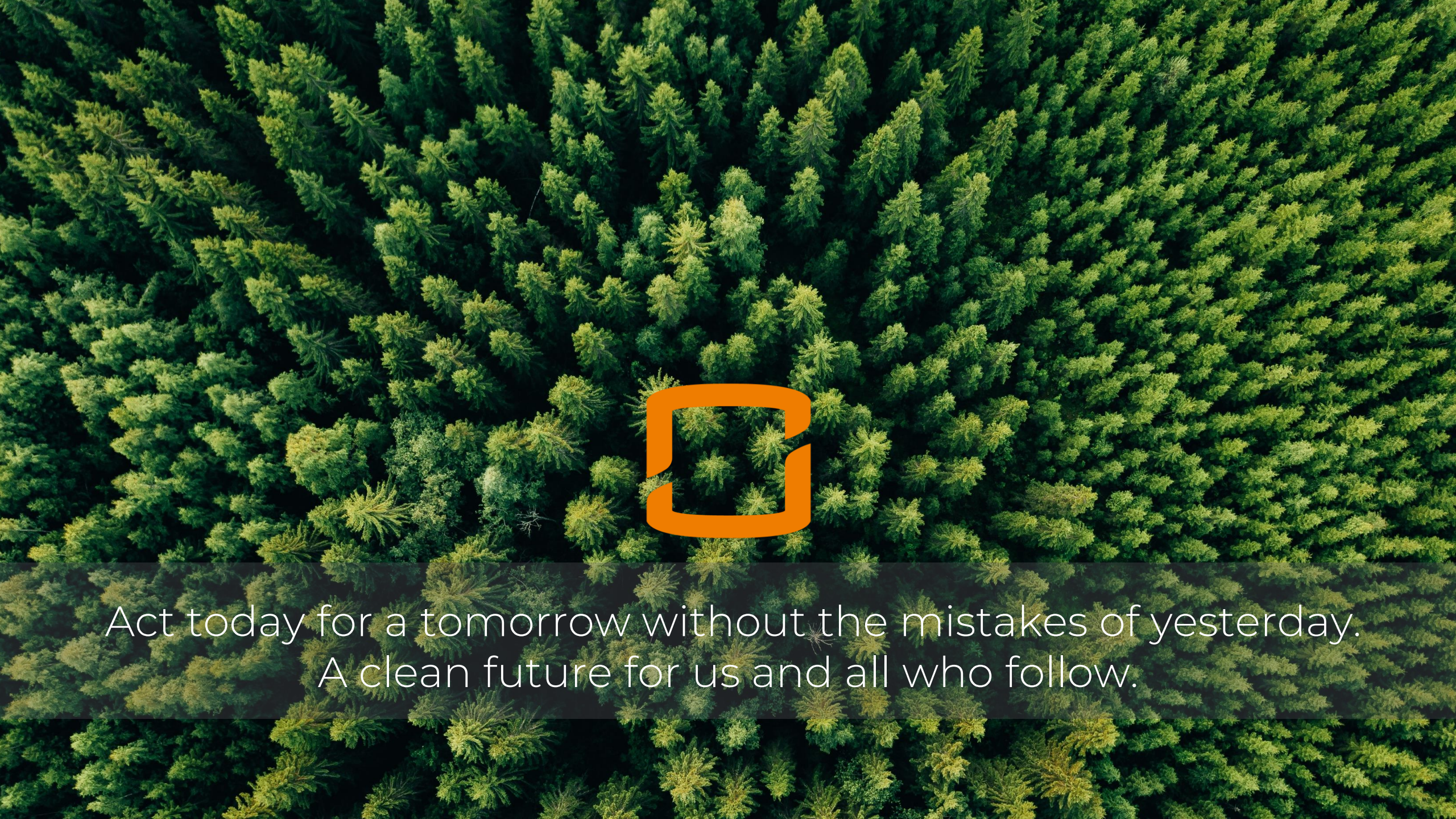

Act today for a tomorrow without the mistakes of yesterday.
A clean future for us and all who follow.

SUNGROW

PV on the northern roof
With 3-ph Hybrid and Battery

A proposition for the cold season

YOUR SPEAKER FOR TODAY

ANDREA POLINI
PRODUCT MANAGER HYBRID & ESS

TECHNICAL PRESALES SUPPORT
& PRODUCT OWNER STORAGE

a.polini@sungrow-emea.com
M: 0049 172 760 3278

FOREWORD...

FILL YOUR SOUTHERN ROOF FIRST

Of course southern roof still makes the most sense for residential PV

FOR THOSE WHO WANT MORE?

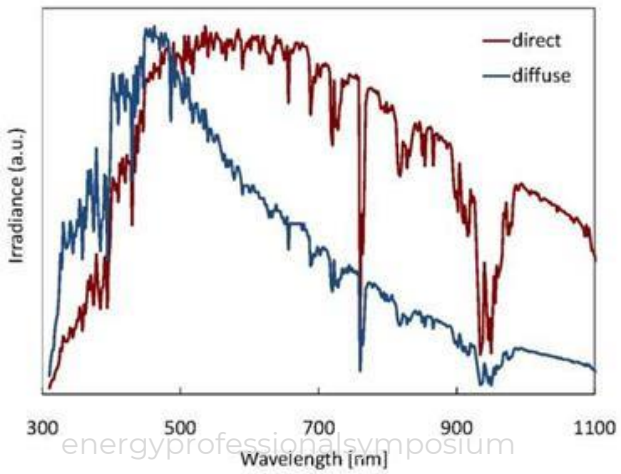
In planning, it is really worth considering northern roof installation

