Operating guide
Eco-eye Trax 3

June 2014

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Introduction to using Eco-eye Smart with a computer

Eco-eye Smart has two totally separate methods of connecting to a computer.

- Use **Trax_card** to access the specially formatted memory card that logs readings every 4 seconds. The card has to be removed from the display and put into a card reader on a computer to transfer the readings.

- Use **Trax_usb** to use the USB cable for:
  - streaming real-time readings to a graph and optionally store to a csv file
  - real-time uploads to the internet of things
  - download daily history from the monitor
  - upgrade the Smart firmware

Using the memory card in the Smart display.

Although this memory card can be used as normal on a computer it has actually been specially formatted to allow us to get many years of detailed data on to the card while still using very little battery power in the Smart display.

Any other memory cards will run the batteries down quickly and NO DATA WILL BE RECORDED.

When a card is inserted into the slot on the side of Smart it will be checked and if it is a valid card the MC icon will come on. The # will also come on if Smart sees this as a new or initialized card. A * indicates that the card is known to Smart and it will add new readings after those already stored on the card.

If the MC icon is off, no readings are being recorded.

If Smart is rebooted for any reason you will need to transfer all readings to your computer and clear the card before Smart will write to it again. The computer data store is not affected and will be updated correctly when the next readings are transferred. There is an initialise button on the Trax card window.

The EcoLog.bin file on the card holds the recorded data and is in an exact location on the card. Do not reformat the card or make any changes to EcoLog.bin – it will stop the system from working and you will need to buy a replacement card.

The card is an MMC which is a predecessor to the common SD cards. If it is not recognised by a built in card reader, try a USB card reader as these usually support this format.

Trax_card, program for Memory card readings

The display:
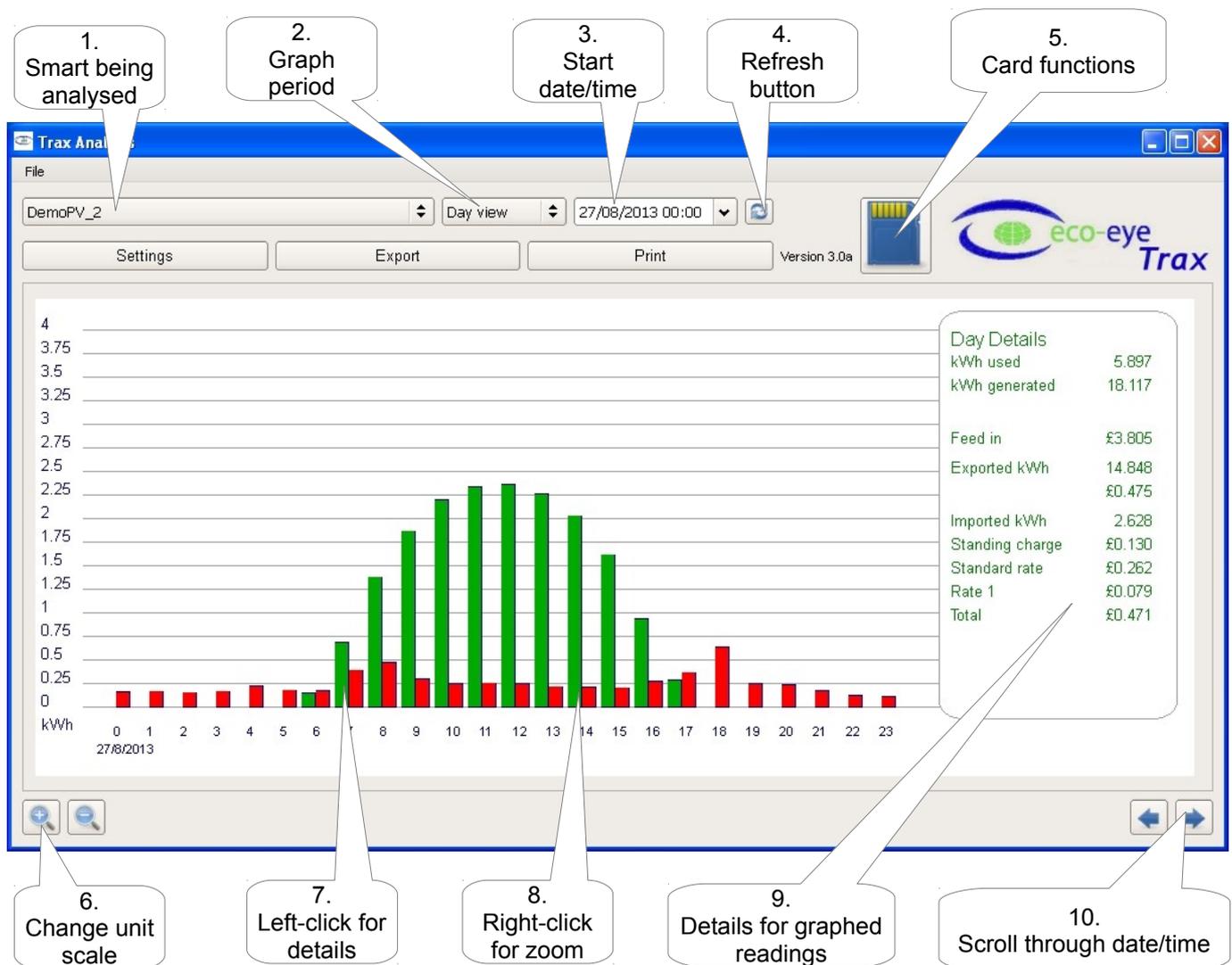
1. **Smart being analysed**.
   This is the name given to the Memory Card when it was first downloaded. Apart from storage space, there is no limit on the number of cards that can be stored. Note that until readings have been downloaded from the card, the graph will be showing demonstration data.
2. **Graph Period**
   There are 2 types of graph: detailed minute or hour and summary day, week and month. The summary graphs have an information panel to the right giving totals for that period.
3. **Start date/time**
   Hover your mouse over this field for information about the period stored for the current Smart.
   Click the down arrow for a calendar. Click on the date or time to set a new date/ time then use the refresh button to update the graph. You can only enter date/times that are within the range stored for that Smart
4. **Refresh Button**
   Use in conjunction with setting date, time or configuration changes such as currency

