Version 7.4.2

PVsyst - Simulation report

Grid-Connected System

Project: cdt3

Variant: New simulation variant trina poly

No 3D scene defined, no shadings

System power: 1620 Wp

CdtKohu - New Zealand

Author

PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2

Project summary

Geographical Site
CdtKohu
New Zealand

Situation

Latitude	-36.94 °S
Longitude	174.65 °E
Altitude	160 m
Time zone	UTC+12

Project settings
Albedo 0.20

Meteo data
CdtKohu
Custom file - Imported

System summary

Grid-Connected System
Simulation for year no 5

No 3D scene defined, no shadings

PV Field Orientation
Fixed plane
Tilt/Azimuth 20 / -21 °

Near Shadings
No Shadings

User's needs
Fixed constant load
342 W
Global
2996 kWh/Year

System information

PV Array

Nb. of modules	6 units
Pnom total	1620 Wp

Inverters

Nb. of units	1 unit
Pnom total	2000 W
Pnom ratio	0.810

Results summary

Produced Energy	2137.24 kWh/year	Specific production	1319 kWh/kWp/year	Perf. Ratio PR	81.78 %
Used Energy	2995.92 kWh/year			Solar Fraction SF	36.43 %

Table of contents

Project and results summary 2
General parameters, PV Array Characteristics, System losses 3
Main results 4
Loss diagram 5
Predef. graphs 6
Single-line diagram 7
Cost of the system 8
Financial analysis 9
CO_2 Emission Balance 12

PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2

General parameters

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

PV Field Orientation

Orientation	Sheds configuration	Models used
Fixed plane	No 3D scene defined	Transposition Perez
Tilt/Azimuth 20 / -21 °		Diffuse Perez, Meteonorm
		Circumsolar separate

Horizon
Free Horizon

Near Shadings
No Shadings

User's needs
Fixed constant load
342 W
Global
2996 kWh/Year

PV Array Characteristics

PV module

Manufacturer	Generic
Model	TSM-355DD14A.18(II)
(Original PVsyst database)	
Unit Nom. Power	270 Wp
Number of PV modules	6 units
Nominal (STC)	1620 Wp
Modules	1 String x 6 In series
At operating cond. (50°C)	
Pmpp	1453 Wp
U mpp	167 V
I mpp	8.7 A

Inverter

Manufacturer	Generic
Model	GW2000-NS
(Original PVsyst database)	
Unit Nom. Power	2.00 kWac
Number of inverters	1 unit
Total power	2.0 kWac
Operating voltage	80-450 V
Pnom ratio (DC:AC)	0.81

Total PV power

Nominal (STC)	1.62 kWp
Total	6 modules
Module area	9.8 m²
Cell area	8.8 m²

Total inverter power

Total power	2 kWac
Number of inverters	1 unit
Pnom ratio	0.81

Array losses

Thermal Loss factor
Module temperature according to irradiance
Uc (const) 20.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

DC wiring losses
Global array res. 323 mΩ
Loss Fraction 1.5 % at STC

Module Quality Loss
Loss Fraction -0.5 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Module average degradation
Year no 5
Loss factor 0.4 %/year
Mismatch due to degradation
Imp RMS dispersion 0.4 %/year
Vmp RMS dispersion 0.4 %/year

IAM loss factor
ASHRAE Param.: IAM = 1 - bo (1/cosi -1)
bo Param. 0.05

PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2

Main results

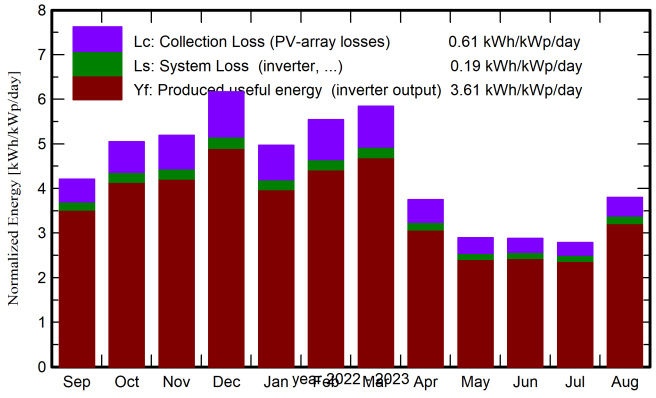
System Production

Produced Energy	2137.24 kWh/year	Specific production	1319 kWh/kWp/year
Used Energy	2995.92 kWh/year	Perf. Ratio PR	81.78 %
		Solar Fraction SF	36.43 %

