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THE CONGREGATE PROJECT

BULGARIAN PILOTS: BURGAS, DOBRICH, SOFIA



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THE PILOTS

Sofia



- The capital and the largest city in Bulgaria
- Over 1 300 000 inhabitants
- Over 860 municipal buildings
- Pilot site: Ivan Bogorov School

Burgas



- Situated on the Black Sea coast
- Over 200 000 inhabitants
- Over 200 municipal buildings
- Pilot site: Industrial and Logistic Park

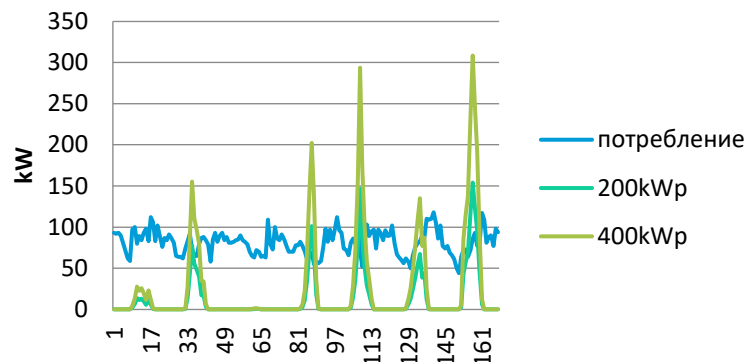
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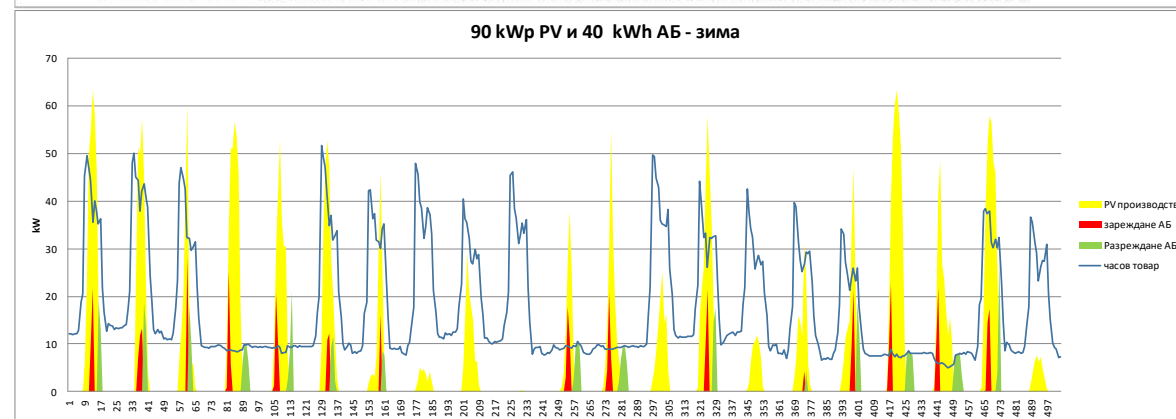
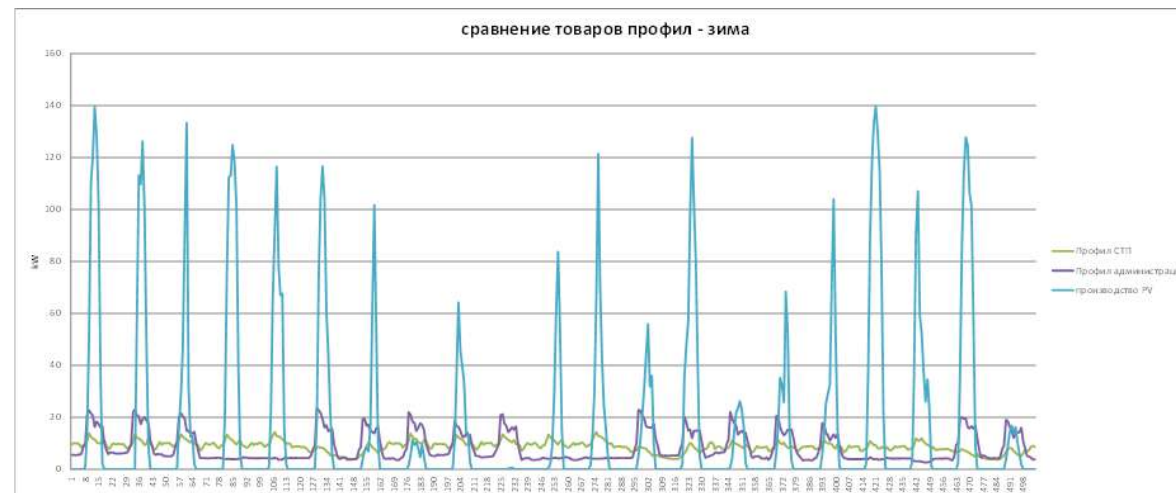
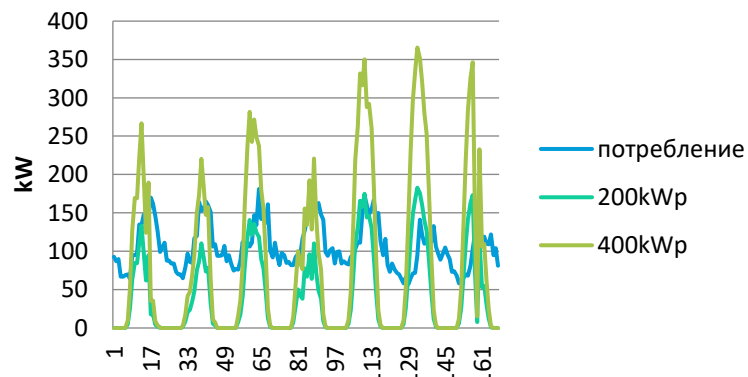
- Municipality within a city
- Over 79 000 inhabitants
- Over 70 municipal buildings
- Pilot site: The main administrative building

