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German-Serbian Development Cooperation Programme „Development of a Sustainable Bioenergy Market in Serbia“

Dr. Thomas Michel, Programme leader




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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)

In Cooperation with:

Ministry of Agriculture and Environmental Protection &

Ministry of Mining and Energy

Duration: March 2013 – December 2017




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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:

Credits for 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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Socio-economic impacts of bioenergy projects - fuel-switch in district heating systems

National level:

- Use of domestic energy resources → reduction of import dependency
- Security of energy supply and diversification through energy mix
- Lowering the trade deficit
- Economic growth through business development and/or employment
- Environmental benefits (CO2-reduction)
- Lower cost of heating energy production
- More affordable prices of heating energy for customers

Socio-economic impacts of bioenergy projects - fuel-switch in district heating systems

Local level:

- Lower and predictable energy costs
- Money remains in the local economy
- Increased local income and employment
- More local jobs (direct and indirect employment)
- Municipalities are more independent in energy planning
- Use of renewable, affordable and sustainable fuel – biomass → locally available
- Improved local infrastructure (roads, rivers, etc,)
- Environmental proteccion through sustainable forest ans land management

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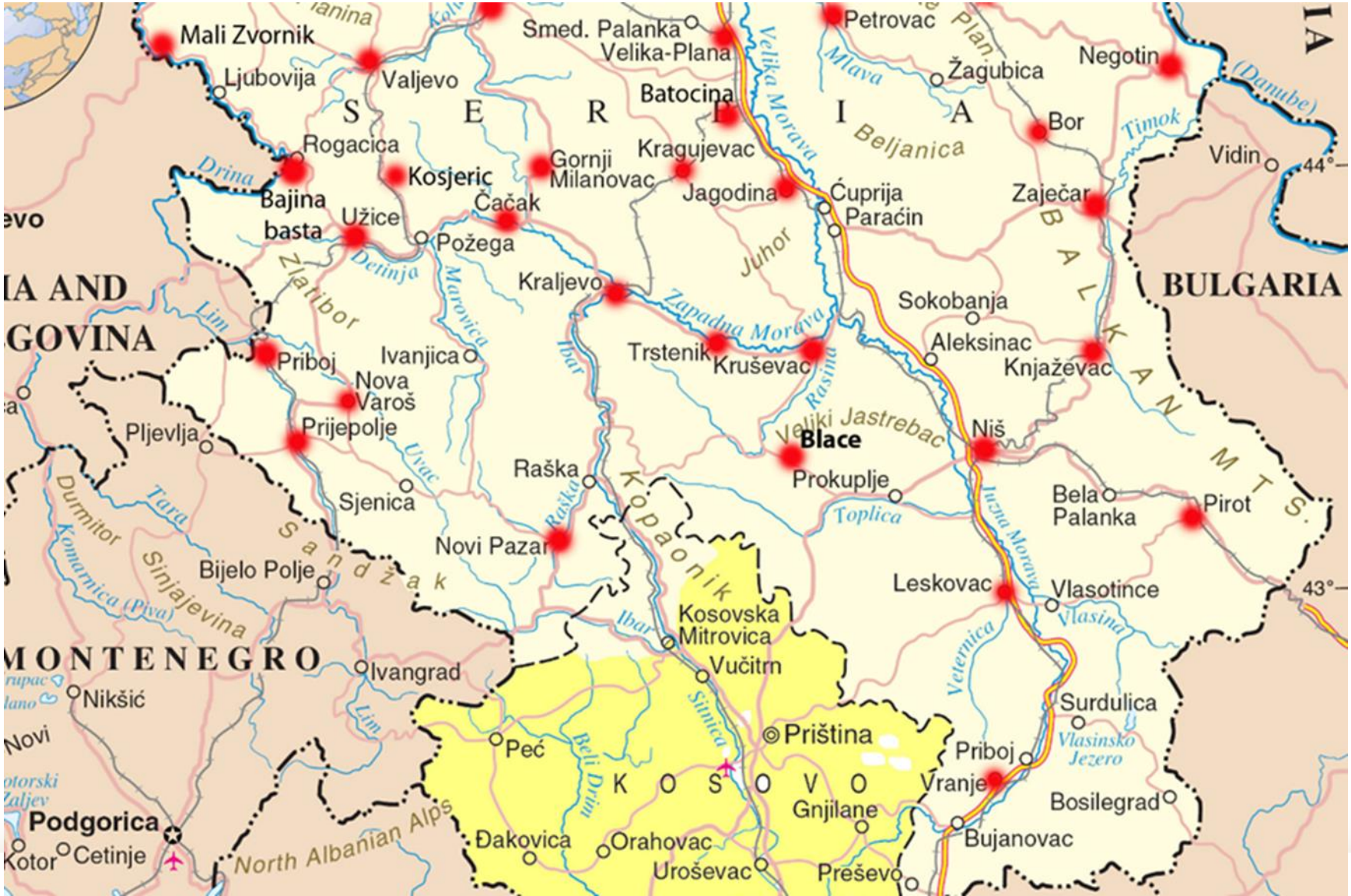

