

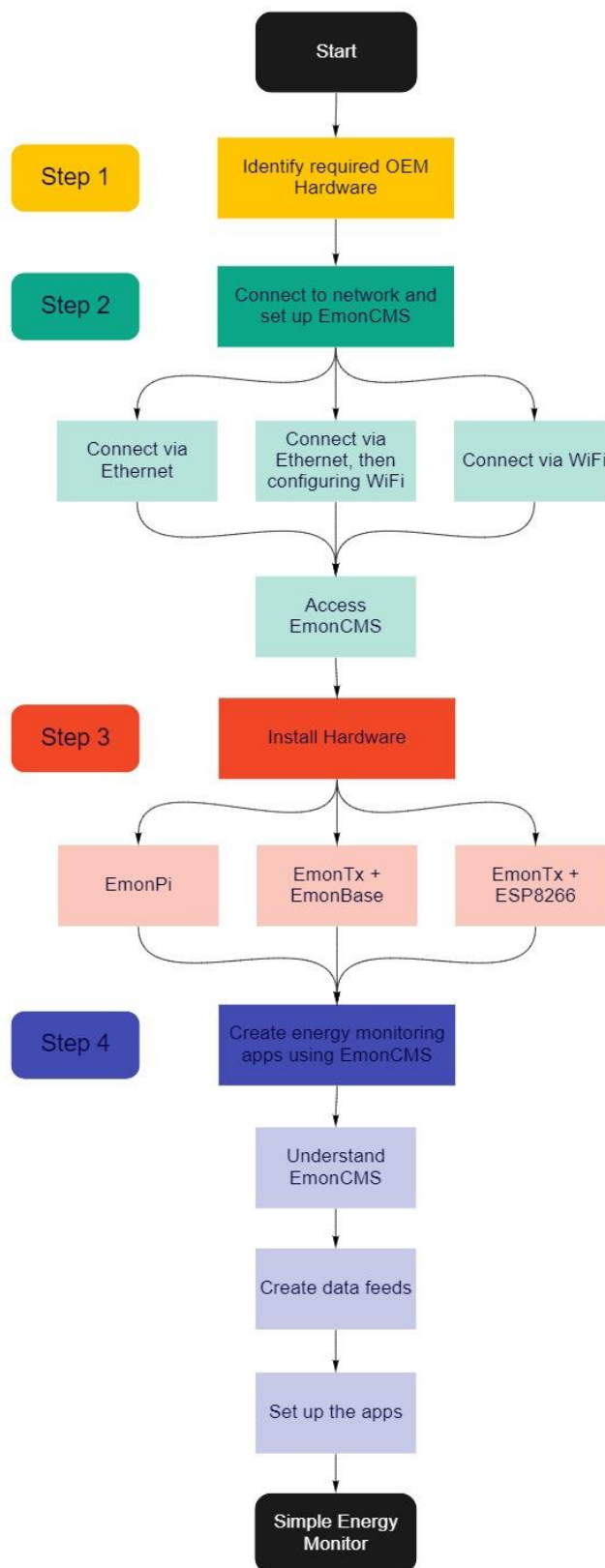
Guide to setting up a simple energy monitor using Open Energy Monitor

The aim of this guide is to show you how to set up a basic electricity consumption monitoring app for your home using the Open Energy Monitor (OEM) Hardware and Software. This is the most basic functionality available. Following this step-by-step guide, you will learn the basics of the OEM platform which are the foundations to learning how to implement this system for more complex monitoring functionalities such as monitoring a heat pump's performance and photovoltaic generation.

There are four steps that must be followed to setup a simple electricity consumption monitoring app:

1. Identifying required OEM Hardware
2. Connecting to network and setting up data logging platform (EmonCMS)
3. Installing Hardware
4. Creating energy monitoring apps using EmonCMS

Figure 1 graphically shows you the steps taken to achieve simple energy monitoring using OEM.



miro

Figure 1: Process flowchart.

Identifying required OEM Hardware

A simple energy monitor to monitor a household's electricity consumption can be created through several different OEM hardware configurations; an EmonPi, an EmonTx + EmonBase, and an EmonTx + ESP8266 WiFi.

Depending on several factors in your home, one configuration may be better than another. In this guide we will be showing how to set up the previously mentioned configurations to create an electricity use monitoring app for your home. To decide which configuration suits your home best, please use Table 1 or Figure 2 below:

Table 1: Configurations based on installation environment.

Configurations	Installation environment
EmonPi	WiFi or ethernet connection available at electric meter location + Min. one AC socket available at electric meter location (two preferred for more accurate power reading) + Single phase system.
EmonTx + EmonBase	Low/No WiFi signal or ethernet next to meter location (for EmonTx) + No/One AC socket available (EmonTx battery powered if none) + Three phase system (optional)
EmonTx + ESP8266 WiFi	No ethernet next to meter location + Reliability issues with the 433Hz radio signal between EmonTx and EmonBase + One AC socket available + 5V USB power supply + Three phase system (optional)

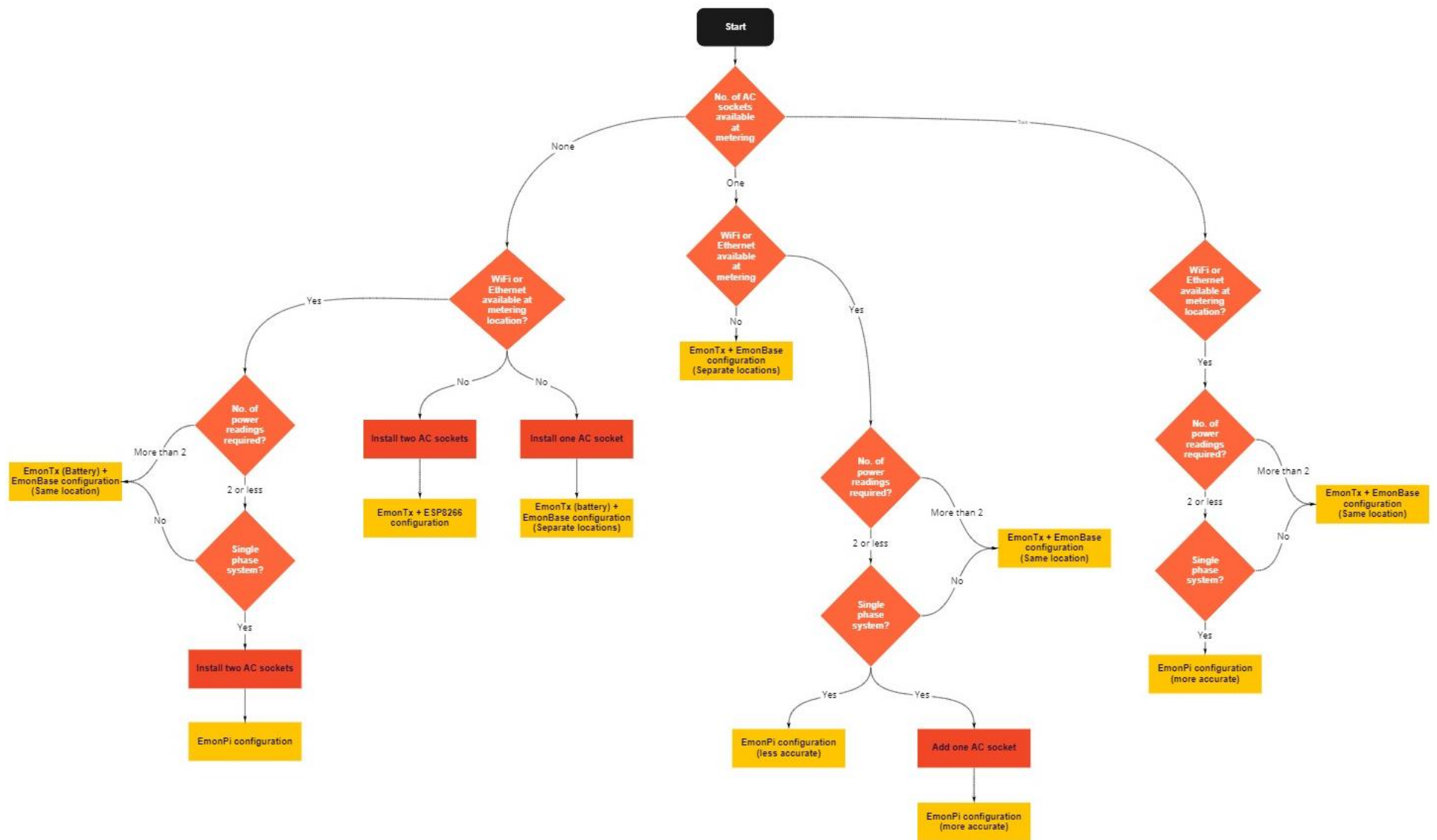


Figure 2: Hardware configuration flowchart.

Note: If WiFi/Ethernet are not available at metering location, it is implied that it is possible to install the EmonBase by the router and that the radio signal would be strong enough to reach the EmonTx. If this is not the case, then follow Figure 3:

