Solar Král s.r.o.
Pod Čertovým pahorkem 471
261 01 Příbram VII
Česká republika

Contact person:
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Soukr. RD
Tomáš Březina
Vizovická 613
460 08 Liberec XIX- Horní Hanychov

Customer No.: 2024-321
Project Name: FVE Březina Tomáš Liberec RD613 Aiko500 9,0 kWp 14,2 kWh
Offer no.: P2024-322-1

30.09.2024

Your PV system from Solar Král s.r.o.

Address of Installation

Vizovická 612
460 08 Liberec XIX- Horní Hanychov

Project Description:

Panely orientace východ-západ
Maximum panelů
Výkon sledovat po hodinách (spotové ceny)
Stříškové položení panelů

Project Overview

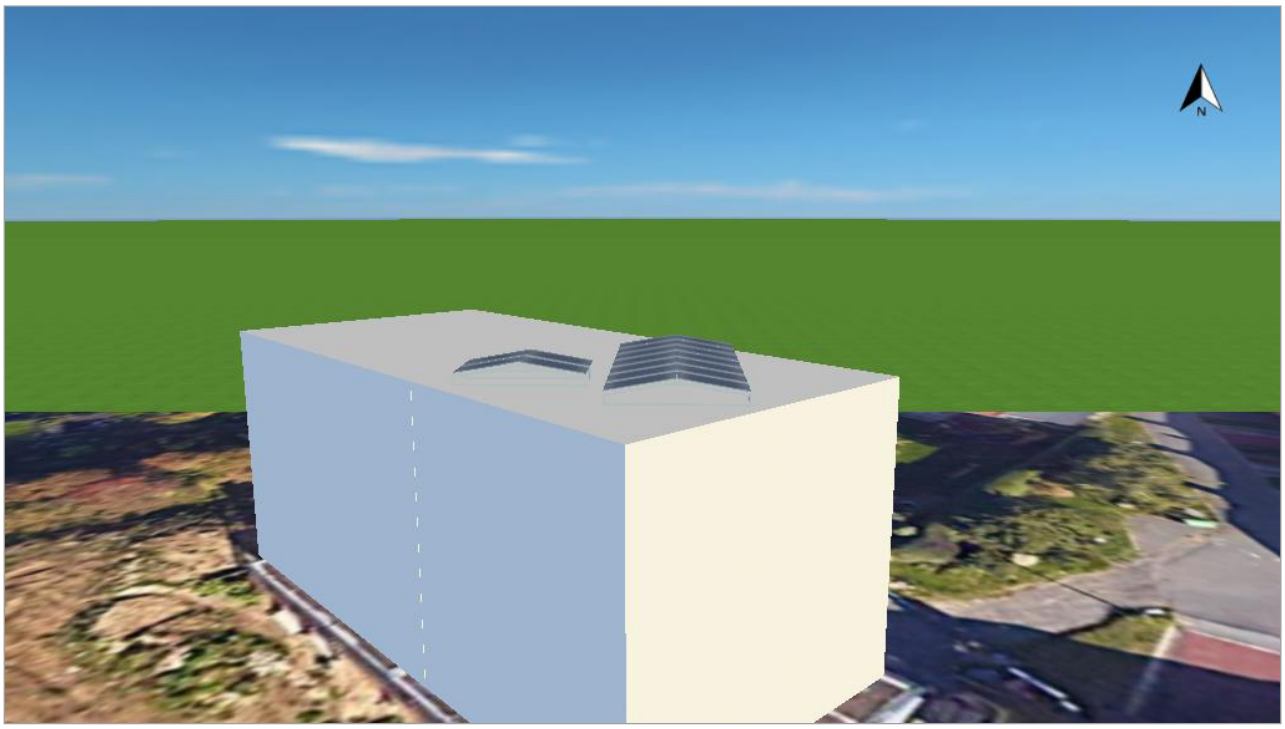


Figure: Overview Image, 3D Design

PV System

3D, Grid-connected PV System with Electrical Appliances and Battery Systems

Climate Data	Liberec, CZE (2001 - 2020)	
Values source	Meteonorm 8.2	
PV Generator Output	9	kWp
PV Generator Surface	39,9	m²
Number of PV Modules	18	
Number of Inverters	1	
No. of battery systems	1	

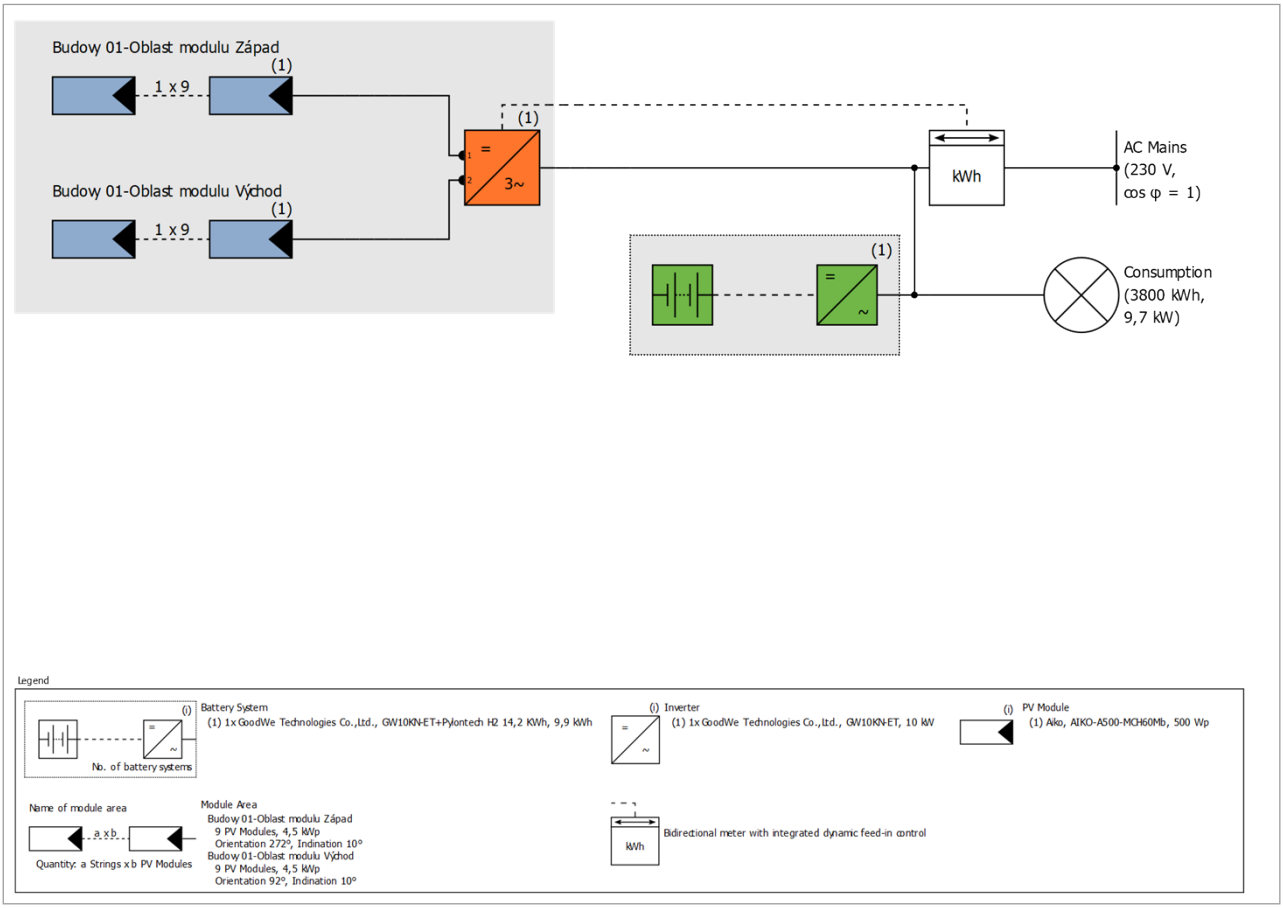


Figure: Schematic diagram

Production Forecast

Production Forecast

PV Generator Output	9,00	kWp
Spec. Annual Yield	907,04	kWh/kWp
Performance Ratio (PR)	81,50	%
Yield Reduction due to Shading	0,3	%
PV Generator Energy (AC grid)	8 217	kWh/Year
Direct Own Use	1 408	kWh/Year
Battery Charge	1 753	kWh/Year
Clipping at Feed-in Point	0	kWh/Year
Grid Export	5 056	kWh/Year
Own Power Consumption	38,1	%
CO_2 Emissions avoided	3 720	kg / year
Level of Self-sufficiency	75,8	%

Financial Analysis

Your Gain

Total investment costs	0,00	Kč
Internal Rate of Return (IRR)	11,03	%
Amortization Period	9,3	Years
Electricity Production Costs	0,7088	Kč/kWh
Energy Balance/Feed-in Concept	Surplus Feed-in	

The results have been calculated with a mathematical model calculation from Valentin Software GmbH (PV*SOL algorithms). The actual yields from the solar power system may differ as a result of weather variations, the efficiency of the modules and inverter, and other factors.