Methodology

- The net effects on local economy (GDP and employment) are estimated with **adapted Biomass Socio-Economic Multiplier model (BIOSEM)**.

- The BIOSEM model is a result of the FAIR Program of DG IV under the European Commission's Fifth Framework Program. It is a quantitative economic model that captures the income and employment effects arising from the deployment of bio-energy plants in rural communities.

- Using a traditional ***Keynesian Income Multiplier approach***, the BIOSEM technique makes predictions about the income and employment effects arising from the installation of a bio-energy plant and production of bio-fuels.

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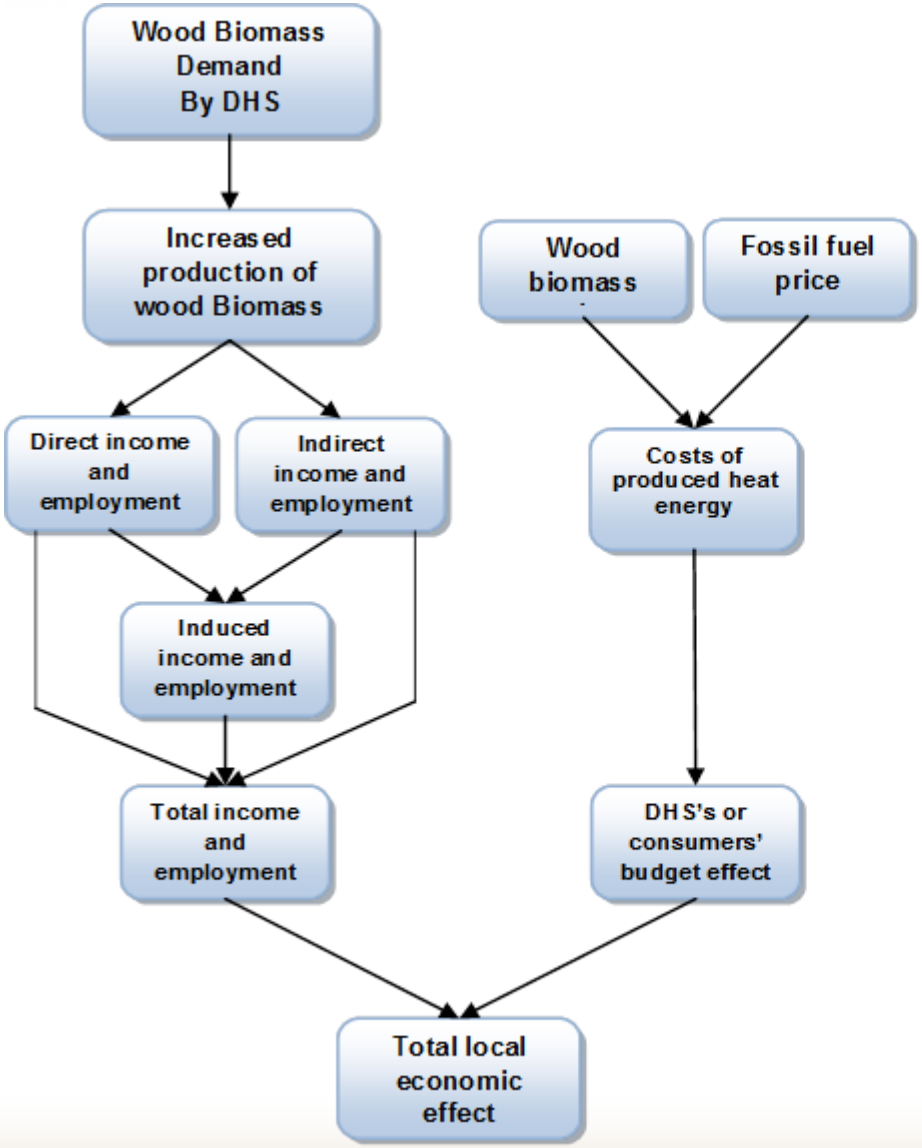
Research model



