Solar Král s.r.o.
Pod Čertovým pahorkem 471
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Česká republika

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Soukr. RD
Jan Březina
Vizovická 612
460 08 Liberec XIX- Horní Hanychov

Customer No.: 2024-321
Project Name: FVE Březina Jan Liberec RD612 18 kWp 16,35 kWh Aiko500
Offer no.: P2024-321-1

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

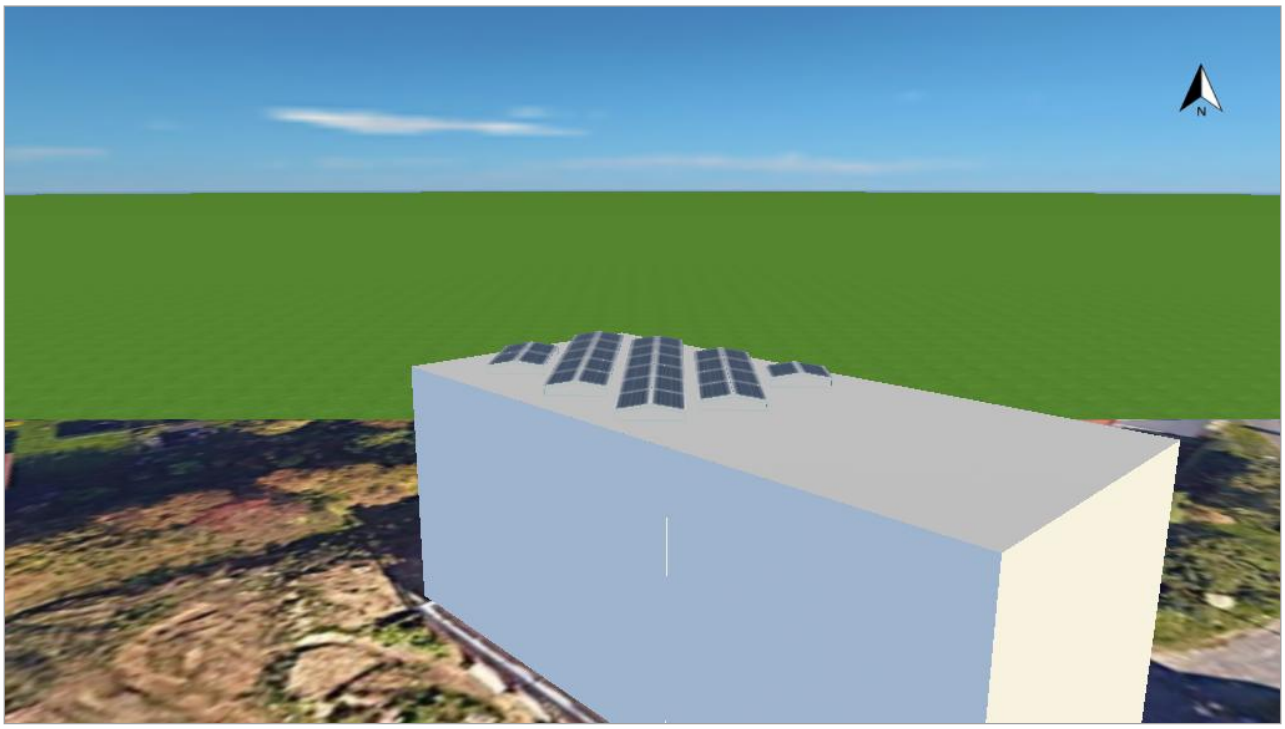


Figure: Overview Image, 3D Design

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	18	kWp
PV Generator Surface	79,8	m²
Number of PV Modules	36	
Number of Inverters	1	
No. of battery systems	1	

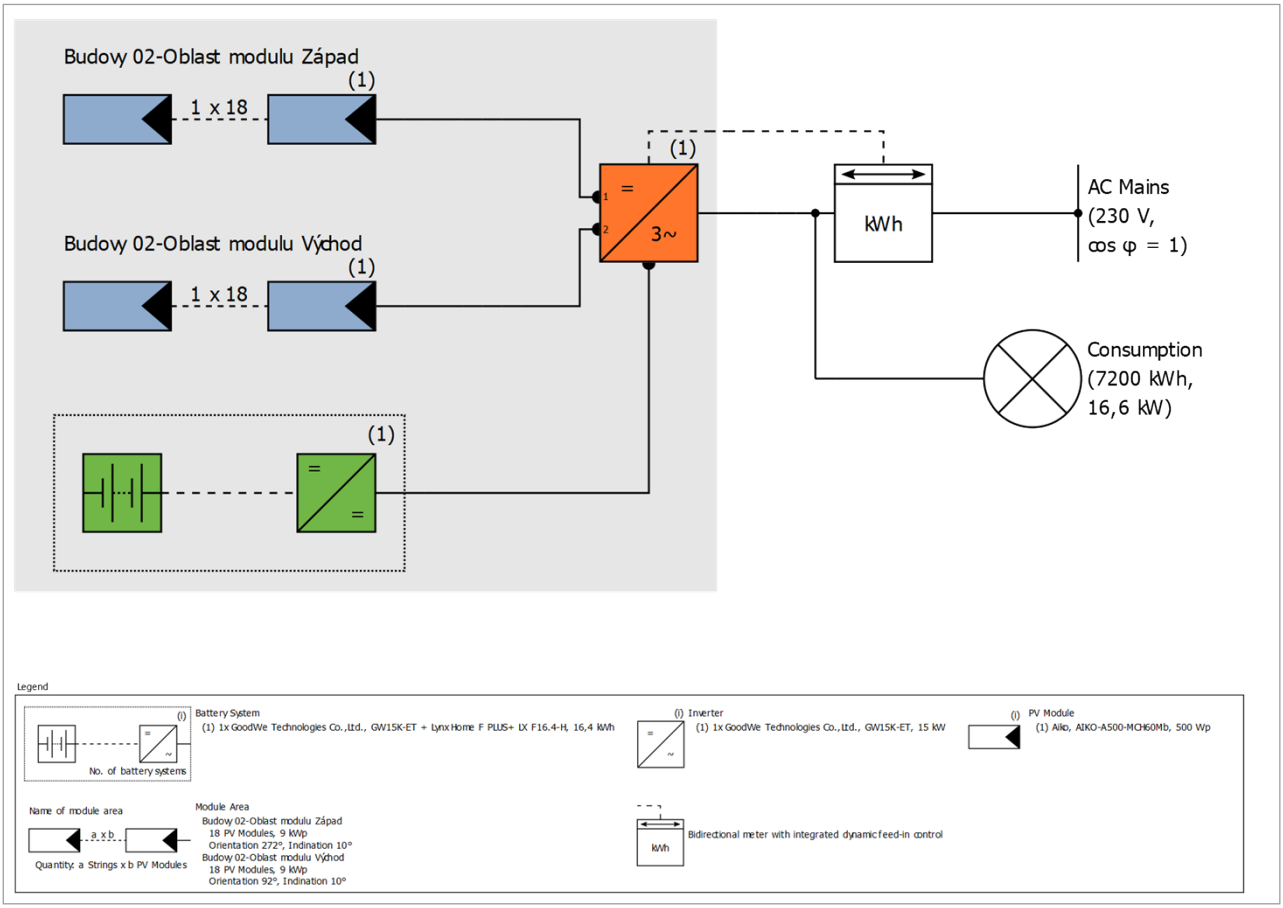


Figure: Schematic diagram

Production Forecast

Production Forecast

PV Generator Output	18,00	kWp
Spec. Annual Yield	911,57	kWh/kWp
Performance Ratio (PR)	81,91	%
Yield Reduction due to Shading	0,6	%
PV Generator Energy (AC grid) with battery	16 177	kWh/Year
Direct Own Use	5 539	kWh/Year
Clipping at Feed-in Point	0	kWh/Year
Grid Export	10 638	kWh/Year
Own Power Consumption	34,1	%
CO_2 Emissions avoided	7 459	kg / year
Level of Self-sufficiency	76,6	%

