



Inter-regional Workshop on Energy Efficiency Investment Projects Pipeline

BOSNIA & HERZEGOVINA

OUTLINES



ABOUT BOSNIA AND HERZEGOVINA

- ✓ Legal Framework

FINANCIAL MECHANISMS

- ✓ Available financing
- ✓ Western Balkan Financial Facility
- ✓ WeBSEFF Conditions
- ✓ EE Project examples Western Balkan

OUR PROJECTS

- ✓ Energy Park Livno, Bosnia
 - ✓ Cash flow and project costs
 - ✓ Energy park Livno- Project process
- ✓ Hospital Livno, Bosnia
 - ✓ Cash flow and project costs
- ✓ 2 Biomass Twin projects
 - ✓ Cash flow and project costs

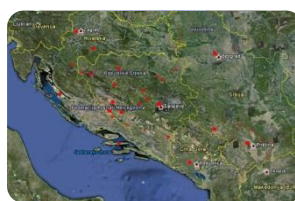


DVOKUTPRO

ENERGY & ENVIRONMENT

ОКОЛОШКО И ЕНЕРГЕТИКА

РАСКОЉЕКО



Bosnia and Herzegovina



- ✓ Capital: Sarajevo
- ✓ Area: 51,197 km²
- ✓ Population 2014: 3,791,622

Столица: Сараево

Площадь: 51 197 км²

Население 2014: 3791622

- ✓ GDP (PPP) – 2014 estimate:
 - Total \$49.241 billion
 - Per capita \$9,986

ВВП (ППС) - 2014 оценка:

- Всего \$ 49241000000

- На душу населения \$ 9.986

- ✓ GDP (nominal) - December 2013 estimate:

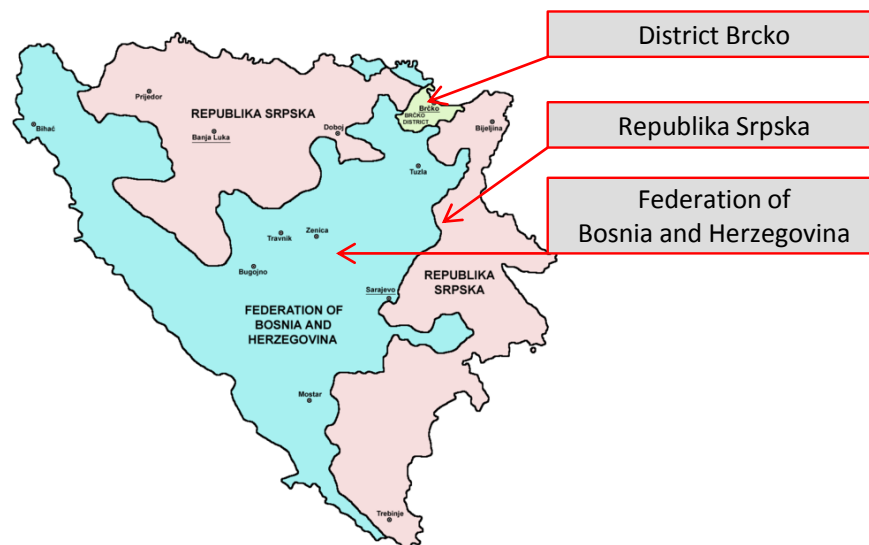
- Total \$18.867 billion

- Per capita \$4,865

ВВП (номинальный) - декабрь 2013 оценка:

- Всего \$ 18.867.000.000

- На душу населения \$ 4.865





LEGAL FRAMEWORK OF FB&H* – ENERGY EFFICIENCY

✓ Law on energy efficiency – in preparation

MAIN RULEBOOKS:

- ✓ Rulebook on energy certification (Official gazette of FB&H, No 50/10)
- ✓ Rulebook on conditions for persons which are working on energy certification (Official gazette of FB&H, No 28/10)

LEGAL FRAMEWORK OF RS** – ENERGY EFFICIENCY

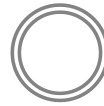
✓ Law on spatial planning and construction (Official gazette of RS, 40/13)

✓ **MAIN RULEBOOKS: in preparation**

* Bosnian Entity Federation of Bosnia and Herzegovina

** Bosnian Entity Republic Srpska

LEGAL FRAMEWORK BOSNIA & CROATIA



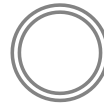
LEGAL FRAMEWORK OF BOSNIA – RENEWABLE ENERGY

- ✓ Law on renewable energy and cogeneration (Official gazette of FBiH, No 70/13)
- ✓ Law on renewable energy and cogeneration (Official gazette of RS, No 39/13, 108/13)
- ✓ Decision on fees for stimulating the production of electricity from renewable sources and in efficient cogeneration (Official gazette of RS, No 116/13)