Concrete example: Fuel-switch in DH in Bajina Bašta

- 2 boiler houses
  - 3 coal boilers 1.6 MW each = 4.8 MW
  - 1 mazut boiler 5 MW
- replacement of 1 coal boiler by 2 wood chip boilers 5 MW each
- shutting down mazut boiler and remaining 2 coal boilers and keeping them as backup

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Bajina Bašta

Fuel type	Annual fuel consump-tion	Unit	Energy output (MWh)	Fuel price per unit (EUR)	Annual fuel cost (EUR)	Fuel cost per energy output (EUR per MWh)
coal	1,110	ton	4,190	100	111,000	26.49
HFO	1,056	ton	10,231	542	572,352	55.94
TOTAL			14,421		683,352	41.22
Wood chips (m=30%)	4,882	ton	14,421	60	292,920	20.31

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POTENTIAL FUEL COSTS SAVINGS

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Bajina Bašta

	Coal	HFO	Wood chips	Savings	Cumulative savings
2015	111,000	572,352	292,920	390,432	390,432
2016	113,080	604,213	292,920	424,373	814,805
2017	115,349	634,935	297,645	452,640	1,267,445
2018	117,997	666,796	302,369	482,423	1,749,868
2019	120,455	700,932	302,369	519,018	2,268,886
2020	123,102	737,344	307,094	553,353	2,822,239
2021	125,750	773,756	311,818	587,688	3,409,926
2022	128,397	813,582	311,818	630,161	4,040,087
2023	131,044	854,545	316,543	669,047	4,709,134
2024	133,692	898,923	316,543	716,072	5,425,206

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EFFECTS OF FUEL SWITCH TO BIOMASS ON LOCAL INCOME AND EMPLOYMENT

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BIOSEM model results

	Prijepolje	Priboj	Nova Varoš	Bajina Bašta	Mali Zvornik	Novi Pazar	Total
Direct labor income, net (EUR)	17,220	27,960	7,608	31,680	7,488	22,320	114,276
Direct profit, net (EUR)	4,305	6,990	1,902	7,920	1,872	5,580	28,569
Total income* (EUR)	37,099	59,644	16,528	67,761	16,318	47,631	244,981
No. of direct jobs	5	10	2	8	2	6	33
No. of indirect jobs	5	8	2	9	2	6	32
No. of induced jobs	3	6	1	7	1	5	23
No. of total new jobs	13	24	5	24	5	17	88

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Induced income effects

DHS	Annual wood chips cost (EUR)	Induced income effect (EUR)
Prijepolje	165,420	248,130
Priboj	383,760	575,640
Nova Varoš	65,580	98,370
Bajina Bašta	292,920	439,380
Mali Zvornik	76,920	115,380
Novi Pazar	220,320	330,480
TOTAL	1,204,920	1,807,380