DIFFUSED LIGHT

PRESENT ON OVERCAST DAYS

Hits southern roof as much as northern roof

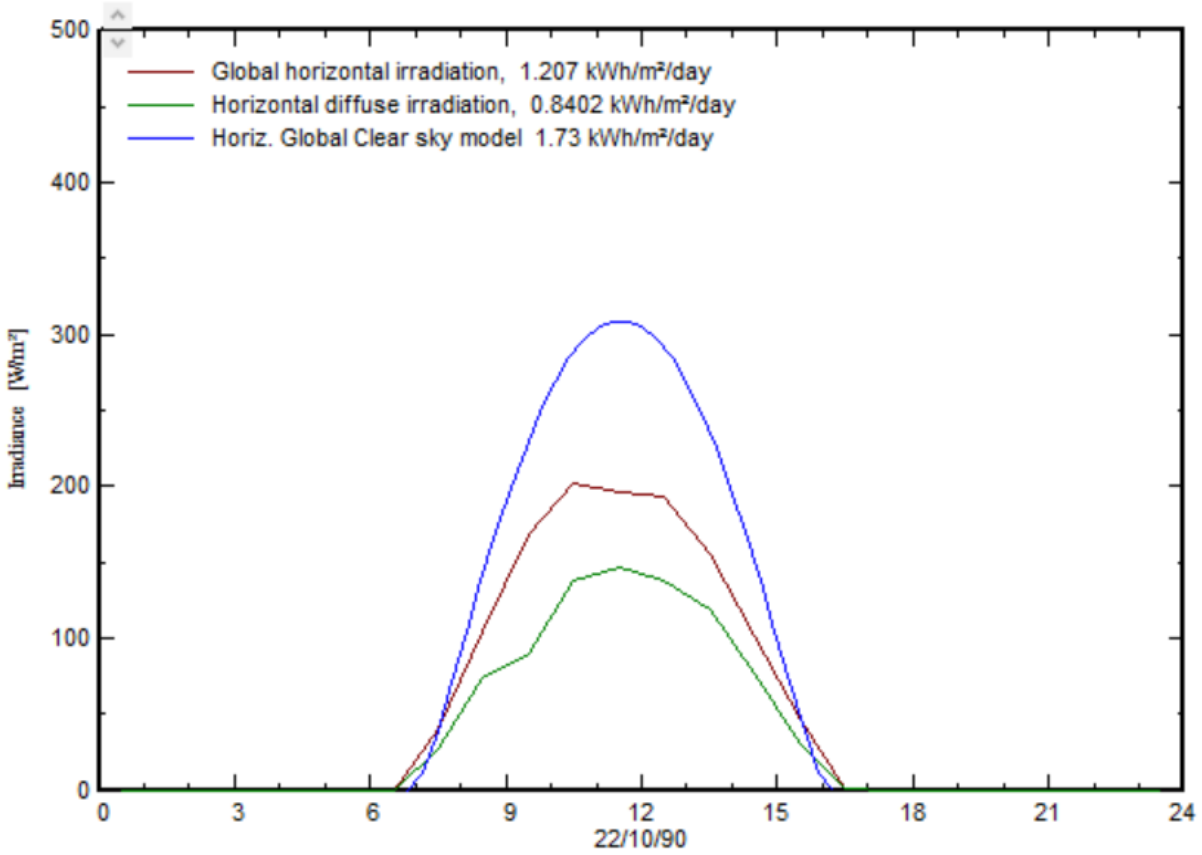
Accounts yearly at least 20-30% of the PV array energy



DIFFUSED LIGHT

USEFUL IN WINTER

Can provide baseload power



Meteo for Erfurt/Binderslebn - Synthetically generated data from monthly values.

Interval beginning	GlobHor kWh/m²/mth	DiffHor kWh/m²/mth
January	23.9	17.1
February	38.7	26.8
March	83.4	46.8
April	120.0	61.2
May	147.7	80.6
June	161.2	80.8
July	160.9	81.2
August	128.8	71.8
September	94.1	44.8
October	56.9	33.2
November	24.7	17.1
December	17.5	11.6
Year	1057.8	573.0

