



BISEPS |

Business clusters Integrated Sustainable Energy PackageS

THE BISEPS PV TOOL

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UGent

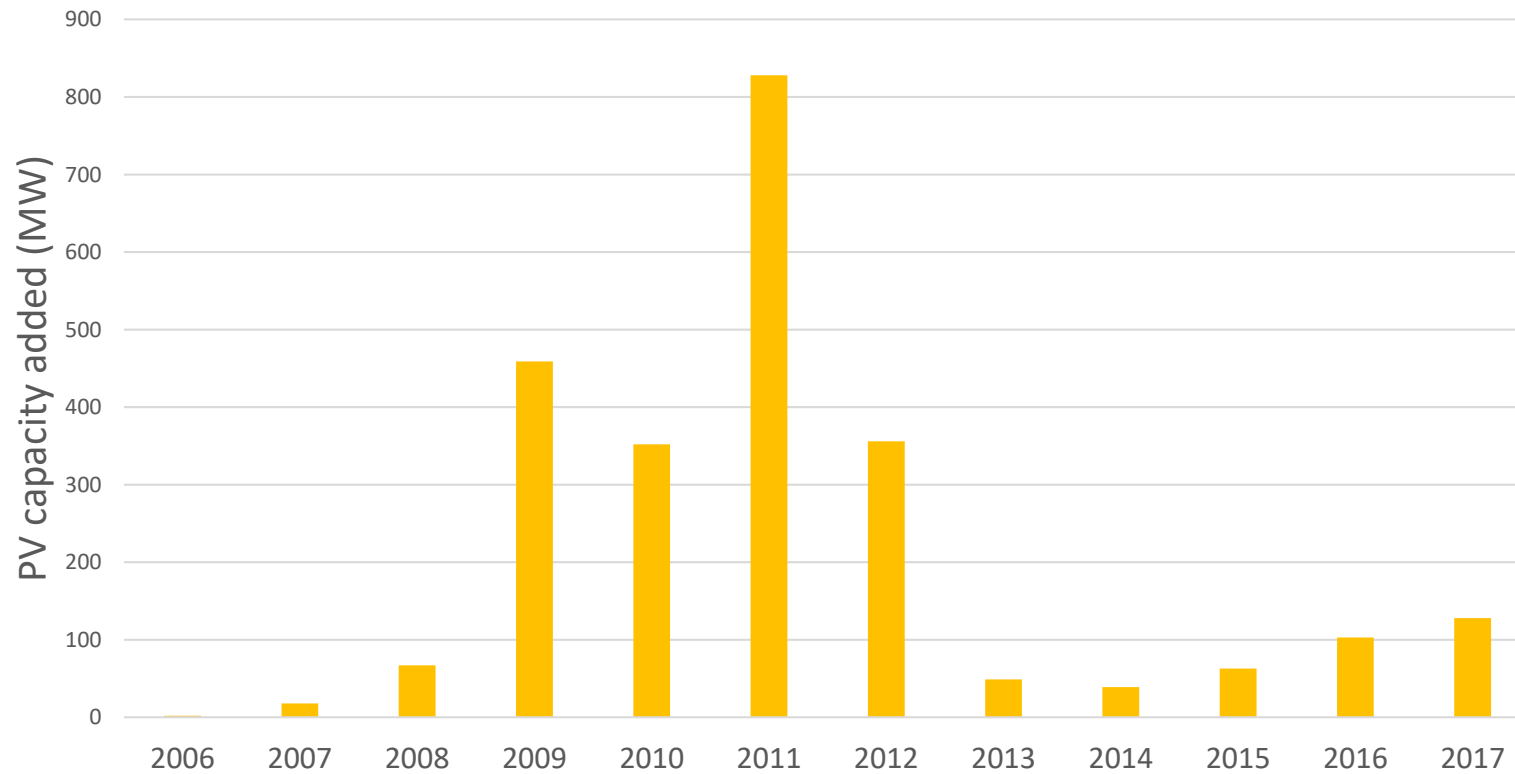


Gemeente Breda



INTRODUCTION

Evolution of PV capacity growth in Flanders





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THE PV-SIZING TOOL FOR INDIVIDUAL BUSINESSES

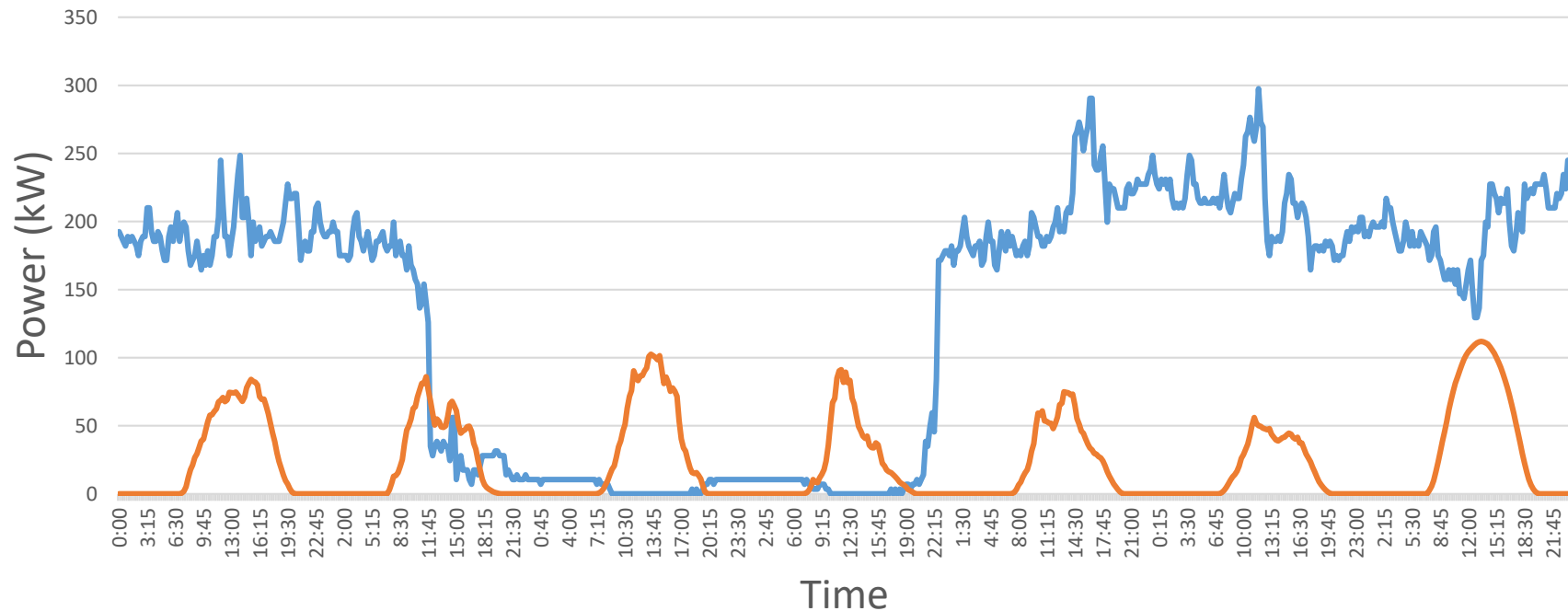


PV-SIZING TOOL: OUTLINE

- Calculation tool for optimal sizing of >10kW PV
- Based on:
 - Quarter-hourly load profile of company
 - Historical PV power generation data
- **Objective:** profitability
- **I.f.o:** PV capacity (kW)
- **Constraint:** available roofspace
- **Economic optimum**

PV SIZING TOOL: INPUTS & PV POWER CALCULATION

Load vs PV Generation



➔ Annual power production, autoconsumption, grid feed-in

PV SIZING TOOL: COST-BENEFIT ANALYSIS FLANDERS

Costs:

- Investment
- Maintenance
- Inverter replacement
- Feed-in tariff

Benefits:

- Avoided cost of electricity
- Feed-in revenue
- Subsidies
- G.o.O

Profitability depends on:

- Power generation
- Electricity bill
- Share of auto-consumption

PV SIZING TOOL: COST-BENEFIT ANALYSIS FLANDERS

Costs		10-250kW	250-750kW
Investment cost	€/kWp	1340	1080
Maintenance cost	€/kWp/year	13	12,8
Replacement inverter (after 12 years)	€/kWp	150	150
Feed-in tariff	€/kWh	0,0015	0,0015
Benefits			
Avoided cost of electricity	€/kWh	0,145	0,145
Sale of injected power	€/kWh	0,035	0,035
Green power certificates (for 10 or 15 years?)	€/kWh	0,0417	0,0425
Guarantees of origin	€/kWh	0,0003	0,0003
Fiscale investment deduction	%	13,5%	13,5%

PV SIZING TOOL: INVESTMENT CASHFLOW ANALYSIS

Year	Production(kWh)	Auto-consumption (kWh)	Feed-in (kWh)	CAPEX (€)	OPEX (€)	Benefits (€)	Discount rate	Cashflow (€)	Discounted CFs (€)	Balance Simple(€)	Balance Discounted(€)