Financial Analysis

Your Gain

Total investment costs	0,00	Kč
Internal Rate of Return (IRR)	9,07	%
Amortization Period	11,2	Years
Electricity Production Costs	0,8314	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	7200 kWh
2 osoby se 2 dětmi	7200 kWh
Load Peak	16,6 kW

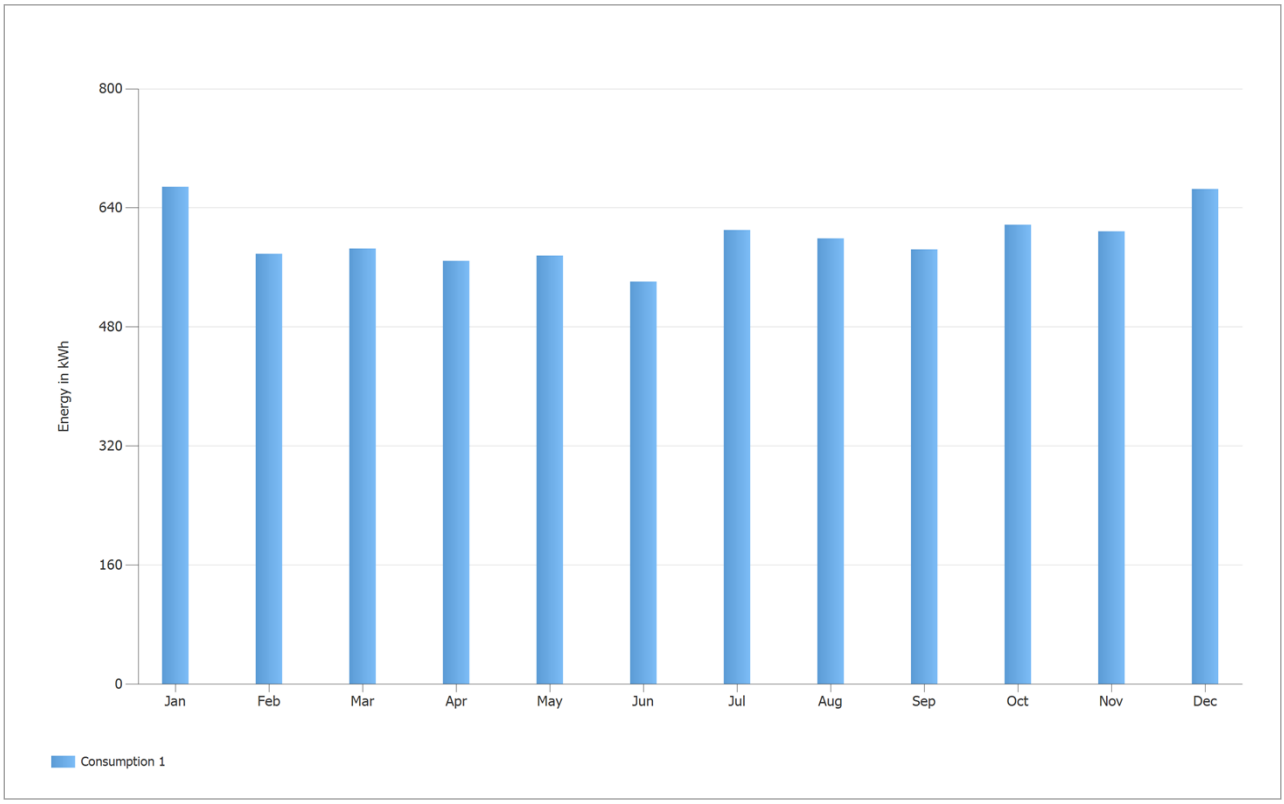


Figure: Consumption

Module Areas

1. Module Area - Budovy 02-Oblast modulu Západ

PV Generator, 1. Module Area - Budovy 02-Oblast modulu Západ

Name	Budovy 02-Oblast modulu Západ
PV Modules	18 x AIKO-A500-MCH60Mb (v1)
Manufacturer	Aiko
Inclination	10 °
Orientation	West 272 °
Installation Type	Mounted - Roof
PV Generator Surface	39,9 m²

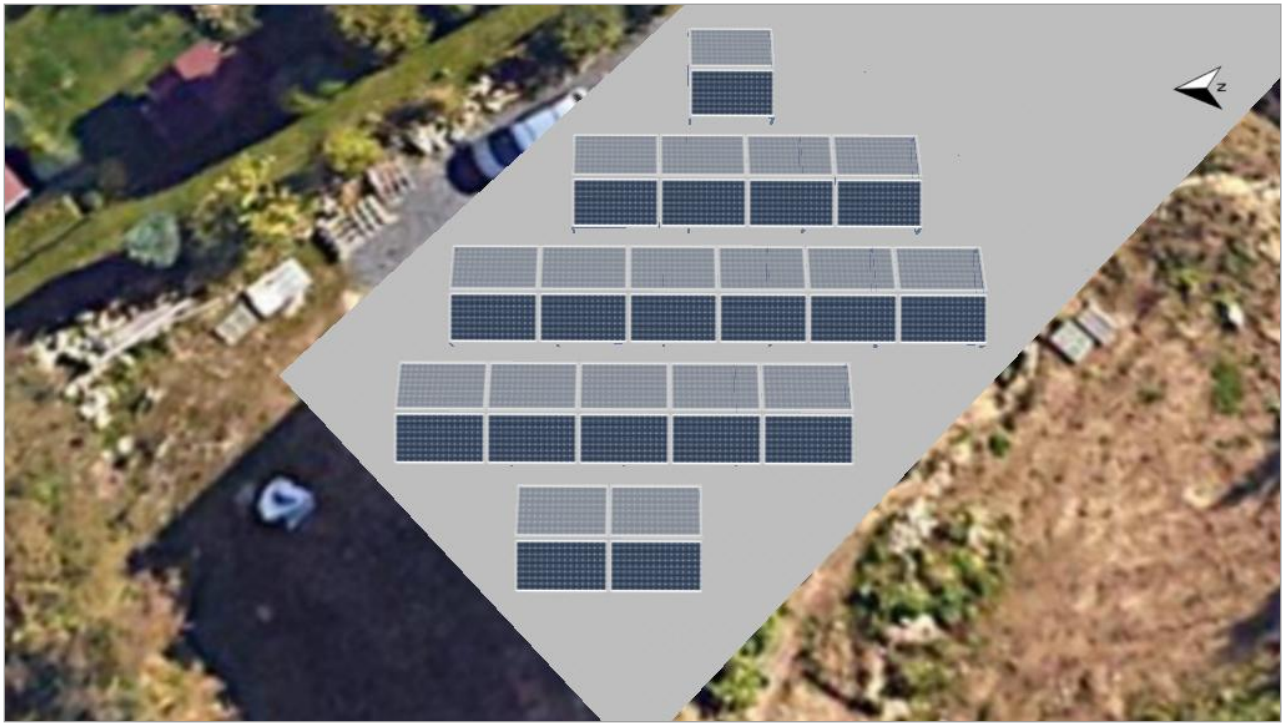


Figure: 1. Module Area - Budovy 02-Oblast modulu Západ

2. Module Area - Budovy 02-Oblast modulu Východ

PV Generator, 2. Module Area - Budovy 02-Oblast modulu Východ

Name	Budovy 02-Oblast modulu Východ
PV Modules	18 x AIKO-A500-MCH60Mb (v1)
Manufacturer	Aiko
Inclination	10 °
Orientation	East 92 °
Installation Type	Mounted - Roof
PV Generator Surface	39,9 m²

