



**MYPV**

**HOT WATER AND SPACE HEATING FROM PHOTOVOLTAICS**

# my-PV GmbH and ESW

## brief introduction



## Dr. Gerhard Rimpler | my-PV CEO

Gerhard Rimpler is the "mastermind" of my-PV products with 24 years of international experience in the solar industry. In addition to management positions in solar electronics, he also managed a solar collector manufacturer and thus knows solar thermal systems well. In addition to his technical expertise, he holds a doctorate in business administration.



## Reinhard Hofstätter | my-PV Trainer

2010 – 2016 Researcher at Austria Solar Innovation Center“ (ASIC)

Subject areas: R&D solar heat and thermal systems,

Lecturer: Upper Austria University of Applied Sciences, Eco-Energy Technology  
Since July 2016 at my-PV



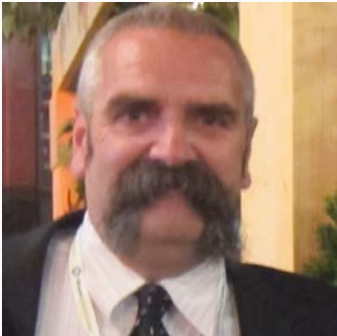
## Tallal Majeed Butt | my-PV International sales

An electrical engineer specialized in sustainable energy system from Germany.  
Handling the international sales department at my-PV.  
New addition to the my-PV team!

# Facts and figures

- Located in Upper Austria (near Steyr)
- Milestones
  - 2011 Founded as PV system vendor, Single line Distributor Trina Solar
  - 2012 Research project „Utility scale storage“ with Yunicos
  - 2013 Development of „ELWA“, Single line Distributor Sungrow
  - 2014 Product Launch ELWA
  - 2015 Termination of the distribution activities,  
concentration on „hot water from photovoltaics“  
Product Launch AC ELWA, AC ELWA-I
  - 2016 Product Launch AC ELWA-E, AC ELWA-F,  
Partnerships with a number of well known companies  
(inverter/battery/EMS/Smarthome manufacturers )
  - 2017 Product Launch AC•THOR  
concentration on „hot water and heating from photovoltaics“
  - 2018 AC•THOR Rollout, Product Launch AC•THOR 9s
  - 2019 AC•THOR 9s Rollout

Energy Smart Water is dedicated to supplying high quality energy efficient water and space heating solutions to its Australian and international distributor partners and customers which have a positive environmental impact, promote energy self-consumption and reduce ongoing energy supply costs.



### **Norm Anderson | Energy Smart Water**

Norm has built up a number of successful commercial businesses in Australia, specialising in commercial plumbing, hot water and heating. Norm is Vice President of Master Plumbers Australia and works in areas of innovation and compliance, introducing innovative renewable energy technologies to the industry and training sector.



### **Javier Rosas | Energy Smart Water**

Industrial Engineer specialized in Electrical & Renewable Energy Engineering

M.Sc. Renewable Energy UNSW

New addition to the ESW team!

Areas of work: hot water systems design involving photovoltaics and research



# Energy Smart Water Head Office, Dromana, Victoria, Australia

Off Grid Energy Facility R&D testing Lab and Training facility





## Energy Smart Water Head Office, Dromana, Australia

Net Zero Energy Facility R&D testing Lab, training and manufacturing plant



Electric Car Charging Station



Inverters and battery storage

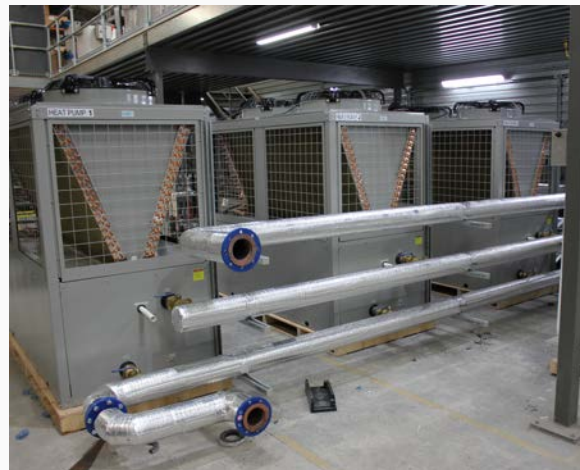


30kW of PV and various thermal panel arrays



## Energy Smart Water Head Office, Dromana, Australia

ROTEX hot water plants: Skid mounted, pre-assembled, plug and play





# Global Partners & Awards

- Solar Decathlon competition in Dubai. Desert Rose Project at Wollongong University
- 2019 Plumbing and Fire Industry Award for Excellence in Sustainability with the integration of the my-PV SC20
- USA training in Chicago
- And more!



## Just a short survey...

- What is your profession?
- What brands have you installed / sold?



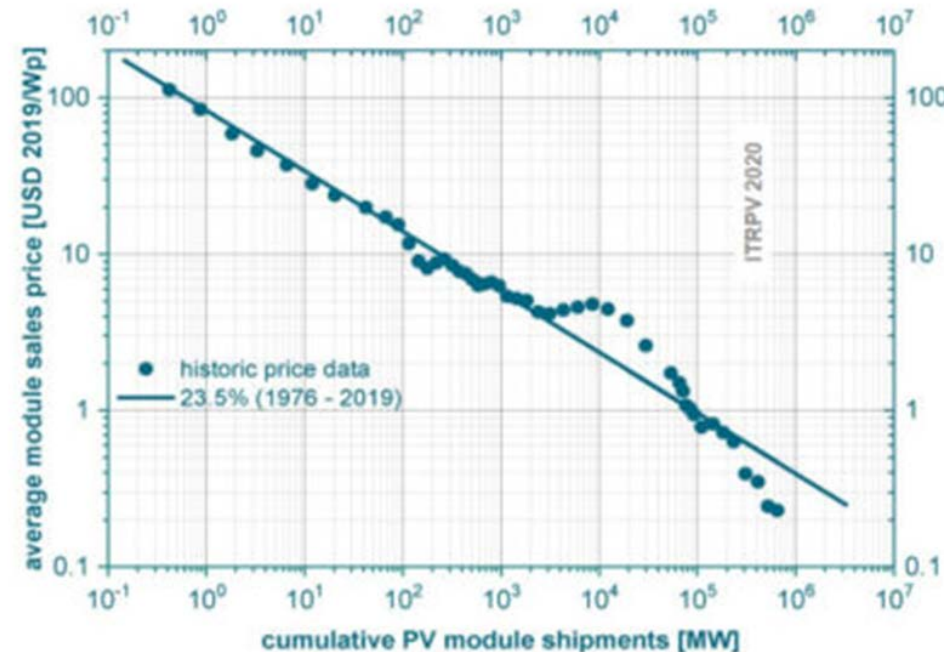
# Hot water & space heating from PV

Why is that?

# Why hot water from PV?

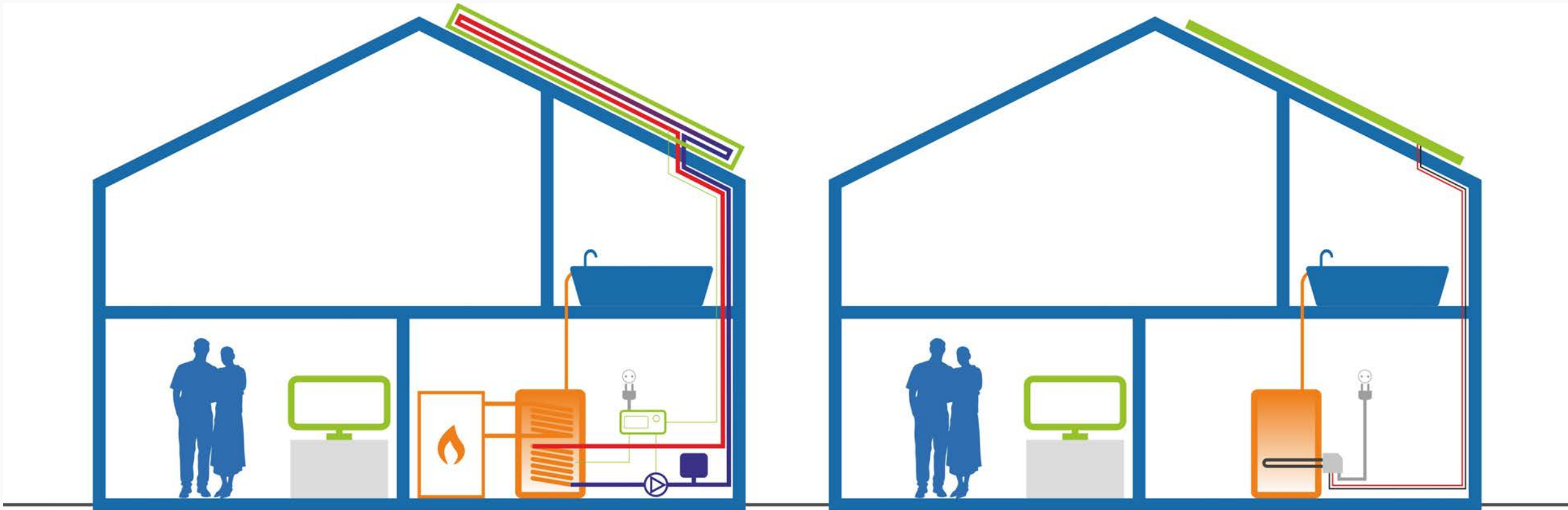
- Photovoltaics is now one of the most cost-effective energy technologies