LOAD PROFILES

Winter week, company XXX



Summer week, company XXX



BURGAS PILOT CASE: BASELINE

Already installed PV plants.

Use of geothermal energy.

Just a few companies provided detailed information for the installed capacity and the load profiles.

Wastewater treatment plant nearby



SCENARIOS – BURGAS

- ❑ Individual solutions – Business As Usual
- ❑ Cooperation within the Industrial zone
- ❑ Cooperation within the Industrial zone and connection to anaerobic plant
 - Advantages
 - Almost full use of the produced energy on site
 - Constant electricity price over a long period of time
 - Better balancing through the anaerobic plant
 - Even lower fees
 - Disadvantages
 - Regulations still not supporting energy cooperatives
 - Additional expenses for design and construction



COMPARISON OF THE RESULTS

- ❑ Final price in scenario 3 - 287 BGN/MWh (annual appreciation of 1.4% for the first 10 years).
- ❑ Only in case of market energy price below 210 BGN/MWh (excluding fees), which is hardly possible, it is more profitable to keep the BaU scenario.
- ❑ Cooperative or individual solutions, comparison:

Company XXX, existing PV plant with 515 kWp	Standard contract (2021)	Standard contract (2022)	Contract with the cooperative	Members of the cooperative
Price of the energy from the PV, BGN/MWh	344	344	344	287
Price of the purchased energy, BGN/MWh	226	235	197	0
Price of sold energy, BGN/MWh	-183	-246	-188	0
Average annual price, BGN/MWh	388	333	354	287

CONCLUSIONS AND RECOMMENDATIONS

- ❑ There is still a lack of ready-to-implement contractual and legal models for cooperation.
- ❑ At this stage, the leading role of the initiator of the cooperation, around which the different actors can unite, is crucial.
- ❑ The price levels achieved are competitive with the current electricity prices.
- ❑ The efficiency of investments can be significantly increased by the implementation of 'smart' solutions.
- ❑ The possibility of balancing the loads through the anaerobic plant allows maximum utilisation of the produced energy on site.