Source: Pvsyst 7.2 simulation

PV ON NORTHERN ROOF

GREAT PERFORMANCE

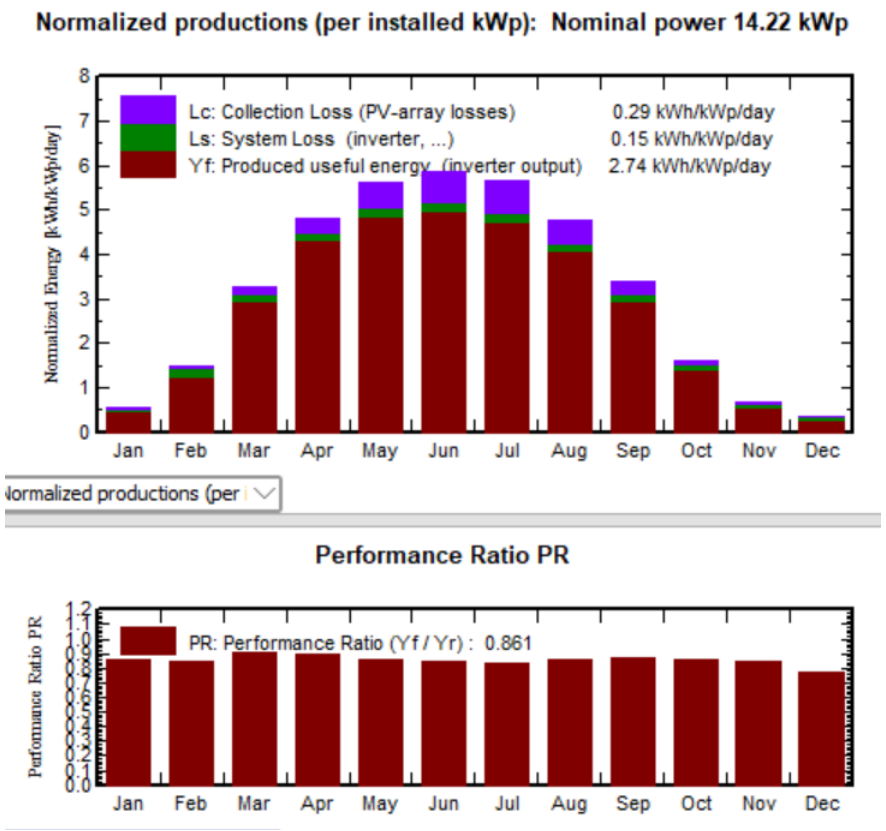
ECONOMIC RETURN

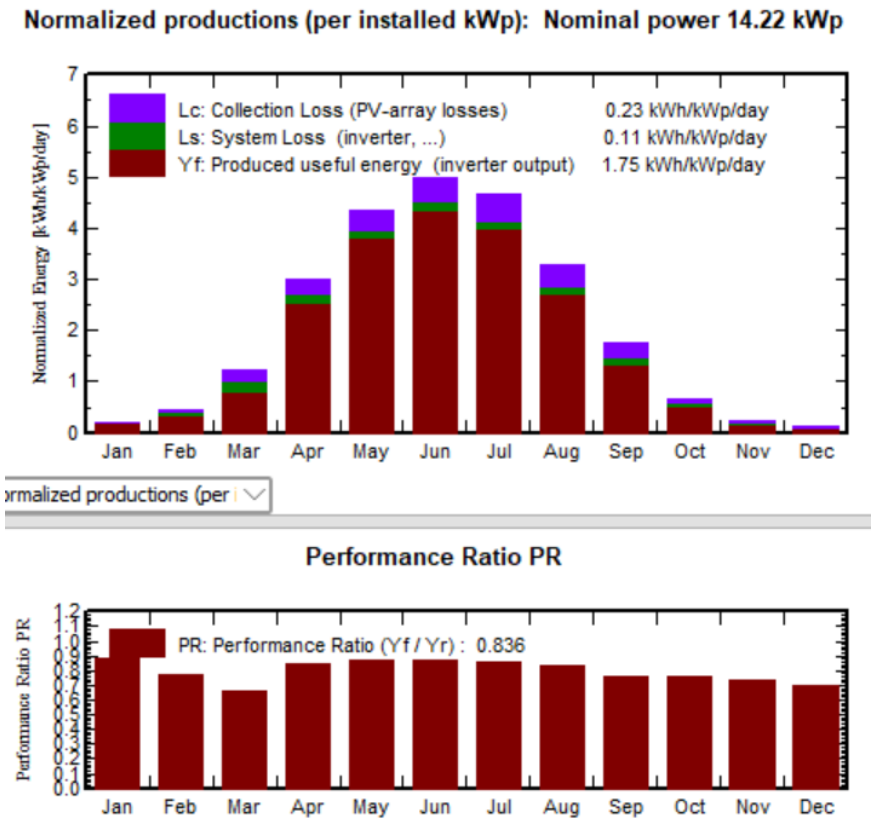
FLEXIBLE USE

GREAT PERFORMANCE

70% AS GOOD IN GERMANY

800Wh/kWp compared to 1100Wh/kWp in the south





SUNGROW

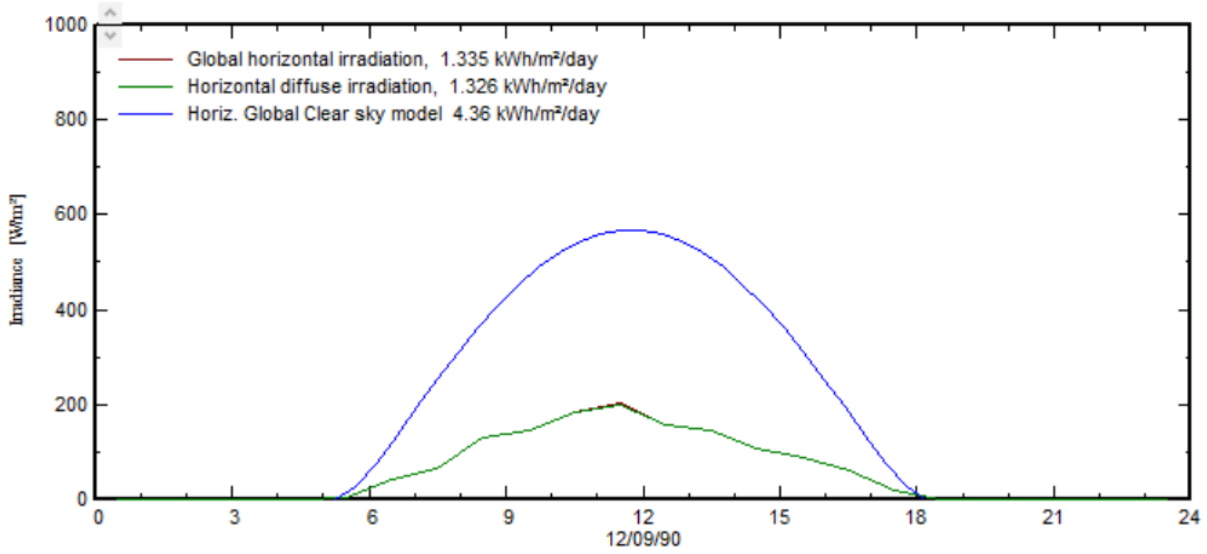
GREAT PERFORMANCE

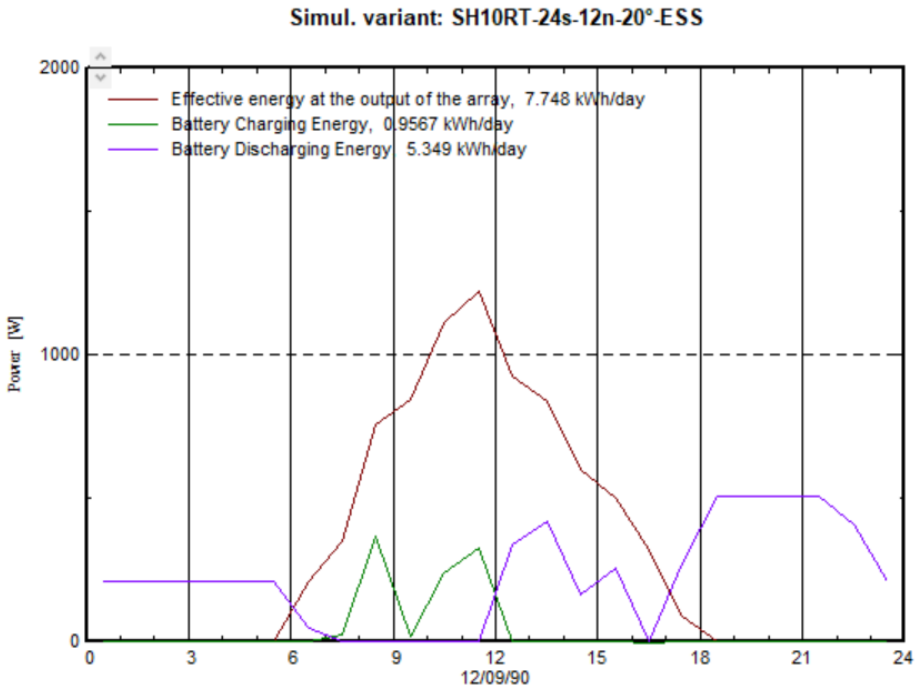
SUN FOR LONGER IN SUMMER

Northern roof irradiation even from 4AM to 10PM in north Europe
The northern the better, as sun is rising in north-east

MORE POWER IN WINTER

Thanks to diffused light from all directions in cloudy days





SUNGROW

ECONOMIC ADVANTAGE

LOW MARGINAL COST

All fixed costs already same as south installation
If the whole roof is installed at the same time

Cost estimate	South roof	+ North roof
Solar Panels	~250€/kWp	~250€/kWp
Installation	~100€/kWp	~100€/kWp
Subconstruction	~100€/kWp	~100€/kWp
Bigger inverter	Not always needed due to DC/AC ratio	~100€/kWp
Fix costs - Approvals - Scaffolding - …	~600€/kWp	Already included

ECONOMIC ADVANTAGE

For example for a 10kWp south + 10kWp north roof
Installed all together

	South roof	+ North roof
Cost estimate	~10’500€	~5’500€

Northern roof is half price than southern roof when installed together!