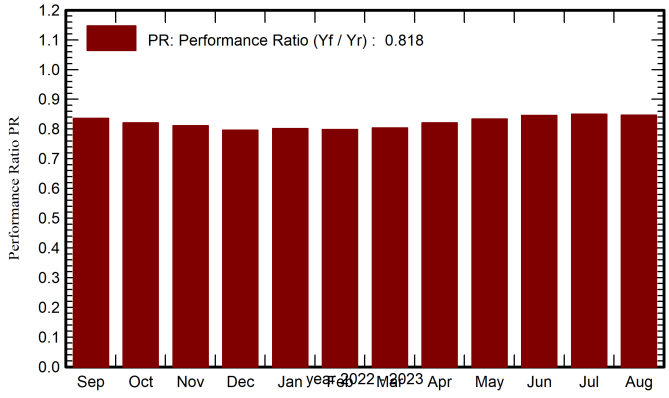
Economic evaluation

Investment		Yearly cost		LCOE	
Global	7,647.08 NZD	Annuities	0.00 NZD/yr	Energy cost	0.24 NZD/kWh
Specific	4.72 NZD/Wp	Run. costs	133.33 NZD/yr		
		Payback period	Unprofitable		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

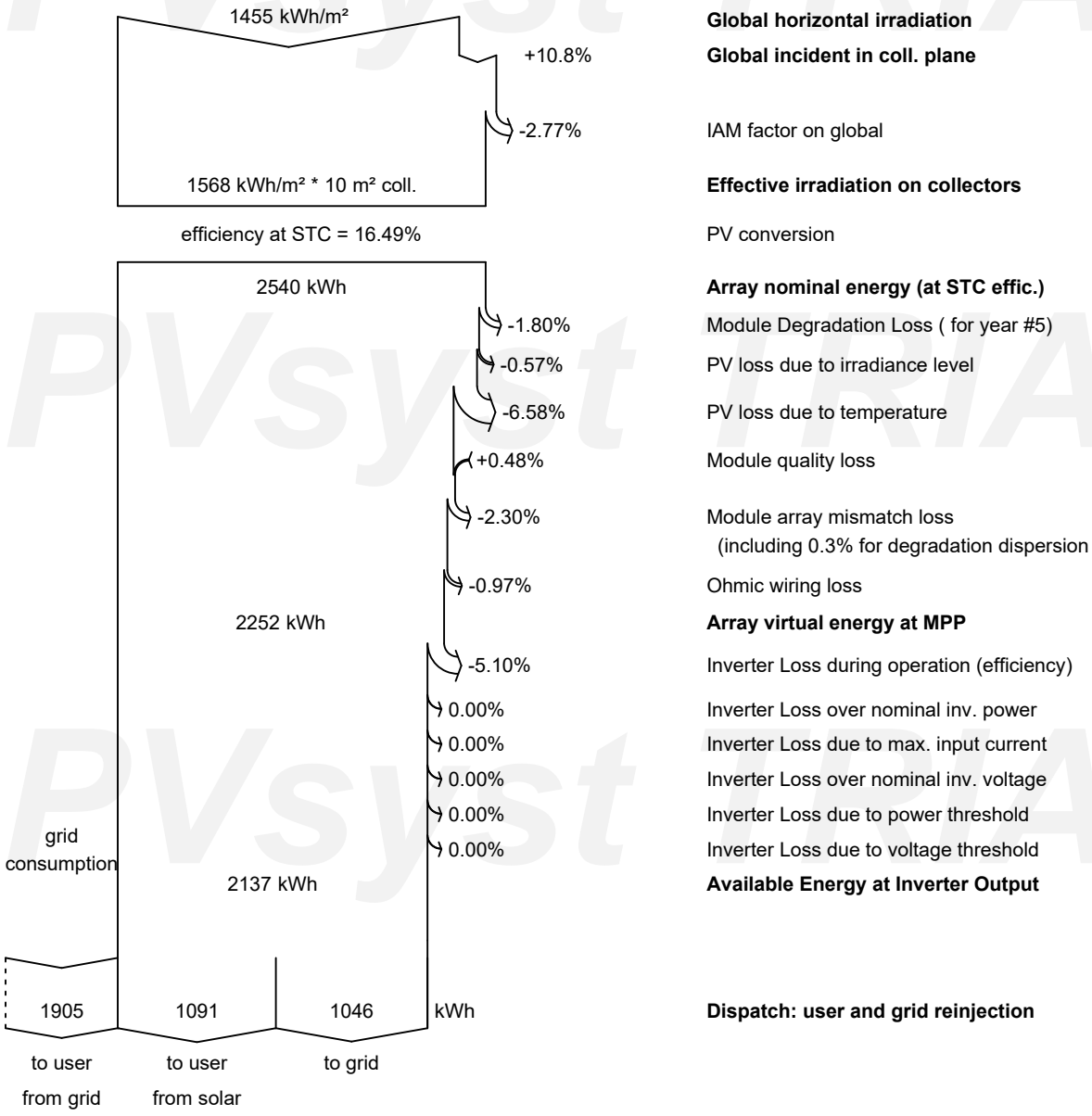
	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray kWh	E_User kWh	E_Solar kWh	E_Grid kWh	EFrGrid kWh
Sep. 22	108.9	53.49	13.61	126.3	123.0	180.3	246.2	87.0	84.1	159.3
Oct. 22	147.2	69.10	15.03	156.5	152.6	219.2	254.4	99.8	108.4	154.7
Nov. 22	155.5	79.47	17.34	155.9	151.6	215.9	246.2	101.3	103.6	144.9
Dec. 22	196.4	78.41	19.18	191.1	186.2	259.2	254.4	111.1	135.3	143.3
Jan. 23	155.2	87.74	20.08	154.0	149.9	211.0	254.4	104.9	95.1	149.6
Feb. 23	148.8	66.10	19.92	155.2	151.4	211.2	229.8	93.9	106.9	136.0
Mar. 23	160.2	56.83	18.41	181.2	176.5	247.9	254.4	105.0	130.9	149.5
Apr. 23	94.1	47.65	17.76	112.5	109.2	157.7	246.2	82.0	67.5	164.3
May 23	69.4	36.75	16.02	89.8	86.7	128.3	254.4	74.3	47.0	180.2
June 23	61.2	28.09	13.06	86.5	83.5	125.1	246.2	71.2	47.2	175.0
July 23	65.5	35.79	12.85	86.5	83.5	125.9	254.4	75.1	44.0	179.4
Aug. 23	92.9	41.28	11.26	117.8	114.4	170.4	254.4	85.9	75.8	168.6
Year	1455.4	680.70	16.19	1613.1	1568.5	2252.2	2995.9	1091.4	1045.8	1904.5