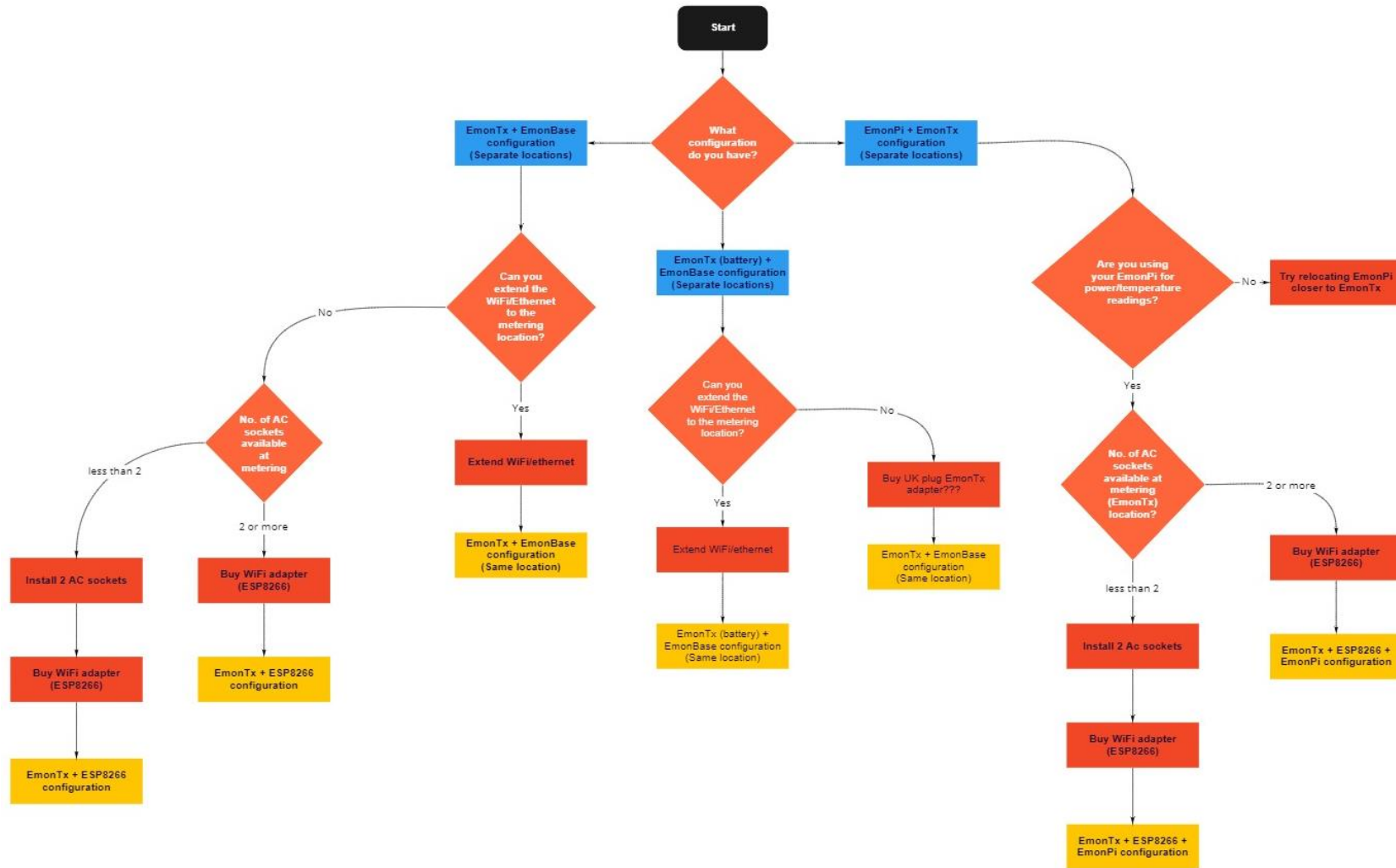


Figure 3: Unreliable radio signal flowchart.

Please note that these configuration suggestions may not be the most ideal configurations as you increase the complexity of the system. Furthermore, the EmonTx + EmonPi configuration has been omitted since it is more expensive than using the EmonTx + EmonBase. However, the EmonPi + EmonTx configuration it is useful if there are any additional power readings that you would like to take where the EmonPi is installed. Use this guide to build your knowledge base and refer to the guides on the more advanced functionalities for the best configuration for your final monitoring system. Ensure you have checked the jurisdictions and regulations in your country prior to installation.

Use the following to navigate to the instructions on how to set up the different configurations:

- EmonPi
- EmonTx + EmonBase
- EmonTx + ESP8266 WiFi

Connecting to network and setting up data logging platform (EmonCMS)

The same software is used on both the EmonPi and EmonBase. A pre-build image called emonSD has everything in place to support both local and remote data logging with EmonCMS.

This guide walks you through connecting an EmonPi or EmonBase to your local network through ethernet or WiFi so they can host and send data to EmonCMS. This can be done prior or post installation of the kit at the metering site. However, it is recommended to **set up EmonCMS prior to the installation of the EmonPi/EmonBase at metering location where ethernet connection may not be available since WiFi set up is easier using an ethernet cable first.**

Connecting via Ethernet

The easiest and most reliable way to connect an EmonPi/EmonBase to EmonCMS is using a simple ethernet cable.

Note: To ensure that your EmonPi/EmonBase does not start a WiFi access point on first boot, **connect the ethernet cable** between the EmonPi/ EmonBase and internet router **first and then power up the unit.**

EmonPi

1. **Connect to socket on the same side as the USB socket, not the RJ45 connector on the opposite side.**
2. Boot the EmonPi. The LCD display will display the firmware version then scan for connected sensors. Once the Raspberry Pi has booted up, the LCD will display the IP address of the EmonPi on the local network:



3. Browse to the EmonPi IP address displayed by typing on your browser's address bar "http://" followed by the EmonPi IP address and then a forward slash. Alternatively, you can try Using Hostname.
4. This should take you to the EmonCMS local user login page:



5. Create an account to log into EmonCMS local.

EmonBase

Since the EmonBase does not have an LCD display, we have to rely on either the hostname or network discovery tools such as [AngryIP Scanner](#) or Fing ([Android](#)/[iOS](#)) to find EmonBase on the network.

Using Hostname

1. Browse to the hostname:
 - a. <http://EmonPi>
 - b. <http://EmonPi.local> or
 - c. <http://EmonPi.lan>
2. This should take you to the EmonCMS local user login page.
3. Create an account to access EmonCMS local.

Finding IP address of EmonPi/EmonBase

If the hostname does not work, it is usually possible to find a list of devices and their IP addresses on your internet router. Alternatively, you can use a network discovery tool to find the IP addresses of the devices connected to your network.

Using your internet router

1. Locate the IP address of your router and log in using an internet browser. The IP address of your router is usually printed on the back or belly of the router.



2. Navigate to this IP address on an internet browser and use the username/password provided on the router to log in.

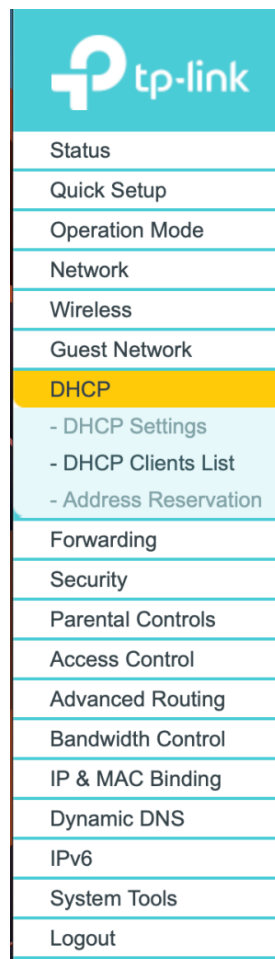


Username

Password

Log In


3. Navigate to the DHCP (Dynamic Host Configuration Protocol) tab and open the clients list.



4. Find the IP address of your pi on the list.

DHCP Clients List

This page displays information of all DHCP clients on the network.

ID	Client Name	MAC Address	Assigned IP	Lease Time
1		92:F3:32:F4:26:A9	192.168.1.100	01:13:38
2		E6:20:1C:9B:46:29	192.168.1.104	01:32:13
3		F4:03:2A:34:F2:1F	192.168.1.113	01:36:16
4		DC:A9:04:86:21:80	192.168.1.102	01:11:21
5		26:C6:F4:FC:F2:2A	192.168.1.117	01:56:50
6		D6:BA:9C:9C:F6:37	192.168.1.109	01:20:30

Refresh

Using discovery tool - Fing

1. Download Fing [Android](#) or Fing [iOS](#).
2. Allow the app the necessary permissions.
3. Once inside the app click on scan for devices.
4. A list of devices connected to your network will appear.
5. Look for EmonPi (or similar) on the list of devices and take note of the number (e.g.192.168.X.X or similar) underneath the device name, this is the IP address you will use to access EmonCMS local.
6. Browse to the EmonBase IP address displayed by typing on your browser's address bar "http://" followed by the EmonBase IP address and then a forward slash.
7. This should take you to the EmonCMS local user login page.
8. Create an account to log into EmonCMS local.

Using discovery tool - AngryIP Scanner

1. Download and install [AngryIP Scanner](#).
2. Press scan.
3. Wait for the program to finish scanning.
4. Browse the list of IP addresses for "emonpi.local" or similar.

IP	Ping	Hostname	Ports [3+]
192.168.1.115	8 ms	emonpi.local	80
192.168.1.116	[n/a]	[n/s]	[n/s]
192.168.1.117	[n/a]	[n/s]	[n/s]
192.168.1.118	[n/a]	[n/s]	[n/s]
192.168.1.119	[n/a]	[n/s]	[n/s]
192.168.1.120	[n/a]	[n/s]	[n/s]
192.168.1.121	[n/a]	[n/s]	[n/s]
192.168.1.122	[n/a]	[n/s]	[n/s]
192.168.1.123	[n/a]	[n/s]	[n/s]
192.168.1.124	[n/a]	[n/s]	[n/s]
192.168.1.125	[n/a]	[n/s]	[n/s]
192.168.1.126	[n/a]	[n/s]	[n/s]
192.168.1.127	[n/a]	[n/s]	[n/s]
192.168.1.128	[n/a]	[n/s]	[n/s]
192.168.1.129	[n/a]	[n/s]	[n/s]
192.168.1.130	[n/a]	[n/s]	[n/s]

- Take note of the number (e.g.192.168.X.X or similar), this is the IP address you will use to access EmonCMS local.
- Browse to the EmonBase IP address displayed by typing on your browser's address bar "http://" followed by the EmonBase IP address and then a forward slash.
- This should take you to the EmonCMS local user login page.
- Create an account to log into EmonCMS local.

Connecting to ethernet and then configuring WiFi

Once the EmonPi/EmonBase is connected to the network via ethernet and you have created an account on EmonCMS local:

- Log into EmonCMS by navigating to it following the steps above.
- Once in, navigate to Setup > WiFi on the left:

WiFi Config

Connect emonPi / emonBase to local WiFi network.

Selected country: GB

[Scan](#)

Select one or more available WiFi networks:

[Save and connect](#)

Note: If you are switching from one WiFi network to another, make sure to connect to the same WiFi network with your computer. If the emonPi/base hostname is preserved on the new network, this page should pick it up, otherwise please check the new IP address on the emonPi LCD or use an app such as [Fing](#) to locate.

Connection Info

Status: **Disconnected**

IP Address:

Mac Address: b8:27:eb:90:8e:77

Sub Net Mask:

Rx Packets:

Tx Packets:

Rx Bytes:

Tx Bytes:

Bitrate:

Frequency:

Link Quality:

Signal Quality:

[Start](#) [Stop](#) [Restart](#) [Refresh](#)

Network Log

- Click the scan button and the available WiFi networks will appear.

