Electrical Bike with Durable Circular Plastic Parts

Publieke samenvatting / Public summary

Aanleiding

This project aims to develop technologies to make electric bike parts circular by using recycled engineering thermoplastic materials to align with the European Union and Dutch government's goals of achieving a circular economy for plastics by 2030 and 2050. The project will provide clear directions on how to use recycled engineering thermoplastics for various applications beyond electric bikes, such as within automotive and household appliances, resulting in substantial carbon savings in other value chains. The dissemination of knowledge gathered will create a further impact in the market areas where OEMs in the Netherlands are keen on reducing the carbon footprint of their end products.

Doelstelling

The current project focuses on the following objectives: - Development of a generic model for the repetitive processing and use (UV weathering) of recycled engineering thermoplastics (R-ETP) of the key durable engineering plastic parts of an electric bike which can be applied in other applications containing these materials (ABS, PC, PA6). - Toolbox (know-how) development for the application of recycled ETP (R-ETP) involving guidelines for Design for Circularity and Design for Disassembly. - Accomplish a closed loop for the recycling of electric bikes in the Netherlands. - Showcase development of an iconic 'Made in Holland' application that will increase the use of circular engineering thermoplastics (R-ETP). - By stimulating demand, contribute to prompting collectors and recyclers to further the development of an infrastructure for collection, sorting, cleaning and re-granulation of R-

Projectinformatie / Project information

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TKITOETKI2020_EI_Recycle
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Algemene informatie / General information

Penvoerder / Secretariat
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Publicaties en materialen / Publications and attachments

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ETP in the Netherlands. - Development of a generic tool that enables the matching of R-ETP raw material specifications with those of targeted durable engineering plastics applications in different markets, resulting in the development of demand-driven standards for R-ETP.

Korte omschrijving

This project focuses on five plastic parts of an electric bike and uses a staged approach to create a circular raw material and adapted part design. In activity 1, the requirements for the parts are determined, and in activity 2, specifications for recycle engineering thermoplastics (R-ETP) are derived. Activity 3 involves injection molding trials and part testing, followed by efforts to enhance the recycled materials in activity 4. Activity 5 optimizes the part design to accommodate R-ETP, while activity 6 embraces a complete part redesign. Activities 3-6 incorporate lessons learned in a toolbox for circular design. Activity 7 involves testing to determine how many lifecycles the parts can bear. Finally, the life cycle impact of the R-ETP solutions is determined, and carbon footprints are calculated in activities 8 and 9, respectively.

Resultaat

This project will deliver the following outcomes: - A full set of product requirements for each part and test protocols to be used. - Identification of available R-ETP materials in The Netherlands and potential suppliers. - Validation of whether the selected R-ETP material meets the set of product requirements. - Development of a toolbox providing practical guidelines for circular design. - A model describing the decay of mechanical properties and know-how on the number of times bike parts based on R-ETP materials can be recycled. - A LCA model to calculate the carbon footprint reduction for each part. These outcomes will be relevant to further the use of engineering plastic recyclates in other applications and contribute to closing the circle of engineering plastic products.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.
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