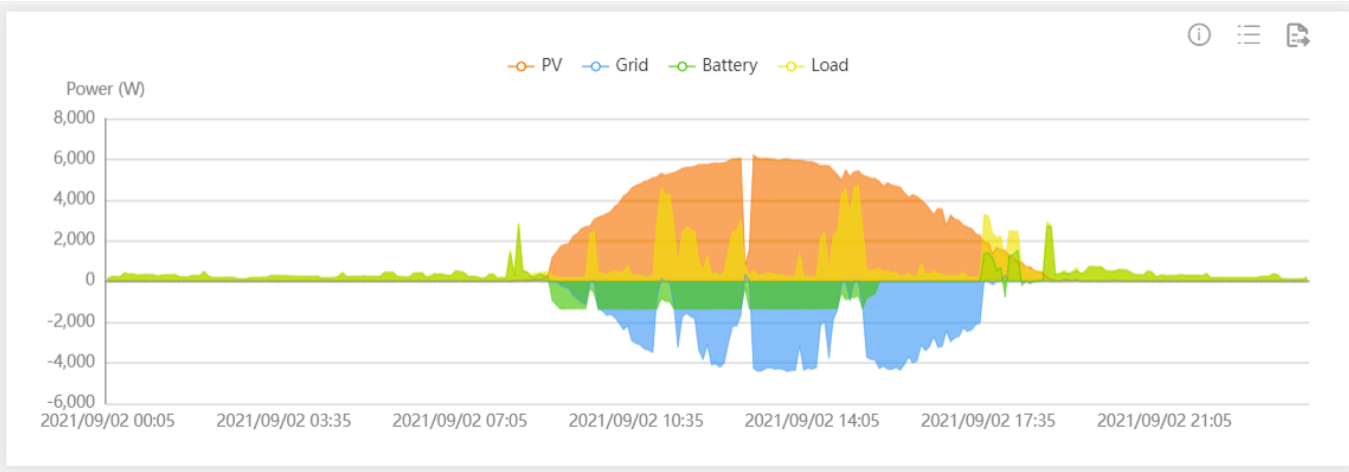
ECONOMIC ADVANTAGE

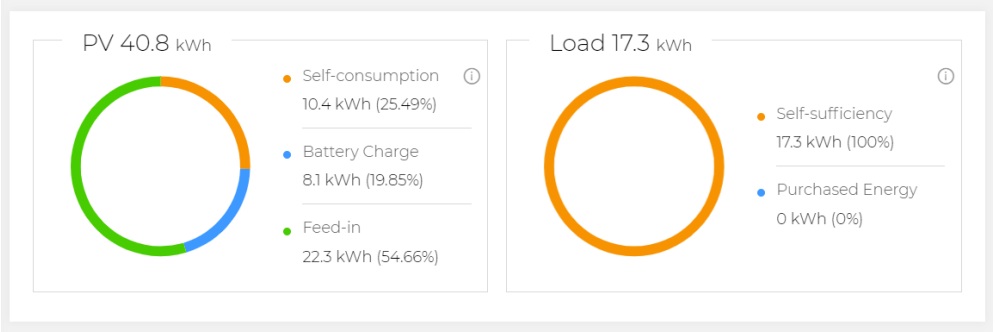
MORNING AND EVENING POWER

Immediately used for house loads self-consumption
6am morning coffee with solar power in summer!

30ct vs 7ct / kWh

Power from northern roof always improves ROI since it’s used for self-consumption





