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LAMPIRAN

KUESIONER PENELITIAN

(Optimalisasi Perencanaan Pembangkitan Energi Listrik dengan Sistem *Hybrid* di Pulau Lumu-Lumu)

1. Nama : …….
2.

Jenis Peralatan	Kuantitas	Lama Pemakaian	Waktu Pemakaian
Lampu dalam			
Lampu Luar			
Televisi			
Kulkas			
Mesin cuci			
Setrika			
Pompa air			
Kipas angin			

Model: C200 D5
Frequency: 50
Fuel Type: Diesel

» Generator set data sheet
200 kVA Standby

Our energy working for you.™

Power Generation

Spec sheet:	**SS7-CPGK**
Noise data sheet (Open/enclosed):	**ND50-OS550 / ND50-CS550**
Airflow data sheet:	**AF50-550**
Derate data sheet (Open/enclosed):	**DD50-OS550 / DD50-CS550**
Transient data sheet:	**TD50-550**

Fuel consumption	**Standby**				**Prime**			
	kVA (kW)				**kVA (kW)**			
Ratings	200 (160)				182.5 (146)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
US gph	2.6	4.7	7.3	9.9	2.4	4.6	6.8	9.0
L/hr	12	22	33	45	11	21	31	41

Engine	**Standby rating**	**Prime rating**
Engine manufacturer	Cummins	
Engine model	6CTAA8.3G1	
Configuration	4 Cycle; In-line; 6 Cylinder Diesel	
Aspiration	Turbo Charged and Charge Air Cooled	
Gross engine power output, kWm	237	213
BMEP at set rated load, kPa	1966	1768
Bore, mm	114	
Stroke, mm	135	
Rated speed, rpm	1500	
Piston speed, m/s	6.8	
Compression ratio	16.8:1	
Lube oil capacity, L	18.9	
Overspeed limit, rpm	1800 ±50	
Regenerative power, kW	17	
Governor type	Electronic	
Starting voltage	24 Volts DC	

Fuel flow		
Maximum fuel flow, L/hr	208	
Maximum fuel inlet restriction, mm Hg	102	
Maximum fuel inlet temperature (°C)	60	

Air		
Combustion air, m^3/min	13.2	12
Maximum air cleaner restriction, kPa	6.2	

Power Generation

Genset Cummins 200 kVA - Genset Power Indo, ...

Detail Produk | Ulasan | Diskusi | Rekomendasi

Kondisi: Baru
Min. Pemesanan: 6 Buah
Etalase: **Genset Cummins**

HARGA GENSET YANG TERTERA DI ATAS ADALAH HARGA UANG MUKA
Power Generator adalah Distributor Genset yang berada di Jawa Tengah. Kapasitas lengkap mulai dari 3 kVA - 3000 kVA.

Kapasitas Genset : 160 kW/200 kVA
Engine : Cummins
Frekuensi : 50 Hz
Kecepatan Terukur : 1,500 rpm
Tegangan Standar : 400/230 V
Silinder & Konfigurasi : 4 - in line
Eclosure : IP23
Phase / wire : 3 phase / 4 wire

(untuk info spesifikasi lebih lengkap dan detail bisa menghubungi admin melalui chat)

HARGA GENSET YANG TERTERA DI ATAS ADALAH HARGA UANG MUKA

Harga Genset Cummins 200 kVA
Open : 284.600.000
Silent : 327.500.000

NEW

CanadianSolar

MAXPOWER (1500 V)
CS6U-325|330|335|340M

Canadian Solar's new 1500 V module is a product for high voltage systems, which can increase the string length of solar systems by up to 50%, saving BOS costs.

25 years — linear power output warranty

10 years — product warranty on materials and workmanship

KEY FEATURES

- 1500 V — Designed for high voltage systems of up to 1500 V_{DC}, saving on BoS costs
- Cell efficiency of up to 20.0 %
- Outstanding low irradiance performance: 96.5 %
- No.1 PTC — High PTC rating of up to 91.7 %
- IP67 junction box for long-term weather endurance
- Heavy snow load up to 5400 Pa, wind load up to 2400 Pa

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001:2008 / Quality management system
ISO 14001:2004 / Standards for environmental management system
OHSAS 18001:2007 / International standards for occupational health & safety

PRODUCT CERTIFICATES*

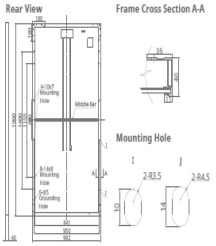
IEC 61215 / IEC 61730: VDE / CE
UL 1703 / IEC 61215 performance: CEC listed (US)
UL 1703: CSA / IEC 61701 ED2: VDE / IEC 62716: VDE / Take-e-way

* As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificate applicable to the products in the region in which the products are to be used.

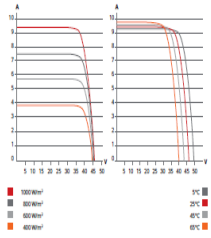
CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. As a leading PV project developer and manufacturer of solar modules with over 15 GW deployed around the world since 2001, Canadian Solar Inc. (NASDAQ: CSIQ) is one of the most bankable solar companies worldwide.

CANADIAN SOLAR INC.
545 Speedvale Avenue West, Guelph, Ontario N1K 1E6, Canada, www.canadiansolar.com, support@canadiansolar.com

ENGINEERING DRAWING (mm)



CS6U-335M / I-V CURVES



ELECTRICAL DATA | STC*

CS6U	325M	330M	335M	340M
Nominal Max. Power (Pmax)	325 W	330 W	335 W	340 W
Opt. Operating Voltage (Vmp)	37.4 V	37.5 V	37.8 V	37.9 V
Opt. Operating Current (Imp)	8.69 A	8.80 A	8.87 A	8.97 A
Open Circuit Voltage (Voc)	45.8 V	45.9 V	46.1 V	46.2 V
Short Circuit Current (Isc)	9.21 A	9.31 A	9.41 A	9.48 A
Module Efficiency	16.72 %	16.97 %	17.23 %	17.49%
Operating Temperature	-40°C ~ +85°C			
Max. System Voltage	1500 V (IEC) or 1500 V (UL)			
Module Fire Performance	TYPE 1 (UL 1703) or CLASS C (IEC 61730)			
Max. Series Fuse Rating	15 A			
Application Classification	Class A			
Power Tolerance	0 ~ + 5 W			

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.

MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline, 6 inch
Cell Arrangement	72 (6 × 12)
Dimensions	1960 × 992 × 40 mm (77.2 × 39.1 × 1.57 in)
Weight	22.4 kg (49.4 lbs)
Front Cover	3.2 mm tempered glass
Frame Material	Anodized aluminium alloy
J-Box	IP67, 3 diodes
Cable	PV1500DC-F1 4 mm2 (IEC) & 12 AWG 2000 V (UL), 1160 mm (45.7 in)
Connector	T4 series or PV2 series
Per Pallet	26 pieces, 635 kg (1400 lbs)
Per container (40' HQ)	624 pieces

ELECTRICAL DATA | NOCT*

CS6U	325M	330M	335M	340M
Nominal Max. Power (Pmax)	235 W	238 W	242 W	245 W
Opt. Operating Voltage (Vmp)	34.1 V	34.2 V	34.5 V	34.6 V
Opt. Operating Current (Imp)	6.88 A	6.96 A	7.01 A	7.10 A
Open Circuit Voltage (Voc)	42.0 V	42.1 V	42.3 V	42.4 V
Short Circuit Current (Isc)	7.46 A	7.54 A	7.62 A	7.67 A

* Under Nominal Operating Cell Temperature (NOCT), irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.41 % / °C
Temperature Coefficient (Voc)	-0.31 % / °C
Temperature Coefficient (Isc)	0.053 % / °C
Nominal Operating Cell Temperature	45±2 °C

PERFORMANCE AT LOW IRRADIANCE

Outstanding performance at low irradiance, average relative efficiency of 96.5 % from an irradiance of 1000 W/m² to 200 W/m² (AM 1.5, 25°C).

PARTNER SECTION

Canadian Solar CS6U-340M

Price Drop!

CanadianSolar

$94.50/panel

Please allow 15 business days for delivery

MECHANICAL DATA	
Technology	MonoCrystalline
Dimensions	77.2 x 39.1 x 1.57 In.
Weight	49.4 lb
Cells	72 Cell
Module Connector	MC4
Frame	Silver
Model	CS6U-340M

Condition · Warranty · Shipping · Returns

TROJAN BATTERY COMPANY

DATA SHEET

SOLAR SSIG 12 255

MODEL	**SSIG 12 255**
VOLTAGE	**12**
CAPACITY	**255Ah @ 100Hr**
MATERIAL	**Polypropylene**
BATTERY	**Deep-Cycle Flooded/Advanced Lead Acid Battery**
COLOR	**Maroon**
WATERING	**Single-Point Watering Kit (Optional)**

MADE IN THE USA

WITH T2 TECHNOLOGY

*Polyon™ Case

12 VOLT

PHYSICAL SPECIFICATIONS

MODEL NAME	TERMINAL TYPE [3]	DIMENSIONS [2] INCHES (mm)			WEIGHT [1] LBS. (kg)	HYDROLINK OR SPWK	HANDLES
		LENGTH	WIDTH	HEIGHT [4]			
SSIG 12 255*	6	14.97 (380)	6.91 (176)	14.67 (373)	123 (56)	SPWK	Braided Rope

ELECTRICAL SPECIFICATIONS

VOLTAGE	CAPACITY [4] AMP-HOURS (Ah)					ENERGY (kWh)
	10-Hr	20-Hr	48-Hr	72-Hr	100-Hr	100-Hr
12	211	229	237	247	255	3.06

CHARGING INSTRUCTIONS

CHARGER VOLTAGE SETTINGS (AT 77°F/25°C)			
SYSTEM VOLTAGE	12V	24V	48V
Maximum Charge Current (% of C_{20} Rate)*	13%		
Maximum Absorption Phase Time (hours)	4		
Absorption Voltage **	14.70	29.40	58.80
Float Voltage	13.50	27.00	54.00
Equalization Voltage	16.20	32.40	64.80

Do not install or charge batteries in a sealed or non-ventilated compartment. Constant under or overcharging will damage the battery and shorten its life as with any battery.
*If charging time is limited contact Trojan Technical Support for assistance.
**In cases where controller has a bulk voltage setting, use absorption voltage setting above.

CHARGING TEMPERATURE COMPENSATION

ADD	SUBTRACT
0.005 volt per cell for every 1°C below 25°C 0.0028 volt per cell for every 1°F below 77°F	0.005 volt per cell for every 1°C above 25°C 0.0028 volt per cell for every 1°F above 77°F

OPERATIONAL DATA

OPERATING TEMPERATURE	SELF DISCHARGE
-4°F to 113°F (-20°C to +45°C). At temperatures below 32°F (0°C) maintain a state of charge greater than 60%.	5 – 15% per month depending on storage temperature conditions.

RECYCLE RESPONSIBLY

99% RECYCLABLE

12V Recoded

STATE OF CHARGE MEASURE OF OPEN-CIRCUIT VOLTAGE

PERCENTAGE CHARGE	SPECIFIC GRAVITY	CELL	12 VOLT
100	1.277	2.122	12.73
90	1.258	2.103	12.62
80	1.238	2.083	12.50
70	1.217	2.062	12.37
60	1.195	2.040	12.24
50	1.172	2.017	12.10
40	1.148	1.993	11.96
30	1.124	1.969	11.81
20	1.098	1.943	11.66
10	1.073	1.918	11.51

TROJAN SIGNATURE SSIG 12 255 FLOODED 12V 229AH BATTERY

Trojan BATTERY COMPANY Clean energy for life.

TROJAN BATTERY

MSRP: ~~$730.95~~

$425.20

(YOU SAVE $305.75)

SKU: SLR-420-0103Z

Note: Out of Stock - See manufacturer for similar products.

Condition: New

Weight: 123.00 LBS

- Buy 4 - 7 and get 1% off
- Buy 8 or above and get 2% off

HOMER Pro

System Simulation Report

File: Revisi 100PV.homer

Author: Anderson

Location: 26F8+92 Barrang Caddi, Makassar City, South Sulawesi, Indonesia (4°58.6'S, 119°12.9'E)

Total Net Present Cost: Rp40,007,410,000.00

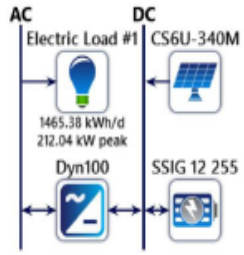
Levelized Cost of Energy (Rp/kWh): Rp4,448

