

PVsyst - Simulation report

Grid-Connected System

Project: Pabrik Karton

Variant: N-Type V5

Tables on a building

System power: 379 kWp

Pabrik Karton - Indonesia

**PVsyst V7.4.8**

VCF, Simulation date:
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with V7.4.8

Project summary**Geographical Site****Pabrik Karton**

Indonesia

Situation

Latitude -6.19 °S

Longitude 106.55 °E

Altitude 16 m

Time zone UTC+7

Project settings

Albedo 0.20

Weather data

Pabrik Karton

Meteonorm 8.1 (2016-2021), Sat=100% - Synthetic

System summary**Grid-Connected System**

Simulation for year no 1

Tables on a building**PV Field Orientation**

Fixed planes 2 orientations

Tilts/azimuths 15 / 90 °

15 / -90 °

Near Shadings

Linear shadings : Fast (table)

User's needs

Unlimited load (grid)

System information**PV Array**

Nb. of modules

648 units

Pnom total

379 kWp

Inverters

Nb. of units

3 units

Pnom total

300 kWac

Pnom ratio

1.264

Results summary

Produced Energy	547063 kWh/year	Specific production	1443 kWh/kWp/year	Perf. Ratio PR	82.21 %
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General parameters**Grid-Connected System****PV Field Orientation****Orientation**

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

Horizon

Free Horizon

Tables on a building**Sheds configuration**

Nb. of sheds 648 units
Several orientations

Near Shadings

Linear shadings : Fast (table)

Models used

Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

User's needs

Unlimited load (grid)

PV Array Characteristics**PV module**

Manufacturer Jinkosolar
Model JKM585N-72HL4-V

(Custom parameters definition)

Unit Nom. Power 585 Wp
Number of PV modules 648 units
Nominal (STC) 379 kWp

Array #1 - Inv 1 - 1A

Orientation #1
Tilt/Azimuth 15/90 °
Number of PV modules 36 units
Nominal (STC) 21.06 kWp
Modules 2 string x 18 In series

At operating cond. (50°C)

Pmpp 19.54 kWp
U mpp 702 V
I mpp 28 A

Array #2 - Inv 1 - 1B

Orientation #1
Tilt/Azimuth 15/90 °
Number of PV modules 18 units
Nominal (STC) 10.53 kWp
Modules 1 strings x 18 In series

At operating cond. (50°C)

Pmpp 9.77 kWp
U mpp 702 V
I mpp 14 A

Array #3 - Inv 1- 1C

Orientation #1
Tilt/Azimuth 15/90 °
Number of PV modules 18 units
Nominal (STC) 10.53 kWp
Modules 1 strings x 18 In series

At operating cond. (50°C)

Pmpp 9.77 kWp
U mpp 702 V
I mpp 14 A

Inverter

Manufacturer Huawei Technologies
Model SUN2000-100KTL-M2-400V

(Custom parameters definition)

Unit Nom. Power 100 kWac
Number of inverters 3 units
Total power 300 kWac

Number of inverters 1 * MPPT 17% 0.2 unit
Total power 16.7 kWac

Operating voltage 200-1000 V
Max. power (=>33°C) 110 kWac
Pnom ratio (DC:AC) 1.26

Number of inverters 1 * MPPT 8% 0.1 unit
Total power 8.3 kWac

Operating voltage 200-1000 V
Max. power (=>33°C) 110 kWac
Pnom ratio (DC:AC) 1.26

Number of inverters 1 * MPPT 8% 0.1 unit
Total power 8.3 kWac

Operating voltage 200-1000 V
Max. power (=>33°C) 110 kWac
Pnom ratio (DC:AC) 1.26



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PV Array Characteristics

Array #4 - Inv 1 - 1D

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #5 - Inv 1 - 1E

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #6 - Inv 1 - 1F

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #7 - Inv 1 - 1G

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #8 - Inv 1 - 1H

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26



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PV Array Characteristics

Array #9 - Inv 1 - 1I

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #10 - Inv 1 - 1J

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	36 units	Number of inverters	1 * MPPT 17% 0.2 unit
Nominal (STC)	21.06 kWp	Total power	16.7 kWac
Modules	2 string x 18 In series		
At operating cond. (50°C)			
Pmpp	19.54 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	28 A	Pnom ratio (DC:AC)	1.26

Array #11 - Inv 2 - 2A

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	36 units	Number of inverters	1 * MPPT 17% 0.2 unit
Nominal (STC)	21.06 kWp	Total power	16.7 kWac
Modules	2 string x 18 In series		
At operating cond. (50°C)			
Pmpp	19.54 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	28 A	Pnom ratio (DC:AC)	1.26

Array #12 - Inv 2 - 2B

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	36 units	Number of inverters	1 * MPPT 17% 0.2 unit
Nominal (STC)	21.06 kWp	Total power	16.7 kWac
Modules	2 string x 18 In series		
At operating cond. (50°C)			
Pmpp	19.54 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	28 A	Pnom ratio (DC:AC)	1.26

Array #13 - Inv 2 - 2C

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26



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PV Array Characteristics

Array #14 - Inv 2 - 2D

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)		Operating voltage	200-1000 V
Pmpp	9.77 kWp	Max. power (=>33°C)	110 kWac
U mpp	702 V	Pnom ratio (DC:AC)	1.26
I mpp	14 A		