Legends

GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_User	Energy supplied to the user
T_Amb	Ambient Temperature	E_Solar	Energy from the sun
GlobInc	Global incident in coll. plane	E_Grid	Energy injected into grid
GlobEff	Effective Global, corr. for IAM and shadings	EFrGrid	Energy from the grid

PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2

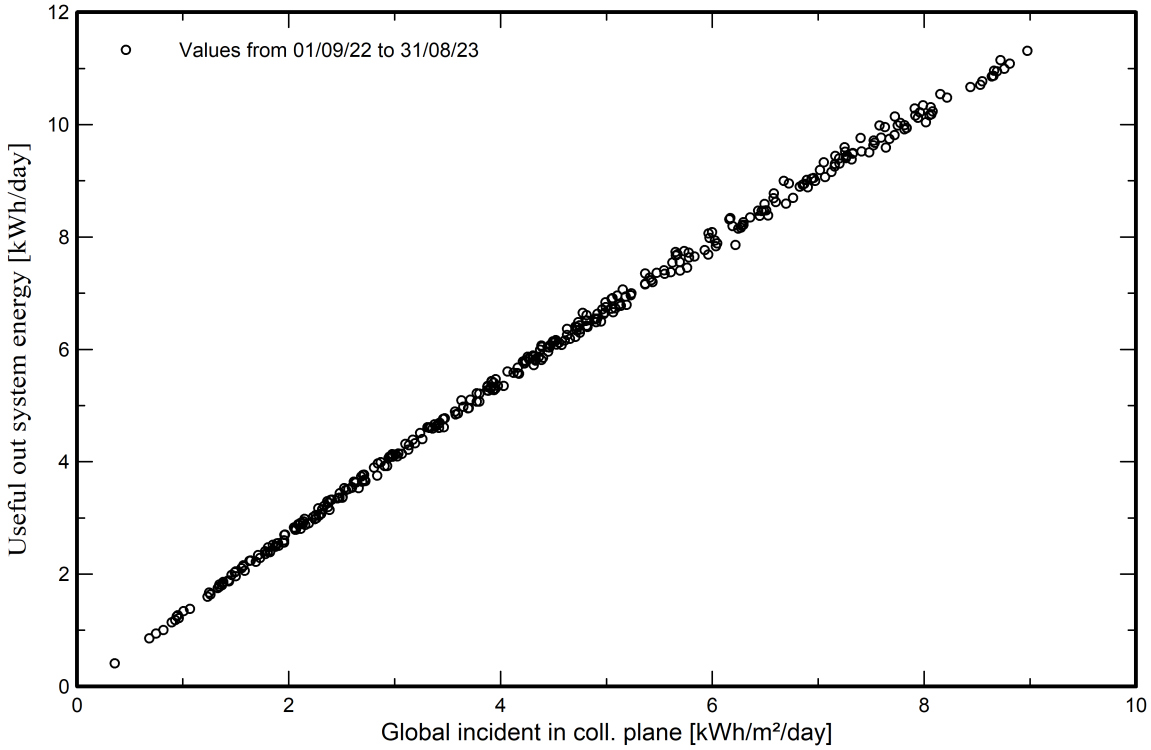
Loss diagram



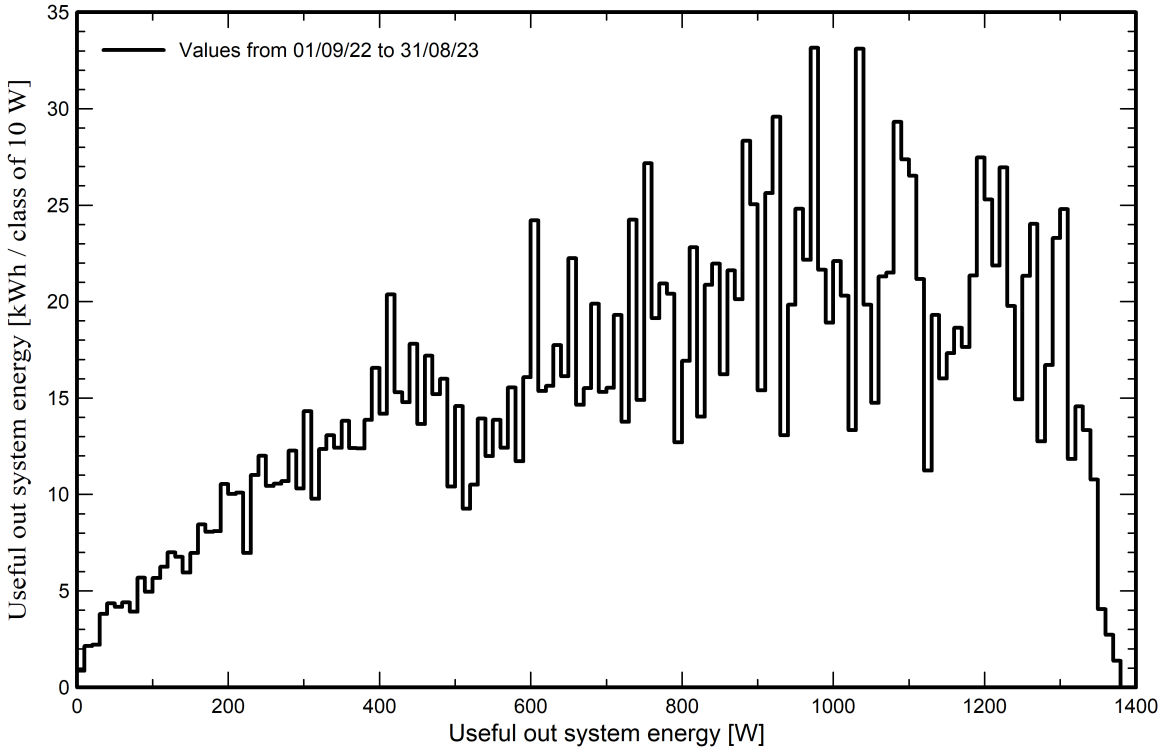
PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2

