

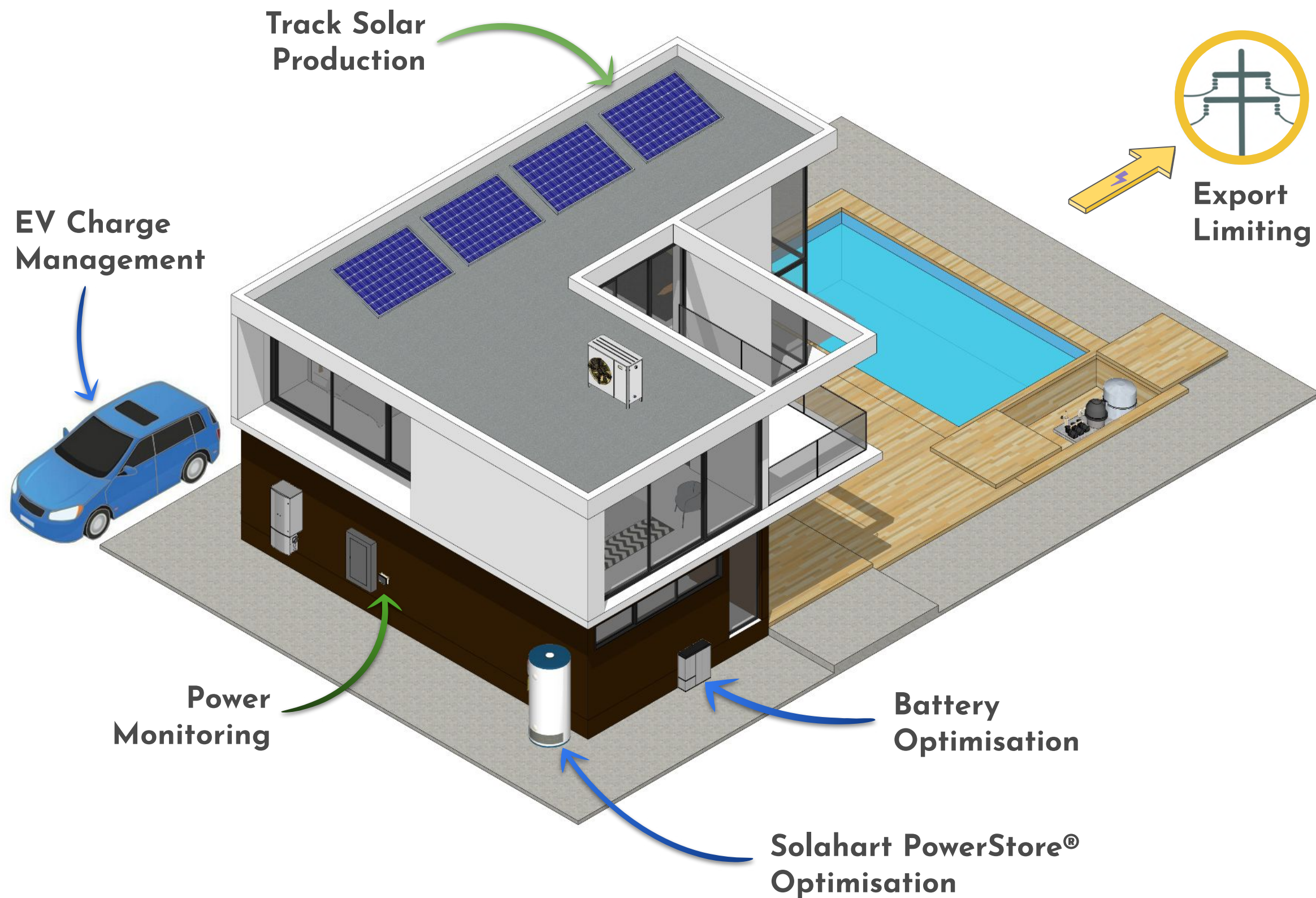


Introduction for Dealers and Installers

For EMU Installations

What it does

Summary



The purpose of the Combined Energy system is to **minimise the total cost of energy** for the customer by:

- Maximising solar self-consumption
- Using the cheapest grid energy possible
- Understanding energy usage patterns in the home
- Managing solar export limits intelligently (including flexible exports / DOEs)

The system controls connected appliances in the home to use as much solar as possible and to use cheaper grid energy where required.

What it does

System Overview video

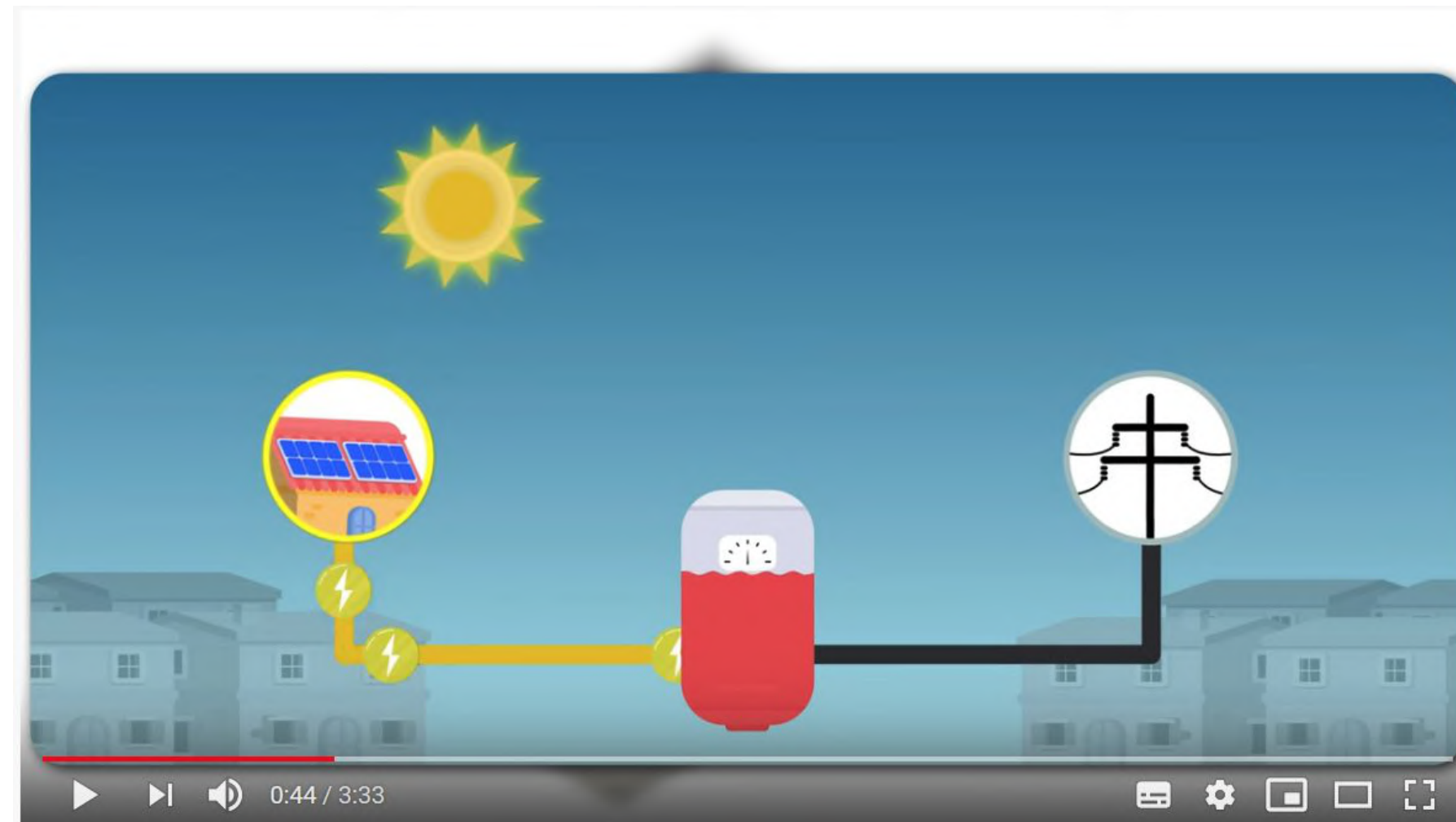


Video: ***Welcome to Combined Energy***

- Introduction to concepts of energy management and solar self-consumption
 - System controls load to match available solar
 - System uses weather information to predict solar availability
 - System learns use patterns in home to predict energy consumption
- Briefly discusses high-level install concepts:
 - Energy Management Unit (EMU) coordinates connected appliances
 - System uses in-home wiring to communicate
- Shows overview of customer portal / web interface:
 - Energy supply and cost statistics
 - Charts of energy usage, with separate contribution from solar shown
- Video available at <https://youtu.be/FjRM232brEI>

What it does

PowerStore video

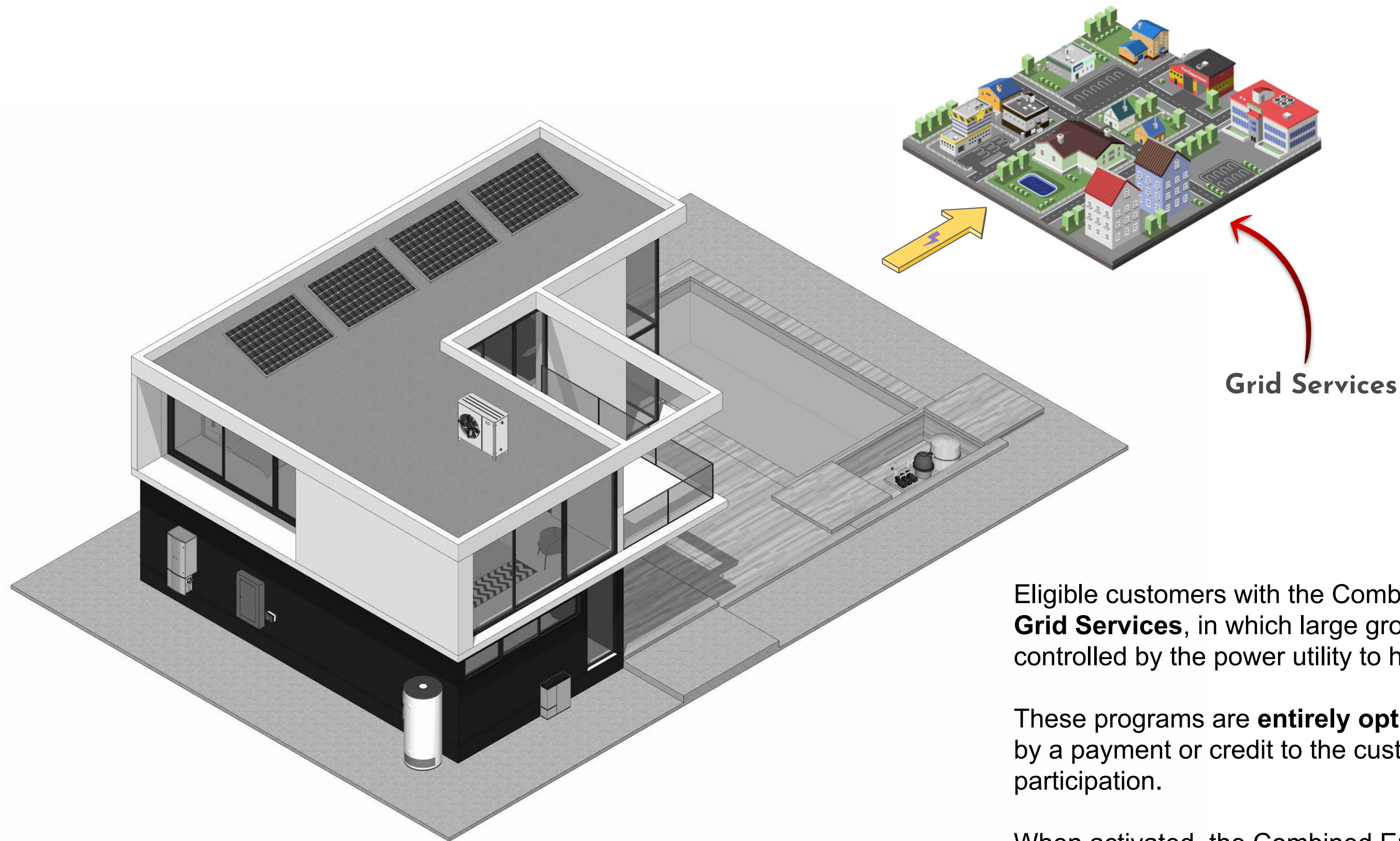


Video: ***Combined Energy Intelligent Tank Control***

- Describes the role of the Combined Energy system in maximising the value of installing a PowerStore water heater through intelligent control
- Video available at <https://youtu.be/kXG9P24xIMI>

What it does

Grid Services



Eligible customers with the Combined Energy system can opt-in to **Grid Services**, in which large groups of customer loads are controlled by the power utility to help manage the grid.

These programs are **entirely optional** and are often accompanied by a payment or credit to the customer in exchange for participation.

When activated, the Combined Energy system manages the amenity of storage loads in the home to ensure no disruption to the customer when participating in grid services.

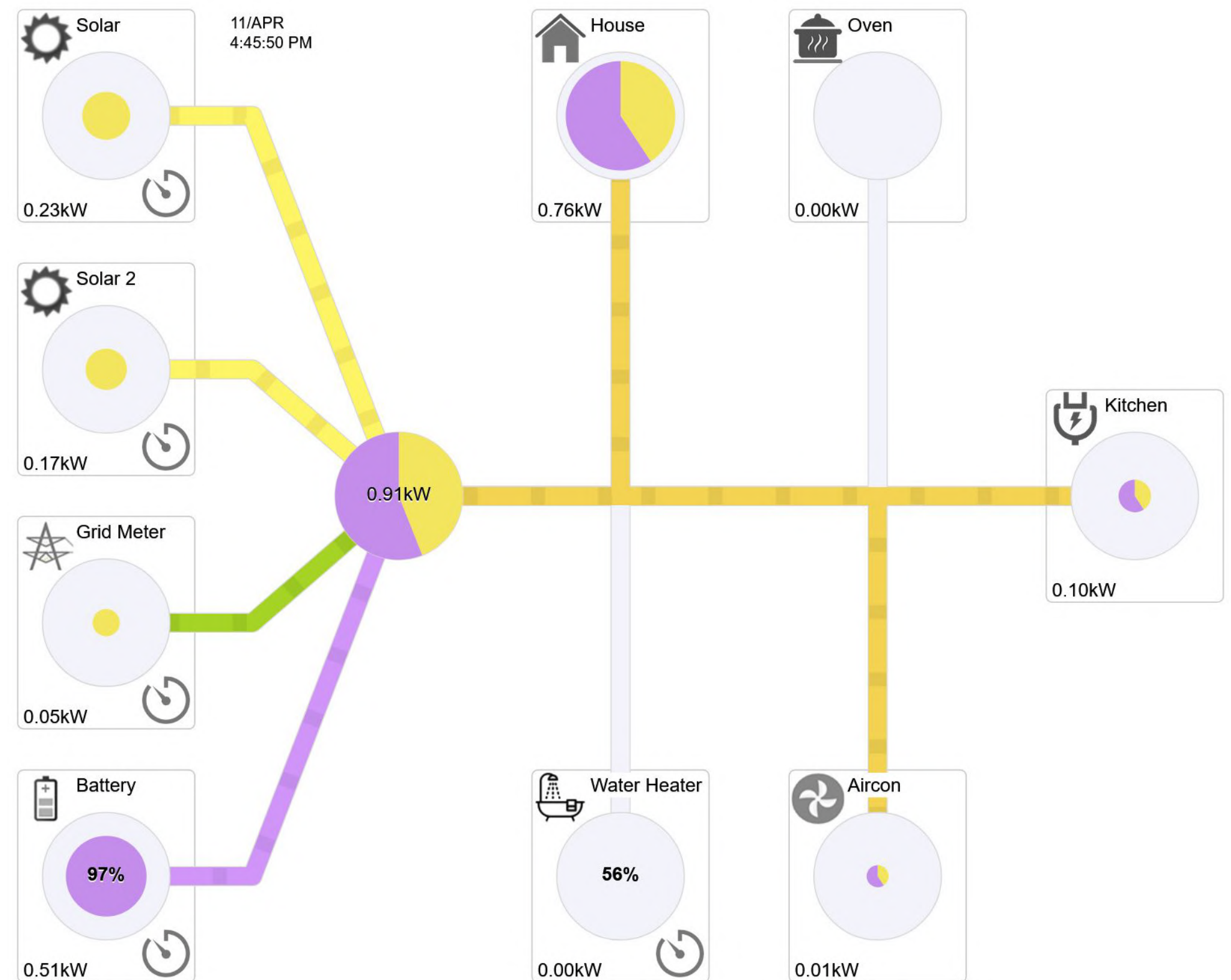
Grid services are currently being trialled in a number of states, including as part of the SA Smart Network program.

