Version 7.3.1

PVsyst - Simulation report

Grid-Connected System

Project: Svendborg

Variant: Neue Simulationsvariante

No 3D scene defined, no shadings

System power: 16.30 MWp

Dongs-Højrup - Denmark

Autor

SPR Energie GmbH (Germany)

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Project summary

Geographical Site
Dongs-Højrup
Denmark

Situation

Latitude	55.13 °N
Longitude	10.56 °E
Altitude	67 m
Time zone	UTC+1

Project settings

Albedo	0.20

Meteo data
Dongs-Højrup
PVGIS api TMY

System summary

Grid-Connected System
Simulation for year no 10

No 3D scene defined, no shadings

PV Field Orientation

Fixed planes	2 orientations
Tilts/azimuths	15 / -90 ° 15 / 90 °

Near Shadings
No Shadings

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	29916 units
Pnom total	16.30 MWp

Inverters

Nb. of units	70 units
Pnom total	12.25 MWac
Pnom ratio	1.331

Results summary

Produced Energy	13852894 kWh/year	Specific production	850 kWh/kWp/year	Perf. Ratio PR	77.79 %

Table of contents

General parameters

Grid-Connected System — **No 3D scene defined, no shadings**

PV Field Orientation

Orientation		Sheds configuration	Models used	
Fixed planes	2 orientations	No 3D scene defined	Transposition	Perez
Tilts/azimuths	15 / -90 °		Diffuse	Imported
	15 / 90 °		Circumsolar	separate

Horizon	Near Shadings	User's needs
Free Horizon	No Shadings	Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	Solar Fabrik
Model	Mono S4 HC 545
(Custom parameters definition)	
Unit Nom. Power	545 Wp
Number of PV modules	29916 units
Nominal (STC)	16.30 MWp

Inverter

Manufacturer	Huawei Technologies
Model	SUN2000-185KTL-H1
(Custom parameters definition)	
Unit Nom. Power	175 kWac
Number of inverters	70 units
Total power	12250 kWac

Array #1 - PV-Feld Ost

Orientation	#1		
Tilt/Azimuth	15/-90 °		
Number of PV modules	14958 units	Number of inverters	35 units
Nominal (STC)	8152 kWp	Total power	6125 kWac
Modules	554 Strings x 27 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	7556 kWp	Max. power (=>35°C)	185 kWac
U mpp	1026 V	Pnom ratio (DC:AC)	1.33
I mpp	7366 A	Power sharing within this inverter	

Array #2 - PV Feld West

Orientation	#2		
Tilt/Azimuth	15/90 °		
Number of PV modules	14958 units	Number of inverters	35 units
Nominal (STC)	8152 kWp	Total power	6125 kWac
Modules	554 Strings x 27 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	7556 kWp	Max. power (=>35°C)	185 kWac
U mpp	1026 V	Pnom ratio (DC:AC)	1.33
I mpp	7366 A	Power sharing within this inverter	

Total PV power

Nominal (STC)	16304 kWp
Total	29916 modules
Module area	77314 m²

Total inverter power

Total power	12250 kWac
Number of inverters	70 units
Pnom ratio	1.33

Array losses

Array Soiling Losses
Loss Fraction 2.0 %

Thermal Loss factor
Module temperature according to irradiance
Uc (const) 29.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

DC wiring losses
Global array res. 2.3 mΩ
Global wiring resistance 1.1 mΩ
Loss Fraction 1.5 % at STC

LID - Light Induced Degradation
Loss Fraction 2.0 %

Module Quality Loss
Loss Fraction -0.8 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

Module average degradation
Year no 10
Loss factor 0.4 %/year
Mismatch due to degradation
Imp RMS dispersion 0.4 %/year
Vmp RMS dispersion 0.4 %/year

IAM loss factor
Incidence effect (IAM): Fresnel smooth glass, n = 1.526

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.998	0.981	0.948	0.862	0.776	0.636	0.403	0.000

System losses

Unavailability of the system
Time fraction 2.0 %
7.3 days,
3 periods

AC wiring losses

Inv. output line up to MV transfo
Inverter voltage 800 Vac tri
Loss Fraction 0.40 % at STC