LEGAL FRAMEWORK CROATIA – RENEWABLE ENERGY

- ✓ Law on energy (Official gazette, No 120/12, 14/14)
- ✓ Regulation on incentives for the production of electricity from renewable energy sources and cogeneration (Official gazette, No 128/2013)
- ✓ Tariff system for production of electricity from renewable energy and cogeneration (Official gazette, No 133/2013 and 151/2013)

FINANCING MECHANISMS



AVAILABLE FINANCING MECHANISMS IN BOSNIA

- **LOCAL FUNDING SOURCES**

Environmental Protection Fund of the Federation of Bosnia and Herzegovina

Development bank of the Federation of Bosnia and Herzegovina

- **INTERNATION FUNDING SOURCES**

European Investment Bank (EIB)

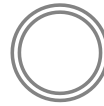
European Bank for Reconstruction and Development (EBRD) – WeBSEFF II

International Finance Corporation (IFC, World Bank facility)

Green for Growth Fund (EIB & KfW)

Local banks commercial loans (Erste, RBA, UNICREDIT, SBERBANK...)

FINANCING MECHANISMS



ENERGY EFFICIENCY & RE , Most effective financial mechanism in B&H
WeBSEFF- Western Balkan Sustainable Energy Financial Facility

ADVANTAGE

- Sustainable for small and medium projects
- Ideal for Energy efficiency & RE projects
- Technical and financial consultancy
- Fast deliver of financing

DISADVANTAGE

- No start up projects
- Commercial banks procedure
- No project financing

PROJECTS

- Production
- Buildings
- Renewable energy
- Fuel Replacement
- New transport vehicle



WeBSEFF II Conditions



UNICREDIT BANK

RAIFFAISEN BANK

Maximum investment costs: 5 mil EUR

PRIVATE SECTOR

- Maximum loan amount: 2 mil EUR
- Eligible investment costs: 100% of total investment costs (with or without costs)

Investment Incentive: 5-10%

PUBLIC SECTOR

- Maximum loan amount: 2.5 mil EUR
- Eligible investment costs: 2.5 mil EUR per project

Investment Incentive: 10-15%

EE PROJECTS



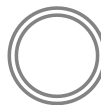
Energy Saving Ratio: >20%
Reduction of greenhouse gasses emission : >20%
IRR > 10%

RE PROJECTS



SHPP 10 MW: positive Environmental Eligibility Test
Wind Turbines 10 MW: positive Environmental Eligibility Test
Solar PVPP 0.5 MW
PB<15 yrs
Financial Viability

ENERGY EFFICIENCY PROJECTS financed by WeBSEFF program



BRAWERY PRODUCTION – BIHACKA PIVOVARA

ENERGY EFFICIENCY: replacement of burners, installation of flow meters and control equipment, reconstruction of boilers

Total investment: 1,218,987 EUR

Annual savings: 384,565 EUR

PB: 3.17 yrs

Energy saving ratio: 54%

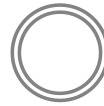
Energy savings: 7,244 MWh/a

CO₂ emission reduction: 2,250 t/a

OTHER BENEFITS: accelerated production and increased production level for 1,300 hectolitres/a



ENERGY EFFICIENCY PROJECTS financed by WeBSEFF program



TELRAD – TELECOMMUNICATION COMPANY

RENEWABLE ENERGY : installation of geothermal HVAC system
for administrative building 3,000 m²