How it works

Energy Management Unit (EMU)



- The brains of the Home Energy Management System (HEMS)
- Connects to customer's Internet router
- Communicates with Power Meters, Connected Appliances (e.g. PowerStore), and Inverters
- Analyses home energy data to detect usage patterns
- Receives weather forecast and energy price information from the cloud
- Coordinates major appliances to make best use of Solar, and to use the cheapest grid energy possible

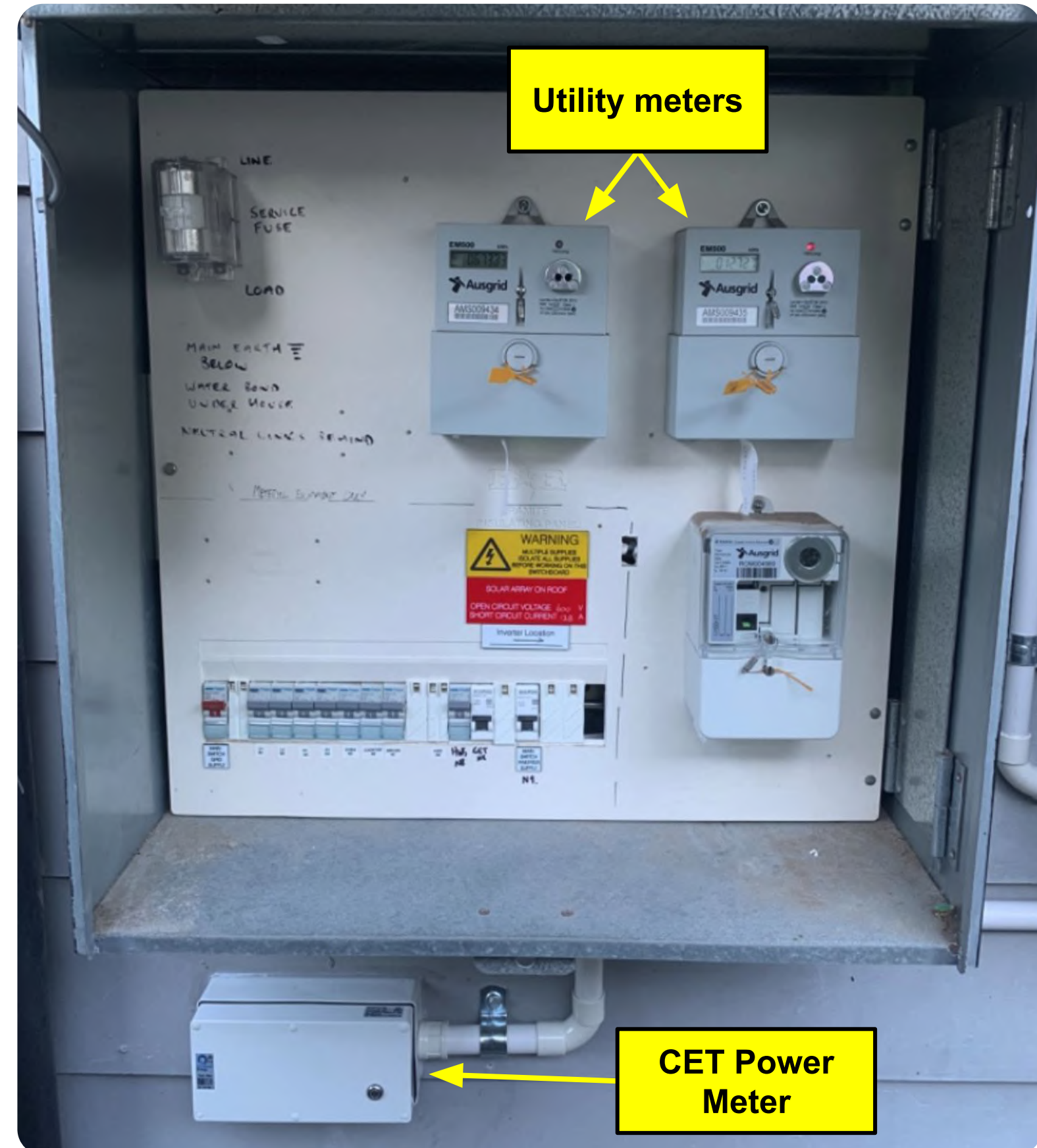


How it works

Power Meter (PM2)

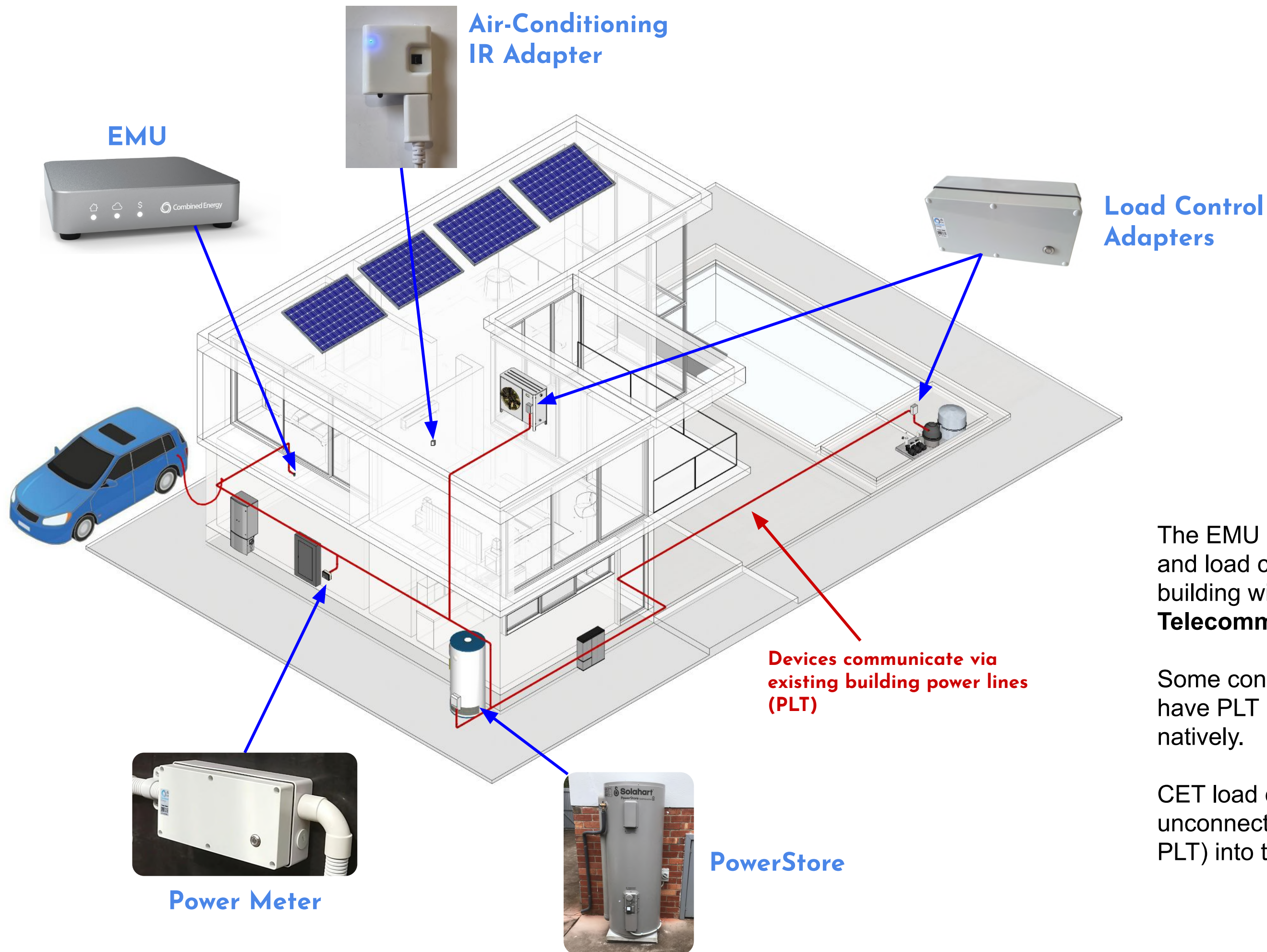


- Installed in or near the electrical switchboard
- Grid supply monitoring
 - Single-phase, 2-phase, 3-phase
- Solar Monitoring
 - Total production
 - Excess solar (export from site)
- Optional monitoring of unconnected appliances
 - Visibility of appliance energy costs
 - Useful for identifying system improvements (e.g. add more solar, add PowerStore)
- Connects to Inverters via data connection
 - Ethernet / RS485
 - Export limiting control
 - Battery control



How it works

Powerline Communications



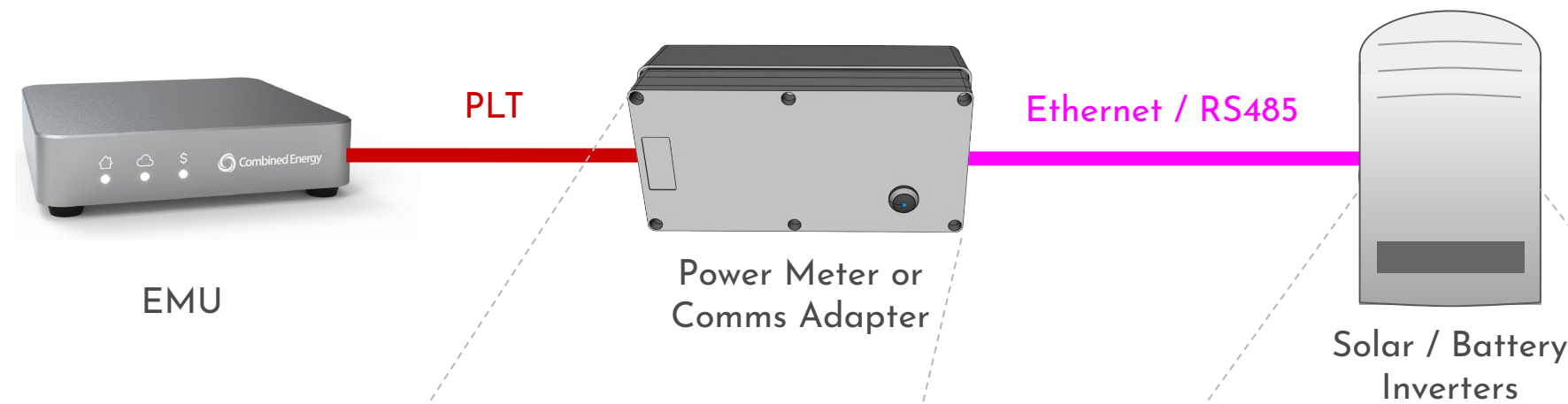
The EMU communicates with connected appliances and load control adapters using the existing building wiring via **Powerline Telecommunications (PLT)**.

Some connected appliances (e.g. PowerStore) have PLT built in, and communicate with the EMU natively.

CET load control adapters are used to integrate unconnected appliances (i.e. appliances without PLT) into the Home Energy Management System.

How it works

Inverter Communications



Solar and Battery Inverters are connected to the system by installing a data cable from a CET Power Meter or Comms Adapter to the Inverter's data port.

A data connection is required for the HEMS to access export control functionality on Inverters.

The two most common data connection types are supported: Ethernet and RS485

Many major Inverter brands supported with more added regularly:

ABB

FIMER

Fronius



GOODWE
YOUR SOLAR ENGINE

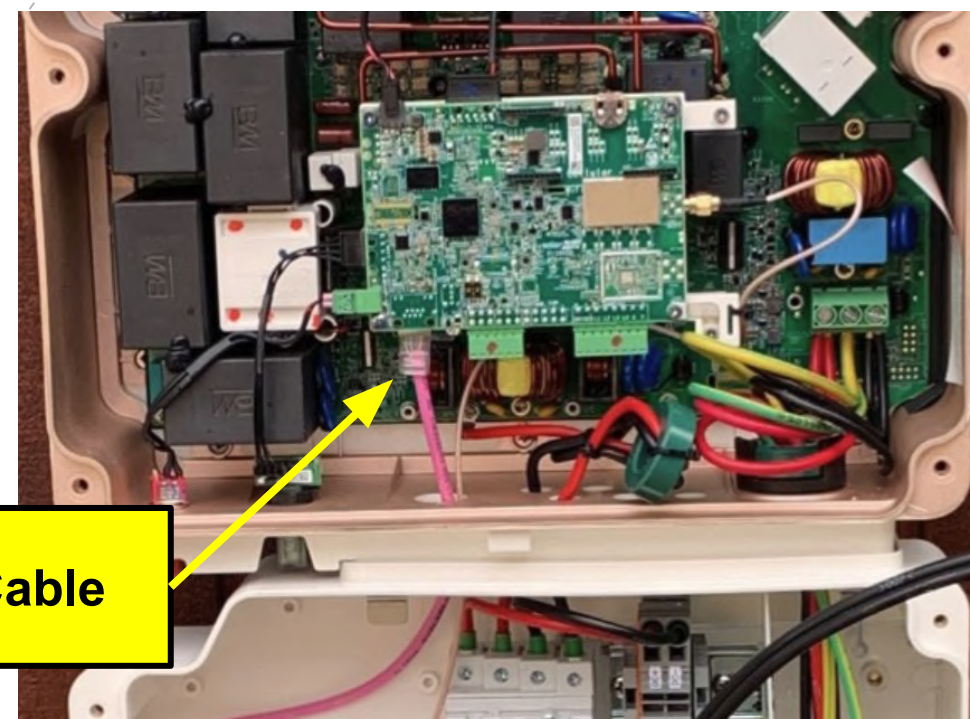
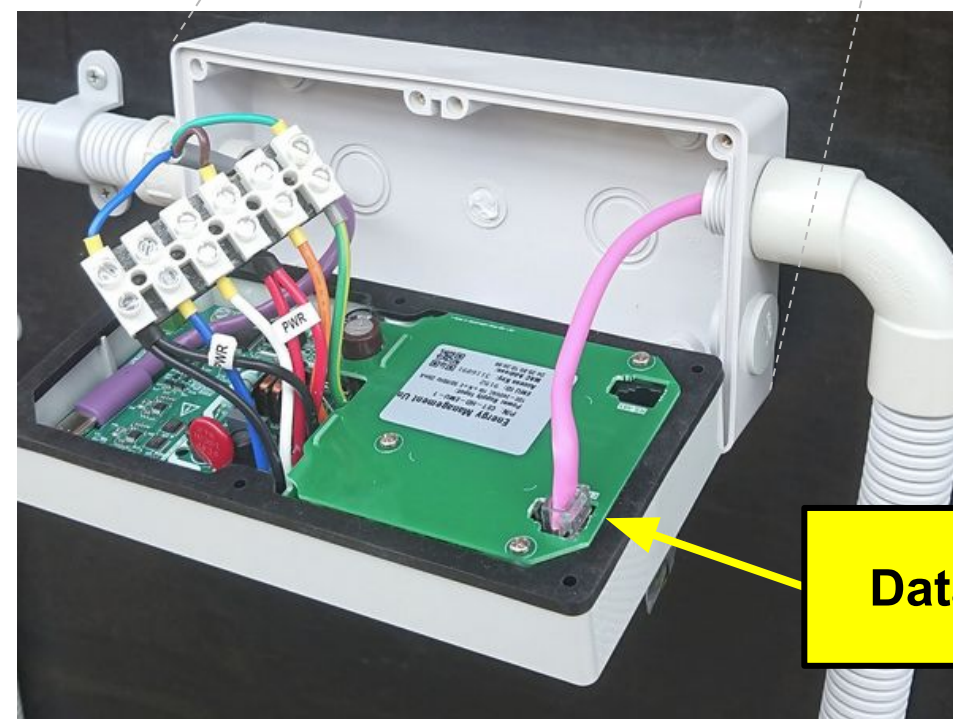
solaredge



solis

Growatt
powering tomorrow

SUNGROW
Clean power for all



Data Cable

How it works

HEMS and Batteries

Batteries **must** be integrated into HEMS for the HEMS to be able to function.

There are two ways that batteries can be integrated into the system:

- Option 1: Via a data connection that enables monitoring and control of the battery
 - **Strongly recommended**
 - Supported by most battery brands
 - HEMS can ensure that the solar resource is shared between the battery and other appliances
 - HEMS can ensure that the battery does not discharge to heat the PowerStore
- Option 2: Battery monitored by CT, HEMS yields to battery system
 - e.g. Tesla (no local control capability)
 - HEMS can not coordinate simultaneous charge of battery and connected appliances with solar
 - The HEMS has to wait until the battery is fully charged, and only then charge other appliances
 - Can work OK if there is a lot of solar PV installed

Easier to maximise the customer's financial and energy benefits with Option 1.

Combined Energy Apps and Services



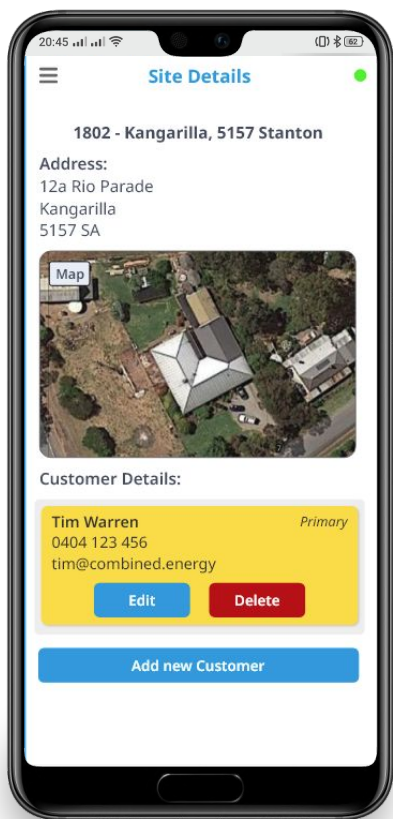
onWatch Management Portal <https://onwatch.combined.energy/>



Used by **Organisations** to:

- Monitor the state of all sites and customer systems
- Add new customers and sites
- Add and manage Installers and support team members
- Access latest documentation

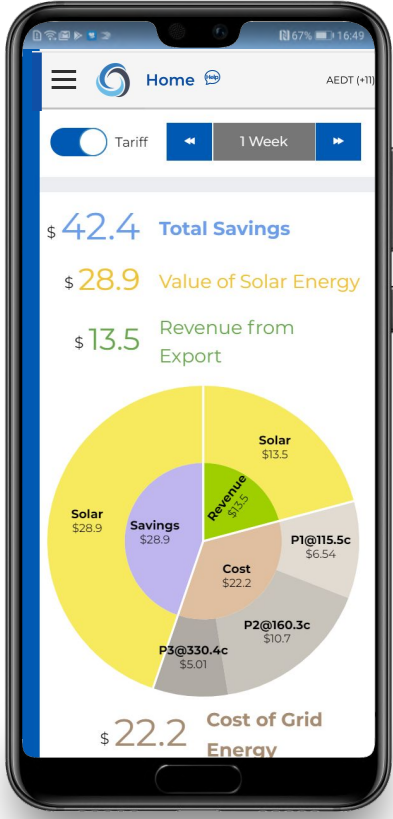
onSite Installer Web App <https://onsite.combined.energy/>



Used by **Installers** to:

- Configure and test new Installations
- Access the latest Installation resources and documentation
- Contact CET Support

atHome Customer Web App <https://athome.combined.energy/>



Used by **Customers** to:

- Monitor household energy use history and costs
- See a breakdown of where energy is being used in the home
- Check charge state of storage loads and solar performance

Combined Energy onWatch Portal

Overview



Combined Energy

New Installation

Installations

People

Resources

Logout

Map

Satellite

Map

Satellite

Portland

Newnes

Wallerawang

Lithgow

B59

A32

Blue Mountains National Park

Katoomba

Jenolan

Penrith

Blacktown

Parramatta

Chatswood

Liverpool

Mascot

Campbelltown

Wombeyan Caves

Nattai National Park

Upper Nepean

Wollongong

Parr

Tuggerah

The Entrance

Gosford

Woy Woy

South Pacific Ocean

299

Customer

Status

ID	Installation Name	Welc	atHome	Installed	Rev	Com	PM	Tank	Tank Prf.	Sol	GW	Organisation Name
950		✓	21 days	30/04/2020	✓	✓				?	636	Solahart Sydney Direct
948		✓	679 days	29/04/2020	✓	✓				!	1407	Solahart Sydney Direct
947		✓	6 days	28/04/2020	✓	✓				?	1446	Solahart Sydney Direct
945		✓	today	27/04/2020	✓	✓				?	1430	Solahart Sydney Direct
942		✓	today	22/04/2020	✓	✓				?	1426	Solahart Sydney Direct

Current map view

☐ Yes

Current organisation

☐ Yes

DSA Received

☐ Yes

☐ No

Welcomed

☐ Yes

☐ No

Visited

☐ Recent

☐ Ever

☐ Never

Review

☐ Valid

☐ New

☐ Review

☐ Issue

☒ Ignore

Gateway Communication

☐ < 10min

☐ < 4hrs

☐ < 24hrs

☐ > 24hrs

Tank

☐ OK

☐ Warning

☐ Critical

☐ Offline

Tank Performance

☒ Short

☐ Medium

☐ Long

☐ Good

☐ Ok

☐ Avg

☐ Bad

Solar Performance

☐ Good

☐ Ok

☐ Avg

☐ Bad

☐ None

Search

Use these controls to filter Installations in the list e.g. show only 'unwelcomed' customers