Set-up of the System

Overview

System Data

Type of System	3D, Grid-connected PV System with Electrical Appliances and Battery Systems

Climate Data

Location	Liberec, CZE (2001 - 2020)
Values source	Meteonorm 8.2
Resolution of the data	1 h
Simulation models used:	
- Diffuse Irradiation onto Horizontal Plane	Hofmann
- Irradiance onto tilted surface	Hay & Davies

Consumption

Total Consumption	3800 kWh
2 osoby s jedním dítětem	3800 kWh
Load Peak	9,7 kW

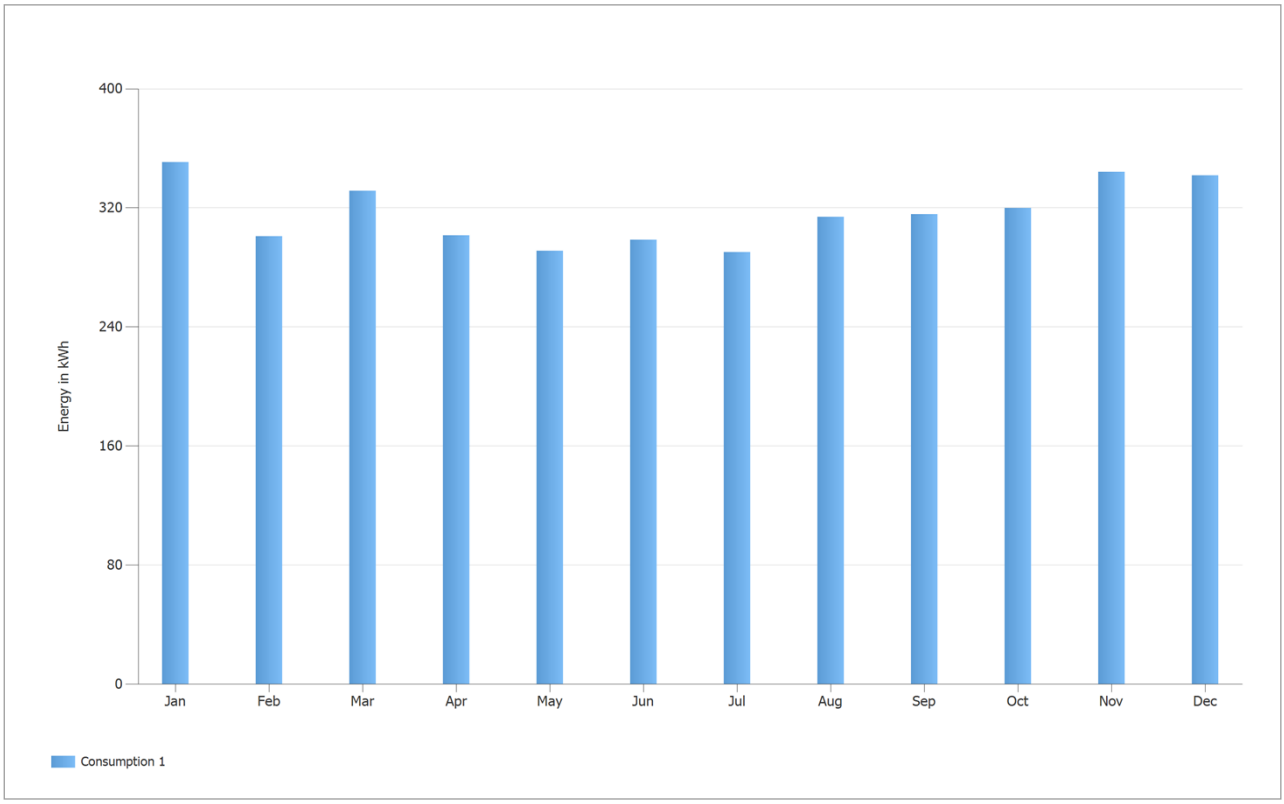


Figure: Consumption

Module Areas

1. Module Area - Budovy 01-Oblast modulu Západ

PV Generator, 1. Module Area - Budovy 01-Oblast modulu Západ

Name	Budovy 01-Oblast modulu Západ
PV Modules	9 x AIKO-A500-MCH60Mb (v1)
Manufacturer	Aiko
Inclination	10 °
Orientation	West 272 °
Installation Type	Mounted - Roof
PV Generator Surface	19,9 m²

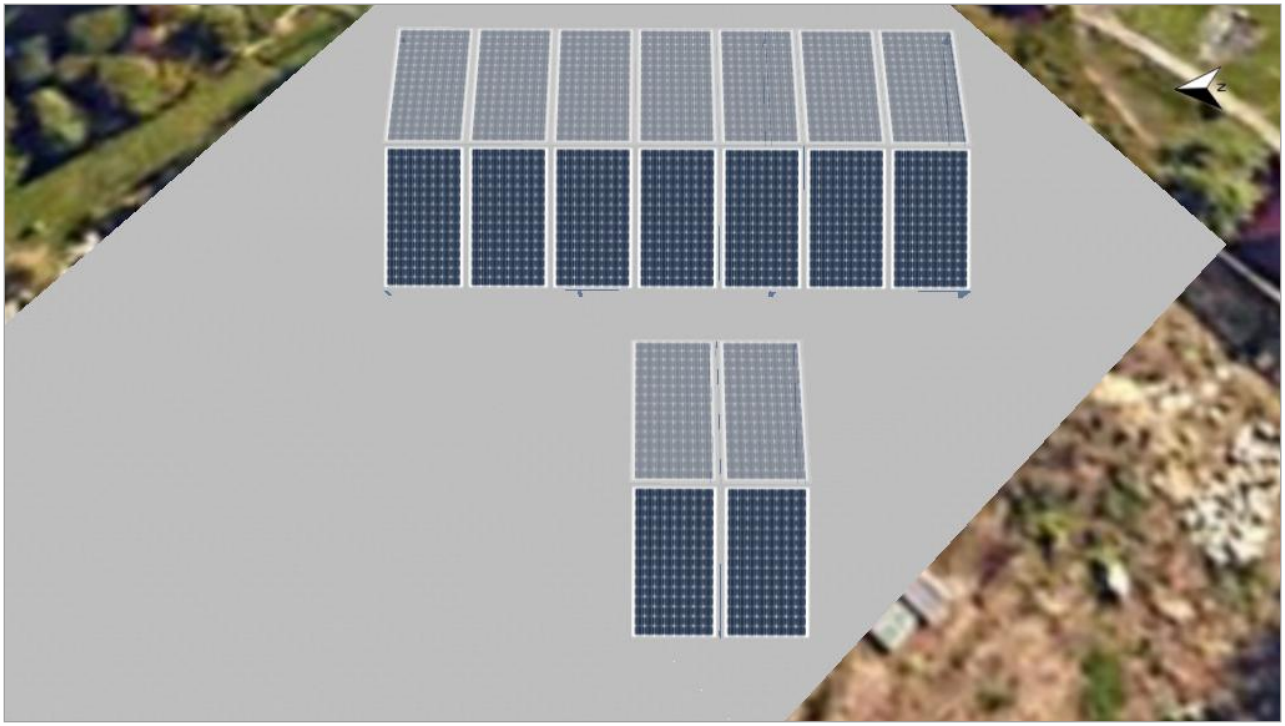


Figure: 1. Module Area - Budovy 01-Oblast modulu Západ

2. Module Area - Budovy 01-Oblast modulu Východ

PV Generator, 2. Module Area - Budovy 01-Oblast modulu Východ

Name	Budovy 01-Oblast modulu Východ
PV Modules	9 x AIKO-A500-MCH60Mb (v1)
Manufacturer	Aiko
Inclination	10 °
Orientation	East 92 °
Installation Type	Mounted - Roof
PV Generator Surface	19,9 m²