Learning curve for module price as a function of cumulative shipments





# Solar Thermal - Disadvantages

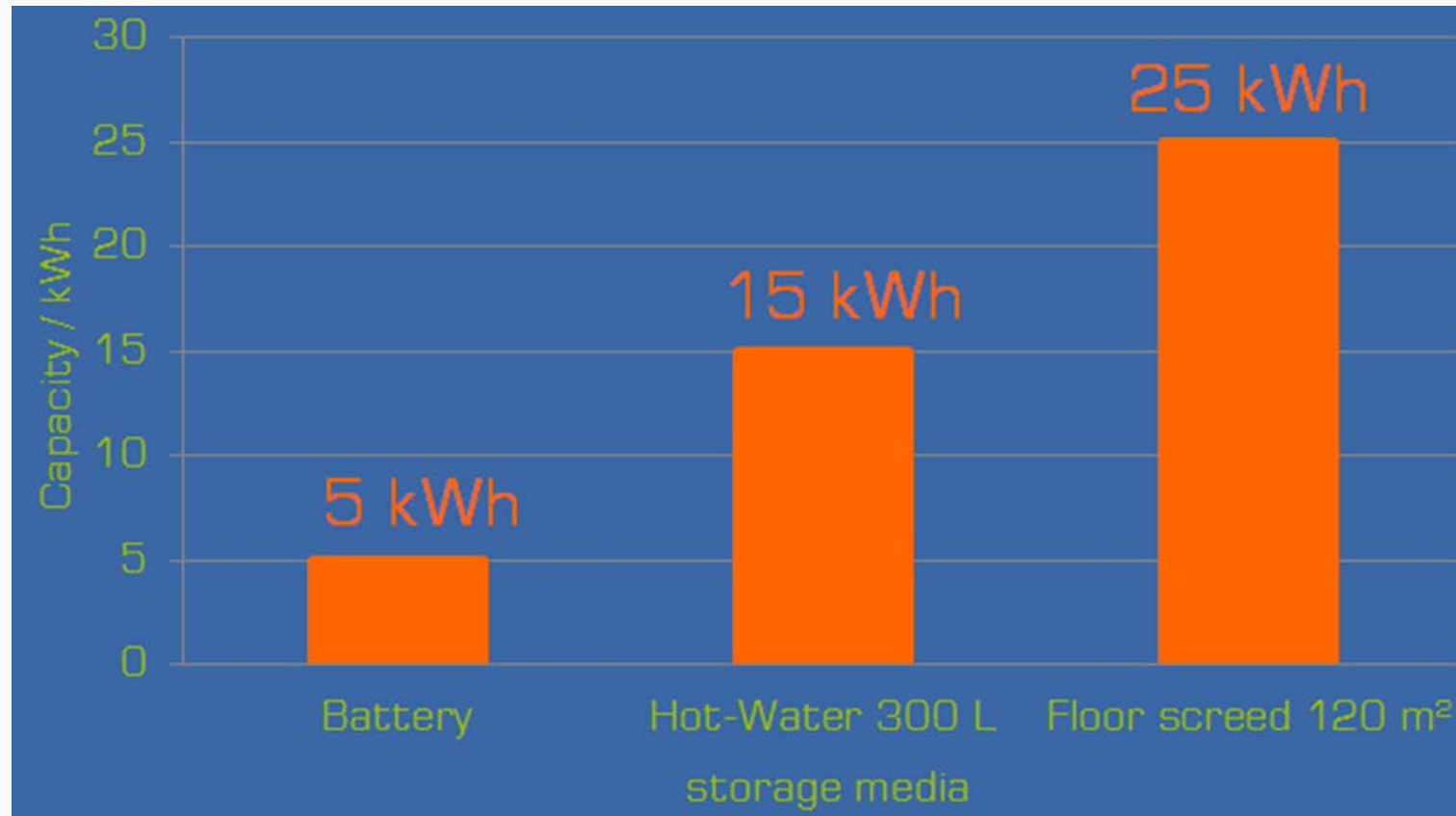


Complex thermal Solar

Simple Solar PV Hot Water

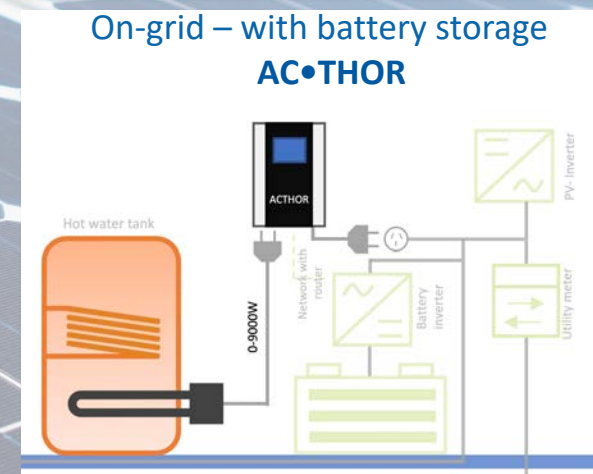
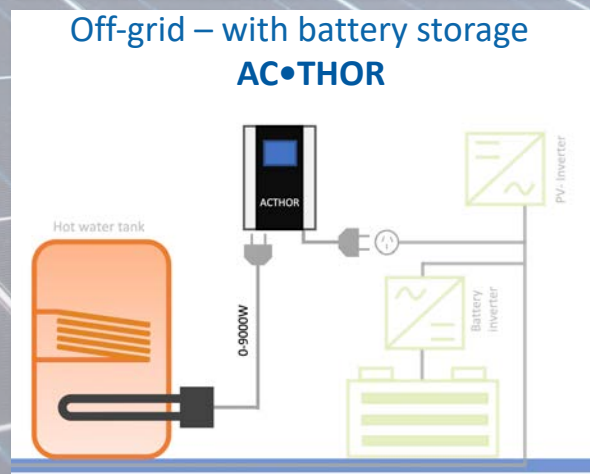
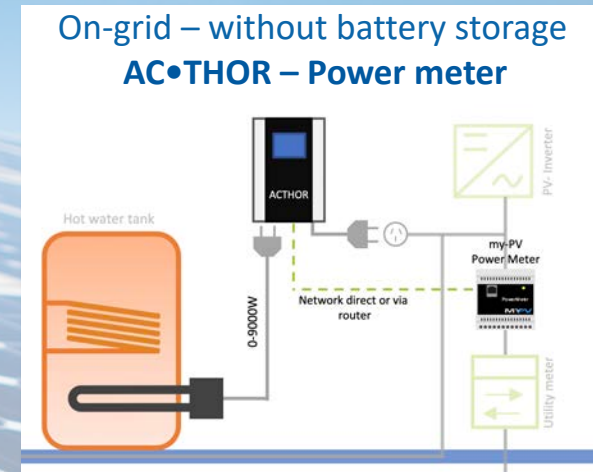
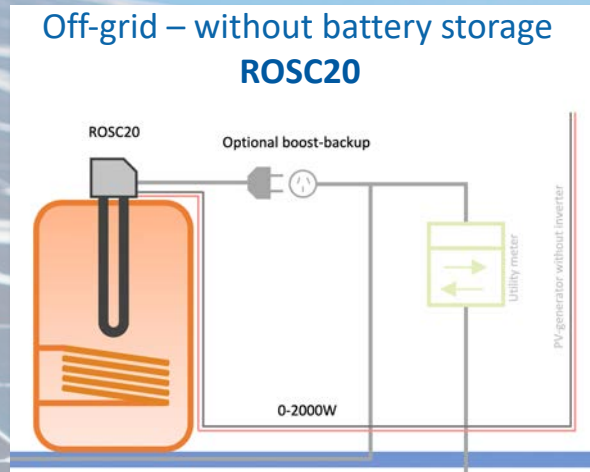
# Why electric hot water and space heating?

- Storage capacities in a single-family home



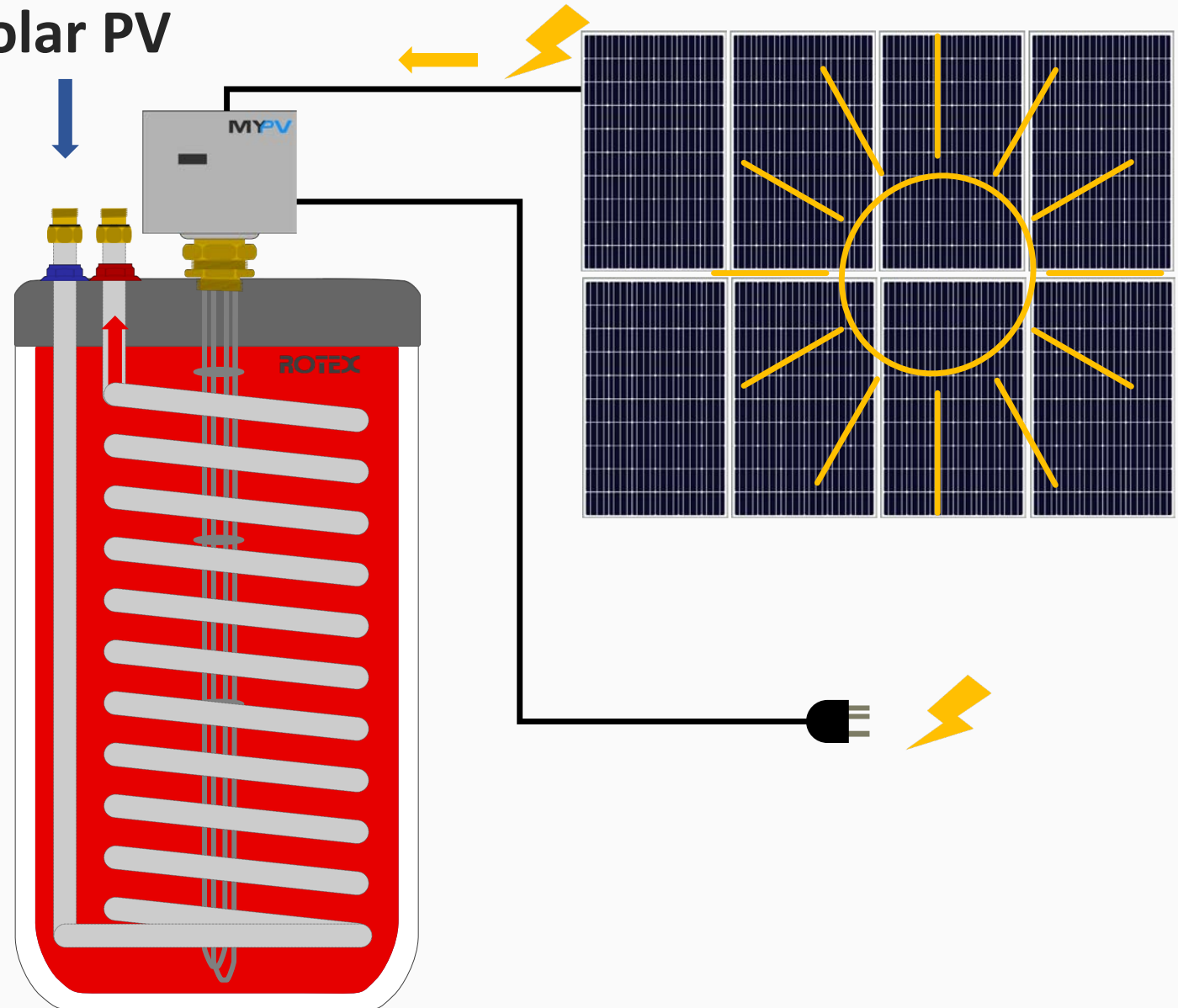


# Hot water from photovoltaics – two products, many possibilities



# ROSC20 DC Water Heating with Solar PV

- 0 - 2kW DC linear power control 3.6kW max
- Off-grid, no grid interference
- Improvement on thermal solar
- Thermal Battery
- MPPT in built for max efficiency
- Datalogger to monitor
- Optional boost-backup 2kW AC
- Target temp. adjustable
- Simple installation, just 2 x MC4s
- IP54
- CEC approved, AS/NZS 60335, IEC 62109-1
- No pump and pipes to roof required





## CASE STUDY: PICAC Narre Warren - Commercial Training Centre

Net Zero Energy Requirement for Hot Water

ROSC20 2 x 2kW DC Elements as Primary heat source power supplied by 4 kW PV solar panels



## CASE STUDY: SYDNEY FAMILY RESIDENCE

ROSC20 2kW DC Element as Primary heat source power supplied by 2.1 kW PV solar panels

### Energy Reduction:

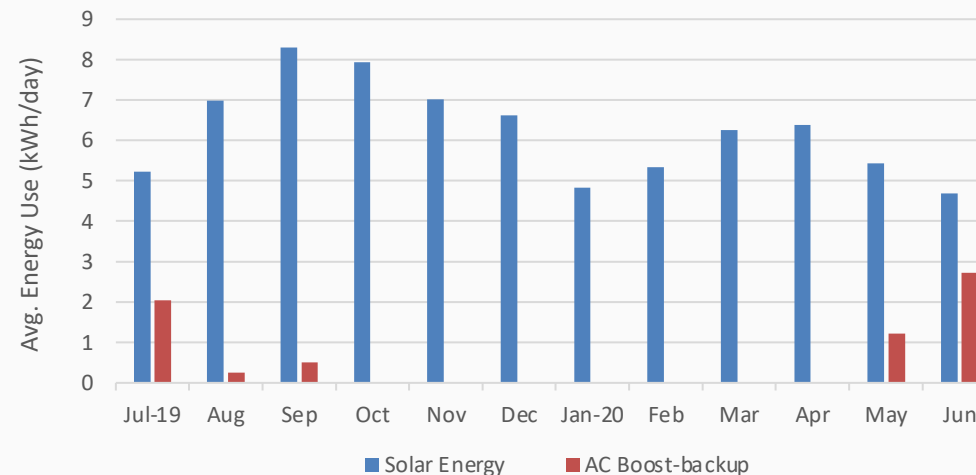
- Home has self generated 2,281kWh/year of electricity
- \$659/year savings



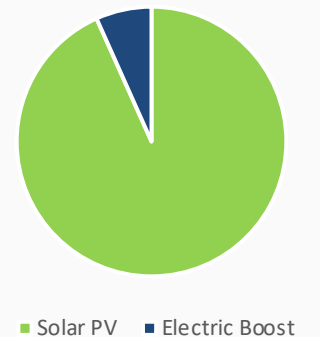
### Heating Performance:

- 92% of the water has been heated by solar PV input
- Only \$59/year spent on Boost-backup