Search for a customer by surname or ID

The last time the customer viewed the atHome website

Date that EMU was Installed

Click the CET logo to open atHome for this Installation

Combined Energy onWatch Portal Overview



Combined Energy

New Installation

Installations

People

Resources

Logout

Map

Satellite

Current map view

☐ Yes

Current organisation

☐ Yes

DSA Received

☐ Yes

☐ No

Welcomed

☐ Yes

☐ No

Visited

☐ Recent

☐ Ever

☐ Never

Review

☒ Valid

☐ New

☐ Review

☐ Issue

☒ Ignore

Gateway Communication

☐ < 10min

☐ < 4hrs

☐ < 24hrs

☐ > 24hrs

Tank

☐ OK

☐ Warning

☐ Critical

☐ Offline

Tank Performance

☒ Short

☐ Medium

☐ Long

☐ Good

☐ Ok

☐ Avg

☐ Bad

Performance

☐ Ok

☐ Avg

☐ Bad

☐ None

Search for

Clear

221

Customer

Status

ID	Installation Name	Welc	atHome	Installed	Rev	Com	PM	Tank	Tank Prf.	Sol	GW	Organisation Name
3084		✓	today	06/06/2022	✓	✓	✓	✓	! ? ?	!	10311	Solahart Sydney Direct
2896		✓	2 days	25/03/2022	✓	✓	✓	✓	✓ ✓ ✓	?	10191	Solahart Sydney Direct
2875		✓	today	18/03/2022	✓	✓	✓	✓	* ✓ ✓	?	10761	Solahart Sydney Direct
2782		✓	130 days	10/02/2022	✓	✓	✓	✓	✓ ✓ ✓	?	11121	Solahart Sydney Direct

Review status
(i.e. has CET validated site)

EMU Connection
Status

Power Meter Status

PowerStore Status

Combined Energy onWatch Portal Overview



Combined Energy

New Installation

Installations

People

Resources

Logout

Map

Satellite

Portland

Newnes

Wallerawang

Lithgow

Richmond

Katoomba

Penrith

Blacktown

Parramatta

Chatswood

Liverpool

Mascot

Campbelltown

Wombeyan Caves

Nattai National Park

Upper Nepean

Wollongong

Tuggerah

The Entrance

Gosford

Woy Woy

South Pacific Ocean

Current map view

☐ Yes

Current organisation

☐ Yes

DSA Received

☐ Yes

☐ No

Welcomed

☐ Yes

☐ No

Visited

☐ Recent

☐ Ever

☐ Never

Review

☒ Valid

☐ New

☐ Review

☐ Issue

☒ Ignore

Gateway Communication

☐ < 10min

☐ < 4hrs

☐ < 24hrs

☐ > 24hrs

Tank

☐ OK

☐ Warning

☐ Critical

☐ Offline

Tank Performance

☐ Avg

☐ Bad

☐ None

Go!

Clear

221

Customer

Status

ID

Installation Name

Welc

atHome

Installed

Rev

Com

PM

Tank

Tank Prf.

Sol

GW

Organisation Name

3084

✓

today

06/06/2022

✓

✓

✓

✓

! ? ?

!

10311

Solahart Sydney Direct

2896

✓

2 days

25/03/2022

✓

✓

✓

✓

✓ ✓ ✓

?

10191

Solahart Sydney Direct

2875

✓

✓

✓

?

10761

Solah

2782

✓

✓

✓

?

11121

Solah

nk	Tank Prf.	Sol	GW	Or
	✓	!	10530	Sol
	Short term (1 day sample): 70%	Sol		

Hint: Hover mouse over icon for a brief description

PowerStore Solar Self-consumption efficiency
Indicates proportion of water heater energy from solar vs. grid

Last 24 hrs In last week In last fortnight

e.g. this site had low excess solar (or unusually high water usage) in last 24hrs, causing high PowerStore grid consumption

Solar production as percentage of maximum production observed at this site in last 30 days
e.g. indicates bad weather



New InstallationInstallationsPeopleResources

Logout

Resources / Downloads

Combined Energy

Energy Management Unit (EMU) System [NEW]

[Combined Energy Introduction to the new EMU System](#)[Combined Energy Energy Management Unit \(CET-HD-EMU-1\) User Manual](#)[Combined Energy Power Meter \(CET-HD-PM2-1\) User Manual](#)[Combined Energy Retrofit Tank Adapter \(CET-HD-RT2-1\) User Manual](#)

Product Overview

[Combined Energy Introduction](#)[CET Comparison of Monitoring and Energy Services](#)[Video - Introduction](#)[Video - Water Heater](#)[Video - A/C \(Future capability, control adapter not yet released, available Q3 2022\)](#)[Video - Pool \(Future capability, control adapter not yet released, available Q4 2022\)](#)

Dealer Information

[Combined Energy Introduction for Dealers and Installers](#)[PowerStore and CET Gateway Installation Requirements](#)[Data Service Agreement](#)[CET Solahart Dealer Portal - Quick Guide](#)[CET Solahart Dealer Portal - User Guide](#)

Combined Energy onWatch Portal

Adding Staff and Installers to an Organisation



Combined Energy New Installation Installations Jobs **People** Resources Dashboard Admin Logout

create

Title	First Name	Last Name	Position	Mobile	Email	Device Id	Active
Mr	Malcolm						✓
Mr	Tim						✓
Mr	Chris						✓
Mr	Phil						✓

Create Person

Title

First Name

Last Name

Position

Mobile

Email

Active ☒

Roles

☐ Manager

☐ Staff

☐ Installer

Save Cancel

Use **Manager** role for individuals who should be able to add/remove Staff and Installers.

Use **Staff** role for individuals who will be adding and managing customers.

Use **Installer** role for anyone who will be visiting site and requires access to the *onSite* Installer webapp.

Remember to deactivate team members who leave the Organisation.

Combined Energy *onWatch* Portal

Welcoming Installers



Person

Title

First Name

Last Name

Position

Mobile

Email

Active

Welcome Sent Onsite

Last Login Onsite

User Active

Name

Token Version

Roles

28/09/2021 15:42:56

10/11/2021 11:13:03

Installer

send installer welcome

Clear registered device

Edit

Close

Remember to send the **installer welcome** to new Installers once they have been added to the Organisation.

The installer welcome message includes a link to the *onSite* web app.

It is recommended that Installers save a shortcut to *onSite* to their home screen.

Once welcomed, Installers can use the *onSite* web app to configure sites, request support, and access documentation.

Combined Energy onWatch Portal

Customer Onboarding



Step 1: Click New Installation



Step 2: Enter Street Address

Address

Customers

Details

Agreements

Review

First Login

Address

Address Search

Street Address

Selected:

1 Barangaroo Ave, Barangaroo, NSW 2000

151.20120, -33.86256

Save

Cancel

Step 3: Enter Customer Details

Customers

Edit Customer

Name

John Doe

Email

email@test.com

Mobile

+61234512422

☒ Primary Contact

Save

Cancel

Customers

1. John Doe

edit

Email: email@test.com

Mobile: 02 3451 2422

Add

Done

Add additional users if multiple logins required

Step 4: Enter Phase Info and NMI if available

Address

Customers

Details

Agreements

Review

First Login

Support

Details

Phase

☒ Single phase (1)

☐ Two phase (2)

☐ Three phase (3)

NMI

NMI

Export limit

☐ Enabled

Notes

Notes

Save

Cancel



Barangaroo,2000 Doe Close

Address	Customers	Details	Agreements	Review	First Login	Support
---------	-----------	---------	------------	--------	-------------	---------

Review

Address

1 Barangaroo Ave
Barangaroo
NSW 2000

Details

Phase: Single phase (1)

NMI: Not entered

Export limit: Export limit not enabled

Notes:

Customers

1. John Doe

- **Email:** email@test.com
- **Mobile:** 02 3451 2422
- **Welcome sent:** not sent

[Send](#)

Agreements

Service agreements that the customer needs to accept are listed here. These agreement will be presented to the customer the first time they log in and will be marked with a tick here once accepted.

-  CET - Combined Energy

Support

Full name: 2951 - Barangaroo,2000 Doe

GW ID:

Review Status: NEW

Tags:

Local Time: 12:15 AM (AEST)

Notes:

Next step:

When you are ready to send the welcome email and SMS to the customer, please click the button below:

Send customer welcome(s)

Step 5: Send customer welcome and ask customer to login on their own device



Step 6: Assist customer with first login and accepting service agreements

Home

Settings

Help

Combined Energy atHome

Log Out

Service Agreements

Name

Mobile

Email

For site at 1 Alan St, Rydalmere, NSW 2116

Combined Energy

Data Services Agreement

This agreement is between you and Combined Energy Technologies Pty Ltd ("CET", "we", "us"), ABN 15 616 324 36, (trading as "Combined Energy"), Solahart's technology partner and provider of home energy monitoring and management services.

To provide an effective energy monitoring and management service, we collect energy consumption data for your site and use this information together with energy prices from your retailer, weather forecast data, and other metrics to coordinate your Home Energy Management system ("the system").

Data Services Agreement

Service Levels

1. **Basic Monitoring:** Provides you with an easy to understand real-time visual display of your home's energy consumption and generation 24/7 so you can identify your costs and take action. If your site has a PowerStore water heater, excess solar generation will be automatically redirected to the tank under this service. The PowerStore water heater controller ensures that a minimum volume of hot water is always available to your household and implements mandatory legionella control requirements. The Basic Monitoring service is free for all Solahart customers and includes the SA Smarter Home Relevant Agent service.

2. **Home Energy Management:** An autonomous home energy optimisation service that reduces your total cost of electricity by coordinating appliances and energy storage devices in your home to make the best use of available solar power. If you are on a time-of-use tariff, this service will prioritise the use of off-peak electricity by estimating the total energy requirements of your appliances based on weather forecast information and usage patterns. This service is provided free of charge to all Solahart customers for a minimum of 12 months from the date of installation, after which you may elect to opt-in to a monthly subscription.

Terms and Conditions

Personal Information

We collect data from your site for the following purposes:

- monitoring and reporting the performance of the system, and devices or appliances connected to the system;
- remote troubleshooting of the system and/or associated devices and appliances;
- marketing of new appliances, devices, functionality or energy services related to the system;
- research and product development purposes.

We will take steps we believe to be reasonable and in alignment with industry and regulatory standards to protect and securely store your information. We will

Please read the agreement before accepting (scroll down)

Accept

Reject

22

Step 7: Assist customer with Energy Pricing page / tariff entry

Home

Live View

\$

Energy Pricing

Combiner

Solar

Battery

Water Heater

Aircon

Others

Grid Meter

System

Help

Energy Pricing?

DistributorTasNetworks

RetailerAurora Energy

Type☐ Flat rate☒ Time of use

StructureTOU 1 2021-01

Estimated prices are inclusive of GST. Daily connection fees are not included in price estimates.

P1 / Off-peak	P2 / Shoulder	Feed-in	Daily Fee	
15.17c	32.59c	9.35c	107.23c	Customise

Accept/Save

Weekdays, Apr - Sep

15.2c

32.6c

15.2c

32.6c

15.2c

Weekends, Jan - Dec

15.2c

Weekdays, Jan - Mar & Oct - Dec

15.2c

32.6c

15.2c

32.6c

15.2c

CET Plan Id22882

As At01/APR/2022 10:44 AM

Updated07/JAN/2021 4:24 PM

Click for instructions on how to enter Energy Pricing information

atHome website
Home page



Home

Live View

Energy Pricing

Combiner

Solar

Water Heater

Others

Grid Meter

System

Help

Home

Live View

Energy Pricing

Combiner

Solar

Water Heater

Others

Grid Meter

System

Help

\$84.3

Total Savings

FROM SOLAR

\$53.0

Value of Solar Energy

USED BY YOUR HOME APPLIANCES

\$31.3

Revenue from Export

FROM SOLAR

54%

Consumed Energy from Solar

46% CAME FROM THE GRID

92%

Hot Water Energy from Solar

FROM YOUR SOLAHART POWERSTORE TANK

63%

Solar Self Consumption

37% EXPORTED TO THE GRID

Solar

\$53.0

Savings

\$53.0

Revenue

(\$31.3)

Cost

\$43.3

Solar

291kWh

Home Energy

291kWh

Nett Grid

238kWh

Nett Export

(399kWh)

\$43.3

Cost of Grid Energy

TO YOUR HOME APPLIANCES

536 kWh

Total energy consumed

IN YOUR HOME

291 kWh

Supplied by Solar

TO YOUR HOME APPLIANCES

245 kWh

Supplied by Grid

TO YOUR HOME APPLIANCES

3 Months

1 Month

1 Week

Log Out

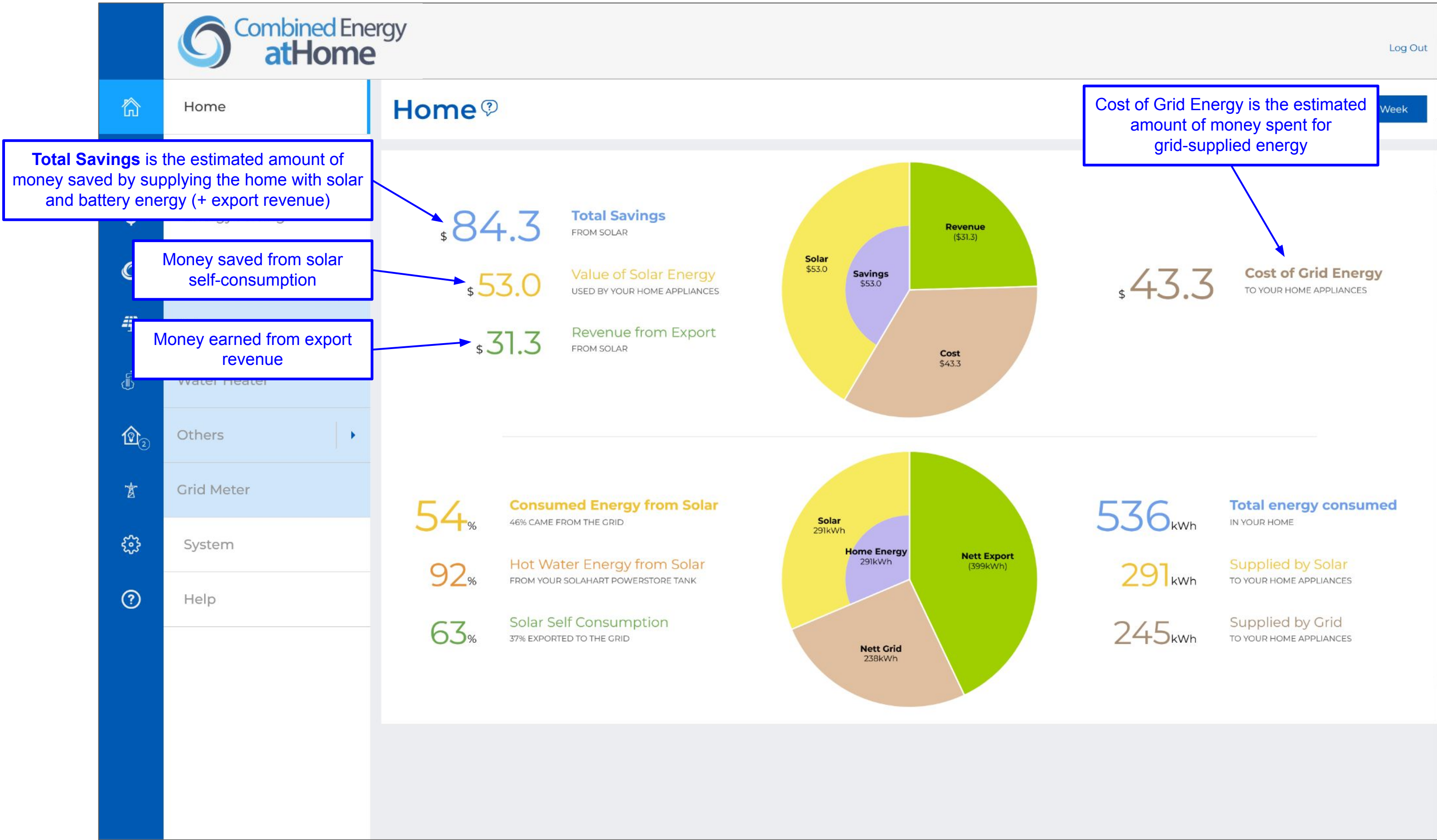
Click the '?' to access help for the current page

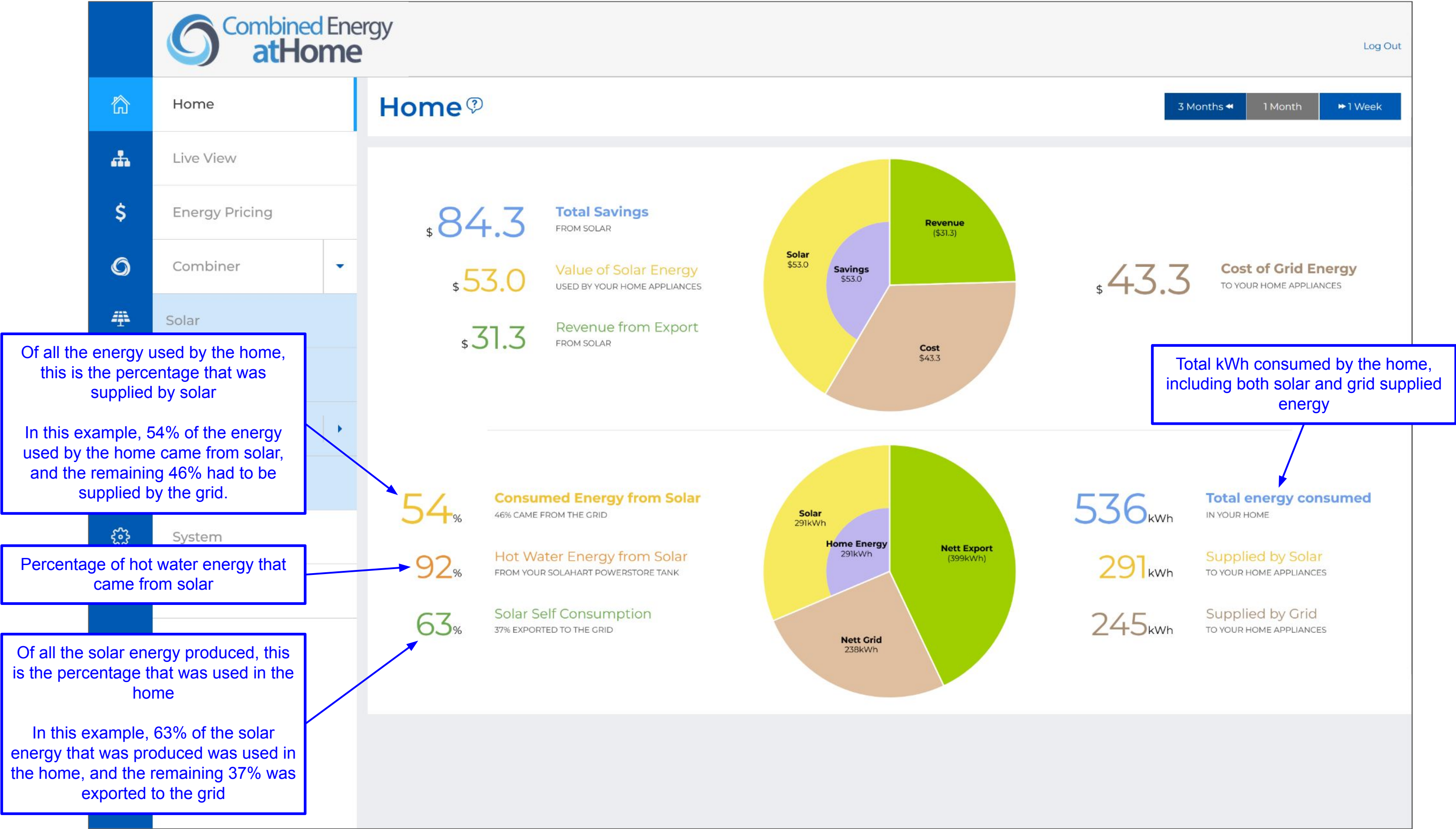
Click to change date range of analysis data

