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Short Communication

Authentication of Solar Energy in Achieving of Metropolitan Region

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1. Description

Urban projects reliance on fossil fuels may be reduced by producing renewable energy on-site, which has several positive effects on the environment, the economy, and society[1]. An essential first step towards reducing cities' reliance on fossil fuels for energy is urban development. Therefore, it is essential to include energy efficiency measures into urban area planning together with the use of renewable and other low impact energy sources in order to achieve ecologically sustainable developments. The complete integration of renewable energy sources into cities and urban regions with the goal of decreasing the reliance of urban areas on fossil fuels[2]. Fossil fuels make up the remaining sources of energy and are currently predicted to continue to provide a significant amount of the world's energy needs for some time to come. Renewable energy sources make up around 15% of the total energy sources in use today. One of the most important tactics for reducing the dangers associated with climate change is to take a firm stance in favour of switching to 100% renewable and low impact alternative energy in the near future. Solar, wind, and biomass energy are examples of renewable energy sources that are now used in cities and metropolitan regions.

Particularly in light of recent technological advancements and a decline in the cost of solar technologies, solar energy is one of the most alluring renewable energy sources in urban projects. Additionally, solar technologies like Photo Voltaic (PV) panels and equipment[3], as well as thermal solar collectors, can be effectively integrated within cities and urban developments, where they can act as standalone elements of the urban landscape and public open spaces, as well as integral parts of building envelopes (roofs and facades). Numerous cities throughout the globe have looked into the possibilities of urban-integrated photovoltaic, and the results show that this technology has the ability to provide a significant amount of the energy needs of these cities. For instance, photovoltaic power production can provide between 62 and 66 percent of the world's electrical needs. Roof-integrated photovoltaic is expected to be able to provide around 17 percent of global energy demand as well as about 32 percent of urban energy demand by 2050, according to the International Energy Agency (IEA). Numerous studies looked at the possibility of combining heat pump and photovoltaic technologies to increase energy efficiency while producing renewable energy. For instance, in cold areas, a photovoltaic system combined with an air source heat pump offers financial and environmental advantages. It has been discovered that combining photovoltaic and thermal hybrid solar systems with a seasonal storage tank and a water-to-water heat pump is a potential method of supplying energy while reducing emissions and running expenses.

Different thermal uses, such as Solar Water Heating (SWH), commercial applications, or space heating and cooling, all employ solar thermal technology. In frigid climates where space heating accounts for a significant portion of overall energy consumption (30 to 45 percent of building energy needs), using solar thermal energy for space heating may be quite advantageous. In order to take into consideration the erratic nature of solar energy supply, solar thermal systems for space heating and domestic hot water production are often installed in conjunction with a backup system[4]. Additionally, by combining solar thermal collection with seasonal storage,

where extra thermal energy is kept in a borehole system, buildings' reliance on fossil fuels for space heating may be further decreased (and domestic hot water). These technologies are only sometimes used in large-scale urban projects, especially in neighbourhoods in countries with frigid temperatures, like Canada. There is a substantial corpus of study on solar access for buildings, neighbourhoods, and cities in addition to research on solar technology and their use. The density of neighbourhoods, distinct building typologies for varied climates, and street orientation are the main factors determining sun access. It may be difficult to achieve energy and carbon neutrality at the neighbourhood level, particularly in areas with a lot of mixed-use housing[5]. A flexible combination of energy sources may help a metropolitan area achieve net-zero energy status, according to recent study. A neighbourhood building types and designs will determine the best combination of energy resources, which may include but is not limited to solar, wind, district heating, and waste to energy.

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