Predef. graphs

Daily Input/Output diagram

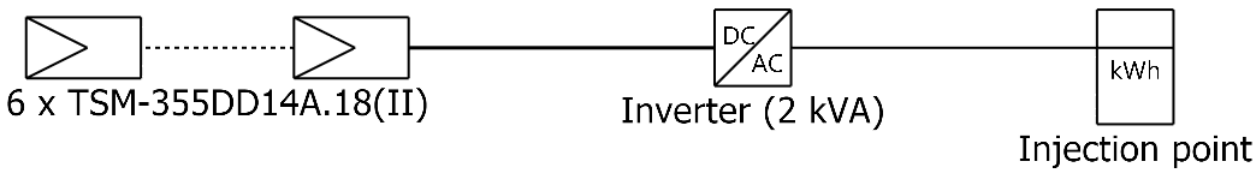


System Output Power Distribution



Single-line diagram

PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2



PV module	TSM-355DD14A.18(II)
Inverter	GW2000-NS
String	6 x TSM-355DD14A.18(II)

	cdt3	
	VC1 : New simulation variant trina poly	10/10/23

PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2

Cost of the system

Installation costs

Item	Quantity units	Cost NZD	Total NZD
PV modules			
TSM-355DD14A.18(II)	6	550.00	3,300.00
Inverters			
GW2000-NS	1	800.00	800.00
Other components			
Accessories, fasteners	1	983.00	983.00
Installation			
Global installation cost per module	6	236.67	1,420.00
Transport	1	300.00	300.00
Taxes			
VAT	1	0.00	844.08
		Total	7,647.08
		Depreciable asset	5,083.00

Operating costs

Item	Total NZD/year
Maintenance	
Provision for inverter replacement	133.33
Total (OPEX)	133.33

System summary

Total installation cost	7,647.08	NZD
Operating costs	133.33	NZD/year
Useful energy from solar	1091	kWh/year
Energy sold to the grid	1046	kWh/year
Cost of produced energy (LCOE)	0.241	NZD/kWh

PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2

Financial analysis

Simulation period

Project lifetime	20 years	Start year	2018

Income variation over time

Inflation	0.00 %/year
Production variation (aging)	0.00 %/year
Discount rate	0.00 %/year

Income dependent expenses

Income tax rate	0.00 %/year
Other income tax	0.00 %/year
Dividends	0.00 %/year

Depreciable assets

Asset	Depreciation method	Depreciation period (years)	Salvage value (NZD)	Depreciable (NZD)
PV modules				
TSM-355DD14A.18(II)	Straight-line	20	0.00	3,300.00
Inverters				
GW2000-NS	Straight-line	20	0.00	800.00
Accessories, fasteners	Straight-line	20	0.00	983.00
		Total	0.00	5,083.00

Financing

Own funds	7,647.08 NZD	

Electricity sale

Feed-in tariff	Summer	0.0800 NZD/kWh	
	Winter	0.1200 NZD/kWh	Jan, Feb, Mar, Oct, Nov, Dec
Duration of tariff warranty		20 years	
Annual connection tax		0.00 NZD/kWh	
Annual tariff variation		0.0 %/year	
Feed-in tariff decrease after warranty		0.00 %	

Self-consumption

Consumption tariff	Peak tariff	0.3000 NZD/kWh	
	Off-peak tariff	0.2000 NZD/kWh	11:00-17:00, 23:00-07:00
Tariff evolution		0.0 %/year	

Return on investment

Payback period	Unprofitable
Net present value (NPV)	-2,865.35 NZD
Internal rate of return (IRR)	-4.11 %
Return on investment (ROI)	-37.5 %