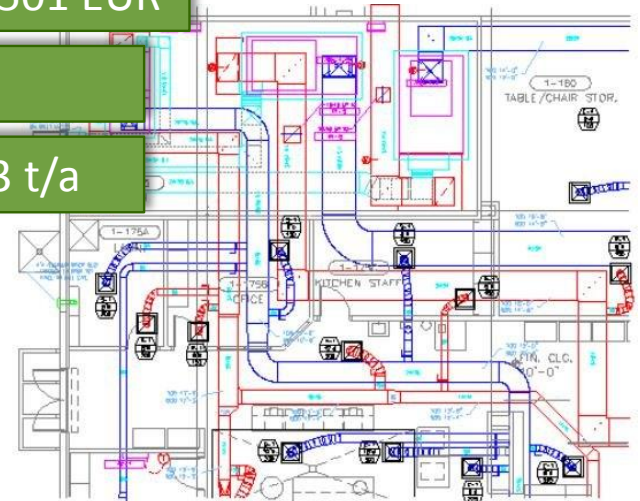
Total investment: 287,441 EUR

Annual savings/Investment: 55,501 EUR

PB: 5.18 yrs

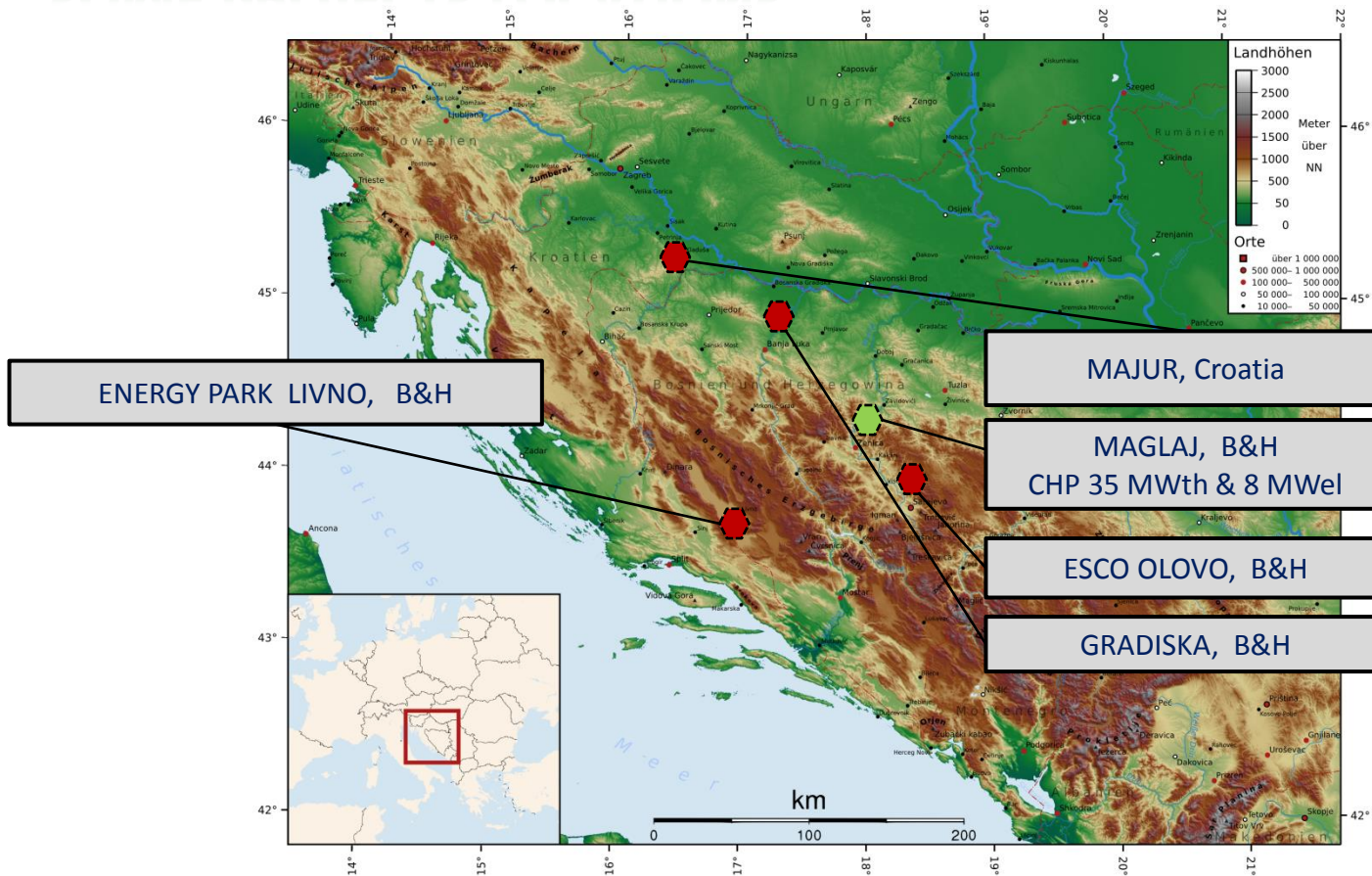
CO₂ emission reduction: 53 t/a

OTHER BENEFITS: safety in energy supply





SOME PROJECTS LOCATIONS



PROJECT IDENTIFICATION FORM - PIF

Energy Park Livno

Energy Globe Award 2013



STATE IN LIVNO BEFORE 2008

- District heating system out of function for 20 years (previously fuel oil was used)
- High consumption of fossil fuels
- High consumption of electricity
- Unefficient boilers
- Low energy efficiency
- High environmental pollution





2008	2009	2010/2011	2012	2013	2014-2016
Establishment of PPP Company	Installation of 2 MWth automatic BIOMASS BOILER	Design and preparation of PROJECT DOCUMENTATION	Construction of 3 km new district heating NETWORK	MESANINE FINANCING in place	Preparing DD for financing April/May 2014
	Installation of MICRO TURBINE 1 kWel		CONSTRUCTION of new boiler room BUILDING	Installation of PHOTOVOLTAIC PANELS 844 m ² /100 kWel	Installation of additional BIOMASS BOILER 4 MWth ongoing
	Construction of 1 km District heating network		Issuing licenses		CHP Installation 2014/15
	Connection of first clients, public, private and business				Finalisation of the project 6 years after start up