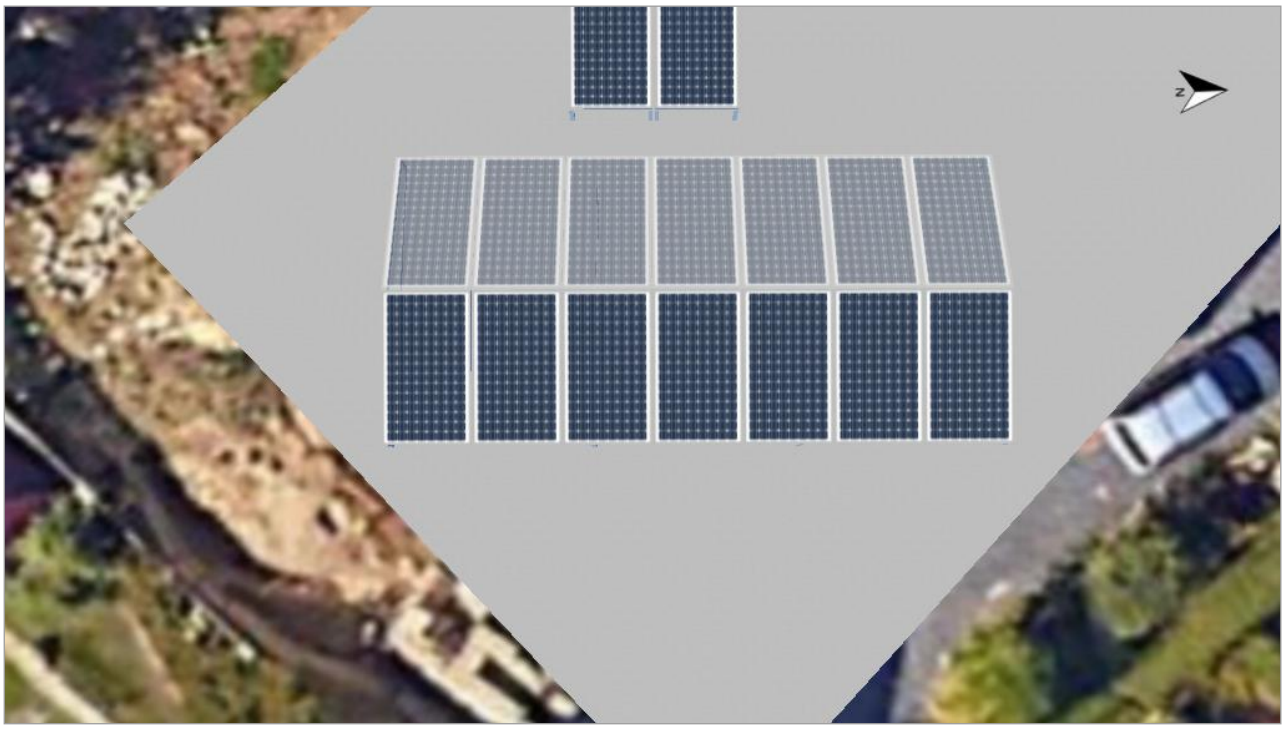


Figure: 2. Module Area - Budovy 01-Oblast modulu Východ

Horizon Line, 3D Design

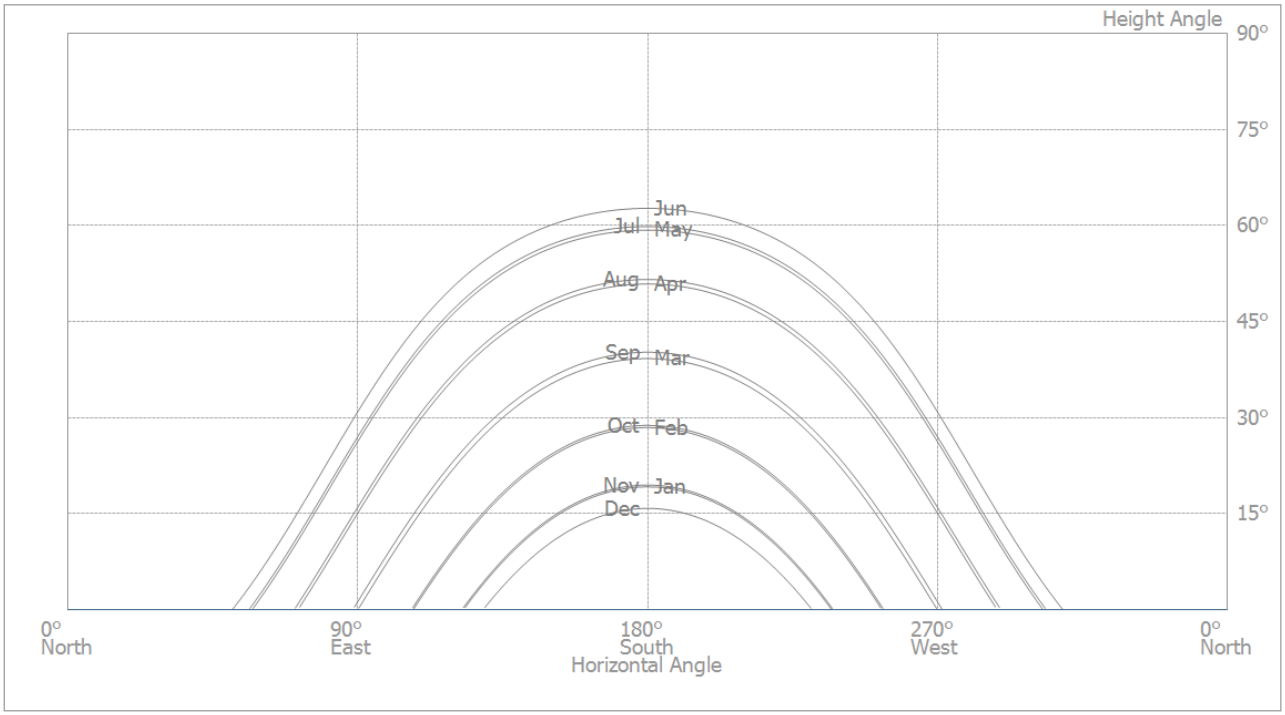


Figure: Horizon (3D Design)

Inverter configuration

Configuration 1

Module Areas	Budovy 01-Oblast modulu Západ + Budovy 01-Oblast modulu Východ
Inverter 1	
Model	GW10KN-ET (v4)
Manufacturer	GoodWe Technologies Co.,Ltd.
Quantity	1
Sizing Factor	90 %
Configuration	MPP 1: 1 x 9
	MPP 2: 1 x 9

AC Mains

AC Mains

Number of Phases	3
Mains voltage between phase and neutral	230 V
Displacement Power Factor (cos phi)	+/- 1

Battery Systems

Battery System - Skupina 1

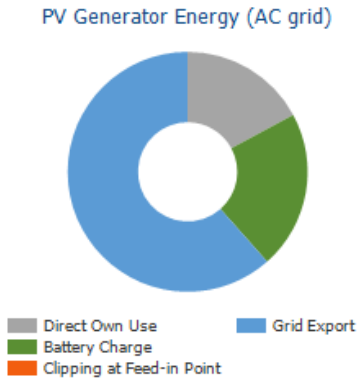
Model	GW10KN-ET+Pylontech H2 14,2 KWh (v6)	
Manufacturer	GoodWe Technologies Co.,Ltd.	
Quantity	1	
Battery Inverter		
Type of Coupling	AC coupling	
Nominal output	10	kW
Battery		
Manufacturer	Pylon Technologies Co., Ltd.	
Model	Force H2 (v1)	
Quantity	4	
Battery Energy	9,9	kWh
Battery Type	Lithium iron phosphate	

Simulation Results

Results Total System

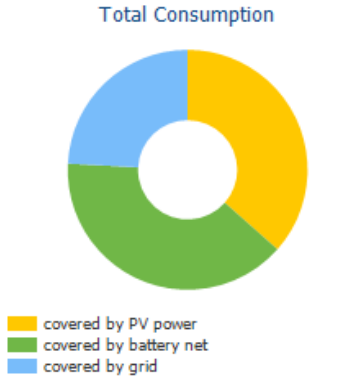
PV System

PV Generator Output	9,00	kWp
Spec. Annual Yield	907,04	kWh/kWp
Performance Ratio (PR)	81,50	%
Yield Reduction due to Shading	0,3	%
PV Generator Energy (AC grid)	8 217	kWh/Year
Direct Own Use	1 408	kWh/Year
Battery Charge	1 753	kWh/Year
Clipping at Feed-in Point	0	kWh/Year
Grid Export	5 056	kWh/Year
Own Power Consumption	38,1	%
CO_2 Emissions avoided	3 720	kg / year



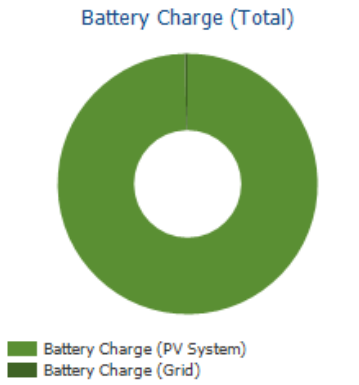
Appliances

Appliances	3 800	kWh/Year
Standby Consumption (Inverter)	53	kWh/Year
Total Consumption	3 853	kWh/Year
covered by PV power	1 408	kWh/Year
covered by battery net	1 514	kWh/Year
covered by grid	932	kWh/Year
Solar Fraction	75,8	%



Battery System

Charge at beginning	10	kWh
Battery Charge (Total)	1 759	kWh/Year
Battery Charge (PV System)	1 753	kWh/Year
Battery Charge (Grid)	6	kWh/Year
Battery Energy for the Covering of Consumption	1 520	kWh/Year
Battery discharge into the grid	0	kWh/Year
Losses due to charging/discharging	223	kWh/Year
Losses in Battery	26	kWh/Year
Cycle Load	2,4	%
Service Life	>20	Years



