IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.67
Volume 5, Issue 5, March 2025

# Energy Efficient Window for Residential Use

**Shraddha A. Salve, Shlok S. Belekar, Bhumika S. Kohokade, Nandini V. Patil**
Department of Electrical Engineering
Guru Gobind Singh Polytechnic, Nashik, India

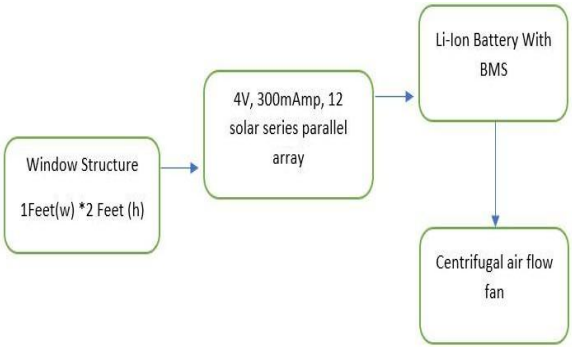
**Abstract:** *In this paper we modify a regular window of a building with solar cells placed form outside with number of series and parallel combination. Windows are usually subjected to face sun and they can capture enough energy to operate the ambient air flow control inside the room to keep room fresher with good oxygen levels. The cost of exhaust system or colling can be reduce with the help of energy efficient solar based window power generation. This system is mostly suitable for homes/flats with no terrace access for solar installation. Then we can modify the windows for power generation. The power generated throw solar energy efficient energy window can also be used for illuminating the room and thus saving in energy consumption from grid. This make*
*homes more comfortable by reducing drafts and increasing the temperature of interior side of the windows, reducing condensation Objectives of the project, design of solar Photo- Voltic blinds for windows of buildings, Storage of energy into compact Li-Ion Batteries, Use of generated power for ambient air flow control into the green buildings.*

**Keywords:** solar cells

## I. INTRODUCTION

In this paper we will modify a regular window of a building with solar cells placed from outside with number of series and parallel combination. Windows are usually subjected to face sun and can capture enough energy to operate the ambient air flow control inside the room to keep room fresher with good oxygen levels. The cost of cooling or exhaust system can be reduced through energy efficient solar based windows power generation. This technology is mostly suitable for homes/ flats with no terrace access for solar installation and can modify the windows for power generation. The power generated through solar energy efficient windows can also be used for illuminating the room and thus saving in energy consumption from grid. Such components use like, Solar cell, Li-Ion cell, Charge controller, Display, Window Frame, Exhaust Fan, DC- DC Converter in this paper.

## II. BLOCK DIGRAM




## III. COMPONENTS LIST WITH COSTING & INFORMATION

| SR. NO. | NAME OF COMPONENTS | SPECIFICATION | QUQNTITY |
|---|---|---|---|
| 1. | Solar cell | 4V, 300mAmp, monocrystalline type Solar cells. | 16 |
| 2. | Li-Ion cell | 18650 Series 3.7V, 2200mAh Li-Ion Cells | 3 |
| 3. | Charge controller | 5 Amp Li-Ion BMS | 1 |

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.67
Volume 5, Issue 5, March 2025

| | | | |
|---|---|---|---|
| 4. | Display | Seven Segment<br>2.7 – 100VDC<br>Voltmeter display | 1 |
| 5. | Window Frame | MS Welded Frame<br>1.5Feet * 2 Feet | 1 |
| 6. | Exhaust Fan | 3 Inch DC Exhaust fan | 1 |
| 7. | . DC-DC<br>Converter | DC12V – DC600V<br>Converter circuit for Window Mosquito | 1 |

## IV. PROBLEM IDENTIFICATION

We can install solar panels on bungalow and house-But we cannot install solar panels on residential buildings.
Because we cannot install solar panel for every flats particular in residential building.
The current residential buildings are very big and the number of flats is so large and high height that this is impossible to install solar.
This is not possible because solar panels weigh a lot.
Then we will install Energy Efficient Window it will generate Electricity. For a particular flats.

## V. SOLUTION

Maximum power of up-to 16-watt DC Power can be generated during full sunlight condition through one window of size 1*2 feet and is multiplied by total number of windows into house.
Saving in energy bills of lighting or air conditioning. 3.Promotion to green energy.
Li-Ion storage can work as emergency power supply during grid cutouts.

## V. APPLICATION

Solar energy windows can be connected to building electrical systems:
To supply power for lighting.

**Appliances.**
Other electrical devices.
Residential homes.
Industrial buildings.
Glass buildings

## VI. FUTURE SCOPE

New technologies and advancements expected to make them more affordable and energy efficient.
Energy-efficient windows can help reduce energy consumption, carbon emissions, and promote a sustainable future.
It will energy consumption.
It will reduce electricity bill

## VII. CONCLUSION

This paper (Window) is designed for 12watt power output using mono-crystalline solar cells. Mono-crystalline solar cells life is more than 20 years thus total energy generated during service life of solar will be larger than its investment costs this will make its attraction for ease of installation for green buildings

## REFERENCES

**[1].** The origins of energy efficient windows stem back to the 1920s when architects launched efforts to improve the comfort of those who lived/worked in buildings.
**[2].** 12 Jan 2017 Lund University, Lund Institute of Technology, Lund 2001. Energy-Efficient
**[3].** Here are some references related to energy efficient solar windows.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.67
Volume 5, Issue 5, March 2025

**[4].** "Transparent Solar Cells for Building Integrated Solar Cells" by Ubiquitous Energy (2020).
**[5].** "High-efficiency transparent solar cells using quantum dots" by Nature Energy (2019).
**[6].** "Perovskite solar cells for energy-saving windows" from Science magazine (2018).
**[7].** Omnipresent Energy.
**[8].** Physee.
**[9].** New energy technology.
**[10].** "Solar windows can save electricity and energy production" by Forbes (2020).
**[11].** "Transparent solar cells can turn windows into generators" by CNN (2019).
**[12].** "Energy-efficient solar windows could revolutionize building design" by Architectural Digest (2018).
**[13].** US Patent 10,857,332 B2 - "Transparent Solar Cell" by Ubiquitous Energy (2020).
**[14].** US Patent 10,544,341 B2 - "Solar Window Assembly" by New Energy Technologies (2019).