Interreg
Danube Transnational Programme
DanuP-2-Gas

Output T2.2

Pre-feasibility Study SERBIA

WP T2: Project main output

August, 2022

Project co-funded by the European Union funds (ERDF, IPA)
www.interreg-danube.eu/danup-2-gas

BLANK PAGE

DOCUMENT CONTROL SHEET

Project reference	
Full title of the project	Innovative model to drive energy security and diversity in the Danube Region via combination of bioenergy with surplus renewable energy
Acronym	DanuP-2-Gas
Programme priority	Priority 3
Programme priority specific objective	SO 3.2 Improve energy security and energy efficiency
Duration	01.07.2020 – 31.12.2022
Project website	www.interreg-danube.eu/danup-2-gas
Project coordinator	TZE

Short Description
The potential for exploitable organic residue for each participating country listing key aspects such as location, amount, transport options and costs.

Document Details	
Title of document	Pre-feasibility Report (Country)
Action	WP T2 Transnational Infrastructure and Biomass assessment & Pre-feasibility Studies
Deliverable	Output T2.2
Delivery date	August 2022

Version	Date	Author	Organization	Description
V1	09.08.2022	RDA Banat team	RDA Banat	1st version

IMPRINT

This document is issued by the consortium formed for the implementation of the DanuP-2-Gas project by the following partners:

- LP Technology Centre Energy - University of Applied Sciences Landshut (DE)
- ERDF PP1 Energy AGency of Savinjska, Koroška and Šaleška Region (SI)
- ERDF PP2 Tolna County Development Agency Nonprofit Public Ltd.(HU)
- ERDF PP3 Energy Institute at the Johannes Kepler University Linz (AT)
- ERDF PP4 Black Sea Energy Research Centre (BG)
- ERDF PP5 URBASOFIA SRL (RO)
- ERDF PP6 Deggendorf Institute of Technology (DE)
- ERDF PP7 National Recycling Agency of Slovakia (SK)
- ERDF PP8 Institute of Technology and Business in České Budějovice (CZ)
- ERDF PP9 MAHART-Freeport Co. Ltd (HU)
- ERDF PP10 International Centre for Sustainable Development of Energy, Water and Environment Systems (HR)
- ERDF PP11 Energy Institute Hrvoje Požar (HR)
- ERDF PP12 University of Zagreb Faculty of Electrical Engineering and Computing (HR)
- IPA PP1 Regional Agency for Socio – Economic Development – Banat Ltd (RS)

Responsible Partner for the compilation of this document

LP Technology Centre Energy - University of Applied Sciences Landshut (DE)
ERDF PP1 Energy Agency of Savinjska, Koroška and Šaleška Region (SI)

BLANK PAGE

CONTENT

Version	Date	Author	Organization	Description
v1	27.09.2021	Kiril Raytchev	BSERC	Initial version
v2	22.02.2022	Kiril Raytchev	BSERC	Reflecting Optimization tool current specification
v3	15.03.2022	Kiril Raytchev	BSERC	Replacing pay-off period analysis with gas price deviation one.

1. METHODOLOGY

Infrastructure and Biomass database given within the Atlas are prerequisite for any use of Optimization tool (OT). After the selection or manual entry of sources, connection points, etc. is done, optimization can be started.

2. CASE STUDIES

Three locations for potential P2G investment are considered. The first one is industrial plant HIP Petrohemija Pančevo (noted as IP), which is the largest petrochemical industry in Serbia with large consumption of natural gas. The second is SOLAR MATAROVA (noted as REP), which is a 25 MW solar power plant The third one is a greenfield location (noted as GF) in PORT AREA NOVI SAD since there is a possibility to connect both to the electricity and gas networks nearby and the location has a good transport connection (river, railway, motorway).

Next tables show characteristics of chosen setup: availability and cost of resources; transportation; amount and price of biomass; RE access; power and gad grid access.

More details about the used setup are given in Excel files attached with this document.

	Grid investment prices	
Electrical grid	Unit cost for electrical transmission grid connection [€/(kW km)]	0,50
	Unit cost for electrical distribution grid connection [€/(kW km)]	0,80
	Capacity cost for electrical transmission grid connection [€/kW]	1,80
	Capacity cost for electrical distribution grid connection [€/kW]	2,90
Gas grid	Unit cost for gas transmission grid connection [€/(kW km)]	0,10
	Unit cost for gas distribution grid connection [€/(kW km)]	0,15
	Capacity cost for gas transmission grid connection [€/kW]	0,40
	Capacity cost for gas distribution grid connection [€/kW]	0,65
Water grid	Unit cost for water grid connection [€/(m^3/h)/km]	350,00
	Capacity cost for water grid connection [€/(m^3/h)]	550,00

	Electricity prices	
	Start time of day tariff [hour]	7
	End time of day tariff [hour]	23
	Start time of weekend tariff [hour]	0
	End time of weekend tariff [hour]	48
Day tariff	Electricity price without grid or operator fees, including taxes [€/kWh]	0,10
	Grid/operator fees of the transmission system, including taxes [€/kWh]	0,01
	Grid/operator fees of the distribution system, including taxes [€/kWh]	0,02
Night tariff	Electricity price without grid or operator fees, including taxes [€/kWh]	0,02
	Grid/operator fees of the transmission system, including taxes [€/kWh]	0,01
	Grid/operator fees of the distribution system, including taxes [€/kWh]	0,02
Weekend tariff	Electricity price without grid or operator fees, including taxes [€/kWh]	0,10
	Grid/operator fees of the transmission system, including taxes [€/kWh]	0,01
	Grid/operator fees of the distribution system, including taxes [€/kWh]	0,02
	Monthly peak power price [€/kW]	3,82
	VAT percentage applicable to electricity business [%]	20

	Gas prices	
	Start of winter period	November
	End of winter period	April
Winter period	Gas price without grid/operators fees, including taxes [€/kWh]	0,31470
	Gas supply fee, including taxes [€/kWh]	0,00420
	Transmission system fee for consumption, including taxes [€/(kWh/day)]	0,037300
	Transmission system fee for injection, including taxes [€/(kWh/day)]	0,028200
	Distribution system fee for consumption, including taxes [€/kWh]	0,079700
	Distribution system fee for injection, including taxes [€/kWh]	0,000000
Summer period	Gas price without grid/operators fees, including taxes [€/kWh]	0,31470
	Gas supply fee, including taxes [€/kWh]	0,00420
	Transmission system fee for consumption, including taxes [€/(kWh/day)]	0,015900
	Transmission system fee for injection, including taxes [€/(kWh/day)]	0,012200
	Distribution system fee for consumption, including taxes [€/kWh]	0,079700
	Distribution system fee for injection, including taxes [€/kWh]	0,000000
	VAT percentage applicable to gas business [%]	10

	Water price	
	Price for water supply, excluding sewerage and wastewater cleaning costs, including operators/grid fees and taxes [€/m^3]	0,52

	Biochar transport prices	
	Unit transport cost via waterway [€/(t km)]	0,01
	Unit transport cost via railroad [€/(t km)]	0,05
	Unit transport cost via road [€/(t km)]	0,1

Biomass source name	SG „Boranja“ Loznica	SG „Beograd“ Beograd	SG „Severni Kucaj“ Kucevo	SG „Timocke sume“ Boljevac	SG „Uzice“ Uzice	SG „Kragujevac“ Kragujevac	SG „Juzni Kucaj“ Despotovac	SG „Prijepolje“ Prijepolje	SG „Golija“ Ivanjica	SG „Stolovi“ Kraljevo
Purchase cost (EUR/t)	10,00	10,00	10,00	10,00	10,00	10,00	10,00	10,00	10,00	10,00
Production capacity (t/year)	3.950,00	2.600,00	5.330,00	4.420,00	2.080,00	1.510,00	3.370,00	2.700,00	4.100,00	2.820,00
Road distance to P2G hub (km)	27,00	38,00	9,98	11,00	25,00	32,00	44,00	11,00	18,00	36,00
Road transport cost (EUR/(t km))	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15
Type	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry

3. RESULTS

For each one of cases studies (IP, REP and GF), variations of methane prices and subsidies are considered. In the Table 1, case summaries are given:

Table 1. Simulation cases

	Conservative prices of methane			Higher prices of methane					
	No increase IP	No increase REP	No increase GF	5x IP	5x REP	5x GF	10x IP	10x REP	10x GF
No subsidy	Fig. 1	Fig. 2	Fig. 3	Fig. 4	Fig. 5	Fig. 6	Fig. 7	Fig. 8	Fig. 9
Subsidy of 50 %	Fig. 10	Fig. 11	Fig. 12	Fig. 13	Fig. 14	Fig. 15	Fig. 16	Fig. 17	Fig. 18

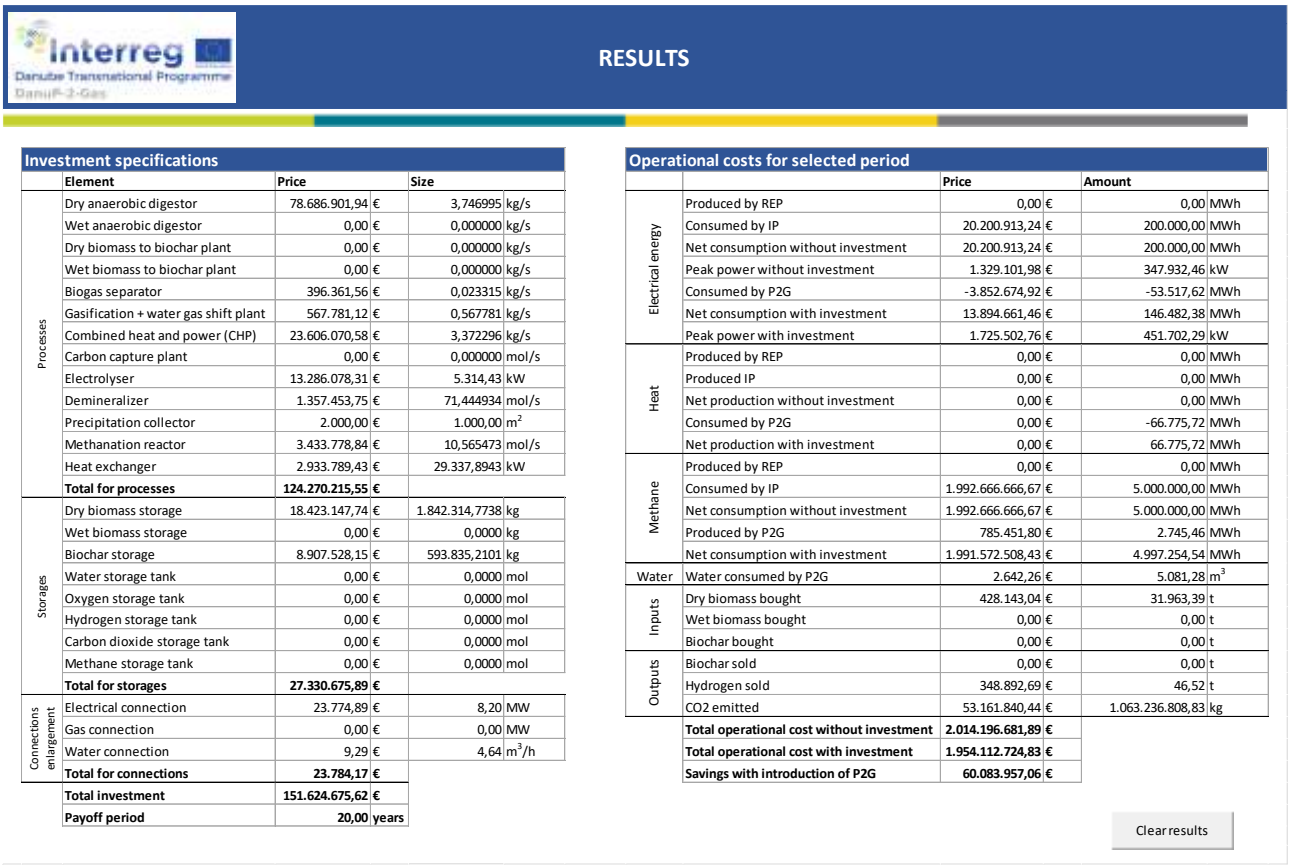
simulation for period of 01 January to 31 Dec

Increases of methane prices noted as “10x” and “5x” refer to the increases in the “Gas price without grid/operator fees, including taxes” and all other costs, which are the attributes in the Gas prices section of the Excel interface. Its conservative value (“1x”) is

set to be 0.03147 €/kWh. Detailed results of simulations are given in the following sections.