Inverter: SUN2000-185KTL-H1
Wire section (35 Inv.) Alu 35 x 3 x 120 mm²
Average wires length 85 m

Inverter: SUN2000-185KTL-H1
Wire section (35 Inv.) Alu 35 x 3 x 95 mm²
Average wires length 0 m

MV line up to Injection
MV Voltage 30 kV
Average each inverter
Wires Alu 3 x 240 mm²
Length 200 m
Loss Fraction 0.01 % at STC

AC losses in transformers

MV transfo
Medium voltage 30 kV

One transfo parameters
Nominal power at STC 2.67 MVA
Iron Loss (24/24 Connexion) 2.67 kVA
Iron loss fraction 0.10 % at STC
Copper loss 26.67 kVA
Copper loss fraction 1.00 % at STC
Coils equivalent resistance 3 x 2.40 mΩ

Operating losses at STC (full system)
Nb. identical MV transfos 6
Nominal power at STC 16.00 MVA
Iron loss (24/24 Connexion) 16.00 kVA
Copper loss 160.00 kVA

Main results

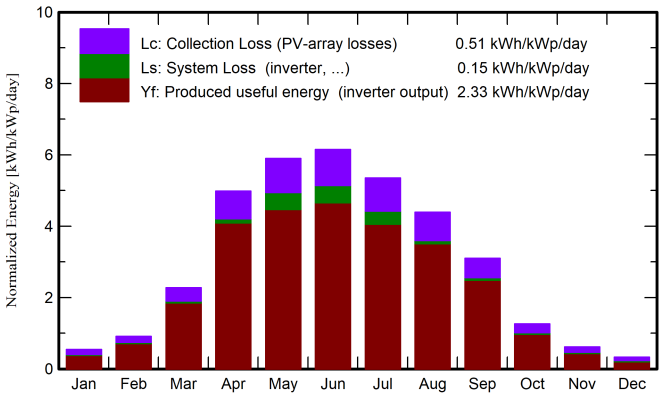
System Production

Produced Energy 13852894 kWh/year

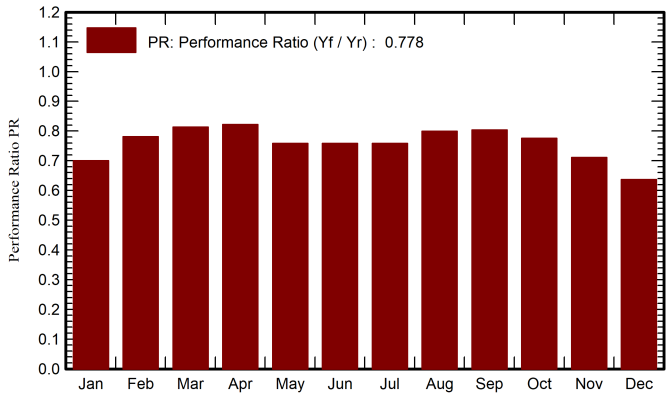
Specific production 850 kWh/kWp/year

Performance Ratio PR 77.79 %

Normalized productions (per installed kWp)