DOBRICH: BASELINE

Hourly consumption available

Repair of the roof needed

No other municipal buildings with different profile nearby

Electrical installation of the building in poor condition



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SCENARIOS - DOBRICH

□ Business As Usual

- 60 kWp: 39% of the consumption covered; 69% of the energy used in the building; Batteries decrease the energy used from the grid by 3 to 5 %; Simple payback – 3,7 year (4,2 years with batteries)
- 90 kWp: 46% of the consumption covered; 53% of the energy used in the building; Batteries can decrease the energy used from the grid by 7 to 13 %; Simple payback – 4,1 year (4,1 years with batteries)

□ Energy cooperative

- 60 kWp: Investment distribution – municipality/private (58%/42%); 6% dividends for private investors; 27% profit for the private investors (10 years); Simple payback for the municipality – 2,7 years
- 90 kWp: Investment distribution – municipality/private (38%/62%); 7% dividends for private investors; 32% profit for the private investors (10 years); Simple payback for the municipality – 2,3 years

ATTRACT THE INVESTORS

☐ Profit – 27% (60 kWp)

☐ Profit – 32% (90 kWp)

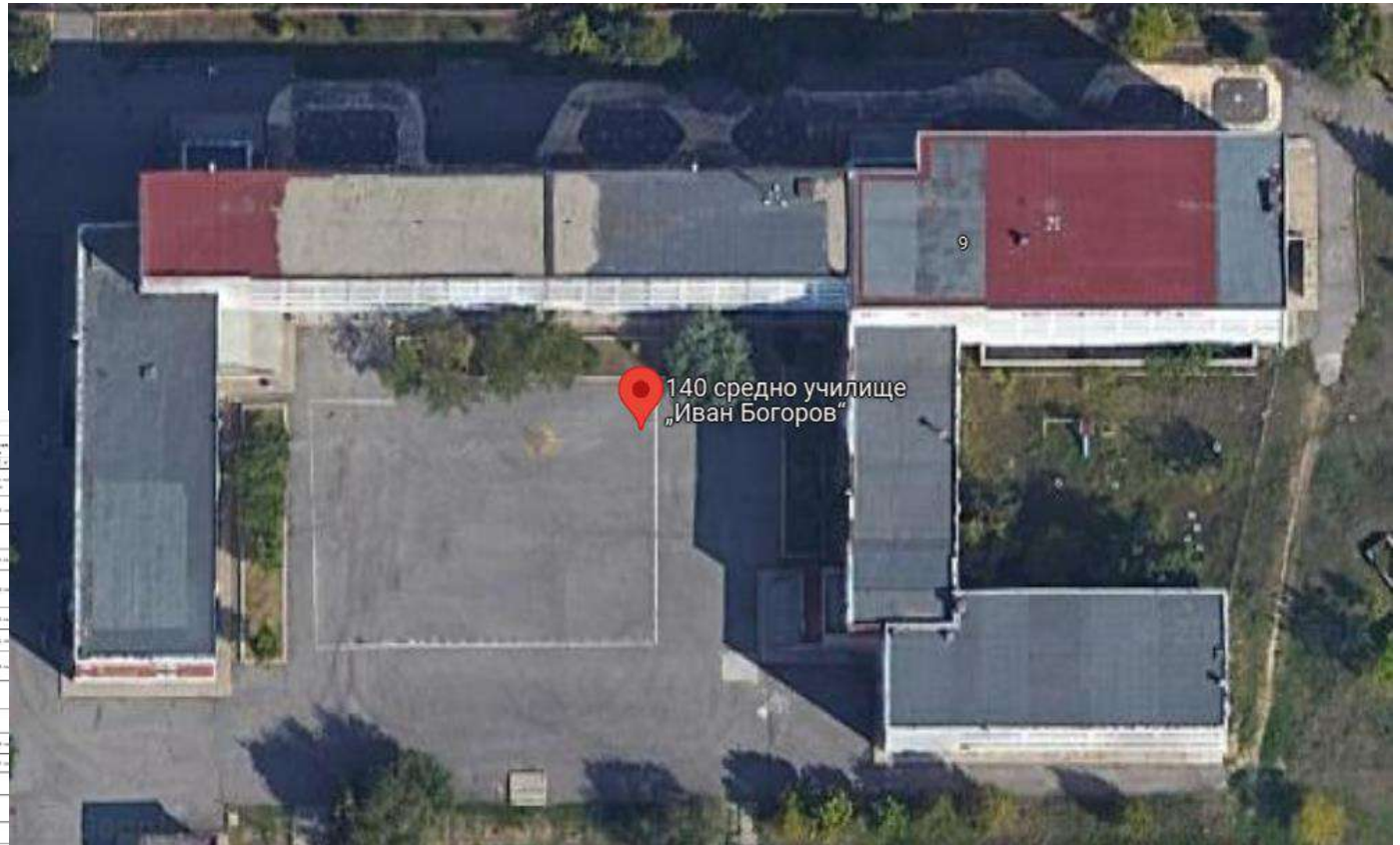
Year	10 investors provide 40 000 BGN		10 investors provide 90 000 BGN	
	capital, BGN	dividends, BGN	capital, BGN	dividends, BGN
1	4000	1 123	9000	2 751
2	4000	1 123	9000	2 751
3	4000	1 123	9000	2 751
4	4000	1 123	9000	2 751
5	4000	1 123	9000	2 751
6	4000	1 123	9000	2 751
7	4000	1 123	9000	2 751
8	4000	1 123	9000	2 751
9	4000	1 123	9000	2 751
10	4000	1 123	9000	2 751