3.1RESULTS WITHOUT SUBSIDIES

In Figures 1 to 9, results for cases without subsidies are depicted. With conservative prices of methane, it is not economical to engage any biomethane production as it is shown in Figures 1 to 3.



RESULTS

Investment specifications

	Element	Price		Size	
Processes	Dry anaerobic digestor	78.686.901,94	€	3,746995	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	396.361,56	€	0,023315	kg/s
	Gasification + water gas shift plant	567.781,12	€	0,567781	kg/s
	Combined heat and power (CHP)	23.606.070,58	€	3,372296	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	13.286.078,31	€	5.314,43	kW
	Demineralizer	1.357.453,75	€	71,444934	mol/s
	Precipitation collector	2.000,00	€	1.000,00	m^2
	Methanation reactor	3.433.778,84	€	10,565473	mol/s
	Heat exchanger	2.933.789,43	€	29.337,8943	kW
	Total for processes	**124.270.215,55**	**€**		
Storages	Dry biomass storage	18.423.147,74	€	1.842.314,7738	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	8.907.528,15	€	593.835,2101	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**27.330.675,89**	**€**		
Connections enlargement	Electrical connection	23.774,89	€	8,20	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	9,29	€	4,64	m^3/h
	Total for connections	**23.784,17**	**€**		
	Total investment	**151.624.675,62**	**€**		
	Payoff period	**20,00**	**years**		

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	20.200.913,24	€	200.000,00	MWh
	Net consumption without investment	20.200.913,24	€	200.000,00	MWh
	Peak power without investment	1.329.101,98	€	347.932,46	kW
	Consumed by P2G	-3.852.674,92	€	-53.517,62	MWh
	Net consumption with investment	13.894.661,46	€	146.482,38	MWh
	Peak power with investment	1.725.502,76	€	451.702,29	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	-66.775,72	MWh
	Net production with investment	0,00	€	66.775,72	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	1.992.666.666,67	€	5.000.000,00	MWh
	Net consumption without investment	1.992.666.666,67	€	5.000.000,00	MWh
	Produced by P2G	785.451,80	€	2.745,46	MWh
	Net consumption with investment	1.991.572.508,43	€	4.997.254,54	MWh
Water	Water consumed by P2G	2.642,26	€	5.081,28	m^3
Inputs	Dry biomass bought	428.143,04	€	31.963,39	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	348.892,69	€	46,52	t
	CO2 emitted	53.161.840,44	€	1.063.236.808,83	kg
	Total operational cost without investment	**2.014.196.681,89**	**€**		
	Total operational cost with investment	**1.954.112.724,83**	**€**		
	Savings with introduction of P2G	**60.083.957,06**	**€**		

Clear results

Fig. 1 Results for IP with conservative prices of methane and no subsidy

RESULTS

Investment specifications

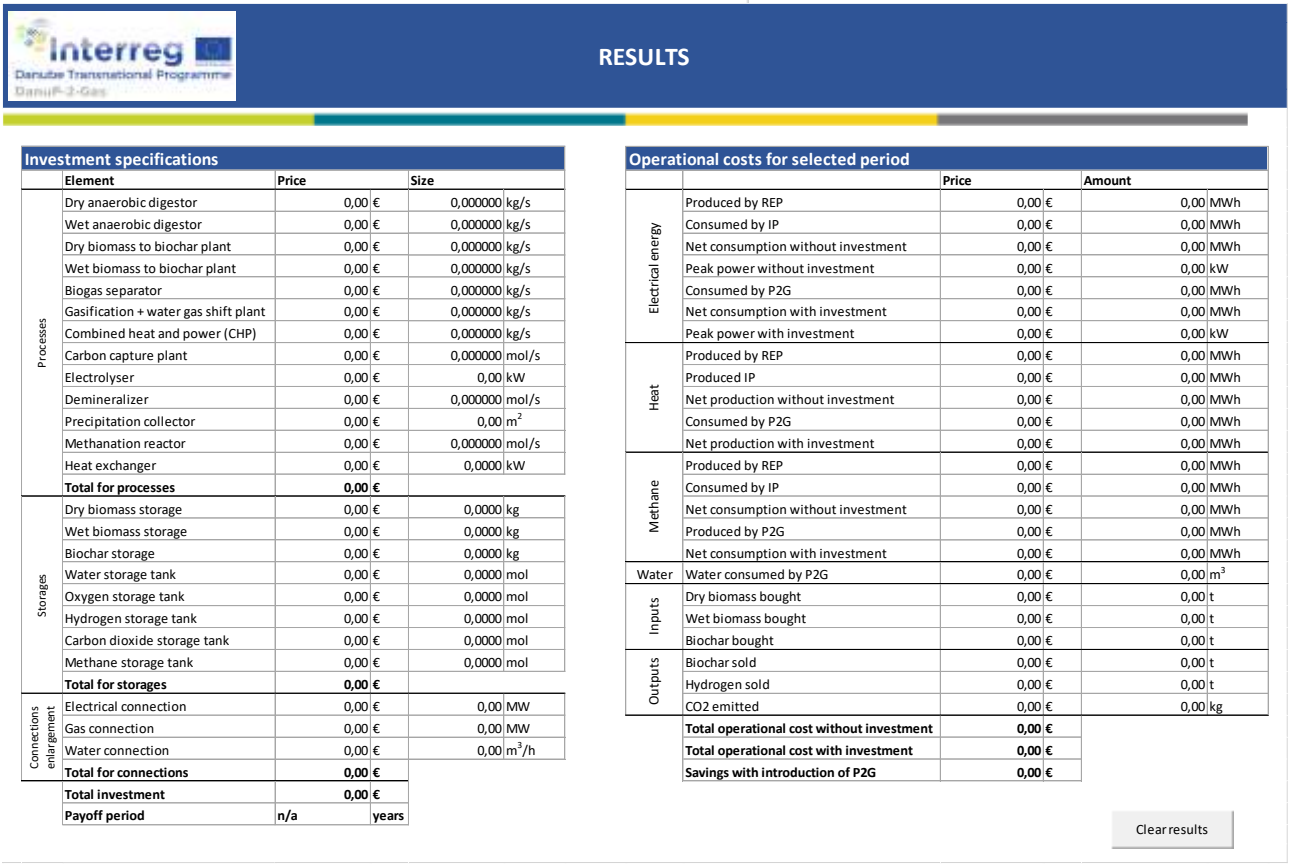
	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**		**years**	

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	170.032,86	€	2.500,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	-170.032,86	€	-2.500,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	-2.500,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**-170.032,86**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**-170.032,86**	**€**		

Clear results

Fig. 2 Results for REP with conservative prices of methane and no subsidy



RESULTS

Investment specifications

	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**	**years**		

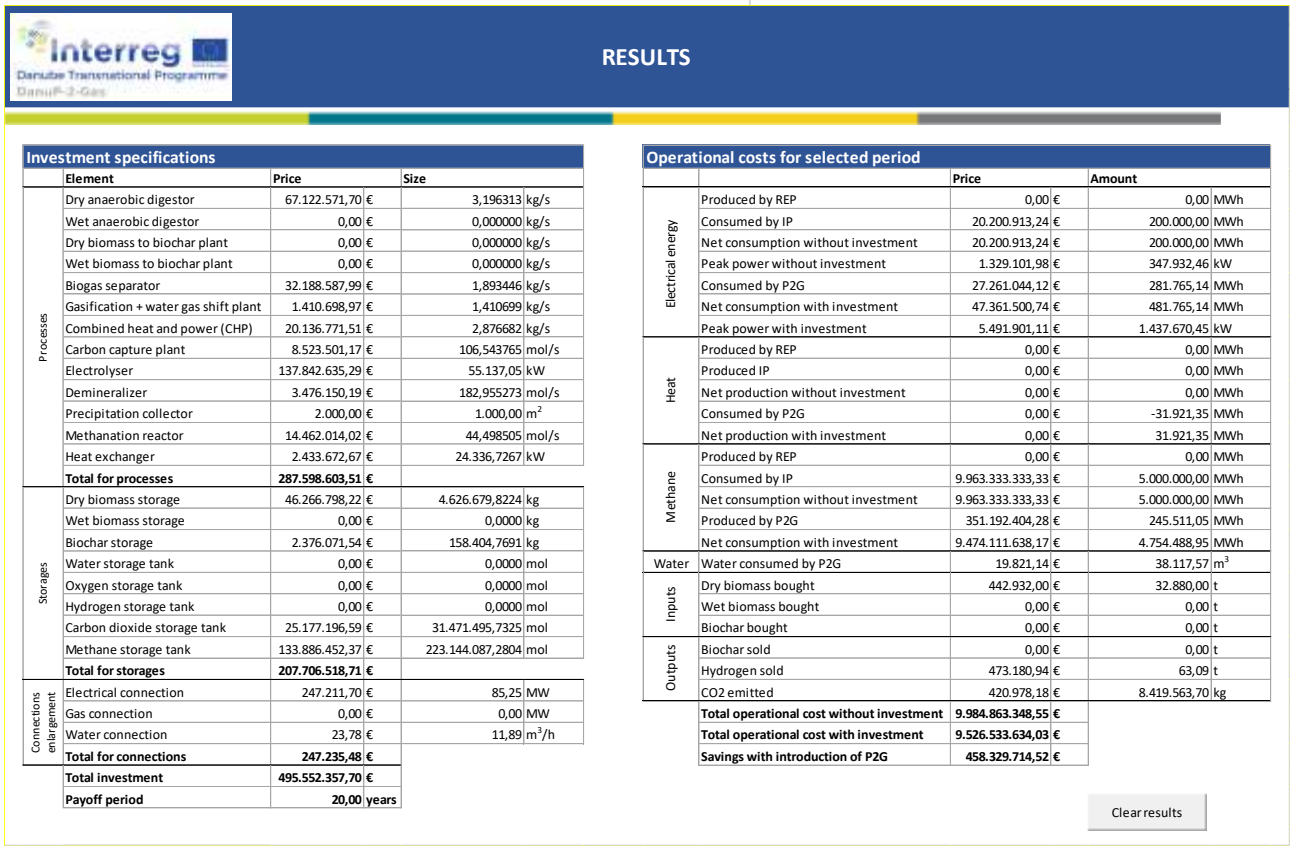
Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**0,00**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**0,00**	**€**		

Clear results

Fig. 3 Results for GF with conservative prices of methane and no subsidy

Although higher methane prices enable operation with profit, biomethane production is not obtained in all cases. In case of IP, due to lower methane summer price, production could be profitable only during winter part of the year. In the summer period, IP will use cheaper methane from the gas grid. In that case, as it is shown in Fig. 4, investment payoff period of 20 years is not enough for any investment in P2G hub.