Array #15 - Inv 2 - 2E

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)		Operating voltage	200-1000 V
Pmpp	9.77 kWp	Max. power (=>33°C)	110 kWac
U mpp	702 V	Pnom ratio (DC:AC)	1.26
I mpp	14 A		

Array #16 - Inv 2 - 2F

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)		Operating voltage	200-1000 V
Pmpp	9.77 kWp	Max. power (=>33°C)	110 kWac
U mpp	702 V	Pnom ratio (DC:AC)	1.26
I mpp	14 A		

Array #17 - Inv 2 - 2G

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)		Operating voltage	200-1000 V
Pmpp	9.77 kWp	Max. power (=>33°C)	110 kWac
U mpp	702 V	Pnom ratio (DC:AC)	1.26
I mpp	14 A		

Array #18 - Inv 2 - 2H

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)		Operating voltage	200-1000 V
Pmpp	9.77 kWp	Max. power (=>33°C)	110 kWac
U mpp	702 V	Pnom ratio (DC:AC)	1.26
I mpp	14 A		



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PV Array Characteristics

Array #19 - Inv 2 - 2I

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #20 - Inv 2 - 2J

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #21 - Inv3 - 1A

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #22 - Inv3 - 1B

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #23 - Inv3 - 1C

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26



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PV Array Characteristics

Array #24 - Inv3 - 1D

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #25 - Inv3 - 1E

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #26 - Inv3 - 1F

Orientation	#1		
Tilt/Azimuth	15/90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #27 - Inv3 - 2A

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

Array #28 - Inv3 - 2B

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	18 units	Number of inverters	1 * MPPT 8% 0.1 unit
Nominal (STC)	10.53 kWp	Total power	8.3 kWac
Modules	1 strings x 18 In series		
At operating cond. (50°C)			
Pmpp	9.77 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	14 A	Pnom ratio (DC:AC)	1.26

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PV Array Characteristics**Array #29 - Inv3 - 2C**

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	36 units	Number of inverters	1 * MPPT 17% 0.2 unit
Nominal (STC)	21.06 kWp	Total power	16.7 kWac
Modules	2 string x 18 In series		
At operating cond. (50°C)			
Pmpp	19.54 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	28 A	Pnom ratio (DC:AC)	1.26

Array #30 - Inv3 - 2D

Orientation	#2		
Tilt/Azimuth	15/-90 °		
Number of PV modules	36 units	Number of inverters	1 * MPPT 17% 0.2 unit
Nominal (STC)	21.06 kWp	Total power	16.7 kWac
Modules	2 string x 18 In series		
At operating cond. (50°C)			
Pmpp	19.54 kWp	Operating voltage	200-1000 V
U mpp	702 V	Max. power (=>33°C)	110 kWac
I mpp	28 A	Pnom ratio (DC:AC)	1.26

Total PV power

Nominal (STC)	379 kWp
Total	648 modules
Module area	1674 m ²
Cell area	1541 m ²

Total inverter power

Total power	300 kWac
Number of inverters	3 units
Pnom ratio	1.26
Power sharing defined	

Array losses**Array Soiling Losses**

Loss Fraction	3.0 %
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Thermal Loss factor

Module temperature according to irradiance	
Uc (const)	15.0 W/m ² K
Uv (wind)	0.0 W/m ² K/m/s

LID - Light Induced Degradation

Loss Fraction	0.5 %
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Module Quality Loss

Loss Fraction	0.0 %
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Module mismatch losses

Loss Fraction	0.2 % at MPP
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Strings Mismatch loss

Loss Fraction	0.2 %
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Module average degradation

Year no	1
Loss factor	0.42 %/year

Mismatch due to degradation

Imp RMS dispersion	0.4 %/year
Vmp RMS dispersion	0.4 %/year

IAM loss factor

Incidence effect (IAM): Fresnel, AR coating, n(glass)=1.526, n(AR)=1.290

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.962	0.892	0.816	0.681	0.440	0.000



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Array losses

Spectral correction

FirstSolar model

Precipitable water estimated from relative humidity

Coefficient Set	C0	C1	C2	C3	C4	C5
Monocrystalline Si	0,85914	-0,02088	-0,0058853	0,12029	0,026814	-0,001781

