

**Project Name:** C. Hall

14/11/2023

## Your PV system from D&R ENERGY LTD.

### Address of Installation

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30 West Street.  
Weston-Super-Mare  
BS23 1JU

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**Project Description:**  
2.4kWp Roof Mounted PV system

# Project Overview

## PV System

### Grid-connected PV System

Climate Data	Bristol/Lulsgate, GBR (1996 - 2015)
Values source	Meteonorm 8.1
PV Generator Output	2.4 kWp
PV Generator Surface	11.7 m <sup>2</sup>
Number of PV Modules	6
Number of Inverters	1

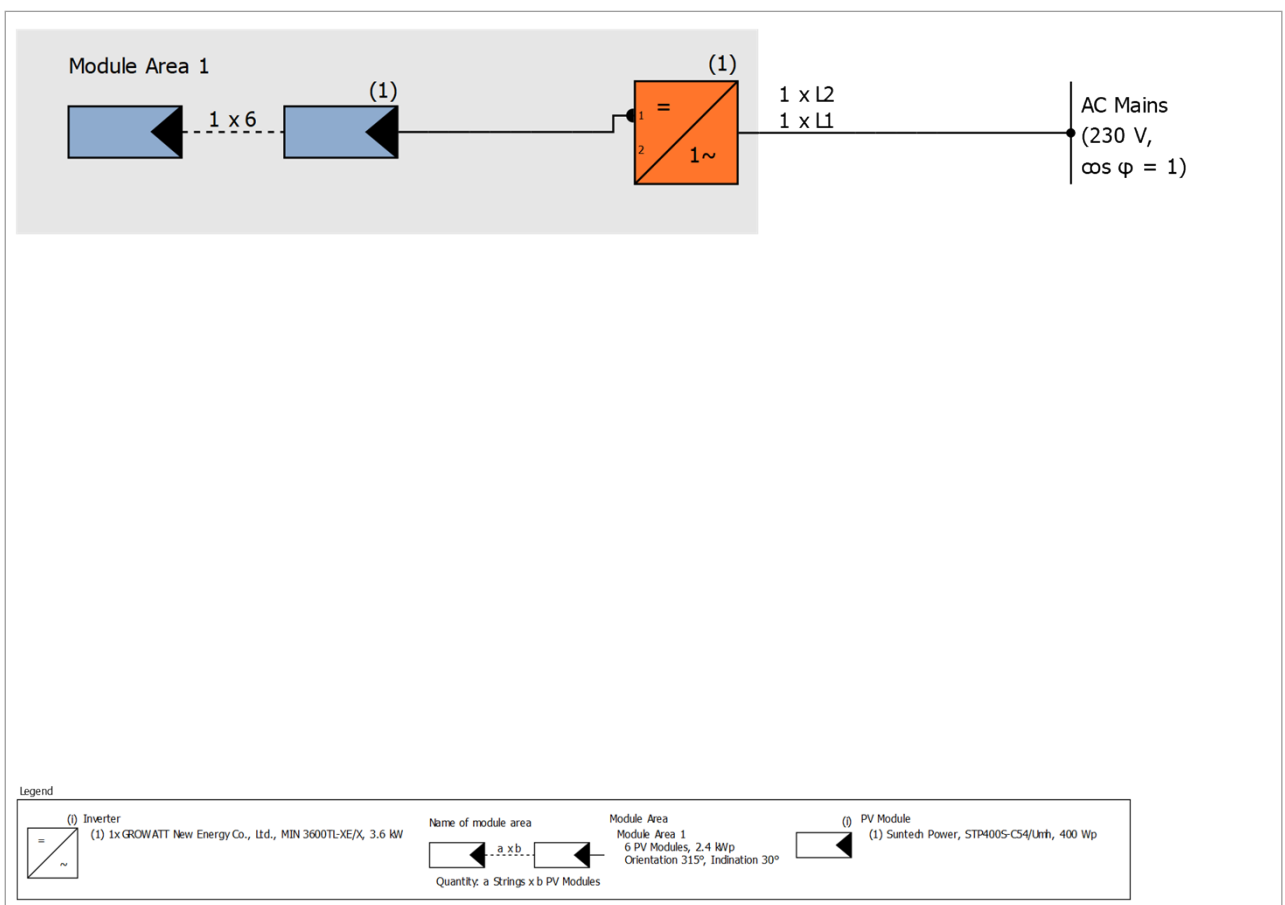


Figure: Schematic diagram

## Production Forecast

### Production Forecast

PV Generator Output	2.40 kWp
Spec. Annual Yield	395.23 kWh/kWp
Performance Ratio (PR)	80.33 %
Grid Export	952 kWh/Year
Grid Export in the first year (incl. module degradation)	938 kWh/Year
Standby Consumption (Inverter)	3 kWh/Year
CO <sub>2</sub> Emissions avoided	446 kg / year

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	Grid-connected PV System
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### Climate Data

Location	Bristol/Lulsgate, GBR (1996 - 2015)
Values source	Meteonorm 8.1
Resolution of the data	1 h
Simulation models used:	
- Diffuse Irradiation onto Horizontal Plane	Hofmann
- Irradiance onto tilted surface	Hay & Davies

## Module Areas

### 1. Module Area - Module Area 1

#### PV Generator, 1. Module Area - Module Area 1

Name	Module Area 1
PV Modules	6 x STP400S-C54/Umh (v1)
Manufacturer	Suntech Power
Inclination	30 °
Orientation	Northwest 315 °
Installation Type	Roof parallel
PV Generator Surface	11.7 m <sup>2</sup>

#### Shading, 1. Module Area - Module Area 1

Shading	40 %
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D&R ENERGY LTD.

Degradation of Module, 1. Module Area - Module Area 1

Characteristic curve	Exponential
Remaining power (power output) after 1 year	98 %
Remaining power (power output) after 25 years	84.8 %