Level of Self-sufficiency

Total Consumption	3 853	kWh/Year
covered by grid	932	kWh/Year
Level of Self-sufficiency	75,8	%

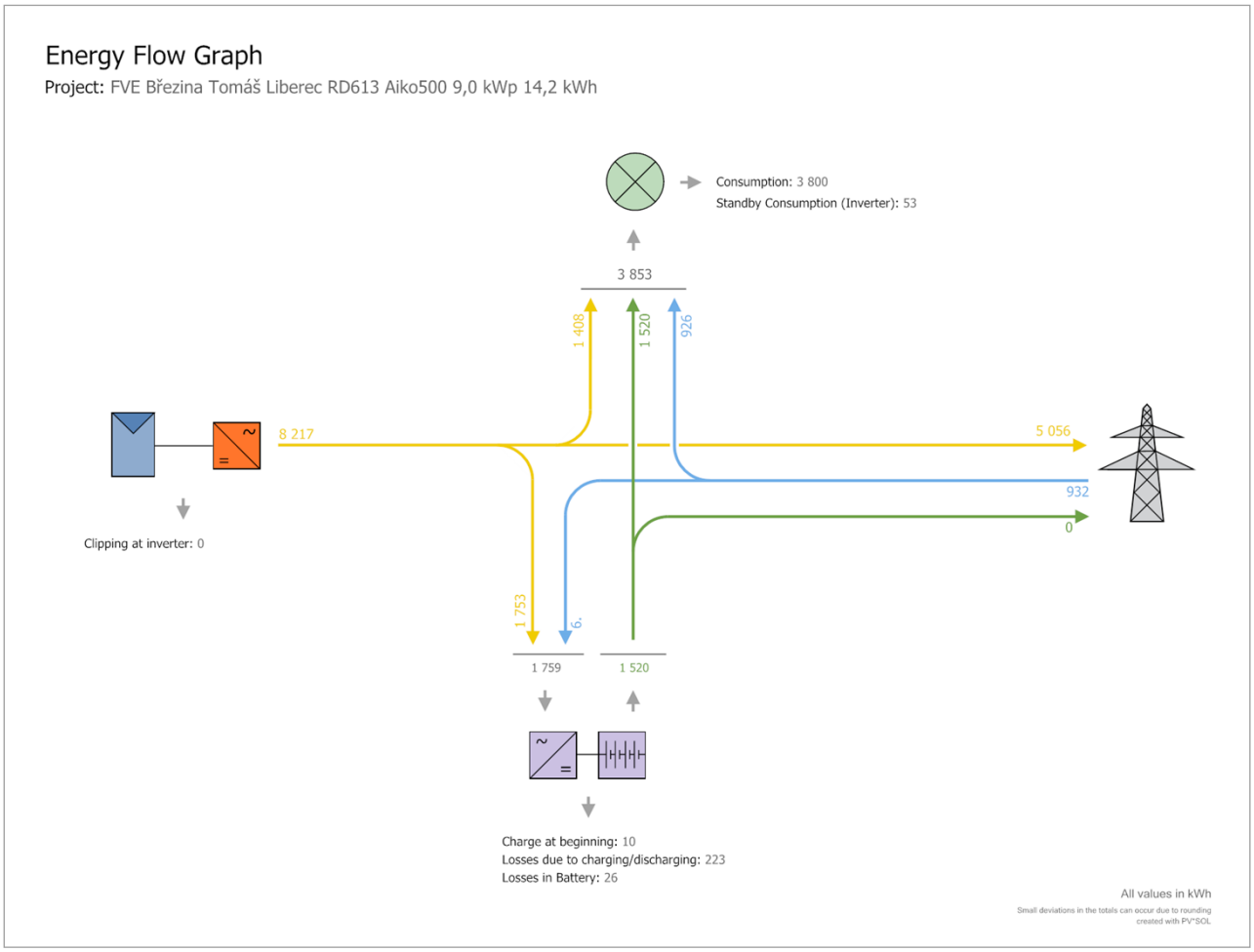


Figure: Energy flow

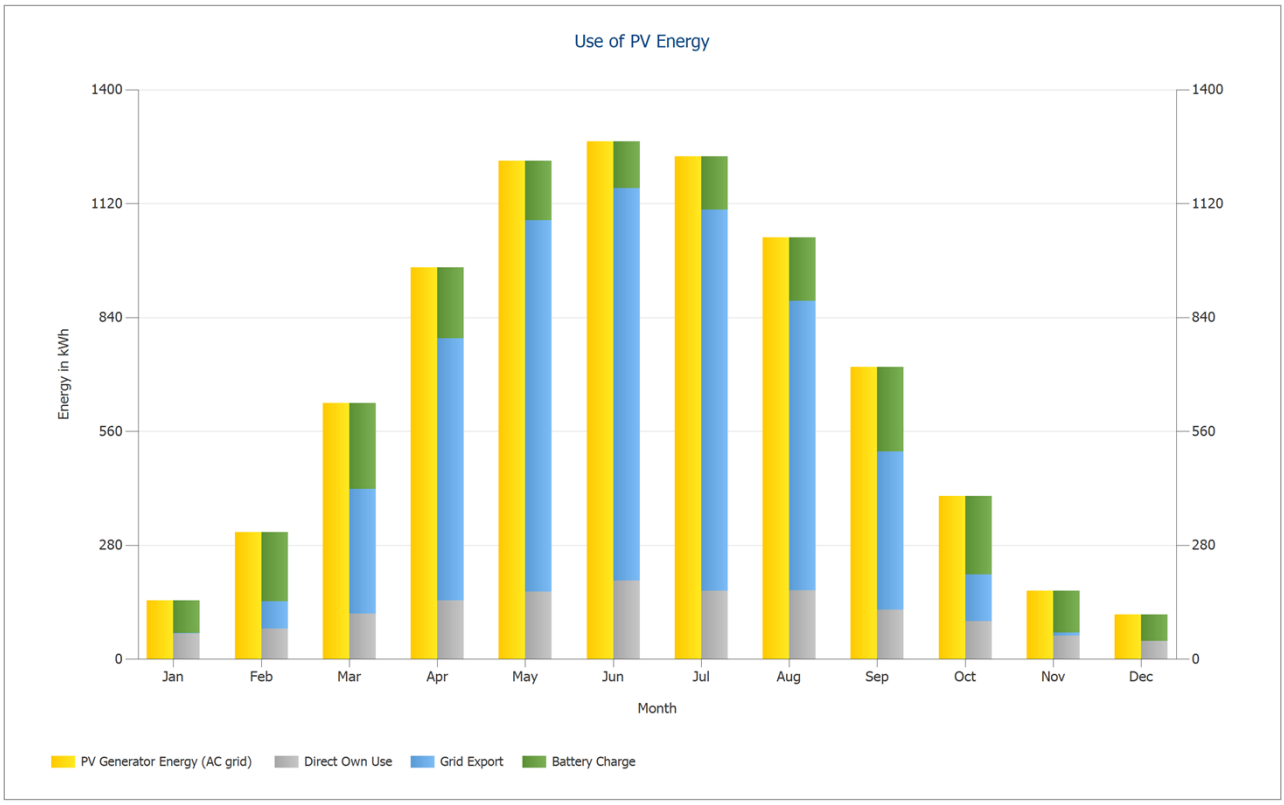


Figure: Use of PV Energy

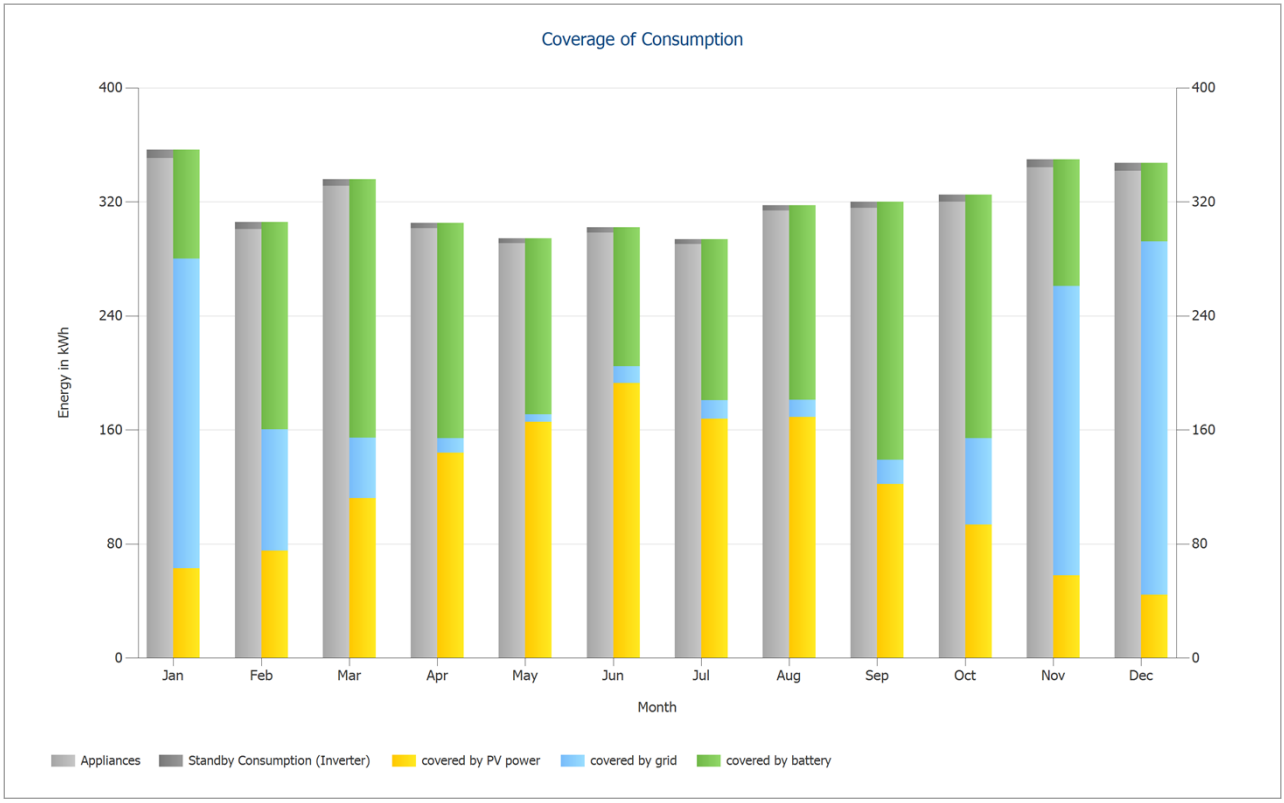


Figure: Coverage of Consumption

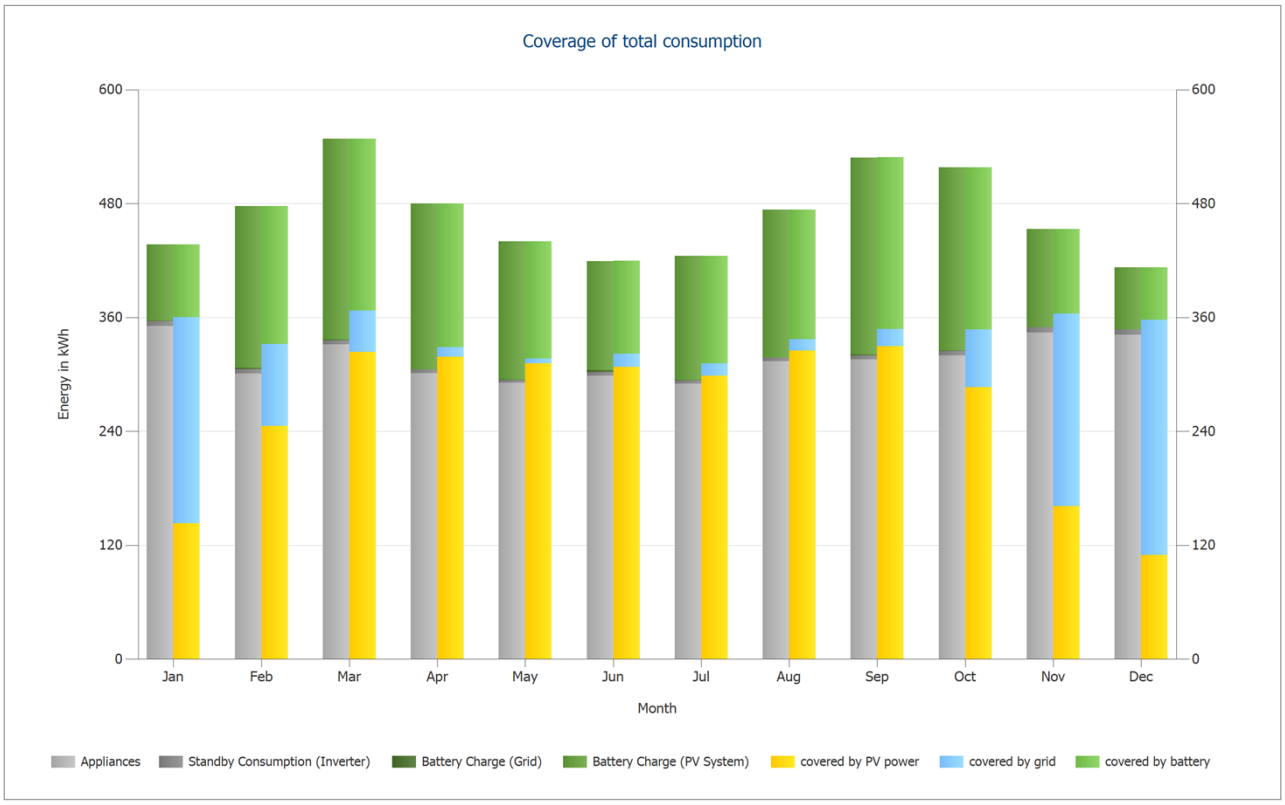


Figure: Coverage of total consumption

Financial Analysis

Overview

System Data

Grid Export in the first year (incl. module degradation)	5 056	kWh/Year
PV Generator Output	9	kWp
Start of Operation of the System	01.03.2025	
Assessment Period	40	Years
Interest on Capital	1	%

Economic Parameters

Internal Rate of Return (IRR)	11,03	%
Accrued Cash Flow (Cash Balance)	514 630,21	Kč
Amortization Period	9,3	Years
Electricity Production Costs	0,7088	Kč/kWh

Payment Overview

Specific Investment Costs	0,00	Kč/kWp
Investment Costs	0,00	Kč
One-off Payments	349 999,00	Kč
Incoming Subsidies	160 000,00	Kč
Annual Costs	0,00	Kč/Year
Other Revenue or Savings	0,00	Kč/Year

Remuneration and Savings

Total Payment from Utility in First Year	2 527,94	Kč/Year
First year savings	18 931,96	Kč/Year
ČEZ Distribuce - Stavební systém		
Validity	30.09.2024 - 29.09.2064	
Specific feed-in / export Remuneration	0,5	Kč/kWh
Feed-in / Export Tariff	2032,1388	Kč/Year
ČEZ domácnost fix3 (ČEZ)		
Energy Price	6,6	Kč/kWh
Base Price	358,33	Kč/Month
Remuneration of Electricity sold to Third Party		
Price of Electricity sold to Third Party	0,50	Kč/kWh
Remuneration of Electricity sold to Third Party	495,80	Kč/Year

