

Joint press release from TLL, DBFZ and UFZ, 21, October 2013:

The potential of straw for the energy mix has been underestimated

Study: Straw could supply energy to several millions of households in Germany

Leipzig. Straw from agriculture could play an important role in the future energy mix for Germany. Up until now it has been underutilised as a biomass residue and waste material. These were the conclusions of a study conducted by the TLL (Thuringian regional institute for agriculture), the DBFZ (German biomass research center) and the Helmholtz Center for Environmental Research (UFZ). According to them, from a total of 30 million tons of cereal straw produced annually in Germany, between 8 and 13 million tons of it could be used sustainably for energy or fuel production. This potential could for example provide 1.7 to 2.8 million average households with electricity and at the same time 2.8 to 4.5 million households with heating. These results highlight the potential contribution of straw to renewable sources of energy, scientists state in the peer-reviewed scientific journal *Applied Energy*

For their respective study, scientists analysed the development of residual substances resulting from German agriculture. Accounting for 58 per cent, straw can be regarded as the most important resource, and yet so far it has hardly been used for energy production. From 1950 to 2000 there was a noticeable rise in the cultivation of winter wheat, rye and winter barley in Germany which then remained relatively constant. To remove any bias from weather fluctuations, the average values were taken from 1999, 2003 and 2007. On average, approx. 30 megatons of cereal straw per year were produced in these years. Due to the fact that not all parts of the straw can be used and the fact that straw also plays an important role as bedding in livestock farming, only about half of these 30 megatons are actually available in the end.

Sustainable use

It must be taken into consideration that cereal straw plays an important role in the humus balance of soils. For this reason some of the straw must be left scattered on the agricultural land to prevent nutrients from being permanently extracted from the soil. To calculate the humus balance of soils three different methods of calculation were tested by the team of scientists. Depending upon the method of calculation

used, 8, 10 or 13 megatons of straw can be used sustainably every year for energy production – i.e. without causing any disadvantages to the soils or other forms of utilisation. "To our knowledge this is the first time that a study like this has been conducted for an EU country, demonstrating the potential of straw for a truly sustainable energy use, while taking into account the humus balance", stresses Prof. Daniela Thraen, scientist at the DBFZ and the UFZ.

Greenhouse gas balances depend on utilisation forms

It can thus be said that straw can contribute to the future energy mix. The degree to which it will contribute to greenhouse gas reduction however will depend on how the straw is used. A reduction compared to fossil fuels can be somewhere between 73 and 92 percent when using straw for the generation of heat, combined heat and power generation or as second-generation biofuel production. The different greenhouse gas balances cast a differentiated light on the EU's goal of covering ten percent of transportation sector's energy use by using biofuels. Once again the study emphasizes how the use of bioenergy needs to take into account various factors. Given the conditions prevalent in Germany, the use of straw in combined heat and power generation would be best for the climate. "Straw should therefore primarily be used in larger district heating stations and/or combined heat and power stations, but technology must be developed for an environmentally-friendly utilisation", stresses Dr. Armin Vetter from TLL, who has been operating a straw-fuelled power station for 17 years.

Role model Denmark

According to the summary of the new study, straw-based energy applications should be developed in Germany in particular in those regions with favourable conditions and appropriate power plants. Even if we wouldn't be spinning straw into gold in the foreseeable future, it would still make an important contribution to the energy turnaround. Looking across the border shows us what is feasible when the course is optimally set: currently Denmark is still considered to be the world leader in straw-based energy applications. 15 years ago a master plan was introduced there, ensuring in the meantime in Germany's northern neighbouring country that over 5 billion kilowatt hours of energy per year is generated from straw. *Tilo Arnhold*

Publications:

Christian Weiser, Vanessa Zeller, Frank Reinicke, Bernhard Wagner, Stefan Majer, Armin Vetter, Daniela Thraen (2013): Integrated assessment of sustainable cereal straw potential and different straw-based energy applications in Germany. Applied Energy, Available online 30 July 2013

<http://dx.doi.org/10.1016/j.apenergy.2013.07.016>

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Conference:

Five years BMU funding program "Promoting projects to optimise biomass energy!"
14. - 15.11.2013 in Leipzig

<http://www.energetische-biomassenutzung.de/index.php?id=448>

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Other Links:

BMU-funding program "Biomass energy use"

<http://www.energetische-biomassenutzung.de/de/home.html>

Basic information on the sustainable use of residual substances from agriculture for generating energy (Series of articles within the BMU-funding program „ Biomass energy use“):

[http://www.energetische-](http://www.energetische-biomassenutzung.de/fileadmin/user_upload/Downloads/Ver%C3%B6ffentlichungen/02_Basisinformationen_Reststoffe_web.pdf)

[biomassenutzung.de/fileadmin/user_upload/Downloads/Ver%C3%B6ffentlichungen/02_Basisinformationen_Reststoffe_web.pdf](http://www.energetische-biomassenutzung.de/fileadmin/user_upload/Downloads/Ver%C3%B6ffentlichungen/02_Basisinformationen_Reststoffe_web.pdf)

The potential of straw in the federal states and administrative districts in Germany:

<http://strohpotenziale.dbfz.de/>

TLL (Thuringian regional institute for agriculture) is responsible as a specialized authority on agriculture for the sovereignty and enforcement of agricultural law. Beyond that, it offers various services as a competence center for agricultural and food production in the form of consultation based on applied and practice-oriented research. The focus thereby is on an efficient and environmentally-friendly production of food-, feed- and non-food-products. <http://www.thueringen.de/de/tll>

The DBFZ (German biomass research center) works as a central and independent mastermind in the field of the energetic use of biomass on the question of how limited available biomass resources can contribute sustainably and most efficiently to the existing and above all to a future energy supply. In the context of its research work the DBFZ identifies, develops, follows up, assesses and demonstrates the most promising fields of application for bioenergy and particularly outstanding and positive examples together with partners in research, economics and the community. <http://www.dbfz.de>

At **the Helmholtz Centre for Environmental Research (UFZ)** scientists are interested in the wide-ranging causes and impacts of environmental change. They conduct research on water resources, biodiversity, the impacts of climate change and adaptation strategies, environmental and biotechnologies, bioenergy, the behaviour of chemicals in the environment and their effects on health, modelling and sociological issues. Their guiding motto: our research serves the sustainable use of natural resources and helps towards long-term food and livelihood security in the face of global change. The UFZ has over 1100 employees working in Leipzig, Halle und Magdeburg. It is funded by the federal government, as well as by the State of Saxony and Saxony Anhalt. <http://www.ufz.de/>

The Helmholtz Association contributes to finding solutions for large and pressing issues in society, science and the economy through excellence in the following six areas of research: energy, earth and the environment, health, key technologies, structure of matter, transport and aerospace. With almost 35,000 employees and coworkers in 18 research centres and an annual budget of approx. 3.8 billion Euros the Helmholtz Association is the largest scientific organization in Germany. Work is conducted in the tradition of the renowned natural scientist Hermann von Helmholtz (1821-1894). <http://www.helmholtz.de/>



Straw could supply energy to several millions of households in Germany. Photo: UFZ / Stefan Michalski