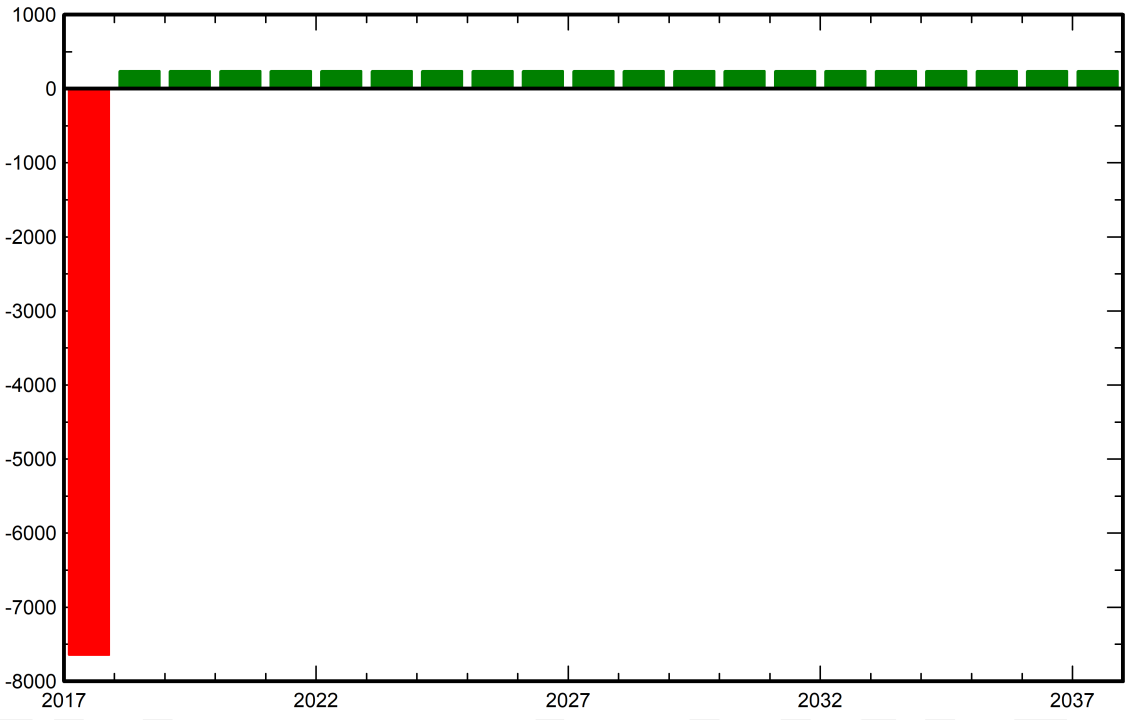
PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2

Financial analysis

Detailed economic results (NZD)

Year	Electricity sale	Own funds	Run. costs	Deprec. allow.	Taxable income	Taxes	After-tax profit	Self-cons. saving	Cumul. profit	% amorti.
0	0	7,647	0	0	0	0	0	0	-7,647	0.0%
1	111	0	133	254	0	0	-22	262	-7,408	3.1%
2	111	0	133	254	0	0	-22	262	-7,169	6.3%
3	111	0	133	254	0	0	-22	262	-6,930	9.4%
4	111	0	133	254	0	0	-22	262	-6,691	12.5%
5	111	0	133	254	0	0	-22	262	-6,452	15.6%
6	111	0	133	254	0	0	-22	262	-6,213	18.8%
7	111	0	133	254	0	0	-22	262	-5,973	21.9%
8	111	0	133	254	0	0	-22	262	-5,734	25.0%
9	111	0	133	254	0	0	-22	262	-5,495	28.1%
10	111	0	133	254	0	0	-22	262	-5,256	31.3%
11	111	0	133	254	0	0	-22	262	-5,017	34.4%
12	111	0	133	254	0	0	-22	262	-4,778	37.5%
13	111	0	133	254	0	0	-22	262	-4,539	40.6%
14	111	0	133	254	0	0	-22	262	-4,300	43.8%
15	111	0	133	254	0	0	-22	262	-4,061	46.9%
16	111	0	133	254	0	0	-22	262	-3,822	50.0%
17	111	0	133	254	0	0	-22	262	-3,583	53.2%
18	111	0	133	254	0	0	-22	262	-3,344	56.3%
19	111	0	133	254	0	0	-22	262	-3,104	59.4%
20	111	0	133	254	0	0	-22	262	-2,865	62.5%
Total	**2,218**	**7,647**	**2,667**	**5,083**	**0**	**0**	**-449**	**5,231**	**-2,865**	**62.5%**