0	0	0	0	245891	0	0	1,00	-245891	-245891	-245891	-245891
1	227274	143123	84152	0	2884	33244	1,10	30360	27600	-215531	-218291
2	227274	143123	84152	0	2884	33244	1,21	30360	25091	-185171	-193200
3	227274	143123	84152	0	2884	33244	1,33	30360	22810	-154812	-170391
4	227274	143123	84152	0	2884	33244	1,46	30360	20736	-124452	-149655
5	227274	143123	84152	0	2884	33244	1,61	30360	18851	-94093	-130804
6	227274	143123	84152	0	2884	33244	1,77	30360	17137	-63733	-113667
7	227274	143123	84152	0	2884	33244	1,95	30360	15579	-33373	-98087
8	227274	143123	84152	0	2884	33244	2,14	30360	14163	-3014	-83924
9	227274	143123	84152	0	2884	33244	2,36	30360	12875	27346	-71049
10	227274	143123	84152	0	2884	33244	2,59	30360	11705	57705	-59344
11	227274	143123	84152	0	2884	33244	2,85	30360	10641	88065	-48703
12	227274	143123	84152	31821	2884	33244	3,14	-1461	-466	86604	-49169
13	227274	143123	84152	0	2884	33244	3,45	30360	8794	116963	-40375
14	227274	143123	84152	0	2884	33244	3,80	30360	7995	147323	-32380
15	227274	143123	84152	0	2884	33244	4,18	30360	7268	177682	-25112
16	227274	143123	84152	0	2884	23698	4,59	20814	4530	198496	-20583
17	227274	143123	84152	0	2884	23698	5,05	20814	4118	219310	-16465
18	227274	143123	84152	0	2884	23698	5,56	20814	3744	240124	-12721
19	227274	143123	84152	0	2884	23698	6,12	20814	3403	260939	-9318
20	227274	143123	84152	0	2884	23698	6,73	20814	3094	281753	-6224
21	227274	143123	84152	0	2884	23698	7,40	20814	2813	302567	-3411
22	227274	143123	84152	0	2884	23698	8,14	20814	2557	323381	-854
23	227274	143123	84152	0	2884	23698	8,95	20814	2324	344195	1470
24	227274	143123	84152	0	2884	23698	9,85	20814	2113	365009	3583
25	227274	143123	84152	0	2884	23698	10,83	20814	1921	385823	5504