RESULTS

Investment specifications

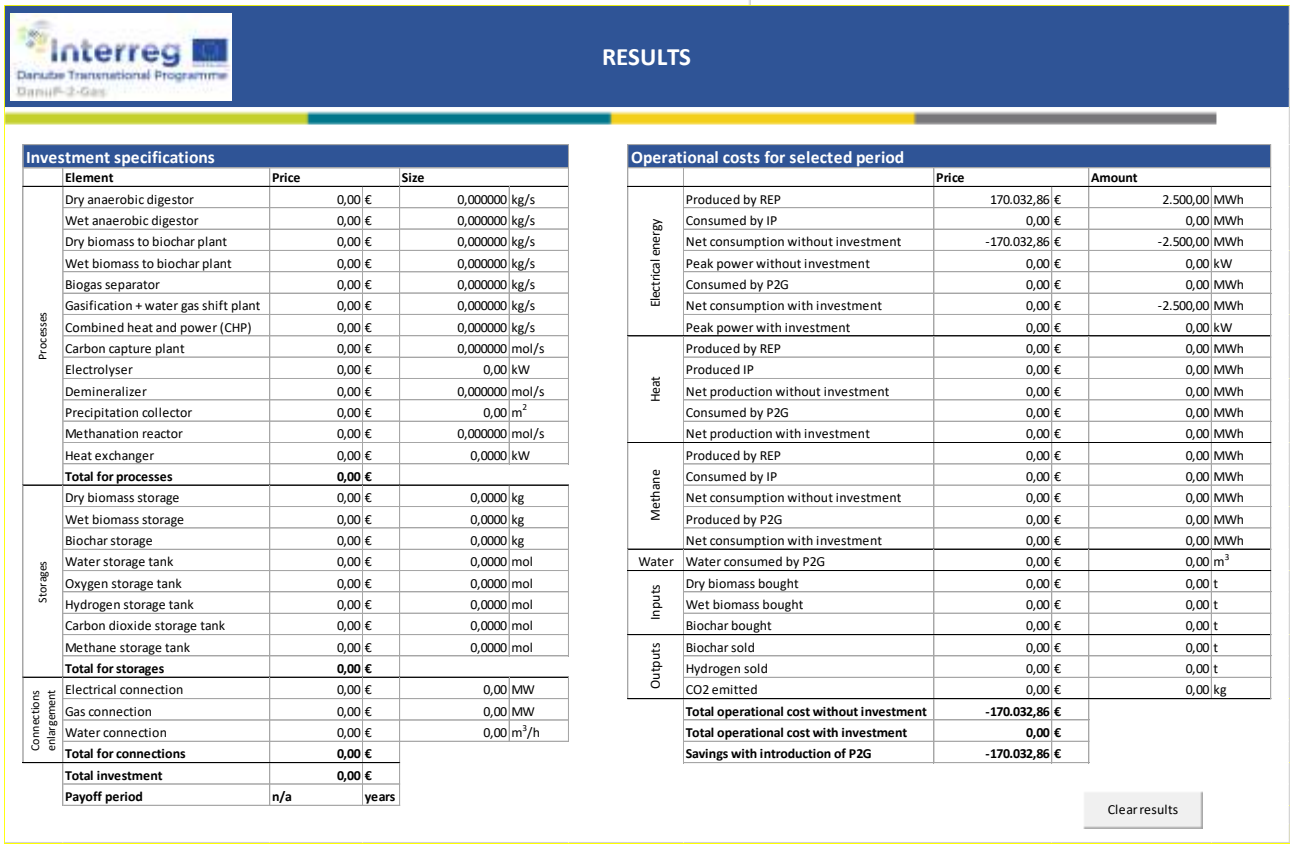
	Element	Price		Size	
Processes	Dry anaerobic digestor	67.122.571,70	€	3,196313	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	32.188.587,99	€	1,893446	kg/s
	Gasification + water gas shift plant	1.410.698,97	€	1,410699	kg/s
	Combined heat and power (CHP)	20.136.771,51	€	2,876682	kg/s
	Carbon capture plant	8.523.501,17	€	106,543765	mol/s
	Electrolyser	137.842.635,29	€	55.137,05	kW
	Demineralizer	3.476.150,19	€	182,955273	mol/s
	Precipitation collector	2.000,00	€	1.000,00	m^2
	Methanation reactor	14.462.014,02	€	44,498505	mol/s
	Heat exchanger	2.433.672,67	€	24.336,7267	kW
	Total for processes	**287.598.603,51**	**€**		
Storages	Dry biomass storage	46.266.798,22	€	4.626.679,8224	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	2.376.071,54	€	158.404,7691	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	25.177.196,59	€	31.471.495,7325	mol
	Methane storage tank	133.886.452,37	€	223.144.087,2804	mol
	Total for storages	**207.706.518,71**	**€**		
Connections enlargement	Electrical connection	247.211,70	€	85,25	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	23,78	€	11,89	m^3/h
	Total for connections	**247.235,48**	**€**		
	Total investment	**495.552.357,70**	**€**		
	Payoff period	**20,00**	**years**		

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	20.200.913,24	€	200.000,00	MWh
	Net consumption without investment	20.200.913,24	€	200.000,00	MWh
	Peak power without investment	1.329.101,98	€	347.932,46	kW
	Consumed by P2G	27.261.044,12	€	281.765,14	MWh
	Net consumption with investment	47.361.500,74	€	481.765,14	MWh
	Peak power with investment	5.491.901,11	€	1.437.670,45	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	-31.921,35	MWh
	Net production with investment	0,00	€	31.921,35	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	9.963.333.333,33	€	5.000.000,00	MWh
	Net consumption without investment	9.963.333.333,33	€	5.000.000,00	MWh
	Produced by P2G	351.192.404,28	€	245.511,05	MWh
	Net consumption with investment	9.474.111.638,17	€	4.754.488,95	MWh
Water	Water consumed by P2G	19.821,14	€	38.117,57	m^3
Inputs	Dry biomass bought	442.932,00	€	32.880,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	473.180,94	€	63,09	t
	CO2 emitted	420.978,18	€	8.419.563,70	kg
	Total operational cost without investment	**9.984.863.348,55**	**€**		
	Total operational cost with investment	**9.526.533.634,03**	**€**		
	Savings with introduction of P2G	**458.329.714,52**	**€**		

Clear results

Fig. 4 Results for IP with 5x higher prices of methane and no subsidy



RESULTS

Investment specifications

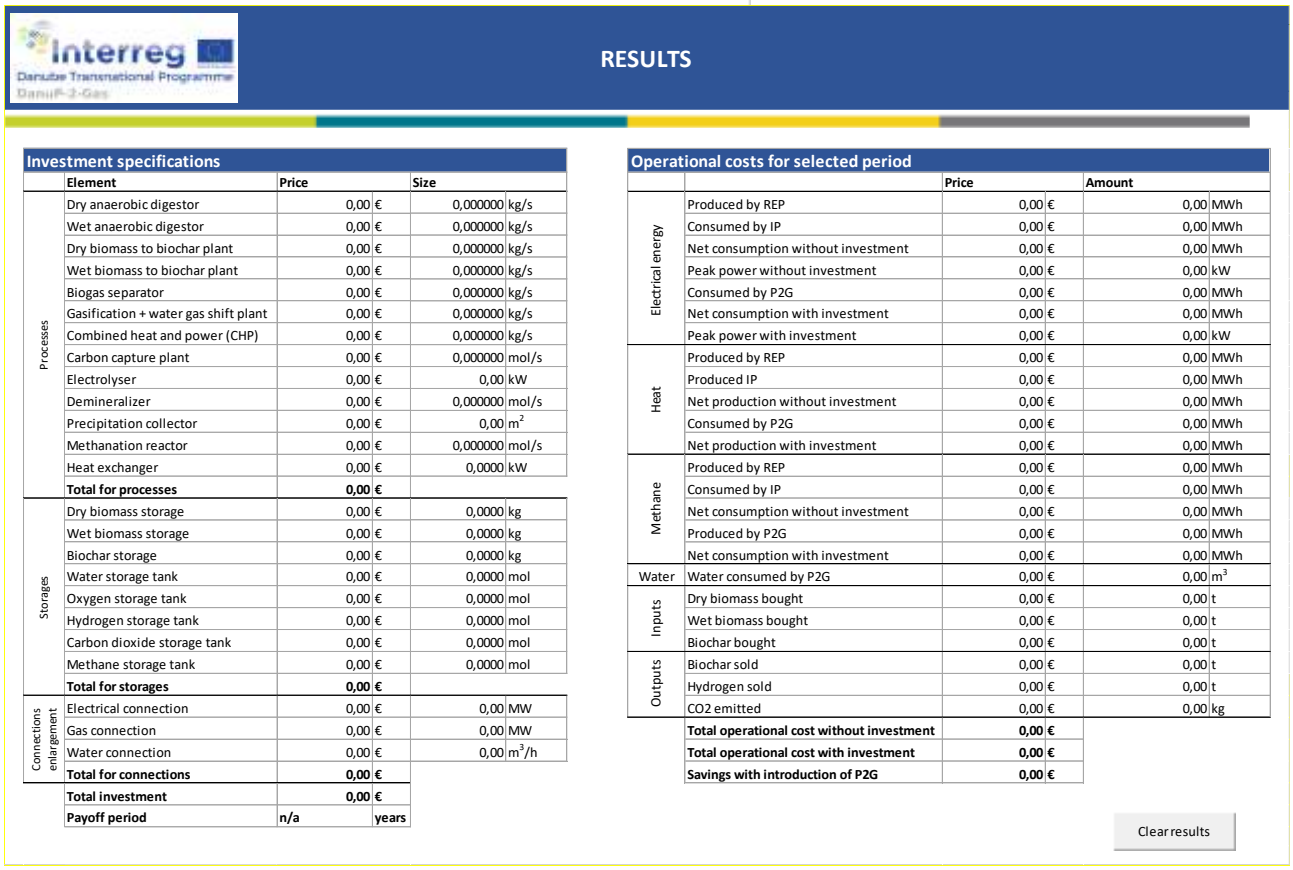
	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**		**years**	

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	170.032,86	€	2.500,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	-170.032,86	€	-2.500,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	-2.500,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**-170.032,86**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**-170.032,86**	**€**		