Performance Ratio PR



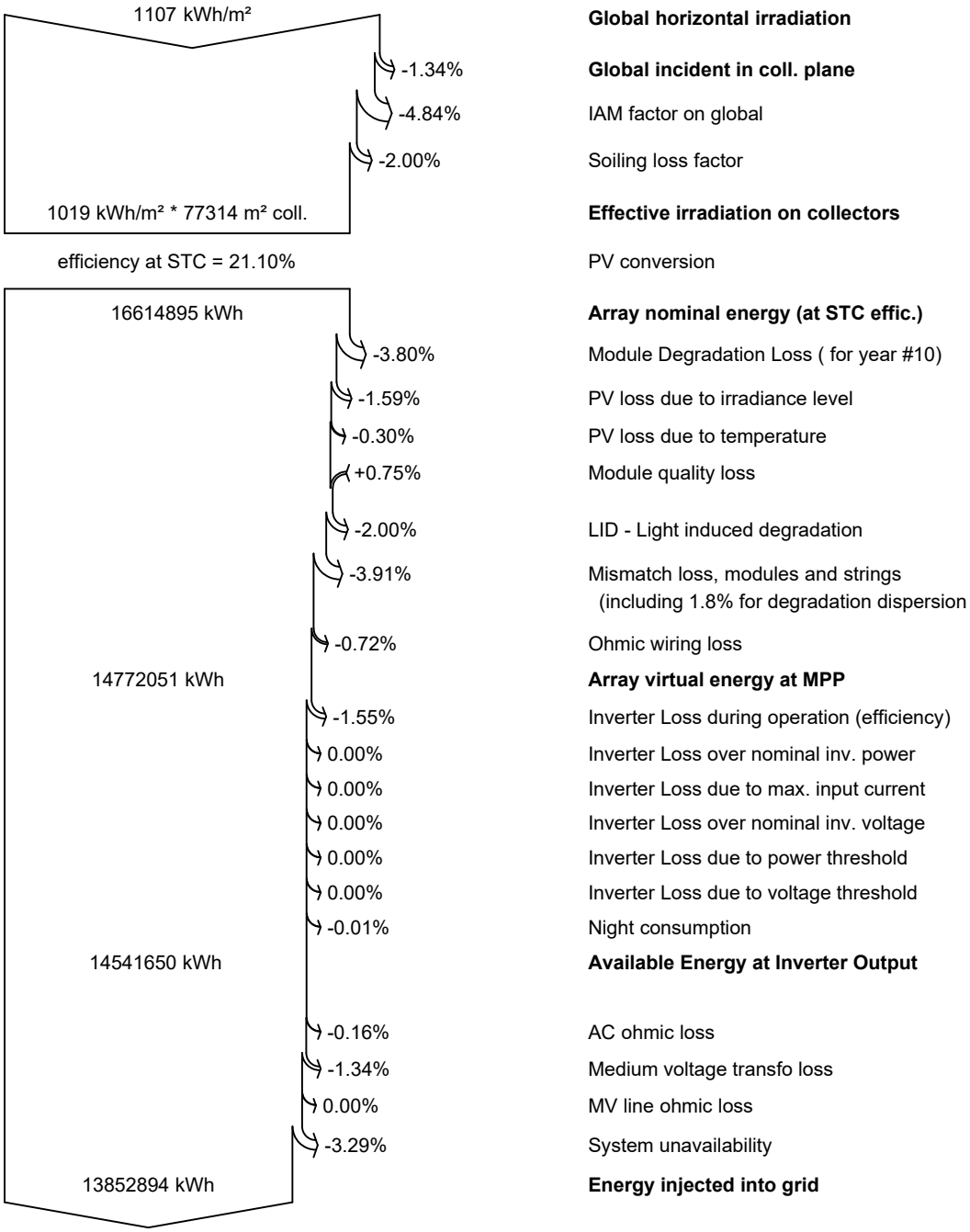
Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray kWh	E_Grid kWh	PR ratio
January	16.7	10.86	1.05	16.8	14.1	207987	191138	0.700
February	25.8	17.30	1.09	25.5	22.9	342559	324749	0.781
March	71.5	39.20	5.87	70.5	64.8	965279	935209	0.814
April	151.4	49.18	8.03	149.5	139.7	2059168	2004545	0.822
May	185.5	73.57	12.10	182.8	172.4	2500673	2259368	0.758
June	187.5	79.95	14.04	184.6	174.4	2514329	2281369	0.758
July	168.7	80.19	17.76	166.0	156.6	2237825	2052242	0.758
August	138.2	72.14	18.85	136.1	127.7	1822751	1773462	0.799
September	93.8	47.41	13.59	92.9	86.0	1253668	1217926	0.804
October	39.4	25.33	9.92	39.0	35.3	515914	493767	0.776
November	18.6	12.91	8.21	18.6	16.1	232043	214994	0.711
December	10.1	7.55	7.10	10.0	8.5	119856	104122	0.637
Year	1107.1	515.57	9.86	1092.3	1018.6	14772051	13852894	0.778