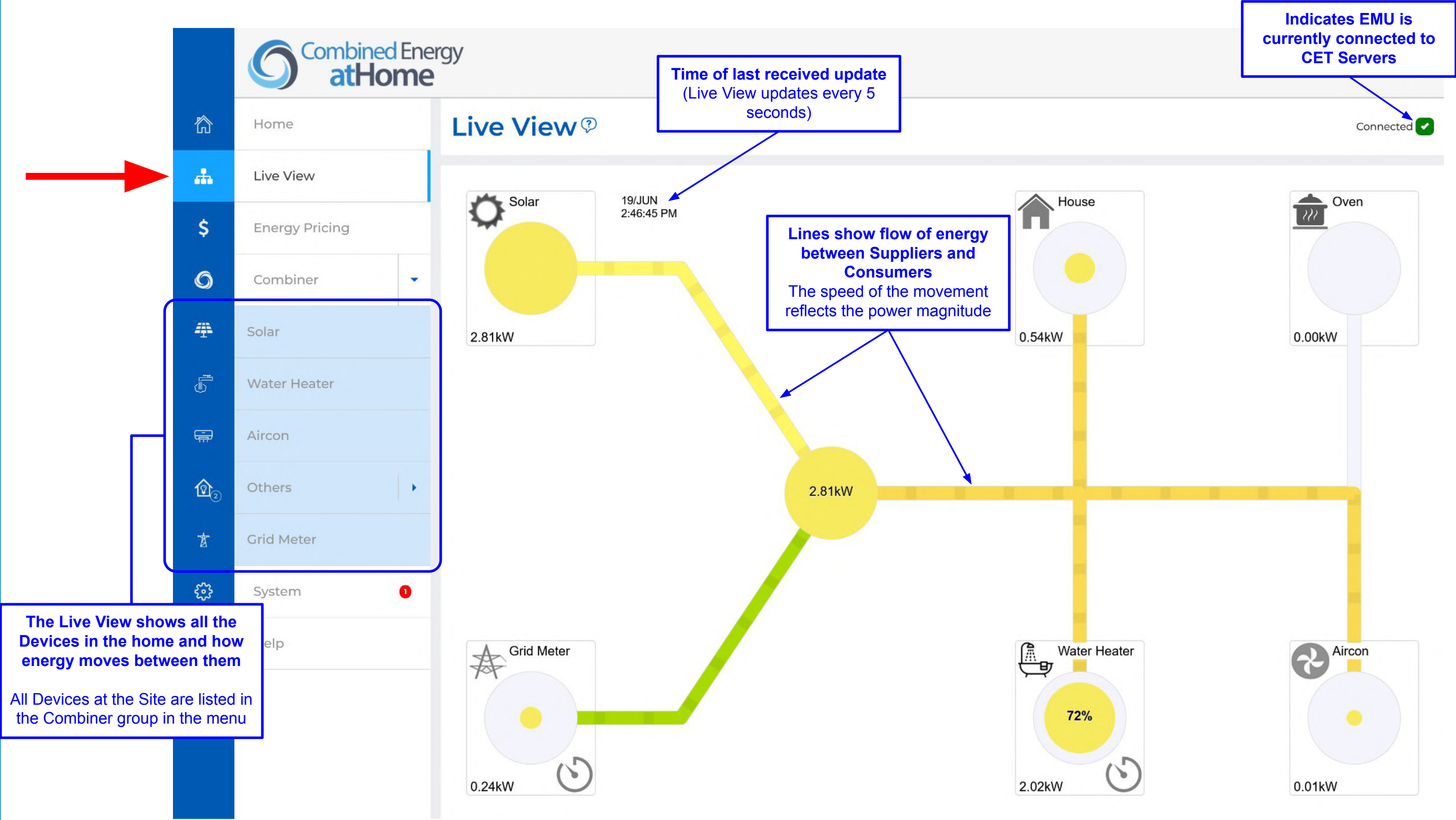
The middle grey label shows the currently selected range ('1 month' in this example)

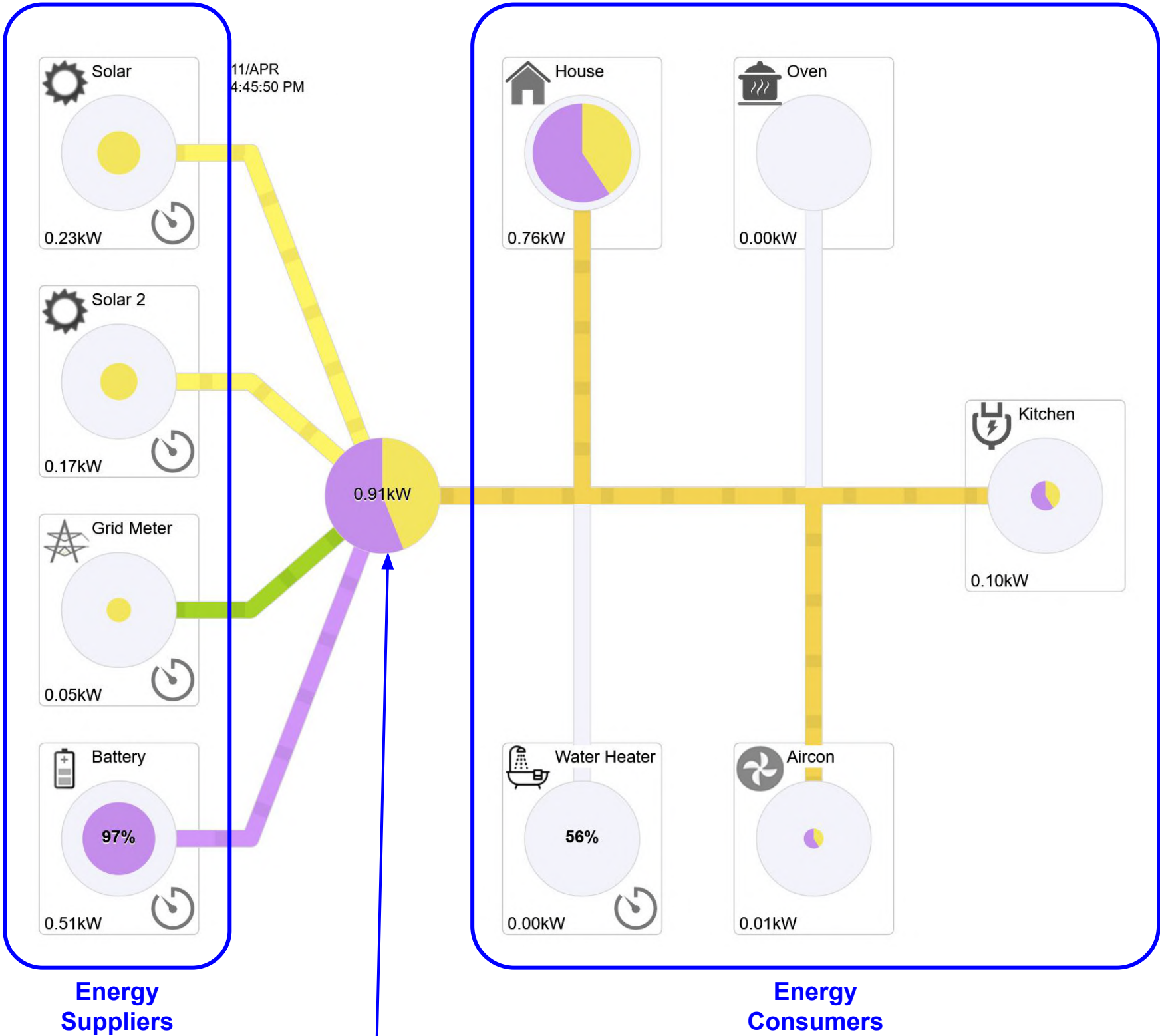
All help pages, including the initial Welcome message, can be accessed through the Help page

24

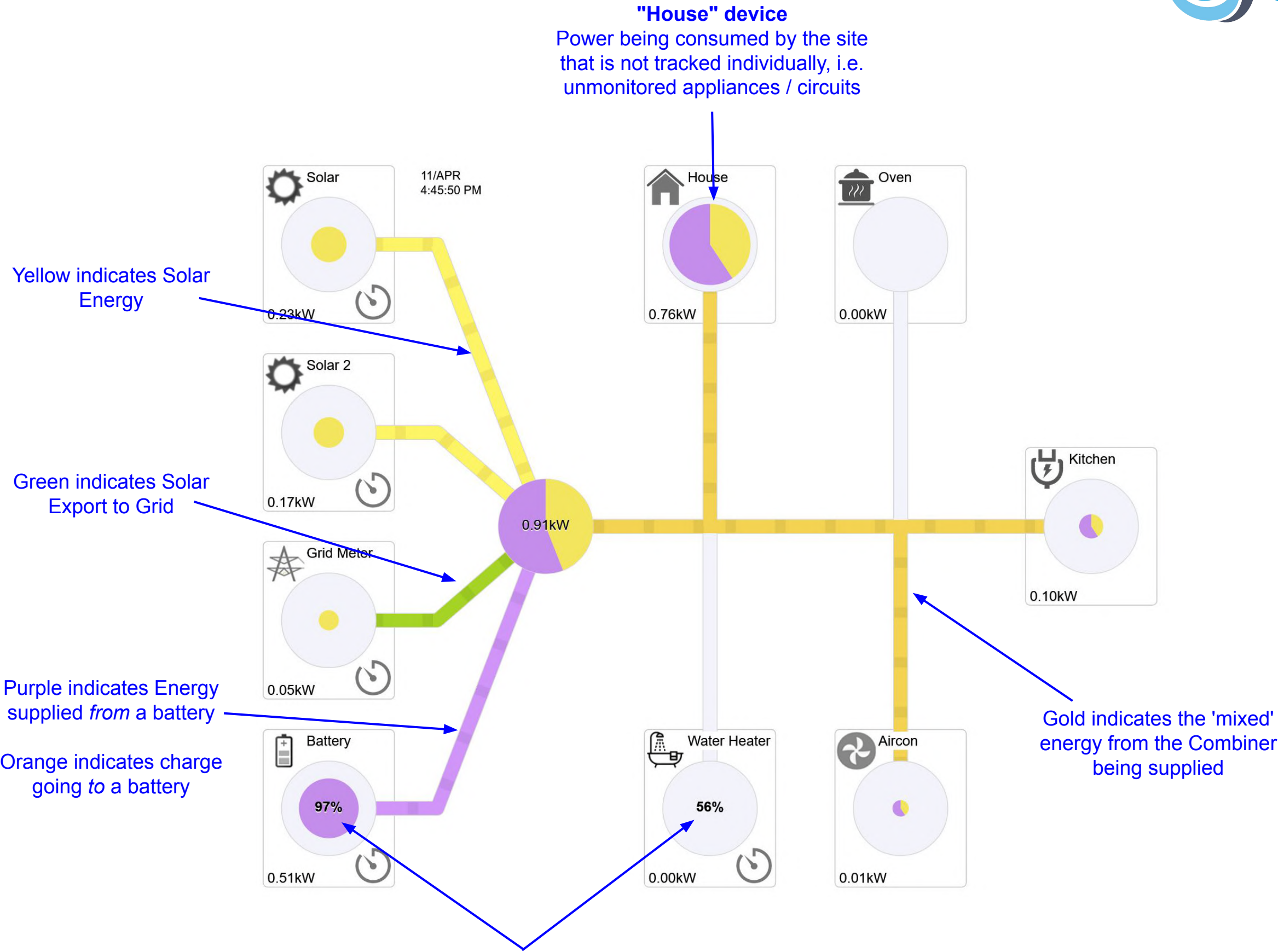








"Combiner"
Shows total power being
consumed / produced by the site



Charge State Percentage for energy storage devices

In this example the battery has 97% charge, so it is supplying energy to the home to offset grid usage.

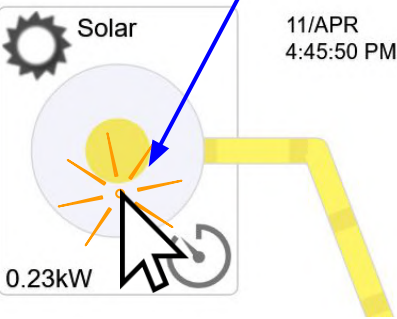
The water heater in this example is at 56% charge, meaning it has 56% of its maximum amount of usable hot water

atHome website

Device Analysis for Solar



Clicking on a device in the Live View will open the analysis page for that device. Device Pages can also be accessed from the side menu.



Click to change date range of analysis data

The middle grey label shows the currently selected range ('1 month' in this example)

The **Cost Analysis** section shows the total savings and revenue for the Device during the selected time interval, as well as a daily averages.

If the 'Tariff' option is enabled, the Savings at each tariff price bracket (as defined on the Energy Pricing page) are also shown.

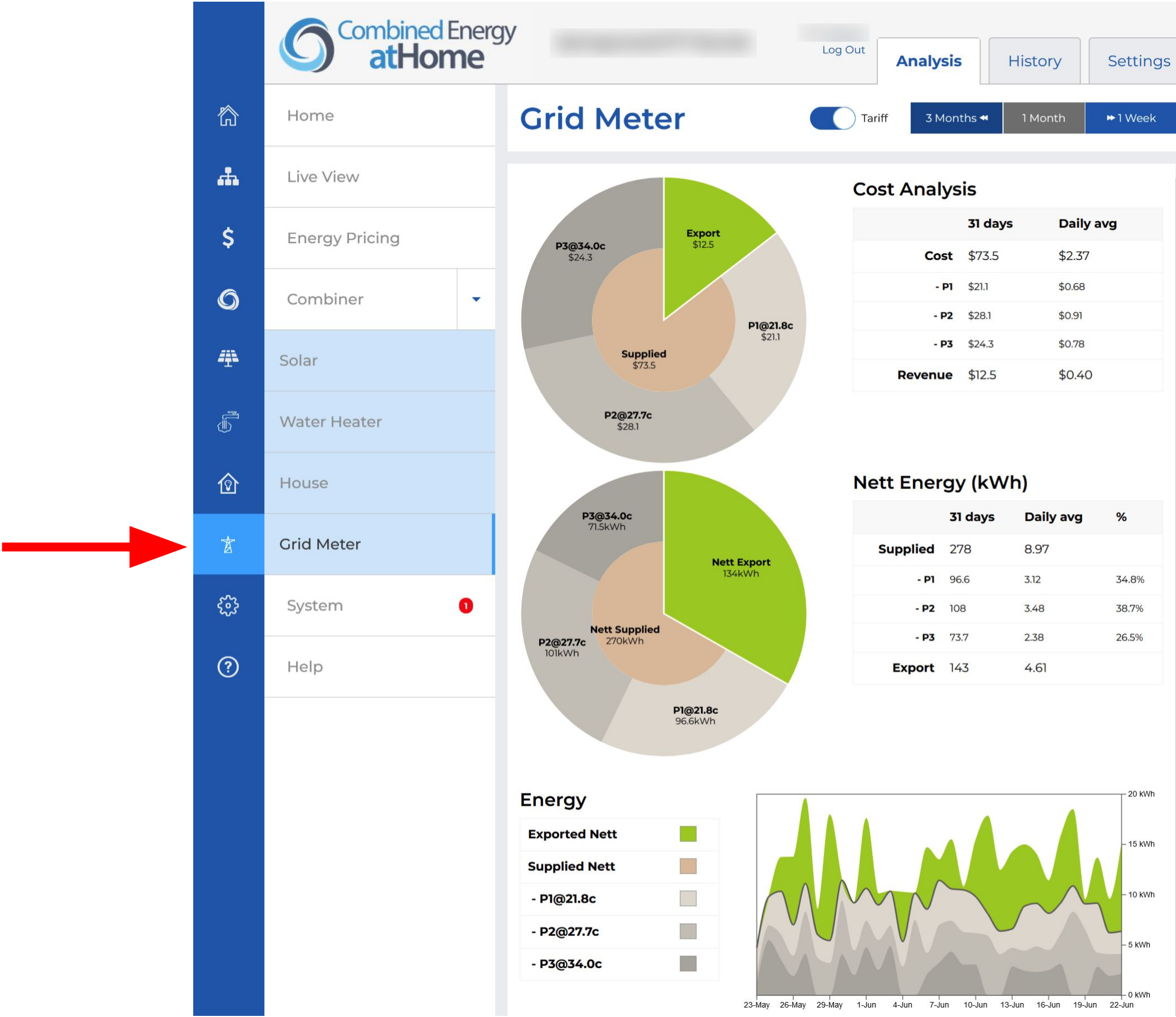
In this example, the Solar offset \$55.8 of grid consumption and earned \$7.30 in export revenue in the last 31 days.

The **Energy** section shows the total supplied / consumed energy for the Device during the selected time interval.

In the case of a Solar device, energy is split into 'Supplied' (i.e. consumed by the home) and 'Exported' (to the grid).

In this example, 249kWh of solar energy were produced in total, with 166kWh (66.6%) self-consumed in the home in the last 31 days.

atHome website
Device Analysis for Grid



The **Cost Analysis** section shows the total cost of grid energy supplied to the home during the selected time interval, as well as a daily averages.

If the 'Tariff' option is enabled, the cost at each tariff price bracket (as defined on the Energy Pricing page) is also shown.

In this example, \$73.5 of grid energy was purchased in the previous 31 days, and \$12.5 was earned by exporting solar

The **Energy** section shows the nett total energy that was imported and exported from/to the grid during the selected time interval.