4. Select your network(s) from the list, put in the password in the PSK field and select save and connect:

The screenshot shows the 'Wifi Config' web interface. At the top, there is a 'Scan' button. Below it, a section titled 'Select one or more available WiFi networks:' lists two networks. The first network, 'Crumble', is selected with a checked checkbox. Its SSID is 'Crumble (Security: WPA2-PSK-CCMP)[[ESS]]' and its signal strength is '-46 dBm'. The PSK field for this network contains a masked password '*****'. The second network, 'TALKTALK-C917B8', is not selected and has a signal strength of '-89 dBm'. Below the network list, there is a 'Save and connect' button followed by the text '..then hit Refersh'. At the bottom, the 'Connection Info' section shows the status as 'Connected' in green. It lists various network parameters: IP Address (192.168.0.63), Mac Address (b8:27:eb:03:d9:9e), Sub Net Mask (255.255.255.0), Rx Packets (222), Tx Packets (233), Rx Bytes (49983), and Tx Bytes (55139). On the right side of this section, it shows Bitrate, Frequency (2.447 GHz), Link Quality (61/70), and Signal Quality. At the top right of the 'Connection Info' section, there are buttons for 'Start', 'Stop', 'Restart', and 'Refresh'.

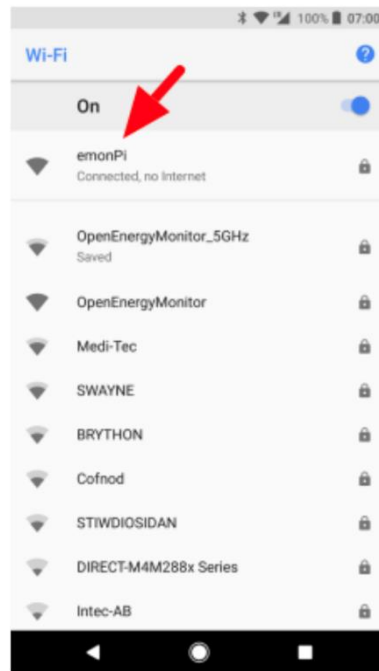
5. After a few seconds 'Connection Info' should refresh automatically to report Status :
Connected and after a few more seconds the IP address should appear.

Follow this link to watch a video on how to connect to WiFi on EmonCMS (<https://www.youtube.com/watch?v=77WEj9Q6JEE>).

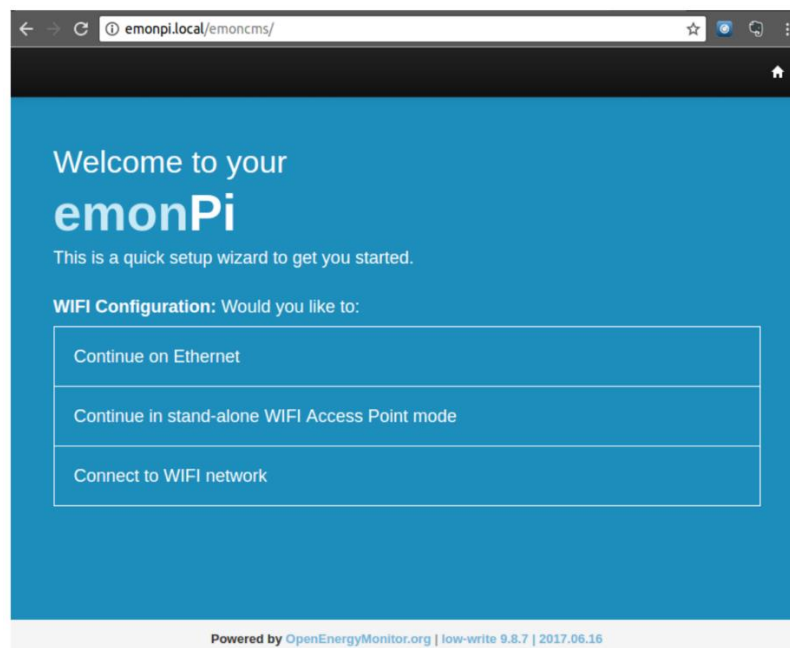
Connecting via WiFi

Alternatively, you can connect directly to WiFi without using the ethernet.

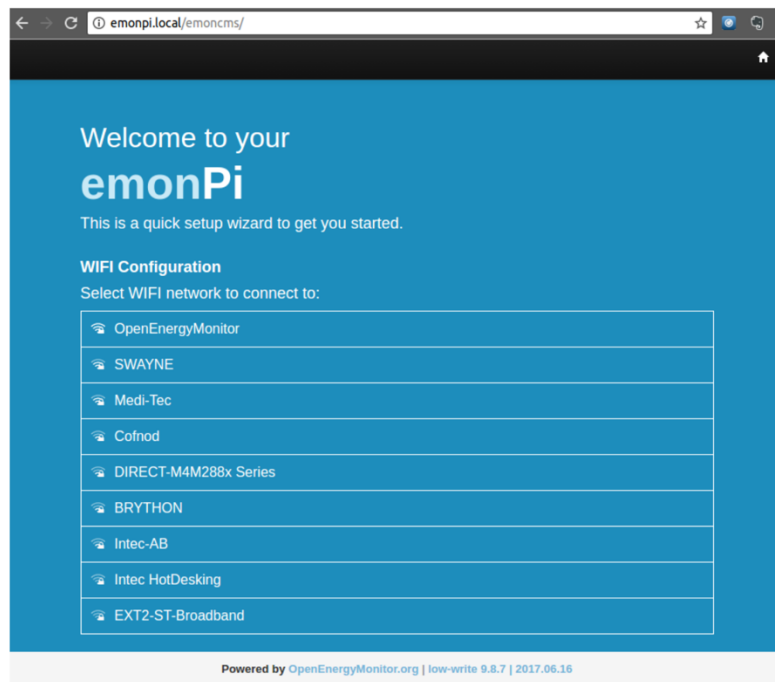
1. Turn on the EmonPi and wait a couple of minutes for the EmonPi to broadcast a WiFi access point called **EmonPi** with password **EmonPi2016**. The LCD will display WiFi:
YES 0% 192.168.42.1



2. Connect to EmonPi WiFi network then either browse to hostname: <http://EmonPi> or <http://EmonPi.local> or IP address <http://192.168.42.1> .
3. EmonPi network setup wizard should now be displayed:



4. Follow setup wizard to connect to local WiFi network:



5. After selecting local WiFi network and entering password the EmonPi will turn off its own WiFi AP then reboot and try and connect to local WiFi network.
6. Once the EmonPi has rebooted, you should be able to access EmonCMS local via its hostname: <http://emonpi>, <http://emonpi.local>, <http://emonpi.lan> or its IP address.

Accessing EmonCMS

Setting up remote access to EmonCMS

Prior to the installation of the EmonPi at the metering site, it is best to set up remote access using Dataplicity so that you may not need to rely on the limited functionalities and capabilities of EmonCMS.org (remote data logging and visualisation service) when you are accessing your EmonPi outside your own network.

Dataplicity is an online service that enables you to access RaspberryPi devices (like your EmonPi/EmonBase) remotely. However, in order to be able to do this, you have to connect to your EmonPi/EmonBase via SSH (Secure Shell Protocol). Please follow this video which will take you through the process of enabling SSH, establishing access through SSH, installing Dataplicity onto the EmonPi/EmonBase SD, and finally accessing the EmonPi/EmonBase and EmonCMS remotely through Dataplicity.

If you would like you can also follow OEM's guide on how to do this:

- [Enabling SSH](#)
- [Setting up Dataplicity](#)

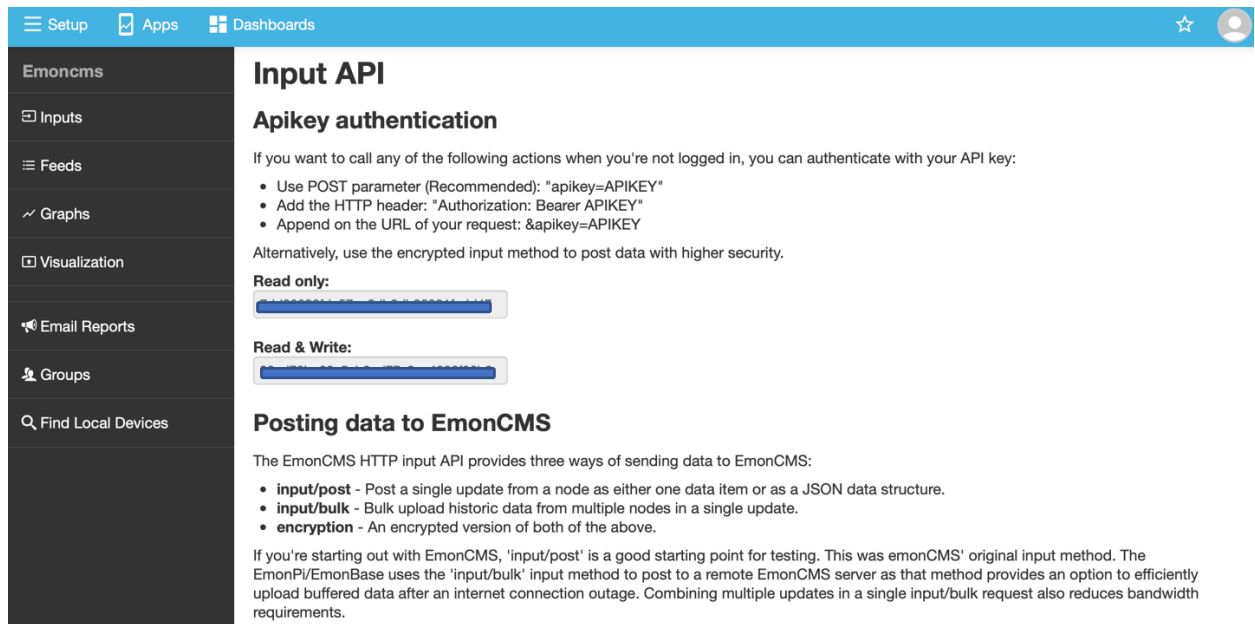
Remote data logging using EmonCMS.org

Posting data to a remote server such as emoncms.org is particularly useful for applications that require public dashboards as there is usually more bandwidth for many users to access the same dashboard than available over a household or remote monitoring site connection. Remote data logging is also useful for applications that require aggregation or remote data analysis.

1. Create an emoncms.org account:

The screenshot shows the Emoncms.org website. At the top left, the logo 'Emoncms.org' is displayed. Below it, a description states: 'Emoncms is a powerful open-source web-app for processing, logging and visualising energy, temperature and other environmental data. Part of the [OpenEnergyMonitor.org](#) project.' To the right of this text is a login form titled 'Emoncms.org Login' with fields for 'Username:' and 'Password:', a 'Remember me' checkbox, and 'Login' and 'register' buttons. Below the login form are buttons for 'Google Play' and 'App Store'. In the center, there is a preview of the Emoncms dashboard on a laptop and a smartphone. The laptop screen shows a dashboard with 'POWER NOW: 209W', '94W', and '303W' at the top, and a line graph below. The smartphone screen shows 'POWER NOW: 23W' and a bar chart. At the bottom of the page, there are three sections: 'Docs' with a book icon and text about documentation; 'Github' with a Github icon and text about open source; and 'Install' with a server icon and text about installing on a RaspberryPi or web server.