Notes: 100% PV pulau Lumu

System Architecture

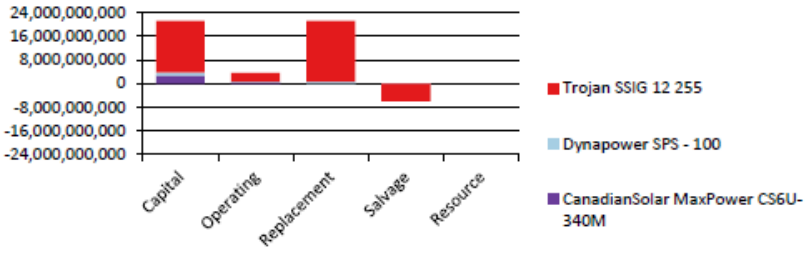
Component	Name	Size	Unit
PV	CanadianSolar MaxPower CS6U-340M	598	kW
Storage	Trojan SSIG 12 255	105	strings
System converter	Dynapower SPS - 100	700	kW
Dispatch strategy	HOMER Load Following		

Schematic



HOMER Pro

Cost Summary



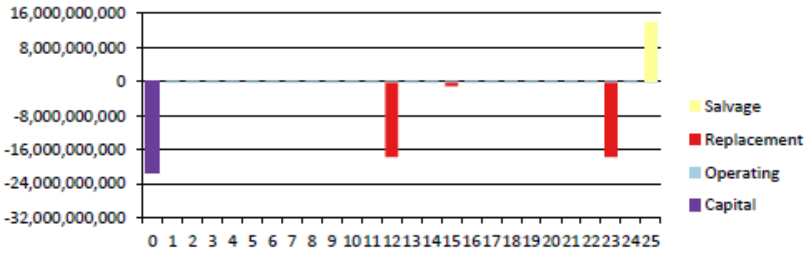
Net Present Costs

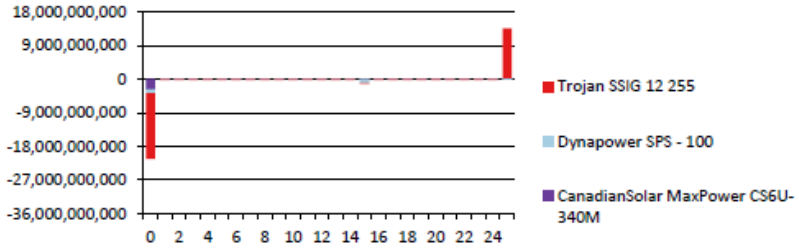
Name	Capital	Operating	Replacement	Salvage	Resource	Total
CanadianSolar MaxPower CS6U-340M	Rp2.73B	Rp461M	Rp0.00	Rp0.00	Rp0.00	Rp3.19B
Dynapower SPS - 100	Rp1.03B	Rp193M	Rp598M	-Rp144M	Rp0.00	Rp1.68B
Trojan SSIG 12 255	Rp17.6B	Rp2.95B	Rp20.6B	-Rp5.99B	Rp0.00	Rp35.1B
System	Rp21.3B	Rp3.61B	Rp21.2B	-Rp6.14B	Rp0.00	Rp40.0B

Annualized Costs

Name	Capital	Operating	Replacement	Salvage	Resource	Total
CanadianSolar MaxPower CS6U-340M	Rp162M	Rp27.4M	Rp0.00	Rp0.00	Rp0.00	Rp190M
Dynapower SPS - 100	Rp61.4M	Rp11.5M	Rp35.6M	-Rp8.55M	Rp0.00	Rp99.9M
Trojan SSIG 12 255	Rp1.04B	Rp176M	Rp1.23B	-Rp356M	Rp0.00	Rp2.09B
System	Rp1.27B	Rp214M	Rp1.26B	-Rp365M	Rp0.00	Rp2.38B

Cash Flow





Electrical Summary

Excess and Unmet

Quantity	Value	Units
Excess Electricity	267,427	kWh/yr
Unmet Electric Load	0	kWh/yr
Capacity Shortage	0	kWh/yr

Production Summary

Component	Production (kWh/yr)	Percent
CanadianSolar MaxPower CS6U-340M	912,023	100
Total	912,023	100

Consumption Summary

Component	Consumption (kWh/yr)	Percent
AC Primary Load	534,864	100
DC Primary Load	0	0
Deferrable Load	0	0
Total	534,864	100

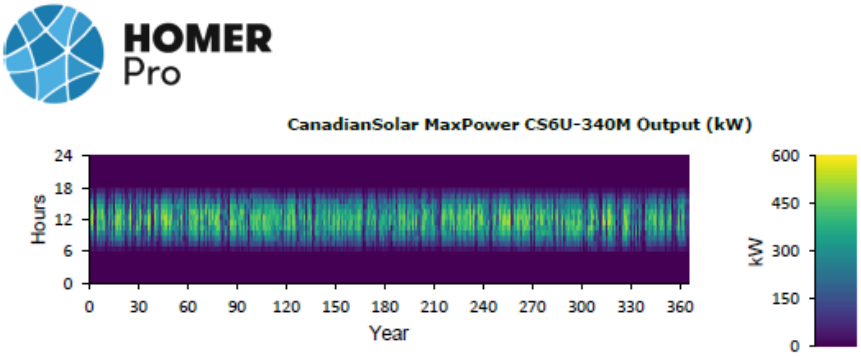
PV: CanadianSolar MaxPower CS6U-340M

CanadianSolar MaxPower CS6U-340M Electrical Summary

Quantity	Value	Units
Minimum Output	0	kW
Maximum Output	539	kW
PV Penetration	171	%
Hours of Operation	4,380	hrs/yr
Levelized Cost	208	Rp/kWh

CanadianSolar MaxPower CS6U-340M Statistics

Quantity	Value	Units
Rated Capacity	598	kW
Mean Output	104	kW
Mean Output	2,499	kWh/d
Capacity Factor	17.4	%
Total Production	912,023	kWh/yr



Storage: Trojan SSIG 12 255

Trojan SSIG 12 255 Properties

Quantity	Value	Units
Batteries	2,520	qty.
String Size	24.0	batteries
Strings in Parallel	105	strings
Bus Voltage	288	V

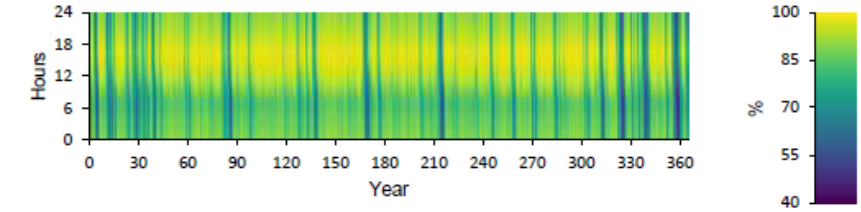
Trojan SSIG 12 255 Result Data

Quantity	Value	Units
Average Energy Cost	0	Rp/kWh
Energy In	462,448	kWh/yr
Energy Out	372,115	kWh/yr
Storage Depletion	2,411	kWh/yr
Losses	92,744	kWh/yr
Annual Throughput	416,037	kWh/yr