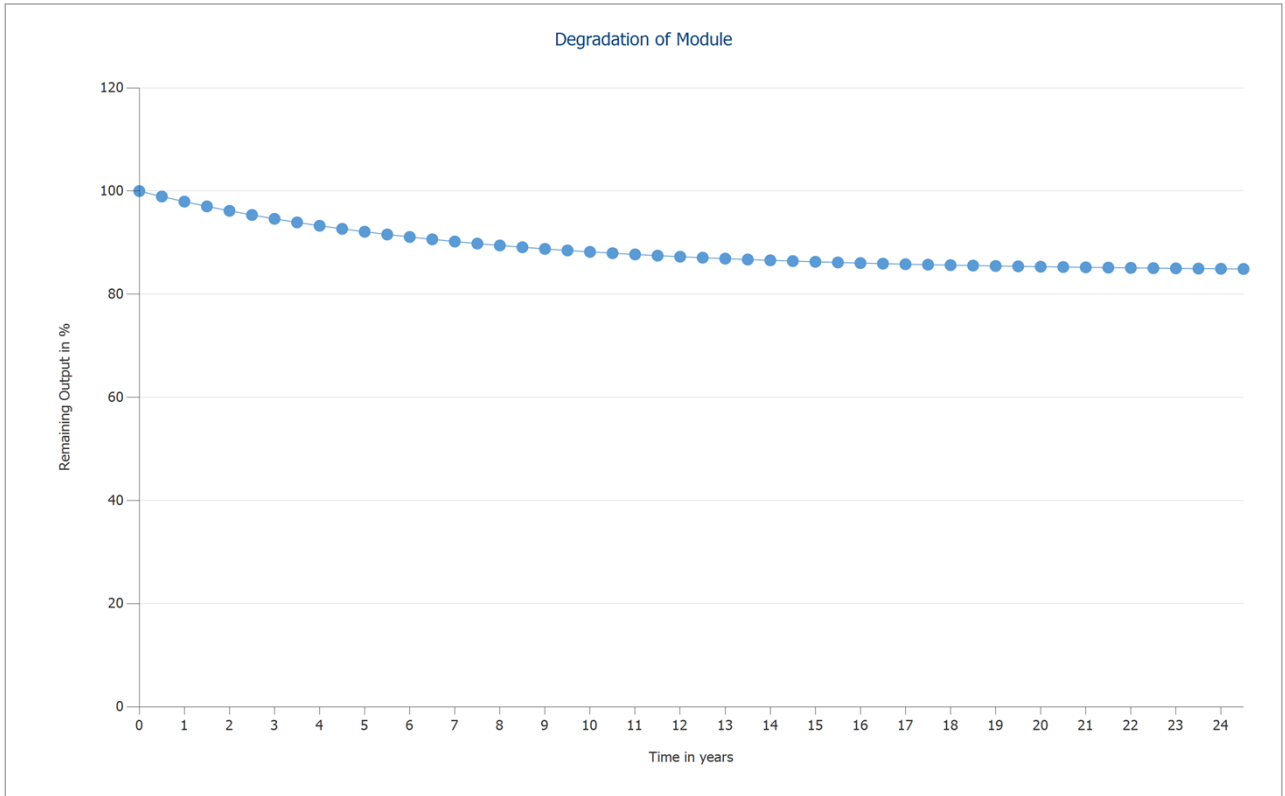


Figure: Degradation of Module, 1. Module Area - Module Area 1

## Inverter configuration

### Configuration 1

Module Area	Module Area 1
Inverter 1	
Model	MIN 3600TL-XE/X (v2)
Manufacturer	GROWATT New Energy Co., Ltd.
Quantity	1
Sizing Factor	66.7 %