Clear results

Fig. 5 Results for REP with 5x higher prices of methane and no subsidy



RESULTS

Investment specifications

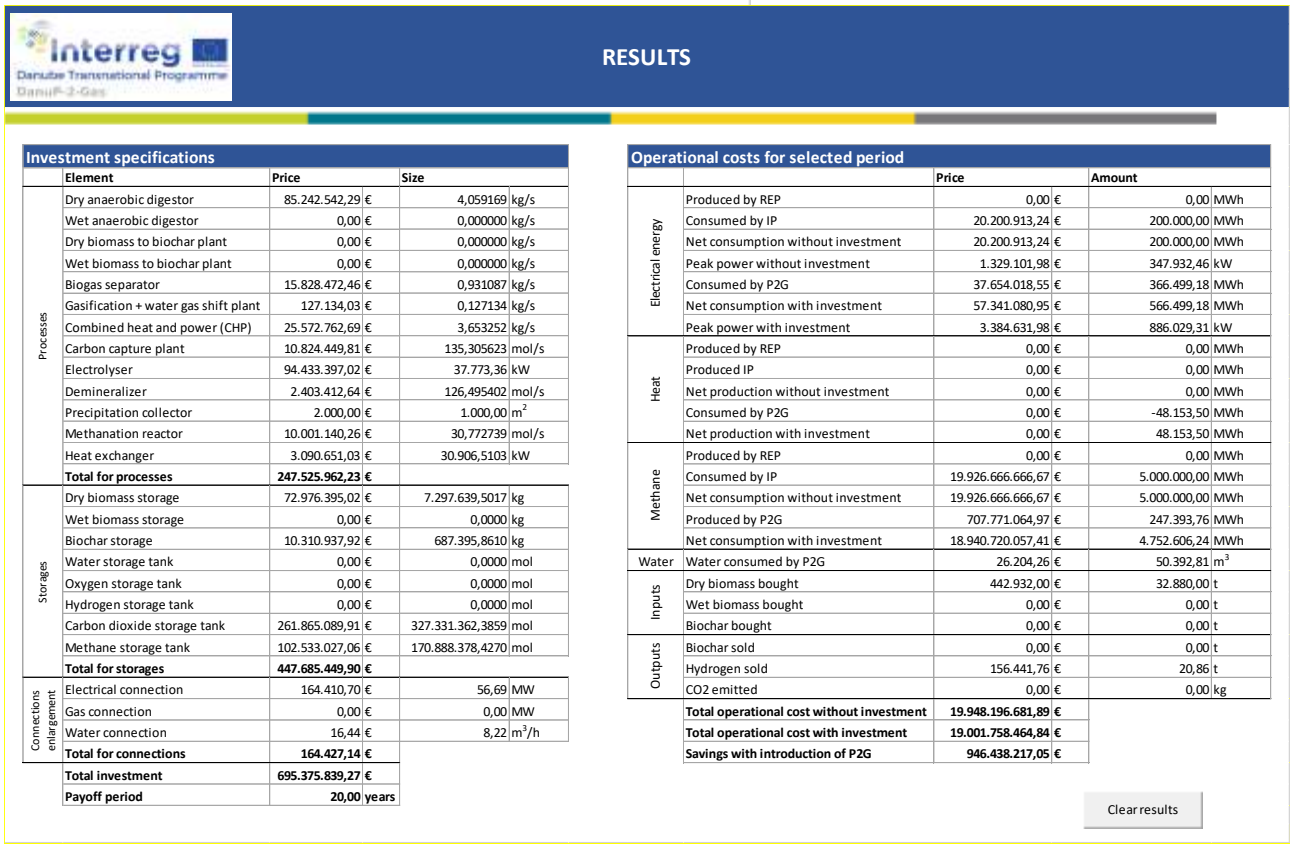
	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**	**years**		

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**0,00**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**0,00**	**€**		

Clear results

Fig. 6 Results for GF with 5x higher prices of methane and no subsidy



RESULTS

Investment specifications

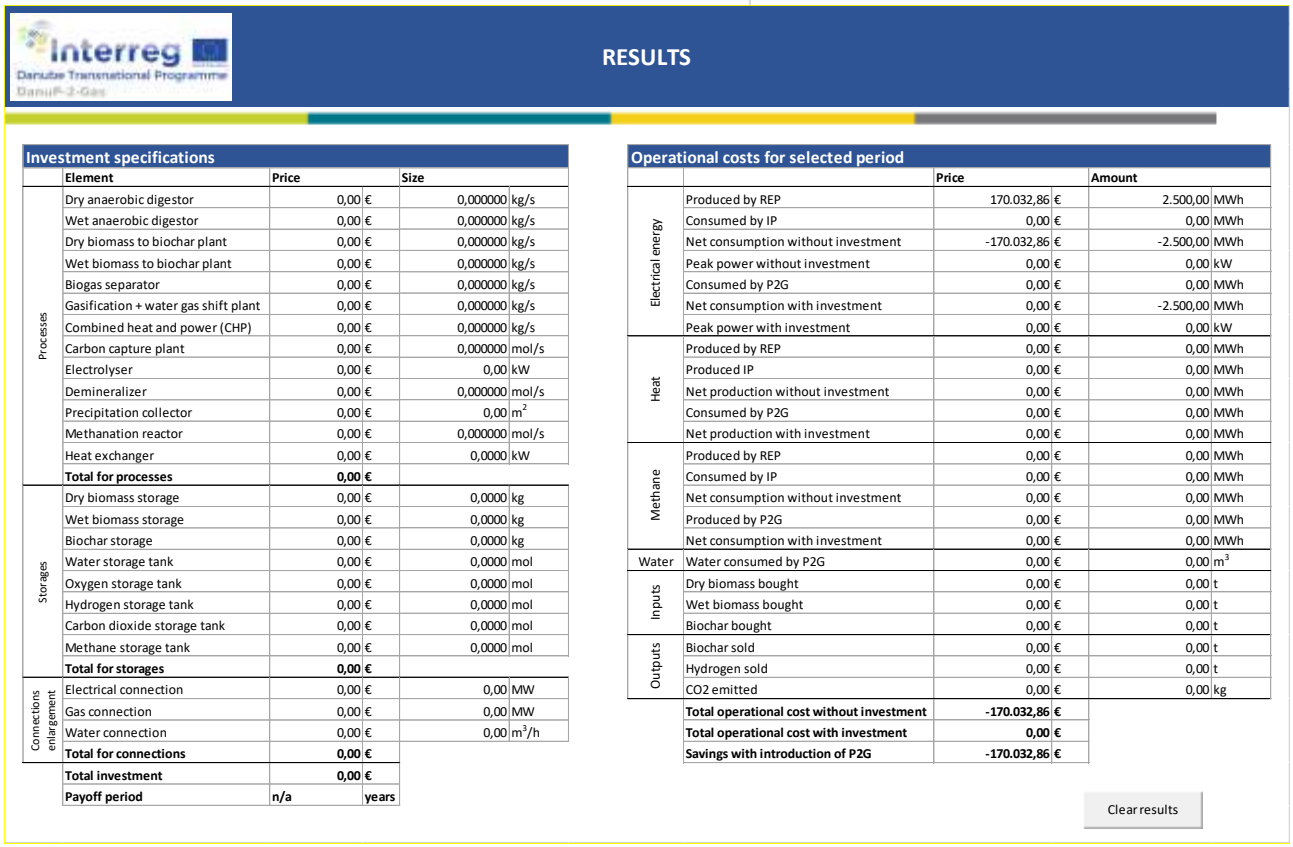
	Element	Price		Size	
Processes	Dry anaerobic digestor	85.242.542,29	€	4,059169	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	15.828.472,46	€	0,931087	kg/s
	Gasification + water gas shift plant	127.134,03	€	0,127134	kg/s
	Combined heat and power (CHP)	25.572.762,69	€	3,653252	kg/s
	Carbon capture plant	10.824.449,81	€	135,305623	mol/s
	Electrolyser	94.433.397,02	€	37.773,36	kW
	Demineralizer	2.403.412,64	€	126,495402	mol/s
	Precipitation collector	2.000,00	€	1.000,00	m^2
	Methanation reactor	10.001.140,26	€	30,772739	mol/s
	Heat exchanger	3.090.651,03	€	30.906,5103	kW
	Total for processes	**247.525.962,23**	**€**		
Storages	Dry biomass storage	72.976.395,02	€	7.297.639,5017	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	10.310.937,92	€	687.395,8610	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	261.865.089,91	€	327.331.362,3859	mol
	Methane storage tank	102.533.027,06	€	170.888.378,4270	mol
	Total for storages	**447.685.449,90**	**€**		
Connections enlargement	Electrical connection	164.410,70	€	56,69	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	16,44	€	8,22	m^3/h
	Total for connections	**164.427,14**	**€**		
	Total investment	**695.375.839,27**	**€**		
	Payoff period	**20,00**	**years**		

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	20.200.913,24	€	200.000,00	MWh
	Net consumption without investment	20.200.913,24	€	200.000,00	MWh
	Peak power without investment	1.329.101,98	€	347.932,46	kW
	Consumed by P2G	37.654.018,55	€	366.499,18	MWh
	Net consumption with investment	57.341.080,95	€	566.499,18	MWh
	Peak power with investment	3.384.631,98	€	886.029,31	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	-48.153,50	MWh
	Net production with investment	0,00	€	48.153,50	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	19.926.666.666,67	€	5.000.000,00	MWh
	Net consumption without investment	19.926.666.666,67	€	5.000.000,00	MWh
	Produced by P2G	707.771.064,97	€	247.393,76	MWh
	Net consumption with investment	18.940.720.057,41	€	4.752.606,24	MWh
Water	Water consumed by P2G	26.204,26	€	50.392,81	m^3
Inputs	Dry biomass bought	442.932,00	€	32.880,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	156.441,76	€	20,86	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**19.948.196.681,89**	**€**		
	Total operational cost with investment	**19.001.758.464,84**	**€**		
	Savings with introduction of P2G	**946.438.217,05**	**€**		