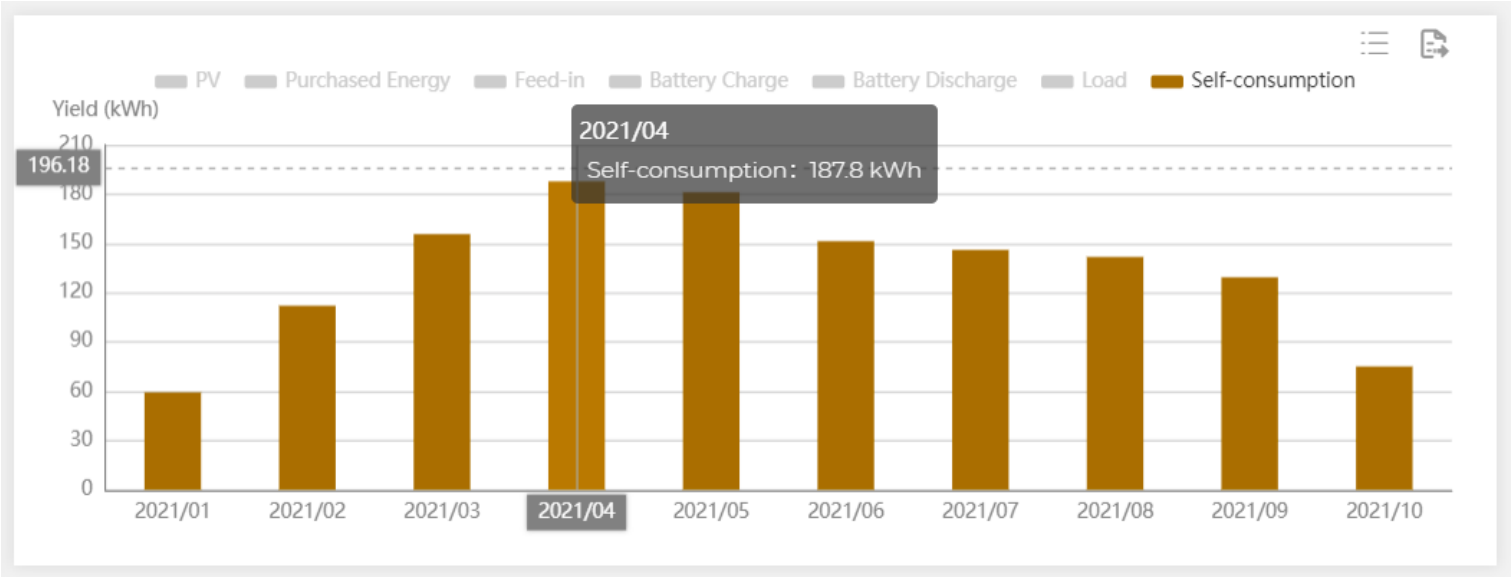
ECONOMIC ADVANTAGE

SPRING AND AUTUMN EVEN BETTER

Highest self-consumption rate

Plenty of diffused light compared to summer

Use of heat-pump more frequent than summer



AND OPTIMIZED BY DESIGN

NO NEED FOR FEED-IN LIMITATION

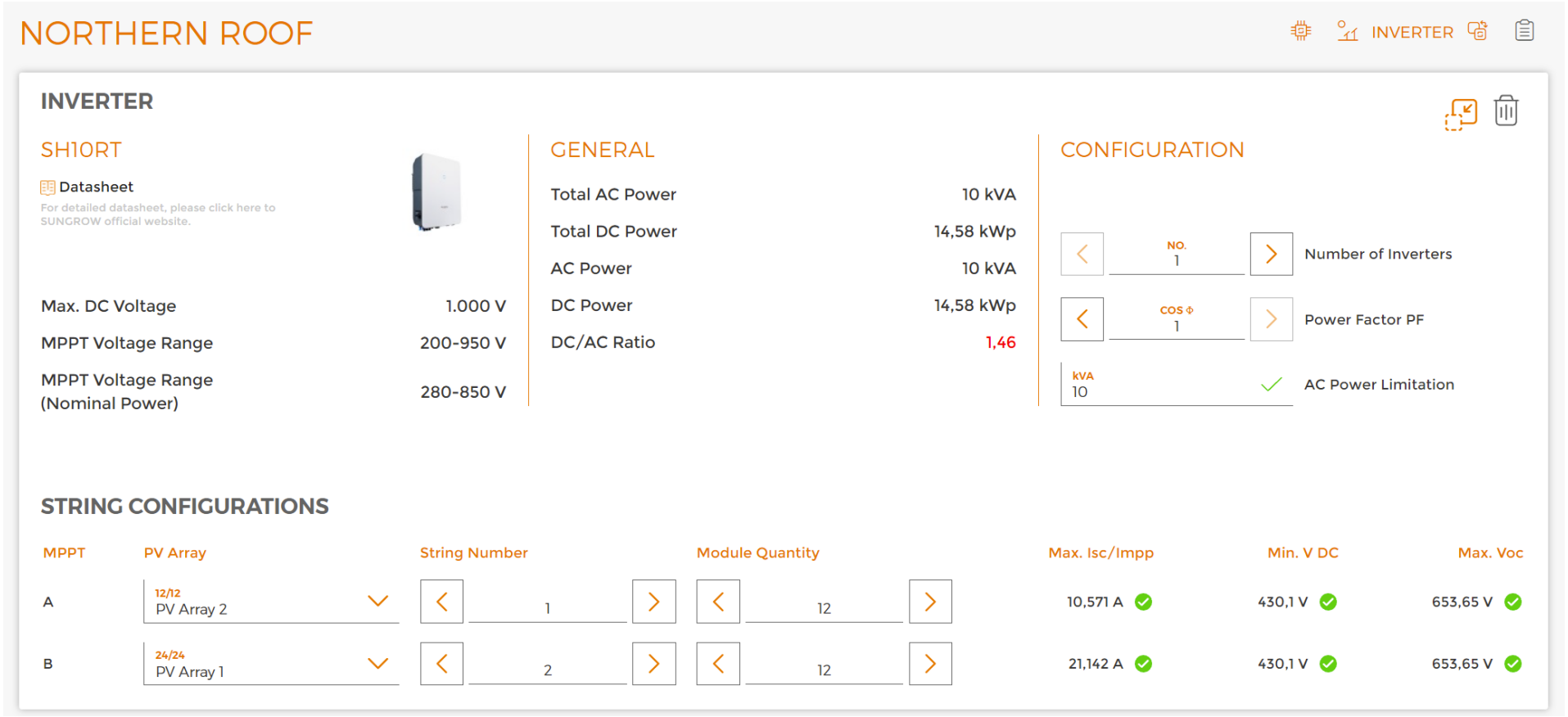
At any time, cannot produce more than 70% of kWp installed when deliberately designed
Ex: SG17RT with 12,5kWp south and 12,5kWp north

