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## A Combined Solar Photovoltaic Distributed Energy Source Appliance

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### Author(s)

Himanshu Dehra

### ABSTRACT

The paper has analysed the state-of-art technology for a solar photovoltaic distributed energy source appliance. The success of implementation of photovoltaic (PV) power project is increased when PV module system is integrated with building design process and is used as multi purpose appliance for use with building elements. The improvement in overall system efficiency of building integrated PV modules embedded in building façade is achieved by minimizing and capturing energy losses. A novel solar energy utilisation technology for generation of electric and thermal power is presented by integration of ventilation and solar photovoltaic device with the heating, ventilating and air conditioning (HVAC) system. The testing appliance named as photovoltaic duct wall was a wooden frame assembly of double wall with air ventilation: two adjacent glass coated PV modules, air column, plywood board filled with polystyrene and dampers. The measurement data is collected from various sensors to read measurements of solar intensity, ambient air temperature, room air temperature, electric power, surface temperatures of PV modules and plywood board, air velocities and air temperatures in the air column. The enhancement in the air velocity of the air column is fulfilled with an exhaust fan fixed in an outdoor room. The simulation model is used to perform the two dimensional energy analyses with applied one dimensional solution of steady state heat conduction equations. The bases of simulation model are conjugating energy travel paths with network boundary conditions of convection, radiation exchange, heat storage capacity, thermal storage capacity and heat transport.

### KEYWORDS

HVAC, Energy Source, Energy Appliance, Energy Distribution, Photovoltaic Duct

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