Clear results

Fig. 7 Results for IP with 10x higher prices of methane and no subsidy



RESULTS

Investment specifications

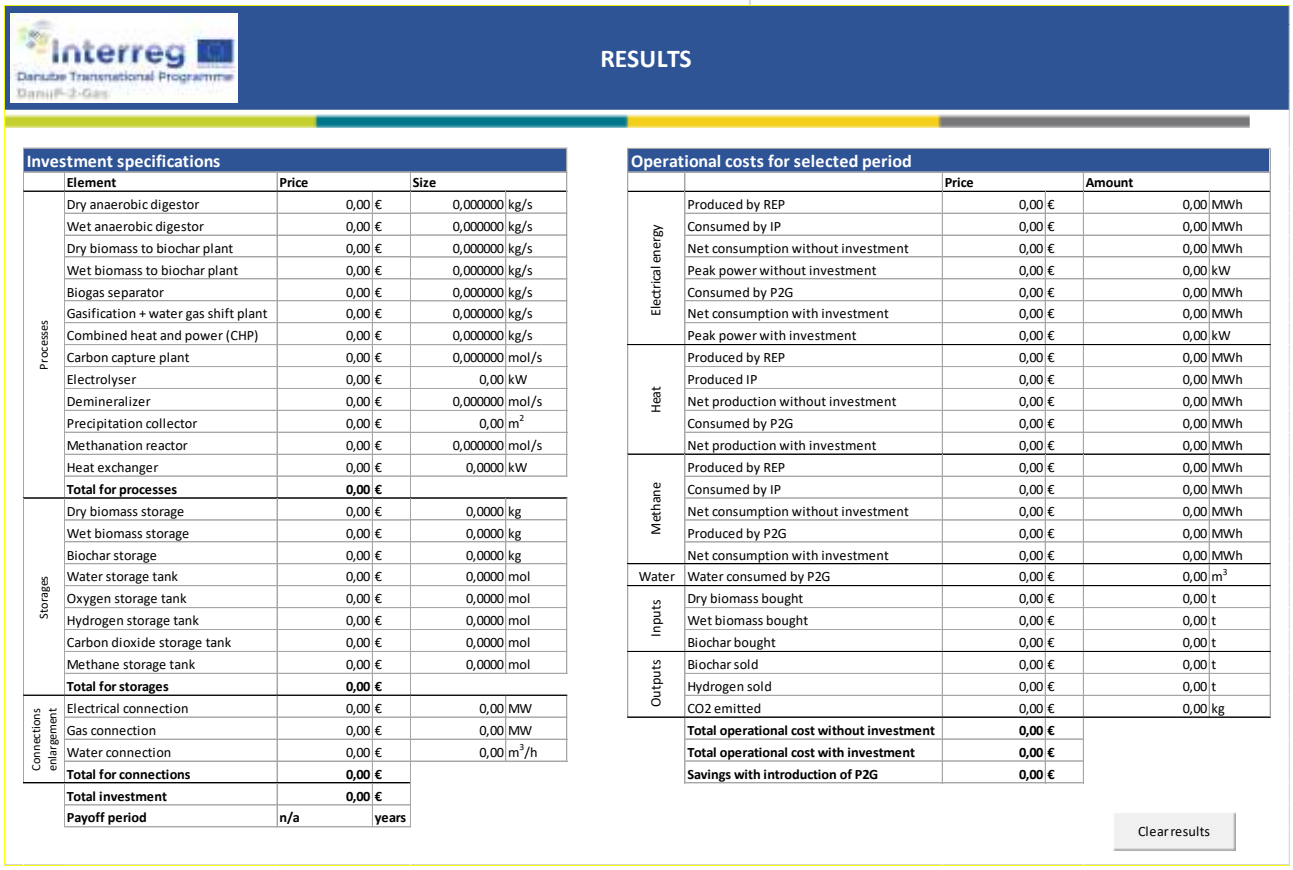
	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**		**years**	

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	170.032,86	€	2.500,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	-170.032,86	€	-2.500,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	-2.500,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**-170.032,86**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**-170.032,86**	**€**		

Clear results

Fig. 8 Results for REP with 10x higher prices of methane and no subsidy



RESULTS

Investment specifications

	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**	**years**		

Operational costs for selected period

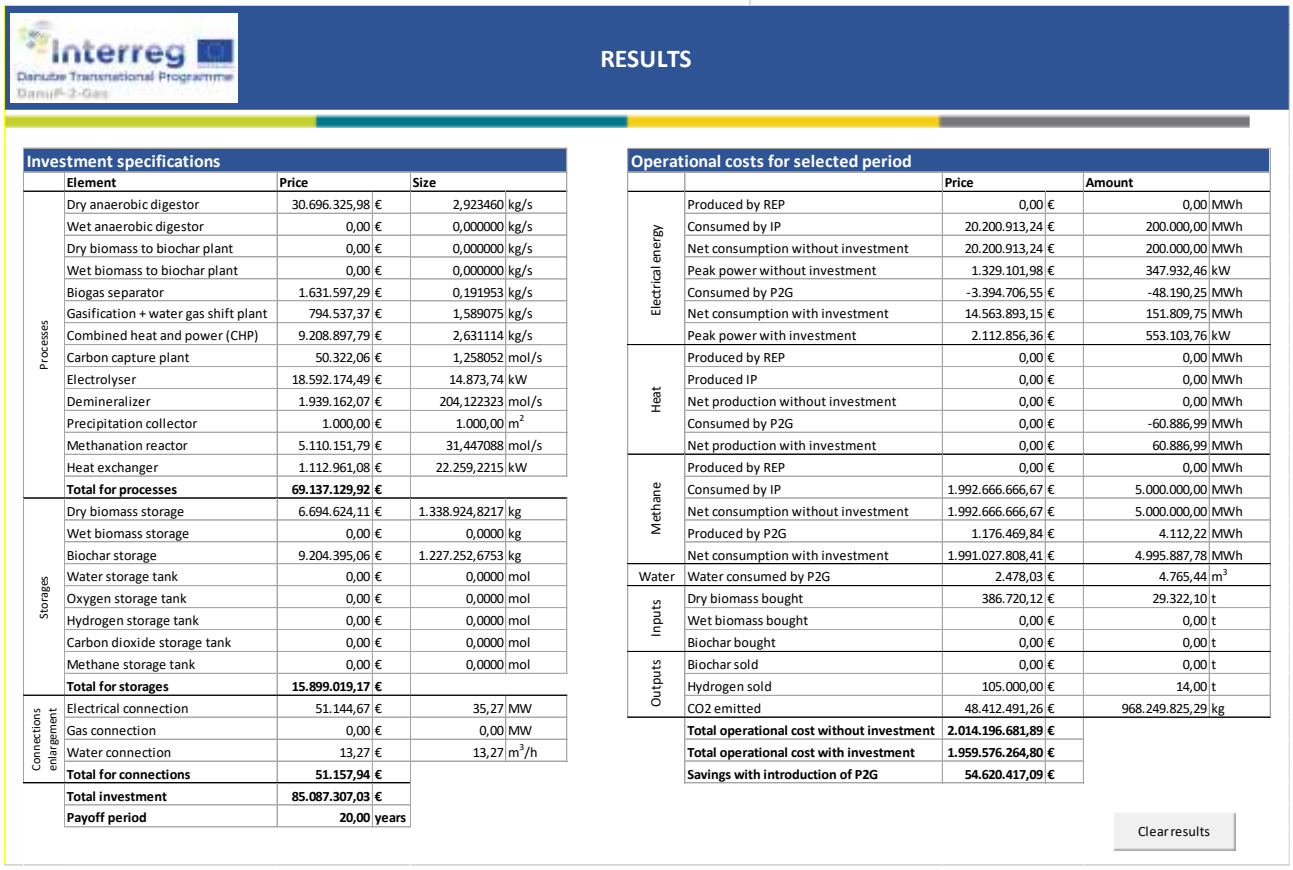
		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**0,00**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**0,00**	**€**		

Clear results

Fig. 9 Results for GF with 10x higher prices of methane and no subsidy

3.2 RESULTS WITH SUBSIDIES

In Figures 10 to 18, results for the cases with subsidies are depicted. Although subsidies are considered, with conservative prices of methane there is no economical reason of any investment in biomethane production as it is shown in Figures 10 to 12.



RESULTS

Investment specifications

	Element	Price		Size	
Processes	Dry anaerobic digestor	30.696.325,98	€	2,923460	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	1.631.597,29	€	0,191953	kg/s
	Gasification + water gas shift plant	794.537,37	€	1,589075	kg/s
	Combined heat and power (CHP)	9.208.897,79	€	2,631114	kg/s
	Carbon capture plant	50.322,06	€	1,258052	mol/s
	Electrolyser	18.592.174,49	€	14.873,74	kW
	Demineralizer	1.939.162,07	€	204,122323	mol/s
	Precipitation collector	1.000,00	€	1.000,00	m^2
	Methanation reactor	5.110.151,79	€	31,447088	mol/s
	Heat exchanger	1.112.961,08	€	22.259,2215	kW
	Total for processes	**69.137.129,92**	**€**		
Storages	Dry biomass storage	6.694.624,11	€	1.338.924,8217	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	9.204.395,06	€	1.227.252,6753	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**15.899.019,17**	**€**		
Connections enlargement	Electrical connection	51.144,67	€	35,27	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	13,27	€	13,27	m^3/h
	Total for connections	**51.157,94**	**€**		
	Total investment	**85.087.307,03**	**€**		
	Payoff period	**20,00**	**years**		

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	20.200.913,24	€	200.000,00	MWh
	Net consumption without investment	20.200.913,24	€	200.000,00	MWh
	Peak power without investment	1.329.101,98	€	347.932,46	kW
	Consumed by P2G	-3.394.706,55	€	-48.190,25	MWh
	Net consumption with investment	14.563.893,15	€	151.809,75	MWh
	Peak power with investment	2.112.856,36	€	553.103,76	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	-60.886,99	MWh
	Net production with investment	0,00	€	60.886,99	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	1.992.666.666,67	€	5.000.000,00	MWh
	Net consumption without investment	1.992.666.666,67	€	5.000.000,00	MWh
	Produced by P2G	1.176.469,84	€	4.112,22	MWh
	Net consumption with investment	1.991.027.808,41	€	4.995.887,78	MWh
Water	Water consumed by P2G	2.478,03	€	4.765,44	m^3
Inputs	Dry biomass bought	386.720,12	€	29.322,10	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	105.000,00	€	14,00	t
	CO2 emitted	48.412.491,26	€	968.249.825,29	kg
	Total operational cost without investment	**2.014.196.681,89**	**€**		
	Total operational cost with investment	**1.959.576.264,80**	**€**		
	Savings with introduction of P2G	**54.620.417,09**	**€**		

Clear results

Fig. 10 Results for IP with conservative prices of methane and with 50% subsidy

RESULTS

Investment specifications

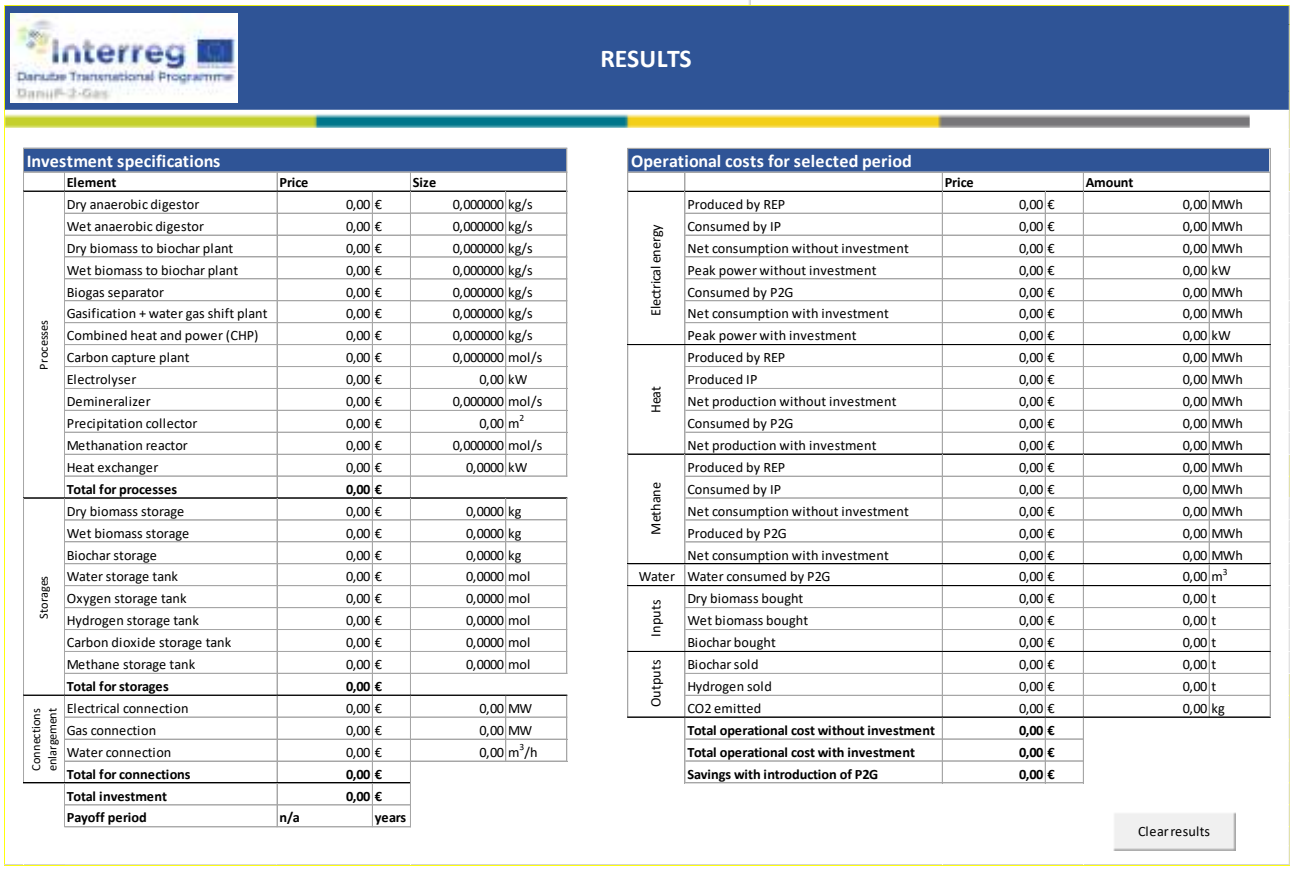
	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**		**years**	