Trojan SSIG 12 255 Statistics

Quantity	Value	Units
Autonomy	102	hr
Storage Wear Cost	4,206	Rp/kWh
Nominal Capacity	7,781	kWh
Usable Nominal Capacity	6,225	kWh
Lifetime Throughput	4,667,040	kWh
Expected Life	11.2	yr

Trojan SSIG 12 255 State of Charge (%)



Converter: Dynapower SPS - 100

HOMER Pro

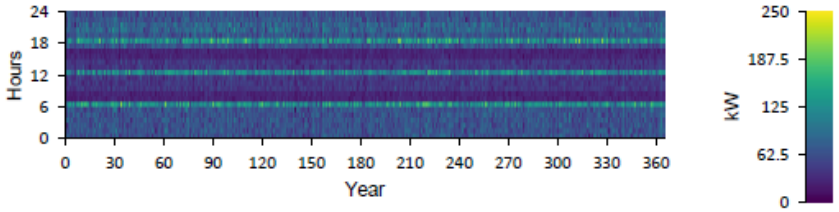
Dynapower SPS - 100 Electrical Summary

Quantity	Value	Units
Hours of Operation	8,760	hrs/yr
Energy Out	534,864	kWh/yr
Energy In	554,263	kWh/yr
Losses	19,399	kWh/yr

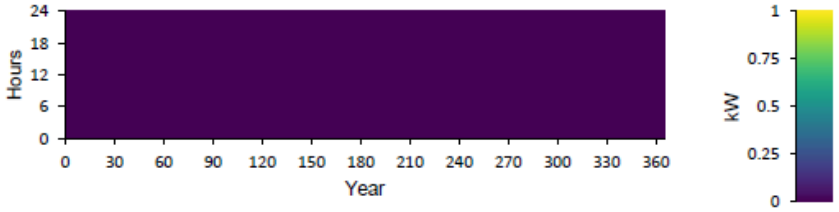
Dynapower SPS - 100 Statistics

Quantity	Value	Units
Capacity	700	kW
Mean Output	61.1	kW
Minimum Output	3.12	kW
Maximum Output	212	kW
Capacity Factor	8.72	%

Dynapower SPS - 100 Inverter Output (kW)



Dynapower SPS - 100 Rectifier Output (kW)



Compare

Economics

IRR (%):**N/A**

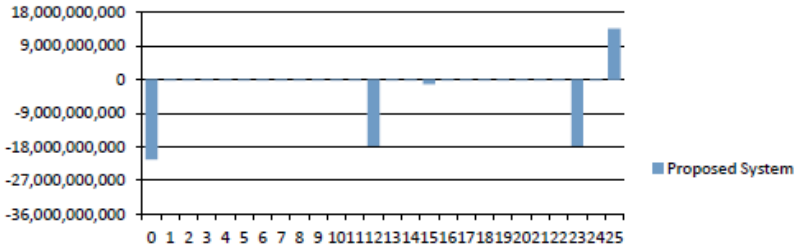
Discounted payback (yr):**N/A**

Simple payback (yr):**N/A**

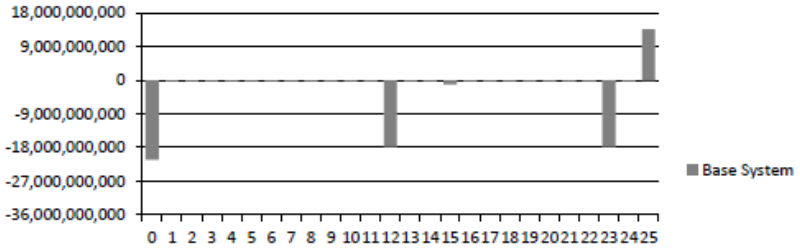
	Base System	Proposed System
Net Present Cost	Rp40.0B	Rp40.0B
CAPEX	Rp21.3B	Rp21.3B
OPEX	Rp1.11B	Rp1.11B
LCOE (per kWh)	Rp4,448	Rp4,448
CO2 Emitted (kg/yr)	0	0
Fuel Consumption (L/yr)	0	0

HOMER Pro

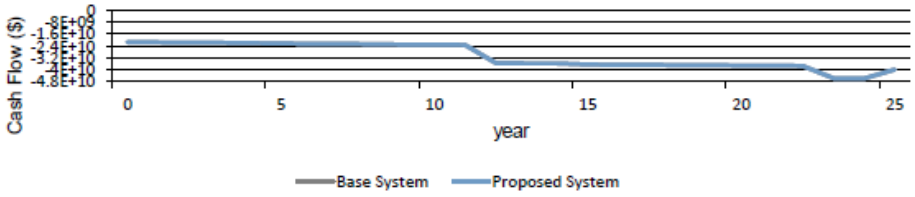
Proposed Annual Nominal Cash Flows



Base System Annual Nominal Cash Flows



Cumulative Discounted Cash Flows



HOMER Pro

System Simulation Report

File: Revisi2 50PV50G.homer

Author: Anderson

Location: 26F8+92 Barrang Caddi, Makassar City, South Sulawesi, Indonesia (4°58.6'S, 119°12.9'E)

Total Net Present Cost: Rp34,632,290,000.00

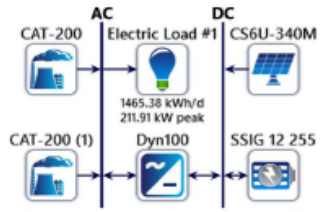
Levelized Cost of Energy (Rp/kWh): Rp3,851

Notes: 50% PV 50 G pulau Lumu-Lumu

System Architecture

Component	Name	Size	Unit
Generator #1	CAT-200kVA-50Hz-PP	160	kW
Generator #2	CAT-200kVA-50Hz-PP (1)	160	kW
PV	CanadianSolar MaxPower CS6U-340M	190	kW
Storage	Trojan SSIG 12 255	32	strings
System converter	Dynapower SPS - 100	300	kW
Dispatch strategy	HOMER Load Following		