MORE INVERTER FLEXIBILITY

Ex: SG10RT with 10kWp south and SH8.0RT 4-15kWp north with SBR096

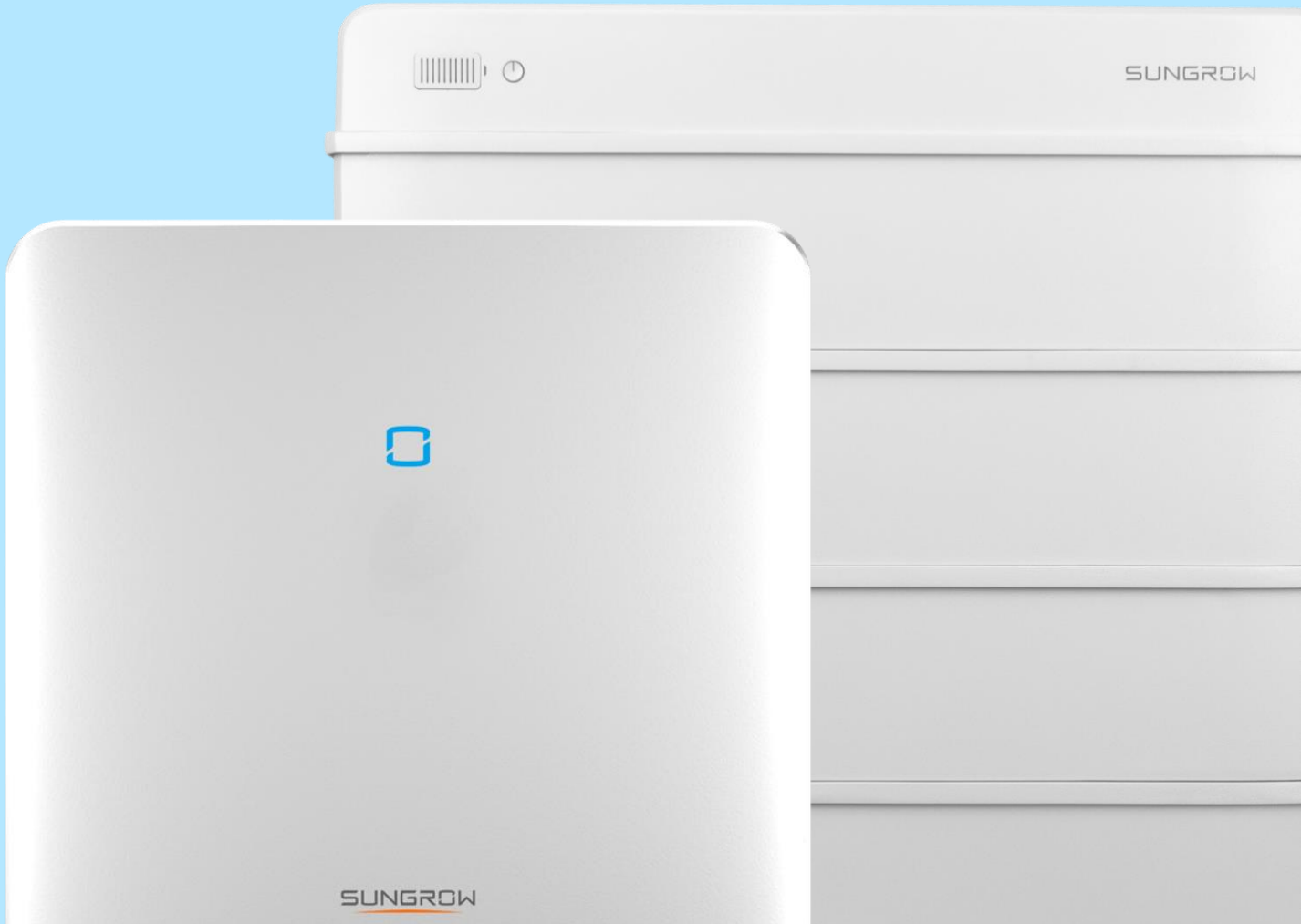
APPROVED BY SUNGROW

design.isolarcloud.com



THE 3-PHASE SOLUTION

BEYOND THE EXPECTED



FOR ALL WHO WANT MORE

OPTIMIZED SELF-CONSUMPTION

maximum discharge current of 30 A

BACKUP MODE

seamless transition with 20 ms switching time

SUNGROW

FOR ALL WHO WANT MORE

PARALLEL OPERATION
connect up to 5 inverters in parallel

RETROFIT ABLE
maximum of flexibility for the future

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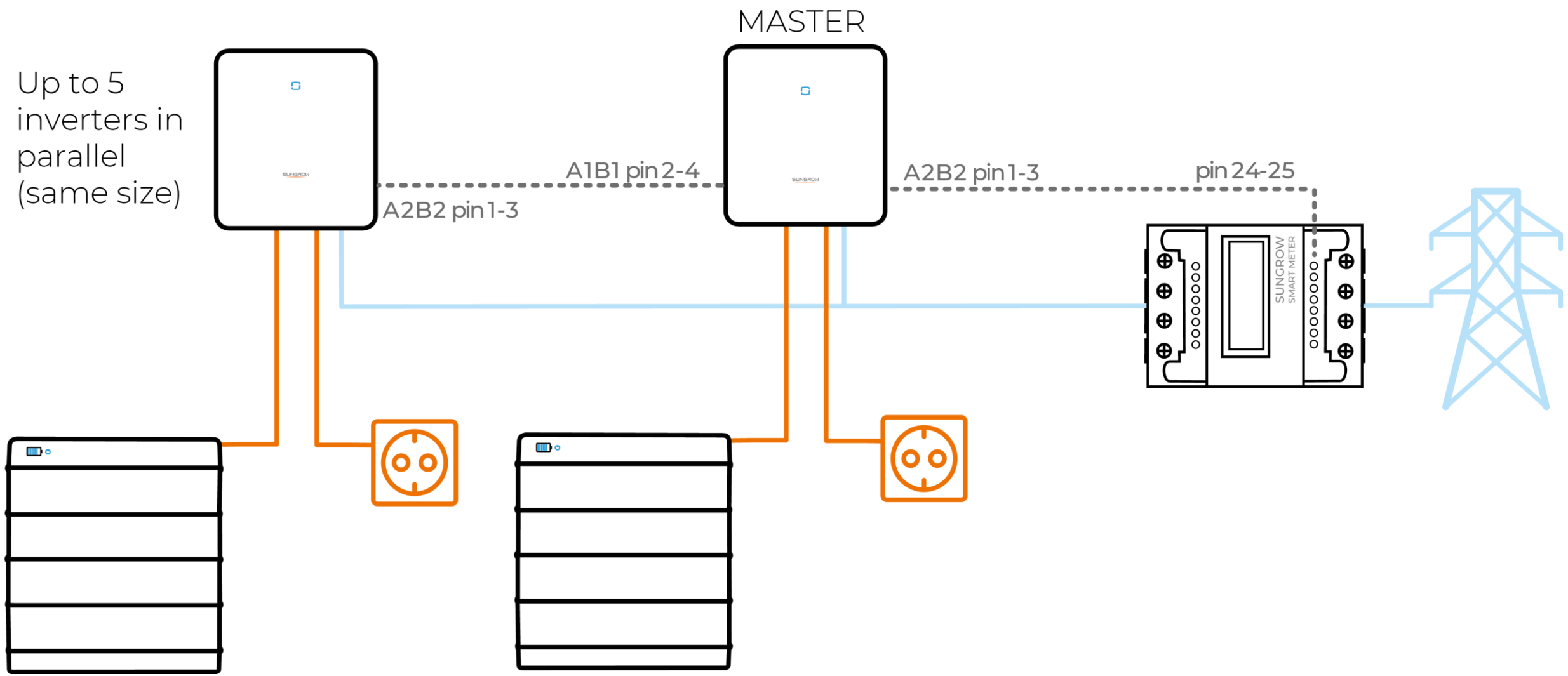
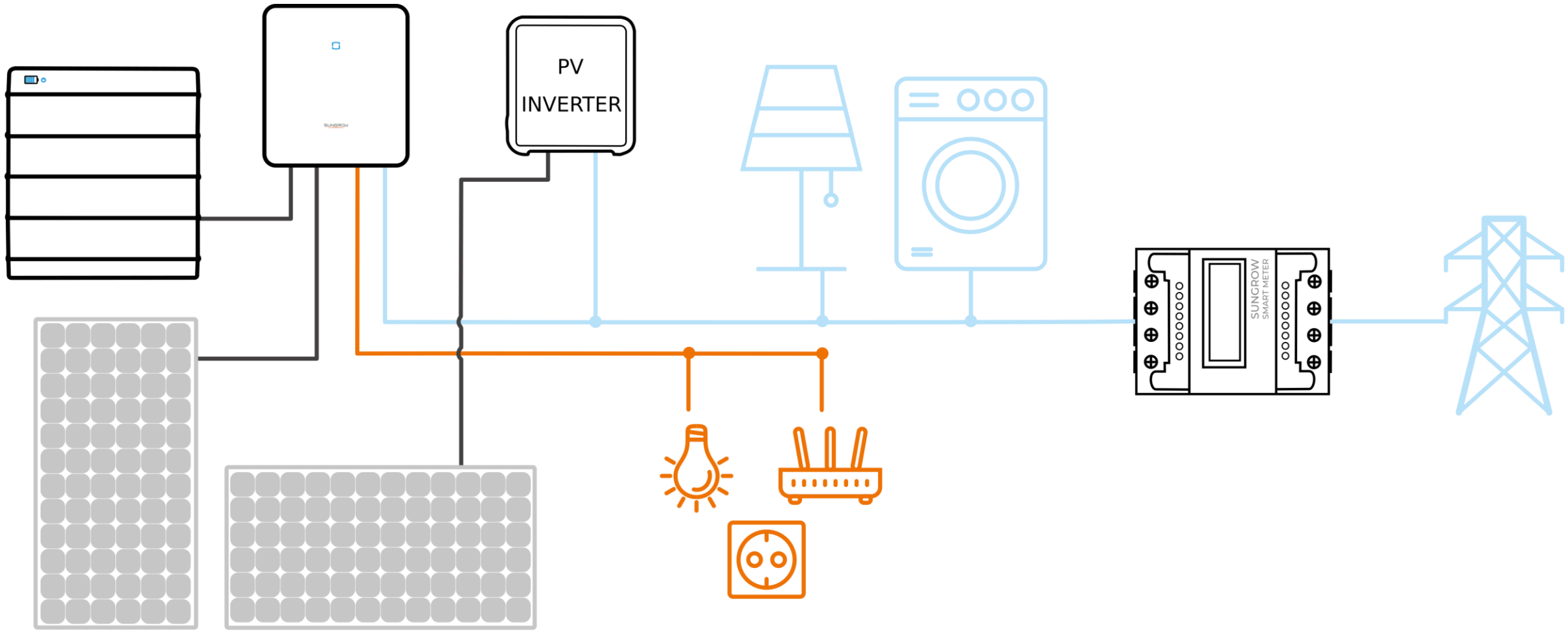
PARALLEL MODE – WIRING