In this example, 278kWh of grid energy was supplied to the home, and 143kWh of solar was exported to the grid in the last 31 days.

atHome website
Device Analysis for Batteries



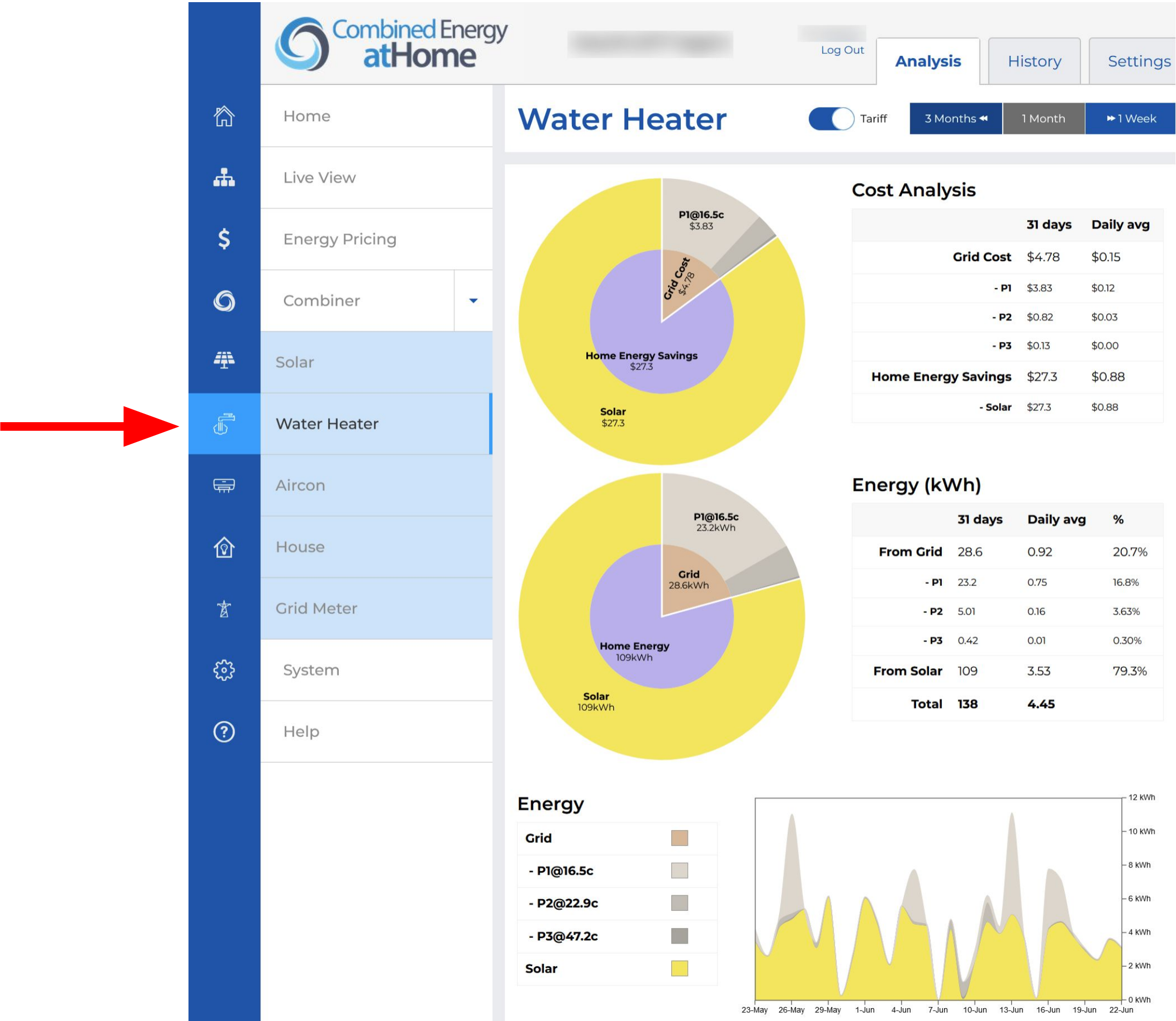
The **Energy** section shows the total energy that was used to charge and discharge the battery during the selected time interval.

In this example, 295kWh of energy was used to charge the battery, and 264kWh was discharged from the battery back into the home in the last 28 days. 98.6% of the energy used to charge the battery came from solar.

The difference between the total charge and discharge energy is due to the round trip efficiency of the charge/discharge cycle.

atHome website

Device Analysis for devices that consume energy



The **Cost Analysis** section shows the total cost of energy supplied to the device during the selected time interval, as well as the total savings due to self-consumption of solar energy

If the 'Tariff' option is enabled, the cost at each tariff price bracket (as defined on the Energy Pricing page) is also shown.

In this example, \$4.78 of grid energy was used to charge the water heater in the previous 31 days, and the equivalent of \$27.3 was saved through solar self-consumption.

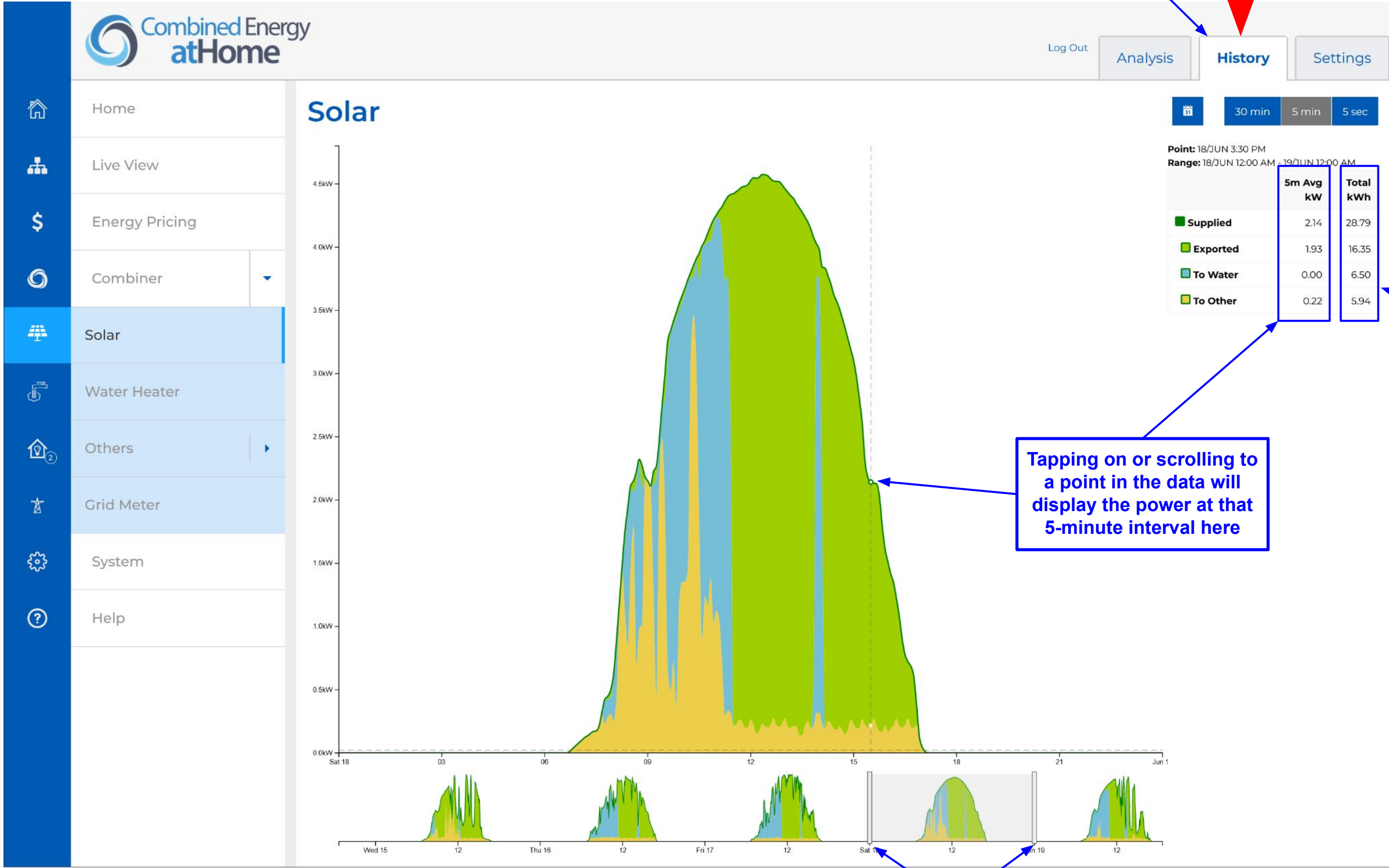
The **Energy** section shows the total energy that was consumed by the device in the previous 31 days.

In this example, 28.6kWh of grid energy was supplied to the device, and 109kWh came from solar.

atHome website
Device History for Solar



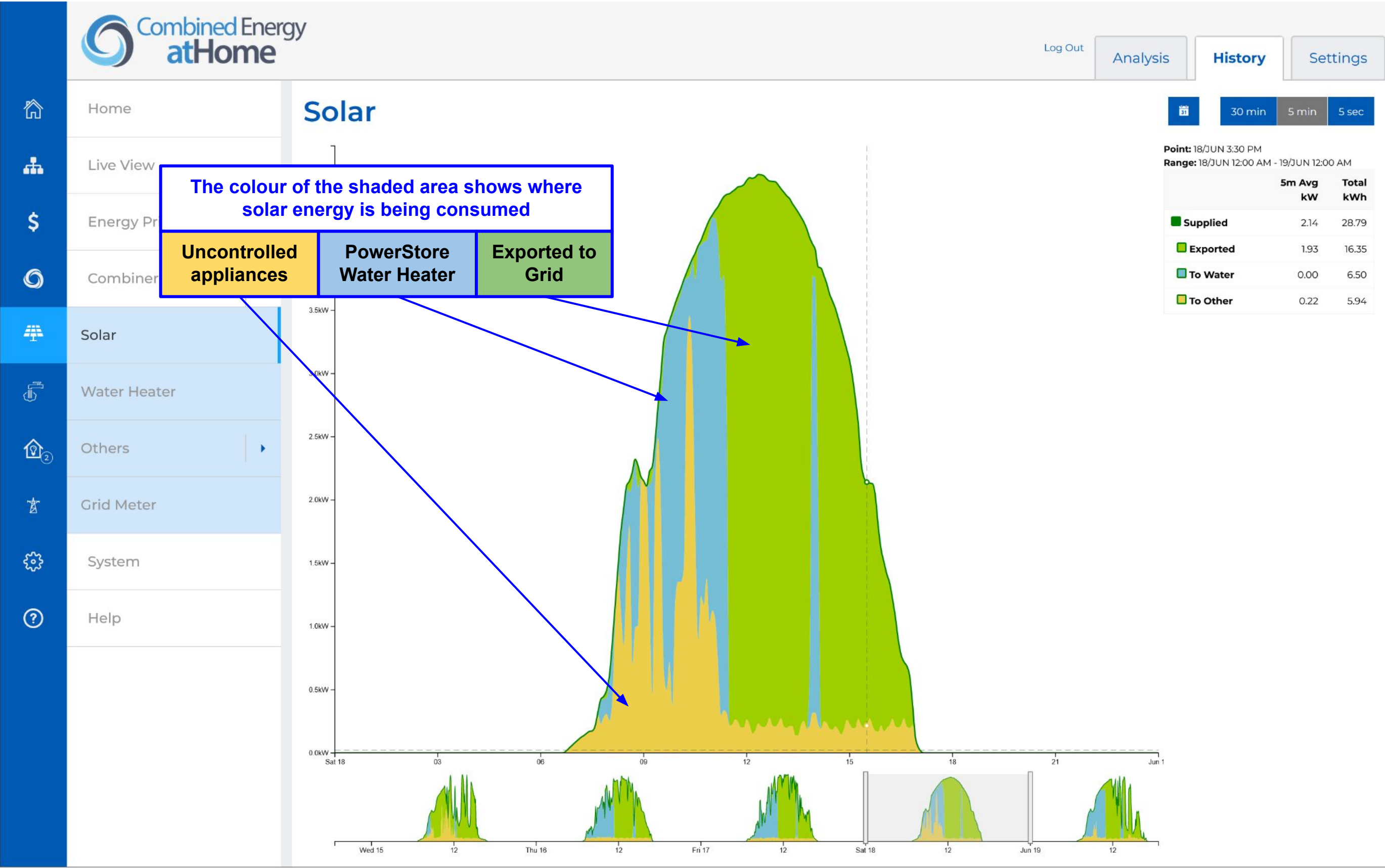
Click the 'History' tab to view detailed historical data for the Device

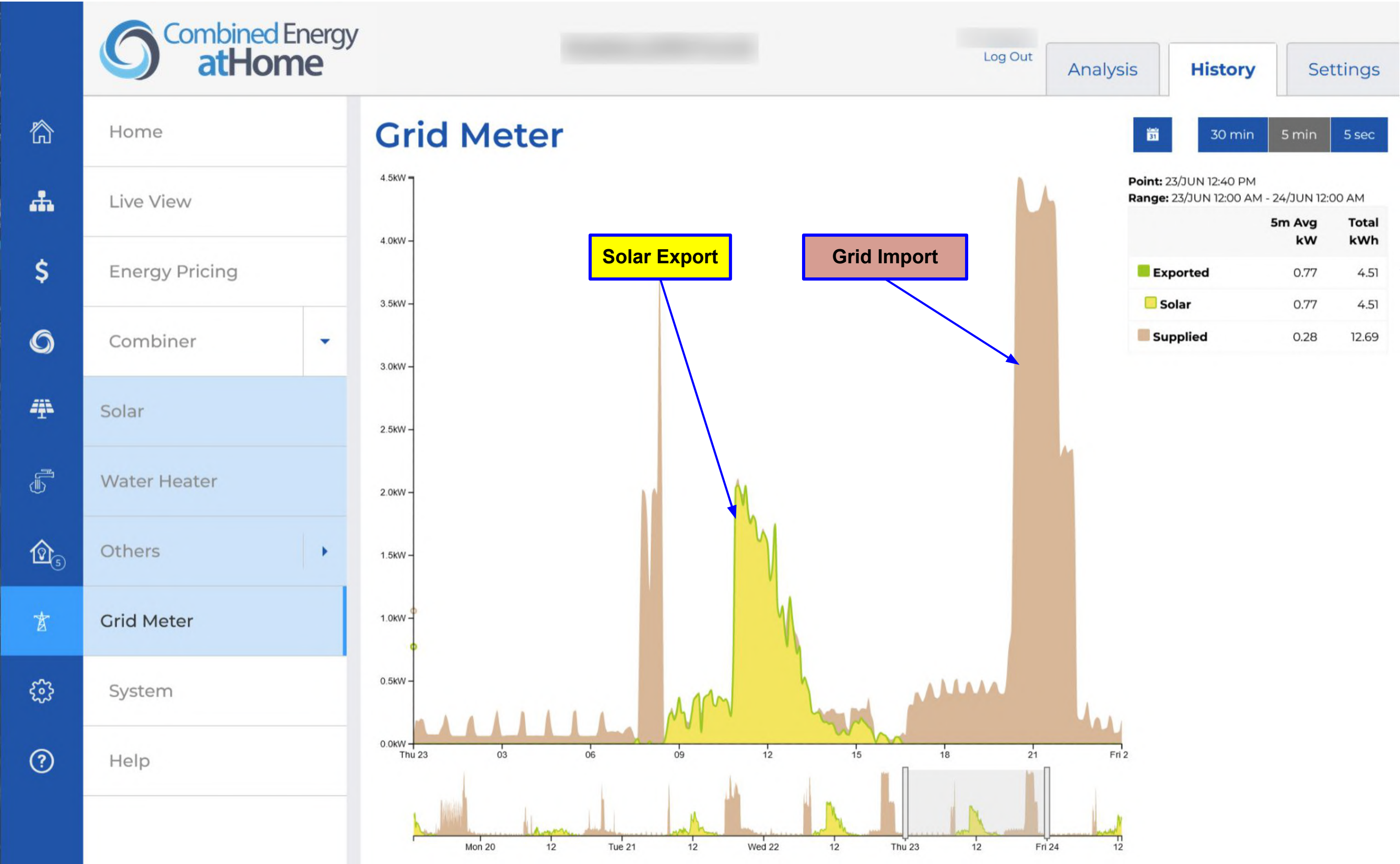


Energy totals for the displayed date range are shown in this table

In this example, the total solar produced in the selected date range was 28.79kWh, with 16.35kWh exported to the grid, 6.5kWh used to charge the water heater, and 5.94kWh consumed by the rest of the home.

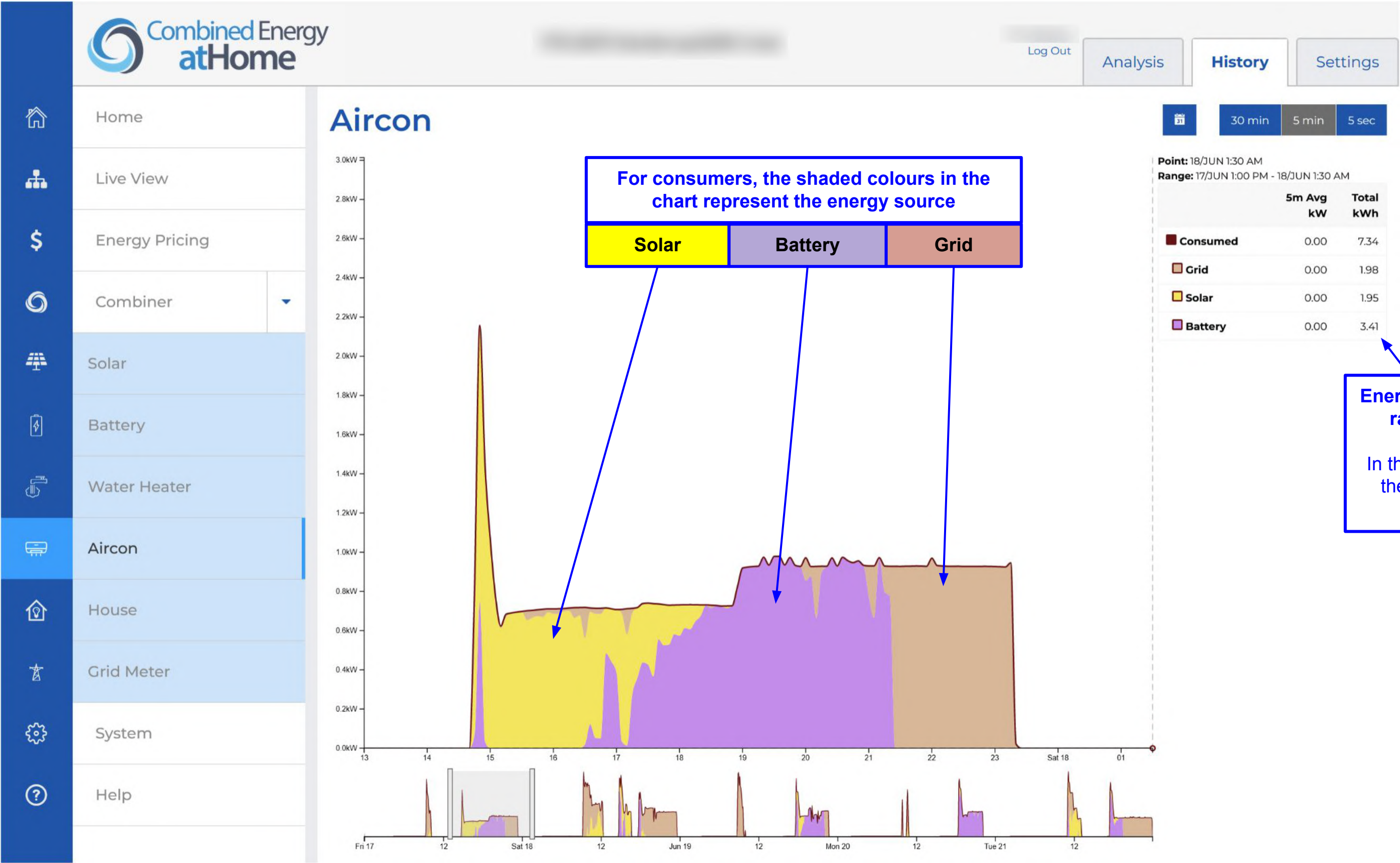
Move these bars in the charting summary to view a specific interval in detail





atHome website

Device History for devices that consume energy



There are some important prerequisites for Installations that should be considered before installation.