Configuration	MPP 1: 1 x 6 MPP 2: not allocated

## AC Mains

### AC Mains

Number of Phases	1
Mains voltage between phase and neutral	230 V
Displacement Power Factor (cos phi)	+/- 1

# Simulation Results

## Results Total System

### PV System

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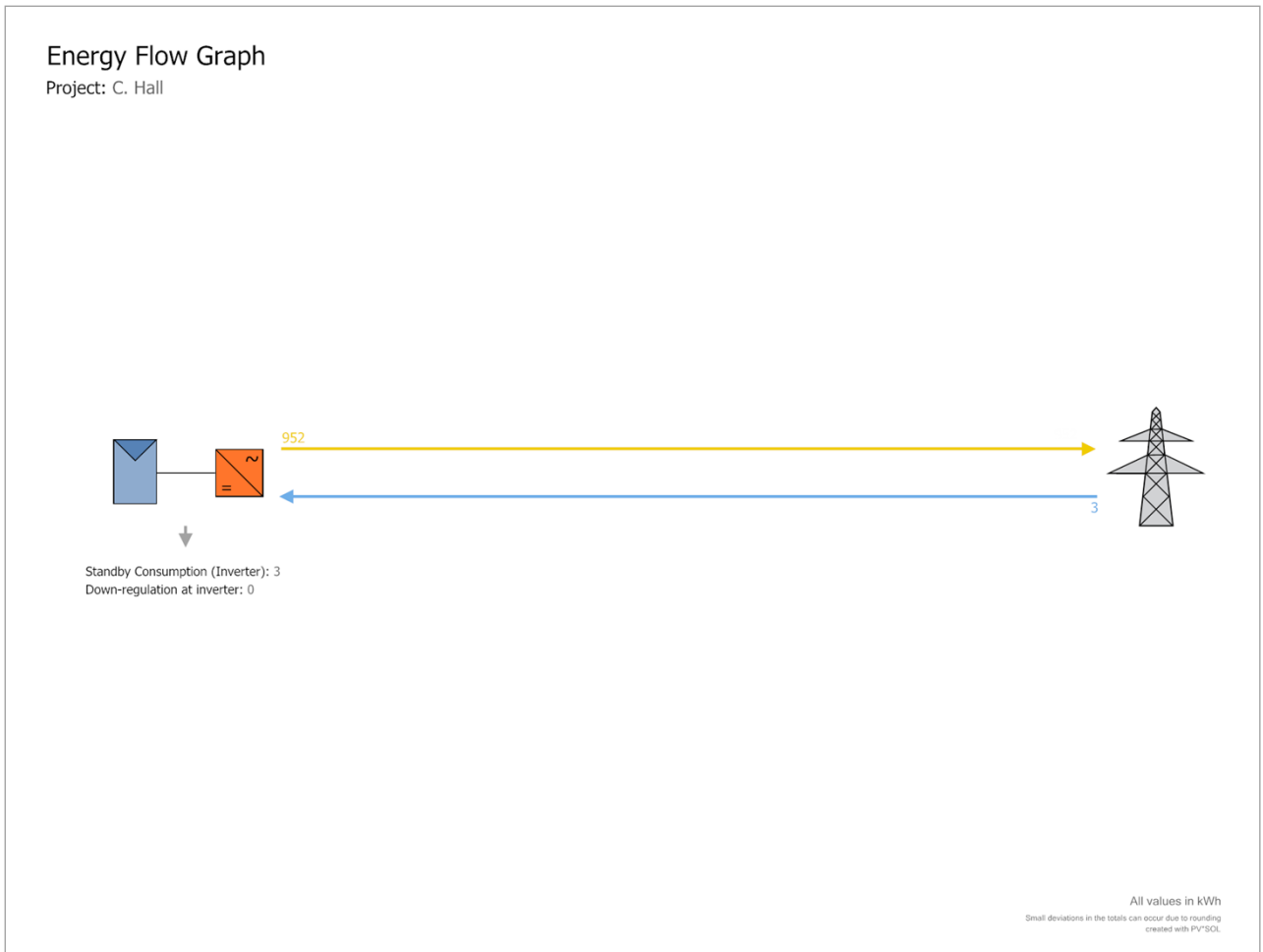