Home Energy Use - daily avg. 2019-2020

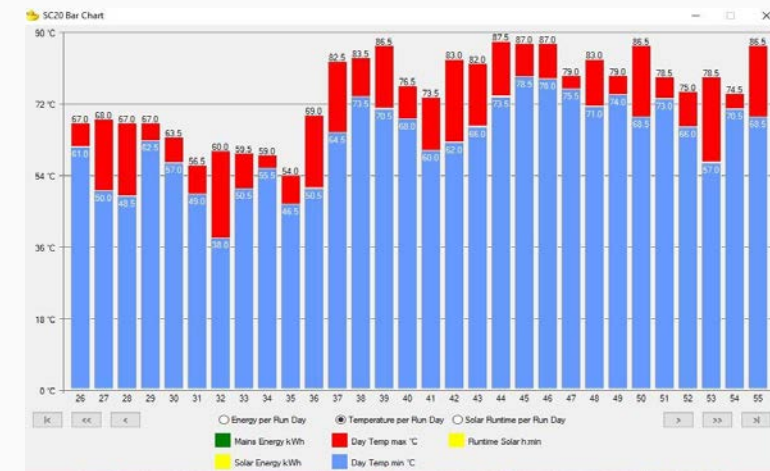
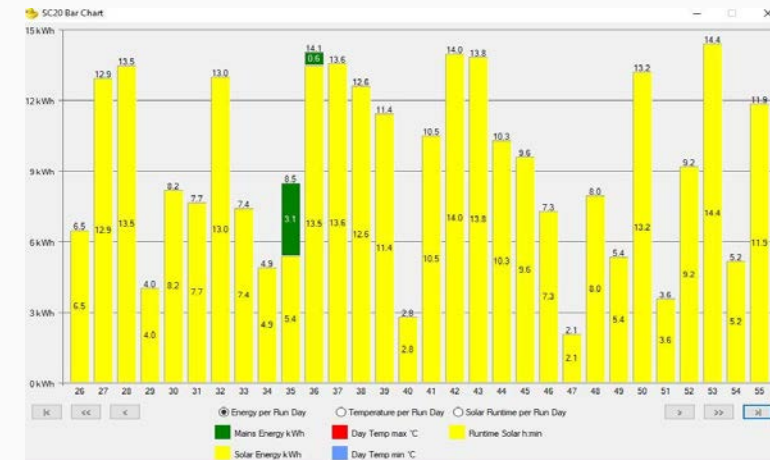
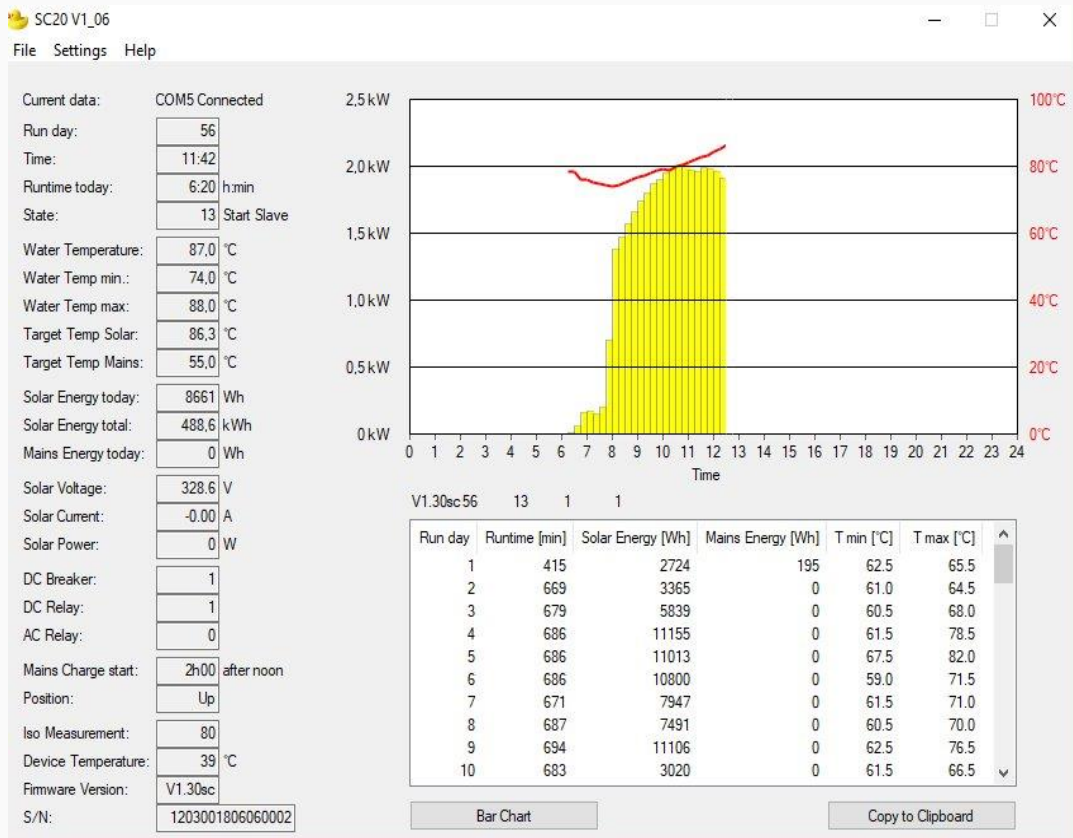


Solar PV Energy Contribution





# ROTEX/ MYPV: ROSC20 Solar Hot Water Heating System at Ferntree Gully VIC





# Industrial Bakery in NSW

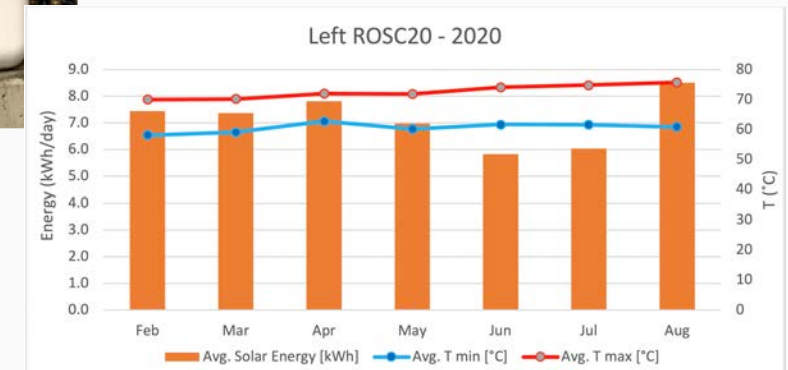
*"Excellent standard. Our **gratitude** towards this team is to be passed onto them" - M.F. Engineering Manager*

## System:

- 2 x ROSC20 + PV Array: 2 x 2.2kWp
- Boost-backup: 3 x gas heaters
- Demand: approx. 4,600L/day

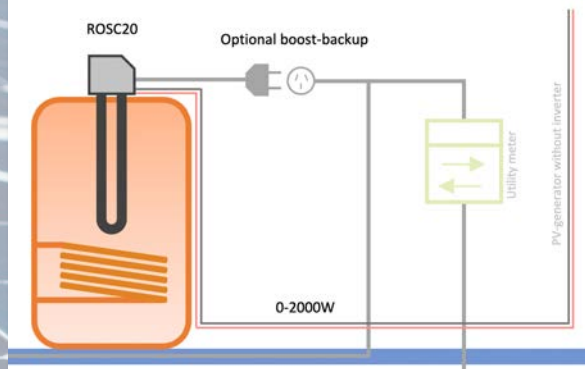
## Advantages:

- Solar yield performing above avg. during winter
- Both tanks balanced in temp. and solar input
- High constant temp. maintained across the period
- No AC-Boost backup used!
- Expected 5,361kWh/yr. **Savings: \$1,560/year\***

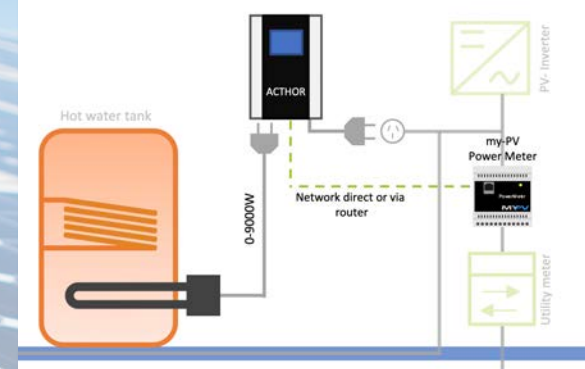


# Hot water from photovoltaics – two products, many possibilities

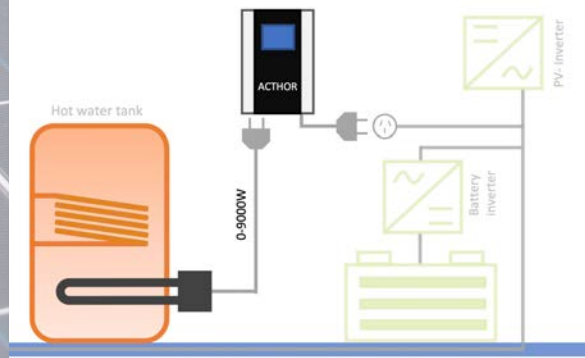
Off-grid – without battery storage  
**ROSC20**



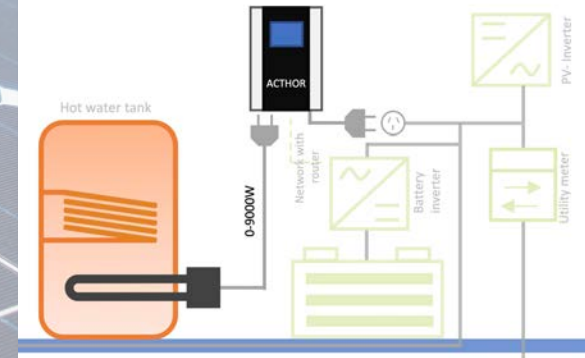
On-grid – without battery storage  
**AC•THOR – Power meter**



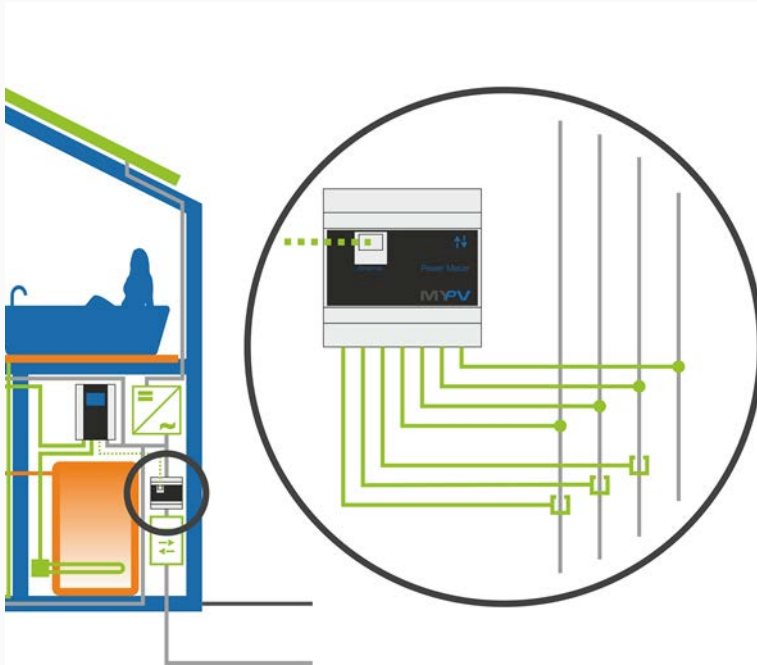
Off-grid – with battery storage  
**AC•THOR**