DC wiring losses

Global wiring resistance 10 mΩ
Loss Fraction 1.0 % at STC

Array #1 - Inv 1 - 1A

Global array res. 329 mΩ
Loss Fraction 1.2 % at STC

Array #3 - Inv 1 - 1C

Global array res. 501 mΩ
Loss Fraction 0.9 % at STC

Array #5 - Inv 1 - 1E

Global array res. 514 mΩ
Loss Fraction 0.9 % at STC

Array #7 - Inv 1 - 1G

Global array res. 595 mΩ
Loss Fraction 1.1 % at STC

Array #9 - Inv 1 - 1I

Global array res. 389 mΩ
Loss Fraction 0.7 % at STC

Array #11 - Inv 2 - 2A

Global array res. 329 mΩ
Loss Fraction 1.2 % at STC

Array #13 - Inv 2 - 2C

Global array res. 501 mΩ
Loss Fraction 0.9 % at STC

Array #15 - Inv 2 - 2E

Global array res. 514 mΩ
Loss Fraction 0.9 % at STC

Array #17 - Inv 2 - 2G

Global array res. 595 mΩ
Loss Fraction 1.1 % at STC

Array #19 - Inv 2 - 2I

Global array res. 345 mΩ
Loss Fraction 0.6 % at STC

Array #21 - Inv3 - 1A

Global array res. 389 mΩ
Loss Fraction 0.7 % at STC

Array #23 - Inv3 - 1C

Global array res. 464 mΩ
Loss Fraction 0.8 % at STC

Array #25 - Inv3 - 1E

Global array res. 539 mΩ
Loss Fraction 1.0 % at STC

Array #27 - Inv3 - 2A

Global array res. 389 mΩ
Loss Fraction 0.7 % at STC

Array #2 - Inv 1 - 1B

Global array res. 595 mΩ
Loss Fraction 1.1 % at STC

Array #4 - Inv 1 - 1D

Global array res. 483 mΩ
Loss Fraction 0.9 % at STC

Array #6 - Inv 1 - 1F

Global array res. 558 mΩ
Loss Fraction 1.0 % at STC

Array #8 - Inv 1 - 1H

Global array res. 639 mΩ
Loss Fraction 1.2 % at STC

Array #10 - Inv 1 - 1J

Global array res. 376 mΩ
