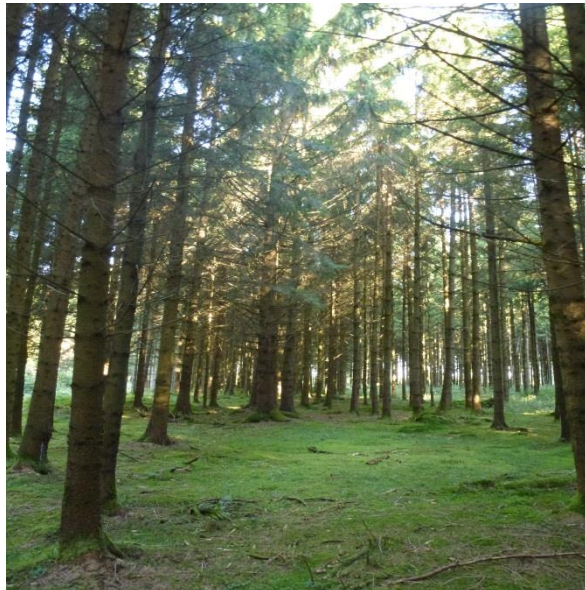




# “Straw-Combustion” - Economic Opportunities for the Serbian Agro-Industry

Framework conditions for straw combustion projects in Serbia:  
First experiences within Project development component of the GIZ DKTI programme





## Facts about the GIZ DKTI programme

- Objective:** To strengthen capacities and create an enabling environment for sustainable use of bioenergy in Serbia
- Funded by:** German Federal Ministry for Economic Cooperation and Development (BMZ) under the German Climate Technology Initiative (DKTI)
- Duration:** March 2013 – December 2017
- Political partners:** Ministry of Agriculture and Environmental Protection & Ministry of Mining and Energy



## Structure of the programme:

### Policy advice

#### GIZ:

Support to harmonization of laws and regulations to EU standards

Support to policy definition and strategy implementation

### Biomass supply

#### KfW:

Advise to investments in district heating companies.

#### GIZ:

Support to the creation of a sustainable supply with bio-resources

### Eff. firewood use in HH

#### GIZ:

Support to a promotion of efficient stoves and ovens / firewood drying

Advise to implement efficiency- and emission standards

### Project development

#### GIZ:

**Advise to the implementation of cost efficient and innovative bioenergy projects**

**Technology and knowledge transfer**

### BioRES

#### GIZ:

Support to the creation of regional Biomass Trade and Logistic centres.

Support local supply chains for biomass.



Cross-cutting theme: Sustainability



# Project development

**Objective:** Innovative bioenergy projects are implemented

**Activities:**

- Identification of projects and potential investors for bioenergy heating systems in public buildings, biogas facilities, facilities for generation of industrial process heat
- Consultancy for plant design and project concepts, elaboration of bankable (pre-) feasibility studies, project documentation, etc.
- Support/Intermediation of financial opportunities and investment subsidies
- Logistical concepts for biomass
- Technical support for permit application and support to increase the efficiency of processes related to procurement procedure, permits and licensing agreements for bioenergy projects
- **Best-practice-documentation and Capacity-Building**
- Dialogue-platform for Serbian and international companies and institutional stakeholders to exchange project ideas, information and experiences



## Working Areas DKTI for Project Development

In the private sector, we support the implementation of innovative self-sufficient bioenergy projects using wood material, organic waste and agro-biomass to substitute fossil fuels for heat, steam and electricity generation integrating private and public stakeholders for long-term international technology partnerships.

Therefore three main different working areas has been chosen:

- Biogas production for company own process heat consumption or CHP electricity generation with organic waste or organic waste water (manure, whey etc.) in cooperation with agro-industry
- Straw-combustion projects for process heat /steam generation and CHP
- Heat generation of wood material (Pellets, Briquettes, Woodchips) for public and private buildings (Hotels, Schools, Hospitals or Investors/Contractors)



Source: GIZ, 2014





# General reasons to implement a straw combustion plant in Serbia

- Strong savings in heat energy costs
- Replacement of old boilers necessary (heat supply safety)
- Emission reduction (smell and visibility)
- Strengthening of local and regional income and production (biomass supply chain)
- Labelling of Green Tourism → Marketing Benefits
- Cost independency for fuels





## Fuel prices for heating in Serbia

FUELS	Heat Values	Price per Unit (net)	Calorific Price	Boiler Efficiency	Heat Price
Agro Pellets	3.9 kWh/kg	100 €/t	26 €/MWh	85%	30.2 €/MWh
Brown coal	4.5 kWh/kg	100 €/t	22 €/MWh	75%	29.6 €/MWh
Electricity	1.0 kWh/kWh	60 €/MWhel	60 €/MWh	85%	70.6 €/MWh
Light Oil	12.6 kWh/kg	1.05 €/l	98 €/MWh	85%	115.3 €/MWh
LPG	12.9 kWh/kg	1.00 €/kg	78 €/MWh	90%	86.3 €/MWh
Heavy Fuel Oil (Mazut)	11.2 kWh/kg	550 €/t	49 €/MWh	80%	61.3 €/MWh
Natural gas	10.0 kWh/m <sup>3</sup>	0.41 €/m <sup>3</sup>	41 €/MWh	95%	43.2 €/MWh
Wood Pellets	4.7 kWh/kg	160 €/t	34 €/MWh	90%	37.8 €/MWh
Woodchips (moisture 35 %)	3.1 kWh/Kg	55 €/t	18 €/MWh	85%	20.9 €/MWh
Straw in Bales	3.9 kWh/kg	45 €/t	12 €/MWh	80%	14.4 €/MWh
Firewood (moisture 45%)	2.5 kWh/kg	60 €/t	24 €/MWh	65%	36.9 €/MWh