- a. Browse to [Emoncms.org](#)
- b. Create account or log-in with existing account
- c. Select **Inputs > Input API helper**
- d. Copy Read-Write API key



Input API

Apikey authentication

If you want to call any of the following actions when you're not logged in, you can authenticate with your API key:

- Use POST parameter (Recommended): "apikey=APIKEY"
- Add the HTTP header: "Authorization: Bearer APIKEY"
- Append on the URL of your request: &apikey=APIKEY

Alternatively, use the encrypted input method to post data with higher security.

Read only:

Read & Write:

Posting data to EmonCMS

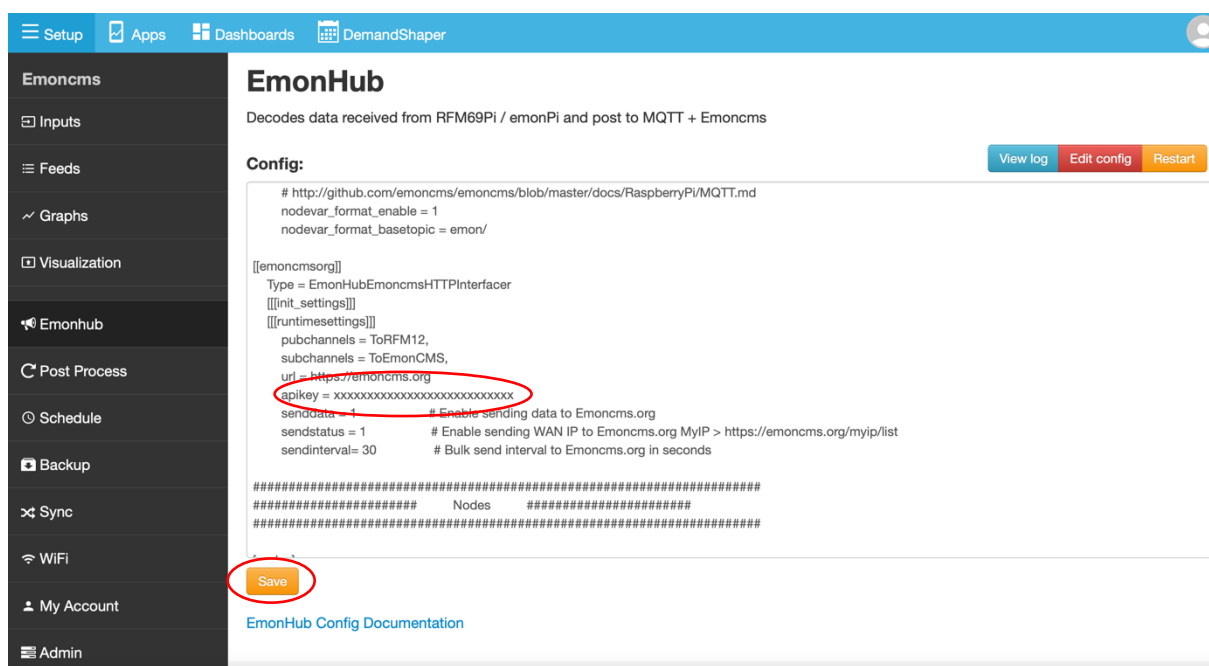
The EmonCMS HTTP input API provides three ways of sending data to EmonCMS:

- **input/post** - Post a single update from a node as either one data item or as a JSON data structure.
- **input/bulk** - Bulk upload historic data from multiple nodes in a single update.
- **encryption** - An encrypted version of both of the above.

If you're starting out with EmonCMS, 'input/post' is a good starting point for testing. This was emonCMS' original input method. The EmonPi/EmonBase uses the 'input/bulk' input method to post to a remote EmonCMS server as that method provides an option to efficiently upload buffered data after an internet connection outage. Combining multiple updates in a single input/bulk request also reduces bandwidth requirements.

2. Enter API key into local Emoncms:

- Log-in to local Emoncms on your local network e.g., <http://emonpi.local> or <http://192.168.X.X>
- Navigate to **Setup > EmonHub**
- Scroll down the EmonHub config, in the **[[emoncmsorg]]** section paste in your Emoncms.org R/W API key overwriting the **xxxxxxxxxxxxxxxxxxxx** value
- Hit **Save**



EmonHub

Decodes data received from RFM69Pi / emonPi and post to MQTT + Emoncms

Config: [View log](#) [Edit config](#) [Restart](#)

```
# http://github.com/emoncms/emoncms/blob/master/docs/RaspberryPi/MQTT.md
nodevar_format_enable = 1
nodevar_format_basetopic = emon/

[[emoncmsorg]]
Type = EmonHubEmoncmsHTTPInterfacer
[[init_settings]]
[[runtimeSettings]]
pubchannels = ToRFM12,
subchannels = ToEmonCMS,
url = https://emoncms.org
apikey = xxxxxxxxxxxxxxxxxxxxxxxx
senddata = 1 # Enable sending data to Emoncms.org
sendstatus = 1 # Enable sending WAN IP to Emoncms.org MyIP > https://emoncms.org/myip/list
sendinterval= 30 # Bulk send interval to Emoncms.org in seconds

#####
##### Nodes #####
#####
```

Save

[EmonHub Config Documentation](#)

3. Setup Emoncms.org Input Processing

- a. Log back into [Emoncms.org](https://emoncms.org)
- b. Inputs from EmonPi should be visible on the Inputs page.
- c. Log Inputs to Feeds in the same way as [Local Emoncms Logging](#)

For more information on how to set up EmonCMS.org visit the OEM guide (<https://guide.openenergymonitor.org/setup/remote/>). Alternatively, you can watch a video on how to do it (<https://www.youtube.com/watch?v=apqG9logMn8>).

Note: EmonCMS.org can be set up after installing the hardware at the metering site.

Installing Hardware

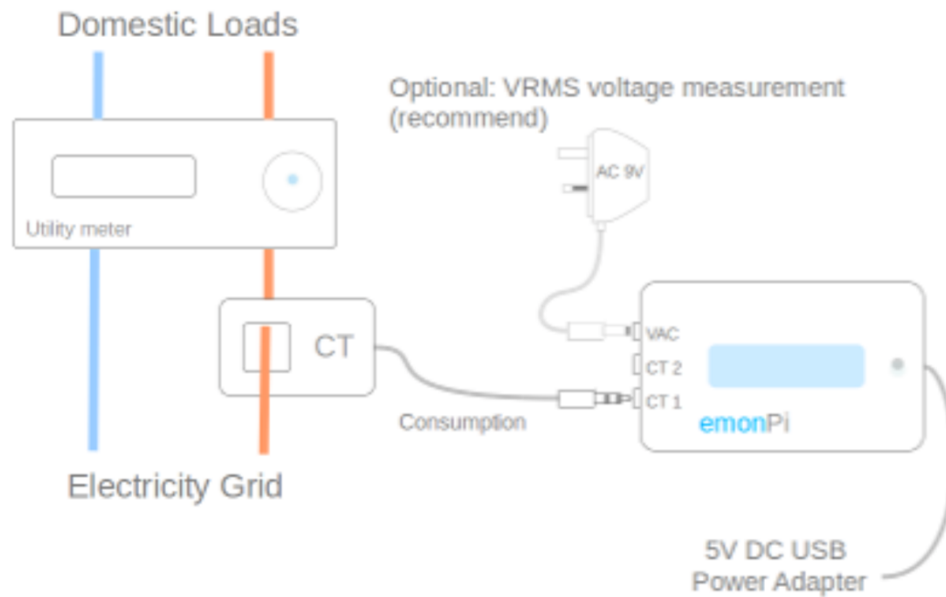
To monitor the electricity consumption the sensors required are:

- A CT sensor to measure the current.
- An AC-AC adapter to measure the voltage.

Using the CT sensor and AC-AC adapter readings, the real power is calculated which, depending to which cable is connected to, will give you the electricity consumption of an appliance, a heat pump or of the entire house. In our case we want to measure the consumption of the entire house, so the CT sensor must be connected to the neutral or line cable connected to the utility meter.

EmonPi

A sample diagram of how an EmonPi can be used to monitor energy consumption of a household can be seen below:



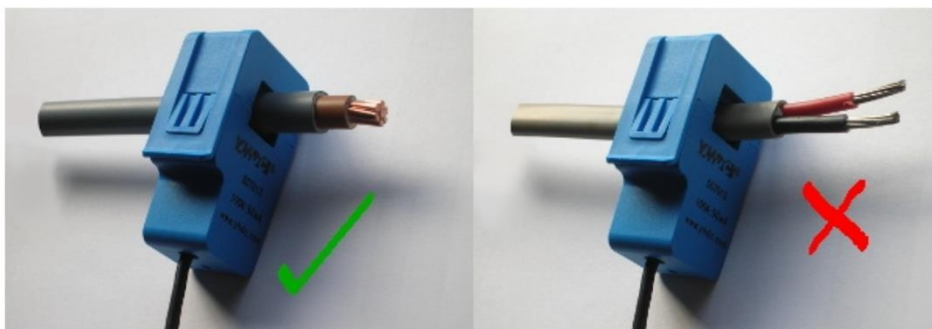
The following steps should be taken to install the hardware:

CT sensor

1. Switch off the power prior to installation.
2. Clip the CT sensor around either the **Line** or **Neutral** cable.

Important

The clip-on CT sensors must be clipped round either the Line or Neutral AC wire. NOT BOTH.



3. Connect jack plug into either CT1 or CT2 socket on the EmonPi.

4. If the power reading (shown on EmonCMS) is negative, reverse the CT sensor orientation.
5. CT sensor cable should not be extended to avoid induced noise.

AC-AC Adapter

1. Plug the AC-AC adapter into a power outlet.
2. This may require installation of a new outlet or extending an existing one.
3. AC-AC adapter cable can be extended if required.
4. Plug power connector into the AC socket on the EmonPi.
5. Provides AC waveform reference for accurate Real Power measurements.

DC 5V USB Adapter

Used to power the EmonPi i.e., not a sensor.

1. Plug the DC 5V USB adapter into a power outlet.
2. Plug the mini-B USB connector into the EmonPi.
3. High quality minimum [1.2A power supply recommended](#).

Example of installation



Power Up

1. Switch on DC & AC power.
2. Check CT sensor(s) & AC Wave are detected.



3. If you connected the EmonPi to the WiFi prior to installation at metering site, then the EmonPi should remember the WiFi network and reconnect.