Legends

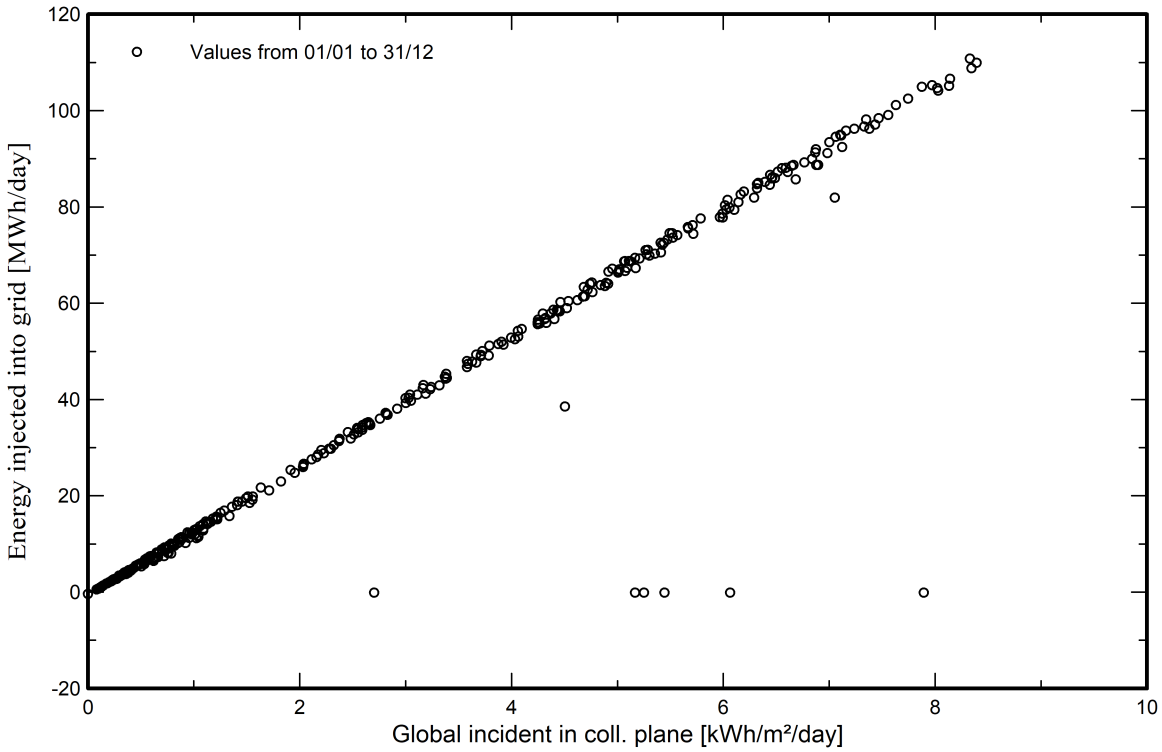
GlobHor	Global horizontal irradiation
DiffHor	Horizontal diffuse irradiation
T_Amb	Ambient Temperature
GlobInc	Global incident in coll. plane
GlobEff	Effective Global, corr. for IAM and shadings
EArray	Effective energy at the output of the array
E_Grid	Energy injected into grid
PR	Performance Ratio