Schematic



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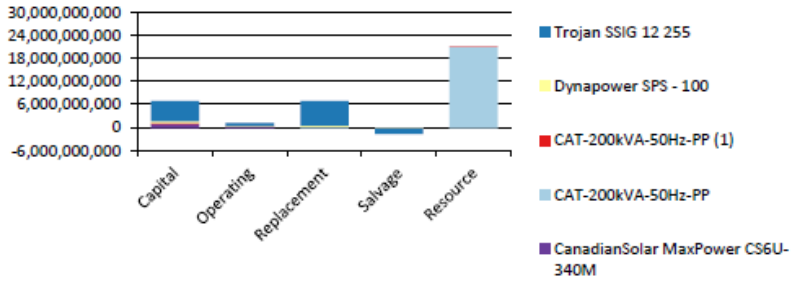
Cost Summary



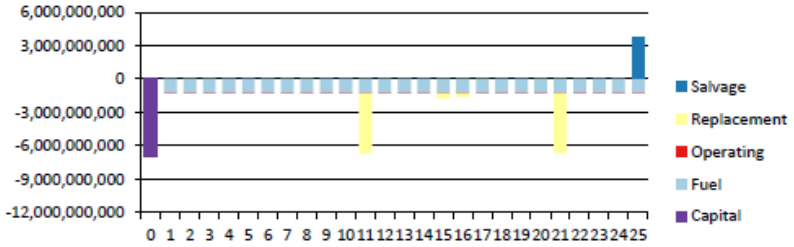
Net Present Costs

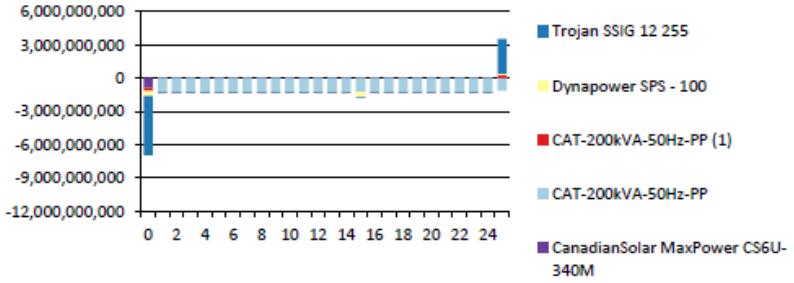
Name	Capital	Operating	Replacement	Salvage	Resource	Total
CanadianSolar MaxPower CS6U-340M	Rp868M	Rp147M	Rp0.00	Rp0.00	Rp0.00	Rp1.01B
CAT-200kVA-50Hz-PP	Rp0.00	Rp53.1M	Rp180M	-Rp52.6M	Rp21.1B	Rp21.2B
CAT-200kVA-50Hz-PP (1)	Rp300M	Rp413,671	Rp0.00	-Rp131M	Rp95.6M	Rp265M
Dynapower SPS - 100	Rp443M	Rp82.7M	Rp256M	-Rp61.6M	Rp0.00	Rp720M
Trojan SSIG 12 255	Rp5.35B	Rp900M	Rp6.53B	-Rp1.40B	Rp0.00	Rp11.4B
System	Rp6.96B	Rp1.18B	Rp6.97B	-Rp1.64B	Rp21.2B	Rp34.6B

Annualized Costs

Name	Capital	Operating	Replacement	Salvage	Resource	Total
CanadianSolar MaxPower CS6U-340M	Rp51.6M	Rp8.72M	Rp0.00	Rp0.00	Rp0.00	Rp60.3M
CAT-200kVA-50Hz-PP	Rp0.00	Rp3.16M	Rp10.7M	-Rp3.13M	Rp1.25B	Rp1.26B
CAT-200kVA-50Hz-PP (1)	Rp17.8M	Rp24,600	Rp0.00	-Rp7.79M	Rp5.69M	Rp15.8M
Dynapower SPS - 100	Rp26.3M	Rp4.92M	Rp15.2M	-Rp3.67M	Rp0.00	Rp42.8M
Trojan SSIG 12 255	Rp318M	Rp53.5M	Rp388M	-Rp83.2M	Rp0.00	Rp677M
System	Rp414M	Rp70.3M	Rp414M	-Rp97.8M	Rp1.26B	Rp2.06B

Cash Flow





Electrical Summary

Excess and Unmet

Quantity	Value	Units
Excess Electricity	0	kWh/yr
Unmet Electric Load	0	kWh/yr
Capacity Shortage	0	kWh/yr

Production Summary

Component	Production (kWh/yr)	Percent
CanadianSolar MaxPower CS6U-340M	290,189	50.7
CAT-200kVA-50Hz-PP	281,418	49.1
CAT-200kVA-50Hz-PP (1)	1,202	0.210
Total	572,809	100

Consumption Summary

Component	Consumption (kWh/yr)	Percent
AC Primary Load	534,864	100
DC Primary Load	0	0
Deferrable Load	0	0
Total	534,864	100

Generator: CAT-200kVA-50Hz-PP (1) (Diesel)

CAT-200kVA-50Hz-PP (1) Electrical Summary

Quantity	Value	Units
Electrical Production	1,202	kWh/yr
Mean Electrical Output	40.1	kW
Minimum Electrical Output	40.0	kW
Maximum Electrical Output	42.2	kW

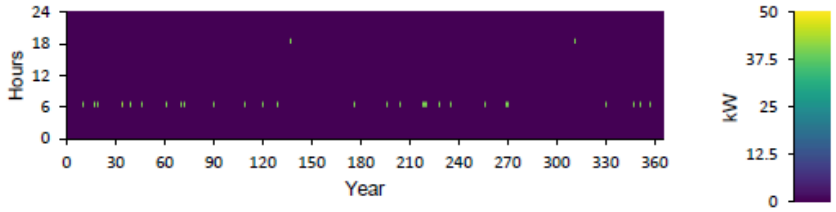
CAT-200kVA-50Hz-PP (1) Fuel Summary

Quantity	Value	Units
Fuel Consumption	377	L
Specific Fuel Consumption	0.313	L/kWh
Fuel Energy Input	3,706	kWh/yr
Mean Electrical Efficiency	32.4	%

CAT-200kVA-50Hz-PP (1) Statistics

Quantity	Value	Units
Hours of Operation	30.0	hrs/yr
Number of Starts	30.0	starts/yr
Operational Life	2,000	yr
Capacity Factor	0.0858	%
Fixed Generation Cost	30,483	Rp/hr
Marginal Generation Cost	4,115	Rp/kWh

CAT-200kVA-50Hz-PP (1) Output (kW)



