

New type of fuel from waste plastic and biomass

Partnership between the Chair of Energy and Environmental Process Engineering at the University of Siegen and a local Hilchenbach company: Reuse of plastic from end-of-life vehicles for energy generation.

The research project titled “Innovative blended fuel granules from waste plastic and biomass“, as an cooperation project between SiCon, a local company which produces and develops recycling plants for end-of-life vehicles, and the professorial chair for energy and environmental processing of the University of Siegen with Prof. Dr.-Ing. Wolfgang Krumm and his team have just started.

According to media reports cars in Germany reach an average age of about 8 years. However, every car, even the most endurance runner or a dashing sportster has to be taken off the streets at some point.

As per “The End of Life Vehicle Directive” 95 % of all components are supposed to find their way into reuse or recycling. For most components of end of life vehicles this is already state of the art. However plastic parts from dashboards, car carpets or seat pads often still end as mixed plastics on waste disposal sites or they are incinerated with poor combustion efficiency. This project which officially started November 2013, abbreviated ReGran, is financed by the German Federal Ministry of Economic Affairs and Energy through the German Federation of Industrial Research and its initiative “future innovation for small and middle sized enterprises” for the period of two years with an annual payment of 175.000 Euro to the university. The cooperating company receives the same amount but has to double the money from its own resources, so that the project scope comes out at more 500.000 Euro.



Prof. Dr.-Ing. Wolfgang Krumm and his member of staff Dipl.-Ing. Moritz Kappes at the Technical Center at the University of Siegen



This is the shape of the new blended fuel granules from waste plastic and biomass

Describing the process it might sound rather simple at first sight: the plastic parts will be shredded down to very small parts. A substantial amount of this material will be fibrous fluff. Together with organic fuels like wood waste, saw dust, pulverized lignite power, rubber powder from recycled tyres or similar materials the fluff will then being processed in a heated Eirich intensive mixer. The testing plant which will be installed at the University of Siegen, will be heated with electricity. Preliminary tests were run at the Eirich Test Center in Hardheim. Industrial application will allow the use of thermal discharge as heat source for larger mixers. At temperatures of approximately 200 C the fluff melts and combines due to the rotation and a mixing tool within the mixer with the added fuels. Out comes a granulated fuel which size can be easily adjusted. This fuel could be used in rotary cement kilns or power plants.

“We then have a defined fuel with specific features according to its later use”, says Prof. Krumm. A lot of research and effort is still ahead Prof. Krumm and his team. “First we need to find out in how far the biogenic energy sources can be integrated in the process. Furthermore a variety of parameters has to be synchronized to receive a fuel with stability in its combustion and gasification characteristics”, says the scientist. One big advantage of the new fuel might be that by adding additives like limestone the emission of hazardous substances could be reduced. Once the fuel is designed research work will continue. Krumm: “We will have to find out about the specific gasification characteristics of the new fuel, whether a high quality product gas can be obtained for application as a substitute of natural gas or which might be adequate for the separation of hydrogen.”

The previous mentioned reduction of harmful substances out of combustion by adding additives will also be tested and further improved if necessary in solid bed and fluidized bed reactors, placed at the Technical Center of the University of Siegen at the Adolf-Reichwein Campus.