appear still to have abundant oil. However, their calculations on total reserves were fairly accurate and many of their predictions have yet to be proved wrong.*

**Keywords:** *Eco-friendly residence, green-ship, household perception, water conservation, water efficiency.*

## I. INTRODUCTION

The Eco-House Project is the main coursework covering most of the second term, from It is a design project as encountered in most building and architectural studies. As the module on Domestic Building Construction Technology fits in with degree courses that all have a specific environmental focus, the focus here is on environmentally friendly housing. The project intends to help the students develop their creative and team working skills, while deepening and applying the theoretical and technical knowledge acquired in the of environmental act. the made up world helpful Environmental , social, and economic benefits, as well as protects the earth and mankind an eco-friendly home is a part of the sustainable development and green buildings which focuses on preventing the house resources from polluting the environment and emphasizes on energy-saving features. Based on data obtained from the Ministry of Energy and Mineral Resources of the Republic of Indonesia the housing sector, especially the use of electricity, contributes more than 30 % of the national energy consumption Electricity is mostly used in urban area residences. Inevitably, this will trigger excessive use of energy, even though the effort to control the use of energy depends on the individual. Thereby, the community should possess the understanding, behaviour, and motivation to use energy efficiently in pursuance of a sustainable environment. Community understanding is inseparable from their social activities. Social interaction of each individual within the community generally occurs in their neighbourhood. Through interaction, knowledge can be directly transferred and understood. However, each family’s perception of energy efficiency will certainly be different, The living environment might influence each individual’s understanding of energy saving. Generally, energy use can be divided into contextual and psychological (behaviour) categories. The contextual category involves local climate, energy marketing, and attributes in buildings, including the physical and system of energy use. The second category focuses on the consequences of building attributes and user characteristics.

## II. METHODOLOGY

### A. Material Methodology

#### 1) Sail Ventilation

The monthly average wind velocity is about 1 m s<sup>-1</sup> throughout the year by year except in when it is about 2 m s<sup>-1</sup>. According to, in this area the wind is caused by the heat island phenomenon of the city. The three ceiling fans in the living space and one in the entertainment area help with the cross-ventilation strategy. This atrium like space is a central air well, inducing cross-ventilation reminiscent of the old rubber smoke houses of multi-tiered roofs, brick piers and timber 270 Eco-house: A Design Guide CS 8.7. ‘Sails’ used for ventilation .CS 8.6. The house has an adaptable envelope that can be altered to suit the time of day and year.

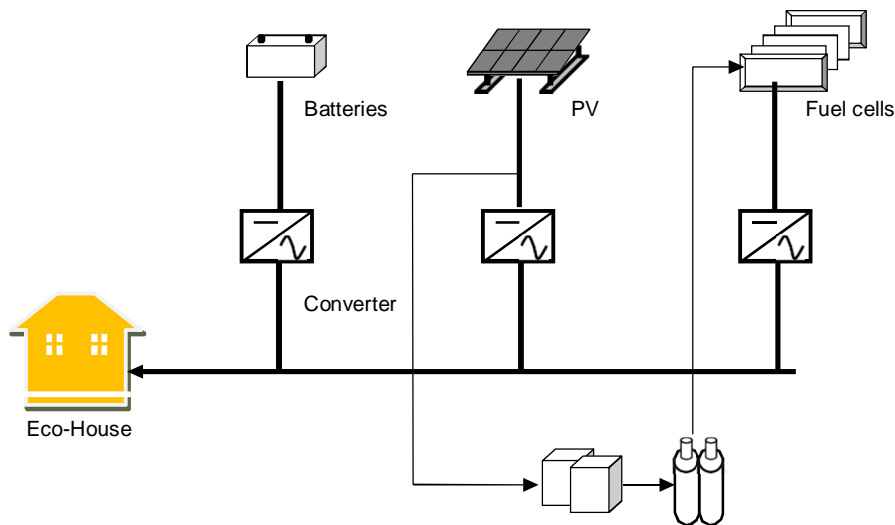
Trusses, the music house and bedroom on the first floor have an air-conditioning system chosen by, who t music in the adjacent music house. Teaching violin and piano for long periods in the music finds the air- conditioning system to be indispensable and a necessity for instruments that require stable humidity level.