Figure: 2. Module Area - Budovy 02-Oblast modulu Východ

Horizon Line, 3D Design

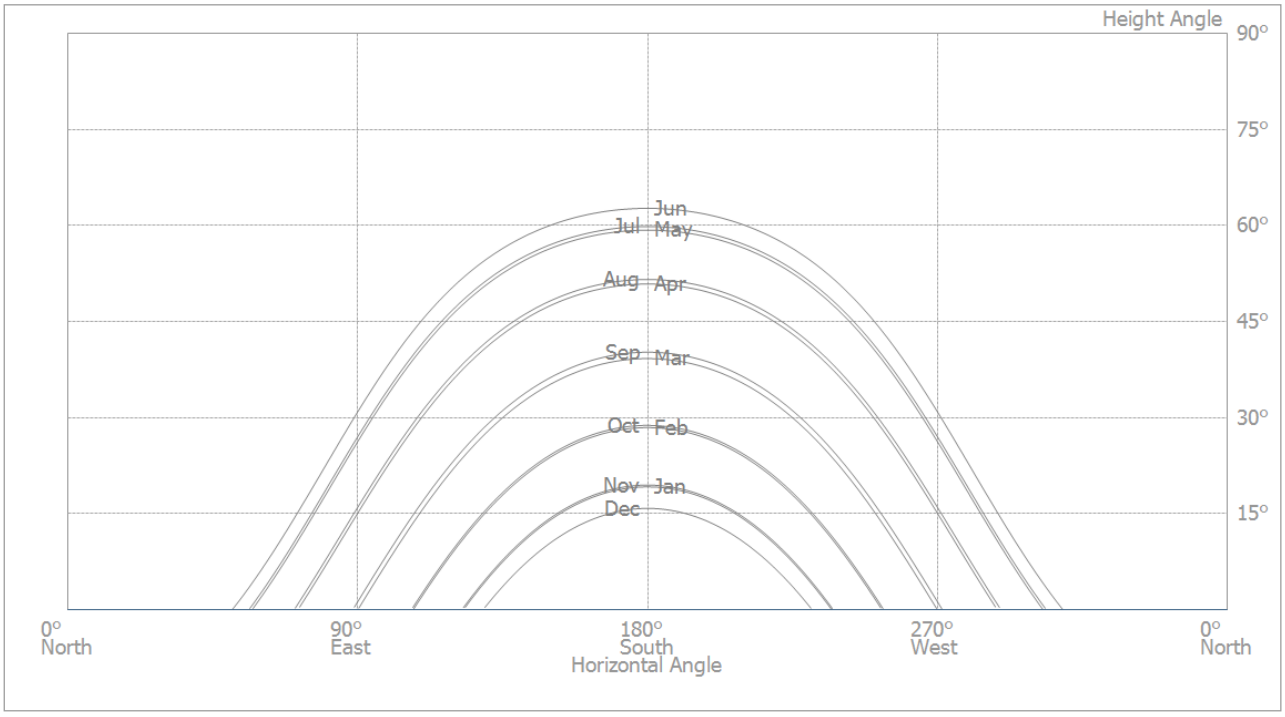


Figure: Horizon (3D Design)

Inverter configuration

Configuration 1

Module Areas	Budovy 02-Oblast modulu Západ + Budovy 02-Oblast modulu Východ
Inverter 1	
Model	GW15K-ET (v5)
Manufacturer	GoodWe Technologies Co.,Ltd.
Quantity	1
Sizing Factor	120 %
Configuration	MPP 1: 1 x 18
	MPP 2: 1 x 18

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

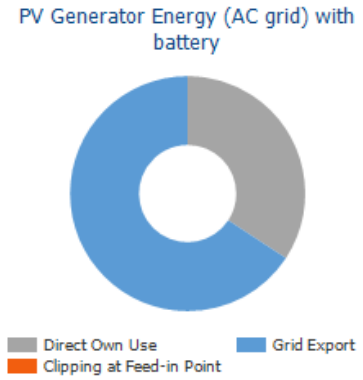
Model	GW15K-ET + Lynx Home F PLUS+ LX F16.4-H (v1)	
Manufacturer	GoodWe Technologies Co.,Ltd.	
Quantity	1	
Battery Inverter		
Type of Coupling	DC intermediate circuit coupling	
Nominal output	12,8	kW
Battery		
Manufacturer	GoodWe Technologies Co.,Ltd.	
Model	LX F3.3-H (v1)	
Quantity	5	
Battery Energy	16,4	kWh
Battery Type	Lithium iron phosphate	

Simulation Results

Results Total System

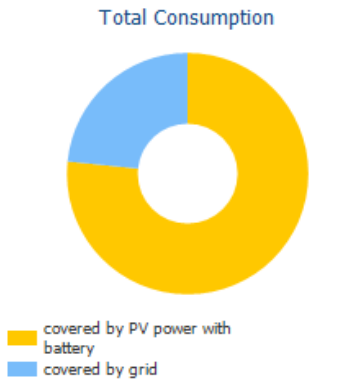
PV System

PV Generator Output	18,00	kWp
Spec. Annual Yield	911,57	kWh/kWp
Performance Ratio (PR)	81,91	%
Yield Reduction due to Shading	0,6	%
PV Generator Energy (AC grid) with battery	16 177	kWh/Year
Direct Own Use	5 539	kWh/Year
Clipping at Feed-in Point	0	kWh/Year
Grid Export	10 638	kWh/Year
Own Power Consumption	34,1	%
CO_2 Emissions avoided	7 459	kg / year



Appliances

Appliances	7 200	kWh/Year
Standby Consumption (Inverter)	30	kWh/Year
Total Consumption	7 230	kWh/Year
covered by PV power with battery	5 539	kWh/Year
covered by grid	1 691	kWh/Year
Solar Fraction	76,6	%



Battery System

Charge at beginning	16	kWh
Battery Charge (PV System)	3 523	kWh/Year
Battery Energy for the Covering of Consumption	3 262	kWh/Year
Battery discharge into the grid	0	kWh/Year
Losses due to charging/discharging	256	kWh/Year
Losses in Battery	21	kWh/Year
Cycle Load	6,0	%
Service Life	17	Years

Level of Self-sufficiency

Total Consumption	7 230	kWh/Year
covered by grid	1 691	kWh/Year
Level of Self-sufficiency	76,6	%

