

# **Urban Eco-Greenergy™ hybrid wind-solar photovoltaic energy system and its applications**

## **Abstract**

This paper introduces the Eco-Greenergy™ hybrid wind-solar photovoltaic energy generation system and its applications. The system is an integration of the novel omnidirection-guide-vane (ODGV) with a vertical axis wind turbine (VAWT). The ODGV is designed to surround the VAWT for wind power augmentation by creating a venturi effect to increase the on-coming wind speed before it interacts with the turbine blades. In wind tunnel tests, the ODGV improves the power output of the VAWT by 3.48 times compared with a bare VAWT at its peak torque. Furthermore, the rotor rotational speed of the wind turbine increased by 182% at 6 m/s of wind speed. A solar PV panel can be mounted on the top surface of the ODGV for solar energy generation. Estimation on wind-solar energy output shows that the system can generate a total of 572.8 kWh of energy per year. By comparison, the ODGV increases the annual wind energy output by 438%. The green energy generated from the hybrid system can be used to power LED lights or other appliances (e.g., CCTV camera).