New Approach for an Easily Detachable Electric Drive Unit for Off-the-Shelf Bicycles

While an increasing number of electric bicycles are sold, the majority is still conventional, i.e., pedal powered. Electric bicycles could raise the share of people cycling in place of more inefficient modes of transportation. This paper investigates and proposes a new approach for an electric drive unit that can easily be attached and detached to a large majority of existing off-the-shelf bicycles to convert them into legal electric assisted bicycles (pedelecs). Different drive mechanisms were investigated and a design with a friction roller at the rear wheel showed the greatest potential. A good solution is achieved with a single unit that incorporates batteries, electronics, motors and sensors in a single enclosure to minimize the mounting time. With a fastening on the seat stay tube using a simple clamp mechanism it can assist the cyclist on most existing bicycles. The legally-required pedal detection is done with an integrated proximity sensor. A prototype is built to prove a simple and nonspecific installation and convenient usage.

Stichworte:  TUM CREATE, CLUSTER B, RP 5, Vehicle-to-Grid, Electric vehicle, Energy market, Economic viability, Ancillary services, Optimization model