Loss Fraction 1.4 % at STC

Array #12 - Inv 2 - 2B

Global array res. 291 mΩ
Loss Fraction 1.1 % at STC

Array #14 - Inv 2 - 2D

Global array res. 483 mΩ
Loss Fraction 0.9 % at STC

Array #16 - Inv 2 - 2F

Global array res. 558 mΩ
Loss Fraction 1.0 % at STC

Array #18 - Inv 2 - 2H

Global array res. 639 mΩ
Loss Fraction 1.2 % at STC

Array #20 - Inv 2 - 2J

Global array res. 721 mΩ
Loss Fraction 1.3 % at STC

Array #22 - Inv3 - 1B

Global array res. 414 mΩ
Loss Fraction 0.8 % at STC

Array #24 - Inv3 - 1D

Global array res. 501 mΩ
Loss Fraction 0.9 % at STC

Array #26 - Inv3 - 1F

Global array res. 583 mΩ
Loss Fraction 1.1 % at STC

Array #28 - Inv3 - 2B

Global array res. 414 mΩ
Loss Fraction 0.8 % at STC



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DC wiring losses

Array #29 - Inv3 - 2C

Global array res. 266 mΩ
Loss Fraction 1.0 % at STC

Array #30 - Inv3 - 2D

Global array res. 307 mΩ
Loss Fraction 1.1 % at STC

AC wiring losses

Inv. output line up to injection point

Inverter voltage 400 Vac tri
Loss Fraction 0.22 % at STC

Global System

Wire section Copper 3 x 400 mm²
Wires length 20 m

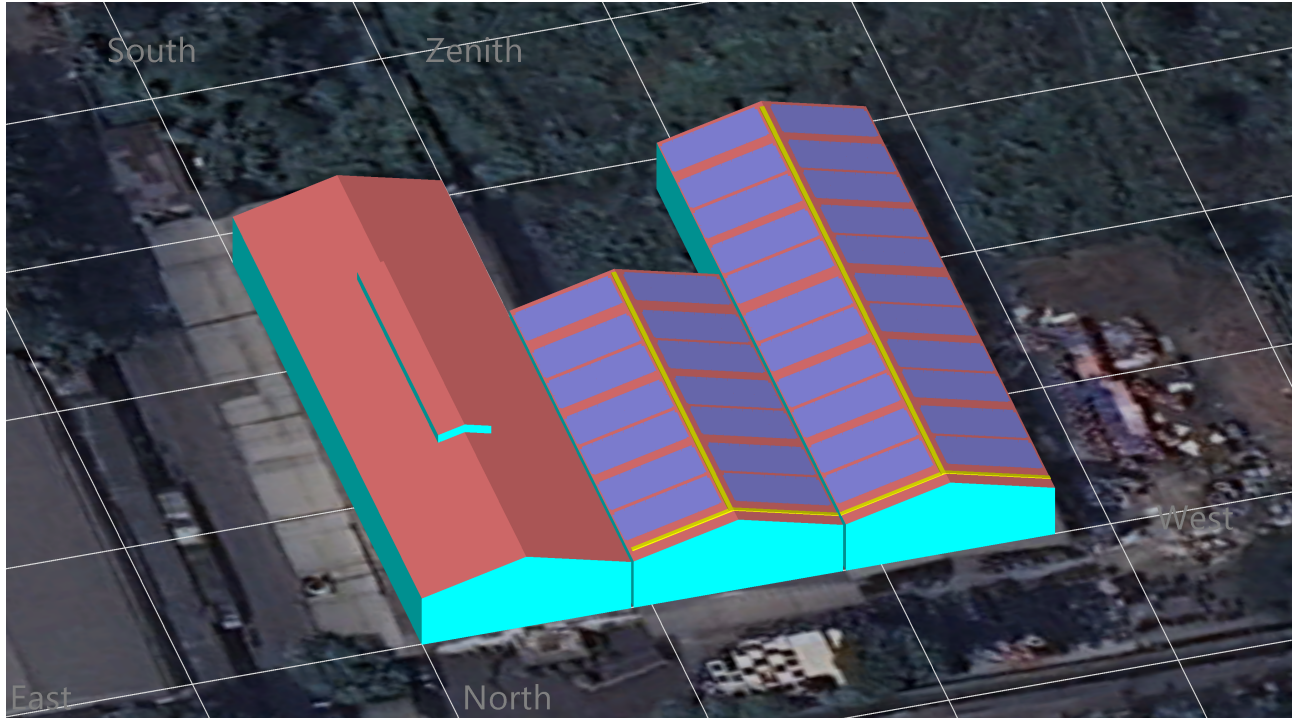


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Near shadings parameter

Perspective of the PV-field and surrounding shading scene

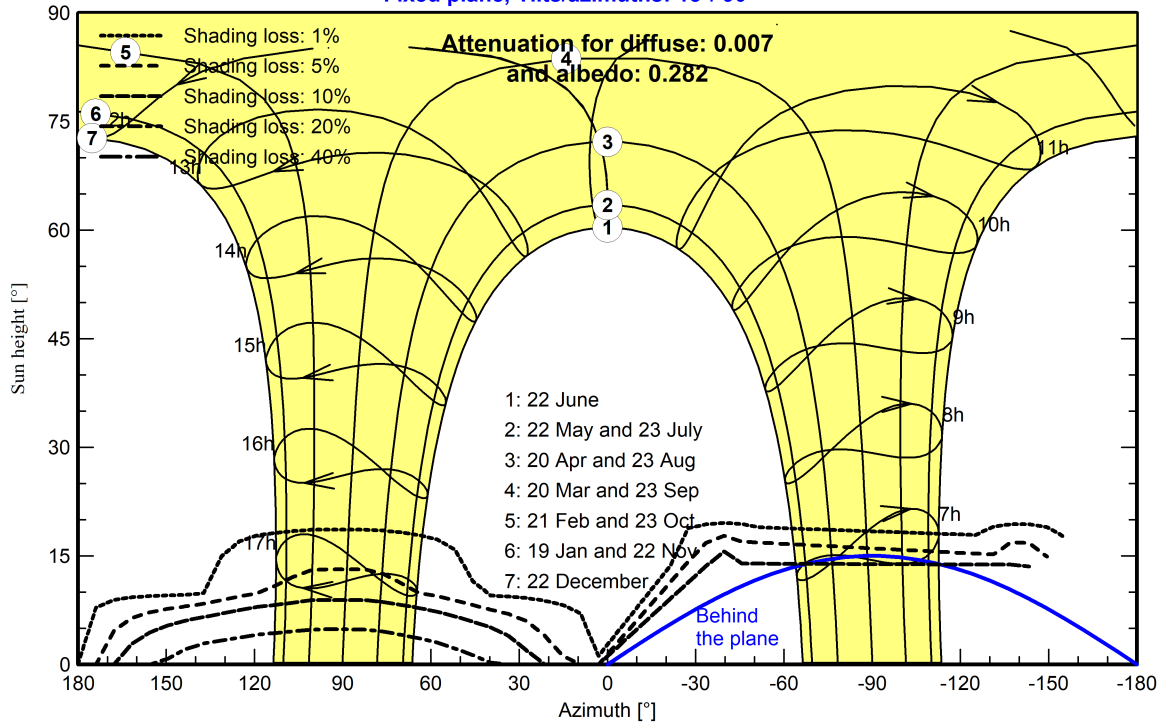




Iso-shadings diagram

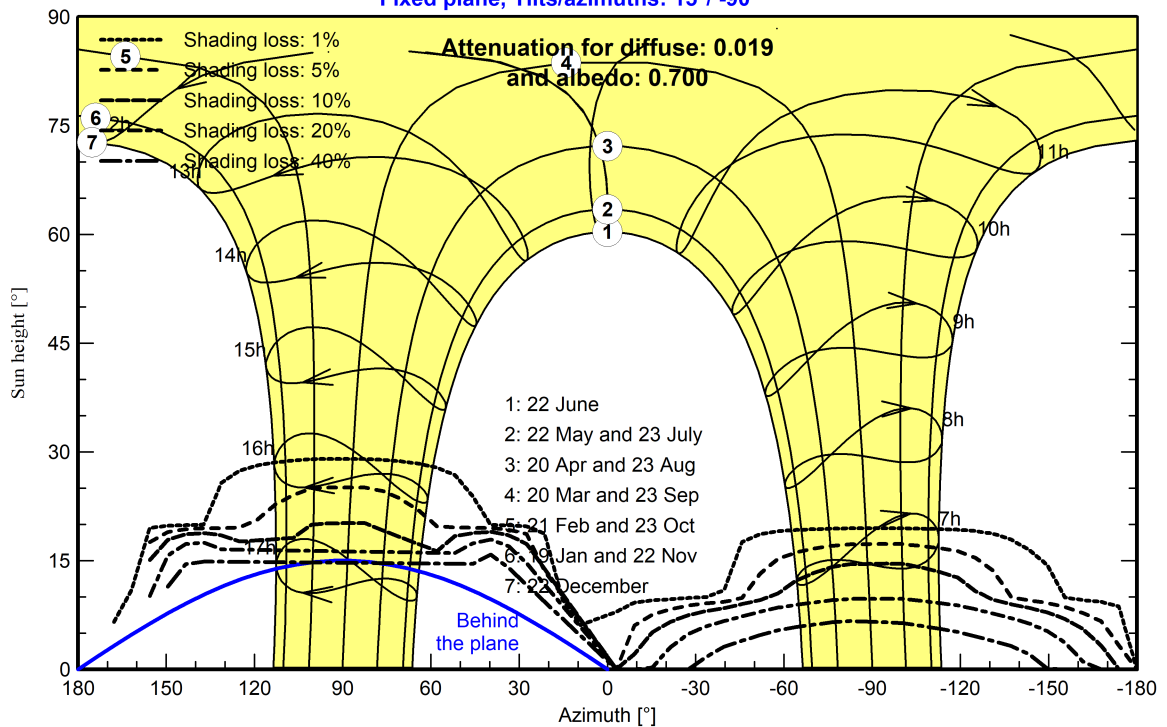
Orientation #1

Fixed plane, Tilts/azimuths: 15°/ 90°



Orientation #2

