

Integrasi sel solar pada glass facade pengaruhnya dalam meminimalkan masuknya panas matahari dan sebagai penghasil daya listrik bangunan = The integration of solar cell in glass facade an effect in minimizing the entry of solar thermal and as producing electrical power of a building

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Abstrak

[ABSTRAK

Photovoltaic sebuah teknologi yang dapat mengubah sinar matahari menjadi energi listrik dapat menjadi jawaban atas berkurangnya energi fosil sebagai bahan utama penghasil listrik konvensional. Photovoltaic sebagai energi terbarukan memiliki kelebihan tidak menimbulkan emisi karbon yang dapat menjadi penyebab pemanasan global. Penggunaan photovoltaic khususnya di Indonesia sebagian besar masih berupa panel yang disusun oleh sel-sel solar dengan daya tertentu. Panel photovoltaic tersebut hanya menjadi sebuah alat penghasil listrik terhadap bangunan.

Photovoltaic dapat dikembangkan menjadi bagian arsitektural dari suatu bangunan. Salah satu alternatif ialah menggabungkannya dengan glass facade yang disebut dengan Photovoltaic Glazing (PV Glazing). Unsur penyusun yang sama antara sel solar dan kaca yaitu silika merupakan salah satu faktor utama dapat bergabungnya kedua material ini. Material kaca yang memiliki konduktivitas yang cukup besar menjadi suatu masalah bagi iklim di Indonesia. Penelitian ini dilakukan untuk mengetahui keoptimalan pemasangan PV terhadap glass facade dalam menghasilkan daya listrik dan kontribusinya dalam mereduksi sinar yang masuk ke dalam bangunan.

Bangunan yang dijadikan studi kasus adalah Fakultas Ilmu Keperawatan Universitas Indonesia (FIK UI) dengan façade kaca orientasi selatan dan Manufacture Research Centre Universitas Indonesia (MRC UI) façade kaca orientasi barat. Penentuan studi kasus mewakili orientasi arah glass façade dan terhindar dari bayangan bangunan sekitar. Penelitian memakai simulasi software PVsyst untuk mengetahui daya dan perangkat yang dibutuhkan dari masing masing sampel yang selanjutnya dianalisa menggunakan parameter Performance Ratio, Solar Fraction, Missing Energy dan Energi yang Tersedia. Untuk melihat tingkat reduksi PV Glazing pada penelitian memakai simulasi Ecotec dan perhitungan Heat Transfer.

Biaya pemasangan PV Glazing yang sangat tinggi membuat teknologi PV ini dikategorikan teknologi yang mahal. Dengan melihat kepada kebutuhan listrik kedua studi kasus pada penelitian ini, dengan menggunakan PV Glazing FIK UI dapat menghemat Rp 63,076,350 per tahunnya dan MRC UI Rp 23,859,937.29 per tahunnya dibandingkan dengan listrik konvensional PLN.

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ABSTRACT

Photovoltaic a technology that could converts sunlight into electrical energy can be the answer of a diminished fossil energy as the principal ingredient electricitygenerating conventional. Photovoltaic as renewable energy has an excess of it does not cause of emission carbon that can be the cause of global warming.The use of photovoltaic especially in indonesia most are still in the form of a panel that was compiled by solar cells with specific resources. Photovoltaic panel was only become an instrument electricity-generating toward the building.

Photovoltaic can be developed to become architectural part of an building.One alternative is combining to glass facade which is called by photovoltaic glazing (pv glazing). A constituent of the same element between solar cell and glass that is silica is one of the main factors integration both of this material. Glass that has sizeable conductivity can be a problem for the climate in Indonesia. The research is done for to know optimal mounting PV against glass facade in producing electrical power and contribution in reducing array entering the building.

A building used as case study are Faculty of Nursing University of Indonesia with south façade glazing orientation and Manufacturing Research Centre, University of Indonesia with west façade glazing orientation.. The determination of the case studies represents the orientation direction glass facade and spared from the shadow of local buildings. Research using software PVsyst ssimulation to know the required devices and power of each sample, then analyzed using the Performance parameters, Solar Fraction, Missing Energy and available energy. To see the level of reduction of PV Glazing on research, using software Ecotec simulation and calculation of heat transfer.

Mounting cost of PV glazing very high makes this categorized technology is very expensive. By looking to the need for electricity both of case study in this research, by using PV glazing, FIK UI can save Rp 63,076,350 per year and MRC UI Rp 23,859,937.29 per year compared with electricity conventional PLN;Photovoltaic a technology that could converts sunlight into electrical energy can

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