This highlights the potential problem of adapting to different indoor climates in one’s lifestyle. A number of opening devices on the roof act as ‘sails’ to catch the wind and assist in cooling the interior. By a strange and fortunate coincidence, Jimmy placed his apertures and openings for ventilation purposes facing west where, in this area of Kuala Lumpur, there is a cool westerly prevailing breeze in the afternoon (from about 4.40 p.m. until about 6.30–7.00 pm)



### 2) Hybrid Energy System

A schematic diagram for the proposed hybrid system is presented in. The proposed system consists of a photovoltaic module, a proton exchange membrane fuel cell stack, an electrolyze, batteries and converters. The fuel cell delivers the current difference between the load current and the PV current. If the PV generates more current than required by the load, then excess current is diverted towards the electrolyze.



### 3) Power Converter

The function of the power converter is to maintain the flow of energy between the alternating current (AC) and direct current (DC) components. The initial cost for the converter was chosen to be \$800/kW and operation and maintenance cost (O&M) of \$5/kW with a lifetime of 15 years and efficiency of 90% (Retail Price List Inverters 2008, Eco-direct 2010). The replacement cost was taken a \$800/kW. Three different sizes of converter (4.7, 5 an5.5 kW) were taken in the model.

### 4) Fuel Cell System

The cost of the fuel cell varies greatly depends on the type of technology used. ECO HOUSE

5) *Heating the Eco-house System*

The eco-house was designed to have both insulation in the skin constructions as well as through the form of the building itself. The walls are constructed with insulating free board and battle insulation between timbers to reduce the heat loss. At the same layout of the spaces ensures that the living spaces receive additional .

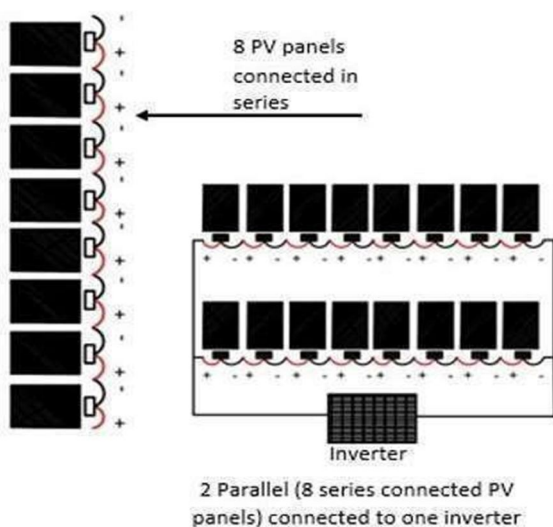
6) *Solar Panel*

Solar cell also called as photovoltaic (PV) cell convert sunlight directly into electricity. Solar panel is one of the component uses to recycle natural energy which convert from heat energy to electrical energy through radiation and natural convection process. The traditional solar cells are made from silicon are usually flat plate and the most efficient. Solar panels used to power homes and businesses are typically made from solar cells combined into modules that hold about 40 cells. A typical home will use about 10 to 20 solar panels to power the home.

The solar charge controller has been attached to the roof. The purpose of this component is to make a connection between the solar panel, the rechargeable battery and the LED circuit that is in the house in such a way that the solar panel charges the battery and powers the circuit at the same time, in case of inadequate sunlight, the LED circuit is powered by means of the rechargeable battery. This allows the house to be powered throughout the day.