PV: CanadianSolar MaxPower CS6U-340M

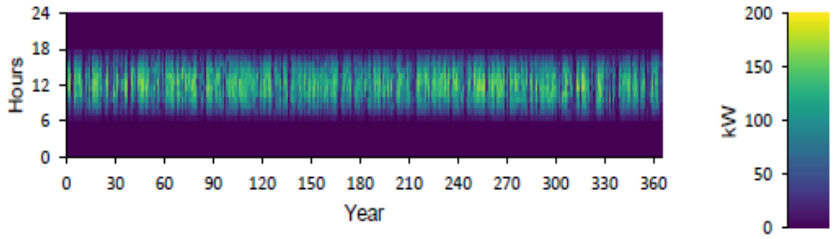
CanadianSolar MaxPower CS6U-340M Electrical Summary

Quantity	Value	Units
Minimum Output	0	kW
Maximum Output	172	kW
PV Penetration	54.3	%
Hours of Operation	4,380	hrs/yr
Levelized Cost	208	Rp/kWh

CanadianSolar MaxPower CS6U-340M Statistics

Quantity	Value	Units
Rated Capacity	190	kW
Mean Output	33.1	kW
Mean Output	795	kWh/d
Capacity Factor	17.4	%
Total Production	290,189	kWh/yr

CanadianSolar MaxPower CS6U-340M Output (kW)



Storage: Trojan SSIG 12 255

Trojan SSIG 12 255 Properties

Quantity	Value	Units
Batteries	768	qty.
String Size	24.0	batteries
Strings in Parallel	32.0	strings
Bus Voltage	288	V

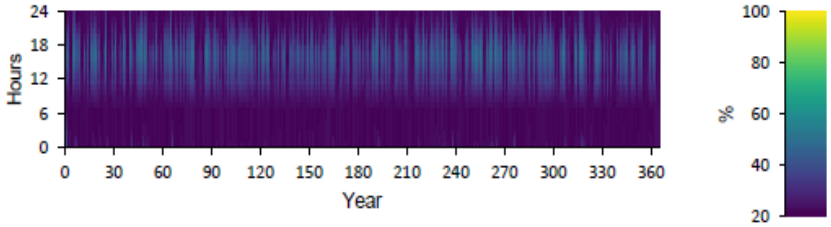
Trojan SSIG 12 255 Result Data

Quantity	Value	Units
Average Energy Cost	0	Rp/kWh
Energy In	151,150	kWh/yr
Energy Out	122,583	kWh/yr
Storage Depletion	1,859	kWh/yr
Losses	30,426	kWh/yr
Annual Throughput	137,052	kWh/yr

Trojan SSIG 12 255 Statistics

Quantity	Value	Units
Autonomy	31.1	hr
Storage Wear Cost	4,206	Rp/kWh
Nominal Capacity	2,371	kWh
Usable Nominal Capacity	1,897	kWh
Lifetime Throughput	1,422,336	kWh
Expected Life	10.4	yr

Trojan SSIG 12 255 State of Charge (%)



Converter: Dynapower SPS - 100

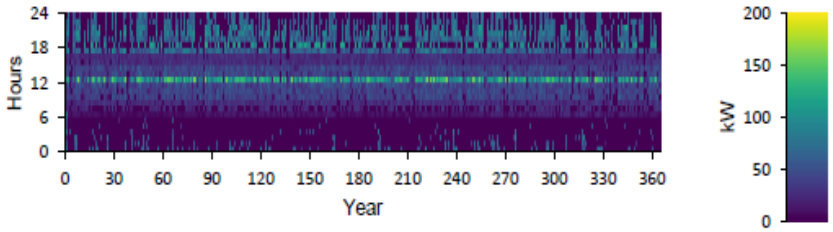
Dynapower SPS - 100 Electrical Summary

Quantity	Value	Units
Hours of Operation	5,535	hrs/yr
Energy Out	255,464	kWh/yr
Energy In	264,729	kWh/yr
Losses	9,266	kWh/yr

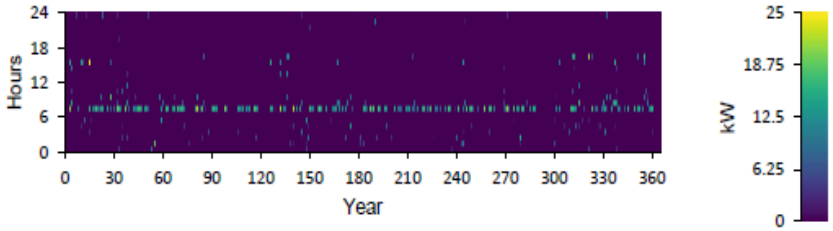
Dynapower SPS - 100 Statistics

Quantity	Value	Units
Capacity	300	kW
Mean Output	29.2	kW
Minimum Output	0	kW
Maximum Output	171	kW
Capacity Factor	9.72	%

Dynapower SPS - 100 Inverter Output (kW)



Dynapower SPS - 100 Rectifier Output (kW)

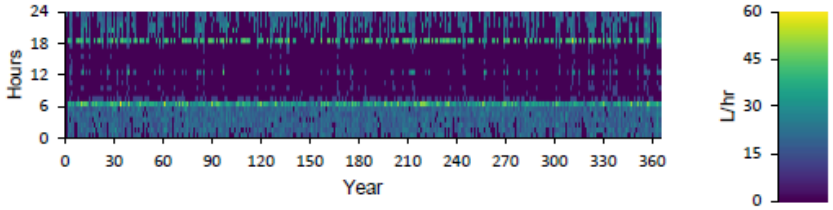


Fuel Summary

Diesel Consumption Statistics

Quantity	Value	Units
Total fuel consumed	83,348	L
Avg fuel per day	228	L/day
Avg fuel per hour	9.51	L/hour

Diesel Consumption (L/hr)



Emissions

Pollutant	Quantity	Unit
Carbon Dioxide	220,528	kg/yr
Carbon Monoxide	0	kg/yr
Unburned Hydrocarbons	0	kg/yr
Particulate Matter	0	kg/yr
Sulfur Dioxide	547	kg/yr
Nitrogen Oxides	0	kg/yr