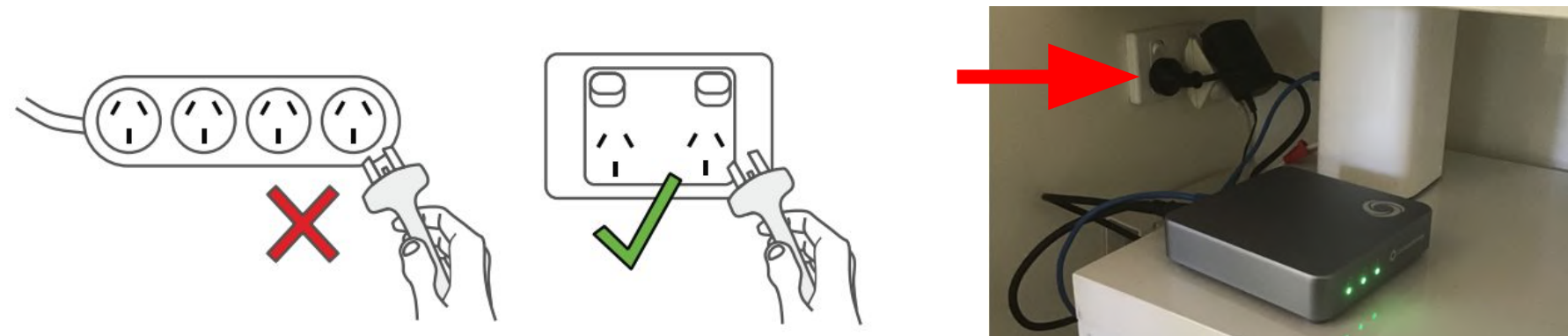
Make sure all of these requirements can be met before proceeding with an installation:

- 1. The site must have a permanent internet service**
- 2. The grid supply at the site must be monitored (using a Power Meter and CT clamps)**
- 3. All solar PV at the site must be monitored (either via data connection or using CT clamps)**
- 4. All batteries at the site must be monitored (with a data connection if supported by vendor)**
- 5. Batteries, Hybrid Inverters, and export-limiting Solar Inverters must have a data connection if possible**
- 6. Third-party energy control systems at the site (Amber, SolarEdge meter, Reposit, Solar Analytics meters with relays, etc) must be reported**

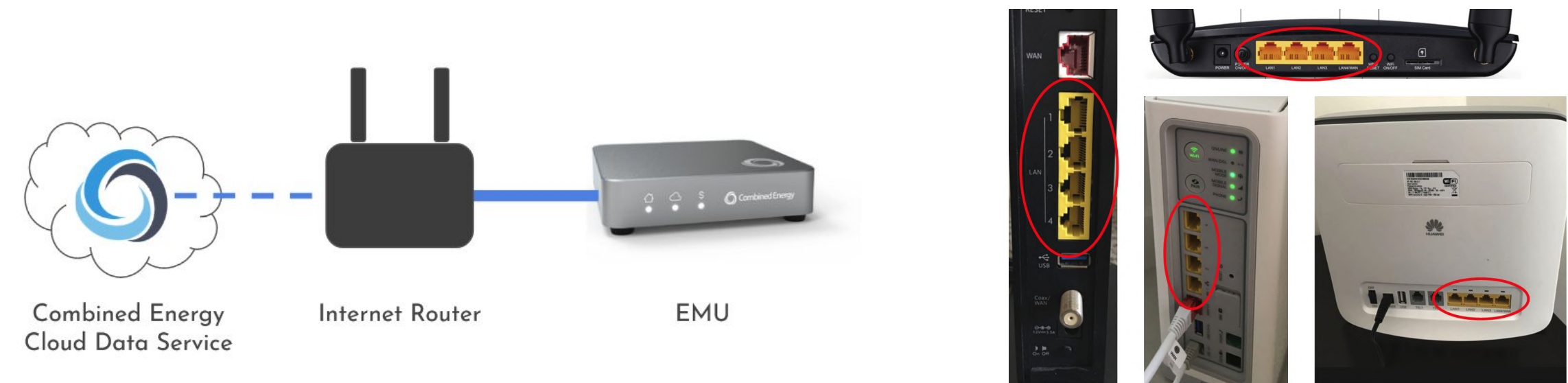
Installations

EMU Installation

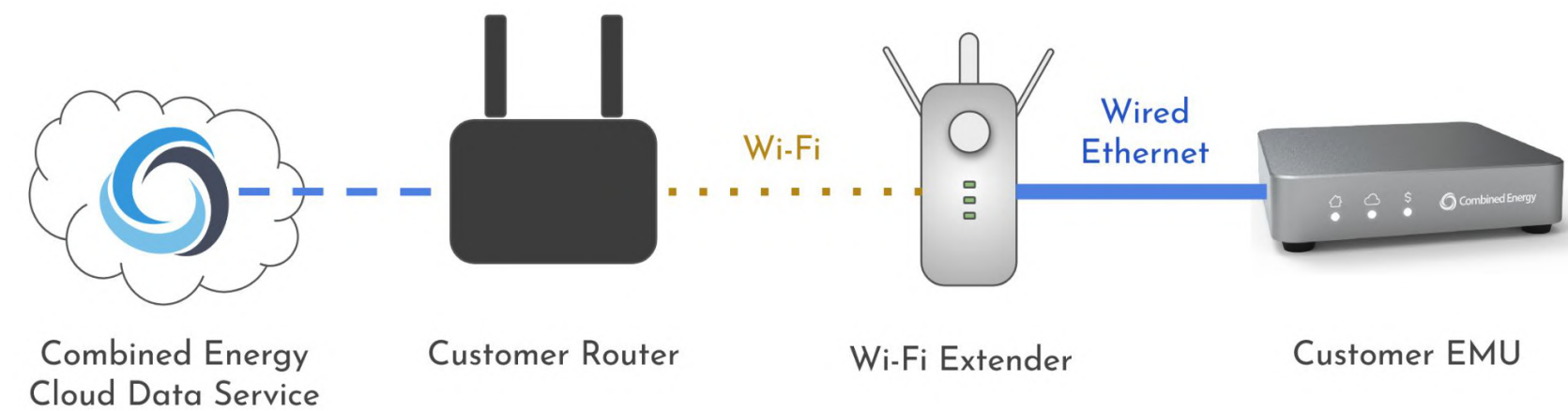
The EMU must be plugged directly into a wall outlet (**not** into a powerboard):



A spare Ethernet port (yellow "LAN" port) is required on the router to connect the EMU:



If the customer has a Wi-Fi hotspot only (i.e. no Ethernet port), a Wi-Fi extender with an Ethernet port can be added to the system:

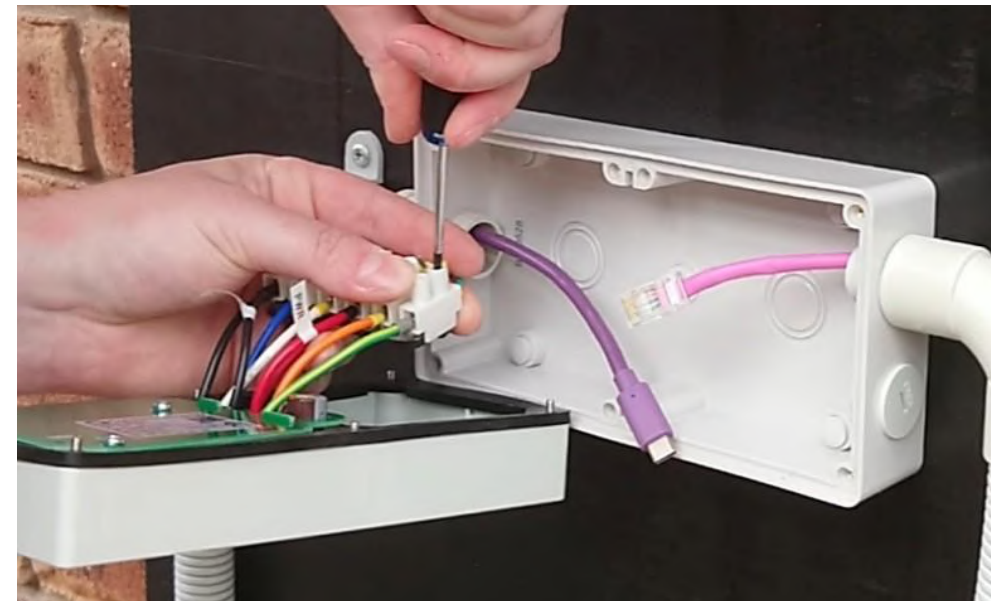


Installations

Power Meter Installation



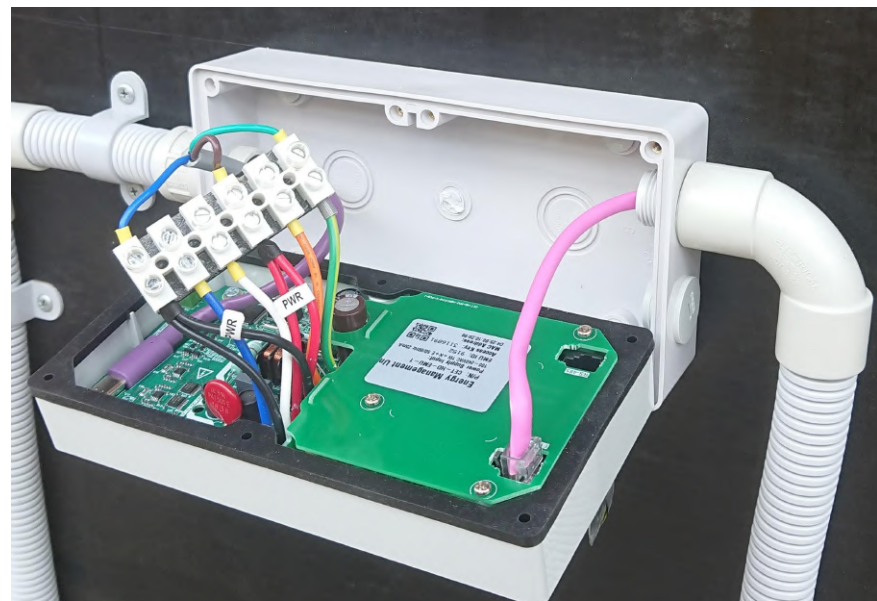
1 - Mount Enclosure Base to Wall



2 - Connect LV Supply Cables



3 - Connect CT Harness



4 - Connect Inverter Data Cable



5 - Close Lid and Seal



6 - Fit screw caps

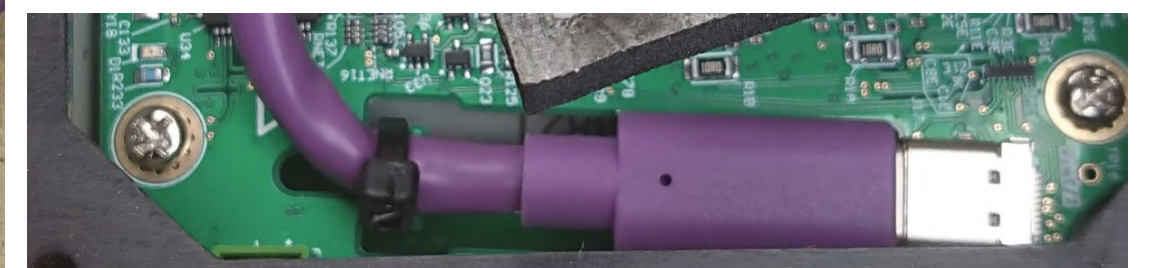
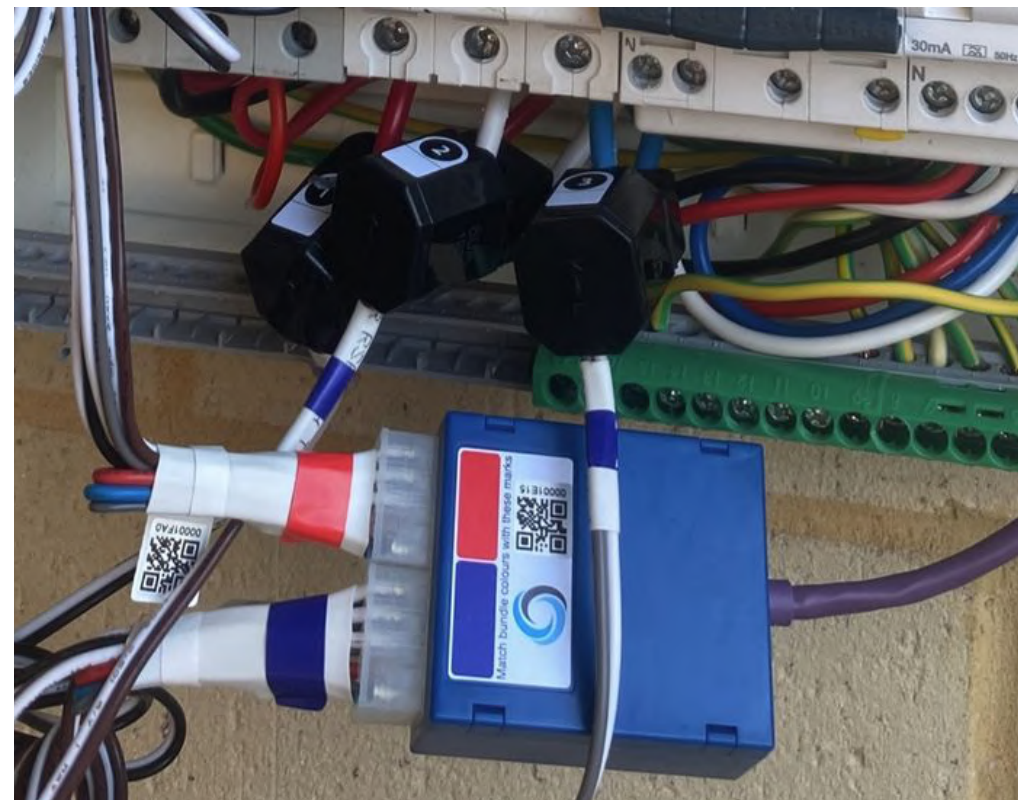
Installations

Power Meter CT Harness Installation

The Combined Energy **CT Harness** system enables easy connection of up to 6 Current Transformers (CTs) to Combined Energy metering products:



The CT Harness accepts up to two **CT Bundles**, each with three CTs:



Installations

Example single-phase site with PowerStore Grid Interactive (v2.0)

System description

- PowerStore Grid Interactive water heater being installed
- ABB Solar being installed (Inverter has Ethernet interface)
- Single-phase home
- Customer would like air-conditioning and cooking circuits monitored

Required Materials

- 1 x CET-HD-EMU-1 Energy Management Unit
- 1 x CET-HD-PM2-1 Power Meter
- 1 x CET-AS-CT1-30-1 CT Harness
- 1 x CET-CT1-B060606-1 60A CT Bundle
- 1 x 315E5X36 PowerStore Grid Interactive
- 3m double-insulated Ethernet cable



Installation Sequence

1. EMU plugged directly into wall outlet and connected to customer router:

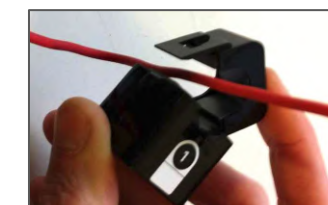


2. Power Meter installed on wall behind Main Switchboard adjacent to Inverter:



3. The Power Meter is connected to the Inverter with an Ethernet cable for comms.

4. CTs Installed in switchboard:
 - a. Red 1 clipped on to Grid supply
 - b. Red 2 on Air-conditioning circuit
 - c. Red 3 on Cooking circuit



5. Installer uses *onSite* web app to contact CET to test power meter, inverter connection, and check PowerStore is working correctly

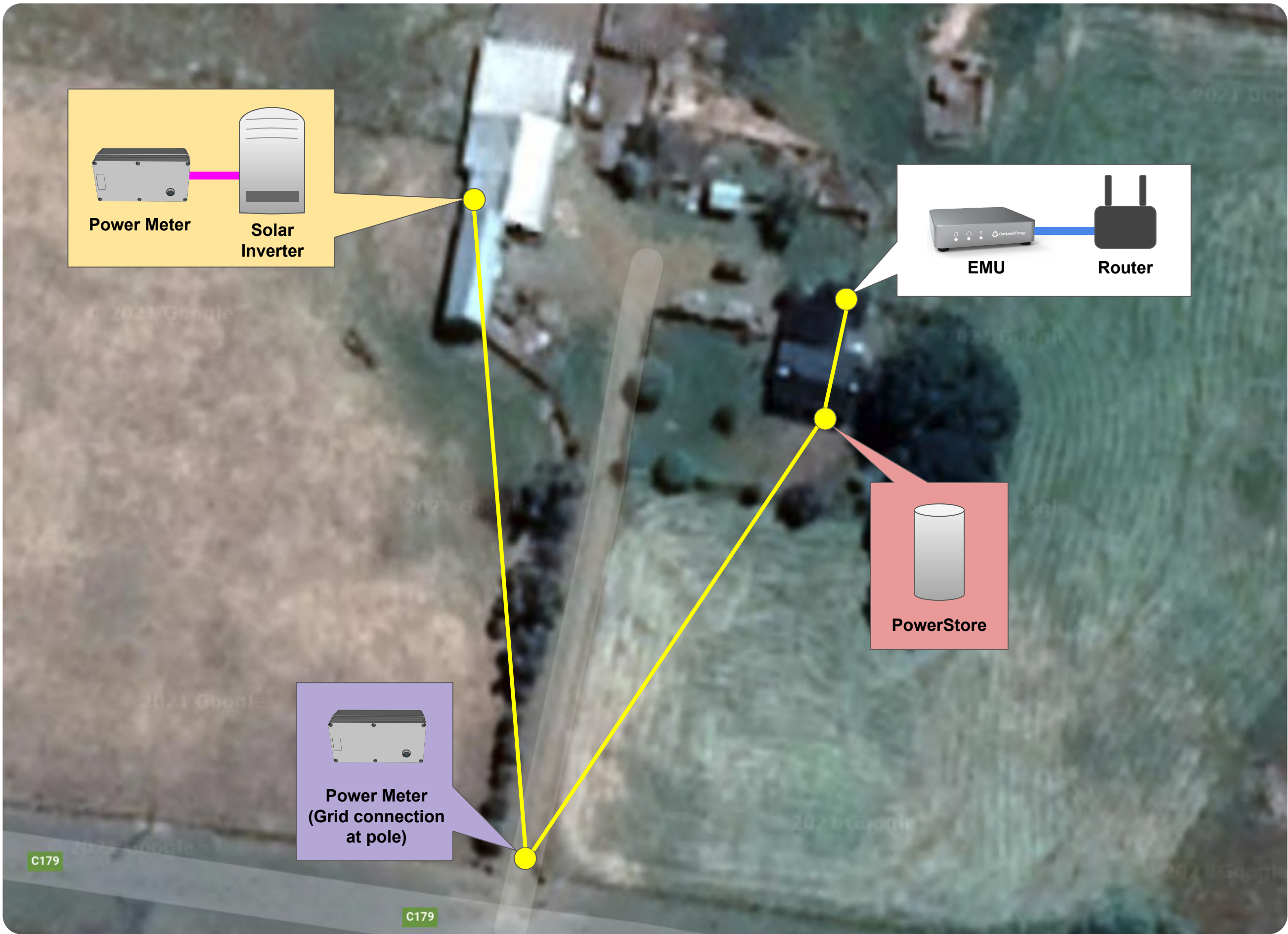


Powerline Communications (PLC)