RETROFIT MODE – WIRING



THE BATTERY

SBR096 SBR128 SBR160 SBR192 SBR224 SBR256

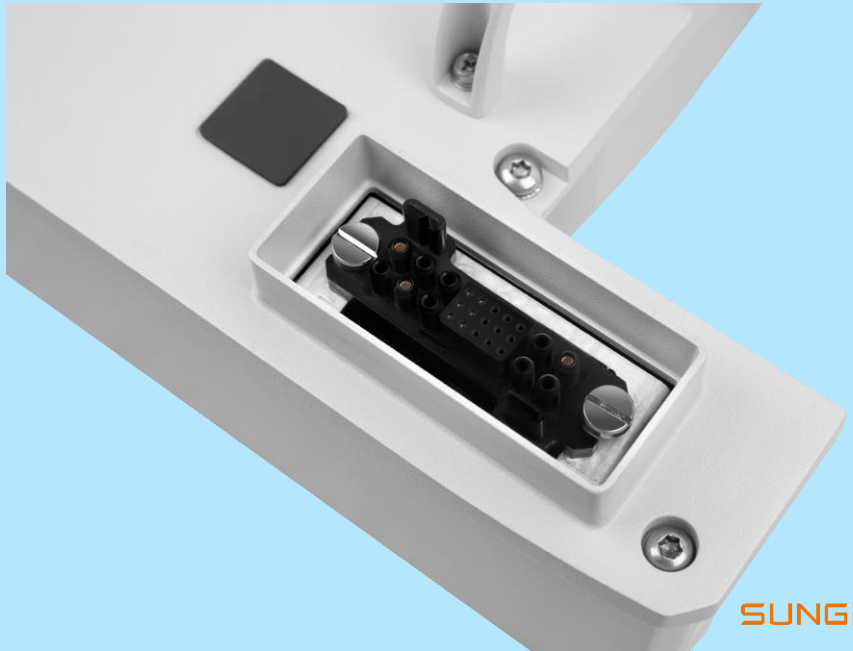
SUNGROW

MODULAR SYSTEM

9.6kWh UP TO 25.6kWh
One battery per inverter, up to 125kWh

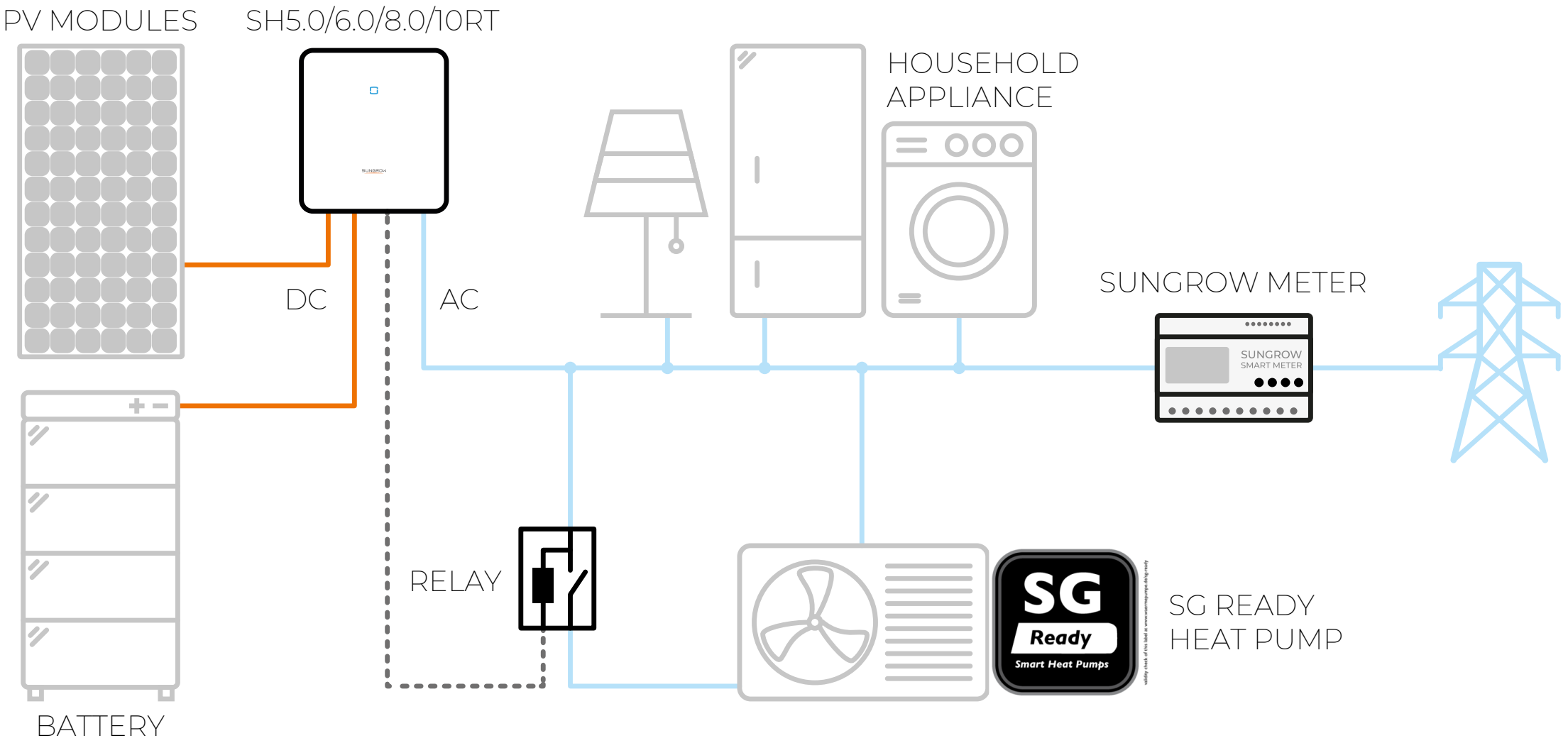
1-PERSON INSTALLATION
33kg module, comfortable handles