Compare Economics

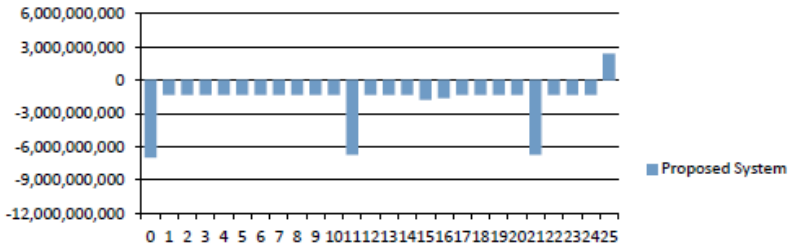
IRR (%):**16.3**

Discounted payback (yr):**5.59**

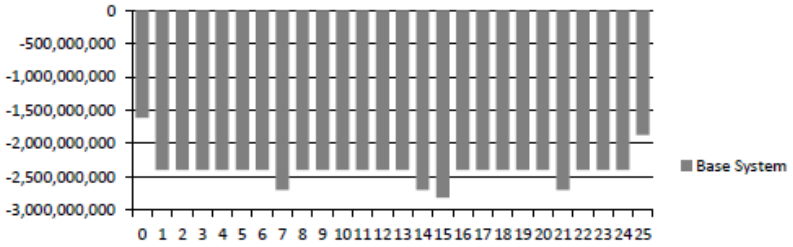
Simple payback (yr):**5.02**

	Base System	Proposed System
Net Present Cost	Rp42.5B	Rp34.6B
CAPEX	Rp1.61B	Rp6.96B
OPEX	Rp2.43B	Rp1.65B
LCOE (per kWh)	Rp4,724	Rp3,851
CO2 Emitted (kg/yr)	415,910	220,528
Fuel Consumption (L/yr)	157,192	83,348

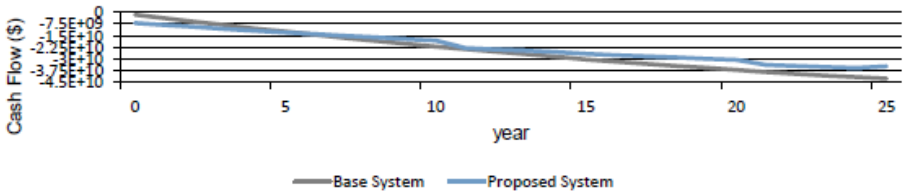
Proposed Annual Nominal Cash Flows



Base System Annual Nominal Cash Flows



Cumulative Discounted Cash Flows



HOMER Pro

System Simulation Report

File: Revisi2 100G.homer

Author: Anderson

Location: 26F8+92 Barrang Caddi, Makassar City, South Sulawesi, Indonesia (4°58.6'S, 119°12.9'E)

Total Net Present Cost: Rp43,495,880,000.00

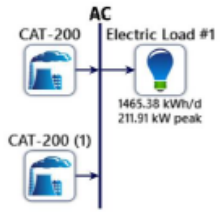
Levelized Cost of Energy (Rp/kWh): Rp4,836

Notes: 80% PV 20 G pulau Lumu-Lumu

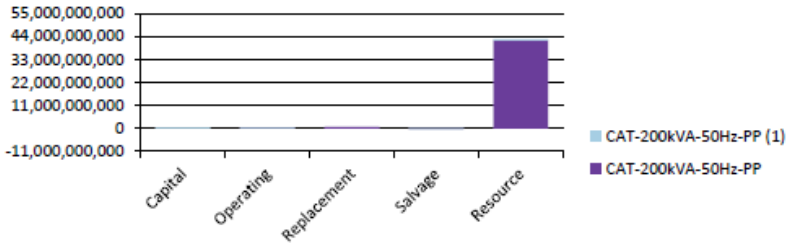
System Architecture

Component	Name	Size	Unit
Generator #1	CAT-200kVA-50Hz-PP	160	kW
Generator #2	CAT-200kVA-50Hz-PP (1)	160	kW
Dispatch strategy	HOMER Load Following		

Schematic



Cost Summary



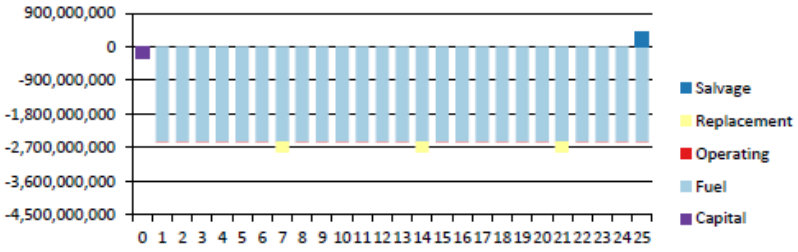
Net Present Costs

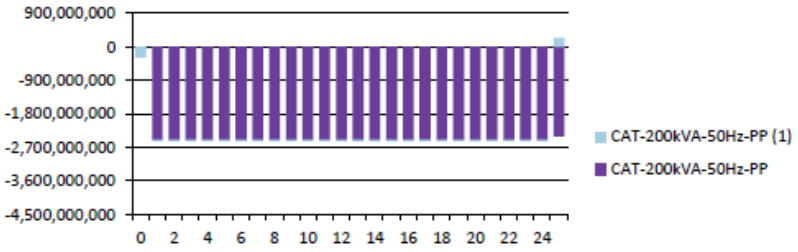
Name	Capital	Operating	Replacement	Salvage	Resource	Total
CAT-200kVA-50Hz-PP	Rp0.00	Rp121M	Rp585M	-Rp46.5M	Rp42.0B	Rp42.7B
CAT-200kVA-50Hz-PP (1)	Rp300M	Rp2.81M	Rp0.00	-Rp121M	Rp651M	Rp833M
System	Rp300M	Rp124M	Rp585M	-Rp168M	Rp42.7B	Rp43.5B

Annualized Costs

Name	Capital	Operating	Replacement	Salvage	Resource	Total
CAT-200kVA-50Hz-PP	Rp0.00	Rp7.18M	Rp34.8M	-Rp2.76M	Rp2.50B	Rp2.54B
CAT-200kVA-50Hz-PP (1)	Rp17.8M	Rp167,280	Rp0.00	-Rp7.22M	Rp38.7M	Rp49.5M
System	Rp17.8M	Rp7.35M	Rp34.8M	-Rp9.98M	Rp2.54B	Rp2.59B

Cash Flow


900,000,000
0
-900,000,000
-1,800,000,000
-2,700,000,000
-3,600,000,000
-4,500,000,000
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Salvage
Replacement
Operating
Fuel
Capital


900,000,000
0
-900,000,000
-1,800,000,000
-2,700,000,000
-3,600,000,000
-4,500,000,000
0 2 4 6 8 10 12 14 16 18 20 22 24
CAT-200kVA-50Hz-PP (1)
CAT-200kVA-50Hz-PP