INNOVATIVE ASPECT

- Local public authorities, teachers, fuel suppliers, children will be **MORE INFORMED** about RE

COSTS

- NEW JOBS** and **INCOME** are created and secured through value added chains

REPLICATION POTENTIAL

- More **SECURE** and **SUSTAINABLE** energy supply system with high potential for replication and upscaling

ENVIRONMENTAL COMPATIBILITY

- Reduction of Green House Gas emission and environmental pollution

Current fuel oil consumption (15 potential clients)

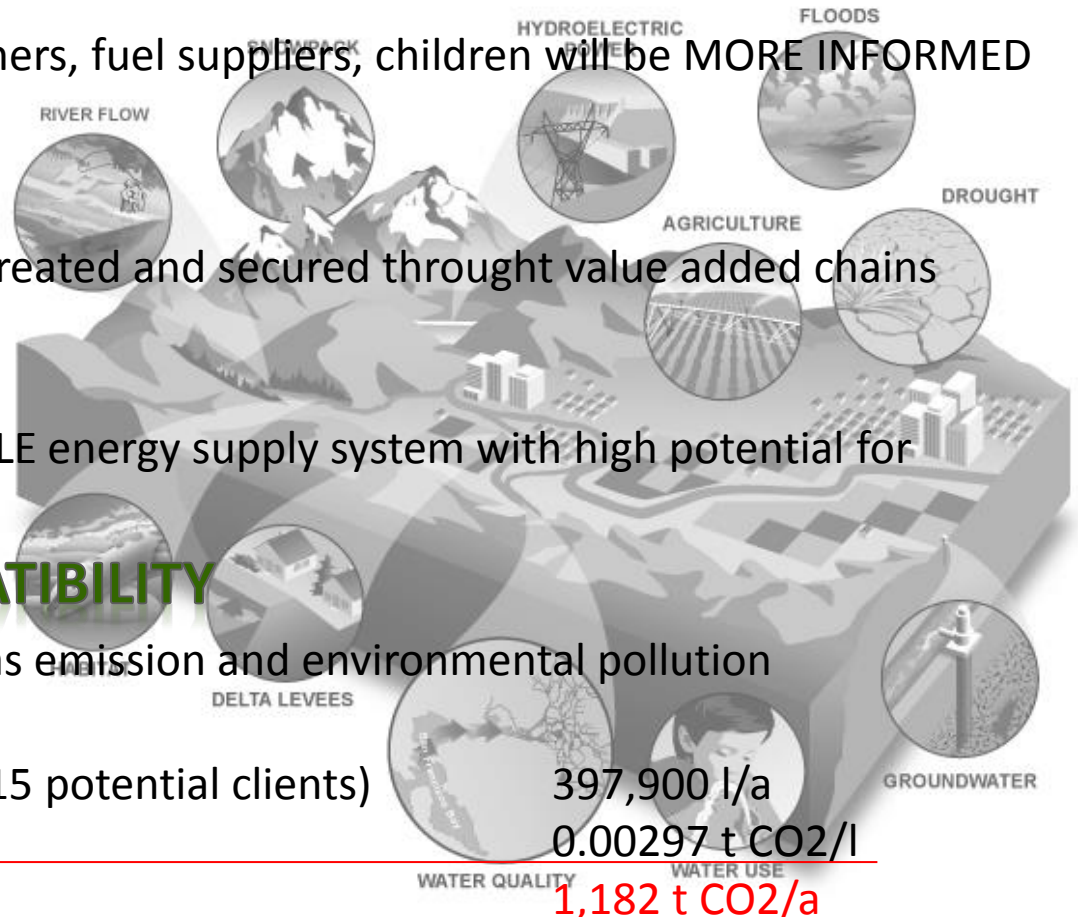
CO₂ emission factor

CO₂ emission reduction

397,900 l/a

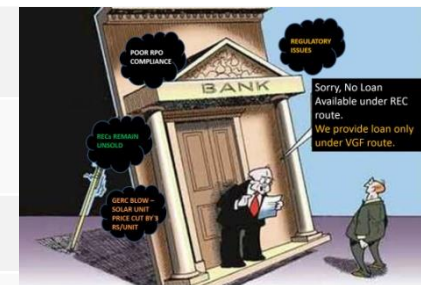
0.00297 t CO₂/l

1,182 t CO₂/a



PROJECT COSTS

INVESTMENT/COSTS	DETAILS	ESTIMATED INVESTMENT COSTS (EUR)	ESTIMATED REVENUES (EUR/a)
Thermal-energy equipment with biomass supply system		1,405,000.00	
Pipe network and connection equipment		166,170.00	
ORC system		2,150,000.00	
Photovoltaic panels	Heat 14,336 MWh/a Electricity 9,454 MWh/a	178,950.00	1.565.697,94
Construction	Electricity 92 MWh/a	178,950.00	34.477,43
Operation costs (sallaries, meintenance, fuel/biomass)		345.740,00	
Others		147.000,00	
TOTAL INVESTMENT AND REVENUES		4.571.810,00	1.600.175,37
TOTAL INVESTMENT AND REVENUES WITHOUT OPERATION COSTS		4.226.070,00	1.600.175,37