On-grid – with battery storage  
**AC•THOR**



# Excess detection with Power Meter



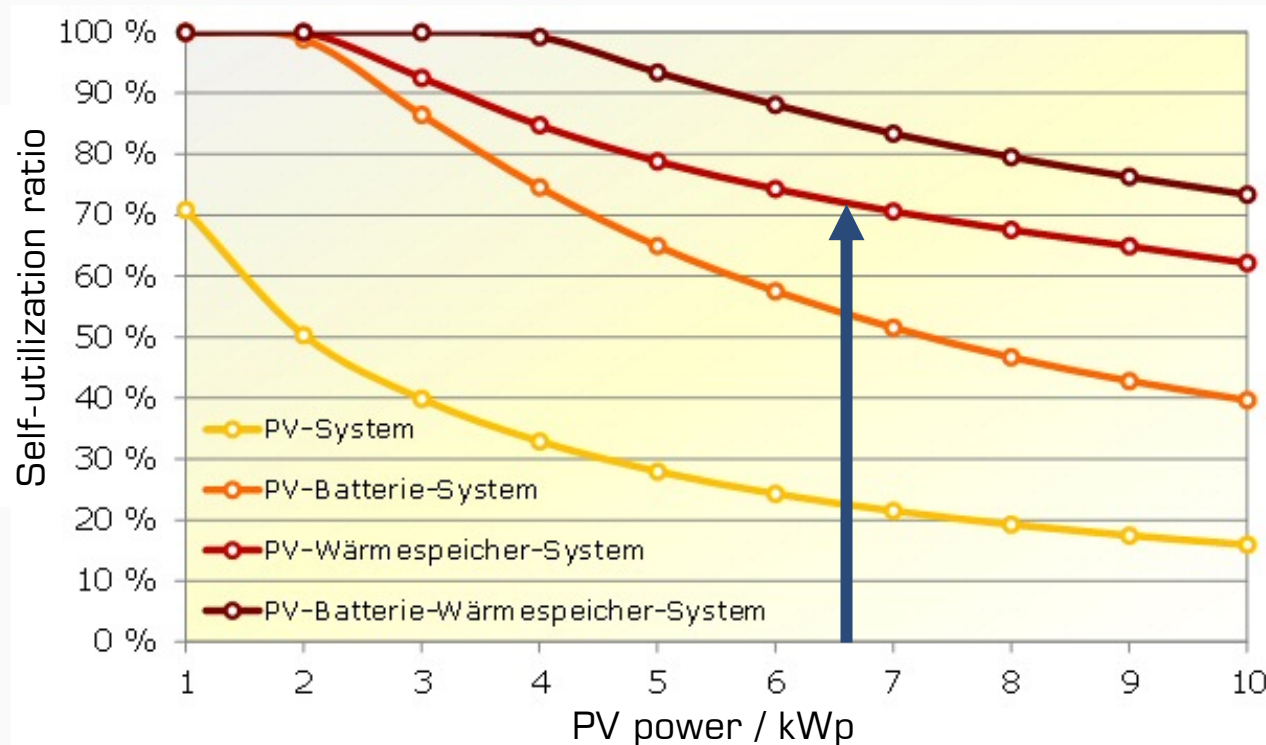
- Communication with AC•THOR via router or direct (without network, with crossover-patchcable)
- 3 Clamp-on transducers (60 A) included in the scope of delivery, larger transducers are possible.



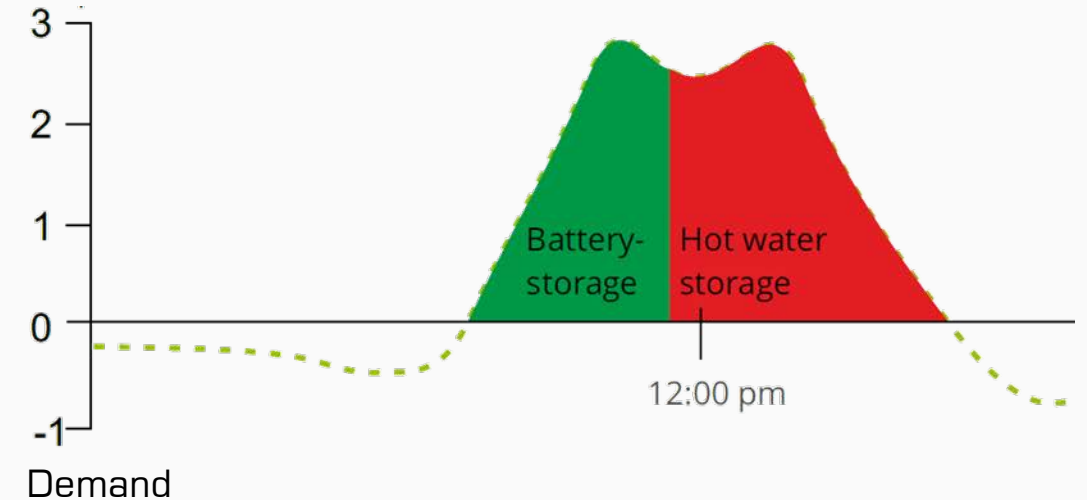
# Compatibility



# PV hot water raises the self-consumption ratio

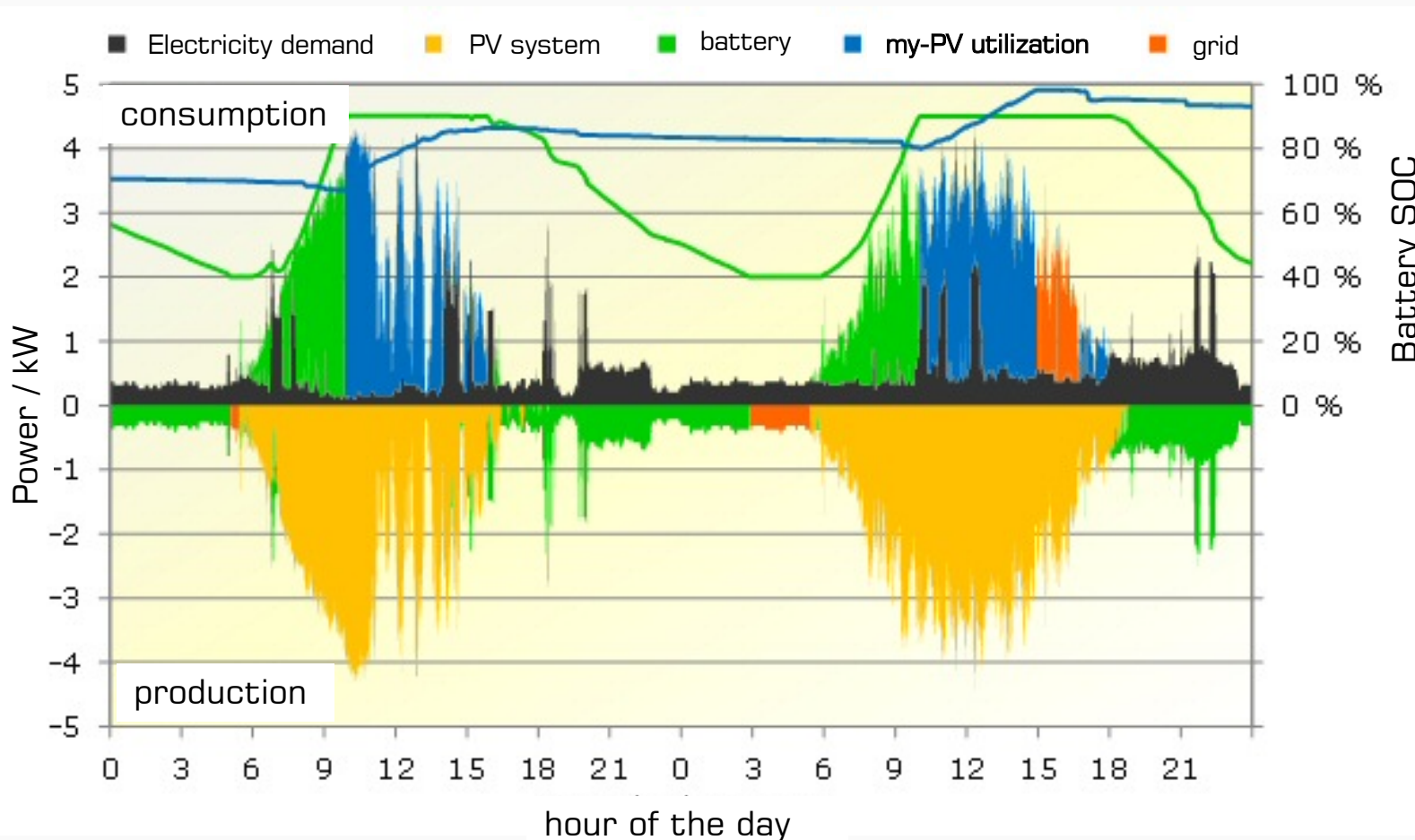


Excess power



Source: <http://www.volker-quaschning.de>

# How Hybrid-Storage works





## Current Issues in the Solar Industry

- Solar feed in tariffs are decreasing in Australia
- Provider authorised to switch off solar in SA in attempt to stabilise the electricity grid
- Implementing high cost battery rebate to stabilise the grid in NT
- Self consumption is still low at 20% for typical install


### Electricity provider authorised to switch off rooftop solar in SA in emergencies

By Nick Harmsen

Posted Thu 27 Aug 2020 at 5:17pm



Source: abc news

SOLAR

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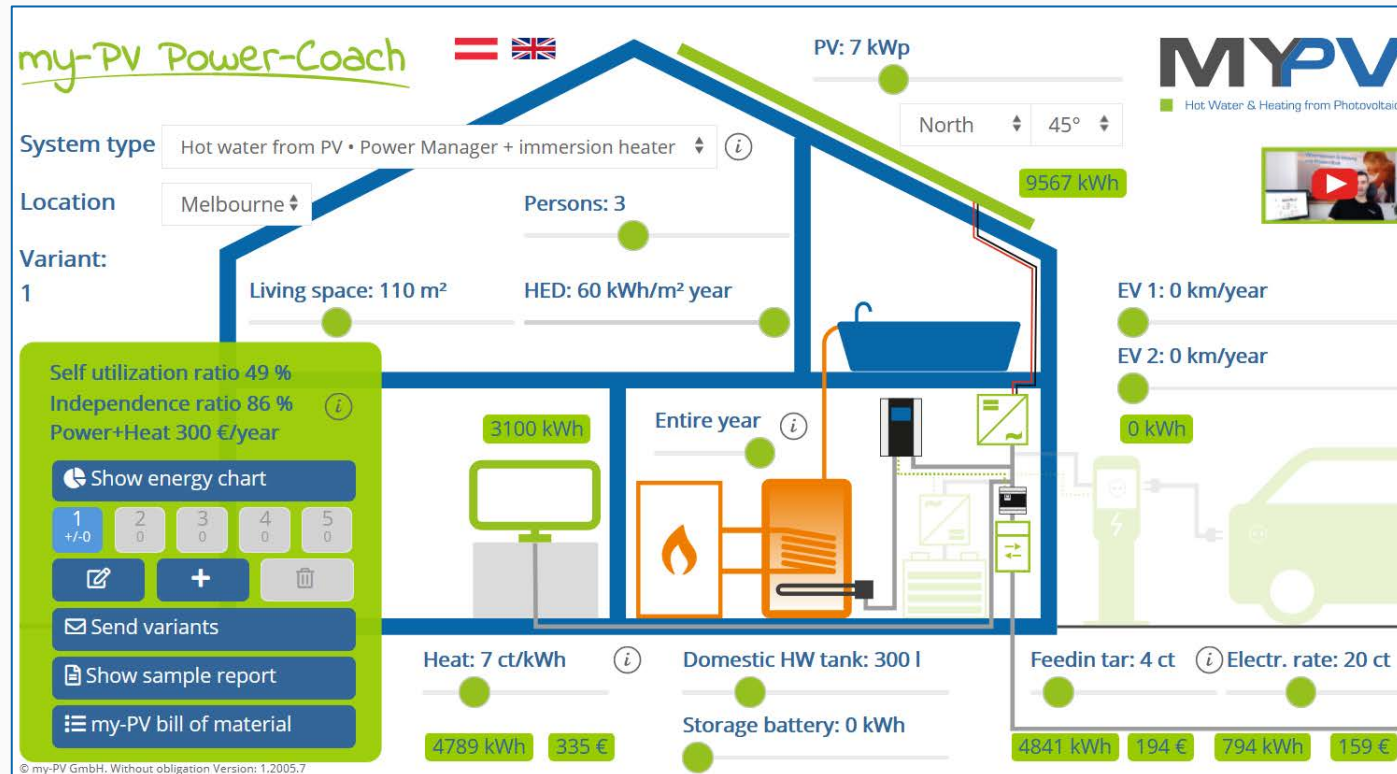
## Feed-In Tariff For New Solar Slashed In Western Australia — Only 3 Cents Before 3 PM!