A



B



C

7) *Geo-Polymer Concrete*

an innovative and eco-friendly construction material which is an alternative to Portland cement concrete- a kind which is more commonly known to cause extreme damage to the environment. But by using geo-polymers, there has been a decrease in the demand for Portland cement and a decrease in CO2 emission. Geo-polymer cement concrete is eco-friendly because it is made from the utilization of waste material such as fly ash and ground granulated blast furnace slag (GGBS). So to summarize, the following materials are required to produce this concrete:

- a) Fly ash
- b) GGBS
- c) Fine and coarse aggregates as required for normal concrete,
- d) Alkaline activator solution for GPCC as mentioned above

Geo-polymer cement is known to have a compressive strength of up to 70 MPa (N/mm<sup>2</sup>) as one of its properties. This concrete gains its strength more rapidly and faster than ordinary Portland cement concrete.

Apart from this, geo-polymers has more qualities than one: the drying shrinkage is much less as compared to cement concrete which makes it better suited for thick and heavy structures, it has low heat of hydration in comparison, its fire resistance is considerably better, the concrete's chloride permeability rating of 'low' to 'very low' and it lastly, it possesses the quality of being highly resistant to acids. All the information above might make you wonder about its applications since there are such differences between the two concretes i.e. Portland concrete and Geo-polymer. Well surprisingly, the application is the same. However, this material has not been popularly used for various applications. It has been more used for construction of pavements, retaining walls, water tanks, precast bridge decks. So, does this concrete fulfill its purpose of giving rise to an eco-friendly building industry? It does. Recently world's first Structural Building, The University of Queensland's Global Change Institute (GCI) has been constructed with the use of geo-polymer concrete. It is a four store high building for public use. It stands firm and steady which shows that the innovation works. Geo-polymer cement has proved itself to be more effective and efficient. It has the power to change the future of the construction industry and the environment, for the better



### III. CONCLUSION

Green Eco-House is one of the alternatives to reduce the PV system of solar panel. The main part consists in this house geo-polymer concrete with an additional feature. The solar panels have been tested and are able to rotate correspond to the sunlight with the help of the shape of the house. This house can really assist in reducing pollution of the environment by using recycled materials at the same time producing clean energy without depending on the cost effect.

#### A. Benefits of Project

Eco-friendly homes or green buildings hold a very strong upper hand over non green buildings in terms of cost and effectiveness to save energy.

The eco-friendly home. The main goal of a green home is to construct it with materials that will last just as long as a normal house but have way less harmful effects than that other house. Eco-friendly homes are a fantastic investment.

As people are slowly turning towards a more natural way of life and investing more and more into green homes, the costs are going up. The real estate has seen the importance it has for people so if ever in life you decide to invest in a green home, it will not be a bad decision.

The green homes use various sources to get clean supply of water like rain and also reduce the wastage of water with proper fixtures in plumbing. They help recycle water and save as much as possible.



### REFERENCES

- [1] Riley, M, and C. Howard (2002). Construction Technology 1: House Construction. Basingstoke: Palgrave Emmitt, S. and C. Gorse (2005). Barry's Introduction to Construction of Buildings. Oxford: Blackwell Publishing
- [2] Roaf, S., M. Fuentes and S. Thomas (2003). Eco house 2 – a Design Guide. Oxford: Architectural Press
- [3] Anderson, J., D. Shiers, M. Sinclair, H. Nigel (2002). The Green Guide to Specification – an Environmental Profiling System for Building Materials and Components. Oxford: Blackwell Science
- [4] Allen, P. and Todd, B. (1995). Off the Grid: Managing Electricity from Renewable Sources. The Centre for Alternative Technology. E-mail: [help@catinfo.demon.co.uk](mailto:help@catinfo.demon.co.uk) Andrews, A. (1997). Nomad Tent Types in the Middle East, Part 1, Vol. 2.
- [5] Anink, D., Chiel Boonstra, C. and Mak, J. (1996). Handbook of Sustainable Building: An Environmental Preference Method for Selection of Materials for use in Construction and Refurbishment. James and James



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