If you have not connected yet and have no ethernet connection available at the metering site, follow steps outlined in Connecting via WiFi.

EmonTx + EmonBase

A typical EmonTx and EmonBase system consists of an EmonTx (includes antennae and wall mounts), four 100A CT sensors (two shown in Figure 4), an ACAC voltage sensor, an EmonBase, USB power supply and micro-USB cable.



Figure 4: EmonTx + EmonBase configuration equipment.

Follow these simple steps to install the equipment:

EmonTx

1. Mount EmonTx in desired location, use wall mounts if required, attach antennae.
2. Plug CT sensors into the EmonTx first and then clip around either the Line or Neutral cable of the AC circuits that you wish to measure. If the power reading (shown on EmonCMS), is negative reverse the CT sensor orientation.
3. Plug in and connect the AC-AC adapter to provide voltage measurement and power. This may require installation of a new outlet or extending an existing one.

Indicator LED: Illuminates solid for a 10 seconds on first power up, then flashes multiple times to indicate an AC-AC waveform has been detected (if powering via AC-AC adapter). Flashes once every 10s to indicate sampling and RF transmission interval.

EmonBase

1. Connect Ethernet before powering up the EmonBase (if using Ethernet).
2. Plug in USB power supply and connect micro-USB cable.

That's the hardware setup done! If you haven't done so, the next step is to configure the network connection and setup the EmonBase to log data locally or/and post data to a remote server such as emoncms.org, see [this section](#).

EmonTx + ESP8266 WiFi

This section shows you how to use the Adafruit ESP8266 Huzzah WiFi module with an EmonTx to make a simple WiFi enabled energy monitor that can post directly to emoncms.org or any other Emoncms installation local or remote.

For applications that only require basic posting of data from one EmonTx to a remote server such as emoncms.org an EmonTx with this WiFi module provides a lower cost route than an EmonBase or EmonPi base-station installation. However, an EmonPi/EmonBase system allows for much greater expandability and customisation.

The module can be bought preassembled so that is readily soldered to the EmonTx (on the left) or connected to the EmonTx using a stackable header (on the right), see Figure 5.

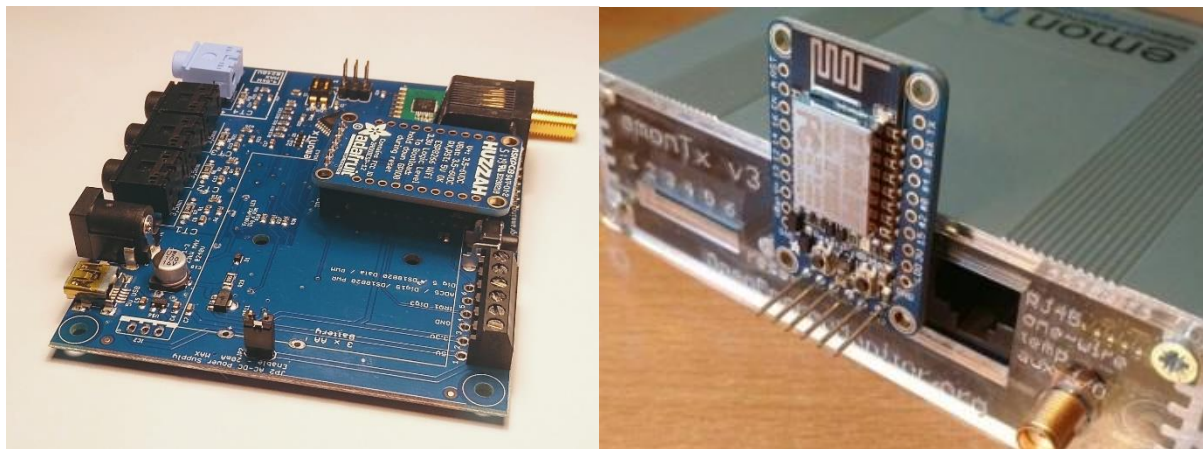
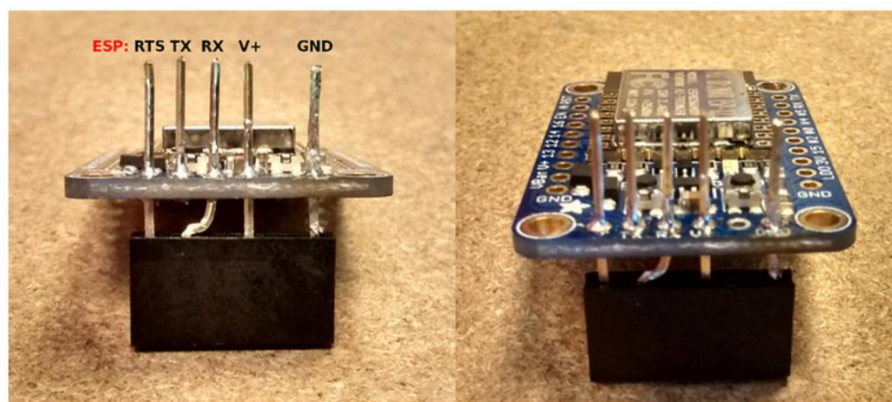


Figure 5: ESP8266 Huzzah WiFi module connection types.

N.B. When using a stackable adapter, you should only connect the RX pins and not the TX pins as shown in the pictures below.



A typical emonTx + ESP8266 WiFi setup requires:

- An emonTx with all its components (CT, AC-AC adapter etc)
- A 5V USB DC Power supply for the emonTx – The AC-AC Voltage adapter that can power the emonTx in normal operation does not deliver enough power to run the ESP8266 Huzzah WiFi module and so an additional 5V USB Power supply is required. Battery operation is not possible when using ESP8266
- ESP8266 Huzzah WiFi module either pre-installed or with a 6 way stackable header

Installation overview:

1. Plug the ESP8266 Huzzah WiFi module into the emonTx.
2. Connect the CT sensor, AC-AC adapter for voltage sensing and plug in USB power to the USB mini socket on the EmonTx.
3. Remove (open) jumper JP2 on the EmonTx PCB, then connect both the 5V DC USB power supply and the AC-AC adapter simultaneously, to ensure that the EmonTx starts up detecting the AC-AC adapter and that enough power is delivered to the ESP8266 Huzzah WiFi module for start-up.

Note: It's important to remove/open jumper JP2 (see Figure 6 in red) as it separates the AC and DC power supplies to ensure the EmonTx is powered via DC and the AC is only used to provide an AC voltage reference.

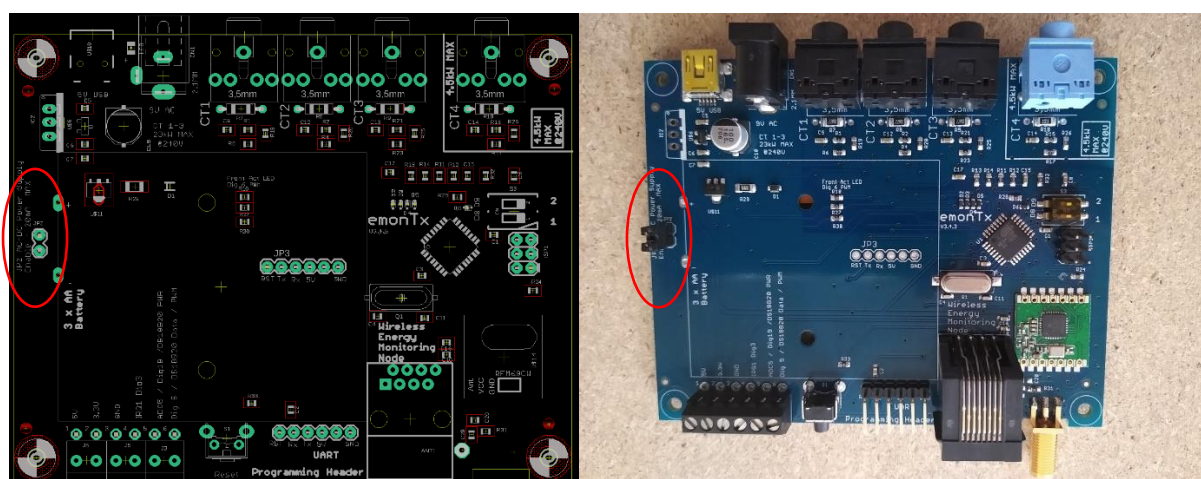


Figure 6: JP2 position on the EmonTx board.

4. The ESP8266 WiFi module will now create a WiFi access point for configuration. Using your laptop or phone, scan for WiFi networks, you should see a network SSID that looks something like: **emonESP_1679732**
5. After successful connection, navigate to IP address 192.168.4.1 to access the configuration page:

emonESP
WiFi Emoncms Link

1. WiFi Network

Connect to local WiFi network:

Mode: Access Point (AP)

Connect to network:

Select	Network	RSSI dBm
<input checked="" type="checkbox"/>	OpenEnergyMonitor	-52
<input type="checkbox"/>	[blurred]	-92
<input type="checkbox"/>	[blurred]	-55
<input type="checkbox"/>	[blurred]	-71
<input type="checkbox"/>	[blurred]	-72
<input type="checkbox"/>	[blurred]	-57
<input type="checkbox"/>	[blurred]	-69
<input type="checkbox"/>	[blurred]	-68
<input type="checkbox"/>	[blurred]	-86
<input type="checkbox"/>	[blurred]	-73
<input type="checkbox"/>	[blurred]	-71

Passkey:

Connect

4. Latest Data

Key	Value
ct1	3W
ct2	0W
ct3	0W
ct4	0W
vrms	23674
pulse	0

Input key value pairs received via serial UART (e.g. "CT1:3935,CT2:325") or HTTP input API e.g.:
<http://192.168.4.1/emoncms-ct1:3935,ct2:325>

2. Emoncms

Emoncms server to post data to:

5. Admin

Web access authentication:

Username:

Password:

Save

6. Firmware

Check for Updates

Upload

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6. Select the WiFi network that you wish to connect to, enter passkey and click 'Connect'. Wait about 30s for the module to connect. Once connected the module will show its IP-address in the interface (underlined in red in the screenshot).

emonESP
WiFi Emoncms Link

1. WiFi Network

Connect to local WiFi network:

Mode: Client + Access Point (STA+AP)

Network	RSSI dBm
OpenEnergyMonitor	-63

IP Address:
192.168.0.101

Turn off Access Point

4. Latest Data

Key	Value
ct1	3W
ct2	0W
ct3	0W
ct4	0W
vrms	23948
pulse	0

Input key value pairs received via serial UART (e.g. "CT1:3935,CT2:325") or HTTP input API e.g.:
<http://192.168.0.101/emoncms-ct1:3935,ct2:325>

2. Emoncms

Emoncms server to post data to:

Emoncms Server*:

e.g. 'emoncms.org', 'emonpi/emoncms', or '192.168.1.4/emoncms'

Emoncms Node Name*:

E.g. 'emonesp', 'heatpump'

Note: emoncms.org only supports numerical nodeIDs 1-32

Write apikey*:

SSL SSH-1 Fingerprint:

5. Admin

Web access authentication:

Username:

Password:

Save

6. Firmware

Check for Updates

Powered by OpenEnergyMonitor.org

7. Click on the IP address to change your browser to the new location. Re-connect to your home WiFi network. Refresh the page to load the emonESP configuration page across your home LAN WiFi rather than the access point.
8. If you wish to post data to Emoncms.org, enter your Emoncms.org write apikey (highlighted in green above) found on your Emoncms.org account page. To see how you can find the apikey, click [here](#).
9. Click save, after around 10-20 seconds the interface should report that the successful packets have been sent to emoncms.org. You can now check the inputs page on your emoncms.org account.
10. Configure Emoncms.org as normal, see emoncms documentation section of guide.

