

**3<sub>rd</sub> South East European Conference on Sustainable Development  
of Energy, Water and Environment Systems**

**Supporting outset and consolidation of bioenergy  
value chains in South East Europe**

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# **Obstacles and constraints in biomass utilization**

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# In medias res!

## **PRESERVATION OF SOIL FERTILITY IS IMPORTANT ISSUE!**

The sufficient potential of crop residues exists, but there is still, among agronomist and farmers, dominante hostility toward crop residues removal.

### **Example from Germany**

Zeller, Thrän, Zeymer, etc. 2012. Basisinformationen für eine nachhaltige Nutzung von landwirtschaftlichen Reststoffen zur Bioenergiebereitstellung. DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH, Leipzig.

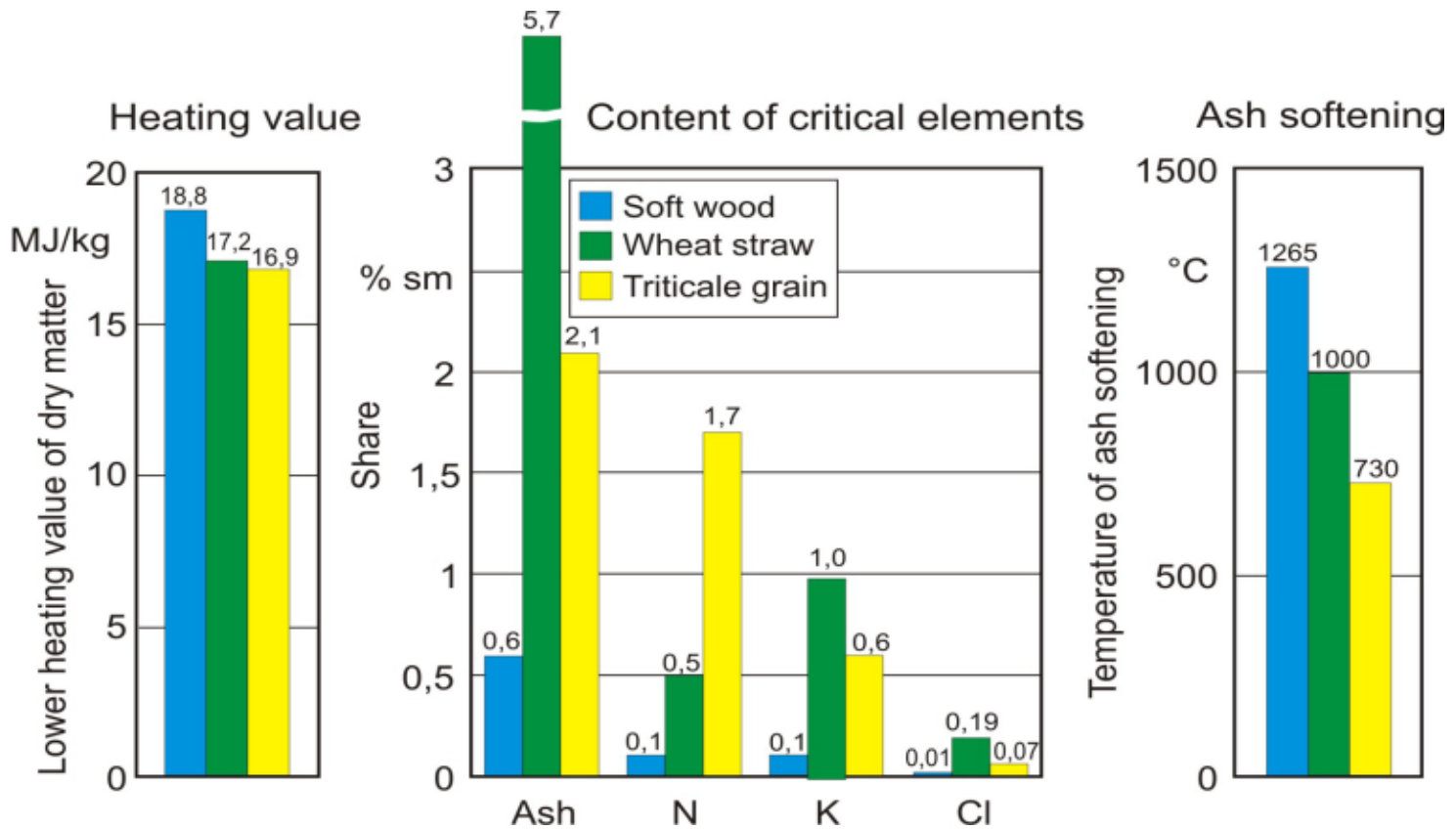
Thoroughly elaborated SOM and SOC aspects for few locations in Germany, elaborated possible saving of GHG emissions!