Electrical Summary

Excess and Unmet

Quantity	Value	Units
Excess Electricity	27,868	kWh/yr
Unmet Electric Load	0	kWh/yr
Capacity Shortage	0	kWh/yr

Production Summary

Component	Production (kWh/yr)	Percent
CAT-200kVA-50Hz-PP	554,543	98.5
CAT-200kVA-50Hz-PP (1)	8,189	1.46
Total	562,731	100

Consumption Summary

Component	Consumption (kWh/yr)	Percent
AC Primary Load	534,864	100
DC Primary Load	0	0
Deferrable Load	0	0
Total	534,864	100

Generator: CAT-200kVA-50Hz-PP (Diesel)

CAT-200kVA-50Hz-PP Electrical Summary

Quantity	Value	Units
Electrical Production	554,543	kWh/yr
Mean Electrical Output	63.3	kW
Minimum Electrical Output	40.0	kW
Maximum Electrical Output	160	kW

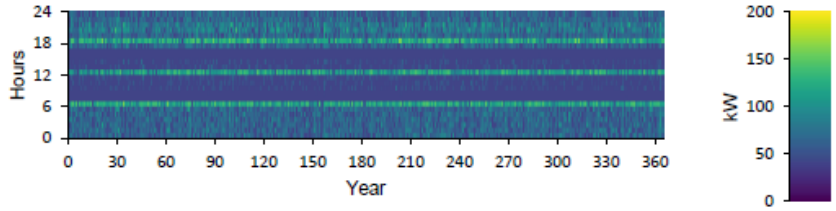
CAT-200kVA-50Hz-PP Fuel Summary

Quantity	Value	Units
Fuel Consumption	165,421	L
Specific Fuel Consumption	0.298	L/kWh
Fuel Energy Input	1,627,742	kWh/yr
Mean Electrical Efficiency	34.1	%

CAT-200kVA-50Hz-PP Statistics

Quantity	Value	Units
Hours of Operation	8,760	hrs/yr
Number of Starts	1.00	starts/yr
Operational Life	6.85	yr
Capacity Factor	39.6	%
Fixed Generation Cost	30,483	Rp/hr
Marginal Generation Cost	4,115	Rp/kWh

CAT-200kVA-50Hz-PP Output (kW)



Generator: CAT-200kVA-50Hz-PP (1) (Diesel)

CAT-200kVA-50Hz-PP (1) Electrical Summary

Quantity	Value	Units
Electrical Production	8,189	kWh/yr
Mean Electrical Output	40.1	kW
Minimum Electrical Output	40.0	kW
Maximum Electrical Output	51.9	kW

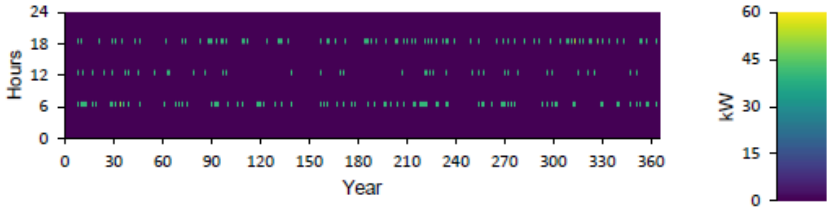
CAT-200kVA-50Hz-PP (1) Fuel Summary

Quantity	Value	Units
Fuel Consumption	2,565	L
Specific Fuel Consumption	0.313	L/kWh
Fuel Energy Input	25,235	kWh/yr
Mean Electrical Efficiency	32.4	%

CAT-200kVA-50Hz-PP (1) Statistics

Quantity	Value	Units
Hours of Operation	204	hrs/yr
Number of Starts	204	starts/yr
Operational Life	294	yr
Capacity Factor	0.584	%
Fixed Generation Cost	30,483	Rp/hr
Marginal Generation Cost	4,115	Rp/kWh

CAT-200kVA-50Hz-PP (1) Output (kW)

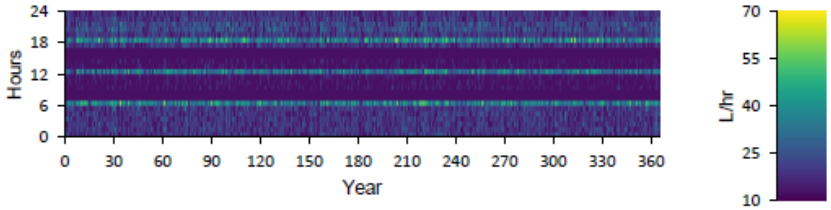


Fuel Summary

Diesel Consumption Statistics

Quantity	Value	Units
Total fuel consumed	167,985	L
Avg fuel per day	460	L/day
Avg fuel per hour	19.2	L/hour

Diesel Consumption (L/hr)



Emissions

Pollutant	Quantity	Unit
Carbon Dioxide	444,467	kg/yr
Carbon Monoxide	0	kg/yr
Unburned Hydrocarbons	0	kg/yr
Particulate Matter	0	kg/yr
Sulfur Dioxide	1,102	kg/yr
Nitrogen Oxides	0	kg/yr

Compare Economics

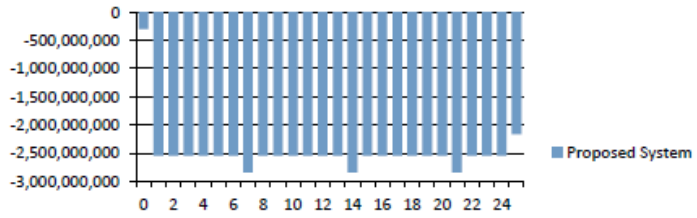
IRR (%):**N/A**

Discounted payback (yr):**N/A**

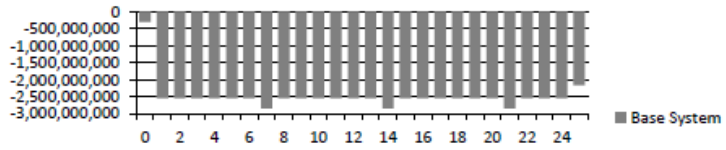
Simple payback (yr):**N/A**

	Base System	Proposed System
Net Present Cost	Rp43.5B	Rp43.5B
CAPEX	Rp300M	Rp300M
OPEX	Rp2.57B	Rp2.57B
LCOE (per kWh)	Rp4,836	Rp4,836
CO2 Emitted (kg/yr)	444,467	444,467
Fuel Consumption (L/yr)	167,986	167,986

Proposed Annual Nominal Cash Flows



Base System Annual Nominal Cash Flows



Cumulative Discounted Cash Flows