Creating energy monitoring apps using EmonCMS

Once you have connected your EmonPi/EmonBase to the network, created an account on EmonCMS local, and installed your sensors, you can proceed to creating the necessary data feeds required to track your electricity consumption via the available apps.

Understanding EmonCMS

The readings from the sensors connected to the EmonPi arrive to EmonCMS in the input tabs. This data is lost if a data feed is not created. Within the EmonCMS input module, different types of data feeds can be created using the input processes available to, for example, log the data collected by the sensors so it can be viewed at a later stage.

In this guide you can find instructions on how to use the default device feeds to automatically create the necessary feeds for the monitoring apps as well as learn how this can be done manually in case you would like to use custom names for the data feeds.

The goal of this section is to create a useful app for you to track your consumption. Which can be created using either EmonCMS local or EmonCMS.org. If you have an energy tariff with a fixed price, you can choose to create a “my electric” (**Error! Reference source not found.**) or a “my electric 2” app (**Error! Reference source not found.**), or both, depending on which layout you prefer.

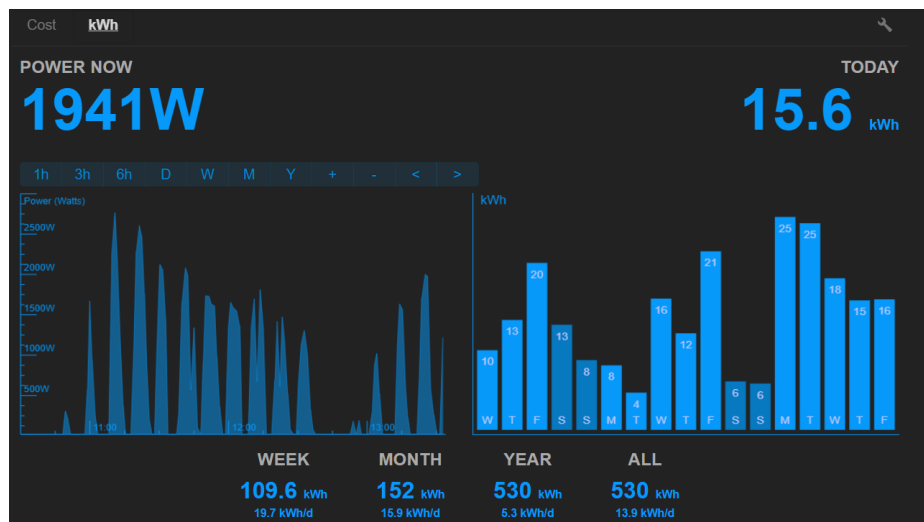


Figure 7: "My electric" app example.

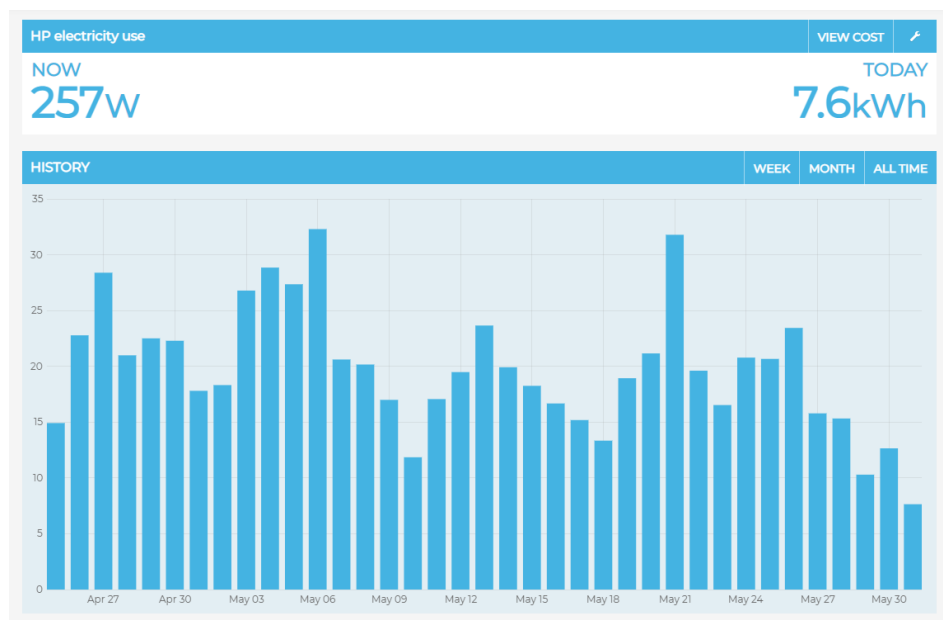


Figure 8: "My electric 2" app example.

If, on the other hand, you have a time of use tariff, i.e., you have a night price and a day price or similar, then you will need to create a “time of use” app (**Error! Reference source not found.**) or “time of use – flexible” (**Error! Reference source not found.**).

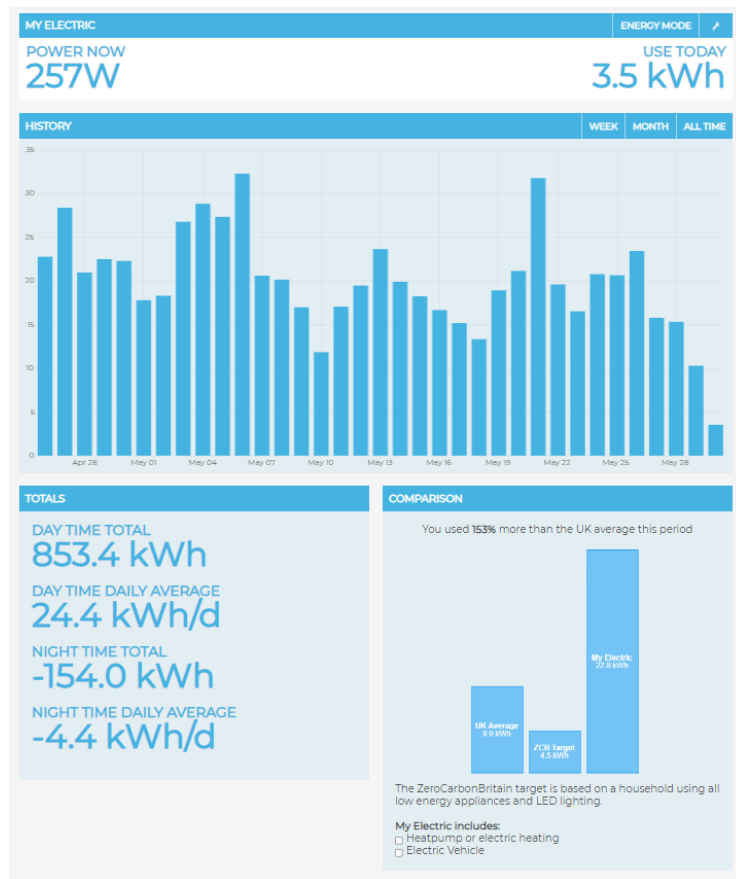


Figure 9: "Time of use" app example.

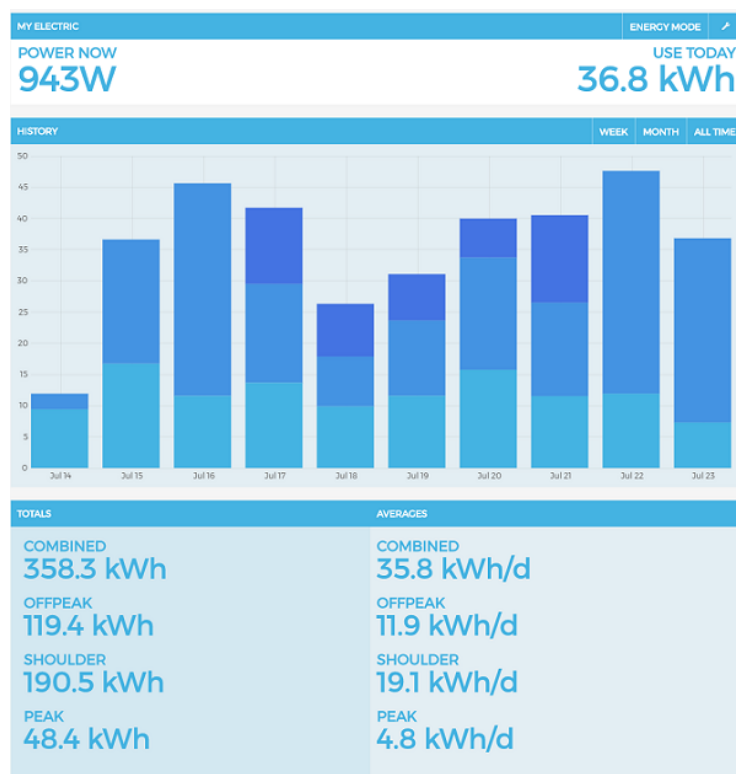


Figure 10: "Time of use - flexible" example.