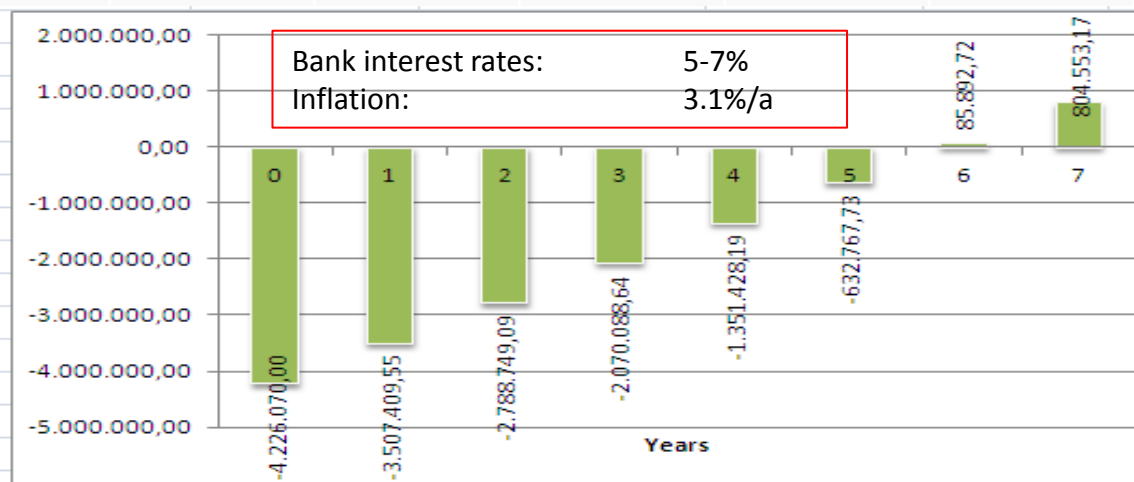
Financing scenario

30% owner's equity
1,267,821.00 EUR

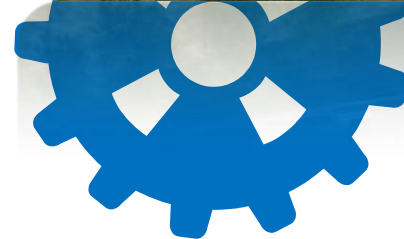
70% bank loan, 7 years 7%
2,958,249.00 EUR

CASH FLOW

YEAR*	0	1	2	3	4	5	6	7
CAPITAL INVESTMENT	-4.226.070,00							
REVENUE		1.600.175,37	1.600.175,37	1.600.175,37	1.600.175,37	1.600.175,37	1.600.175,37	1.600.175,37
OPERATION & MAINTENANCE COSTS		345.740,00	345.740,00	345.740,00	345.740,00	345.740,00	345.740,00	345.740,00
BANK LOAN		535.774,92	535.774,92	535.774,92	535.774,92	535.774,92	535.774,92	535.774,92
TOTAL SAVINGS		718.660,45	718.660,45	718.660,45	718.660,45	718.660,45	718.660,45	718.660,45
CASH FLOW	-4.226.070,00	-3.507.409,55	-2.788.749,09	-2.070.088,64	-1.351.428,19	-632.767,73	85.892,72	804.553,17

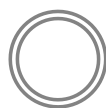


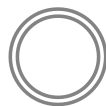
OUR PROJECT PROCESSS



PROJECT IDENTIFICATION FORM - PIF

HOSPITAL “Dr Fra Mihovil Sucic” LIVNO



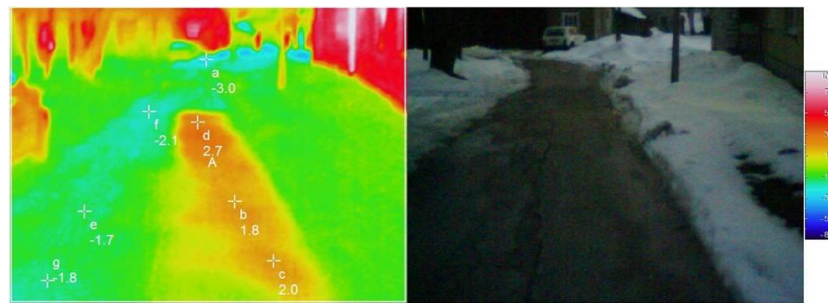
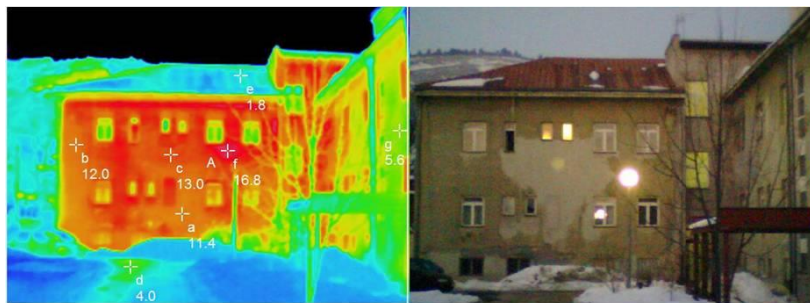