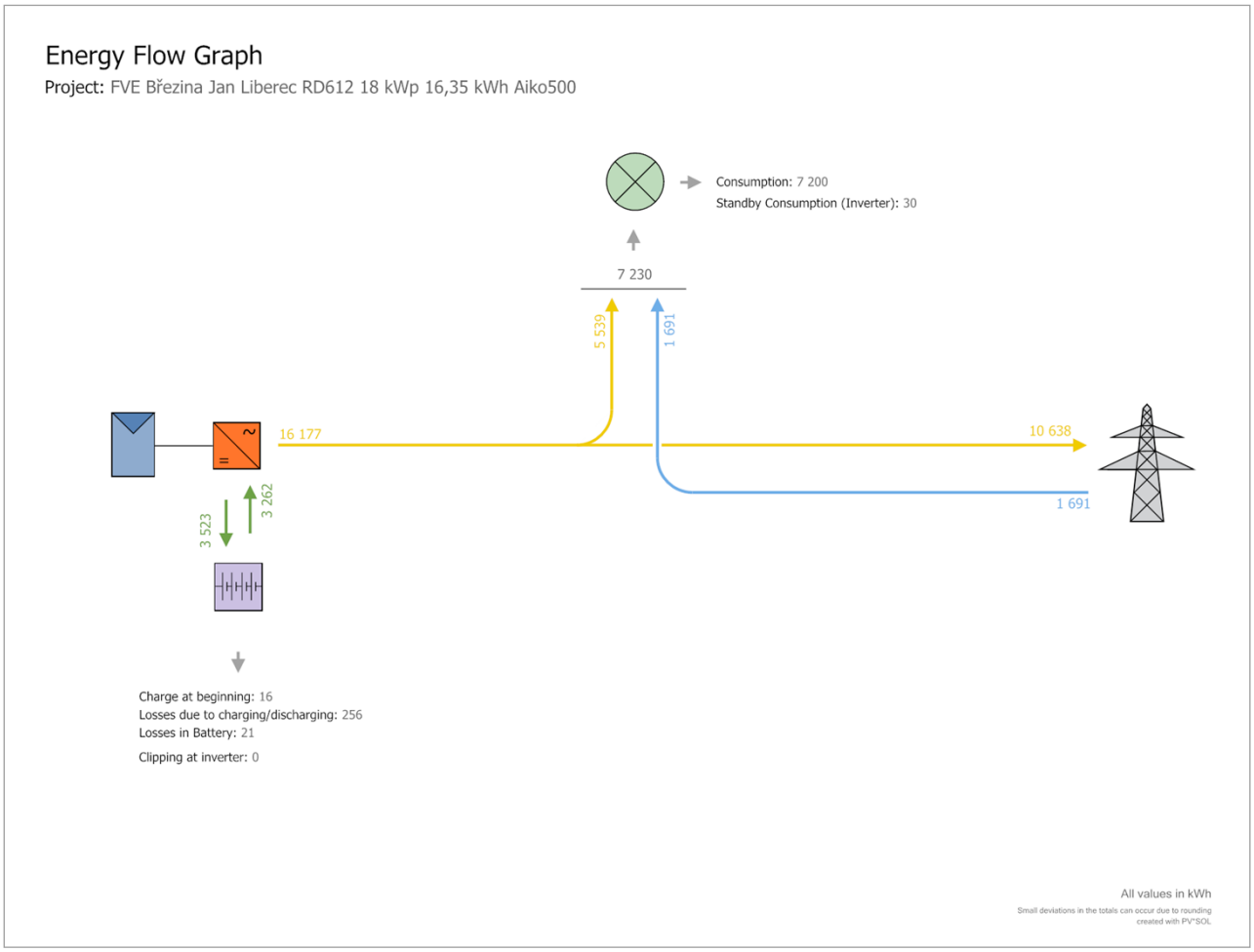


Figure: Energy flow

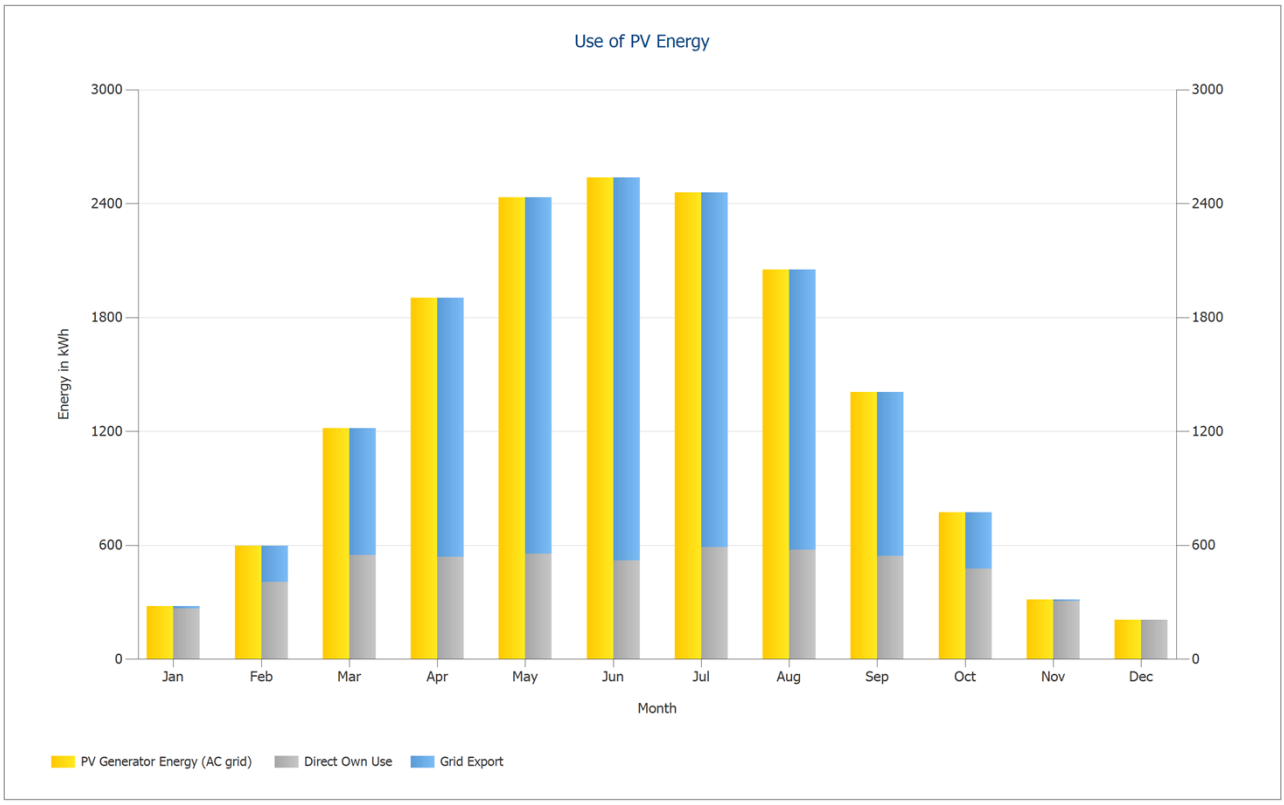


Figure: Use of PV Energy

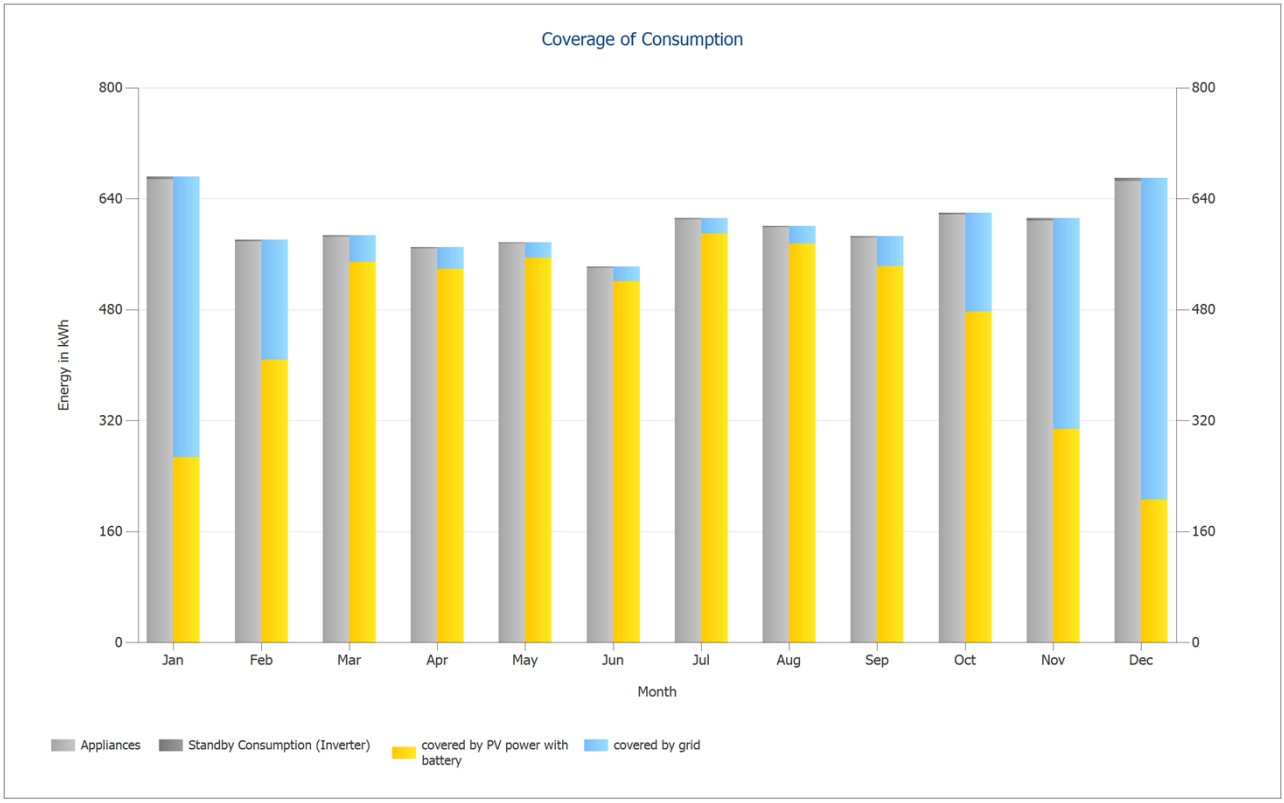


Figure: Coverage of Consumption

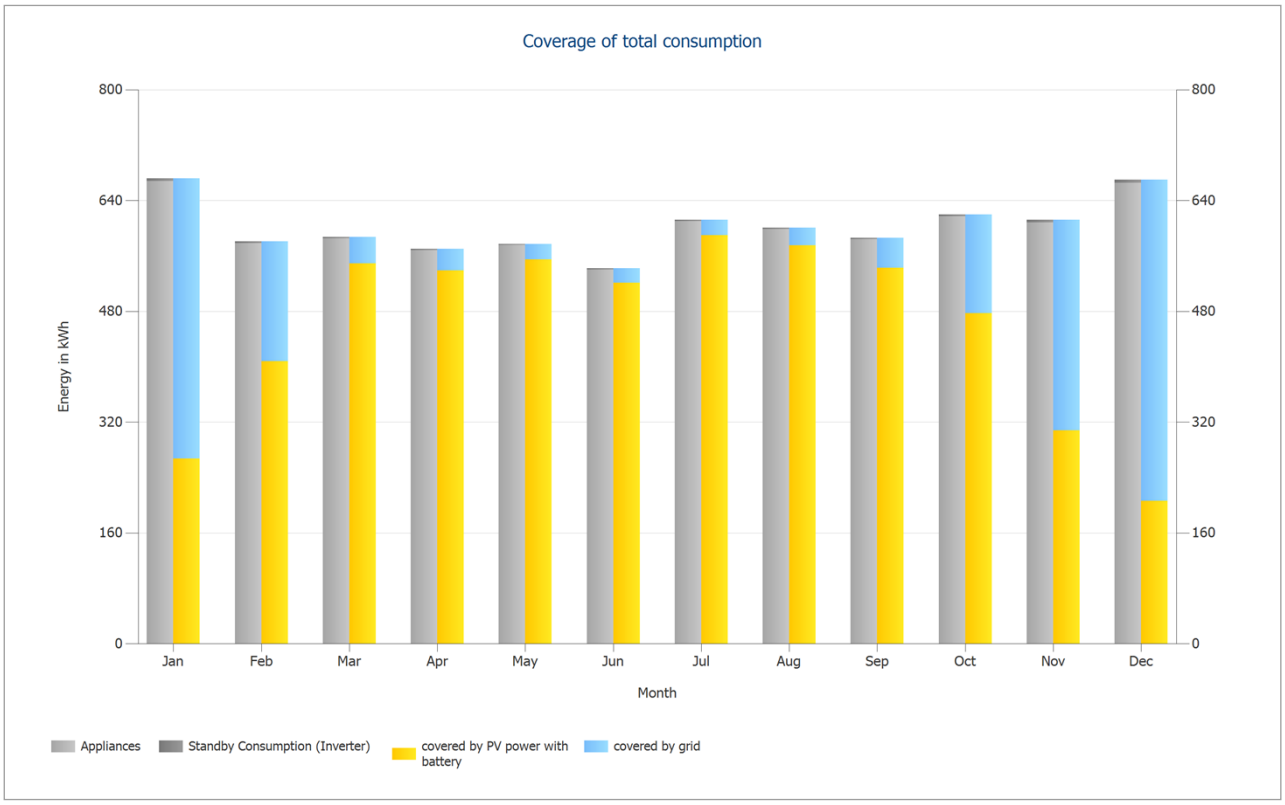


Figure: Coverage of total consumption

Financial Analysis

Overview

System Data

Grid Export in the first year (incl. module degradation)	10 638	kWh/Year
PV Generator Output	18	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)	9,07	%
Accrued Cash Flow (Cash Balance)	927 725,49	Kč
Amortization Period	11,2	Years
Electricity Production Costs	0,8314	Kč/kWh

Payment Overview

Specific Investment Costs	0,00	Kč/kWp
Investment Costs	0,00	Kč
One-off Payments	600 799,00	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	NaN	Kč/Year
First year savings	36 360,17	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	NaN	Kč/Year
ČEZ domácnost fix3 (ČEZ)		
Energy Price	6,6	Kč/kWh
Base Price	358,33	Kč/Month