PV SIZING TOOL: OPTIMISATION & RESULTS

- **Optimisation:**
 - Maximisation of profitability i.f.o installed PV capacity
- **Results:**
 - Optimal PV capacity
 - Measures of profitability: NPV, IRR & payback time
 - Occupied roof space
 - Share of total roof space



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PV-SHARING IN BUSINESS CLUSTERS

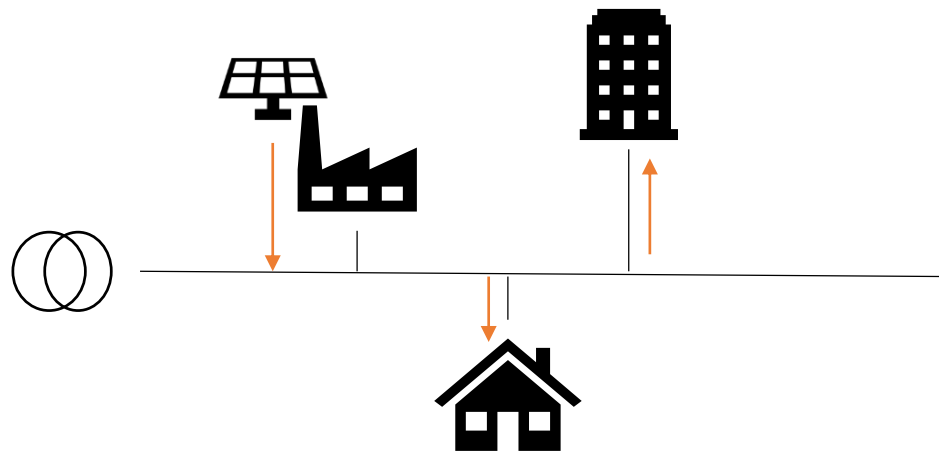
WHY PV SHARING?

- PV-sharing = collaborative business models for PV
- Motivation:
 - Improvement of business case
 - Increase in optimal installed capacity
- Examples:
 - External investment
 - Installation on neighbouring roof via direct line
 - Direct sale over the grid to neighbours

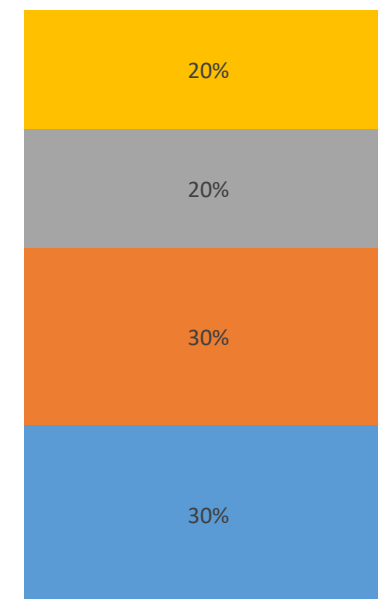
EXAMPLE: DIRECT SALE OF FEED-IN POWER TO NEIGHBOURS

- **Idea:**

- tax/ grid tariff discount for locally contained feed-in power
- Limited use of grid → lower grid tariff?



The electricity bill in Flanders



■ Electricity
 ■ DG tariff
 ■ TG tariff
 ■ Taxes

WHAT IF... THE FEED-IN PRICE WERE HIGHER?

Feed-in tariff	0,035 €/kWh
Optimal capacity	158 kWp
NPV	€7166
IRR	10,6%
Payback	8,31 years
Occupied share of roof space	55%



Feed-in tariff	0,05 €/kWh
Capacity	158 kWp
NPV	€15 279
IRR	11,2%
Payback	8 years
Occupied share of roof space	55%



Feed-in tariff	0,05 €/kWh
Optimal capacity	212,1 kWp
NPV	€16 962
IRR	11%
Payback	8,1 years
Occupied share of roof space	74%