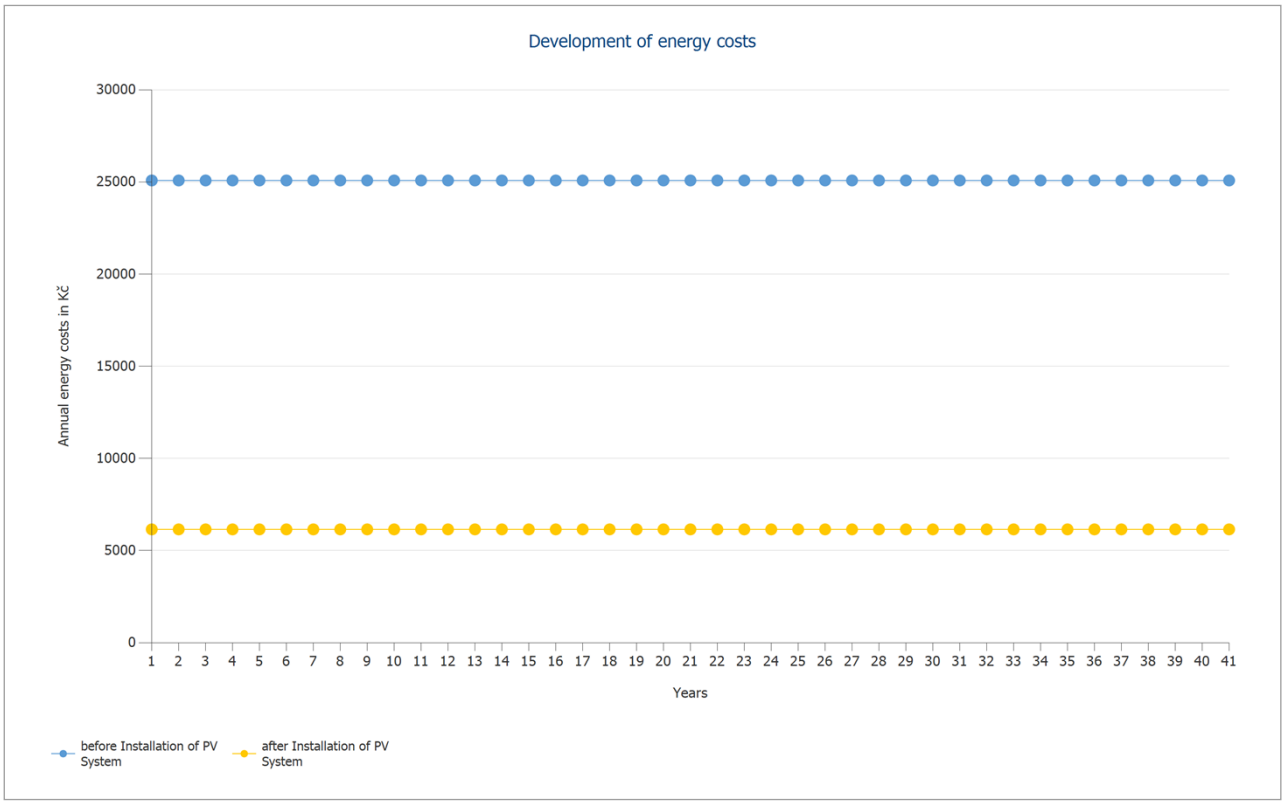


Figure: Development of energy costs

Cash flow

Cash flow

	Year 1	Year 2	Year 3	Year 4	Year 5
One-off Payments	-349 999,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Incoming Subsidies	160 000,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Feed-in / Export Tariff	2 502,91 Kč	2 478,13 Kč	2 453,60 Kč	2 429,30 Kč	2 405,25 Kč
Electricity Savings	18 744,52 Kč	18 558,93 Kč	18 375,17 Kč	18 193,24 Kč	18 013,11 Kč
Annual Cash Flow	**-168 751,57 Kč**	**21 037,06 Kč**	**20 828,77 Kč**	**20 622,55 Kč**	**20 418,36 Kč**
Accrued Cash Flow (Cash Balance)	-168 751,57 Kč	-147 714,51 Kč	-126 885,74 Kč	-106 263,19 Kč	-85 844,83 Kč

Cash flow

	Year 6	Year 7	Year 8	Year 9	Year 10
One-off Payments	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Incoming Subsidies	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Feed-in / Export Tariff	2 381,44 Kč	2 357,86 Kč	2 334,51 Kč	2 311,40 Kč	2 288,51 Kč
Electricity Savings	17 834,76 Kč	17 658,18 Kč	17 483,35 Kč	17 310,25 Kč	17 138,86 Kč
Annual Cash Flow	**20 216,20 Kč**	**20 016,04 Kč**	**19 817,86 Kč**	**19 621,64 Kč**	**19 427,37 Kč**
Accrued Cash Flow (Cash Balance)	-65 628,63 Kč	-45 612,59 Kč	-25 794,73 Kč	-6 173,08 Kč	13 254,29 Kč

Cash flow

	Year 11	Year 12	Year 13	Year 14	Year 15
One-off Payments	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Incoming Subsidies	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Feed-in / Export Tariff	2 265,86 Kč	2 243,42 Kč	2 221,21 Kč	2 199,22 Kč	2 177,44 Kč
Electricity Savings	16 969,17 Kč	16 801,15 Kč	16 634,81 Kč	16 470,10 Kč	16 307,03 Kč
Annual Cash Flow	**19 235,02 Kč**	**19 044,58 Kč**	**18 856,02 Kč**	**18 669,32 Kč**	**18 484,48 Kč**
Accrued Cash Flow (Cash Balance)	32 489,31 Kč	51 533,88 Kč	70 389,90 Kč	89 059,22 Kč	107 543,70 Kč

Cash flow

	Year 16	Year 17	Year 18	Year 19	Year 20
One-off Payments	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Incoming Subsidies	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Feed-in / Export Tariff	2 155,88 Kč	2 134,54 Kč	2 113,40 Kč	2 092,48 Kč	2 071,76 Kč
Electricity Savings	16 145,58 Kč	15 985,72 Kč	15 827,45 Kč	15 670,74 Kč	15 515,58 Kč
Annual Cash Flow	**18 301,46 Kč**	**18 120,26 Kč**	**17 940,85 Kč**	**17 763,22 Kč**	**17 587,35 Kč**
Accrued Cash Flow (Cash Balance)	125 845,16 Kč	143 965,42 Kč	161 906,27 Kč	179 669,49 Kč	197 256,84 Kč

Cash flow

	Year 21	Year 22	Year 23	Year 24	Year 25
One-off Payments	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Incoming Subsidies	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Feed-in / Export Tariff	2 051,25 Kč	2 030,94 Kč	2 010,83 Kč	1 990,92 Kč	1 971,21 Kč
Electricity Savings	15 361,96 Kč	15 209,87 Kč	15 059,27 Kč	14 910,17 Kč	14 762,55 Kč
Annual Cash Flow	**17 413,21 Kč**	**17 240,81 Kč**	**17 070,10 Kč**	**16 901,09 Kč**	**16 733,76 Kč**
Accrued Cash Flow (Cash Balance)	214 670,05 Kč	231 910,85 Kč	248 980,96 Kč	265 882,05 Kč	282 615,81 Kč

Cash flow

	Year 26	Year 27	Year 28	Year 29	Year 30
One-off Payments	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Incoming Subsidies	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Feed-in / Export Tariff	1 951,69 Kč	1 932,37 Kč	1 913,24 Kč	1 894,29 Kč	1 875,54 Kč
Electricity Savings	14 616,38 Kč	14 471,66 Kč	14 328,38 Kč	14 186,52 Kč	14 046,06 Kč
Annual Cash Flow	**16 568,08 Kč**	**16 404,03 Kč**	**16 241,62 Kč**	**16 080,81 Kč**	**15 921,59 Kč**
Accrued Cash Flow (Cash Balance)	299 183,88 Kč	315 587,92 Kč	331 829,54 Kč	347 910,35 Kč	363 831,94 Kč

Cash flow

	Year 31	Year 32	Year 33	Year 34	Year 35
One-off Payments	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Incoming Subsidies	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Feed-in / Export Tariff	1 856,97 Kč	1 838,58 Kč	1 820,38 Kč	1 802,36 Kč	1 784,51 Kč
Electricity Savings	13 906,99 Kč	13 769,29 Kč	13 632,96 Kč	13 497,98 Kč	13 364,34 Kč
Annual Cash Flow	**15 763,96 Kč**	**15 607,88 Kč**	**15 453,34 Kč**	**15 300,34 Kč**	**15 148,85 Kč**
Accrued Cash Flow (Cash Balance)	379 595,90 Kč	395 203,77 Kč	410 657,12 Kč	425 957,46 Kč	441 106,31 Kč

Cash flow

	Year 36	Year 37	Year 38	Year 39	Year 40
One-off Payments	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Incoming Subsidies	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč	0,00 Kč
Feed-in / Export Tariff	1 766,84 Kč	1 749,35 Kč	1 732,03 Kč	1 714,88 Kč	1 697,90 Kč
Electricity Savings	13 232,02 Kč	13 101,01 Kč	12 971,30 Kč	12 842,87 Kč	12 715,71 Kč
Annual Cash Flow	**14 998,86 Kč**	**14 850,36 Kč**	**14 703,33 Kč**	**14 557,75 Kč**	**14 413,61 Kč**
Accrued Cash Flow (Cash Balance)	456 105,17 Kč	470 955,53 Kč	485 658,85 Kč	500 216,60 Kč	514 630,21 Kč

Degradation and inflation rates are applied on a monthly basis over the entire observation period. This is done in the first year.

