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

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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

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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 knowlege transfer

BioRES

GIZ:

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

Support local supply chains for biomass.

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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 procudere, 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

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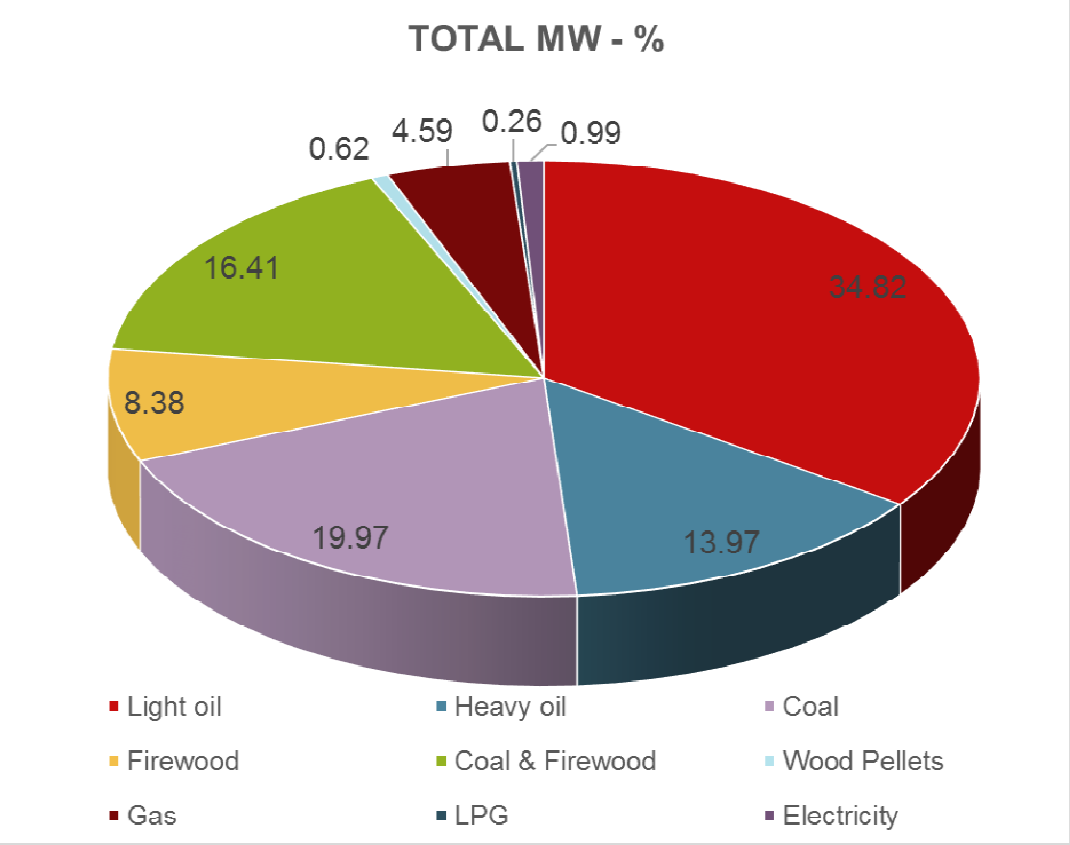
Fuels used for heating in public buildings in Serbia (without district heating)



Source: Source GIZ/DKTI 2014 – without Vojvodina

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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/m³	0.41 €/m³	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

Source: GIZ, 2014

Current heating system and its costs:

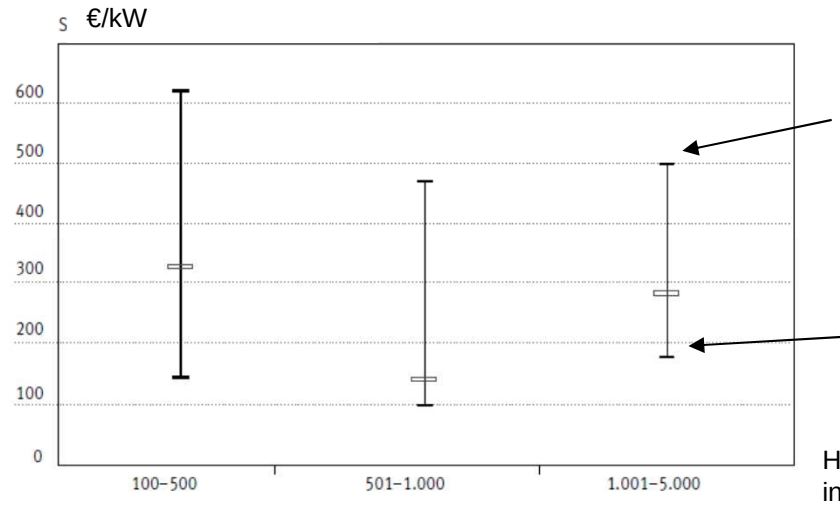
- 2 overdesigned, 20-years-old light fuel boilers á 400 kW
- Current consumption: 75 t/a light fuel á 1.000 €/t = 75.000 €/a