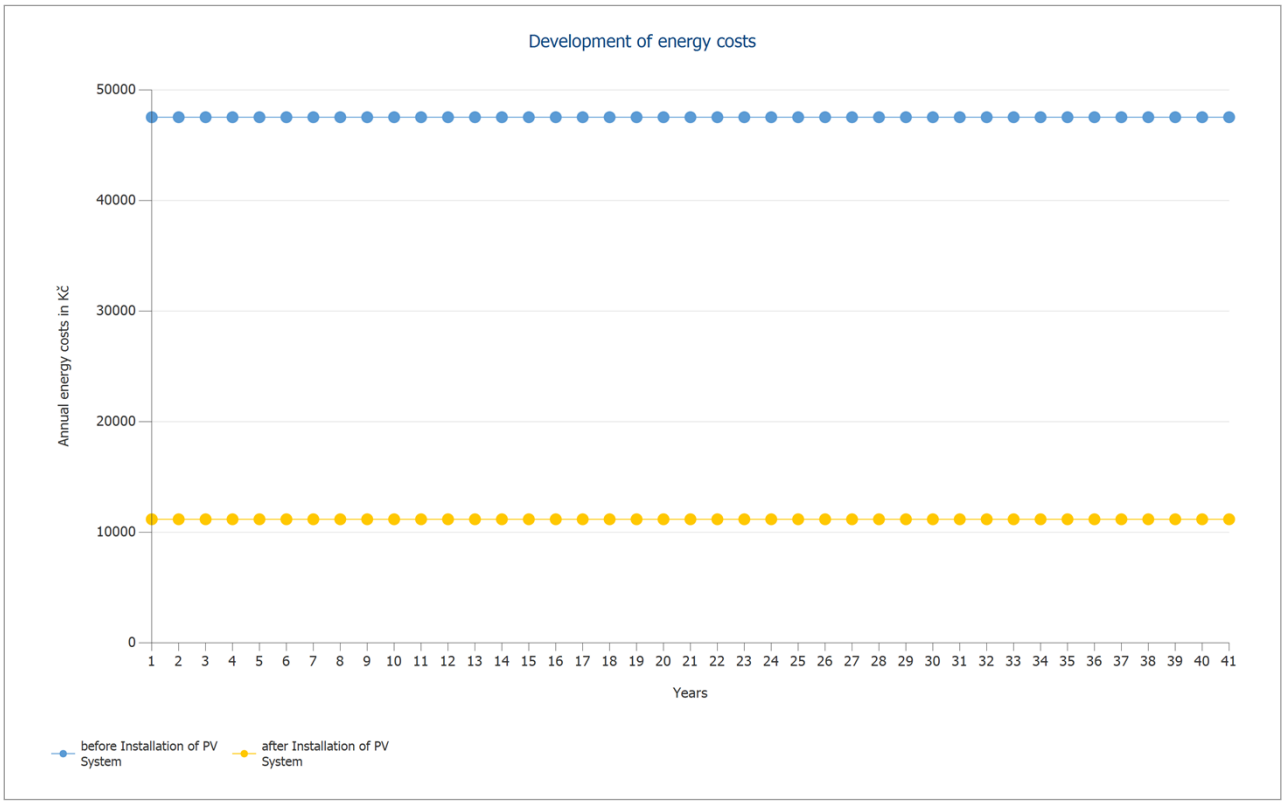


Figure: Development of energy costs

Cash flow

Cash flow

	Year 1	Year 2	Year 3	Year 4	Year 5
One-off Payments	-600 799,00 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	5 266,40 Kč	5 214,26 Kč	5 162,63 Kč	5 111,52 Kč	5 060,91 Kč
Electricity Savings	36 000,17 Kč	35 643,73 Kč	35 290,82 Kč	34 941,41 Kč	34 595,45 Kč
Annual Cash Flow	**-399 532,43 Kč**	**40 857,99 Kč**	**40 453,45 Kč**	**40 052,92 Kč**	**39 656,36 Kč**
Accrued Cash Flow (Cash Balance)	-399 532,43 Kč	-358 674,45 Kč	-318 221,00 Kč	-278 168,07 Kč	-238 511,71 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	5 010,80 Kč	4 961,19 Kč	4 912,07 Kč	4 863,43 Kč	4 815,28 Kč
Electricity Savings	34 252,92 Kč	33 913,79 Kč	33 578,01 Kč	33 245,55 Kč	32 916,39 Kč
Annual Cash Flow	**39 263,72 Kč**	**38 874,97 Kč**	**38 490,07 Kč**	**38 108,98 Kč**	**37 731,66 Kč**
Accrued Cash Flow (Cash Balance)	-199 247,99 Kč	-160 373,02 Kč	-121 882,95 Kč	-83 773,97 Kč	-46 042,30 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	4 767,60 Kč	4 720,40 Kč	4 673,66 Kč	4 627,39 Kč	4 581,57 Kč
Electricity Savings	32 590,48 Kč	32 267,80 Kč	31 948,32 Kč	31 632,00 Kč	31 318,81 Kč
Annual Cash Flow	**37 358,08 Kč**	**36 988,20 Kč**	**36 621,98 Kč**	**36 259,39 Kč**	**35 900,38 Kč**
Accrued Cash Flow (Cash Balance)	-8 684,22 Kč	28 303,98 Kč	64 925,97 Kč	101 185,35 Kč	137 085,74 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	4 536,21 Kč	4 491,30 Kč	4 446,83 Kč	4 402,80 Kč	4 359,21 Kč
Electricity Savings	31 008,72 Kč	30 701,71 Kč	30 397,73 Kč	30 096,76 Kč	29 798,77 Kč
Annual Cash Flow	**35 544,94 Kč**	**35 193,01 Kč**	**34 844,56 Kč**	**34 499,56 Kč**	**34 157,98 Kč**
Accrued Cash Flow (Cash Balance)	172 630,67 Kč	207 823,68 Kč	242 668,24 Kč	277 167,80 Kč	311 325,79 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	4 316,05 Kč	4 273,32 Kč	4 231,01 Kč	4 189,11 Kč	4 147,64 Kč
Electricity Savings	29 503,74 Kč	29 211,62 Kč	28 922,40 Kč	28 636,04 Kč	28 352,51 Kč
Annual Cash Flow	**33 819,79 Kč**	**33 484,94 Kč**	**33 153,40 Kč**	**32 825,15 Kč**	**32 500,15 Kč**
Accrued Cash Flow (Cash Balance)	345 145,57 Kč	378 630,51 Kč	411 783,91 Kč	444 609,06 Kč	477 109,21 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	4 106,57 Kč	4 065,91 Kč	4 025,66 Kč	3 985,80 Kč	3 946,34 Kč
Electricity Savings	28 071,79 Kč	27 793,86 Kč	27 518,67 Kč	27 246,21 Kč	26 976,44 Kč
Annual Cash Flow	**32 178,37 Kč**	**31 859,77 Kč**	**31 544,33 Kč**	**31 232,01 Kč**	**30 922,78 Kč**
Accrued Cash Flow (Cash Balance)	509 287,58 Kč	541 147,35 Kč	572 691,67 Kč	603 923,68 Kč	634 846,45 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	3 907,26 Kč	3 868,58 Kč	3 830,27 Kč	3 792,35 Kč	3 754,80 Kč
Electricity Savings	26 709,35 Kč	26 444,90 Kč	26 183,07 Kč	25 923,83 Kč	25 667,16 Kč
Annual Cash Flow	**30 616,61 Kč**	**30 313,48 Kč**	**30 013,34 Kč**	**29 716,18 Kč**	**29 421,96 Kč**
Accrued Cash Flow (Cash Balance)	665 463,07 Kč	695 776,54 Kč	725 789,88 Kč	755 506,07 Kč	784 928,03 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	3 717,63 Kč	3 680,82 Kč	3 644,37 Kč	3 608,29 Kč	3 572,57 Kč
Electricity Savings	25 413,03 Kč	25 161,41 Kč	24 912,29 Kč	24 665,64 Kč	24 421,42 Kč
Annual Cash Flow	**29 130,66 Kč**	**28 842,23 Kč**	**28 556,67 Kč**	**28 273,93 Kč**	**27 993,99 Kč**
Accrued Cash Flow (Cash Balance)	814 058,68 Kč	842 900,92 Kč	871 457,58 Kč	899 731,51 Kč	927 725,49 Kč

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

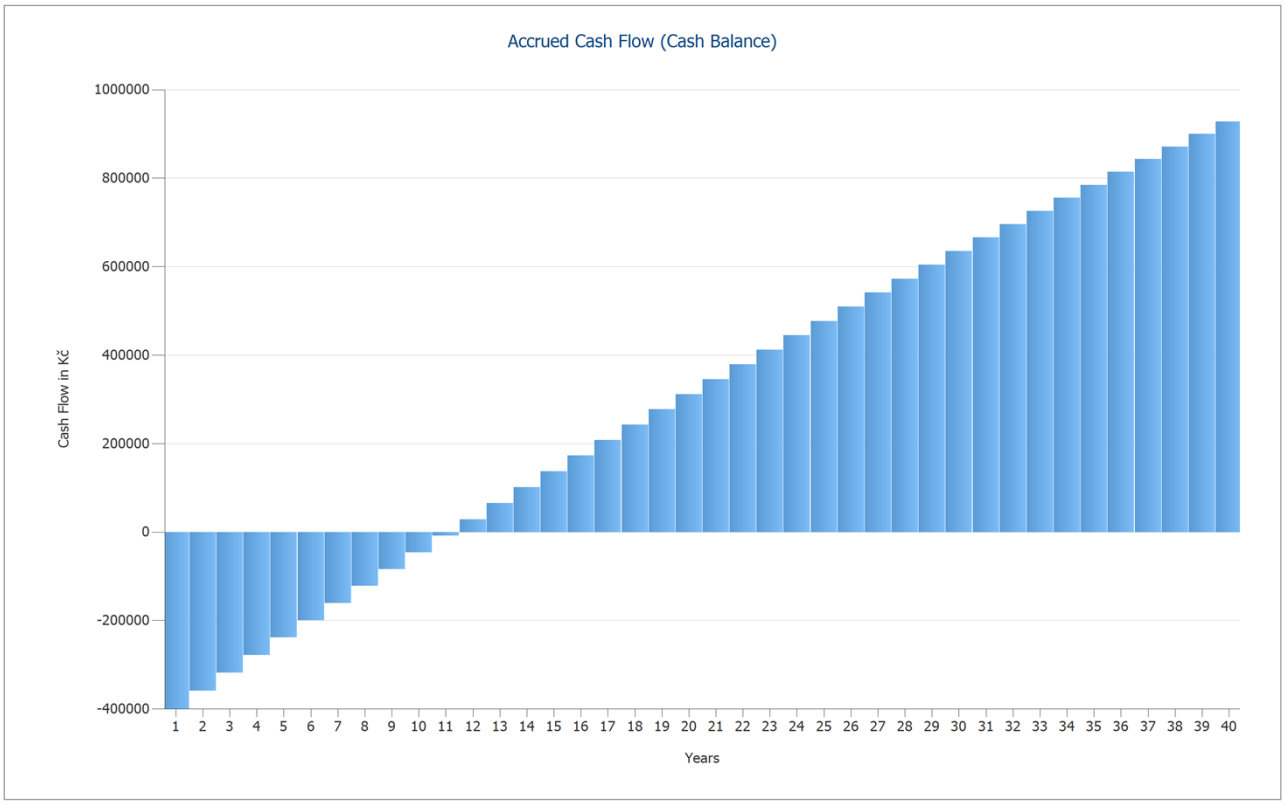


Figure: Accrued Cash Flow (Cash Balance)