symbol

5. **Card functions**
   Use this button to download the latest readings from your card. Details on page ??

6. **Change unit scale**
   Each click either halves or doubles the unit scale

7. **Left-click for details**.
   Using a left-click of the mouse will give details for the readings at that time.

8. **Right-click for zoom**
   Use a right-click to select zoom in or out for the graph centred at that time.

9. **Details for graphed readings**
   This box gives the totals for the period being displayed. The totals shown will depend on the type of Smart and the details entered in Set-up for tariffs etc.

10. **Scroll through date/time.**
    Click or hold to scroll through the available readings for the current Smart

There are 3 other buttons at the top of the screen:

Set-up functions
This is the same General Settings as on the live graph – see page 7

Export functions
This allows export to a csv file between a range of dates/times that do not have to be what is currently displayed but must be within the range of stored readings.
Either detailed instantaneous readings(4 second) or summary actual (30 minute) can be selected.
The output can be in Amps or Kw
On the detailed output Trax allows selection of instant readings (i.e. what would be seen on the Smart display at the instant the reading is taken) or the cumulative value. The cumulative is 1/900th of the instant reading so they can be added together to get KwH
The file location and name can be selected. The default is the current Smart folder and a name that is the initial date and time selected.
The output file contains the readings in amps.

Print functions
This sends the current graph view to a printer

To close Trax_card use the red X at the top right of the window or file/exit. Trax will ask for confirmation before closing.

Memory card operations

Smart stores the readings in internal memory and then writes them to the Memory card when the internal buffer is full. SmartPC stores 252 demand readings and writes to the card every 16 minutes. SmartPV stores 126 demand and generate readings so writes to the card every 8 minutes. It is essential that the card is in your Smart when this is due to happen other wise your readings will be lost.

To help you know when the next write will be, the icon slowly flashes for the last 2 minutes and for the last minute flashes fast.

To make sure you have time to download your data only take the card out from the Smart when the icon is **not** flashing.

Put the card into a card reader on your computer. Click on the card icon, Trax_card will find your card automatically.

If this card has not been used on this computer:

• You can now create a new data store for this card – just supply a name and press the New button.

• If you already have been storing readings and this is a replacement card you might want to add the readings on this card to your data store, press the Link button and a list of your existing data stores will be shown for you to select from.

If the card has already been used on this computer:

• If the data store is correct, just press the Update button and the data store will be updated with any new readings on the card.

• You may want to start a new data store with the readings on the card – press the New button and continue with the screen above.
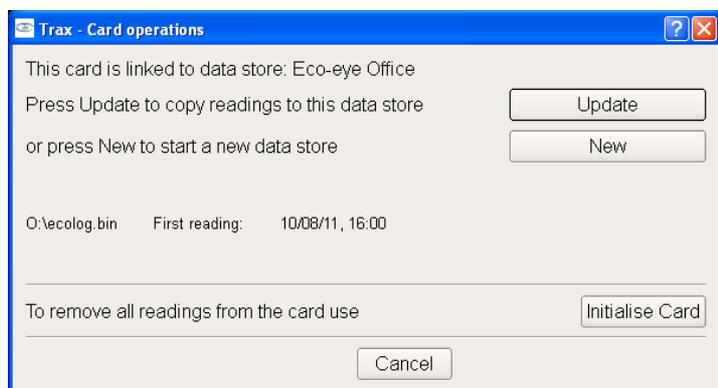
If you have already stored the readings and need to clear the card because Smart has been rebooted, press the Initialize Card button.