STATE IN HOSPITAL AND HEALTH CENTER

- Hospital is located in three object: main building, neurology, green building
- Health center is separated unit (but with the same heating system)
- Total area of hospital and health center is 10,300 m²
- 208 beds
- 394 workers – 63 doctors and 231 nurses
- Thermal bridges
- Old heating system
- Fuel oil boiler with insufficient annual consumption 109,300 l/a
- High electrical consumption – 781 MWh/a



1) Main building; (2) Neurology building; (3) Green building; (4) Health center



PLANNED ACTIVITIES – PHASE I

- Conduction of energy audit and preparation of Energy Audit Report

PLANNED ACTIVITIES – PHASE II

- Implementation of energy efficiency measures:

Reconstruction of pipe network 230 m
(DN 100, DN 80, DN 65)

Installation of ultrasonic heat consumption
meter in hospital boiler room 60 m³/h

Installation of ultrasonic heat consumption
meter in Health center Livno 15 m³/h

Installation of heat substation 1,500 kW

Installation of thermostatic sensors (222 pc) and
angle valves (222 pc)

Installation of automatic balance valves: automatic branch
valves (61 pc) and regulation branch valve (61 pc)

Installation of variable speed pump regulator
(2 pc) and boiler system dictates (1 pc)



MAIN BENEFITS ARE:

- Reduction of HEAT DEMANDS and reduction of ENERGY COSTS;
- Reduction of EMISSION by using biomass district heating system instead of heavy fuel oil heating system;
- Increase of ENERGY EFFICIENCY and THERMAL COMFORT;
- Increase of AWARENESS of local community regarding energy efficiency and it's benefits.

Current fuel oil consumption
CO2 emission factor

109,300 l/a
0.00297 t CO2/l

CO2 emission reduction

325 t CO2/a

EXPECTED PROJECT COSTS



INVESTMENT/COSTS	ESTIMATED INVESTMENT COSTS (EUR)	ESTIMATED SAVINGS (EUR/a)
Heat substation 1,500 kW	51,761	47,468
Ultrasonic heat consumption meter 60 m3/h	2,979	
Ultrasonic heat consumption meter 15 m3/h	1,416	
Thermostatic sensors and angle valves	7,272	
Automatic balance valves	14,121	
Variable speed pump regulator and boiler system dictates	6,154	
Reconstruction of pipe network	30,515	
Detailed Energy audit and Energy Audit Report	3,260	
TOTAL INVESTMENTS AND REVENUES	117,480	47,468