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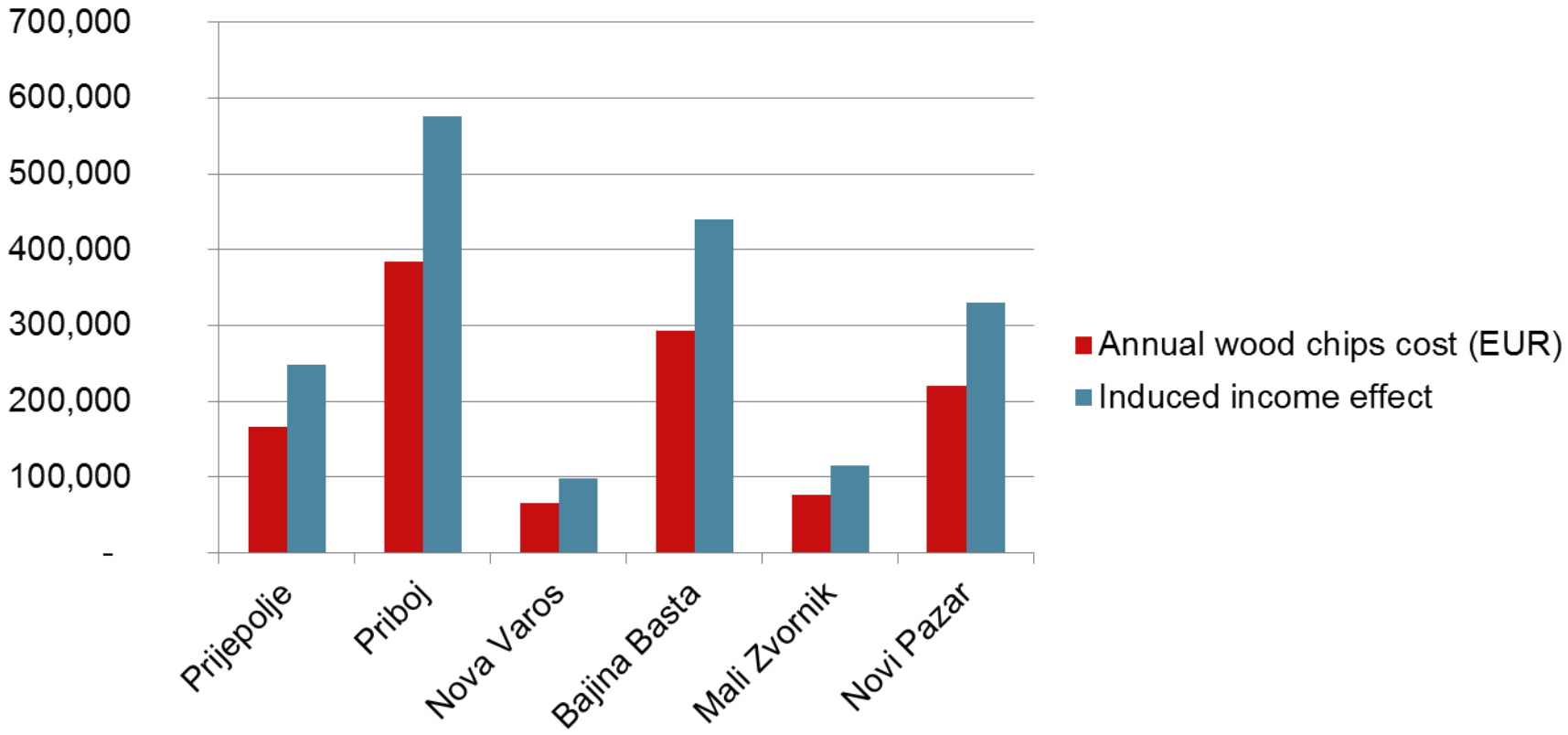
Induced income effects



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THE FINANCIAL VALUE OF CARBON EMISSION REDUCTION

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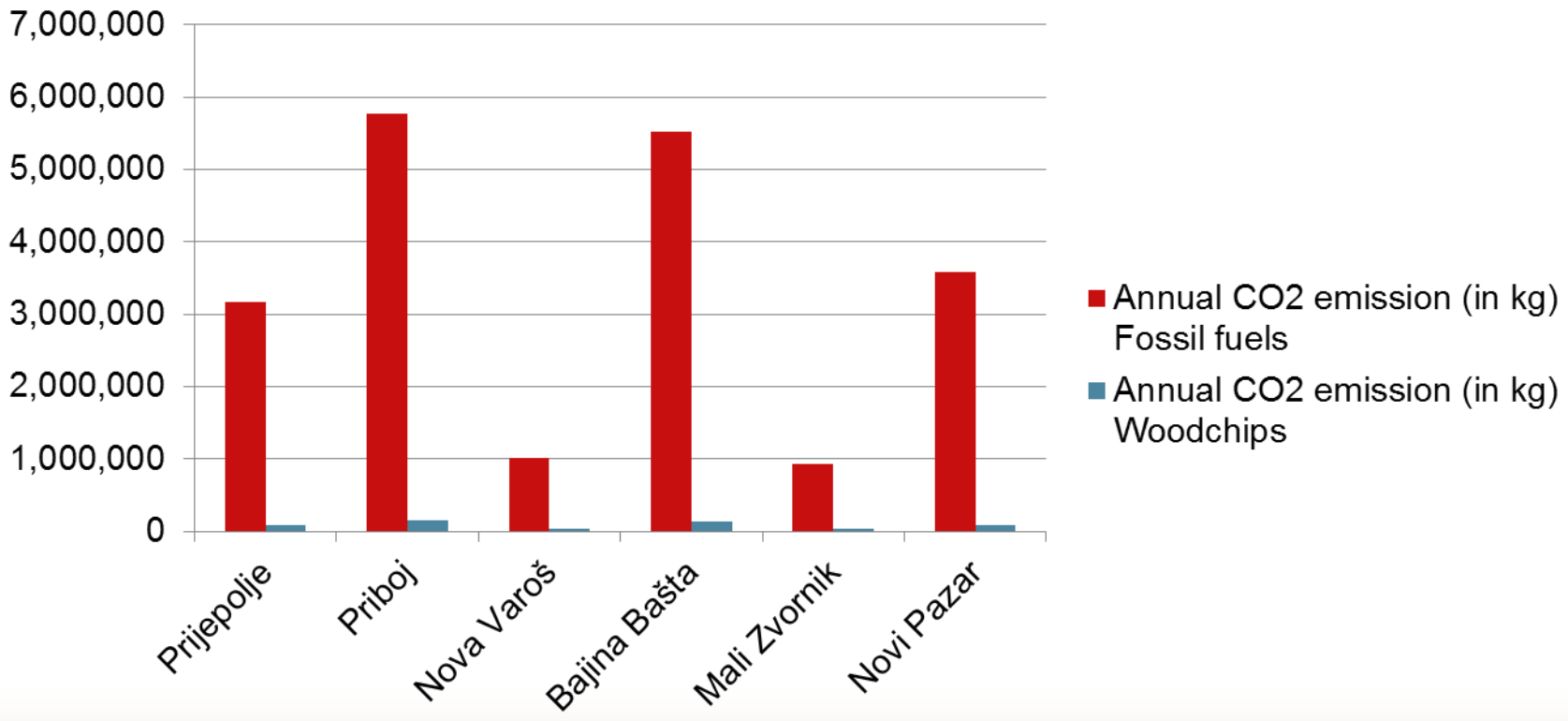
Annual carbon emission in selected DHS (comparison of fossil fuels and wood biomass)