September 1, 2020 by [Ronald Brakels](#) • [30 Comments](#)

Source: SolarQuotes

# The my-PV Power-Coach

- <https://coach.my-pv.com/>
- <https://youtu.be/y7XMcg2ohso> (German)



# AC•THOR i / AC•THOR 9s

## Solutions and product combinations



# AC•THOR i Photovoltaic-Power-Manager



# AC•THOR i in Detail

## Technical specifications

- Supply voltage: 230 V, 45-65 Hz
- Linear power-control 0 – 3,000 W  
+ relay output 16 A
- Mains connection: Single-phase
- Load connection:  
Mains socket for resistive loads + int. adapter
- Self-consumption < 2 W
- Color Touch Screen 2.83"
- Dimensions (L x H x D): 135 x 210 x 65 mm
- Weight: 1.5 kg incl. cable
- Temperature sensor (5 meters)
- Communication: Ethernet RJ45, RS485, PWM in/out



# AC•THOR 9s

9s





# AC•THOR 9s in Detail

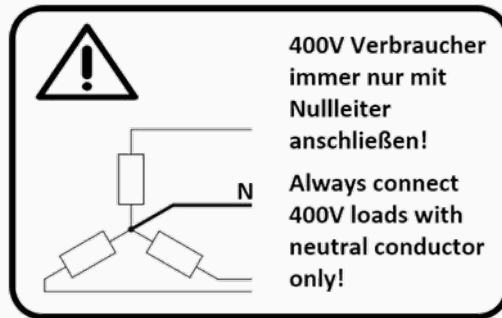
## Technical specifications

- Supply voltage: 3x230 V, 45-65 Hz
- Linear power-control 0 – 9,000 W  
+ relay output 16 A
- Load connections: pluggable
- **All three outputs controllable!**
- Self-consumption < 2 W
- Display: Color Touch Screen 2.83"
- Dimensions (L x H x D): 135 x 195 x 65 mm
- Weight: 1.3 kg
- Temperature sensor (5 meters)
- Communication: Ethernet RJ45, RS485,  
PWM in, PWM out, potential free input



# AC•THOR 9s in Detail
















- Always connect 400V loads with neutral conductor only!



- All three outputs controllable!  
OUT-1  
0 to 230 V pure sine 0 to 3,000 W max. NOT switchable  
OUT-2  
0 to 230 V pure sine 0 to 3,000 W max. or 230 V switched  
OUT-3  
0 to 230 V pure sine 0 to 3,000 W max. or 230 V switched



## AC•THOR i / AC•THOR 9s modes

Operating modes	AC•THOR	AC•THOR 9s
M1 Hot water		
M2 Hot water stratified charging		
M3 Hot water 6kW		
M4 Hot water + heat pump		
M5 Hot water + space heating		
M6 Space heating		
M7 Hot water + PWM		
M8 Frequency mode		

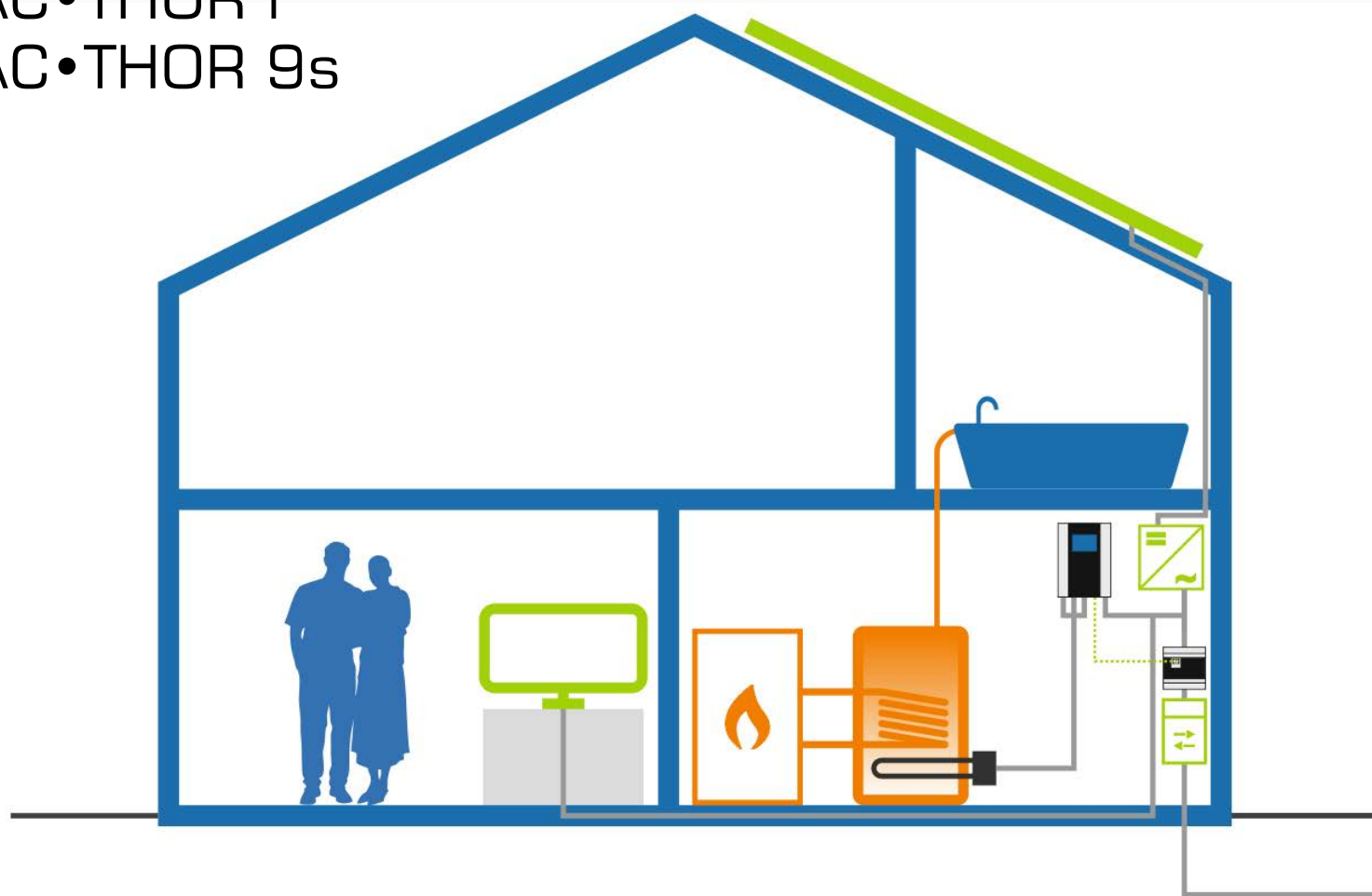
Always possible in combination with battery!



# M1: Hot water

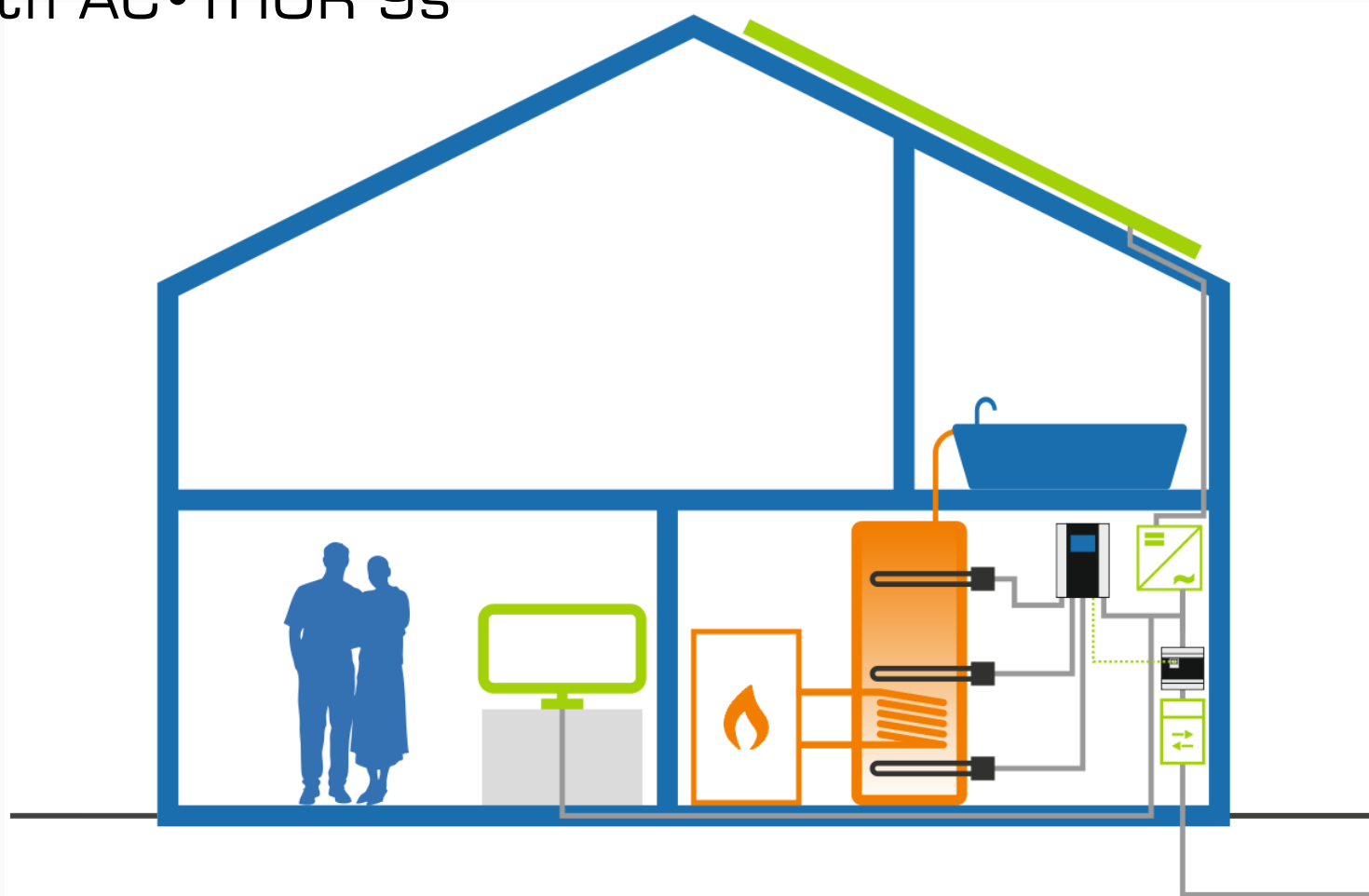
3 kW with AC•THOR i

9 kW with AC•THOR 9s



# M1: Hot water

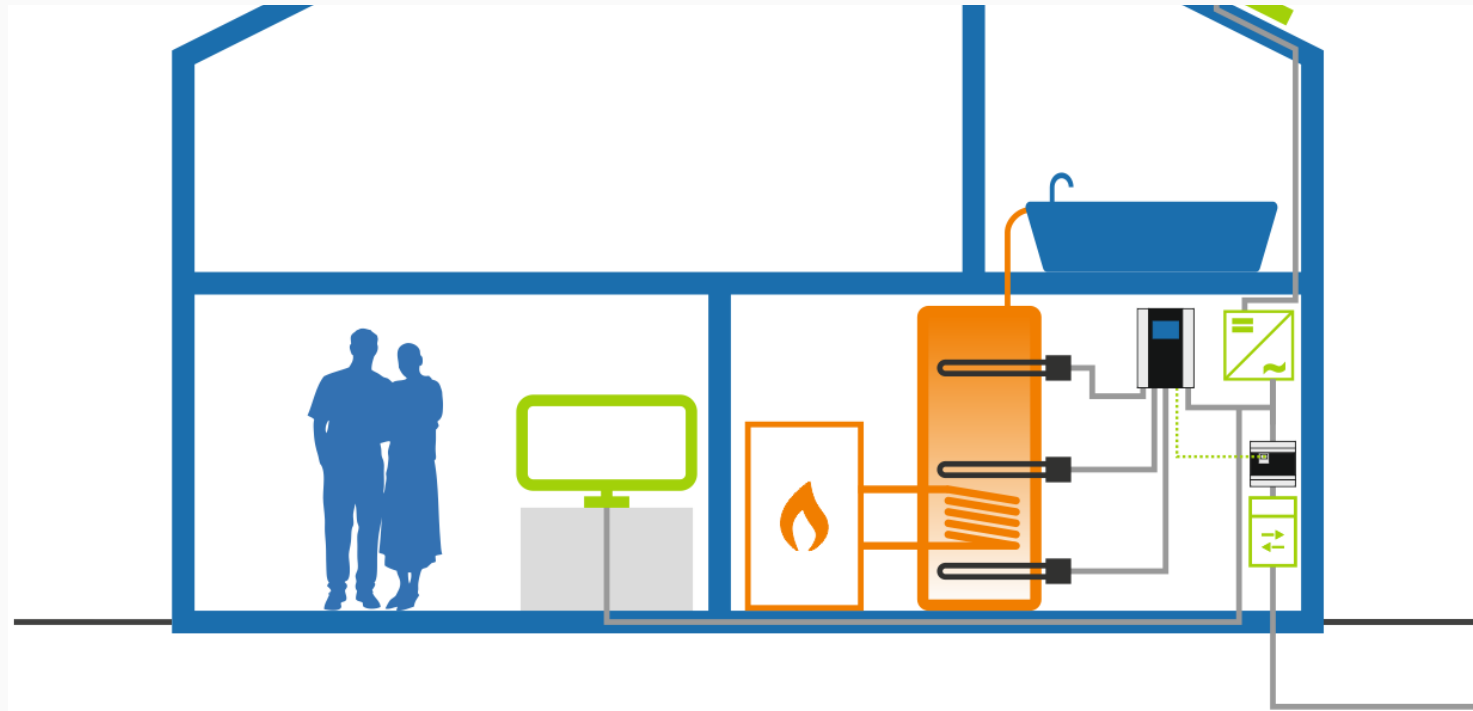
3 x 3 kW with AC•THOR 9s



# M1: Hot water

3 x 3 kW with AC•THOR 9s

- DO NOT CONFUSE WITH STRATIFICATION CHARGE M2 !
- Outputs for optional backup can also be activated individually