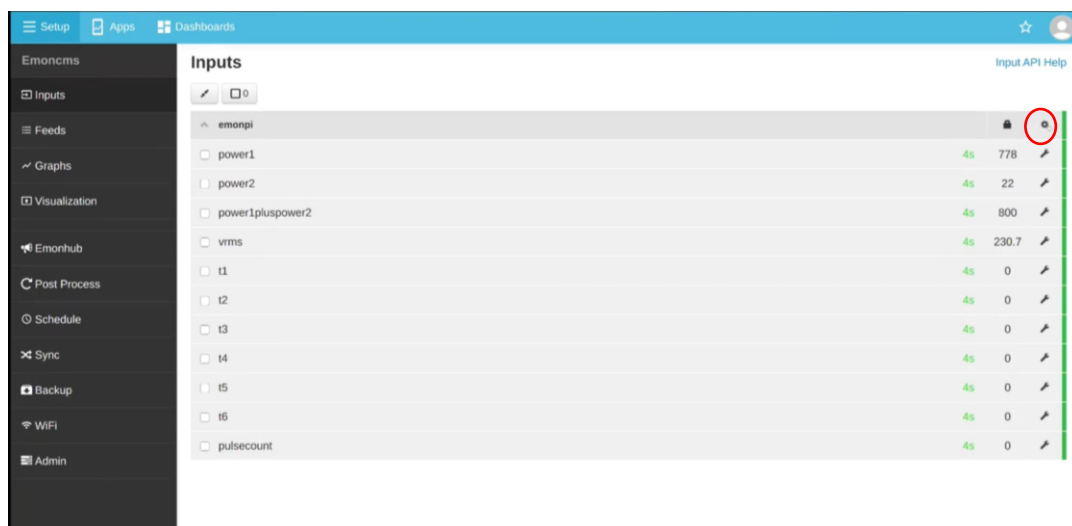
Nonetheless, to create any of the apps above the only two feeds required are:

- use: instantaneous power use in Watts.
- use_kwh: power in kWh i.e., cumulative power use.

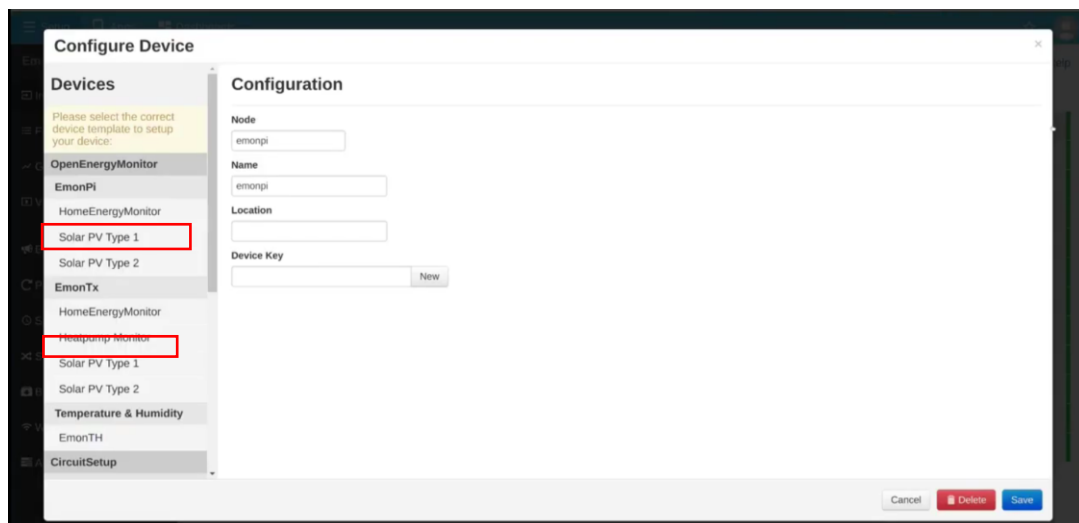
Default device feeds

This method is recommended since EmonCMS will automatically generate the feeds needed for that specific purpose based on the type of device you are using e.g., EmonPi vs EmonTx.

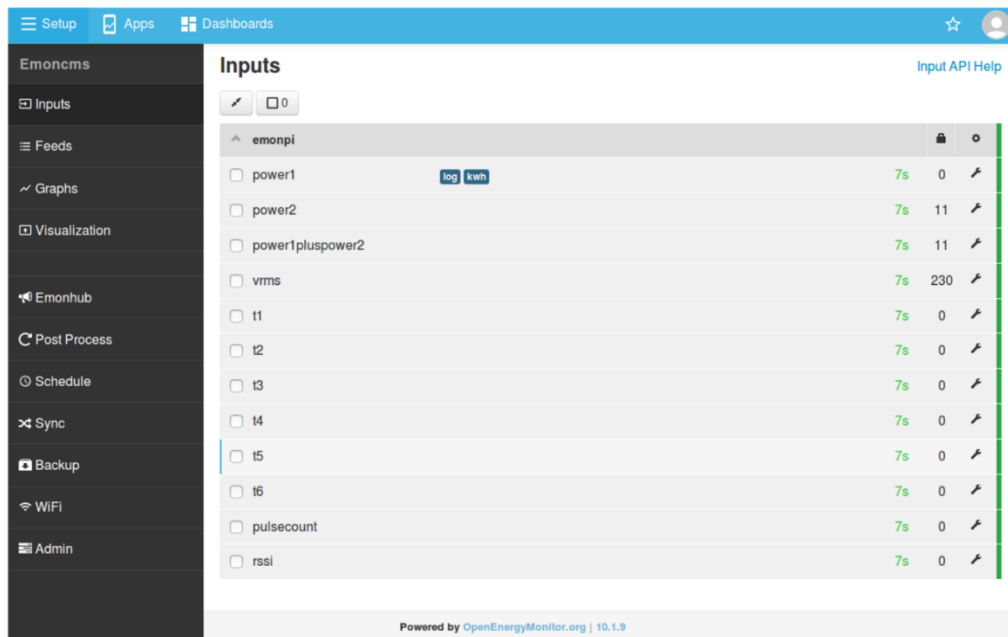
1. Navigate to **Setup > Inputs**.
2. Click on the cog icon next to the node key e.g., EmonPi or EmonTx.



3. This will bring up the configure device window. Select “HomeEnergyMonitor” under either EmonPi/EmonTx depending on which device the CT sensor is connected to.

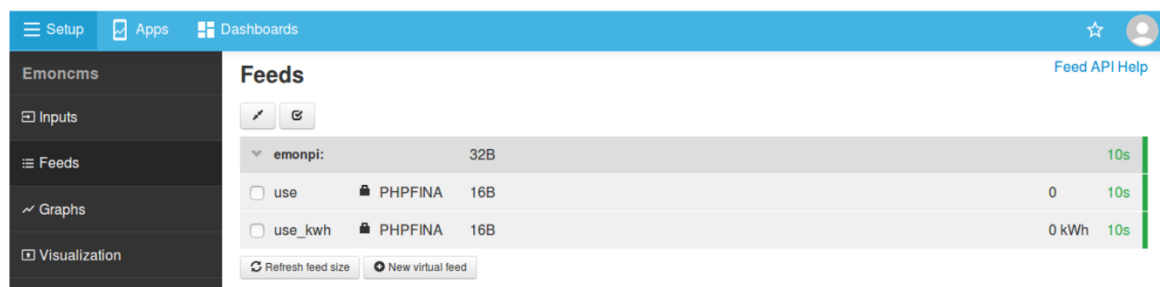


4. Click “save”.
5. A window will appear with the summary information of the feeds that will be created, click “Initialize”.
6. The Inputs page should now display the active input processes in the Process list column.



emonpi					
<input type="checkbox"/>	power1	log kWh	7s	0	
<input type="checkbox"/>	power2		7s	11	
<input type="checkbox"/>	power1pluspower2		7s	11	
<input type="checkbox"/>	vrms		7s	230	
<input type="checkbox"/>	t1		7s	0	
<input type="checkbox"/>	t2		7s	0	
<input type="checkbox"/>	t3		7s	0	
<input type="checkbox"/>	t4		7s	0	
<input type="checkbox"/>	t5		7s	0	
<input type="checkbox"/>	t6		7s	0	
<input type="checkbox"/>	pulsecount		7s	0	
<input type="checkbox"/>	rsssi		7s	0	

7. Navigate to Setup > Feeds.
8. Updating feeds should now be visible.

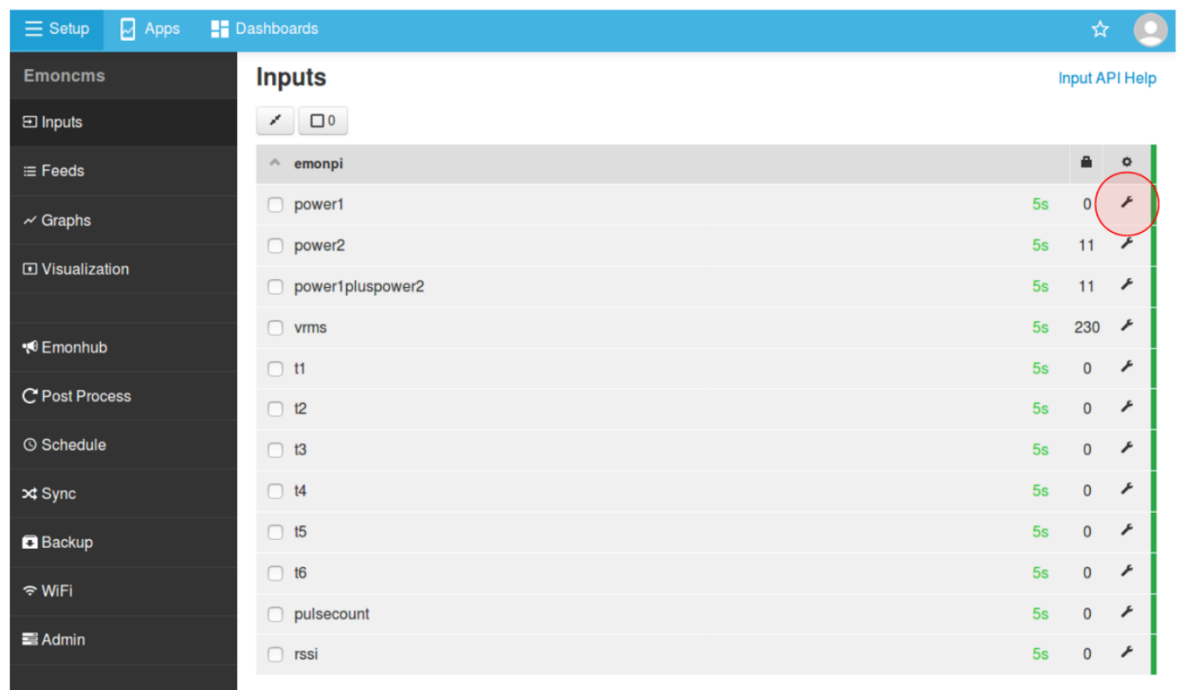


emonpi:					
<input type="checkbox"/>	use	PHPFINA 16B	0	10s	
<input type="checkbox"/>	use_kwh	PHPFINA 16B	0 kWh	10s	

Note: No data will be visible immediately. Wait a few hours to build up some data before trying to view a feed.