Figure: Energy flow

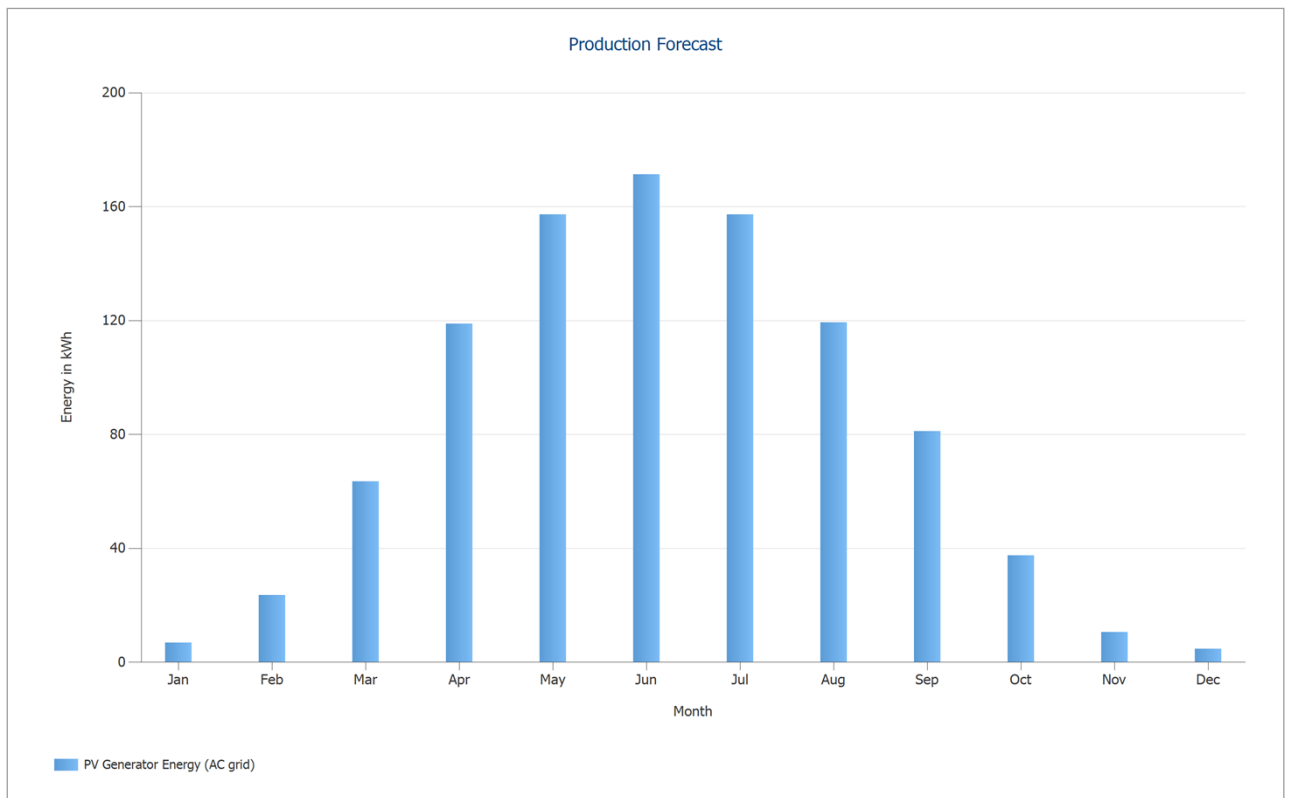


Figure: Production Forecast

## PV System Energy Balance

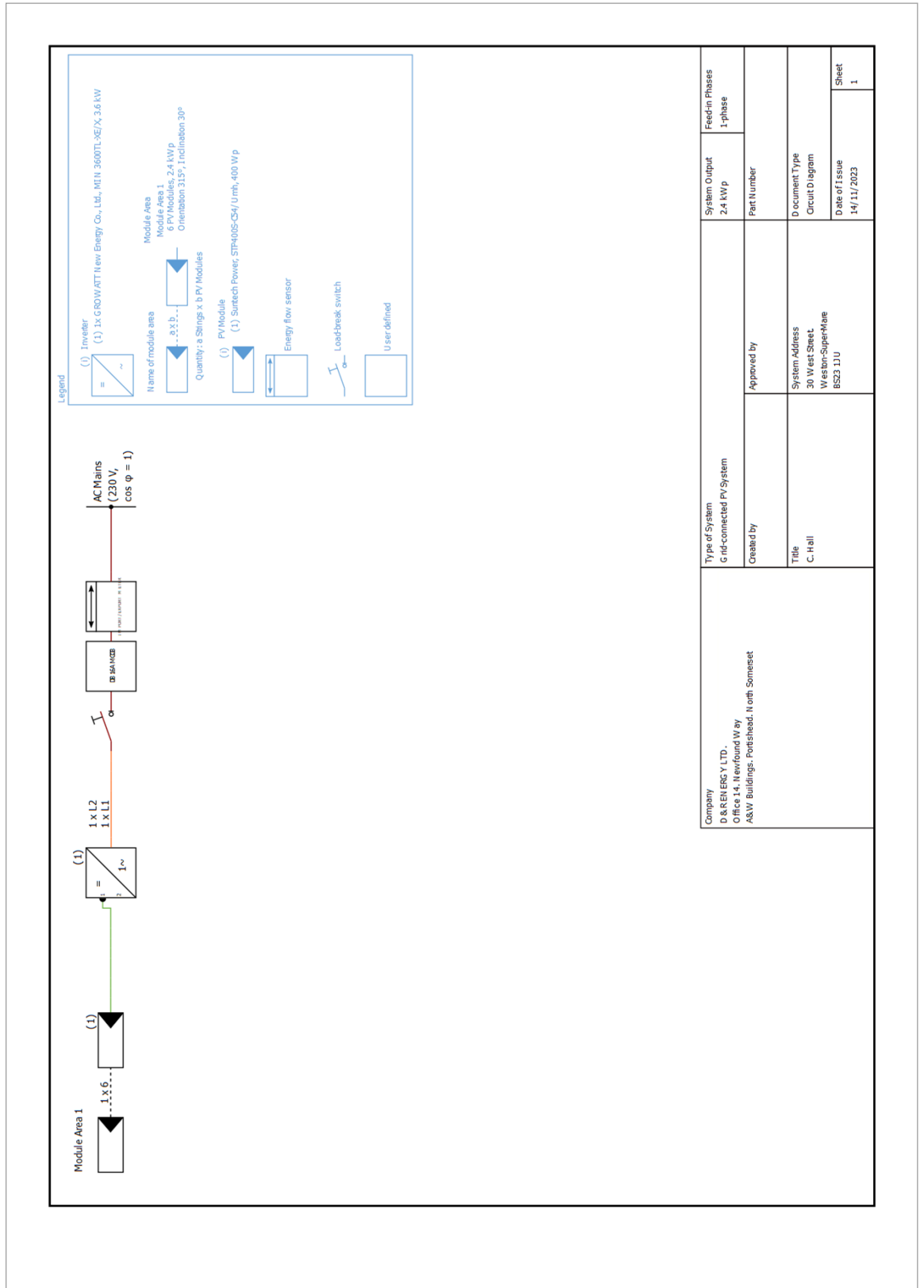
### PV System Energy Balance

<b>Global radiation - horizontal</b>	<b>1,061.57 kWh/m<sup>2</sup></b>	
Deviation from standard spectrum	-10.62 kWh/m <sup>2</sup>	-1.00 %
Ground Reflection (Albedo)	14.08 kWh/m <sup>2</sup>	1.34 %
Orientation and inclination of the module surface	-245.05 kWh/m <sup>2</sup>	-23.01 %
Shading	-327.99 kWh/m <sup>2</sup>	-40.00 %
Reflection on the Module Interface	-17.55 kWh/m <sup>2</sup>	-3.57 %
<b>Global Radiation at the Module</b>	<b>474.44 kWh/m<sup>2</sup></b>	
	474.44 kWh/m <sup>2</sup>	
	x 11.73 m <sup>2</sup>	
	= 5,565.27 kWh	
<b>Global PV Radiation</b>	<b>5,565.27 kWh</b>	
Soiling	-83.45 kWh	-1.50 %
STC Conversion (Rated Efficiency of Module 20.46 %)	-4,360.12 kWh	-79.54 %