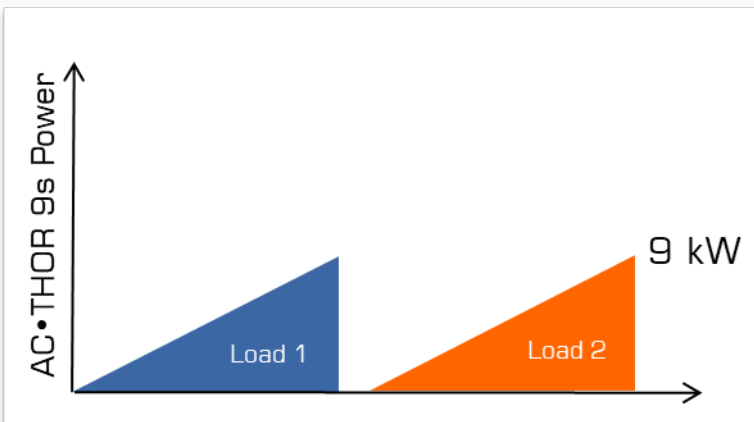




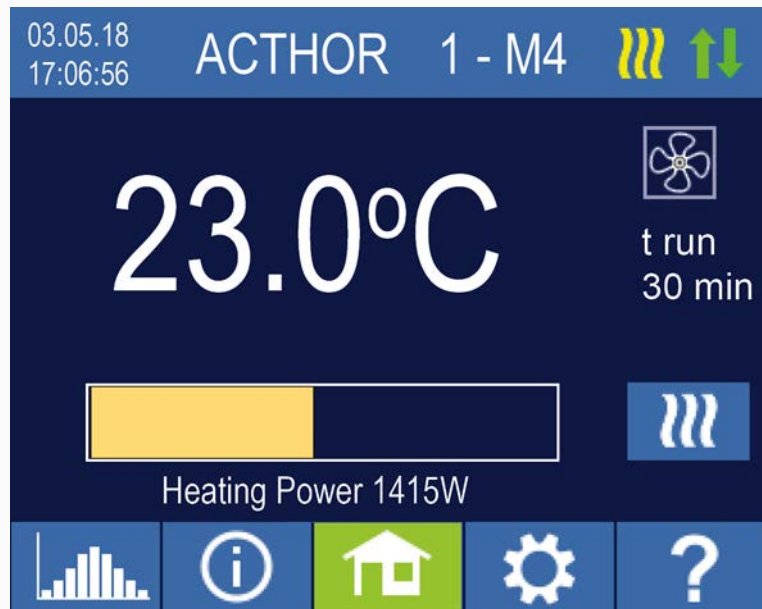
## M2: Hot water stratification charge

2 x 3 kW with AC•THOR i

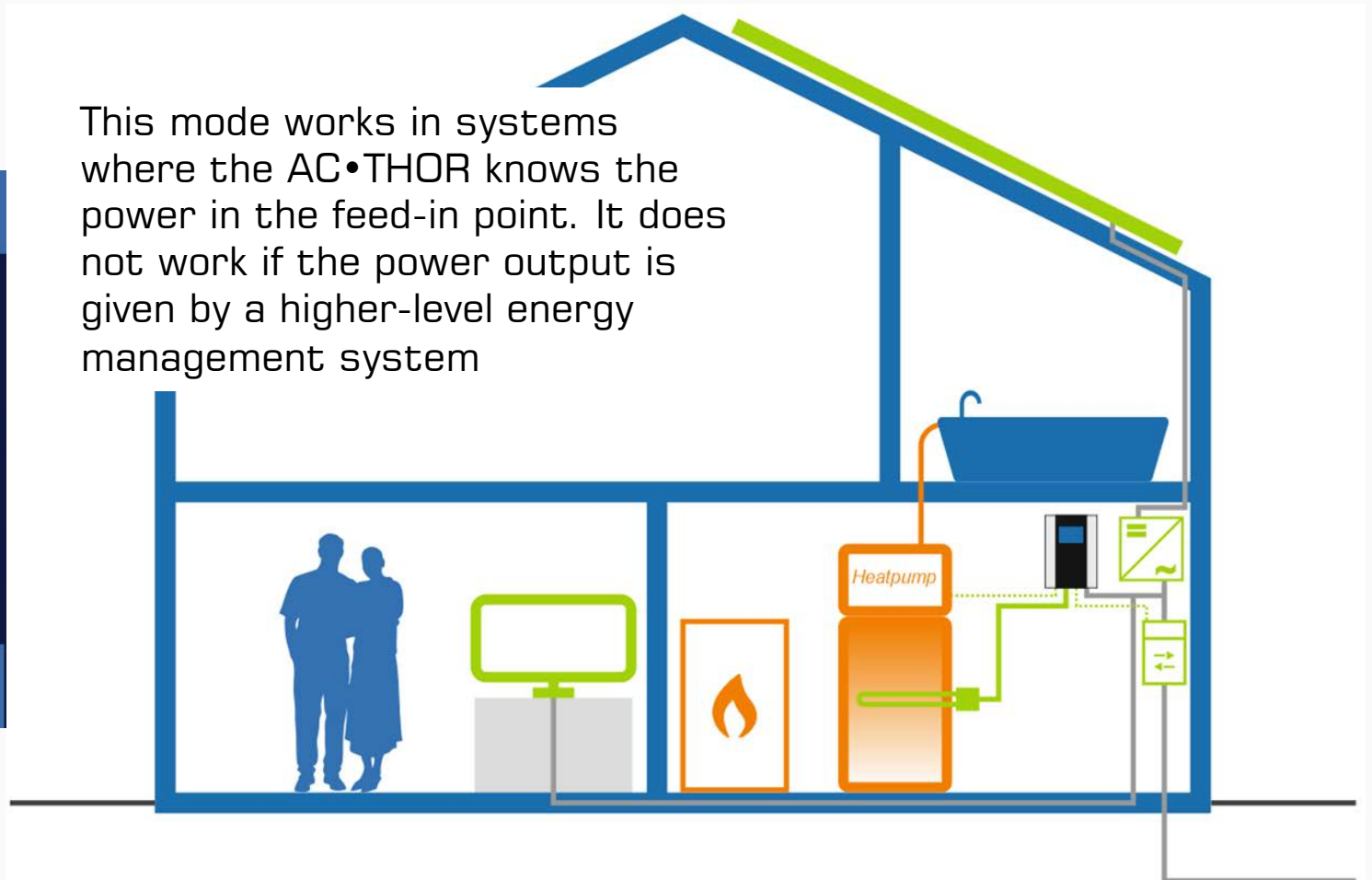
2 x 9 kW with AC•THOR 9s



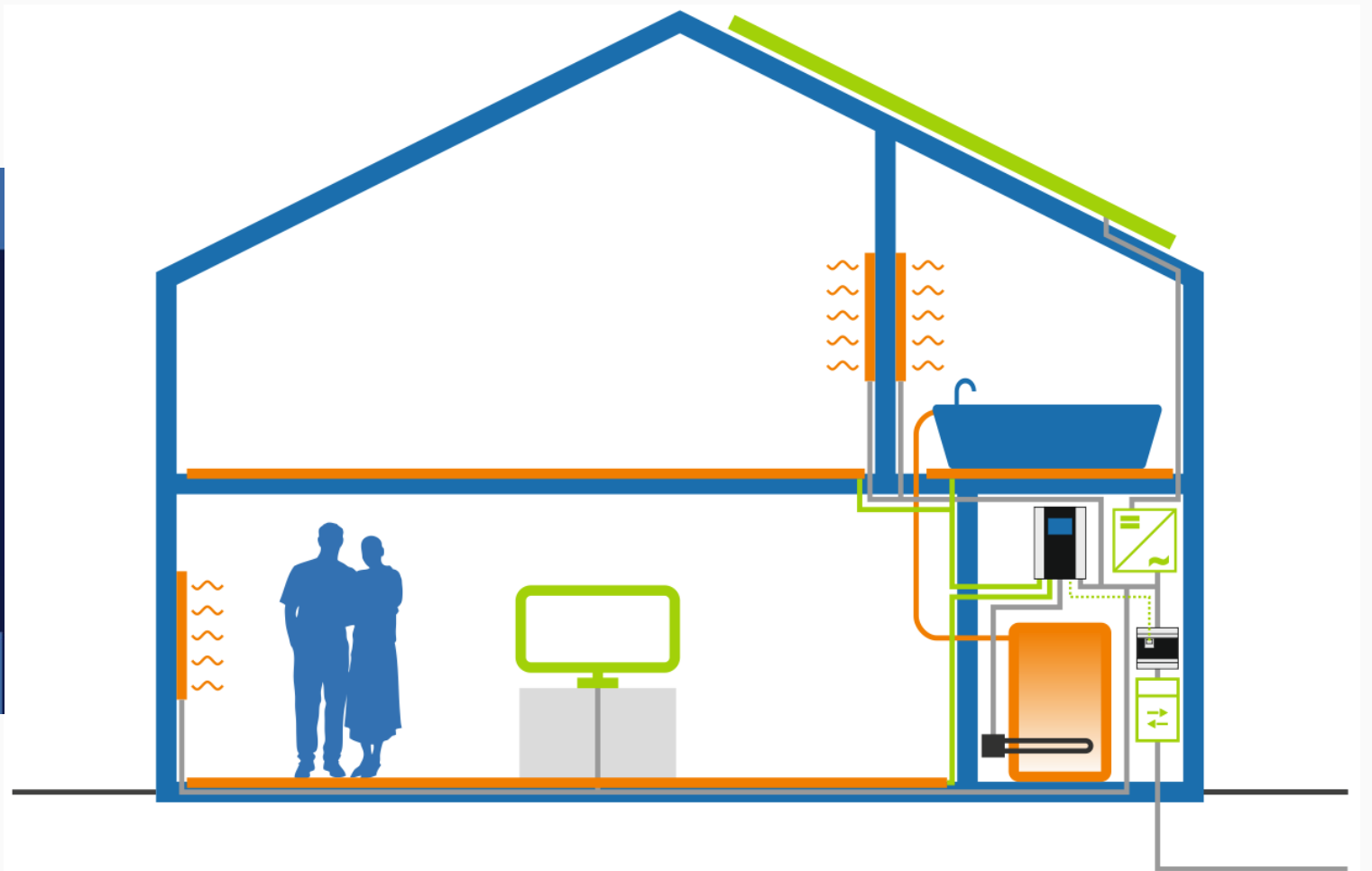
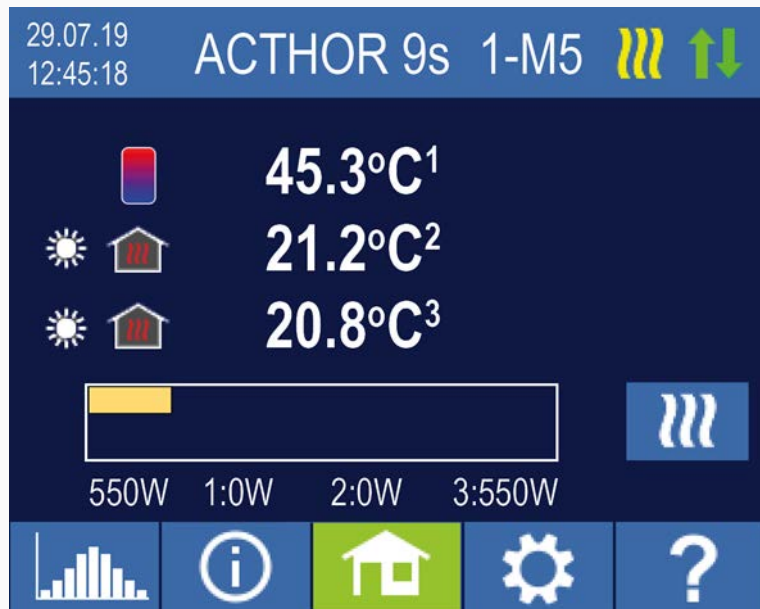
## M4: Hot water + heat pump