Fixed plane, Tilts/azimuths: 15°/ -90°





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Main results

System Production

Produced Energy (P50)	547063 kWh/year	Specific production (P50)	1443 kWh/kWp/year	Perf. Ratio PR	82.21 %
Produced Energy (P75)	525415 kWh/year	Specific production (P75)	1386 kWh/kWp/year		
Produced Energy (P80)	520026 kWh/year	Specific production (P80)	1372 kWh/kWp/year		

Economic evaluation

Investment

Global 2.500.483.335.23 IDR

Specific 6596 IDR/Wp

Yearly cost

Annuities 0.00 IDR/yr

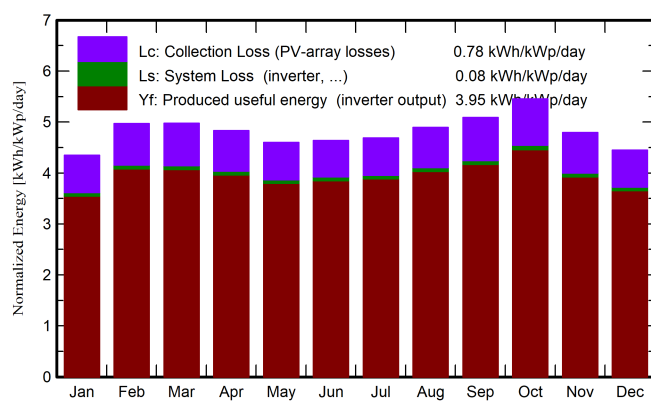
Run. costs 195.073.405.26 IDR/yr

Payback period 5.7 years

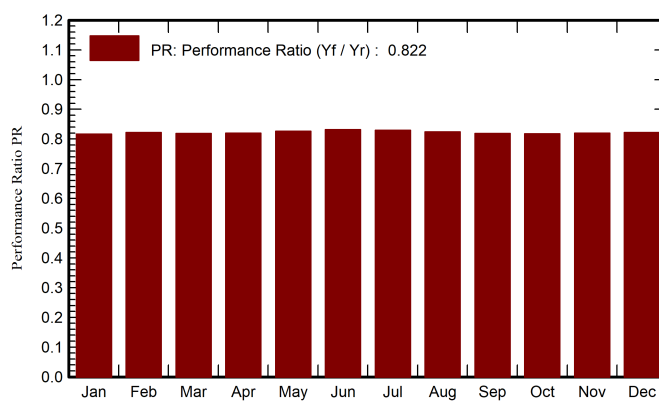
LCOE

Energy cost 558 IDR/kWh

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray kWh	E_Grid kWh	PR ratio
January	137.0	71.3	26.56	134.7	126.3	42515	41707	0.817
February	141.7	80.5	26.51	139.2	131.0	44182	43350	0.822
March	157.1	85.7	26.88	154.3	145.3	48772	47850	0.818
April	147.6	76.0	26.82	145.1	136.4	45942	45074	0.820
May	145.1	77.5	27.28	142.6	133.8	45496	44654	0.826
June	141.6	69.8	26.66	139.1	130.7	44652	43817	0.831
July	148.1	71.9	26.51	145.4	136.7	46564	45695	0.829
August	154.6	81.1	26.83	151.8	143.1	48307	47398	0.824
September	155.5	86.4	26.72	152.7	143.9	48329	47423	0.819
October	172.4	100.1	27.40	169.1	159.4	53444	52445	0.818
November	146.7	83.9	26.76	143.8	135.4	45548	44690	0.820
December	140.4	81.6	26.80	137.9	129.4	43781	42961	0.822
Year	1787.9	965.7	26.81	1755.5	1651.4	557531	547063	0.822