## Supply security.

Fluctuation of biomass yield. By drought seasons reduced by 30 % and more.

Characteristics of crop residues, important for heating appliances.



Wood vs. agricultural biomass

# BIG PLANTS ISSUES, EXAMPLE LCB

The following major obstacles for LCB (Lignocellulosic Bioethanol) production realization in Serbia have been identified:

1. The LCB production is in early commercial phase, and this is linked with risks for potential investors.
2. Supply security is an important issue. How to motivate farmers to collect stover and sell it? Corn stover yield fluctuates depending on weather conditions.
3. There is no adequate collection technology yet available. Cornrower types of headers are not available in the country. Interesting could be also, so called, high-cut technology, but this one has not been tested in Europe yet.
4. The program of LCB production in Serbia has great importance and should be supported by adequate measures.
5. **Supply logistic of big amount of corn stover should include water transport to the possibly highest level, not only due to costs and environmental impacts, but to minimize overloaded of public roads.**



# Local Action Plan - Biofuels

**The following innovation challenges and needs have been identified**

## **1. Harvest of corn stover**

Corn stover presents in Serbia and other Danube Region countries, e.g. Bulgaria, Croatia, Hungary, Ukraine, vast unused potential for biofuels. Harvest and utilization of corn stover and corn cobs can contribute to farmers' higher incomes and thus to rural development (social dimension).

## 2. Biomass for small residential heating

Performance improvement of small biomass appliances for residential heating is crucial and urgent objective in the whole Danube Region and especially in Serbia. In this regard, low-cost solutions of appliances with acceptable level of pollutants emission is sought-after.

## 3. Biogas

Important new sustainability criteria defined in the proposed RED directive upgrade and these related to ILUC. The following objectives and innovations are foreseen (e.g.):

1. To mobilize potential on smaller animal farms, mini, 80 to 150 kW and micro units, up to 80 kW of nominal electric power...

# LEGISLATION

National relevant decree:

Limit values of pollutants' (LVP) emissions of new small solid fuels combustion appliances (measured for oxygen content 13 % in flue gases)

Pollutant	Fuel	Thermal power, (kW <sub>th</sub> )	LVP, (mg/Nm <sup>3</sup> )
Particulate matter (PM)	Coal	≥ 4	90
	Wood, excluding wooden briquettes and pellets	≥ 4	100
	Wooden briquettes and pellets	≥ 4	60
Carbon monoxide (CO)	Coal and wood, excluding wooden briquettes and pellets	4-500	1000
	Wooden briquettes and pellets	4-500	800
	Coal, wood, wooden briquettes and pellets	≥ 500	500

Limits taken from German regulations. No data for NO<sub>x</sub> and other pollutants, and not for agricultural biomass.

Obligatory testing of products is not mentioned and performed!!!

## Pollutants emission limits according to standard SRPS EN 303-5.2016

Stoking, feeding	Fuel	Nominal thermal power kW	Limit values								
			CO			OGC			PM		
			mg/m <sup>3</sup> for 10 % O <sub>2</sub>								
			Class			Class			Class		
			3	4	5	3	4	5	3	4	5
Manual	Biogenic	≤50	5 000	1 200	700	150	50	30	150	75	60
		>50≤150	2 500			100			150		
		>150≤500	1 200			100			150		
	Fossil	≤50	5 000	150	125						
		>50≤150	2 500	100	125						
		>150≤500	1 200	100	125						
Automatic	Biogenic	≤50	3 000	1 000	500	100	30	20	150	60	40
		>50≤150	2 500			80			150		
		>150≤500	1 200			80			150		
	Fossil	≤50	3 000	100	125						
		>50≤150	2 500	80	125						
		>150≤500	1 200	80	125						

OGC: organic gaseous carbon; PM: particulate matter.



# **MOBILIZATION OF CORN COBS AS ENERGY SOURCE AND IMPROVEMENT OF HEATING APPLIANCES CONCERNING ENVIRONMENTAL IMPACTS**

**Joint project with TU Hamburg, Prof. Dr. Martin Kaltschmitt**

**Our wish, our targets are:**

- 1. To be under limit for Class 3 for manual stoking.**
- 2. To be under limits for Class 4, or even Class 5 for automatic stoking, pellets.**

**But how?**

**Primary, boiler reconstruction and additives (for pellets)**

**and**

**Secondary measures, plans for future.**



Examples of very simple appliances for agro biomass utilization as a fuel for residential heating, widely used in Serbia



## Some positive examples

Biomass boilers of manufacturer Terming achieved very good emission reduction of one boiler, but still needs innovative solution for other types.



Firm Termoplin produces attractive biomass hot air heaters used for diverse driers. Needs improvements regarding pollutants' emissions reduction.



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