	Bajina Bašta	Nova Varoš	Priboj	Prijepolje	Mali Zvornik	Novi Pazar
Fuel & consumption (per season)	1,110 t of coal 1,056 t of HFO	318 t of HFO	1,950 t of HFO	445 t of coal 650 t of HFO	442,000 m^3 of natural gas	1,119 t of HFO
Total fuel costs (EUR)	**683,352**	**172,356**	**1,056,900**	**396,800**	**195,364**	**606,498**
Required biomass (t)	4,882	1,043	6,396	2,757	1,282	3,672
Projected biomass costs (EUR)	**292,920**	**62,580**	**383,760**	**165,420**	**76,920**	**220,320**
Cumulative savings, 2015-2024 (EUR)	**5,425,206**	**1,533,417**	**9,402,876**	**3,268,323**	**1,675,743**	**5,394,754**
NPV	13,372,784.8	2,322,296.38	22.975.907,29	8.240.663,80	2.663.588,33	13,205,288.70
New jobs creation	**24**	**5**	**24**	**13**	**5**	**17**
New local income, annualy	67,761	16,528	59,644	37,099	16,318	47,631
CO_2 reduction (t)	5,400	1,000	5,600	3,000	900	3,500
Value of CO_2 reduction 2015-2024 (EUR)	**945,927**	**173,361**	**986,563**	**540,682**	**158,632**	**610,249**

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In Cooperation with

Republic of Serbia
Ministry of Agriculture and
Environmental Protection

Republic of Serbia
Ministry of Mining and Energy

Socio-economic impacts of bioenergy projects – biogas

- **Energetics.** Biogas plants are presenting cogeneration of »green« electricity and heat.
- **Renewable energy sources exploitation.** Biogas can significantly contribute to the protection and improvement of local natural resources and environment.
- **Reduced dependence on imported fossil fuels.**
- **Reduction of GHG emissions and diminishing of global warming.**
- **Waste reduction.** Biogas production is a great way to meet the increasingly restrictive national and European regulations in this area, and for the use of organic waste from agriculture, industry, households and treatment facilities for energy production, which followed by recycling into fertilizer.

Socio-economic impacts of bioenergy projects – biogas

- **Contribution to energy and environmental targets of EU**
- **Reduction of soil and groundwater pollution.**
- **New jobs creation** in various sectors: agriculture, crafts and trades, machine and component suppliers, biogas operators etc.
- **Additional taxes to the municipality**
- **Production of high-quality fertilizer for farms**
- **Generation of electricity and heat from renewable energy sources**
- **Security of energy supply**
- **Climate protection**
- **Flexible and efficient end use of biogas**