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	170.032,86	€	2.500,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	-170.032,86	€	-2.500,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	-2.500,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**-170.032,86**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**-170.032,86**	**€**		

Clear results

Fig. 11 Results for REP with conservative prices of methane and with 50% subsidy



RESULTS

Investment specifications

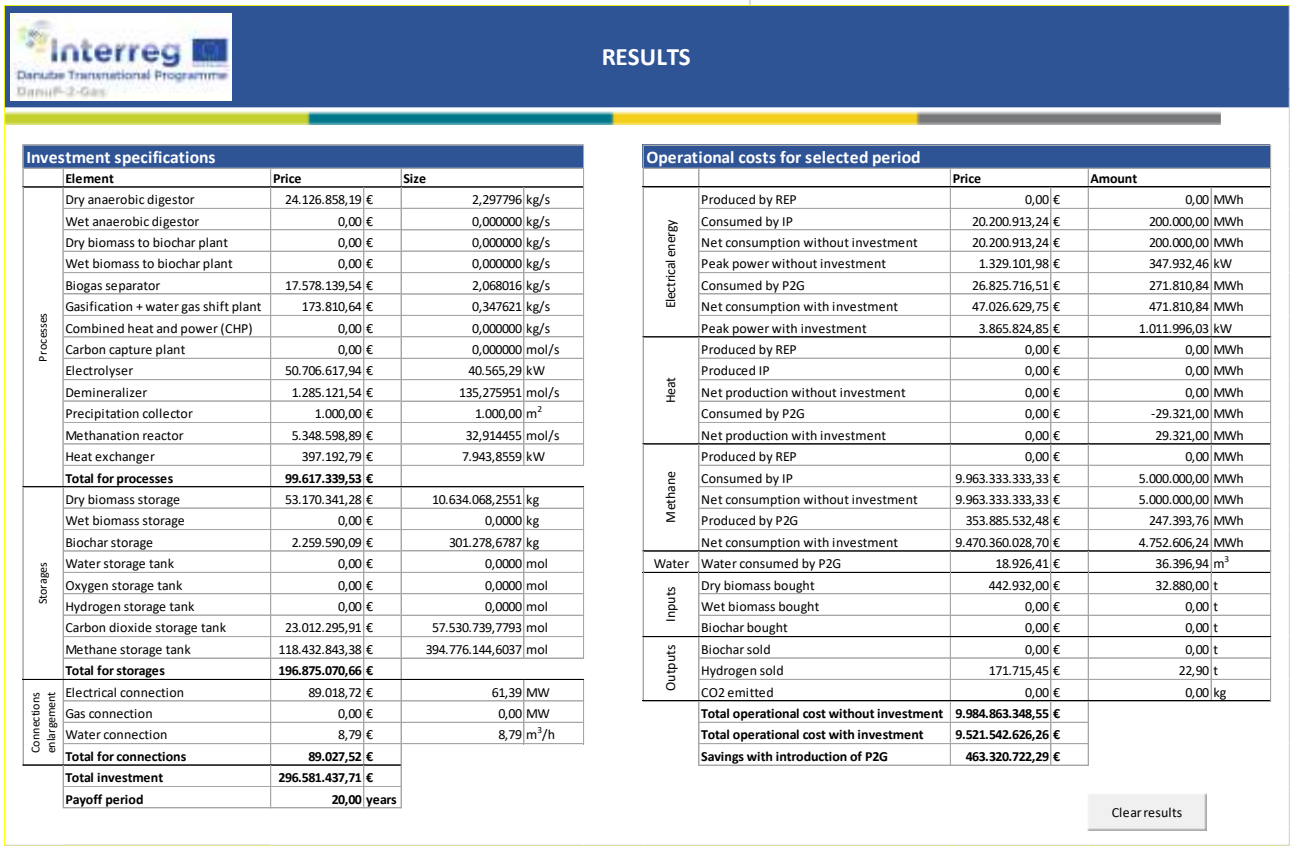
	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**	**years**		

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**0,00**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**0,00**	**€**		

Clear results

Fig. 12 Results for GF with conservative prices of methane and with 50% subsidy



RESULTS

Investment specifications

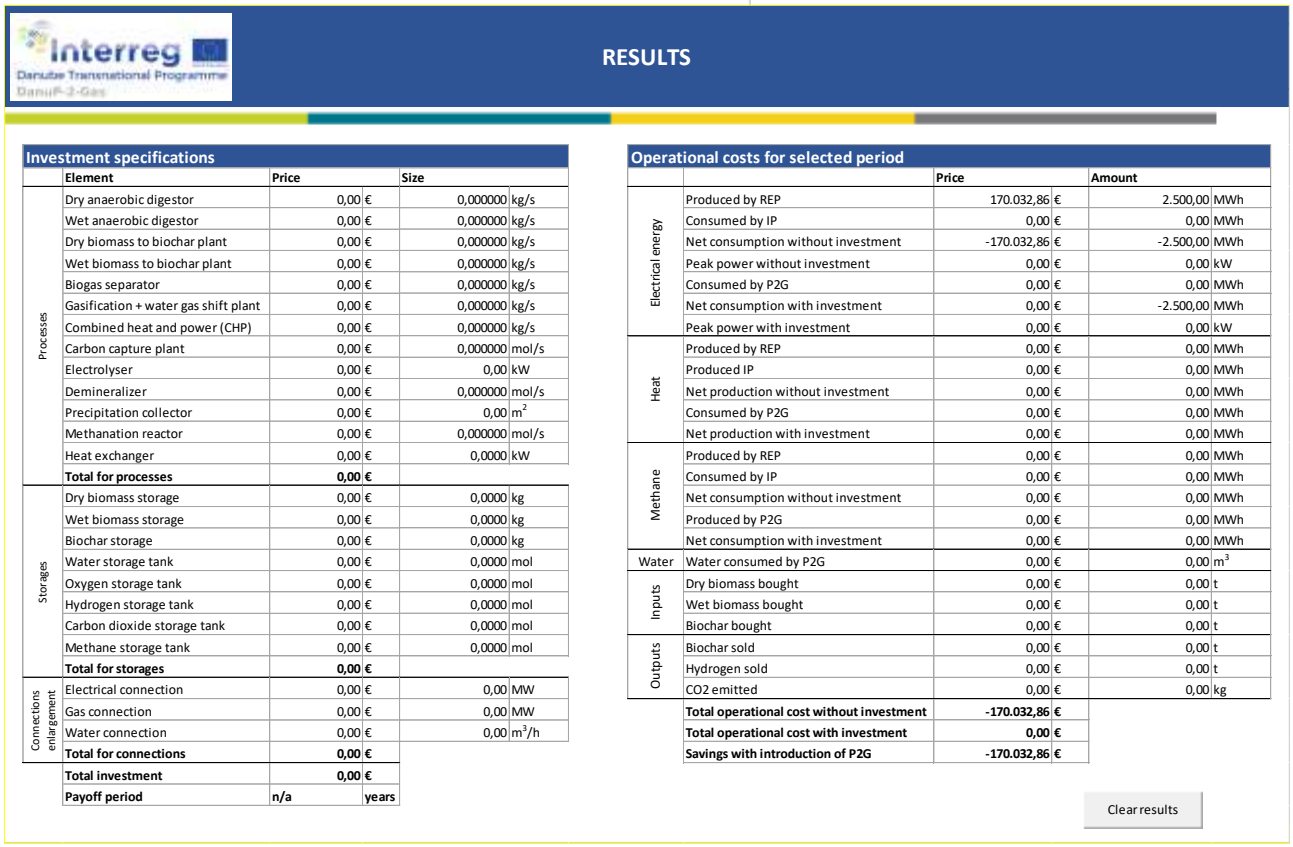
	Element	Price		Size	
Processes	Dry anaerobic digestor	24.126.858,19	€	2,297796	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	17.578.139,54	€	2,068016	kg/s
	Gasification + water gas shift plant	173.810,64	€	0,347621	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	50.706.617,94	€	40.565,29	kW
	Demineralizer	1.285.121,54	€	135,275951	mol/s
	Precipitation collector	1.000,00	€	1.000,00	m^2
	Methanation reactor	5.348.598,89	€	32,914455	mol/s
	Heat exchanger	397.192,79	€	7.943,8559	kW
	Total for processes	**99.617.339,53**	**€**		
Storages	Dry biomass storage	53.170.341,28	€	10.634.068,2551	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	2.259.590,09	€	301.278,6787	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	23.012.295,91	€	57.530.739,7793	mol
	Methane storage tank	118.432.843,38	€	394.776.144,6037	mol
	Total for storages	**196.875.070,66**	**€**		
Connections enlargement	Electrical connection	89.018,72	€	61,39	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	8,79	€	8,79	m^3/h
	Total for connections	**89.027,52**	**€**		
	Total investment	**296.581.437,71**	**€**		
	Payoff period	**20,00**	**years**		

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	20.200.913,24	€	200.000,00	MWh
	Net consumption without investment	20.200.913,24	€	200.000,00	MWh
	Peak power without investment	1.329.101,98	€	347.932,46	kW
	Consumed by P2G	26.825.716,51	€	271.810,84	MWh
	Net consumption with investment	47.026.629,75	€	471.810,84	MWh
	Peak power with investment	3.865.824,85	€	1.011.996,03	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	-29.321,00	MWh
	Net production with investment	0,00	€	29.321,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	9.963.333.333,33	€	5.000.000,00	MWh
	Net consumption without investment	9.963.333.333,33	€	5.000.000,00	MWh
	Produced by P2G	353.885.532,48	€	247.393,76	MWh
	Net consumption with investment	9.470.360.028,70	€	4.752.606,24	MWh
Water	Water consumed by P2G	18.926,41	€	36.396,94	m^3
Inputs	Dry biomass bought	442.932,00	€	32.880,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	171.715,45	€	22,90	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**9.984.863.348,55**	**€**		
	Total operational cost with investment	**9.521.542.626,26**	**€**		
	Savings with introduction of P2G	**463.320.722,29**	**€**		

