



## Potentials and first Experiences of Energy-Supply-Contracting by implementing a fuel-switch to biomass for the heating of public buildings in Serbia



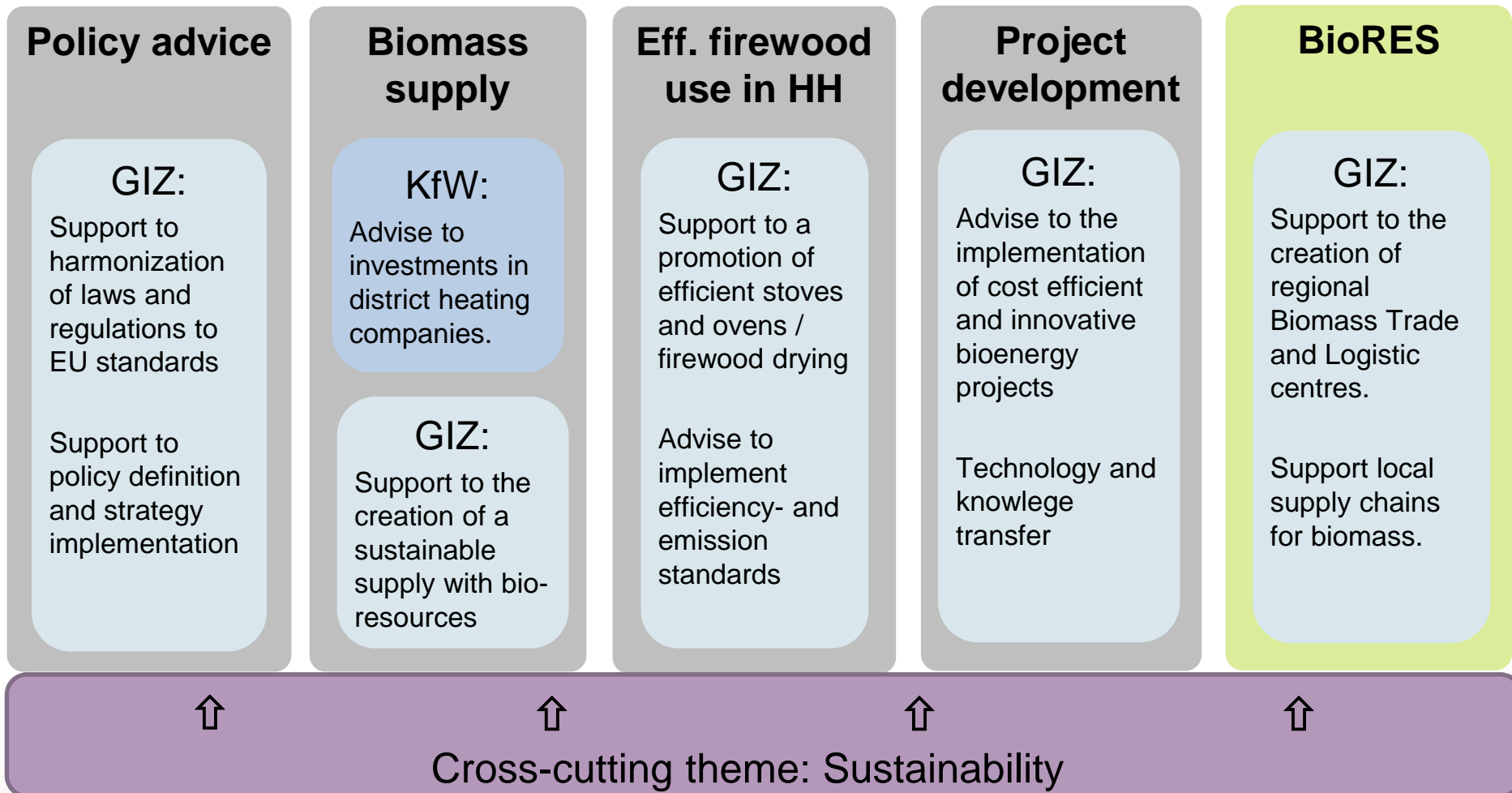


## Facts about the GIZ DKTI programme

- 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:





## 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
- Heat generation of wood material (Pellets, Briquettes, Woodchips) for public and private buildings (Hotels, Schools, Hospitals or Investors/Contractors)