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

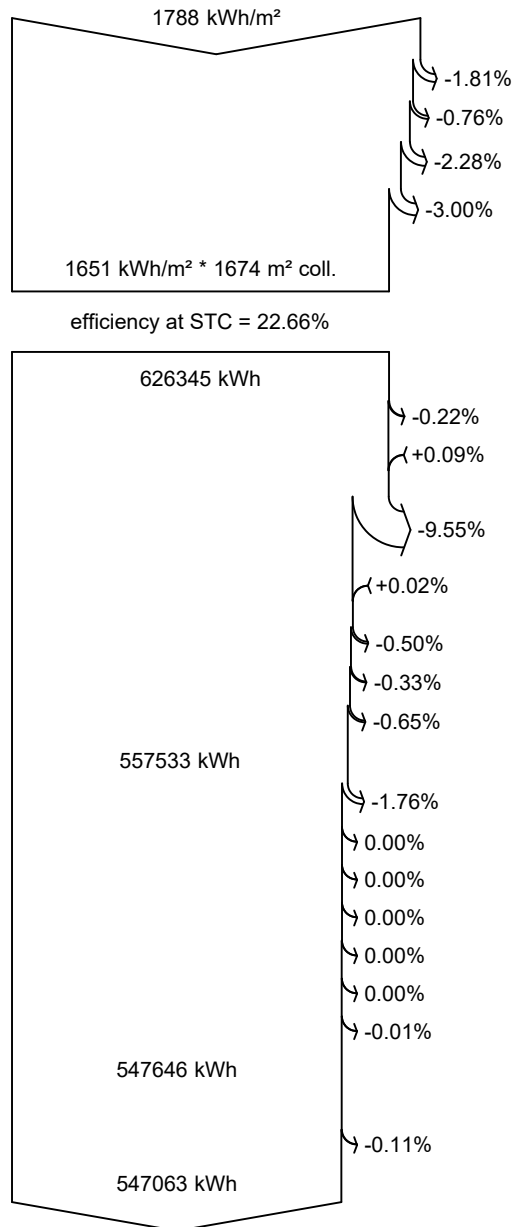
PR Performance Ratio



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Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Near Shadings: irradiance loss

IAM factor on global

Soiling loss factor

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

Module Degradation Loss (for year #1)