Manually creating the data feeds

1. Start by logging in to your EmonPi <http://EmonPi/> (or local IP address) or EmonCMS.org.
2. Navigate to Setup > Inputs.
3. You should now see an updating input list of connected nodes (e.g EmonPi, EmonTx, emonTH) and the keys (e.g. power1, power2 etc.) together with the last received value. If you do not, see [Setup > Troubleshooting](#).
4. Click on the Input Config Spanner next to the input you wish to log to a Feed:

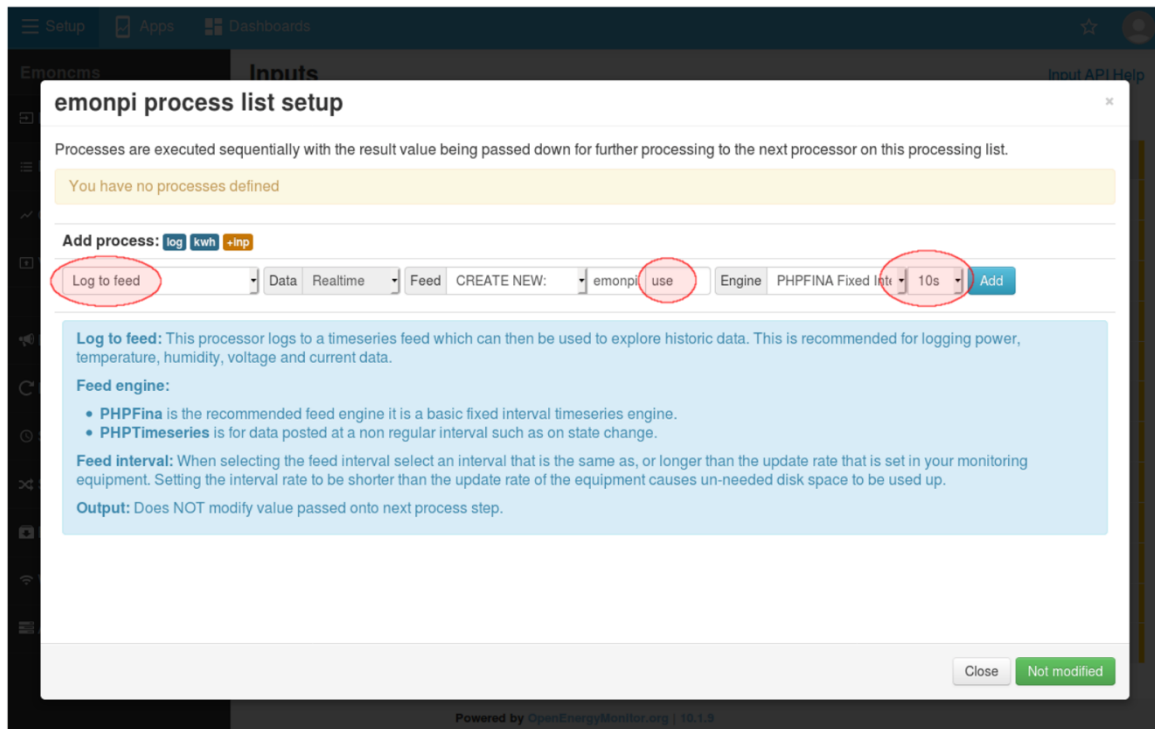


5. Process List setup box will open.

Instantaneous power in W feed

1. Since we want to log the instantaneous power in Watts, which is what the power 1 value gives us (if CT sensor is connected to CT1 connection), we need to simply log the value to feed. Hence select “Log to Feed” as the Input Process.
2. Create a new feed giving it a name. In our case we are going to name it “use” so that the app knows automatically what feed to use.
3. Select the default PHPFINA Feed Engine.
4. Select a logging interval e.g., 10s for EmonTx/EmonPi

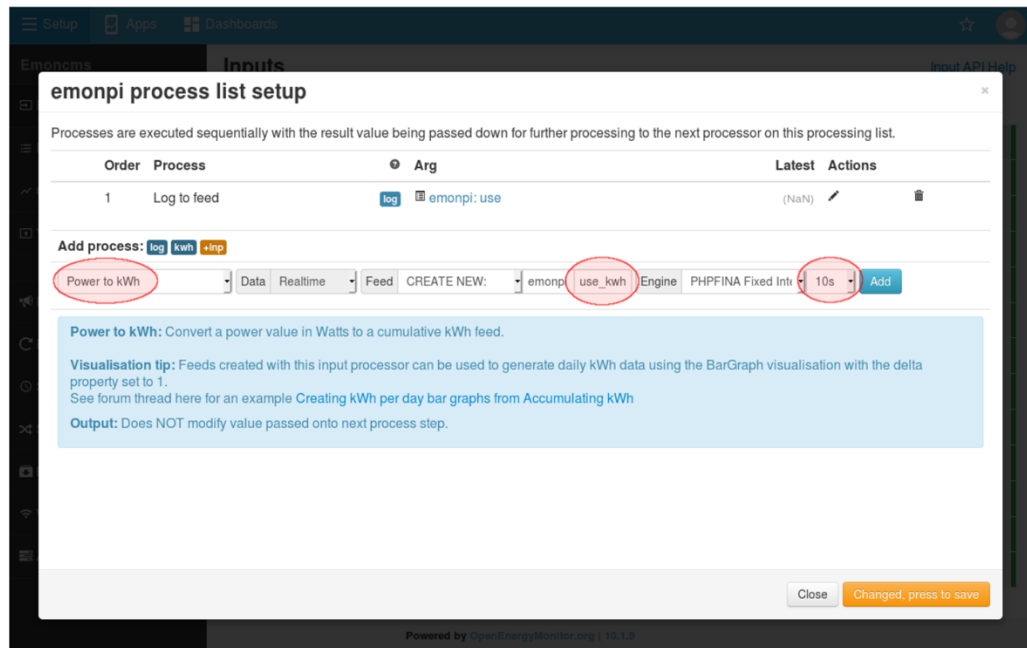
5. Click “Add” to add that input process:



Cumulative power in kWh feed

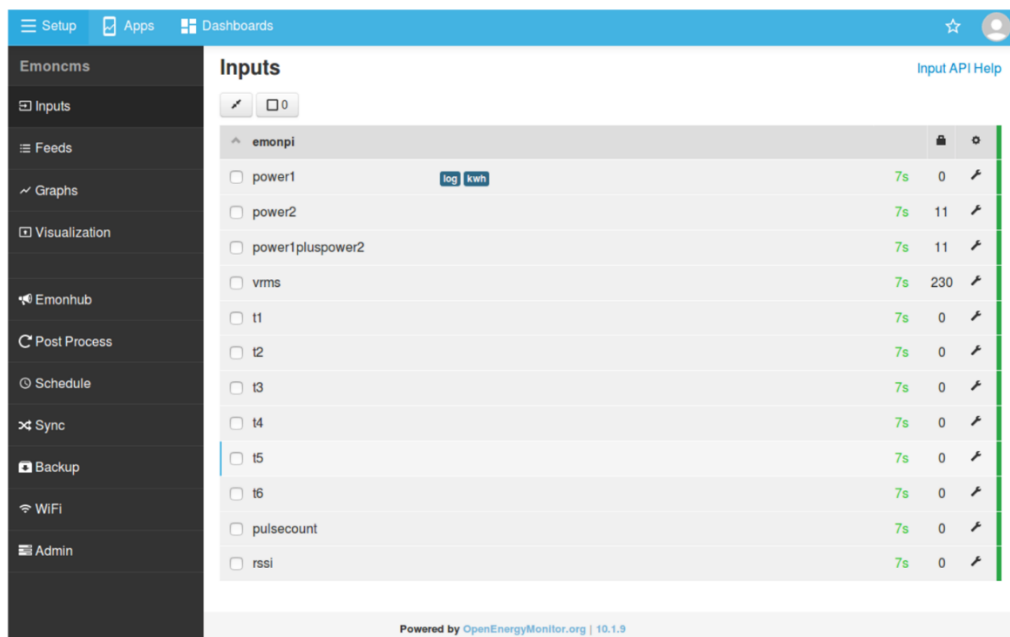
To create a corresponding kWh feed, we need to add another input process:

1. Choose Power to kWh Input Process.
2. Create. Furthermore, the EmonTx + EmonPi configuration has been omitted since it is more expensive than using the EmonTx + EmonBase. However, the EmonPi + EmonTx configuration it is useful if there are any additional power readings that you would like to take where the EmonPi is installed. Create a new cumulative power feed with the name use_kwh so that the app knows automatically what feed to use.
3. Select the default PHPFina Feed Engine.
4. Select a logging interval e.g., 10s for EmonTx/EmonPi.
5. Click “Add” to add that input process.
6. Once the required input processes have been added click “Changed, Press to Save” and close the Input List window.

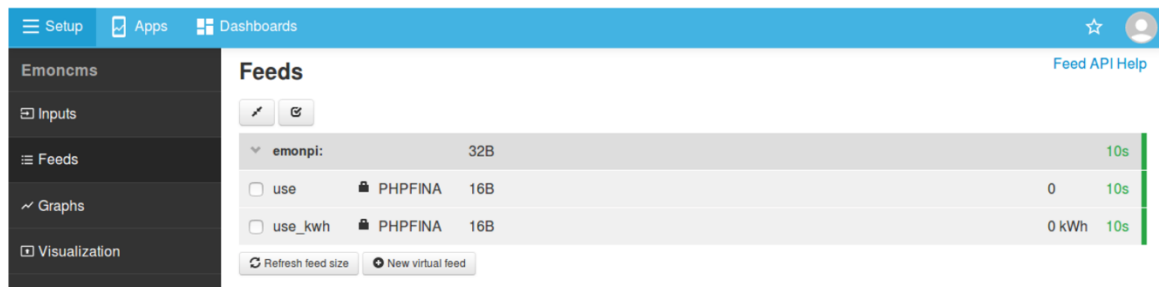


Note: The Input Processes are carried out in order from top to bottom. If you are creating more complex feeds, ensure the order is the one you desire. In addition, take care with the order of input processes since some processes carry the modified value to the next step.

7. The Inputs page should now display the active input processes in the Process list column.



8. Navigate to Setup > Feeds.
9. Updating feeds should now be visible.



Note: No data will be visible immediately. Wait a few hours to build up some data before trying to view a feed.

Setting up the apps

1. Navigate to Apps > + New, then select the App you would like to set up (“My electric”, “My electric 2”, “Time of use” or “Time of use – flexible”).
2. If you set the default names (or used the Default device feeds), then select “Auto Select” on both the “use” and “use_kwh” fields and press “OK”. Otherwise browse the feeds list and select the respective instantaneous and cumulative feeds.
3. Input your tariff information then select “Launch App”.