Current fuel prices for heating in Serbia without VAT Source: GIZ study and calculation (prices may vary depending on the region and the quality of the fuel)

**Prices can differ due to region, quality and quantity**



## Project example with simple numbers: public school building in Serbia

Current heating system and its costs:

- 2 oversized, 20-years-old light fuel oil boilers á 400 kW
- Current consumption: 75 t/a light fuel oil á 1.000 €/t = 75.000 €/a



Source: GIZ, 2014

Solution with a straw pellet boiler concept:

- 1x 500 kW wood chip system for around 150.000 – 200.000 € Investment cost, current system for peak load and back-up
- Future fuel costs: 200 t/a á 100 €/t = 20.000 €/a



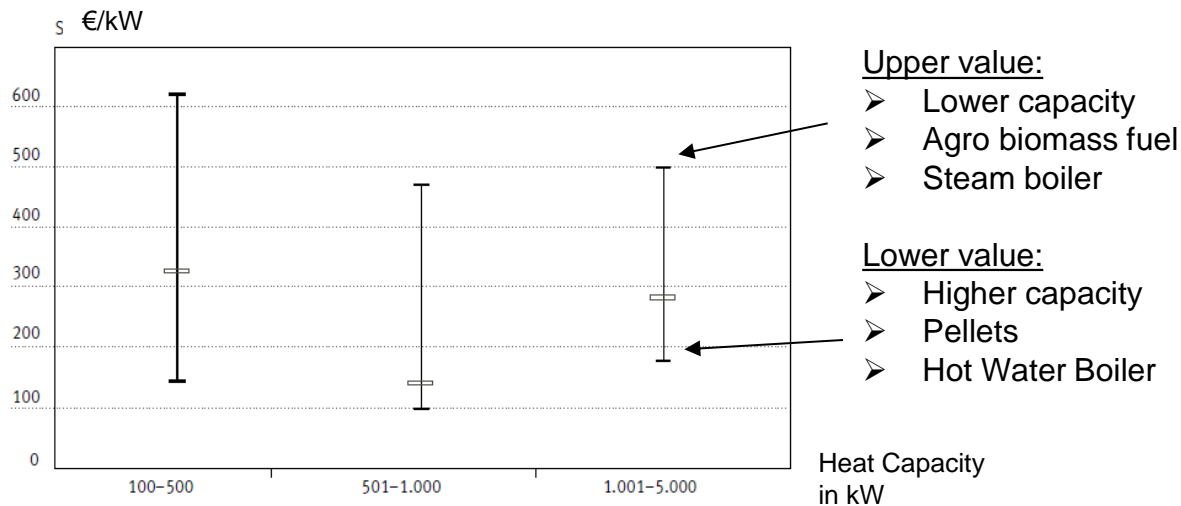
**55.000 €/a savings of fuel costs**





# Specific Investment costs for Biomass boilers

## Specific Investment Costs for fully automated biomass boilers



Quelle: /Schaumann und Schmitz 2009/, /Wuppertal Institut 2006/, /Wolff 2005/, /IFAS 2004/, /Wilhelm 2007/

Source: Leitfaden Feste Biobrennstoffe 2014, FNR



## Feed-in Tariffs according to Serbian Law 2013

Type of Electrical Generation	Feed-inTariff
Biomass power plant up to 1 MWel	13,26 €Ct./kWh
Biomass power plant 1 - 10 MWel	13,82-0,56 x Pel €Ct./kWh
Biomass power plant 10 MWel	8,22 €Ct/kWh
Biogas power plant up to 0.2 MWel	15,66 €Ct./kWh
Biogas power plant 0.2 – 1 MWel	16,498-4,188 x Pel €Ct./kWh
Biogas power plant over 1 MWel	12,31 €Ct/kWh
Plant fired by biogas from animal origin waste	12,31 €Ct./kWh

Source: DECREE ON INCENTIVE MEASURES FOR PRIVILEGED POWER PRODUCERS Pursuant to the Article 59, paragraph 6 of the Energy Law ("RS Official Gazette", No. 57/11, 80/11 – corrigendum, 93/12 and 124/12)



Adaption expected for 2015



# Financial structure: Example EBRD -weBSEFF

## Loans and grants for businesses

WeBSEFF is available to provide financing of up to EUR 2 m (2.5 m for public stakeholders) to private businesses looking to invest in: (amongst others)

- Modern technologies that cut energy consumption or CO2 emissions by at
- Reduce costs and make enterprises more competitive
- Provide opportunities to replace old equipment and modernize production



## Conditions:

- Loan through third bank
- Equity: 20 - 40 % of investment
- Grant 5 -10 % of investment (10-15 % for public stakeholders)
- Interest rate 6-8 % per year





## Financial structure: Example KfW-MEGLIP Programom

- Only for Serbian Municipalities and municipal public utilities
- Max amount: EUR 1.25 m
- Loan through third bank
- No equity requirement
- Interest rate 5-8 % per year
- Grant 15-20 % of overall loan amount after implementation





## Thank you for your attention!

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Please visit us on: [www.bioenergy-serbia.rs](http://www.bioenergy-serbia.rs)

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