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

Specific Investment costs for Biomass boilers

Specific Investment Costs for fully automated biomass boilers



Upper value:
- Lower capacity
- Agro biomass fuel
- Steam boiler

Lower value:
- Higher capacity
- Pellets
- Hot Water Boiler

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

Source: Leitfaden Feste Biobrennstoffe 2014, FNR

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BIOMASS-ESCO (Supply-Contracting)

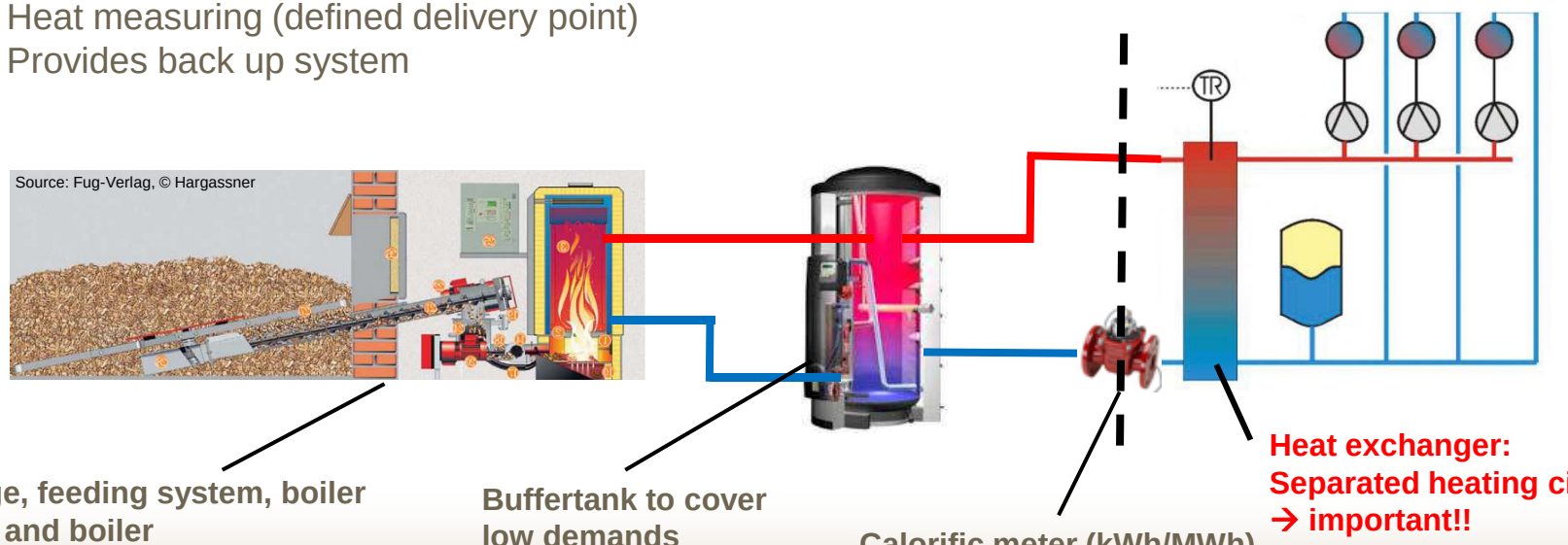
ESCO-Company:

- 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

Interface of supply/responsibility



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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

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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-Comission 3 - 6 weeks

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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 responsability 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

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Price Setting

- Variable Working Price: $WP = \_\_\_\_ € /MWh * F/F_0$

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

F_0 =Fuel index (market price or costs) in start of contract

- Fix Price: $FP = \_\_\_ € * (x + y * O/O_0)$

x = share of capital costs in %

y = share for operation costs in %

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

O_0 =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

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Thank you for your attention!

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Development of a Sustainable Bioenergy Market in Serbia

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