<b>Rated PV Energy</b>	<b>1,121.70 kWh</b>	
Low-light performance	-35.12 kWh	-3.13 %
Deviation from the nominal module temperature	18.60 kWh	1.71 %
Diodes	-5.53 kWh	-0.50 %
Mismatch (Manufacturer Information)	-21.99 kWh	-2.00 %
Mismatch (Configuration/Shading)	0.00 kWh	0.00 %
<b>PV Energy (DC) without inverter down-regulation</b>	<b>1,077.67 kWh</b>	
Failing to reach the DC start output	-1.47 kWh	-0.14 %
Down-regulation on account of the MPP Voltage Range	0.00 kWh	0.00 %
Down-regulation on account of the max. DC Current	0.00 kWh	0.00 %
Down-regulation on account of the max. DC Power	0.00 kWh	0.00 %
Down-regulation on account of the max. AC Power/cos phi	0.00 kWh	0.00 %
MPP Matching	-3.10 kWh	-0.29 %
<b>PV energy (DC)</b>	<b>1,073.10 kWh</b>	
<b>Energy at the Inverter Input</b>	<b>1,073.10 kWh</b>	
Input voltage deviates from rated voltage	-3.50 kWh	-0.33 %
DC/AC Conversion	-108.36 kWh	-10.13 %
Standby Consumption (Inverter)	-3.07 kWh	-0.32 %
Total Cable Losses	-9.61 kWh	-1.00 %
<b>PV energy (AC) minus standby use</b>	<b>948.55 kWh</b>	
<b>PV Generator Energy (AC grid)</b>	<b>951.62 kWh</b>	



# Plans and parts list

## Circuit Diagram



Company D & R ENERGY LTD. Office 14, Newfound Way A&W Buildings, Portsmouth, PO1 1QF	Type of System Grid-connected PV System	System Output 2.4 kW p	Feed-in Phases 1-phase
	Created by C. Hall	Part Number	
Title C. Hall	Approved by	Document Type Circuit Diagram	Sheet 1
		System Address 30 West Street Weston-Super-Mare BS22 1JU	
		Date of Issue 14/11/2023	

Figure: Circuit Diagram

## Parts list

### Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		Suntech Power	STP400S-C54/Umh	6	Piece
2	Inverter		GROWATT New Energy Co., Ltd.	MIN 3600TL-XE/X	1	Piece