Loss diagram

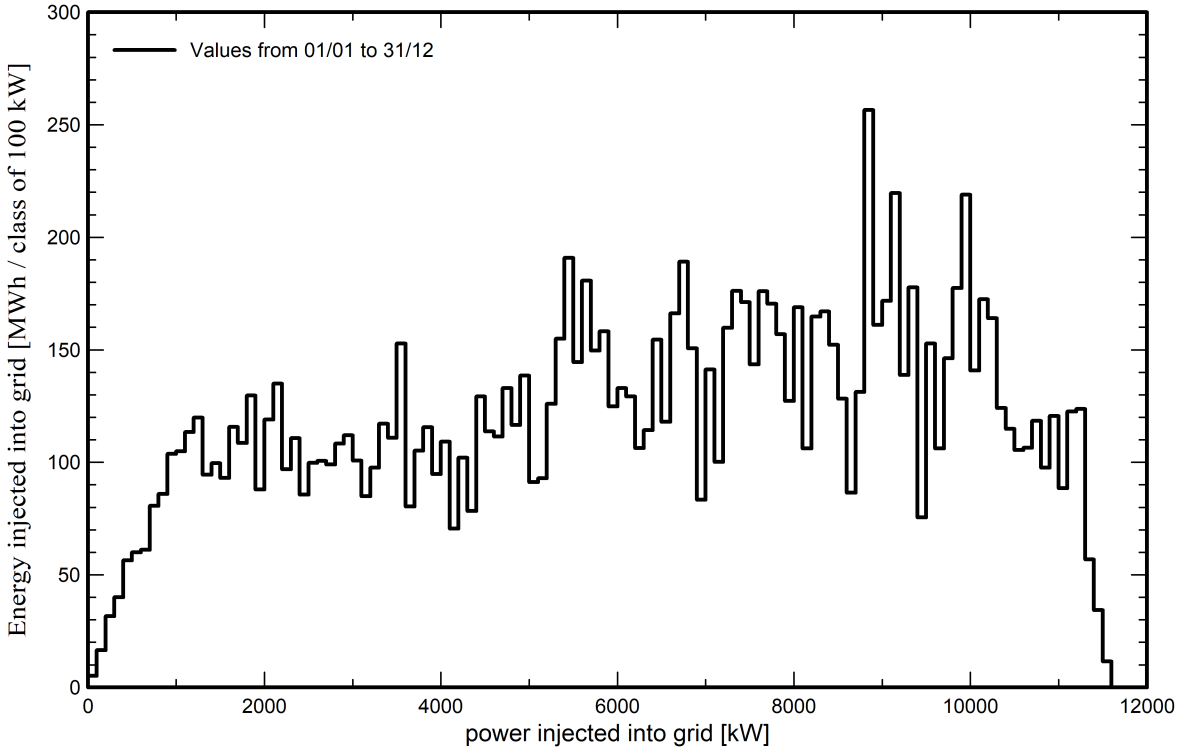


Predef. graphs

Tägliches Eingabe/Ausgabe Diagramm



System-Ausgangsleistungsverteilung



P50 - P90 evaluation

Meteo data

Source	PVGIS api TMY
Kind	Not defined
Year-to-year variability(Variance)	0.0 %
Specified Deviation	

Simulation and parameters uncertainties

PV module modelling/parameters	1.0 %
Inverter efficiency uncertainty	0.5 %
Soiling and mismatch uncertainties	1.0 %
Degradation uncertainty	1.0 %

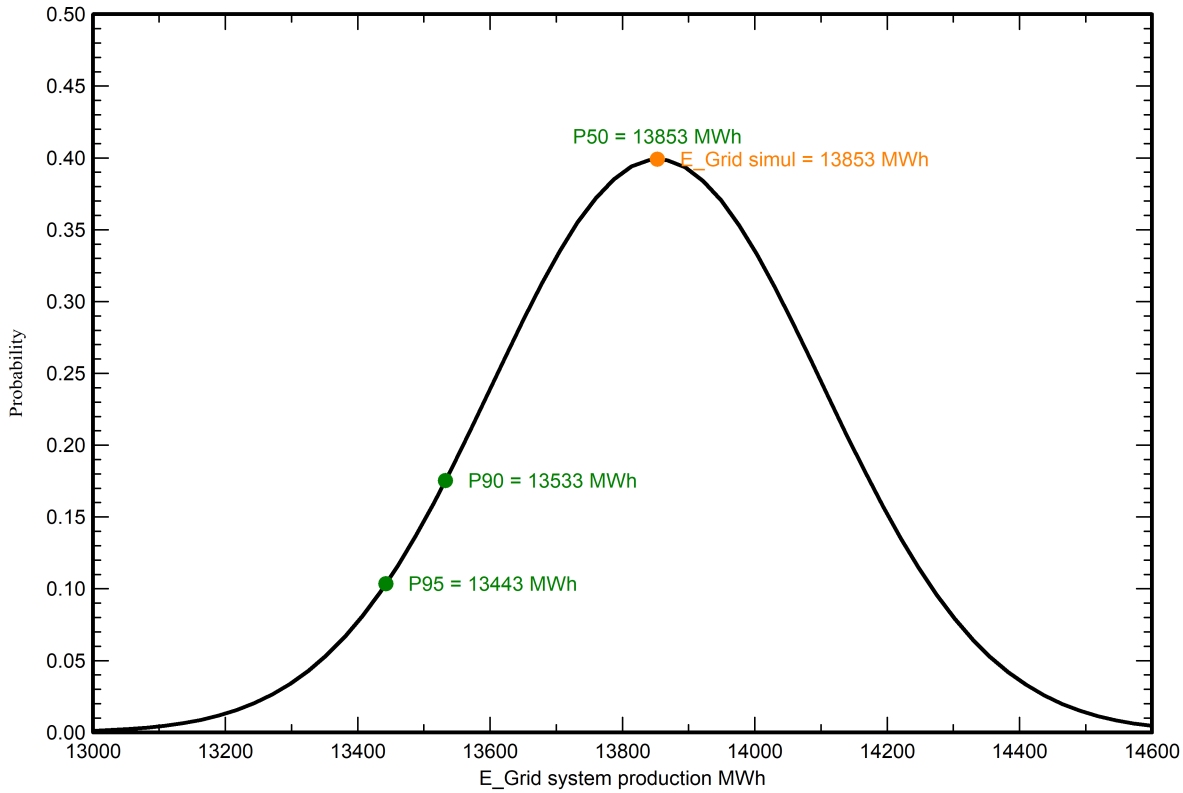
Global variability (meteo + system)