Source: GIZ, 2014



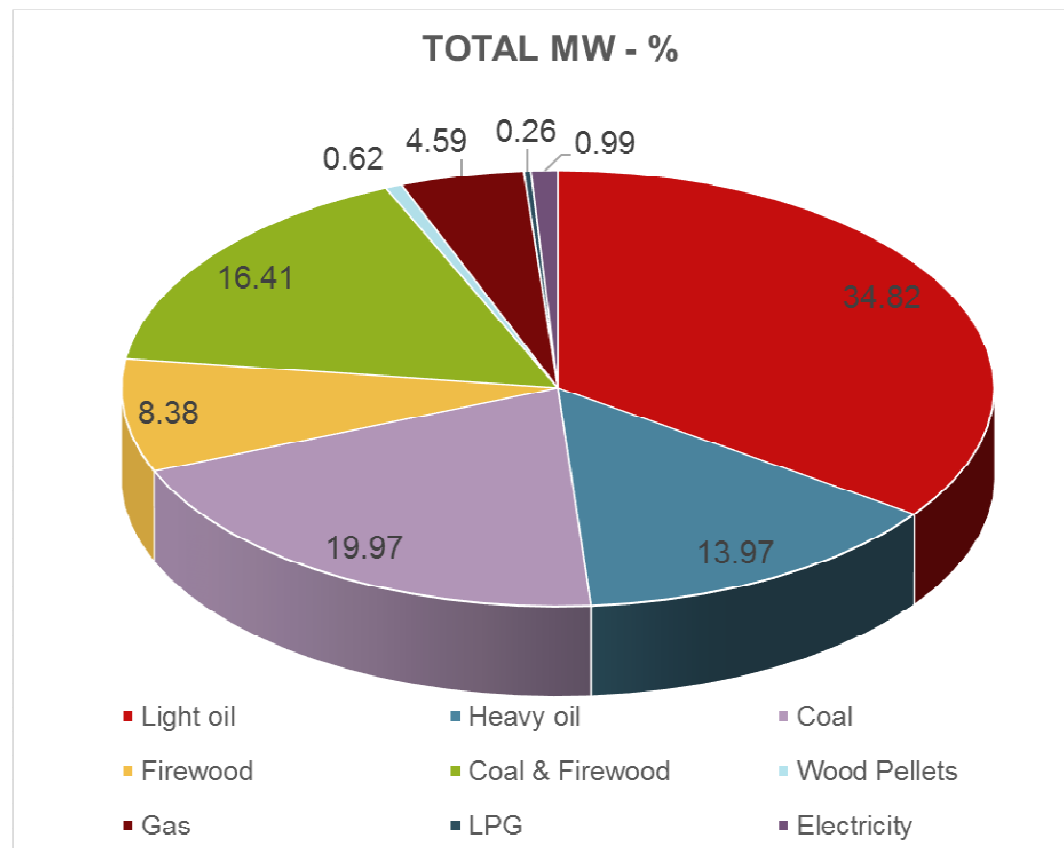
## General reasons to implement a bioenergy heating system in Serbia

- 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





## Fuels used for heating in public buildings in Serbia (without district heating)



Source: Source GIZ/DKTI 2014 – without Vojvodina



## 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 boilers á 400 kW
- Current consumption: 75 t/a light fuel á 1.000 €/t = 75.000 €/a

Solution with a woodchip boiler concept:

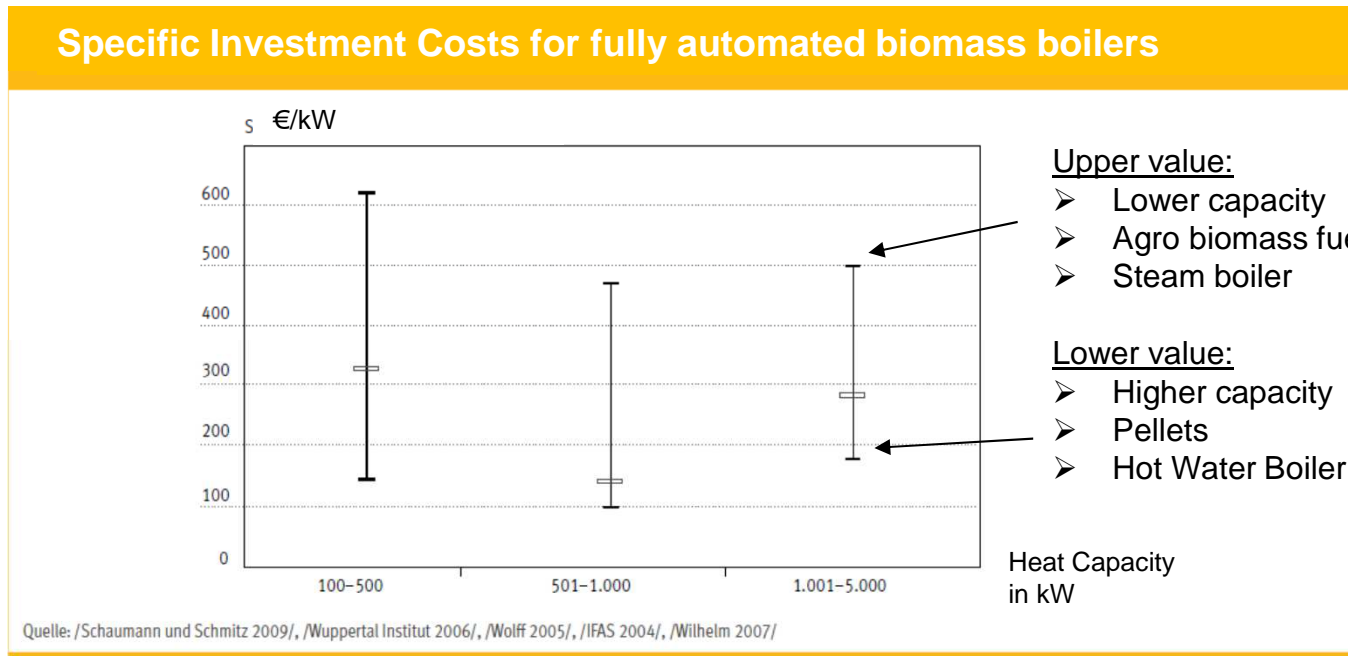
- 1x 500 kW wood chip system for around 150.000 – 200.000 € Investment cost, current system as a back-up
- Future fuel costs: 275 t/a á 65 €/t = 17.875 €/a