PV loss due to irradiance level

PV loss due to temperature

Spectral correction

LID - Light induced degradation

Mismatch loss, modules and strings

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Night consumption

Available Energy at Inverter Output

AC ohmic loss

Energy injected into grid

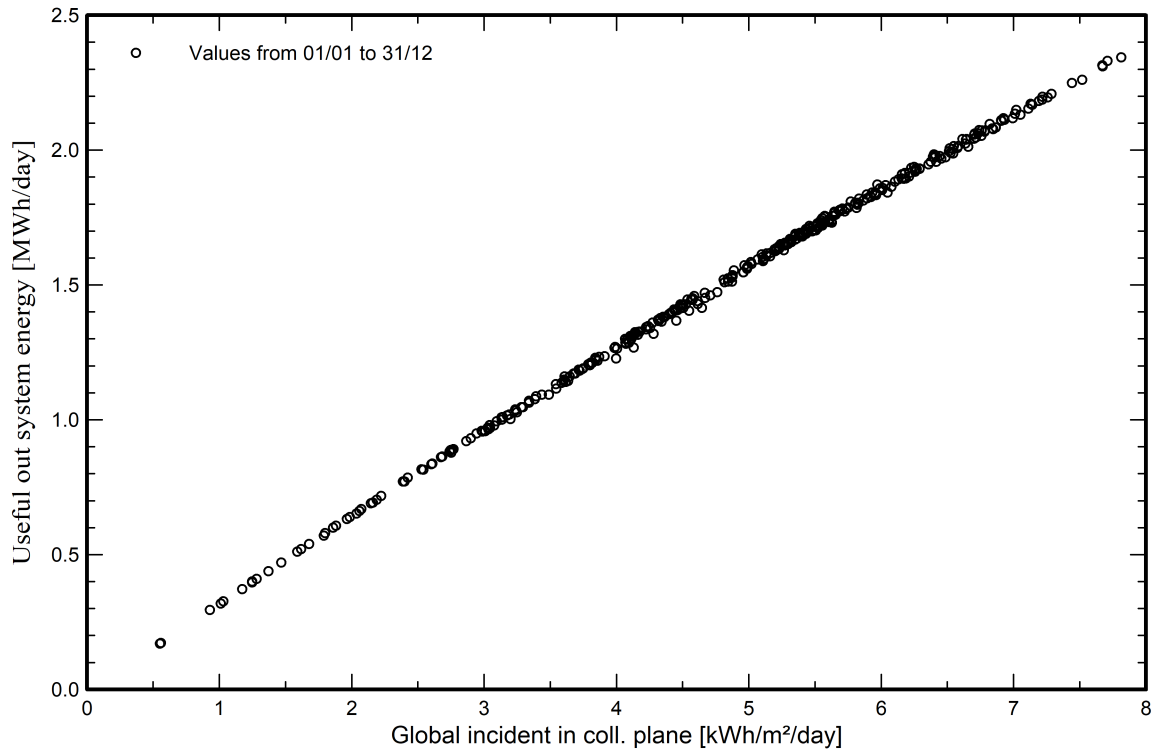


PVsyst V7.4.8

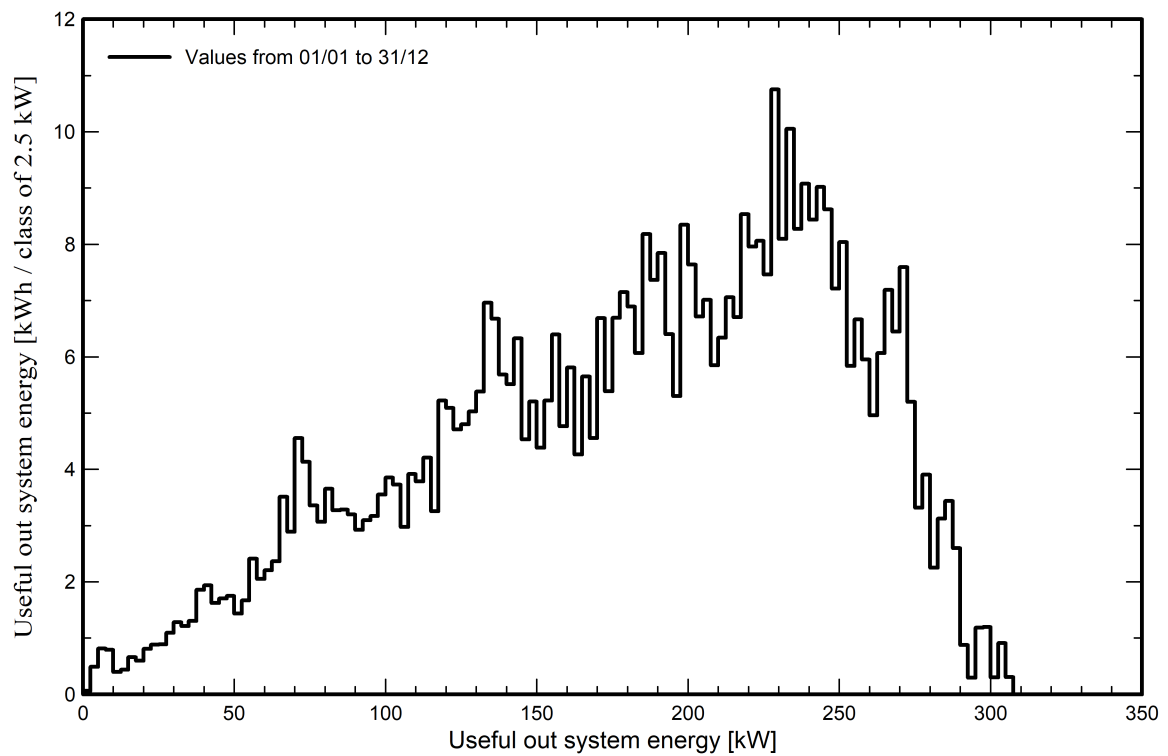
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Predef. graphs

Daily Input/Output diagram



System Output Power Distribution



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Cost of the system**Installation costs**

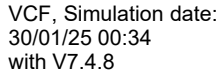
Item	Quantity units	Cost IDR	Total IDR
PV modules			
JKM585N-72HL4-V	648	1.395.123.72	904.040.170.00
Supports for modules	648	264.359.91	171.305.222.00
Inverters			
SUN2000-100KTL-M2-400V	3	67.900.000.00	203.700.000.00
Other components			
Solar Cable	1	109.127.200.00	109.127.200.00
Komponen Lainnya	1	683.366.201.00	683.366.201.00
Studies and analysis			
Engineering	1	29.189.160.00	29.189.160.00
Installation			
Project Management	648	147.687.90	95.701.760.00
Heavy Machinery	1	60.000.000.00	60.000.000.00
Taxes			
VAT	1	0.00	244.053.622.23
		Total	2.500.483.335.23
		Depreciable asset	2.071.538.793.00

Operating costs

Item	Total IDR/year
Maintenance	
Provision for inverter replacement	20.370.000.00
Pest Management	33.945.00
Operation & Administration	6.530.065.69
Cleaning	35.642.267.00
System Inspection & Monitoring	11.564.434.88
Module Replacement	1.834.101.73
Asset Management	4.085.596.41
Component Part Replacement	887.009.47
Administrative, accounting	27.831.114.00
Total (OPEX)	108.778.534.18
Including inflation (3.75%)	195.073.405.26

System summary

Total installation cost	2.500.483.335.23 IDR
Operating costs (incl. inflation 3.75%/year)	195.073.405.26 IDR/year
Produced Energy	547 MWh/year
Cost of produced energy (LCOE)	558.2867 IDR/kWh



Variant: N-Type V5

Payback period	5.7 years
Net present value (NPV)	7.143.913.586.11 IDR
Internal rate of return (IRR)	16.07 %
Return on investment (ROI)	285.7 %



Financial analysis

Detailed economic results (kIDR)