Clear results

Fig. 13 Results for IP with 5x higher prices of methane and with 50% subsidy



RESULTS

Investment specifications

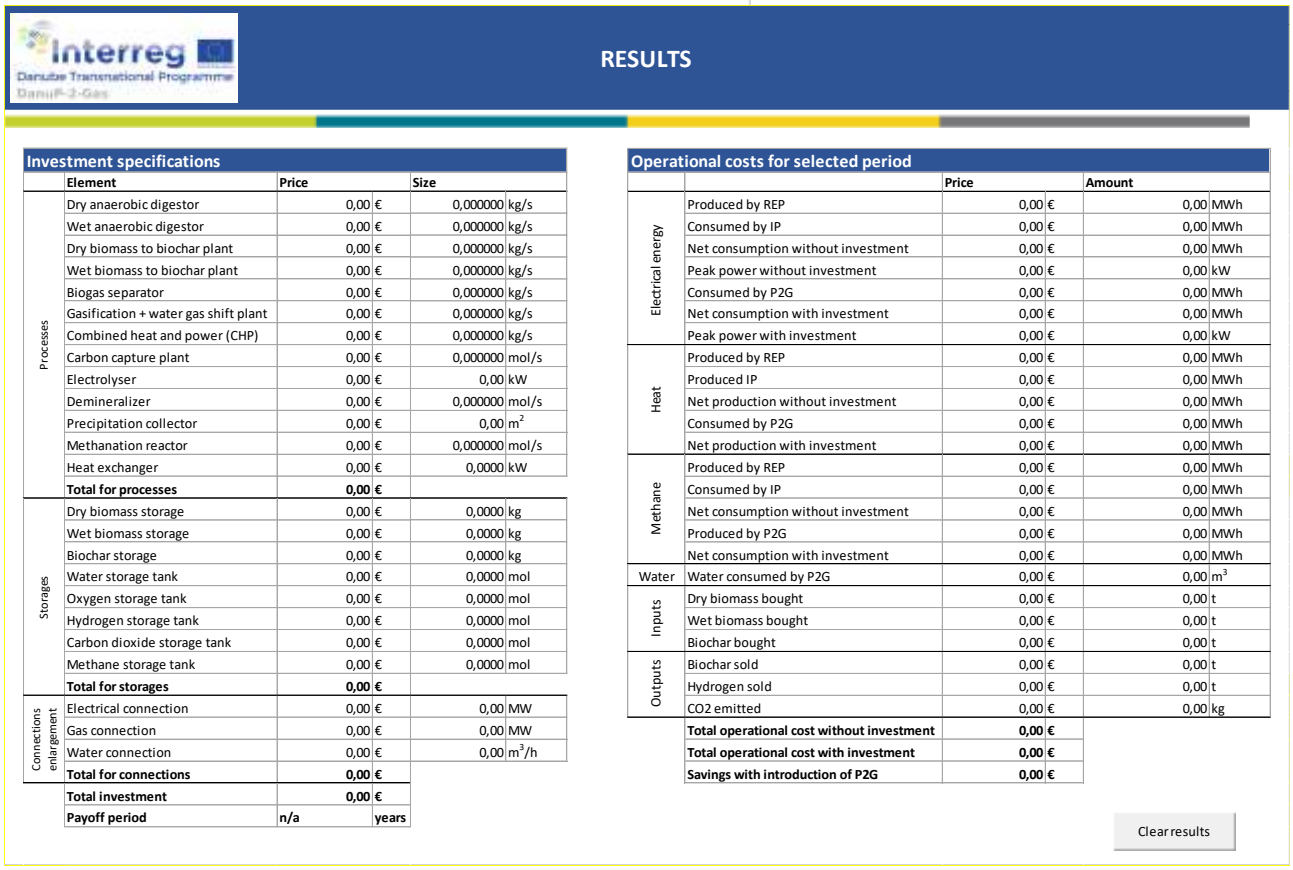
	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**		**years**	

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	170.032,86	€	2.500,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	-170.032,86	€	-2.500,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	-2.500,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**-170.032,86**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**-170.032,86**	**€**		

Clear results

Fig. 14 Results for REP with 5x higher prices of methane and with 50% subsidy



RESULTS

Investment specifications

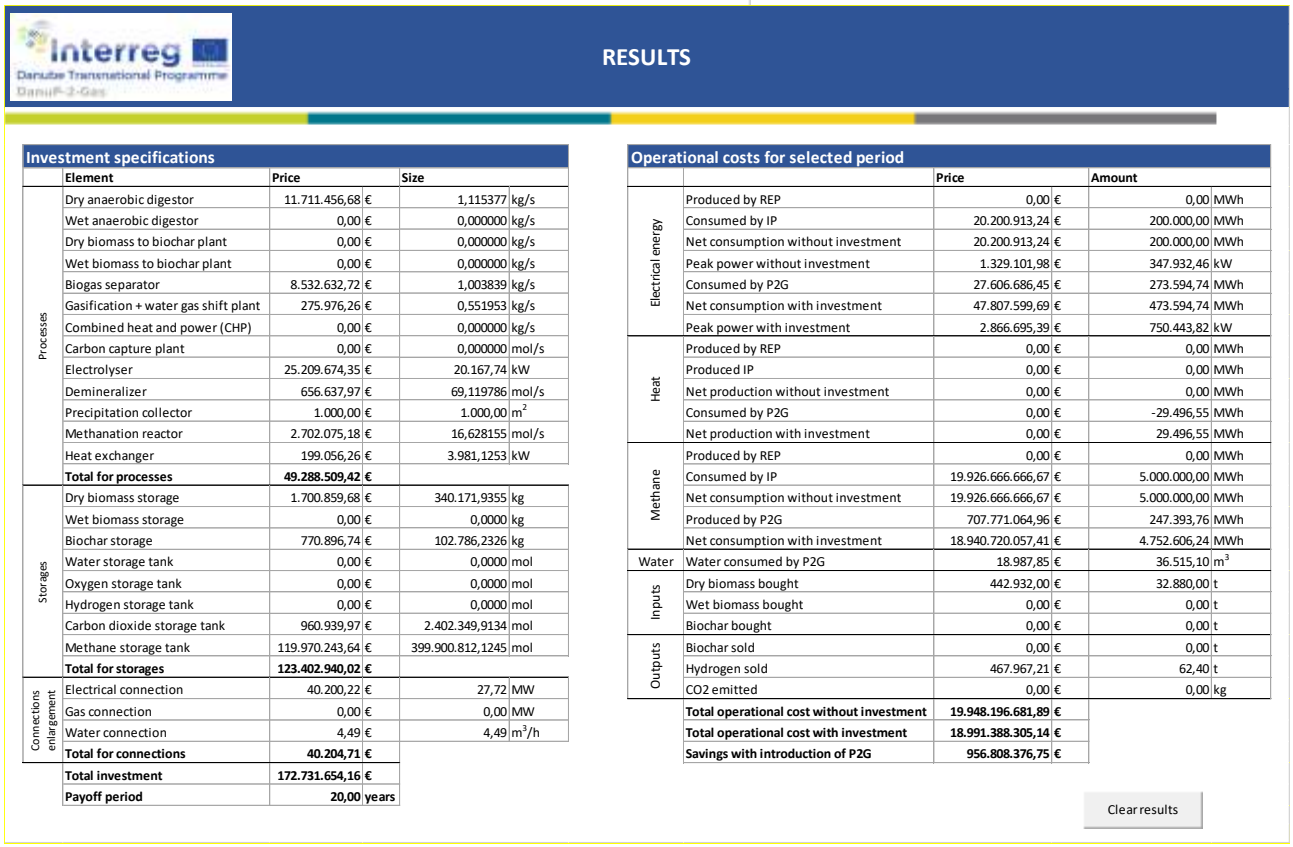
	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**	**years**		

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**0,00**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**0,00**	**€**		

Clear results

Fig. 15 Results for GF with 5x higher prices of methane and with 50% subsidy



RESULTS

Investment specifications

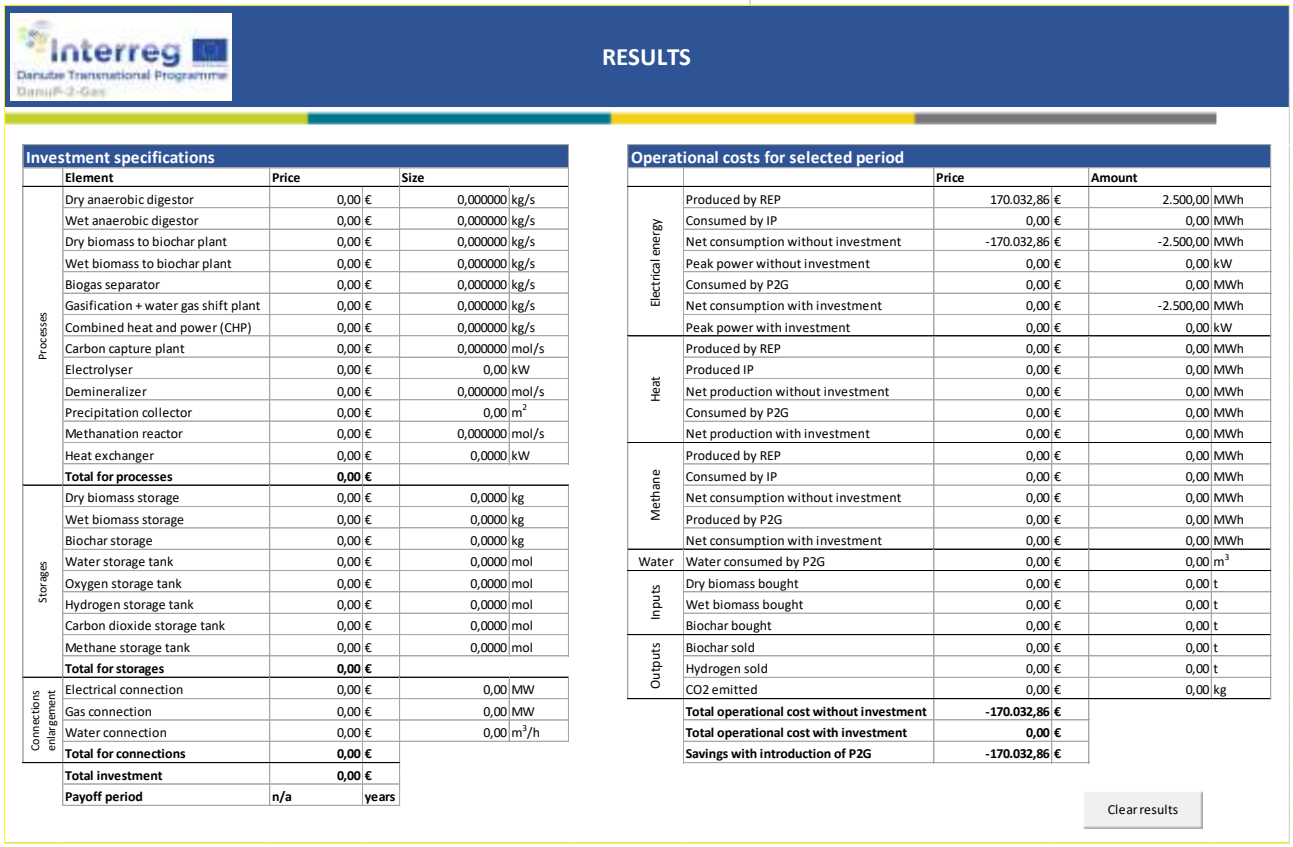
	Element	Price		Size	
Processes	Dry anaerobic digestor	11.711.456,68	€	1,115377	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	8.532.632,72	€	1,003839	kg/s
	Gasification + water gas shift plant	275.976,26	€	0,551953	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	25.209.674,35	€	20.167,74	kW
	Demineralizer	656.637,97	€	69,119786	mol/s
	Precipitation collector	1.000,00	€	1.000,00	m^2
	Methanation reactor	2.702.075,18	€	16,628155	mol/s
	Heat exchanger	199.056,26	€	3.981,1253	kW
	Total for processes	**49.288.509,42**	**€**		
Storages	Dry biomass storage	1.700.859,68	€	340.171,9355	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	770.896,74	€	102.786,2326	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	960.939,97	€	2.402.349,9134	mol
	Methane storage tank	119.970.243,64	€	399.900.812,1245	mol
	Total for storages	**123.402.940,02**	**€**		
Connections enlargement	Electrical connection	40.200,22	€	27,72	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	4,49	€	4,49	m^3/h
	Total for connections	**40.204,71**	**€**		
	Total investment	**172.731.654,16**	**€**		
	Payoff period	**20,00**	**years**		