Source: GIZ, 2014



## Specific Investment costs for Biomass boilers



Source: Leitfaden Feste Biobrennstoffe 2014, FNR



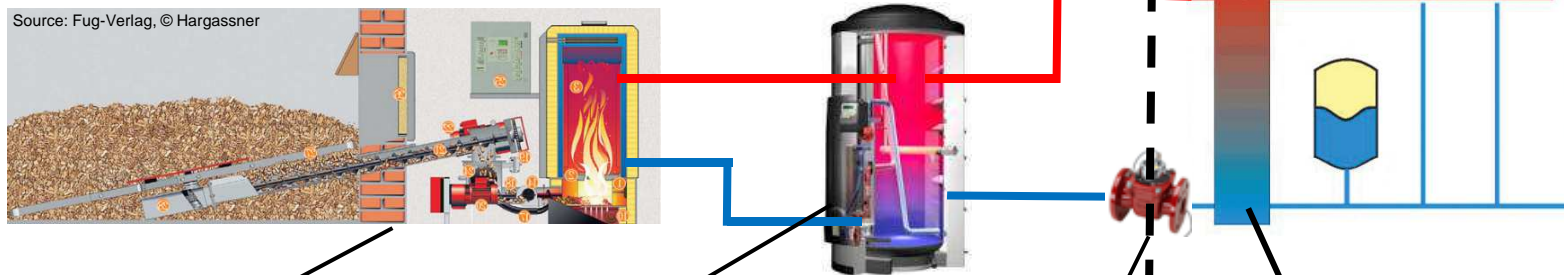
# BIOMASS-ESCO (Supply-Contracting)

## ESCO-Company:

- Designs, finances, builds, operates biomass plants until delivery border of heat/warm water
- Responsibility for boiler efficiency
- Biomass purchasing, logistic and quality supervision
- Maintenance
- Heat measuring (defined delivery point)
- Provides back up system

## Client:

- Pays heat energy consumption plus fixed monthly/yearly price for finance and operation
- Responsible for internal heating system/consumption



Storage, feeding system, boiler house and boiler

Buffertank to cover low demands

Calorific meter (kWh/MWh)

**Heat exchanger:  
Separated heating circles  
→ important!!**



## Advantages and disadvantages of the ESCO-Modell

### Advantages:

- Budget for investment can be used for other public needs
- Public debts can be reduced or won't increase
- Outsourcing of responsibility and risk for boiler efficiency, possible damages
- Implementation and operation of heating plant by experienced partner
- New technology requires additional capacities and knowledge – no need in case of ESCO
- No additional internal capacities for fuel logistics and quality control needed
- After PPP-procurement no additional administration for tendering (fuel, equipment, spare parts) needed
- Concentration on core tasks
- Local income regarding biomass supply and operation will increase, since also a foreign investor would purchase on local market

### Disadvantages:

- Sharing savings with a private partner
- 10 years fixed contract with partner – less flexibility





## Crucial Documents for PPP-Procurement

- Project proposal to be approved by assembly (prefeasibility level)
- Feasibility Study with Business Plan and Value-for-Money-Analysis
- Contract model and specifications
- Bidding and selection criteria
- Duration revision by PPP-Commission 3 - 6 weeks





## Contract criteria

- Heat capacity (min./max.) and back up system
- Heat delivery guarantee and penalty
- Payment aspects
- Duration, extraordinary cancellation
- Delivery border (P&ID) and responsibility interface
- Property issues and access, ownership of special purpose vehicle
- Var. price per consumption in € or RSD/MWh (price index?)
- Fix price in € per month/year for capital costs (fix) and operation costs (index for salary/spare parts)
- Guarantees (both sides)
- Final agreements





## Price Setting

➤ Variable Working Price:  $WP = \text{___} \text{ € /MWh} * F/F_0$

F = Fuel index (market price or costs) in accounting period

F<sub>0</sub> = Fuel index (market price or costs) in start of contract

➤ Fix Price:  $FP = \text{___} \text{ €} * (x + y * O/O_0)$

x = share of capital costs in %

y = share for operation costs in %

O = Operation costs index (salaries, mech. parts etc.) in accounting period

O<sub>0</sub> = Operation costs index (salaries, mech. parts etc.) in start of contract



## Financial structure for ESCO: Example EBRD -weBSEFF

### Loans and grants for businesses

WeBSEFF is available to provide financing of up to EUR 2 m 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
- Interest rate 6-8 % per year





## Thank you for your attention!

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