Powerline Communications offers a few key advantages over other communications technologies:

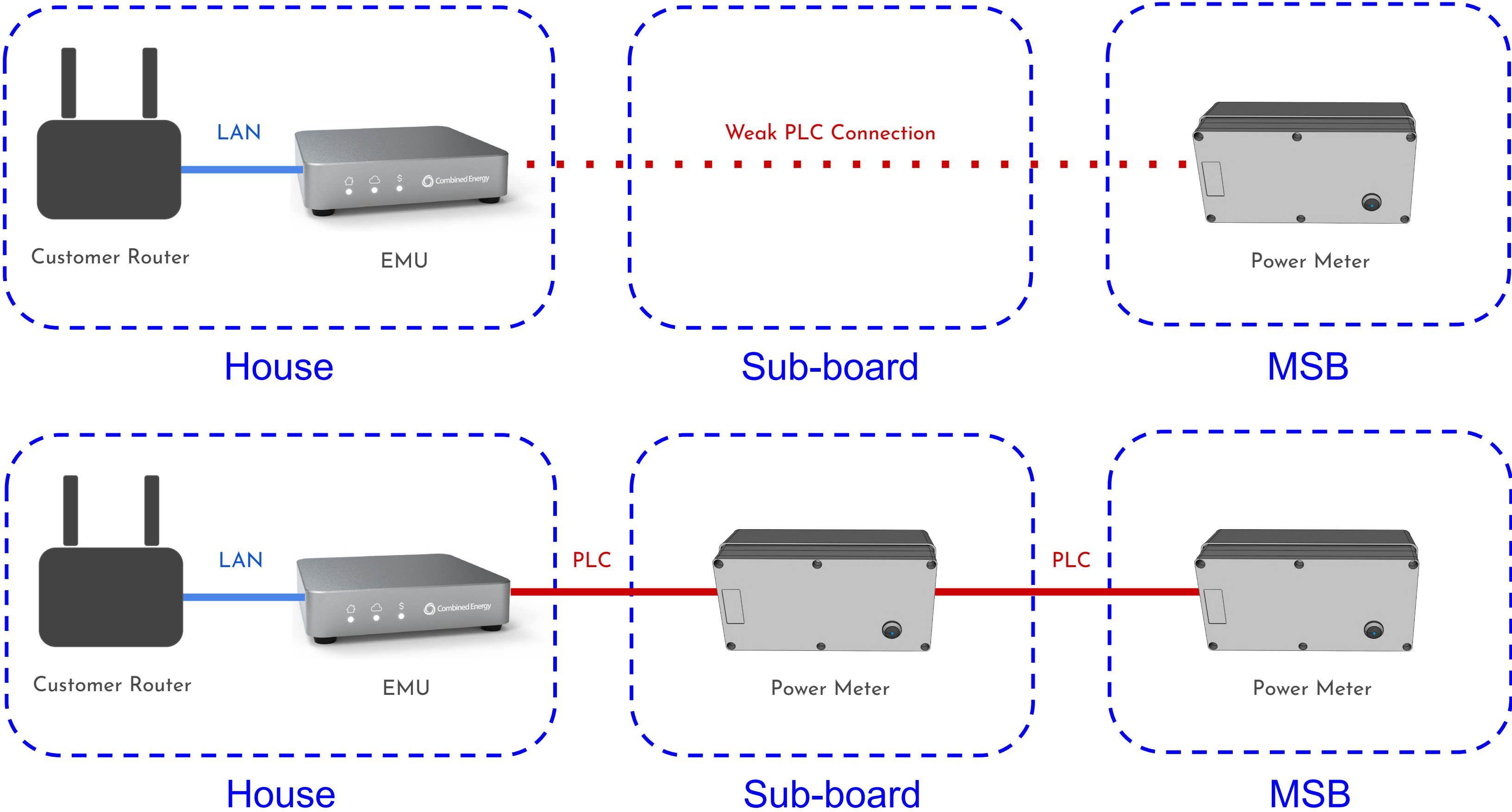
- No need for password setup / pairing
- HEMS network is completely separate from customer network
 - Customer IT equipment often blocks traffic between devices on Ethernet / Wi-Fi network
- No need to reconnect devices when customer upgrades their router or changes their Wi-Fi password
- Connected appliances (e.g. PowerStore) are often located in Wi-Fi dead zones
 - But very easy to get to via the power supply cable
- Inbuilt multi-hop capability

Powerline Communications (PLC) Multihop Capability



In this example, multihop communications enables the EMU to communicate with devices in the shed via intermediate nodes on the far side of the house and at the main switchboard on the street.

Powerline Communications (PLC) Multihop Capability

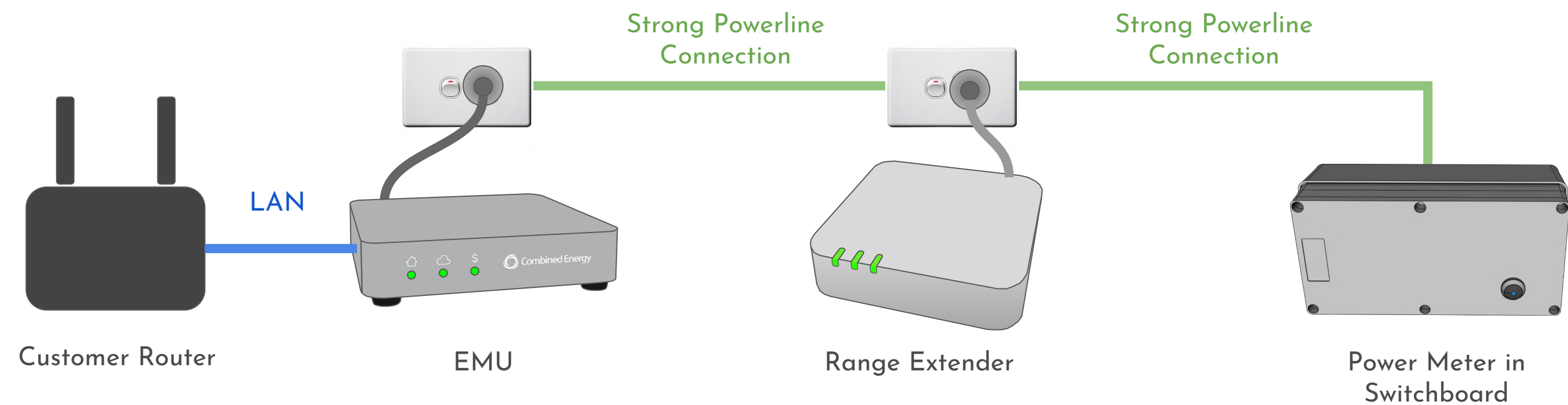
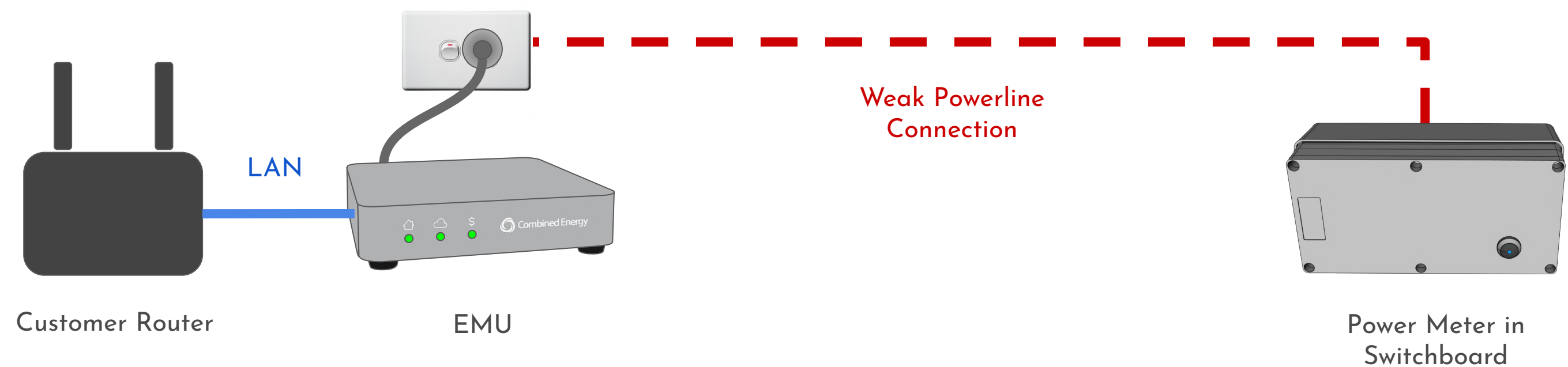


Powerline Communications works by modulating high frequency signals onto the existing building powerlines.

As with all communications technologies, environmental conditions can cause two types of degradation of these signals:

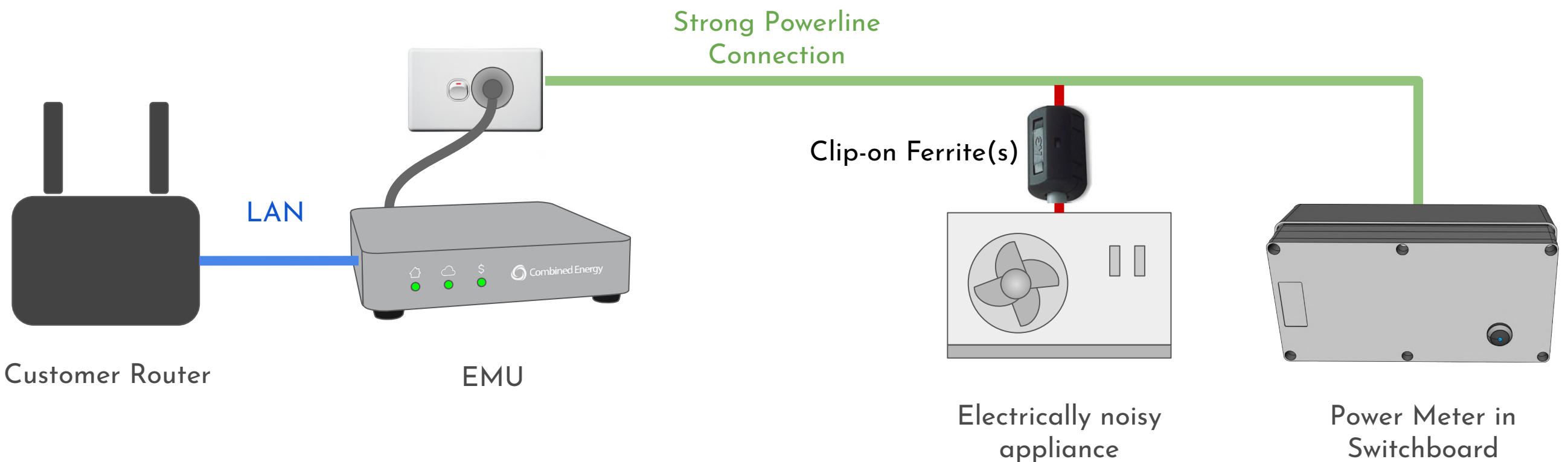
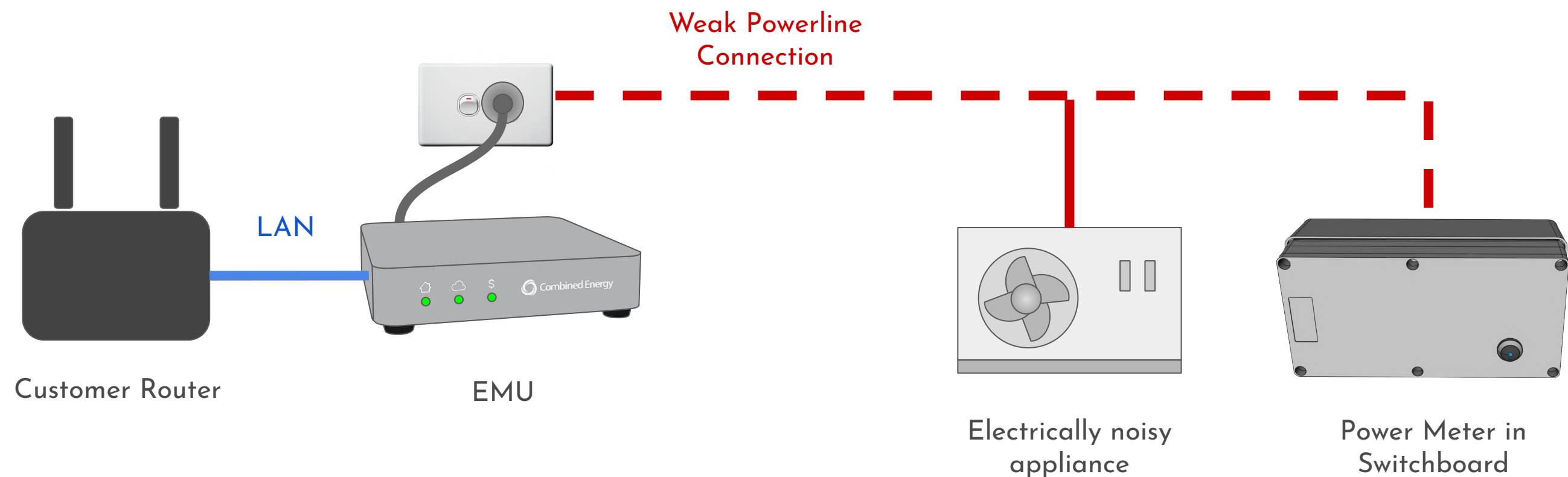
1. **Attenuation (signal level is reduced)**, which is caused by:
 - a. Filters built into power boards
 - b. Filters found in some "smart" GPOs
 - c. Some appliance power supplies, DIN-rail power supplies
2. **Interference (signal is drowned out)**, caused by:
 - a. Some models of solar inverter (e.g. older HD-WAVE SolarEdge inverters)
 - b. Noisy plugpack power supplies for IT appliances

Powerline Communications (PLC) Range Extender (CET-H4-RE2-1)



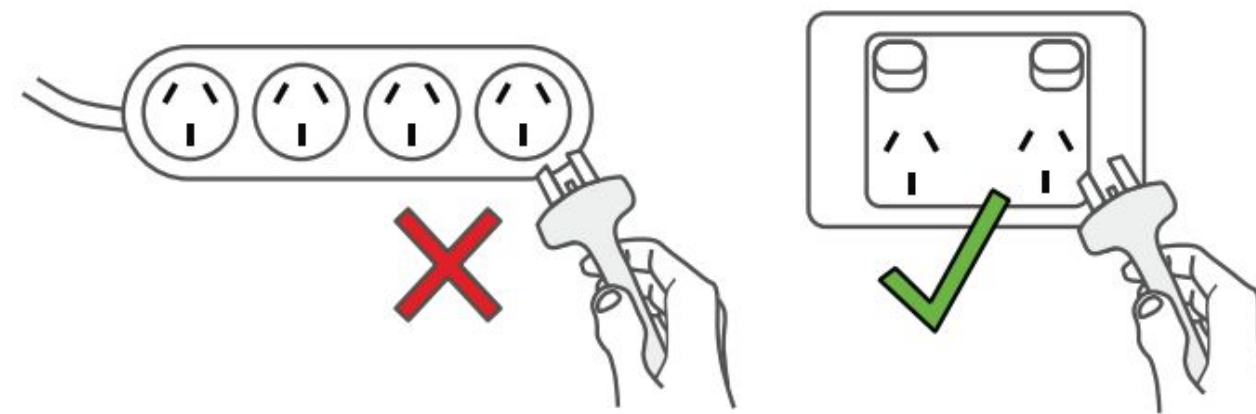
Powerline Communications (PLC)

Clip-on Ferrites



Strategies for improving PLC performance in sites with poor comms:

1. Ensure EMU is plugged directly into a GPO, not a powerboard - this prevents the EMU's powerline signals from being filtered out



2. Move the EMU further away from sources of noise (e.g. IT equipment power supplies), e.g:
 - a. Try another GPO
 - b. Move the EMU to a different circuit/room using either:
 - i. Existing Ethernet ports in the home
 - ii. A Wi-Fi extender (preferably an existing one)
 - c. *Note: It is often better to move the EMU to a different circuit, rather than just closer to the switchboard*



Products and Part Numbers

Part Name	Part Number	Notes	Image
Energy Management Unit	CET-HD-EMU-1	- Required at all Sites - Supplied with power and Ethernet cable User Manual	
Power Meter	CET-HD-PM2-1	- Required at all Sites - Supplied with mounting accessories - CT Bundles and CT Harnesses ordered separately User Manual	
CT Harness	CET-AS-CT1-05-1 (0.5m) CET-AS-CT1-30-1 (3m)	- Each Power Meter requires one CT Harness to connect the CT Bundles - Available in two lengths (3m / 0.5m) - See PM2 User Manual for installation details	
CT Bundle	CET-CT1-B060606-1 (60A) CET-CT1-B121212-1 (120A) CET-CT1-B202020-1 (200A)	- CT Bundles have 3 CTs each - Each Power Meter can support up to two CT Bundles - CT Bundles plug into CT Harness - Available in 60A / 120A / 200A options - Higher current ratings available on request - See PM2 User Manual for installation details	
Range Extender	CET-H4-RE2-1	Customer-installable Range Extender / repeater for the HEMS HD-PLC network	