10% owner's equity
11,748 EUR

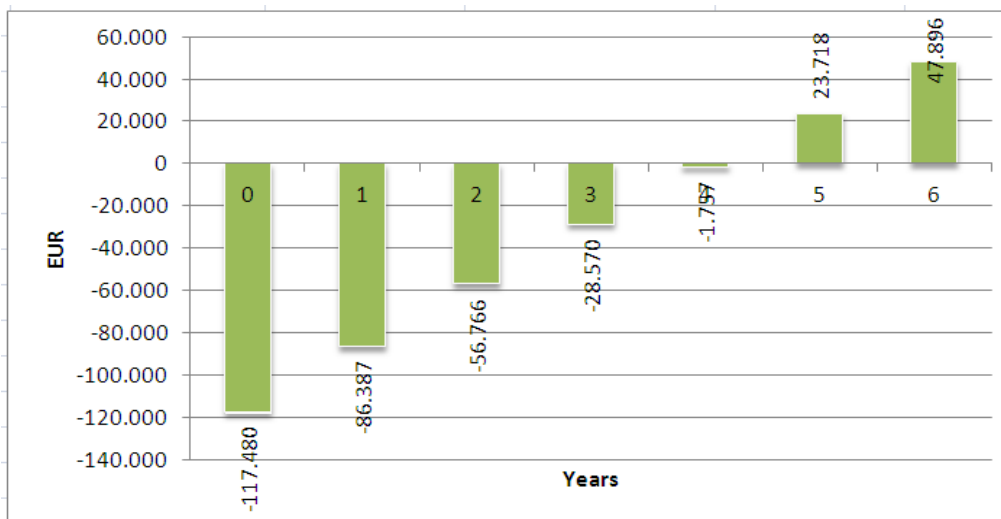
90% bank loan, 6 years 7%
105,732 EUR

CASH FLOW



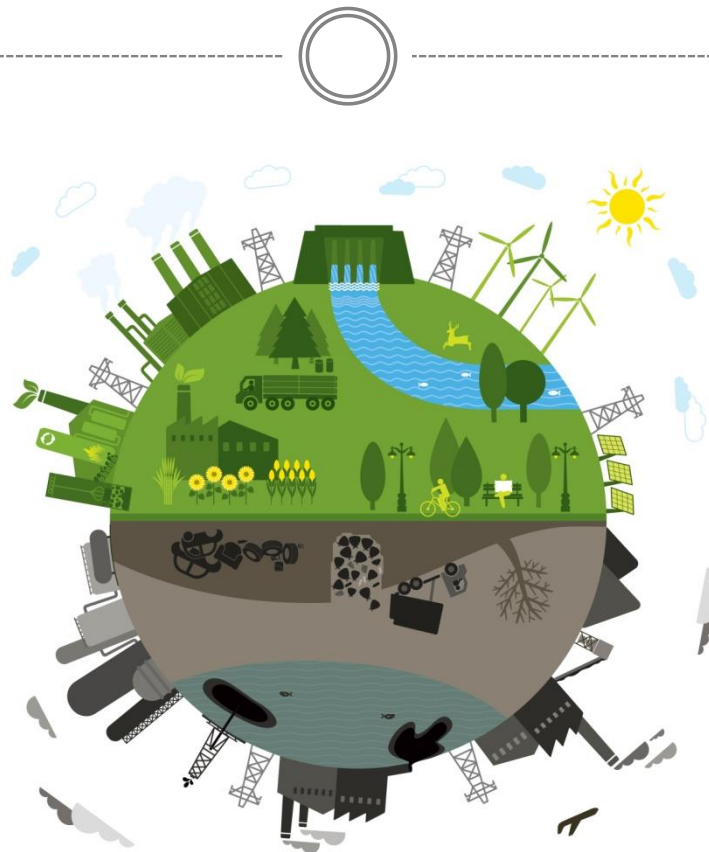
YEAR*	0	1	2	3	4	5	6
CAPITAL INVESTMENT	117.480						
SAVINGS		47.468	45.997	44.571	43.189	41.850	40.553
BANK LOAN		16.375	16.375	16.375	16.375	16.375	16.375
TOTAL SAVINGS		31.093	29.621	28.195	26.814	25.475	24.178
CASH FLOW	-117.480	-86.387	-56.766	-28.570	-1.757	23.718	47.896

*All figures are in EUR



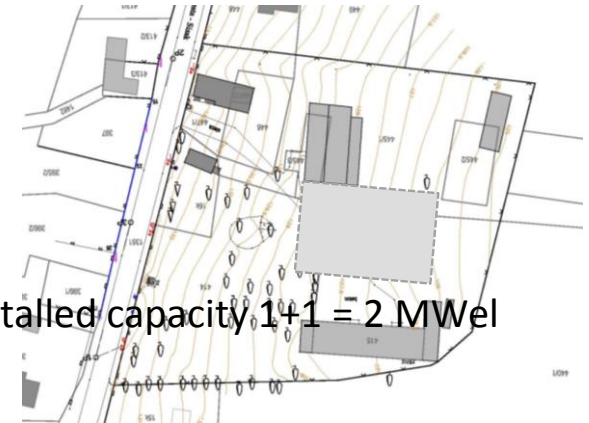
PROJECT IDENTIFICATION FORM – PIF

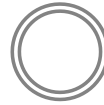
2 Biomass cogeneration plants Twin project in Bosnia & Croatia



CURRENT STATE

- industrial zone Majur & Gradiska
- Technology: Biomass steam-turbine cogeneration plant with installed capacity $1+1 = 2$ MWel and $4.8+4.8 = 9.6$ MWth
- Planned energy production is:
 - Electricity: 15,024 MWh/a
 - Heat energy: 57,692 MWh/a
- Electricity - sold in the state electro-system
- Heat energy – Biomass producing and district heating of facility in industrial zone





INNOVATIVE ASPECT

- Local public authorities, teachers, fuel suppliers, children will be MORE INFORMED about RE

COSTS

- NEW JOBS and INCOME are created and secured through value added chains

REPLICATION POTENTIAL

- More SECURE and SUSTAINABLE energy supply system with high potential for replication and upscaling