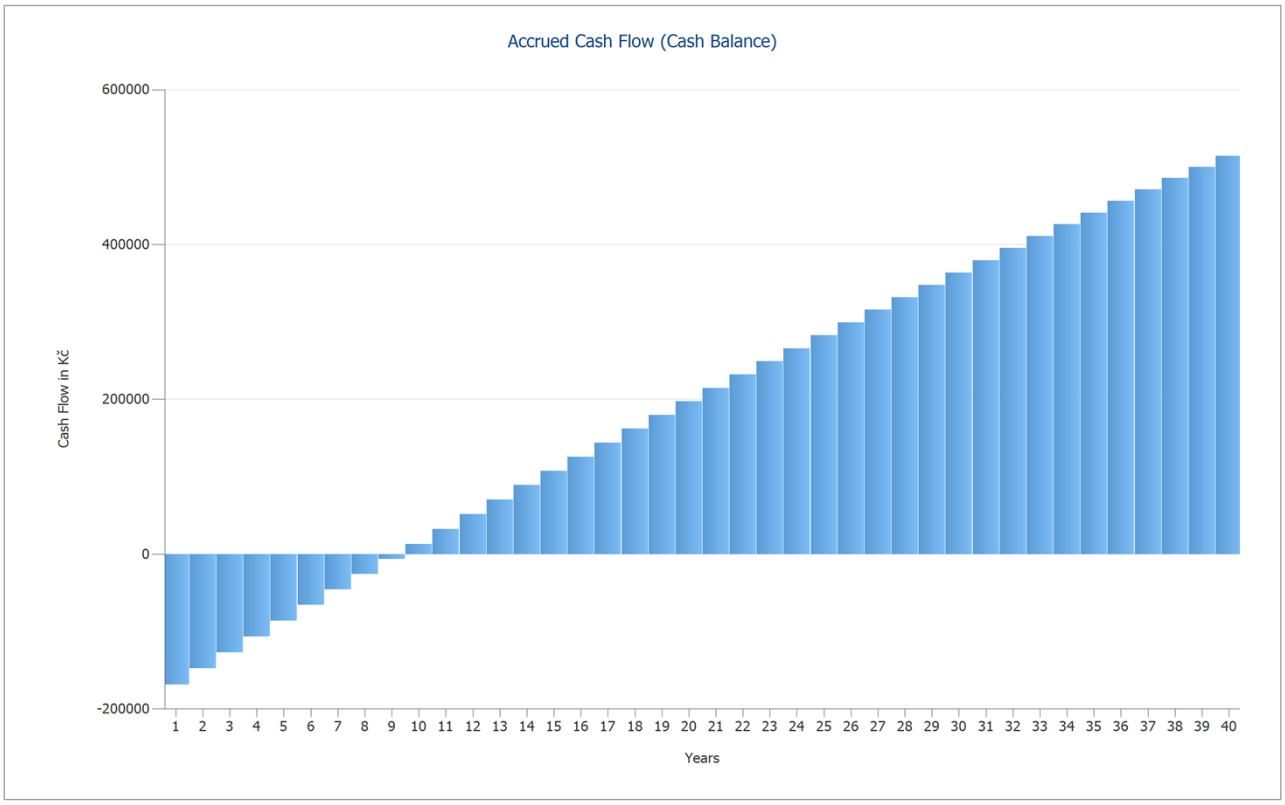


Figure: Accrued Cash Flow (Cash Balance)