Installer Kit

Products and Part Numbers

Installer Kit and replacement parts

Part Name	Part Number	Notes	Image
EMU System Installer Kit	CET-KIT-EMU-INST-1	1 per Installer team strongly recommended - Collection of useful accessories and parts that are occasionally required during installation - Replacement parts listed below can be ordered separately	
2 x CET-H4-RE2-1 Range Extender	CET-H4-RE2-1	- HD-PLC Range Extender - Customer installable	
22 x Split-core ferrite FAIR-RITE 0431164181 [1 x 22pc tray]	0431164181	Tray of 22 clip-on ferrites for improving PLT performance	
1 x Wi-Fi Extender TP-LINK RE200	TP-LINK RE200	Wi-Fi Range Extender for routers with no spare Ethernet ports, or for relocating EMU	
5 x CET RS485 Filter [1 x 5 pack]	CET-IT2-485FILPK-1	Used with CET Power Meter when connecting to Goodwe DNS series inverters	 x5
2 x Ethernet cable 1.5m, double-insulated	CET-IT1-ETH15-1	For connecting to third-party devices from Power Meters	

Support

onWatch and *atHome* queries

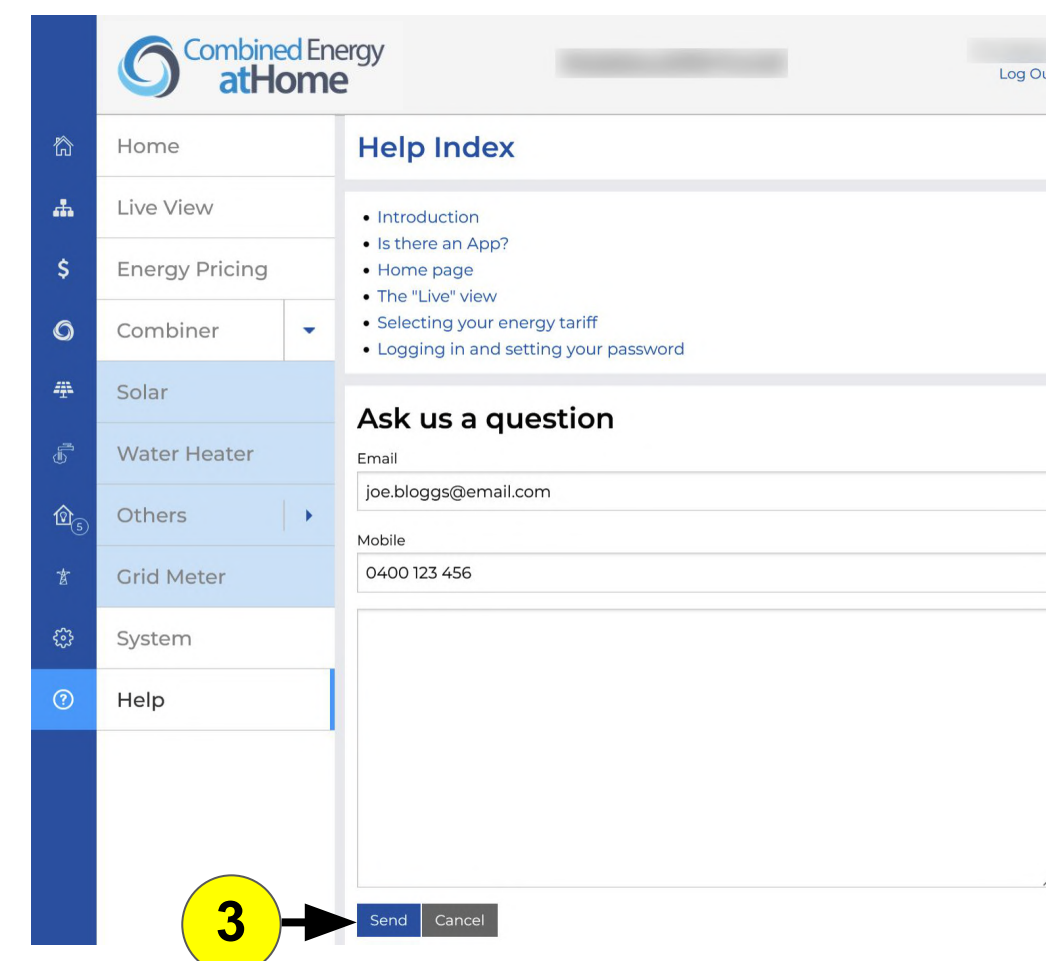
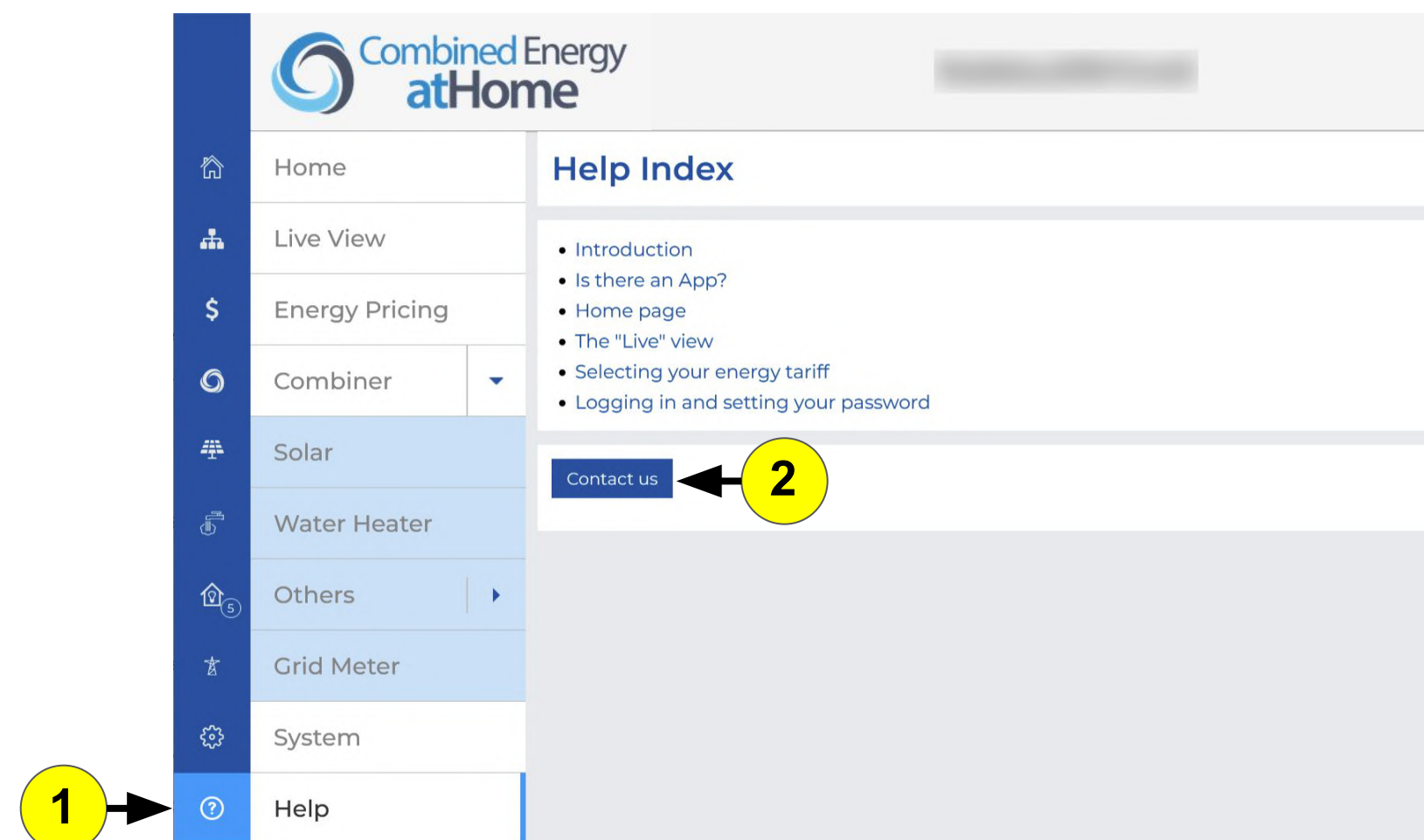


For questions relating to:

- The *onWatch* Portal
- The *atHome* website
- CET Products
- System design and unusual installation requirements

Please email CET Support at: support@combined.energy

Customers and Dealers can also contact CET via the **Contact us** form on the Help page of the *atHome* website:



CET Support can help with:

- Issues relating to CET Apps and Services (e.g. *onWatch*, *atHome*, *onSite*)
- Issues relating to the Home Energy Management system at a specific site, such as:
 - Communication issues (EMU or devices offline)
 - Configuration issues (devices not appearing in Live View, invalid data)
- Setting or changing export limit rules at a site

For issues relating to Rheem products (e.g. PowerStore), CET Support can help with initial diagnosis and can refer product issues to Rheem Support if required.

Please contact CET Support if any part of a system is replaced or upgraded, for example:

- Replacement / repair of PowerStore water heaters
- Replacement / repair of Solar Inverters and Batteries
- Addition of any new major appliances, or any major electrical works

CET can confirm that the Home Energy Management System is properly configured and working before the Installer / service technician leaves the site.

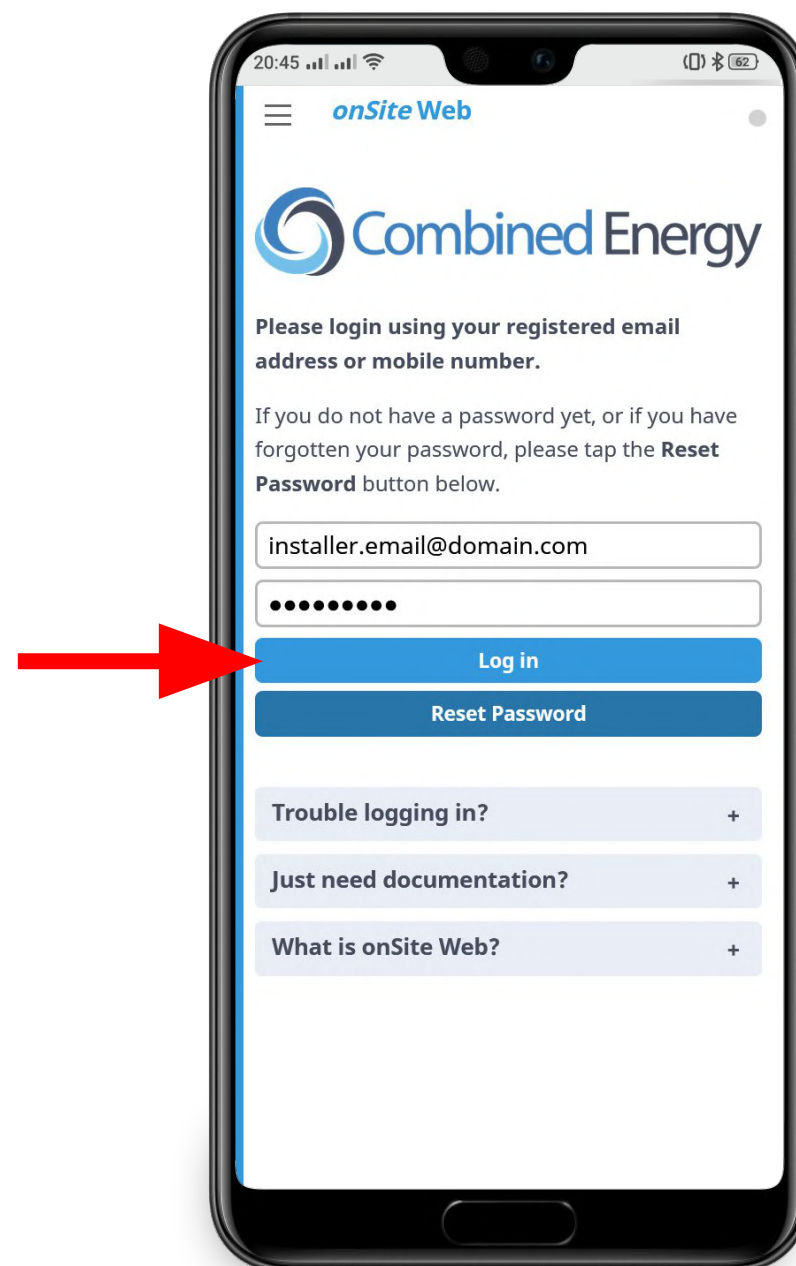
Support

Installer support through *onSite*

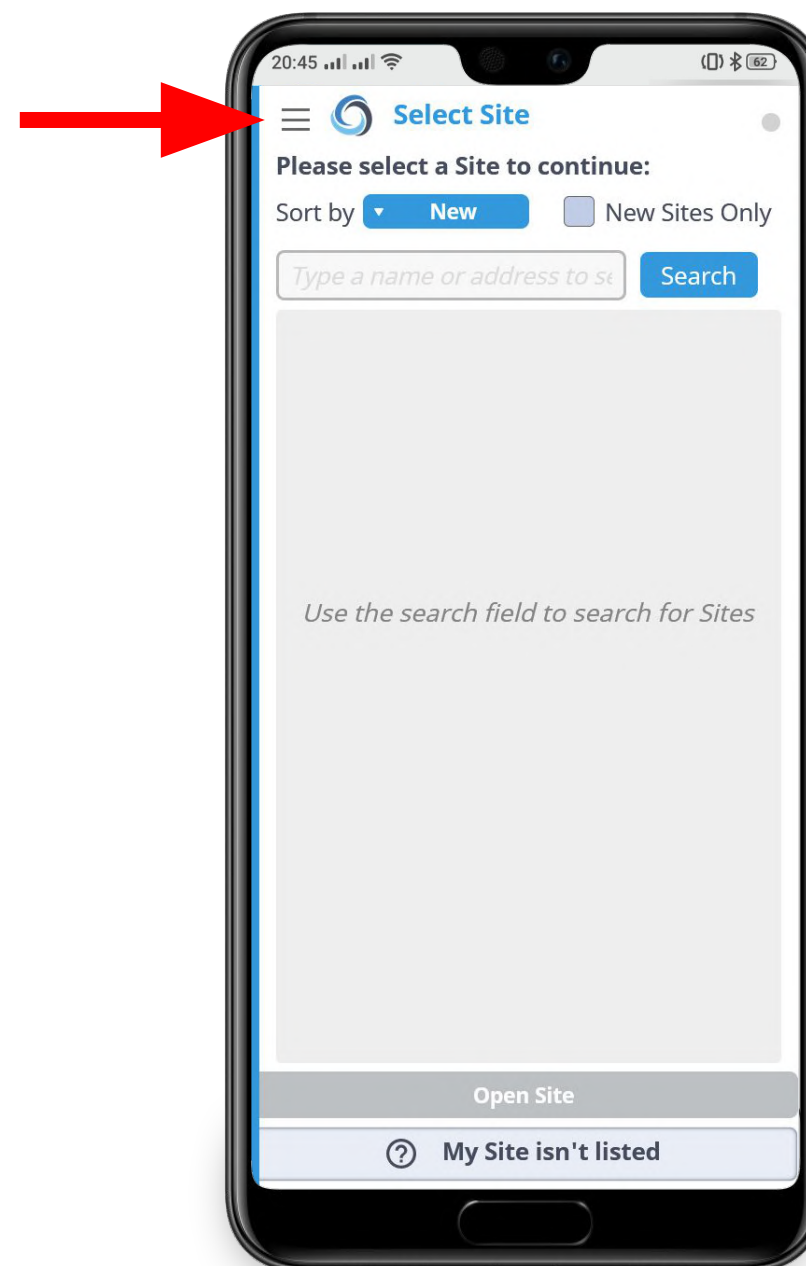


For Installers to receive support while at a site they **must be registered** by the Organisation that manages the customer.

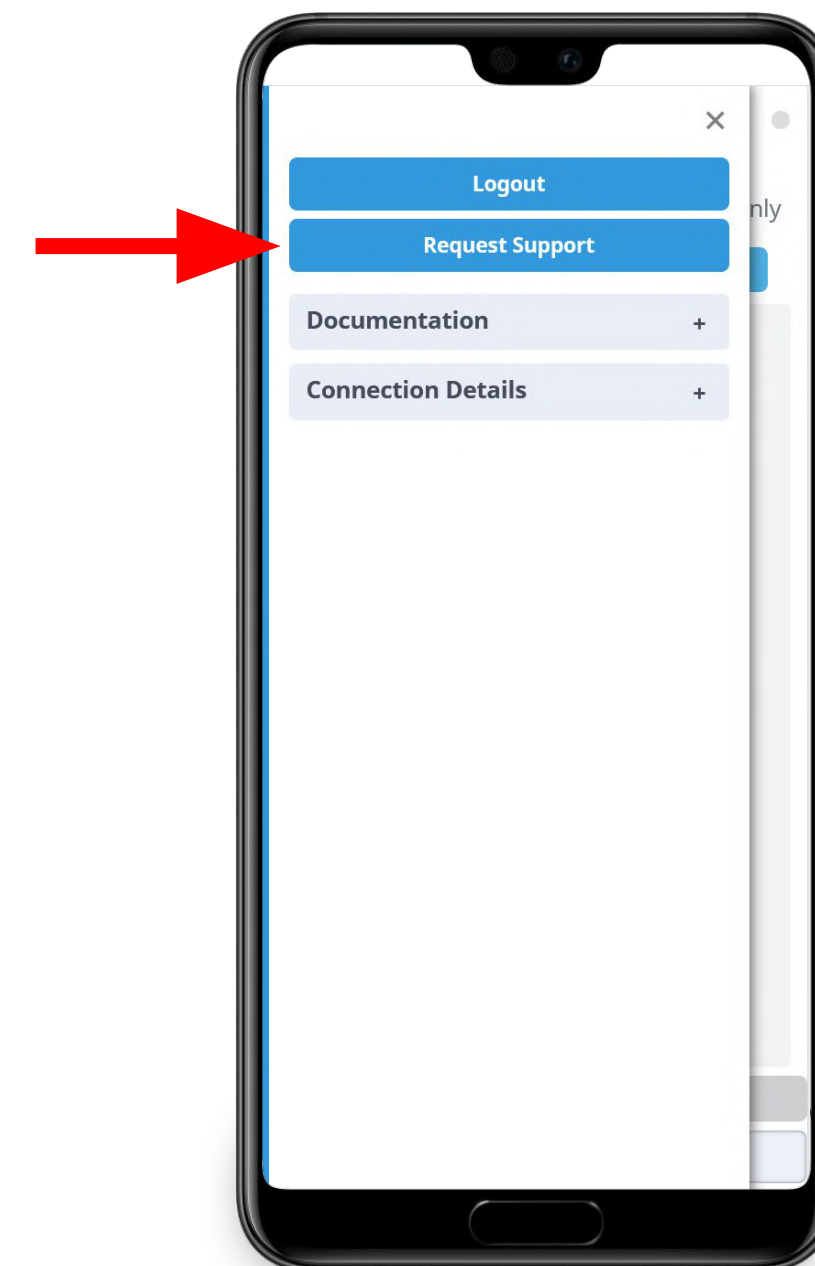
The *onSite* web app can be accessed at <https://onsite.combined.energy/>



Log In



Open Menu



Request Support