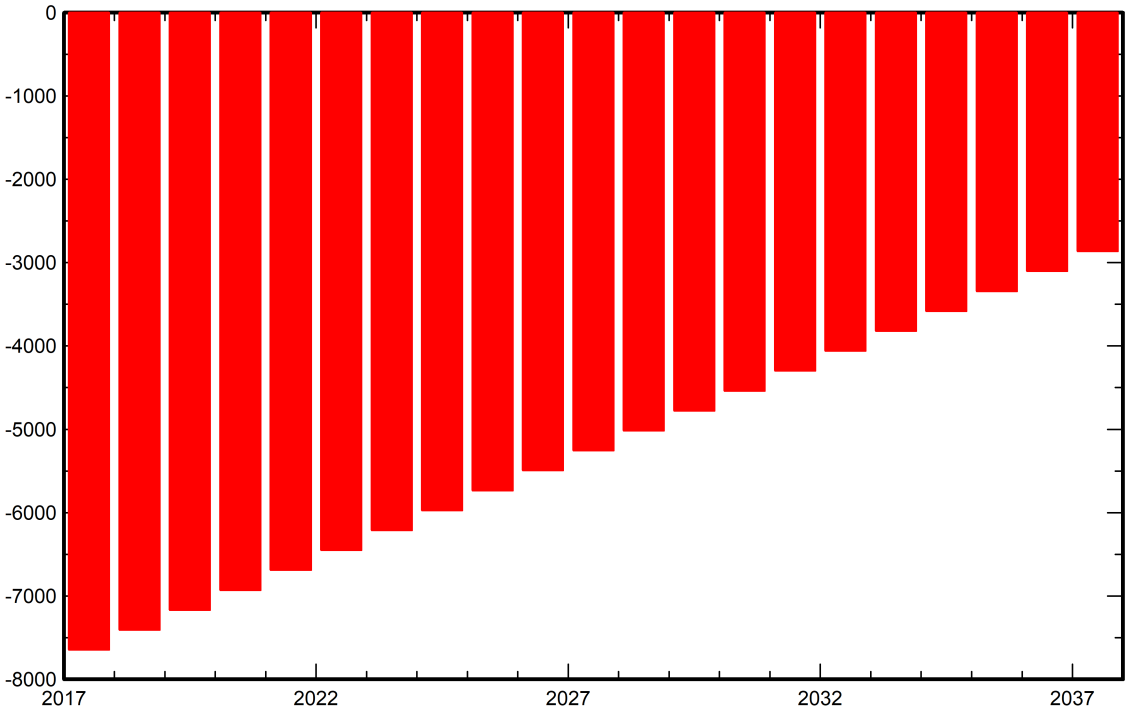
Yearly net profit (NZD)



PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2

Financial analysis

Cumulative cashflow (NZD)



PVsyst V7.4.2
VC1, Simulation date:
10/10/23 20:59
with v7.4.2

CO_2 Emission Balance

Total: 6.6 tCO_2

Generated emissions

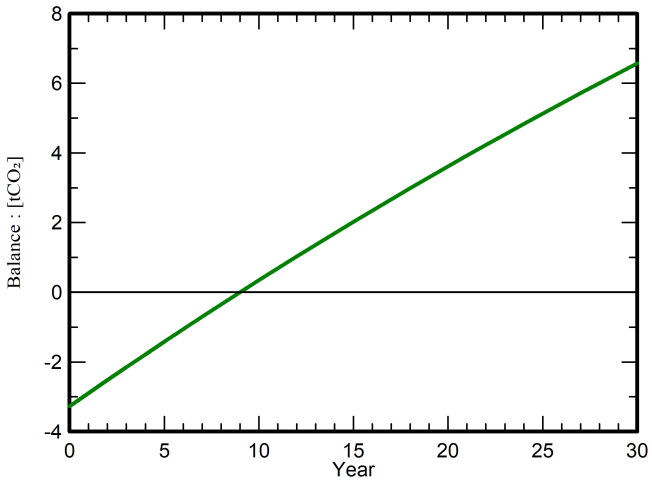
Total: 3.27 tCO_2

Source: Detailed calculation from table below

Replaced Emissions

Total:	11.3 tCO_2
System production:	2137.24 kWh/yr
Grid Lifecycle Emissions:	177 gCO_2/kWh
Source:	IEA List
Country:	New Zealand
Lifetime:	30 years
Annual degradation:	1.0 %

Saved CO_2 Emission vs. Time



System Lifecycle Emissions Details

Item	LCE	Quantity	Subtotal
			[$kgCO_2$]
Modules	1903 kgCO2/kWp	1.62 kWp	3083
Supports	1.18 kgCO2/kg	60.0 kg	70.8
Inverters	117 kgCO2/units	1.00 units	117