ENVIRONMENTAL COMPATIBILITY

- Reduction of Green House Gas emission and environmental pollution

$$15,024 \text{ kWh}_{\text{el}}/\text{a} \times 0.7446 \text{ kg CO}_2/\text{kWh}_{\text{el}} = 11,187 \text{ kg CO}_2/\text{a}$$

$$57,695 \text{ kWh}_{\text{th}}/\text{a} \times 0.7597 \text{ kg CO}_2/\text{kWh}_{\text{th}} = 43,831 \text{ kg CO}_2/\text{a}$$

Total: 55,018 kg CO₂/a

EXPECTED PROJECT COSTS



INVESTMENT/COSTS	DETAILS	ESTIMATED INVESTMENT COSTS (EUR)	ESTIMATED REVENUES (EUR/a)
Thermal-energy equipment with biomass supply system (Steam CHP plant)		2,926,000	2,418,864
Cables, pipe network, transport costs, other costs		405,000	
Installation costs		150,000	
Construction work		160,000	
Operation costs (biomass, electricity, other operation costs)		1,364,000	
TOTAL INVESTMENT AND REVENUES		5,005,000	2,418,864
TOTAL INVESTMENT AND REVENUES WITHOUT OPERATION COSTS		3,641,000	

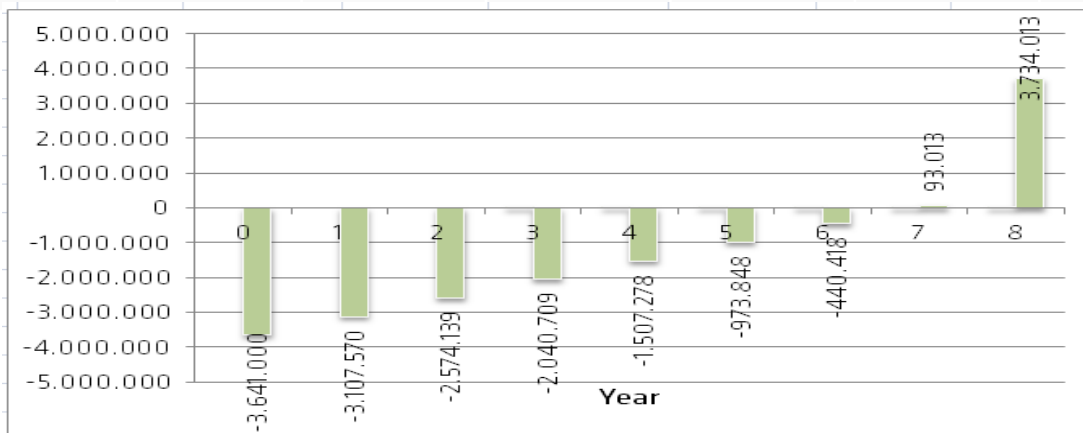
30% owner's equity
1,092,300.00 EUR

70% bank loan, 6 years, 7%
2,548,700.00 EUR

CASH FLOW

YEAR*	0	1	2	3	4	5	6	7	8
CAPITAL INVESTMENT	3,641,000								
REVENUE		2,418,864	2,418,864	2,418,864	2,418,864	2,418,864	2,418,864	2,418,864	2,418,864
OPERATION & MAINTENANCE COST		1,364,000	1,364,000	1,364,000	1,364,000	1,364,000	1,364,000	1,364,000	1,364,000
BANK LOAN		521,434	521,434	521,434	521,434	521,434	521,434	521,434	521,434
TOTAL REVENUE		533,430	533,430	533,430	533,430	533,430	533,430	533,430	533,430
CASH FLOW	-3,641,000	-3,107,570	-2,574,139	-2,040,709	-1,507,278	-973,848	-440,418	93,013	3,734,013

*All figures are in EUR



PROJECTS STATUS

LIVNO	2 BIOMASS	FOJNICA	KONJIC	ENERGY	KAMEN 1
Preparing DD for financing April/May 2014	Design and preparation of PROJECT DOCUMENTATION	Design and preparation of PROJECT DOCUMENTATION	Design and preparation of PROJECT DOCUMENTATION	MESANINE FINANCING in place	Design and preparation of PROJECT DOCUMENTATION
Installation of additional BIOMASS BOILER 4 MWth ongoing	Purchase of land and obtaining permits	Feasibility study and tender documentation supported by EC	Feasibility study and tender documentation supported by EC	Building Construction, Instalation of equipement	Installation of MICRO TURBINE and measuring
CHP Instalation 2014/15	Equity financing	No Financing	No Financing	12/2014 In operation	No Financing
PHOTOVOLTAIC PANELS in operation					





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ENERGY PARK LIVNO, BOSNIA AND HERZEGOVINA, CHP 1,4MWel , PV 100kW...

THANK YOU FOR YOUR ATTENTION

СПАСИБО ЗА ВНИМАНИЕ

ขอขอบคุณสำหรับความสนใจของคุณ