Year	Electricity sale	Own funds	Run. costs	Deprec. allow.	Taxable income	Taxes	After-tax profit	Cumul. profit	% amorti.
0	0	2.500.483.335	0	0	0	0	0	-2.500.483.335	0.0%
1	564.929.532	0	108.778.534	69.051.293	387.099.705	0	456.150.998	-2.044.332.337	18.2%
2	561.417.442	0	112.857.729	69.051.293	379.508.420	0	448.559.713	-1.595.772.624	36.2%
3	557.905.352	0	117.089.894	69.051.293	371.764.165	0	440.815.458	-1.154.957.166	53.8%
4	554.393.262	0	121.480.765	69.051.293	363.861.204	0	432.912.497	-722.044.669	71.1%
5	550.881.172	0	126.036.294	69.051.293	355.793.585	0	424.844.878	-297.199.791	88.1%
6	547.369.082	0	130.762.655	69.051.293	347.555.134	0	416.606.427	119.406.636	104.8%
7	543.856.992	0	135.666.254	69.051.293	339.139.444	0	408.190.737	527.597.373	121.1%
8	540.344.901	0	140.753.739	69.051.293	330.539.869	0	399.591.163	927.188.535	137.1%
9	536.832.811	0	146.032.004	69.051.293	321.749.514	0	390.800.807	1.317.989.343	152.7%
10	533.320.721	0	151.508.204	69.051.293	312.761.224	0	381.812.517	1.699.801.860	168.0%
11	529.808.631	0	157.189.762	69.051.293	303.567.576	0	372.618.869	2.072.420.729	182.9%
12	527.209.676	0	163.084.378	69.051.293	295.074.005	0	364.125.298	2.436.546.027	197.4%
13	524.610.721	0	169.200.042	69.051.293	286.359.386	0	355.410.679	2.791.956.705	211.7%
14	522.011.766	0	175.545.044	69.051.293	277.415.429	0	346.466.722	3.138.423.428	225.5%
15	519.412.811	0	182.127.983	69.051.293	268.233.535	0	337.284.828	3.475.708.255	239.0%
16	516.813.856	0	188.957.782	69.051.293	258.804.780	0	327.856.073	3.803.564.329	252.1%
17	514.214.901	0	196.043.699	69.051.293	249.119.908	0	318.171.201	4.121.735.530	264.8%
18	511.615.945	0	203.395.338	69.051.293	239.169.315	0	308.220.608	4.429.956.138	277.2%
19	509.016.990	0	211.022.663	69.051.293	228.943.034	0	297.994.327	4.727.950.465	289.1%
20	506.418.035	0	218.936.013	69.051.293	218.430.729	0	287.482.022	5.015.432.488	300.6%
21	503.819.080	0	227.146.113	69.051.293	207.621.674	0	276.672.967	5.292.105.455	311.6%
22	499.064.051	0	235.664.093	69.051.293	194.348.665	0	263.399.958	5.555.505.413	322.2%
23	494.309.021	0	244.501.496	69.051.293	180.756.232	0	249.807.525	5.805.312.938	332.2%
24	489.553.992	0	253.670.302	69.051.293	166.832.397	0	235.883.690	6.041.196.628	341.6%
25	484.798.963	0	263.182.938	69.051.293	152.564.731	0	221.616.024	6.262.812.652	350.5%
26	480.043.933	0	273.052.299	69.051.293	137.940.342	0	206.991.635	6.469.804.287	358.7%
27	475.288.904	0	283.291.760	69.051.293	122.945.851	0	191.997.144	6.661.801.431	366.4%
28	470.533.875	0	293.915.201	69.051.293	107.567.381	0	176.618.674	6.838.420.105	373.5%
29	465.778.845	0	304.937.021	69.051.293	91.790.531	0	160.841.824	6.999.261.929	379.9%
30	461.023.816	0	316.372.159	69.051.293	75.600.364	0	144.651.657	7.143.913.586	385.7%
Total	15.496.599.079	2.500.483.335	5.852.202.158	2.071.538.793	7.572.858.128	0	9.644.396.921	7.143.913.586	385.7%

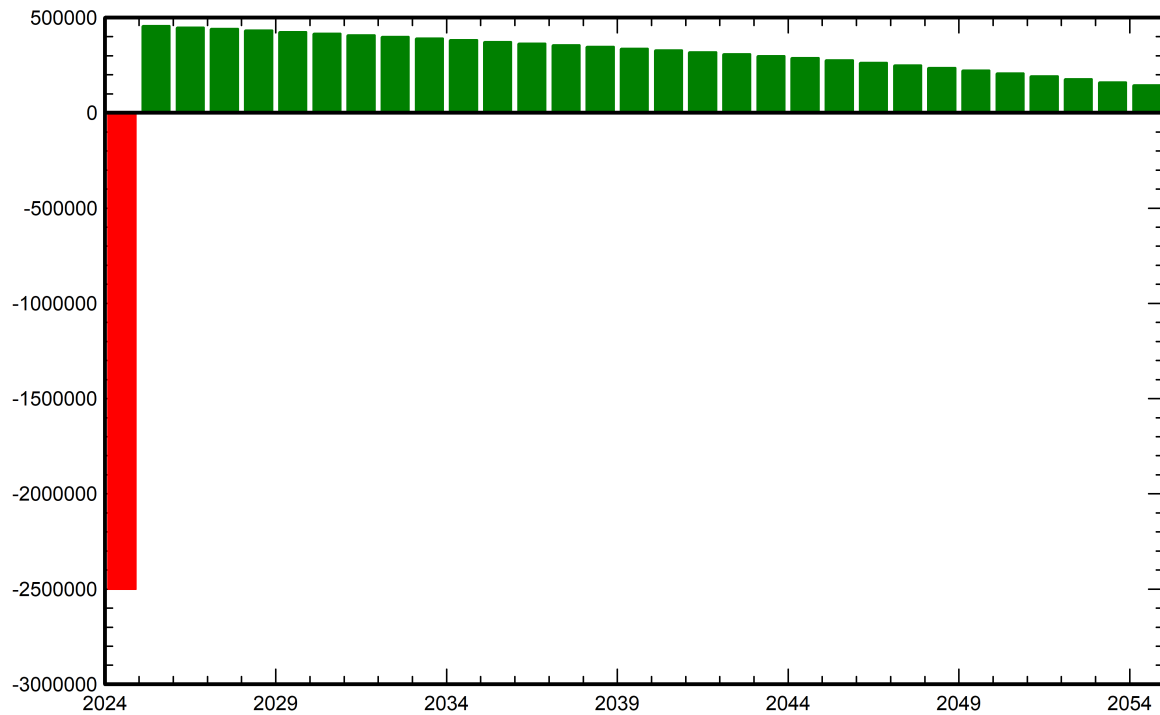


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Financial analysis

Yearly net profit (kIDR)



Cumulative cashflow (kIDR)