PLUG AND PLAY
no cables required between modules



SUNGROW

HEATPUMP CONNECTION

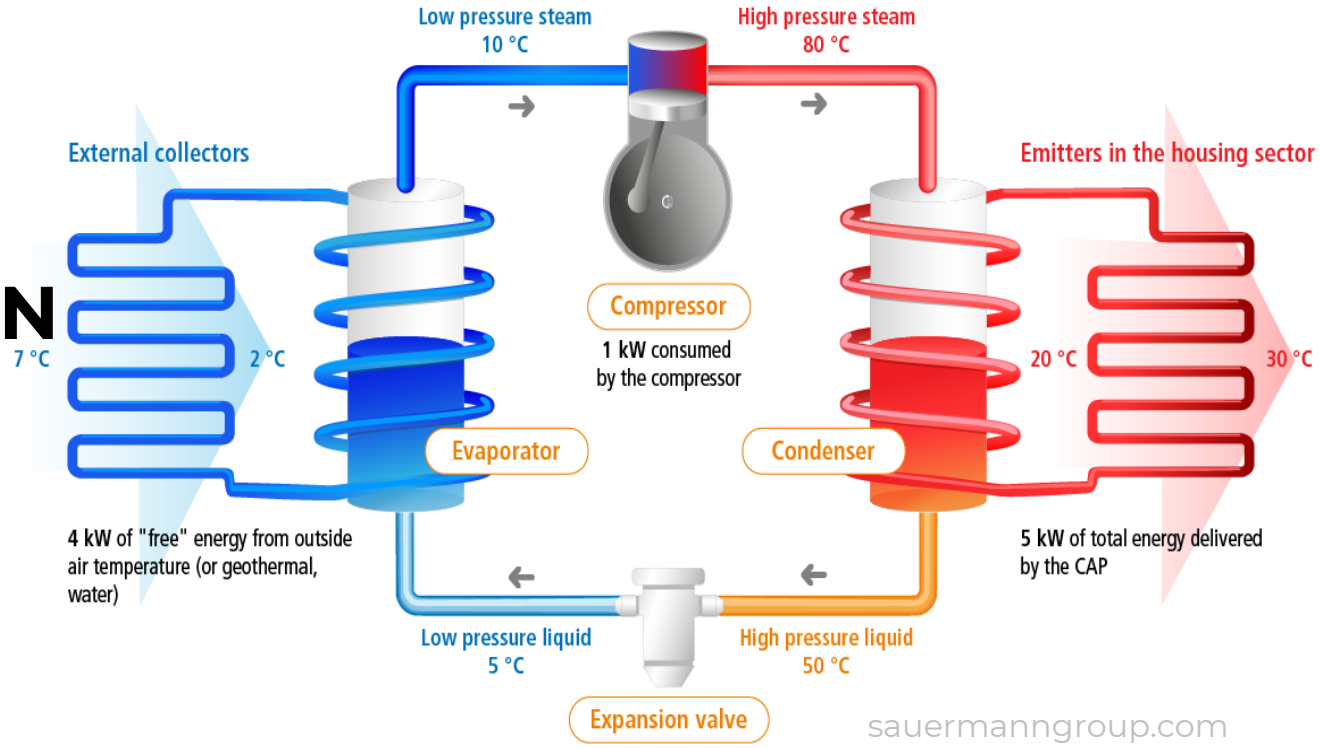


HEATPUMP HOW DOES IT WORK

GAS/LIQUID CYCLE
R134a, boiling at -26°C

COMPRESSOR/EXPANSION
Using electricity

HEAT EXCHANGER
Internal/External



HEATPUMP HOW DOES IT WORK

HIGH COP

Coefficient of Performance

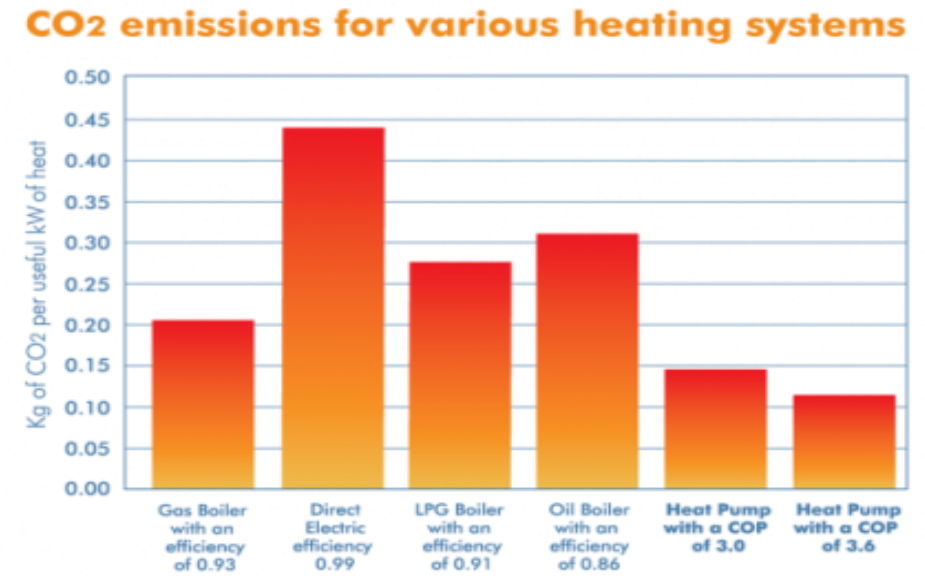
Thermal power output vs Electrical power input
For example 2,64kW vs 0,707kW = 3,73 COP

Heat Pump	
Thermal power (Compressor)	2,64 kW
Max. thermal power	4,64 kW
Air flow min,/max.	200 m³/h - 300 m³/h
Refrigerant	R134a - 1,4 kg
Electrical Data	
Voltage/frequency	230 V/50 Hz
Fuse	13 A
Protection index	IP 21
Power input compressor	0,707 kW
Power auxiliary heating	2,0 kW

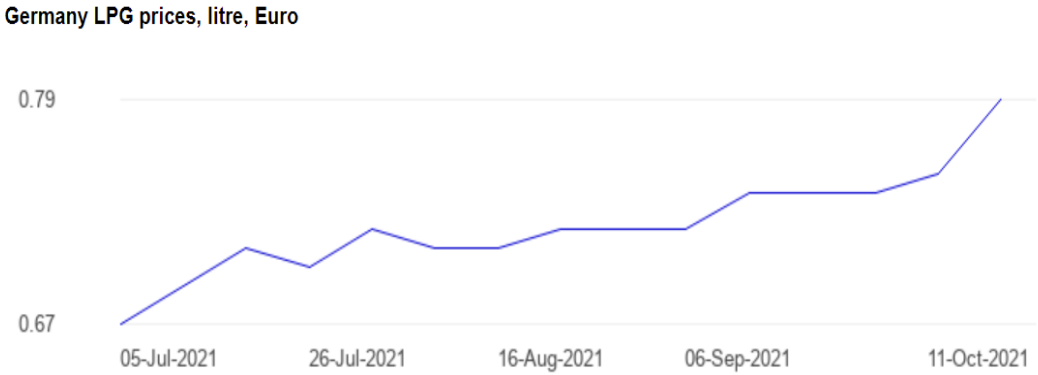
SUNGROW

STANDARD SCENARIO

7kWp PV on south side
~20kWh per day produced
7ct/kWh injected in grid
Around 30% self consumption



LPG Gas heating – no heat pump
80ct/L and LPG 6,9kWh/L
80/6.9/0.9=12.8 ct/kWh cost
Subject to LPG price hike



SUNGROW

IMPROVED SCENARIO

PV ON NORTH AND SOUTH

15kWp capacity

Yield increased by more than 50%
Upfront cost increased by less than 50%

Additional yield boosts self consumption

Reduced ROI as a result

IMPROVED SCENARIO

SBR BATTERY

12.8kWh usable energy

10 years of guaranteed energy throughput

cost over 10y of 15ct/kWh used

On average 70% self consumption rate

Each kWh given back at or below 24ct/kWh

IMPROVED SCENARIO

HEATPUMP

Up to 80% more energy efficient than LPG

Direct consumption ~3ct/kWh therm.
With battery at night ~8ct/kWh therm.

Average use 3.5kWh/day

Up to 100% supplied with self-consumption

Upfront cost recovered in less than 4 years

COMMERCIAL BUILDINGS

PV ON NORTHERN ROOF

For factories, office buildings and multi-family condos
Slope of 10-15% means sun still hits directly northern roof
Northern roof generates 30% more power

WE ARE SUNGROW

SUNGROW EUROPE

Global leading with strong local presence

12 local teams

7 service hubs

7 subsidiaries

2 training centers

+ 150 GW

installed worldwide

+ 50 GW

annual production capacity

3000 units

per day


Warehouse
in Venlo
SUNGROW


35 working days
from production to distributor
SUNGROW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YOUR QUESTIONS


SUNGROW POWER NEWS
cleanpowerforall.com