This mode works in systems where the AC•THOR knows the power in the feed-in point. It does not work if the power output is given by a higher-level energy management system

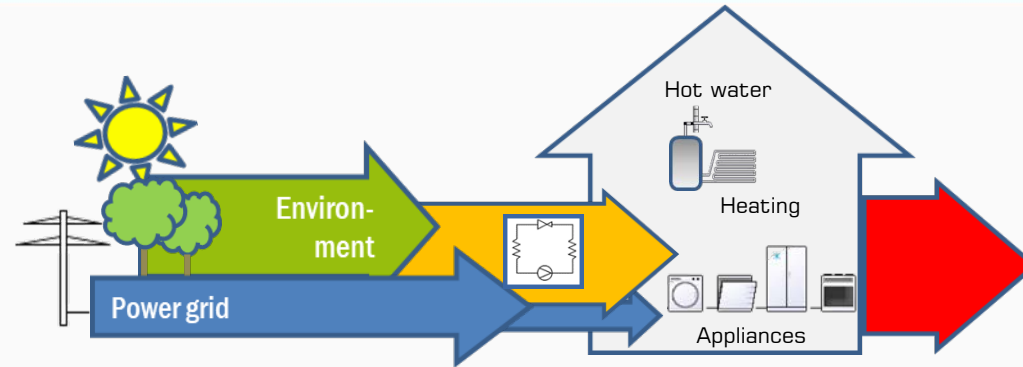


M5: Hot water + el. Floor heating + IR

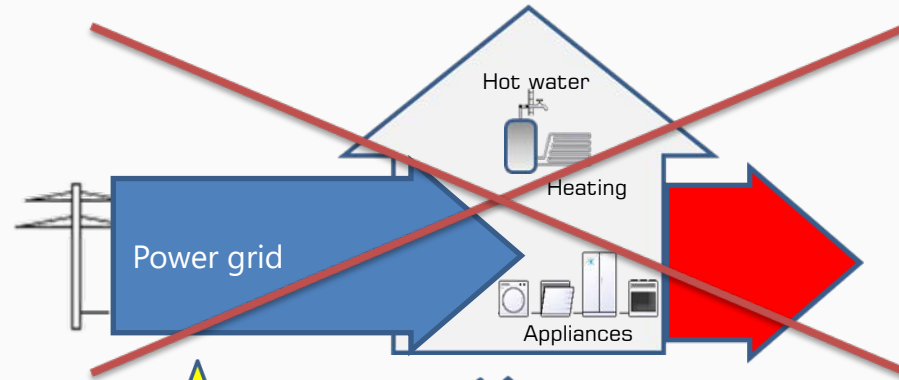




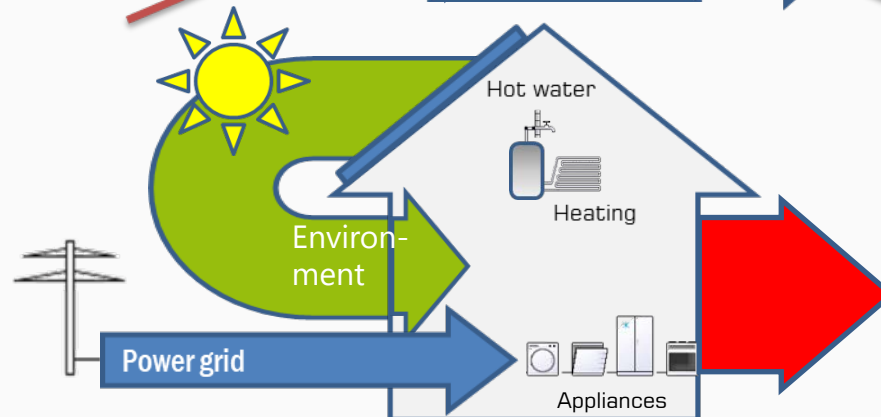
Heatpump



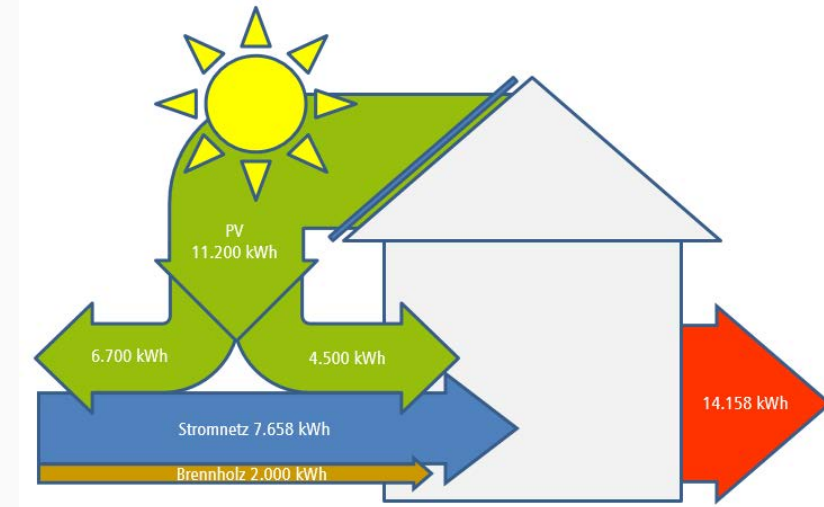
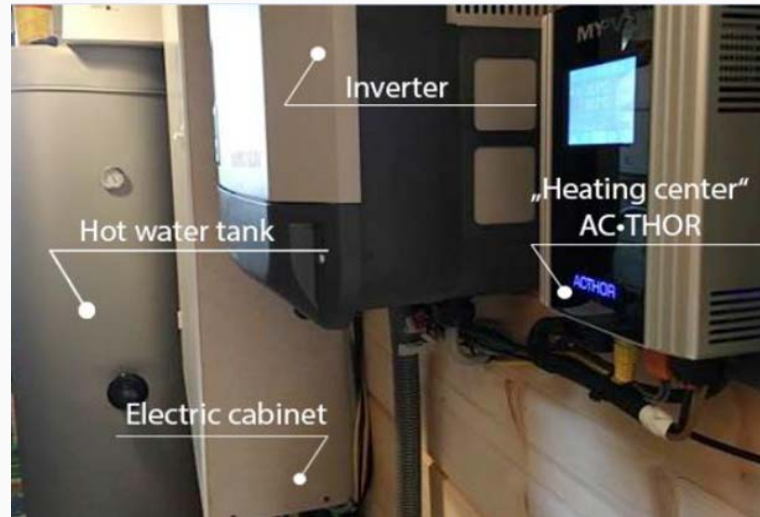
Electric direct heating  
with mains current



Solar electric heating with  
photovoltaics and AC•THOR



# Lead Project #1



## Project data

- 10,98 kWp Photovoltaics, grid-tied, south-facing, 45° inclination
- 300 l hot water boiler, Immersion heater 3 kW, controlled by AC•THOR
- 150 m<sup>2</sup> space, electric underfloor heating, controlled by AC•THOR
- Heating demand approx. 50 kWh/m<sup>2</sup>
- Operating costs 2019-2020 for electricity, hot water, heating 750 EUR (1230 AUD)

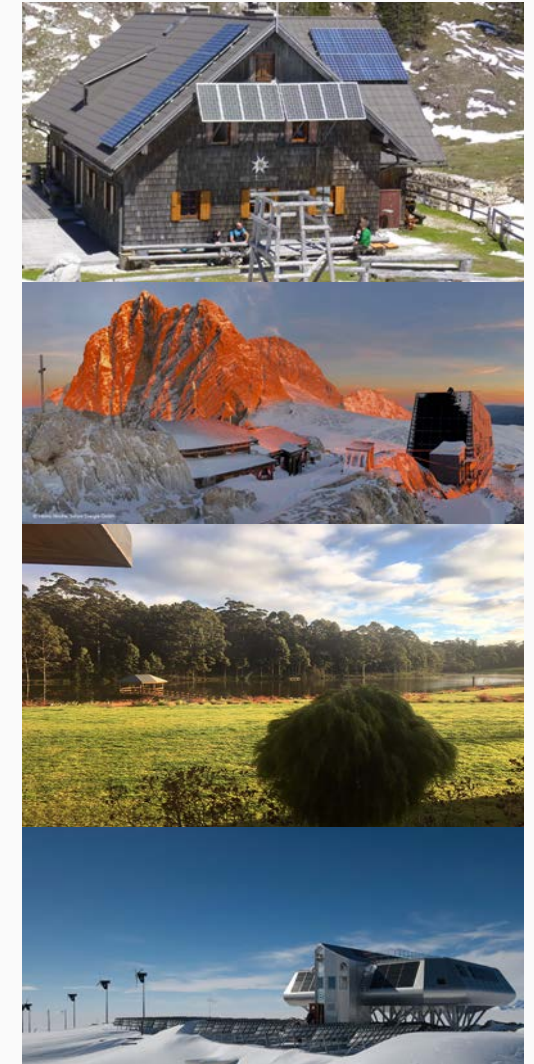
## M8: Frequency mode (for AC off-grid)



- Control by frequency shift battery inverter



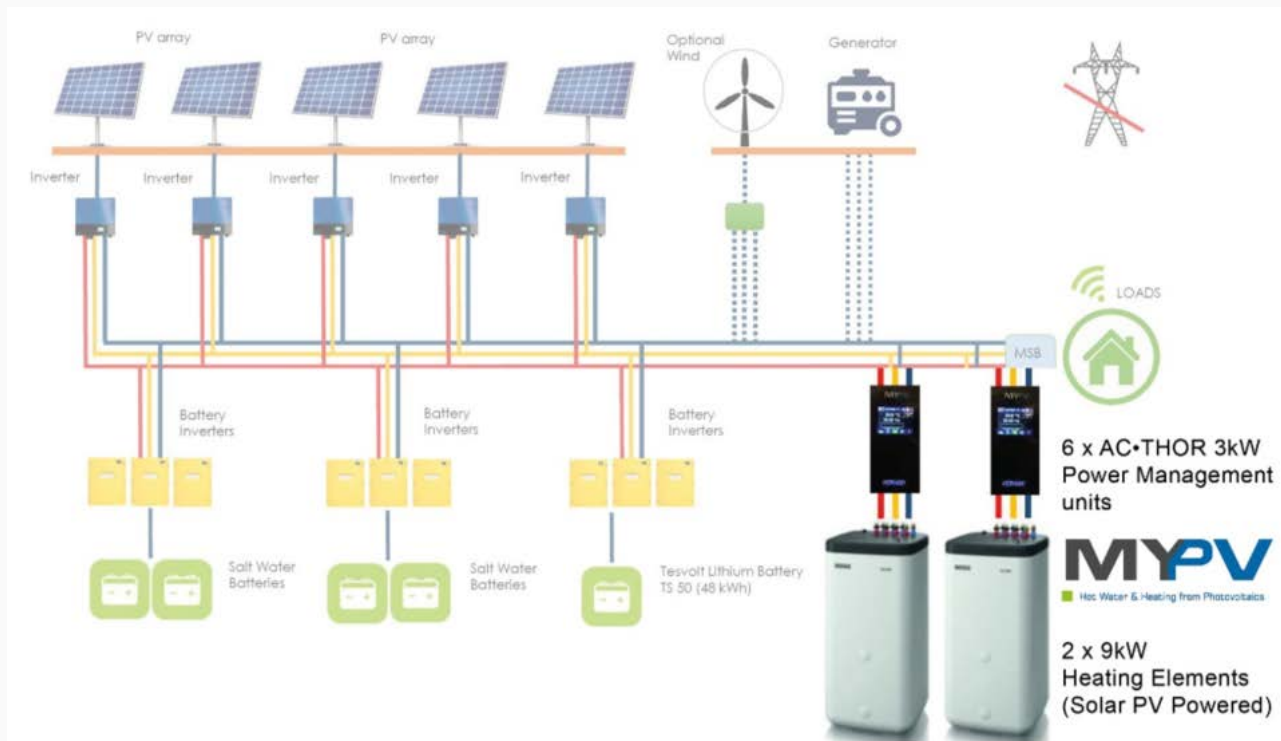
**victron energy**  
BLUE POWER





# Project: Avocado farm in WA

- 53 kWp off-grid system, frequency-shift inverters
- 160 kWh saltwater battery and 48 kWh lithium-cells
- Two tanks ROTEX Sanicube, each with a 9 kW immersion heater powered by three AC•THORs