Plans and parts list

Circuit Diagram

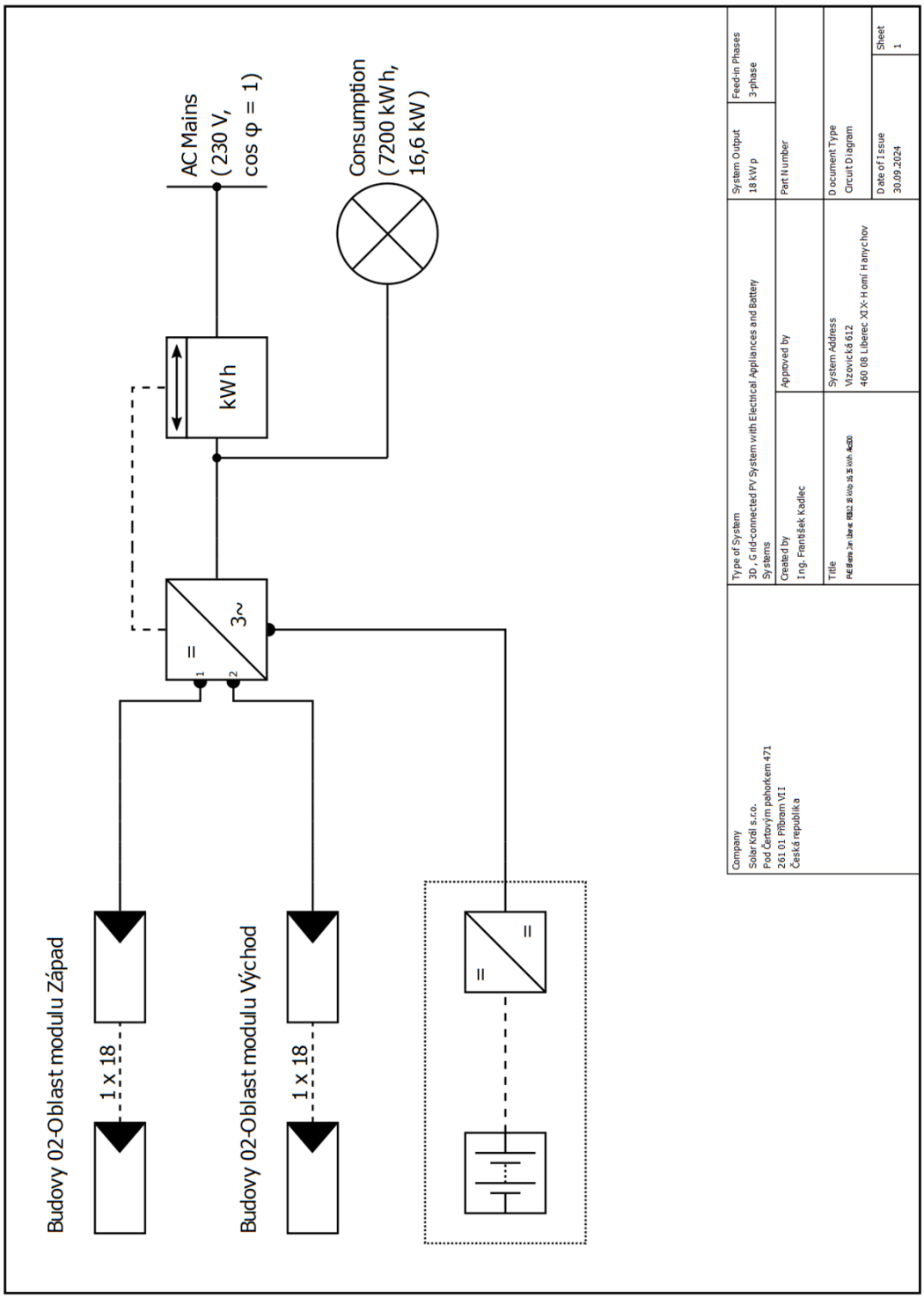


Figure: Circuit Diagram

Overview plan

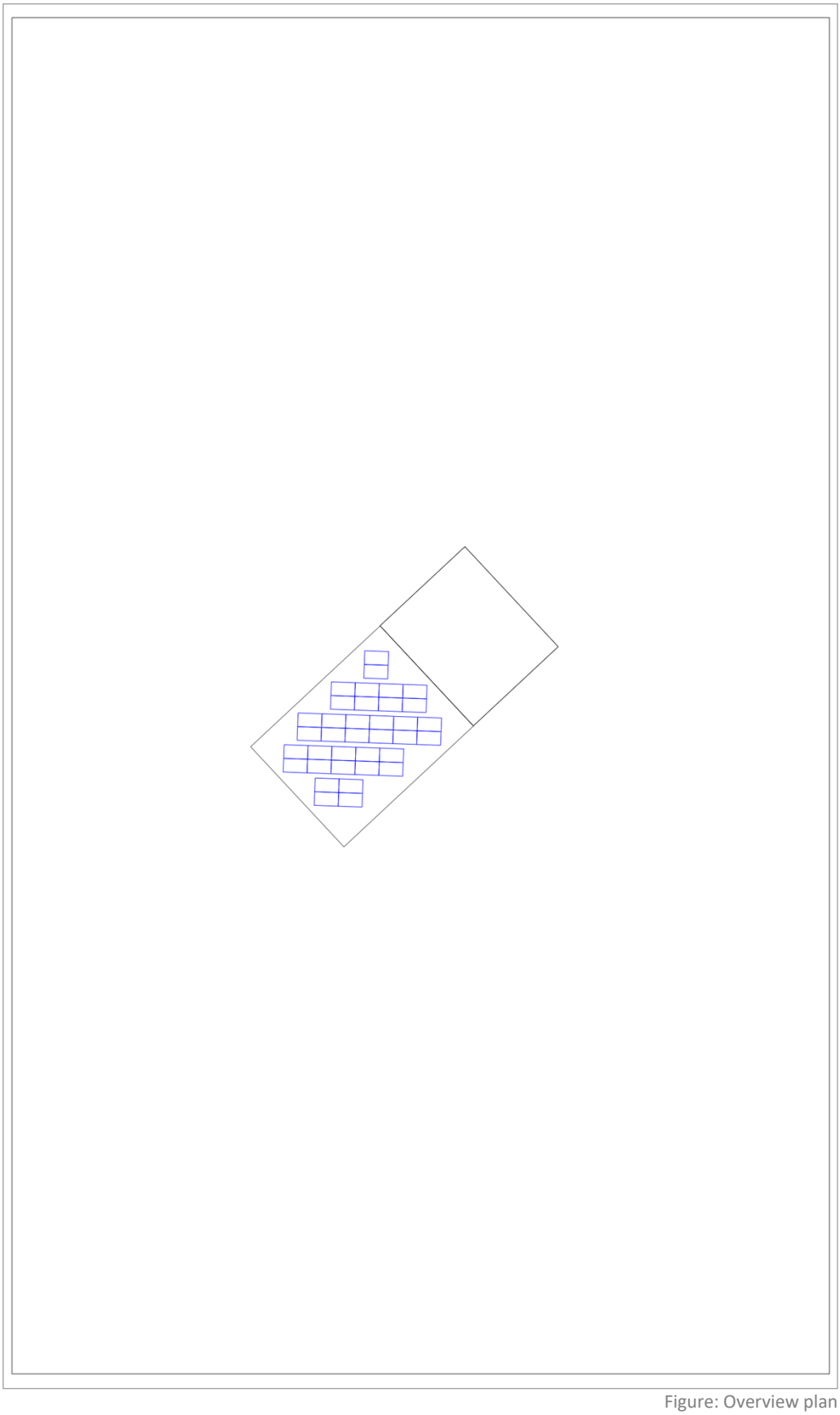


Figure: Overview plan

Dimensioning Plan

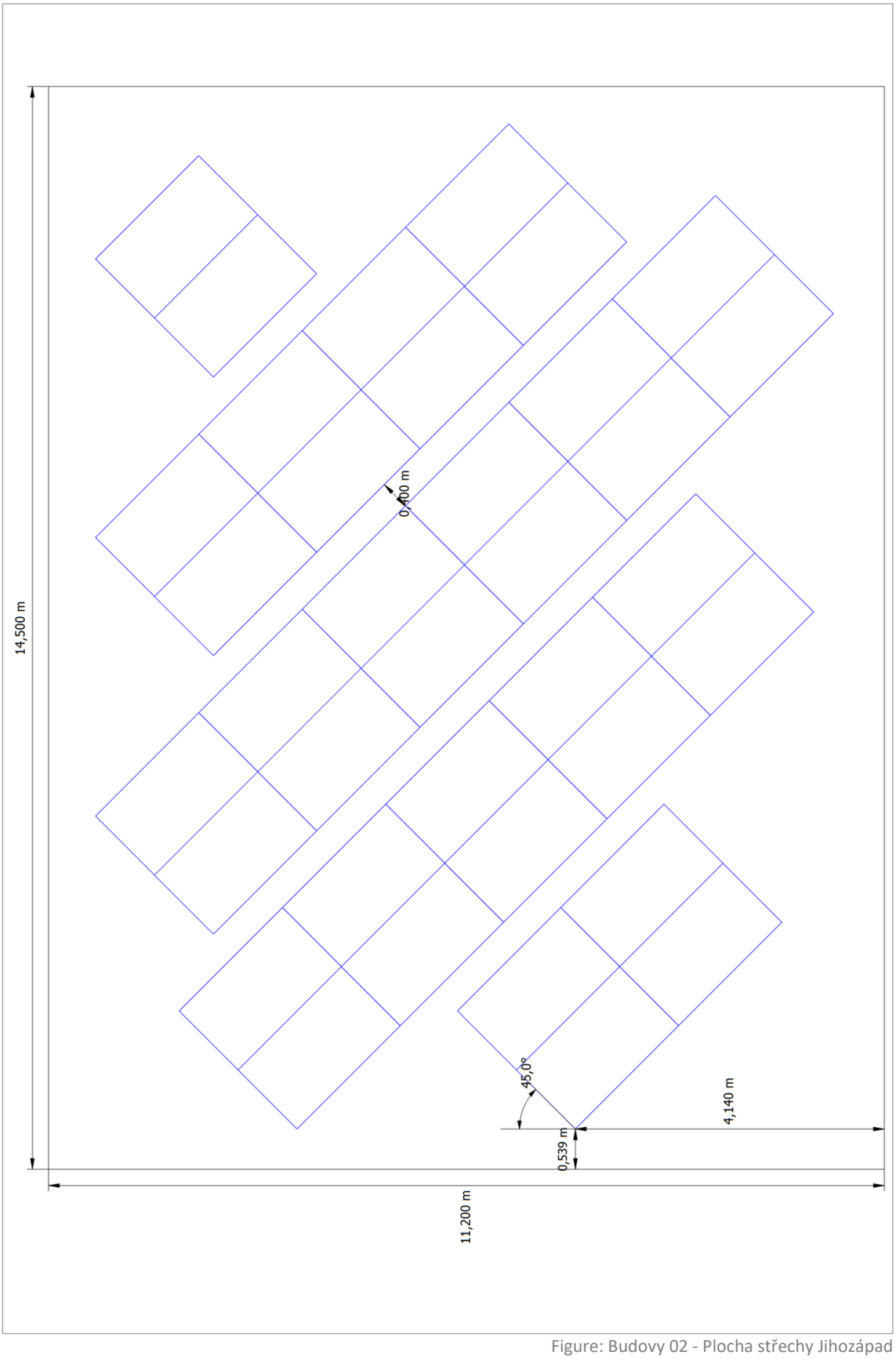


Figure: Budovy 02 - Plocha střechy Jihozápad

String Plan

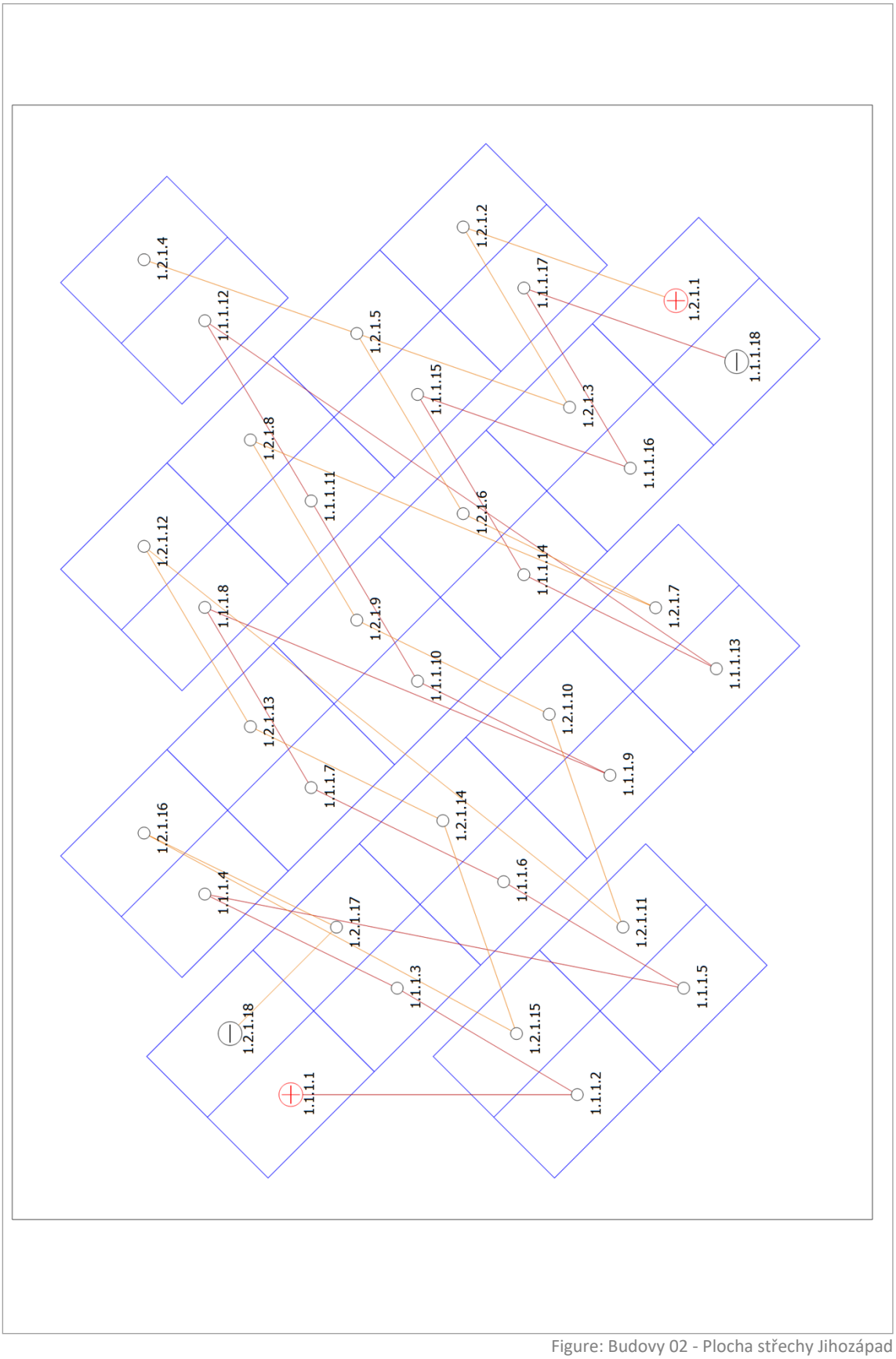


Figure: Budovy 02 - Plocha střechy Jihozápad

Parts list

Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		Aiko	AIKO-A500-MCH60Mb	36	Piece
2	Inverter		GoodWe Technologies Co.,Ltd.	GW15K-ET	1	Piece
3	Battery System		GoodWe Technologies Co.,Ltd.	GW15K-ET + Lynx Home F PLUS+ LX F16.4-H	1	Piece
4	Components			Bidirectional meter with integrated dynamic feed-in control	1	Piece