CopenHybrid – Development of a CO2 Neutral Hybrid Street Lighting System for the Danish Municipalities’ Illumination Classes - DTU Orbit (22/12/2018)

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A mathematical model has been developed for the energy system of the hybrid street lighting making it possible to simulate a given configuration (solar panel performance data, size and orientation - wind turbine performance data, projected area and height - battery data) over a year in an urban environment of a given configuration based on measured wind/solar/temperature data from nearby meteorological station or other relevant weather data. The simulation can show if it is possible to cover the consumption by the light source over the year. The model can be used to evaluate both commercial hybrid systems and to dimension new systems for use in given environments where the weather data are known. Since weather and day/night length are varying a lot around the world the systems should be dimensioned very differently depending on the place of use. By using the simulation tool it is shown that it is possible to create a hybrid street lighting for an urban environment with a maximum of 2 floor height buildings which governs >70% of the luminaires in Copenhagen (the Capital of Denmark) fulfilling the requirements of 2.5 lux on the street over the year. Furthermore the tool is powerful to evaluate hybrid systems on the market (if all the technical data is known) for use in a given urban placement.

General information
State: Published
Number of pages: 6
Pages: 5DO.13.1
Publication date: 2013

Host publication information
Title of host publication: Proceedings of the 28th EU PVSEC
Electronic versions:
5DO.13.1.pdf
Source: dtu
Source-ID: u::9384
Research output: Research - peer-review › Article in proceedings – Annual report year: 2013