Plans and parts list

Circuit Diagram

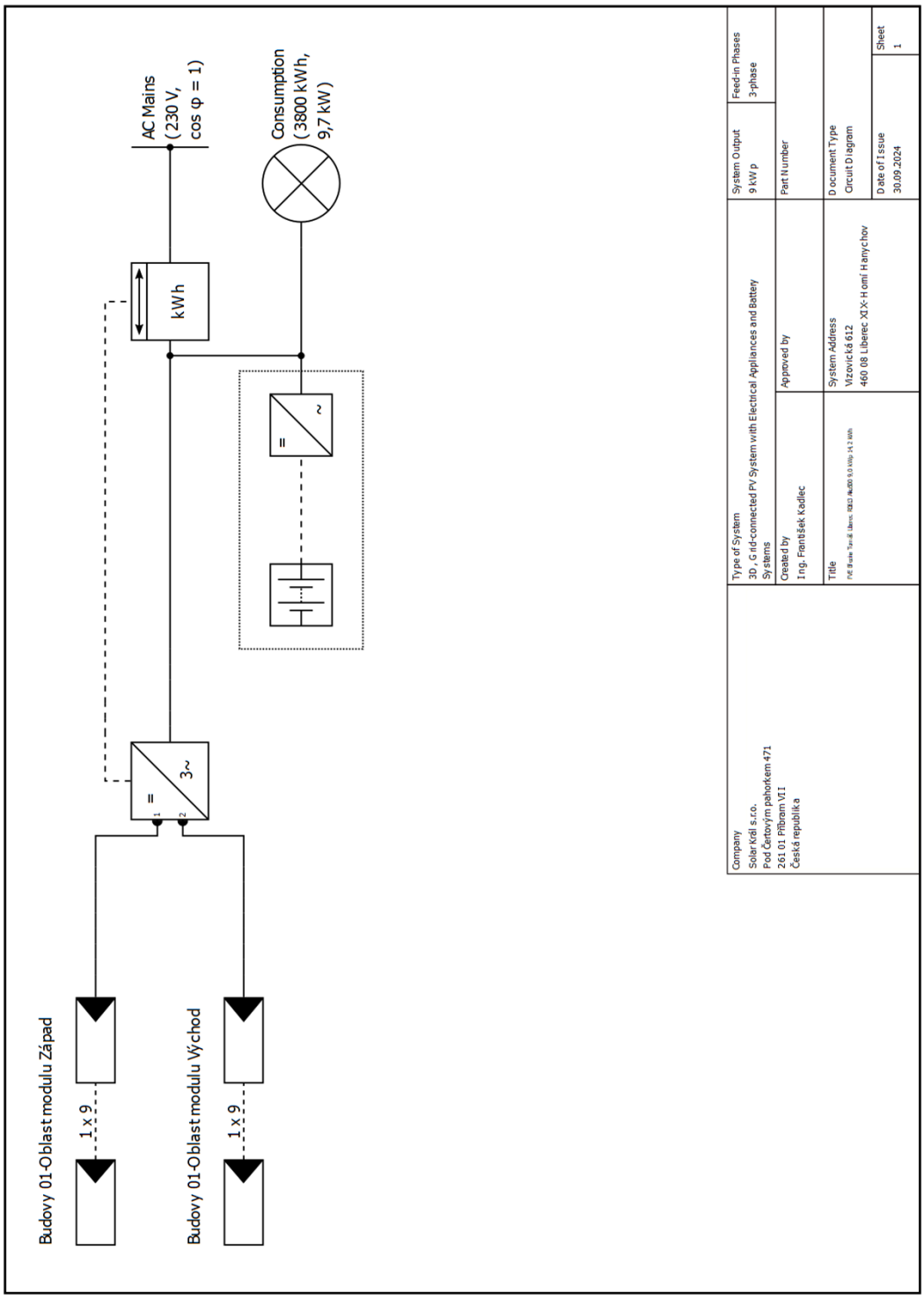


Figure: Circuit Diagram

Overview plan

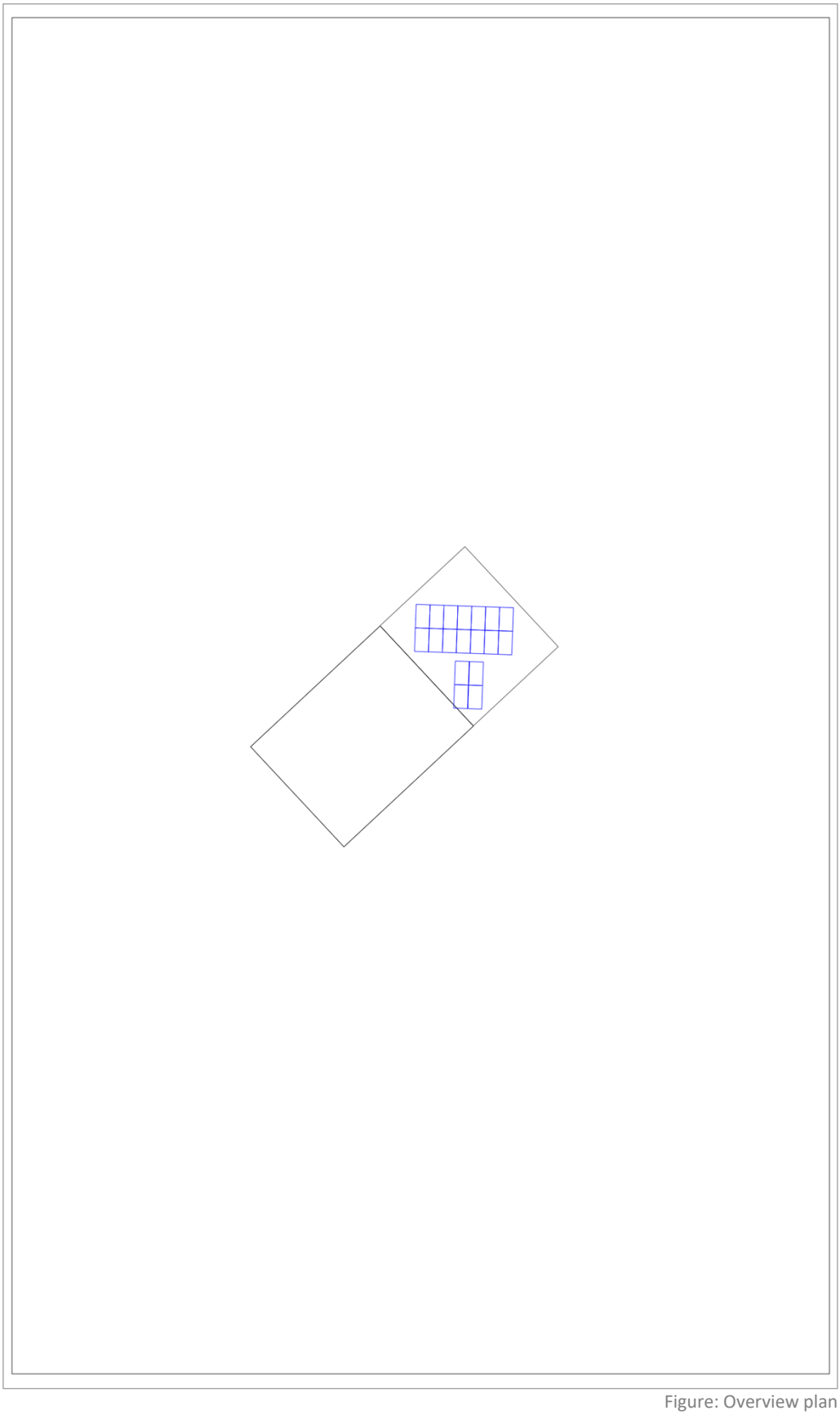


Figure: Overview plan

Dimensioning Plan

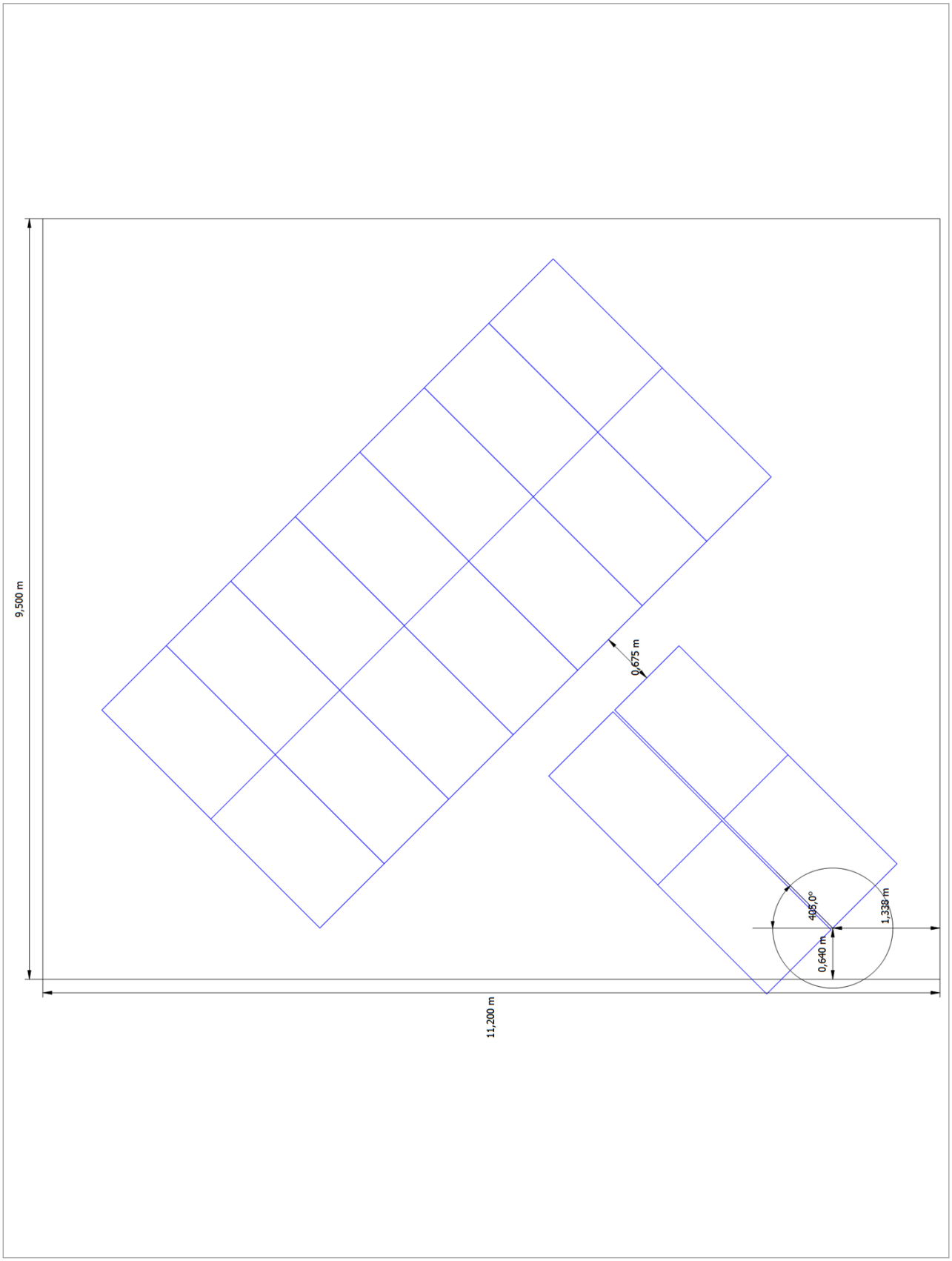


Figure: Budovy 01 - Plocha střechy Jihozápad

String Plan

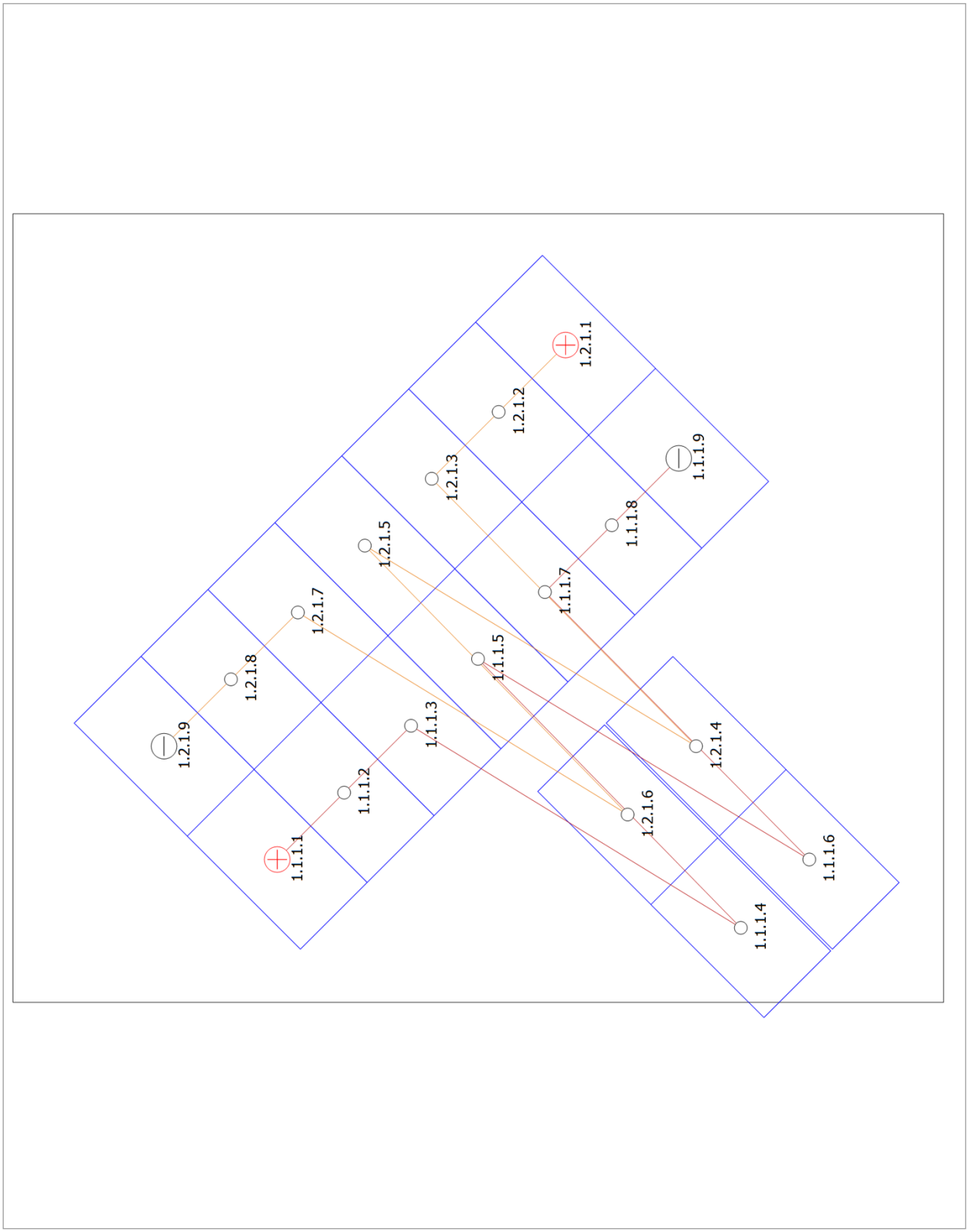


Figure: Budovy 01 - Plocha střechy Jihozápad

Parts list

Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		Aiko	AIKO-A500-MCH60Mb	18	Piece
2	Inverter		GoodWe Technologies Co.,Ltd.	GW10KN-ET	1	Piece
3	Battery System		GoodWe Technologies Co.,Ltd.	GW10KN-ET+Pylontech H2 14,2 KWh	1	Piece
4	Components			Bidirectional meter with integrated dynamic feed-in control	1	Piece