Variability (Quadratic sum)	1.8 %

Annual production probability

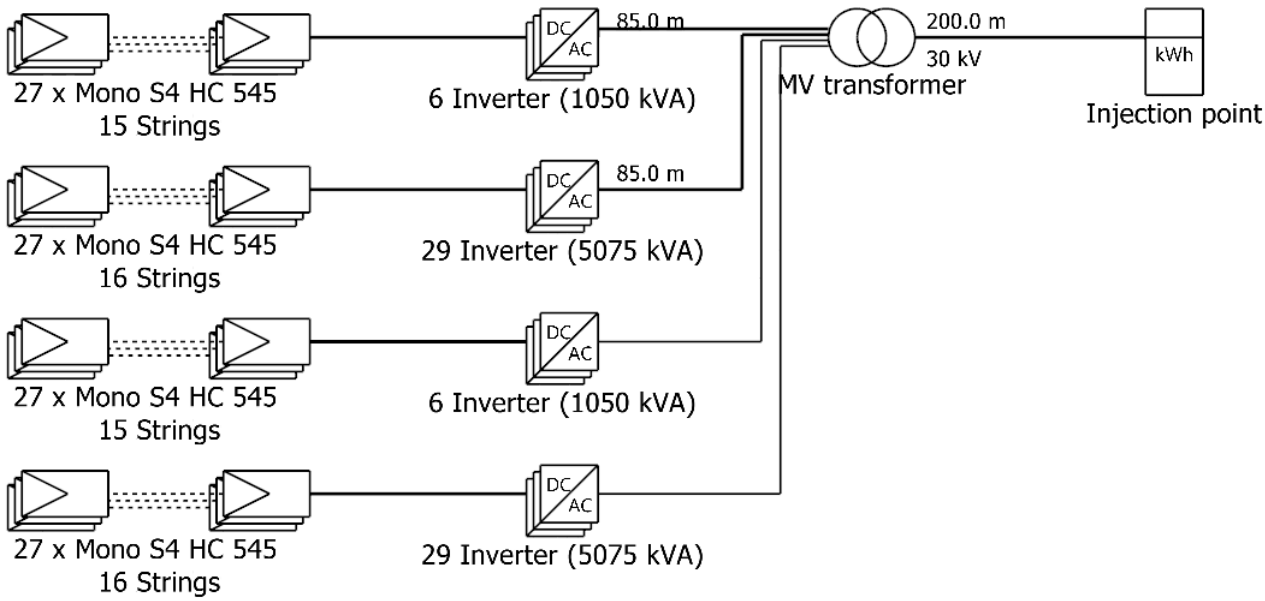
Variability	250 MWh
P50	13853 MWh
P90	13533 MWh
P95	13443 MWh

Probability distribution



Single-line diagram

PVsyst V7.3.1
VC0, Simulation date:
13/02/23 15:32
with v7.3.1



PV module	Mono S4 HC 545
Inverter	SUN2000-185KTL-H1
String	27 x Mono S4 HC 545

Svendborg	SPR Energie GmbH
VC0 : Neue Simulationsvariante	13/02/23