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	20.200.913,24	€	200.000,00	MWh
	Net consumption without investment	20.200.913,24	€	200.000,00	MWh
	Peak power without investment	1.329.101,98	€	347.932,46	kW
	Consumed by P2G	27.606.686,45	€	273.594,74	MWh
	Net consumption with investment	47.807.599,69	€	473.594,74	MWh
	Peak power with investment	2.866.695,39	€	750.443,82	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	-29.496,55	MWh
	Net production with investment	0,00	€	29.496,55	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	19.926.666.666,67	€	5.000.000,00	MWh
	Net consumption without investment	19.926.666.666,67	€	5.000.000,00	MWh
	Produced by P2G	707.771.064,96	€	247.393,76	MWh
	Net consumption with investment	18.940.720.057,41	€	4.752.606,24	MWh
Water	Water consumed by P2G	18.987,85	€	36.515,10	m^3
Inputs	Dry biomass bought	442.932,00	€	32.880,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	467.967,21	€	62,40	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**19.948.196.681,89**	**€**		
	Total operational cost with investment	**18.991.388.305,14**	**€**		
	Savings with introduction of P2G	**956.808.376,75**	**€**		

Clear results

Fig. 16 Results for IP with 10x higher prices of methane and with 50% subsidy



RESULTS

Investment specifications

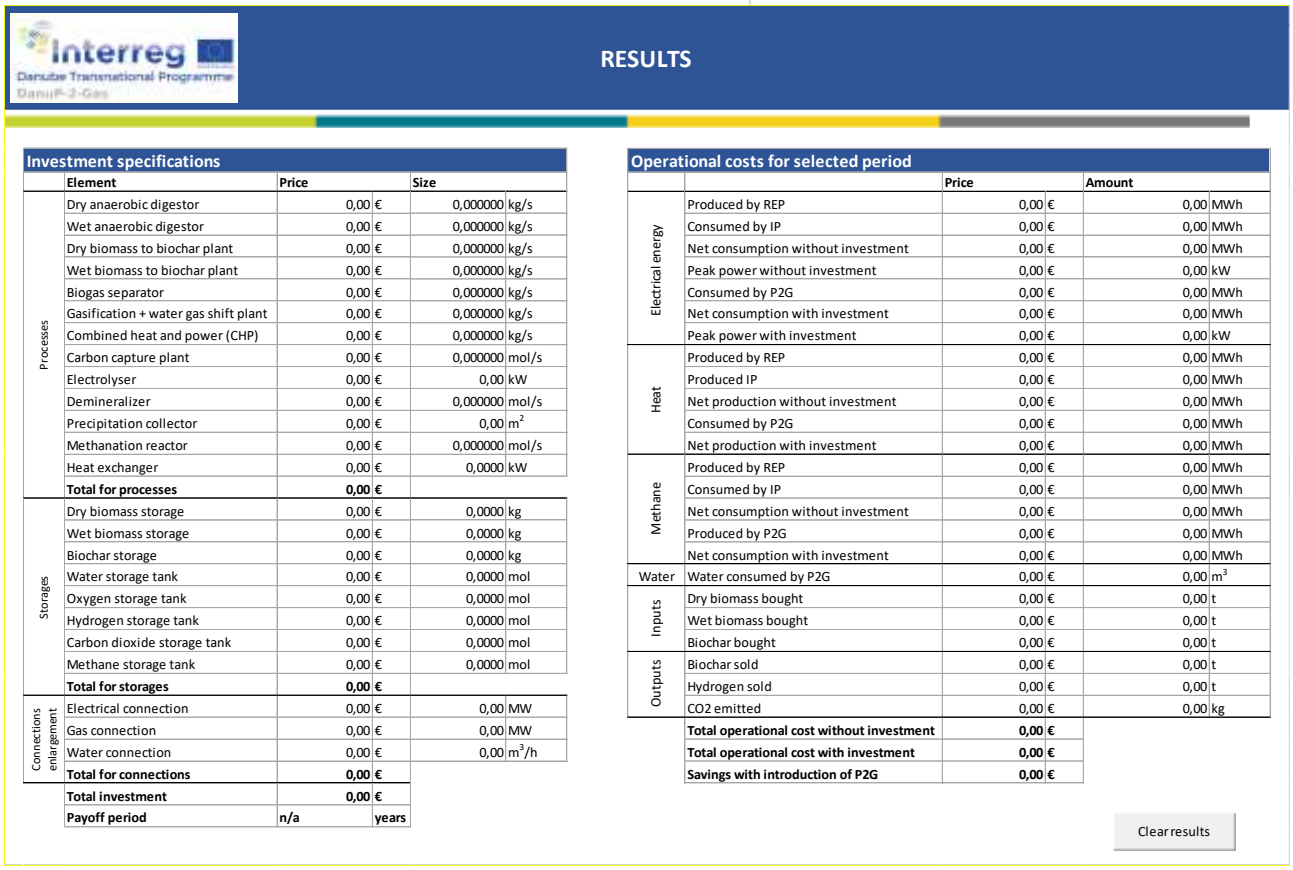
	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**		**years**	

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	170.032,86	€	2.500,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	-170.032,86	€	-2.500,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	-2.500,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**-170.032,86**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**-170.032,86**	**€**		

Clear results

Fig. 17 Results for REP with 10x higher prices of methane and with 50% subsidy



RESULTS

Investment specifications

	Element	Price		Size	
Processes	Dry anaerobic digestor	0,00	€	0,000000	kg/s
	Wet anaerobic digestor	0,00	€	0,000000	kg/s
	Dry biomass to biochar plant	0,00	€	0,000000	kg/s
	Wet biomass to biochar plant	0,00	€	0,000000	kg/s
	Biogas separator	0,00	€	0,000000	kg/s
	Gasification + water gas shift plant	0,00	€	0,000000	kg/s
	Combined heat and power (CHP)	0,00	€	0,000000	kg/s
	Carbon capture plant	0,00	€	0,000000	mol/s
	Electrolyser	0,00	€	0,00	kW
	Demineralizer	0,00	€	0,000000	mol/s
	Precipitation collector	0,00	€	0,00	m^2
	Methanation reactor	0,00	€	0,000000	mol/s
	Heat exchanger	0,00	€	0,0000	kW
	Total for processes	**0,00**	**€**		
Storages	Dry biomass storage	0,00	€	0,0000	kg
	Wet biomass storage	0,00	€	0,0000	kg
	Biochar storage	0,00	€	0,0000	kg
	Water storage tank	0,00	€	0,0000	mol
	Oxygen storage tank	0,00	€	0,0000	mol
	Hydrogen storage tank	0,00	€	0,0000	mol
	Carbon dioxide storage tank	0,00	€	0,0000	mol
	Methane storage tank	0,00	€	0,0000	mol
	Total for storages	**0,00**	**€**		
Connections enlargement	Electrical connection	0,00	€	0,00	MW
	Gas connection	0,00	€	0,00	MW
	Water connection	0,00	€	0,00	m^3/h
	Total for connections	**0,00**	**€**		
	Total investment	**0,00**	**€**		
	Payoff period	**n/a**	**years**		

Operational costs for selected period

		Price		Amount	
Electrical energy	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Peak power without investment	0,00	€	0,00	kW
	Consumed by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
	Peak power with investment	0,00	€	0,00	kW
Heat	Produced by REP	0,00	€	0,00	MWh
	Produced IP	0,00	€	0,00	MWh
	Net production without investment	0,00	€	0,00	MWh
	Consumed by P2G	0,00	€	0,00	MWh
	Net production with investment	0,00	€	0,00	MWh
Methane	Produced by REP	0,00	€	0,00	MWh
	Consumed by IP	0,00	€	0,00	MWh
	Net consumption without investment	0,00	€	0,00	MWh
	Produced by P2G	0,00	€	0,00	MWh
	Net consumption with investment	0,00	€	0,00	MWh
Water	Water consumed by P2G	0,00	€	0,00	m^3
Inputs	Dry biomass bought	0,00	€	0,00	t
	Wet biomass bought	0,00	€	0,00	t
	Biochar bought	0,00	€	0,00	t
Outputs	Biochar sold	0,00	€	0,00	t
	Hydrogen sold	0,00	€	0,00	t
	CO2 emitted	0,00	€	0,00	kg
	Total operational cost without investment	**0,00**	**€**		
	Total operational cost with investment	**0,00**	**€**		
	Savings with introduction of P2G	**0,00**	**€**		

Clear results

Fig. 18 Results for GF with 10x higher prices of methane and with 50% subsidy

4. CONCLUSIONS

Prefeasibility studies for three typical location cases for a P2G hub investment in Serbia are presented. Results that use optimization with a free linear programming solver are given which is part of the optimization tool distributed for a widespread use. Maximum allowed return on investment period of 20 years is considered uniformly in all cases, however often the optimum economical setup of the investment yields much shorter return on investment periods. Increase of methane price up to 280 €/MWh enables investment in biomethane production within the P2G in cases with IP. In case of GF, investment is not economically viable with current price of methane. For the optimization runs that use time periods shorter than one year due to the free linear programming solver constraints, control simulations for the complete year are obtained also by the IBM CPLEX solver which UNIZGFER can use only by its staff for academic/research purposes. Control simulations obtained with employment of the IBM CPLEX solver confirm that results obtained by the free solver are correct and trustworthy for P2G investment considerations.)