# Off-grid system in Tasmania

90% of the hot water from AC•THOR i

## System:

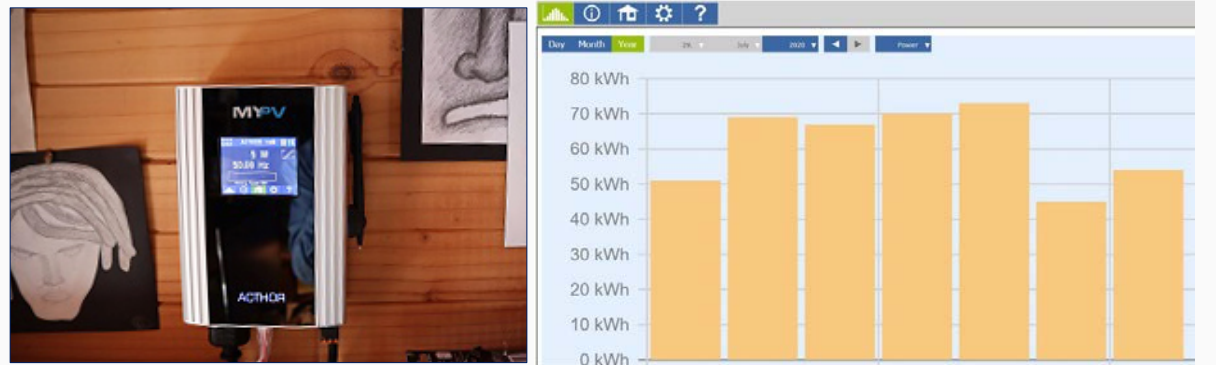
- 3.51 kWp PV, 12kWh Battery, SMA PV/battery inverters
- 315 L hot water tank, 2-3 people

## Advantages:

- Avoids energy wasted and PV inverter shutdown when the battery is full
- Converts the hot water tank into a “liquid battery”
- Non dependant on energy retailers (savings \$600/yr \*)
- Hot water monitoring and remote control

Michael desires the AC•THOR community to keep growing!

*\*Based on a rate of 0.30¢/kWh and 95.2¢/day*



# Cloud Monitoring

## Extensive plant monitoring possible

- Inverter, battery, heat pump, EV charging station

## Remote Control

- Boost on/off, temperatures, legionella, Boost times, etc
- Perfect for remote troubleshooting

Boost Mode
☐ Off
☒ On
☐ Relay

Single Boost

Temperature max
°C

Temperature min
°C

Boost timeframe 1 from

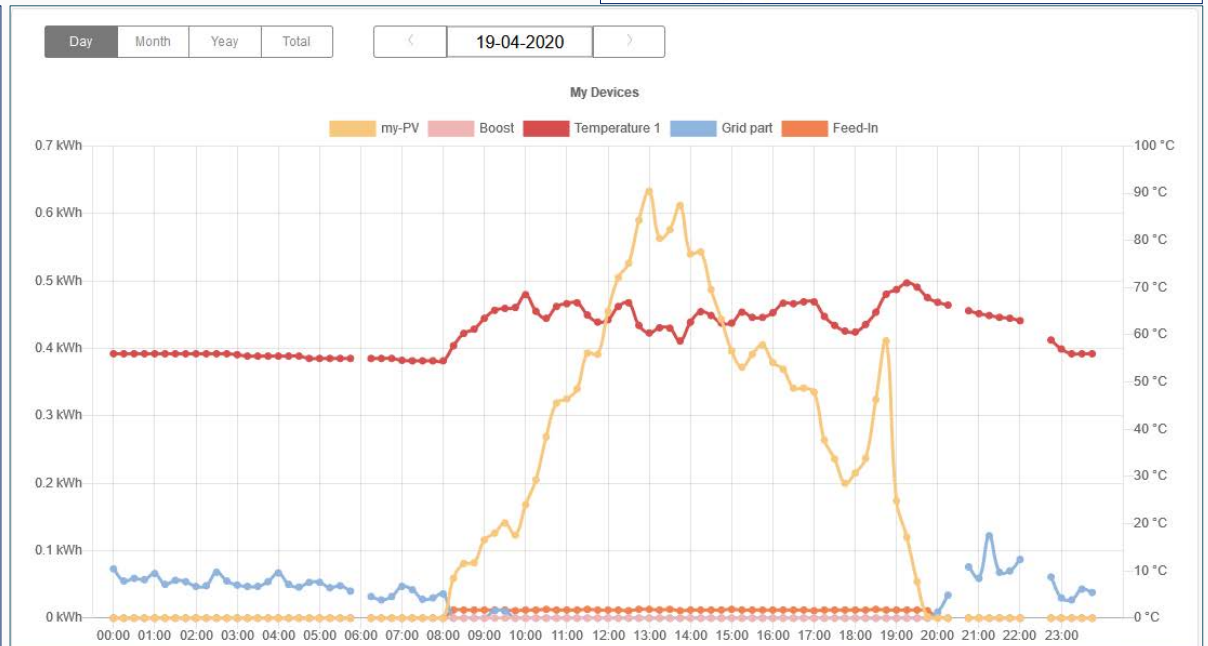
Boost timeframe 1 to

Boost timeframe 2 from

Boost timeframe 2 to

Boost-output

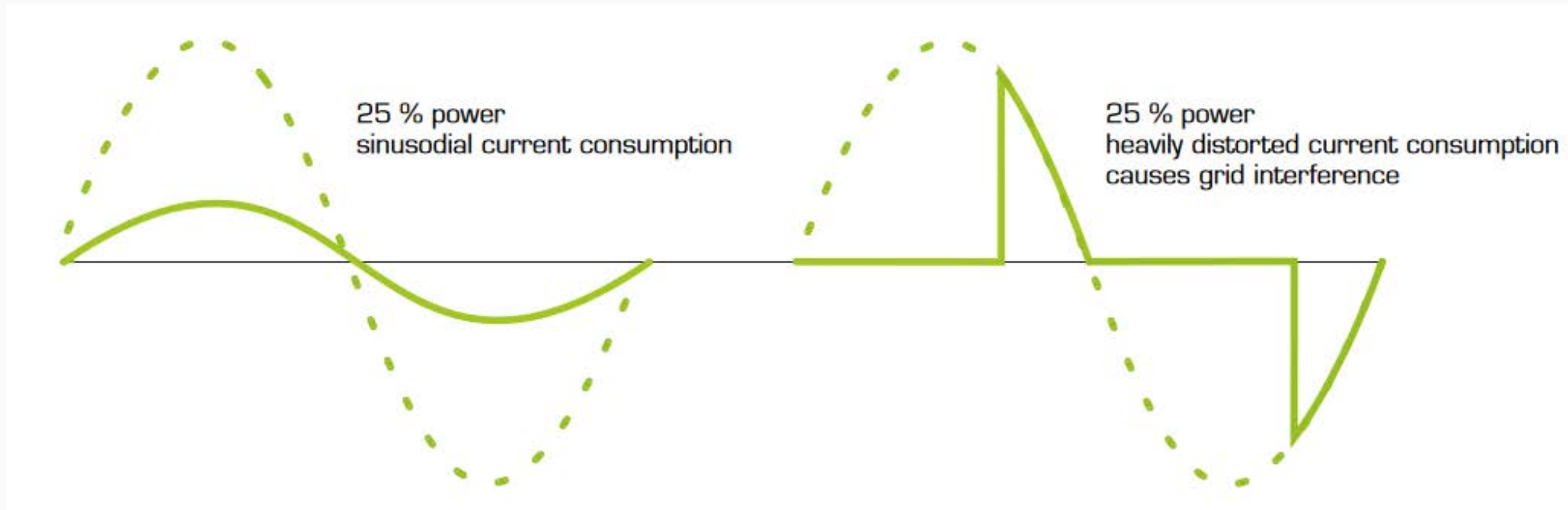
Monday
☒



# Power regulation for heating appliances

my-PV





Thyristor



➤ Download Overview

<http://www.my-pv.com/download/presse/Power%20regulation%20for%20heating%20appliances%20EN200729.pdf>

# Advantages over other solutions

	my-PV AC•THOR 9s	my-PV AC•THOR		Thyristor 		
Linear power control	✓	✓	✓	✓	✓	✓
External control possible / open system	✓	✓				
Each load output can be controlled linearly	✓	✓				
All connections pluggable	✓	✓				
Color Touch Display	✓	✓				
Suitable for three-phase ohmic loads	✓		✓	✓		
Integrated switching relay for further consumers	✓	✓	✓	✓	✓	
Frequency control in off-grid systems	✓	✓				
External control by PWM signal	✓	✓				
Compliance with grid connection conditions (TAEV or TAB)	✓	✓	✓		✓	✓
Compliance with CE requirements EMC network perturbations Disruption of other consumers possible	✓	✓	✓	On-site measurement required	✓	✓
Compliance CE requirements EMC radiation	✓	✓	✓	On-site measurement required	Not known	
Compact size (smaller than DIN A5 sheet of paper)	✓	✓		✓		

All information without guarantee



## AC•THOR / AC•THOR 9s Advantages

- Multimode possible with 11 devices
- Easy installation: All connections pluggable!
- User-friendly via 2.83" TFT Color Touch Screen, Setup without additional equipment
- Flexible control by various inverters, battery systems and smart homes
- Extraordinary compact
- Linear power control for optimal energy utilization, pure alternating current output  
**NO THYRISTOR !!!**
- Maintenance-free due to cables instead of pipes
- Downsizing of the building installation room
- Can also be used in residential construction (simple renovation possible)

# Where to buy

- [esw.net.au/our-products](http://esw.net.au/our-products)


esw.net.au/our-products/pv-solar-hot-water

esw ENERGY SMART WATER

HOME PRODUCTS CONTACT

PRODUCTS / PV SOLAR HOT WATER

## PV Solar Hot Water



Reliable Hot Water from PV Panels

- ✓ Uses 100% of your PV energy
- ✓ No thermal heat losses on transfer
- ✓ AC boost heating included
- ✓ Optional gas or alternate boost heating
- ✓ No pumps, no piping
- ✓ No refrigerants
- ✓ No inverter
- ✓ Easy installation


esw.net.au/our-products/acthor

esw ENERGY SMART WATER

HOME PRODUCTS CONTACT

PRODUCTS / ACTHÖR PHOTOVOLTAIC POWER DIVERTER

## ACTHÖR Photovoltaic Power Diverter



**MYPV**  
Hot Water from Photovoltaics


Divert surplus solar PV for water and room heating prior to grid export or when batteries are full to optimise PV self-consumption.

### Hot water heating and space heating with solar power

ACTHÖR 9s (0 - 9 kW) and ACTHÖR I (0-6kW) are linearly controlled photovoltaic power managers for water heating and room heating.

Simple & efficient: ACTHÖR 9s controls up to 3 electrical heat sources and provides comfort - depending on the availability of PV energy and heat demand. And that for both hot water, as well as for space heating. In a residential building that is built or renovated according to current energy standards, ACTHÖR 9s replaces conventional, water-based building installations. Missing residual energy can be obtained from the public grid.

ACTHÖR can also be integrated into conventional, water-based systems such as buffer storages. Its flexibility leaves nothing to be desired. Thanks to the built-in touch display, it can be operated without any additional devices at any time and it is easy to install.



### ACTHÖR 9s for 3-phase heating elements up to 9 kW

With the same size as the ACTHÖR, the ACTHÖR 9s is also capable to control 3-phase immersion heaters linearly with an output of up to 9,000 watts.

# Detailed information online

<https://www.my-pv.com/en/info/downloads>

- General product information
- Manuals, Wiring diagrams
- Webinar records



# YouTube

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