SOFIA: BASELINE

Ivan Bogorov school

No summer consumption, the energy may be used in other municipal buildings, based on contract with energy trader or through direct cable.

№	Именник	Адрес	Тип	Площина (кв. м)	Единици	Класификация	Тип на потребление	Средна годишна консумация (кWh)	Максимална консумация (кWh)	Средна годишна консумация (кWh/кв. м)	Максимална консумация (кWh/кв. м)	Средна годишна консумация (кWh/кв. м)	Максимална консумация (кWh/кв. м)	Средна годишна консумация (кWh/кв. м)	Максимална консумация (кWh/кв. м)	Средна годишна консумация (кWh/кв. м)	Максимална консумация (кWh/кв. м)	Средна годишна консумация (кWh/кв. м)	Максимална консумация (кWh/кв. м)
1	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
3	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
4	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
5	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
6	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
7	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
8	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
9	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
10	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
11	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
12	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
13	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
14	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
15	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
16	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
17	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
18	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
19	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
20	Иван Богоров	140 средно училище „Иван Богоров“	Общ.	1751.0	1	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000



SCENARIOS

- Covering part of the school needs and selling the surplus
- Covering part of the school and the kindergarten needs and selling the surplus



ATTRACT THE INVESTORS

- ❑ Profit – 63% (supplying only the school)
- ❑ Profit – 47% (supplying the school and the kindergarten)

Year	Supplying only school		Supplying school and kindergarten	
	capital, BGN	dividends, BGN	capital, BGN	dividends, BGN
1	30 000	19 070	30 000	14 173
2	30 000	19 070	30 000	14 173
3	30 000	19 070	30 000	14 173
4	30 000	19 070	30 000	14 173
5	30 000	19 070	30 000	14 173
6	30 000	19 070	30 000	14 173
7	30 000	19 070	30 000	14 173
8	30 000	19 070	30 000	14 173
9	30 000	19 070	30 000	14 173
10	30 000	19 070	30 000	14 173

CONCLUSIONS AND RECOMMENDATIONS

- There is still a lack of ready-to-implement contractual and legal models for cooperation.
- RE installations for own needs have limited effect and batteries are not solving this issue.
- Energy cooperatives allow to share the financial risk, providing a good return for investors relative to current bank deposit rates.
- If electricity prices are higher than assumed, the municipality can offer better terms to the investors.
- The municipality should establish its own unit to control and manage energy flows in the building and to communicate with traders and investors.
- The efficiency of investments can be increased by the implementation of 'smart' solutions.
- Another municipal building with different load profile nearby (sport facility) can significantly increase the effect of the PV plant.
- Priority should be given to using the energy produces for own needs

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THANK YOU FOR YOUR ATTENTION

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