The Progress window will open.
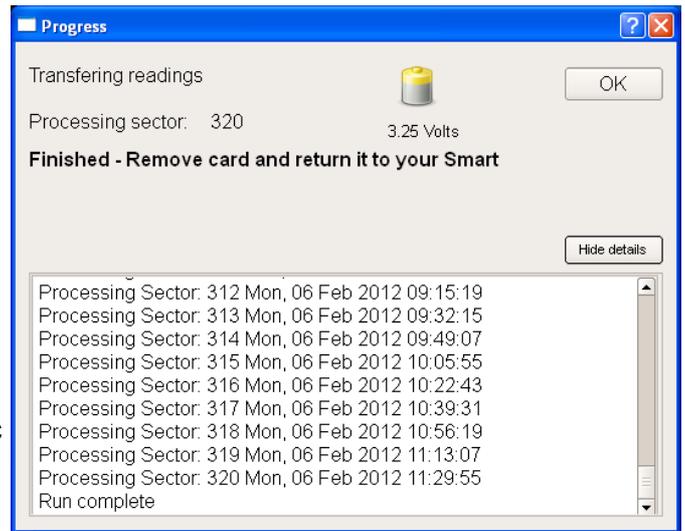
Processing sectors will go up quite quickly

On subsequent runs it will start where the previous run finished.

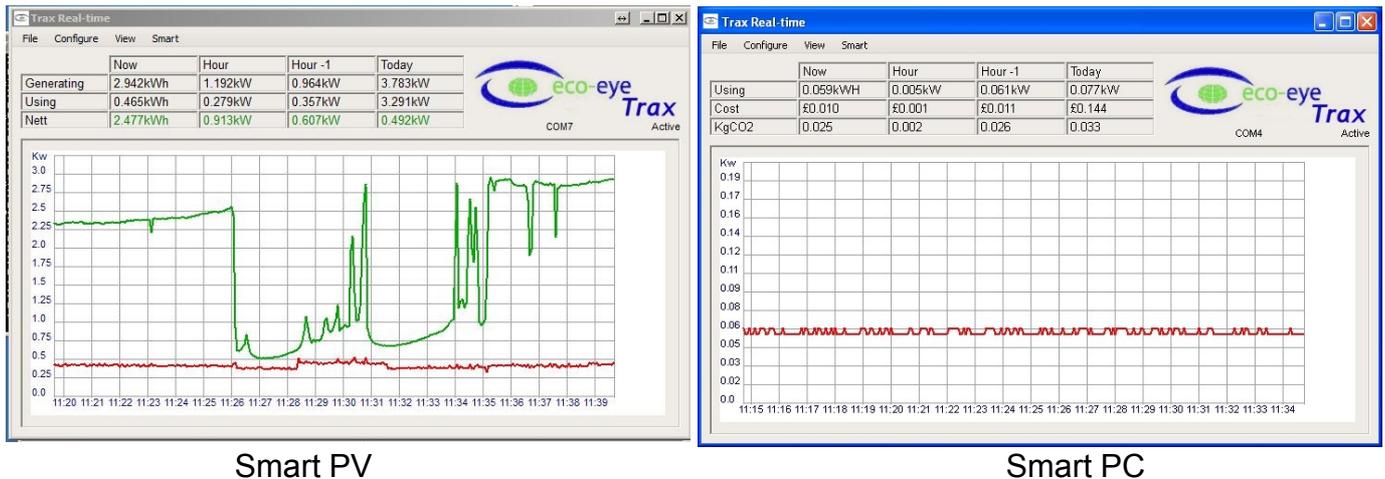The finished message indicates that it is time to get the card back into its Smart.

The battery icon shows the lowest voltage recorded and acts as a warning for battery changing.

The lower half of the window contains diagnostic information and is also recorded to a log file (Log.txt) in the data store folder.

Click OK to close this window.


```
Progress                                         [?][X]

Transfering readings                              [OK]

Processing sector:   320         3.25 Volts
Finished - Remove card and return it to your Smart

                                          [Hide details]

Processing Sector: 312 Mon, 06 Feb 2012 09:15:19
Processing Sector: 313 Mon, 06 Feb 2012 09:32:15
Processing Sector: 314 Mon, 06 Feb 2012 09:49:07
Processing Sector: 315 Mon, 06 Feb 2012 10:05:55
Processing Sector: 316 Mon, 06 Feb 2012 10:22:43
Processing Sector: 317 Mon, 06 Feb 2012 10:39:31
Processing Sector: 318 Mon, 06 Feb 2012 10:56:19
Processing Sector: 319 Mon, 06 Feb 2012 11:13:07
Processing Sector: 320 Mon, 06 Feb 2012 11:29:55
Run complete
```

Trax_usb, Live monitoring with the USB cable

Smart PV

Trax Real-time				
File Configure View Smart				eco-eye
	Now	Hour	Hour -1	Today
Generating	2.942kWh	1.192kW	0.964kW	3.783kW
Using	0.465kWh	0.279kW	0.357kW	3.291kW
Nett	2.477kWh	0.913kW	0.607kW	0.492kW
			COM7	Active

Smart PC

Trax Real-time				
File Configure View Smart				eco-eye
	Now	Hour	Hour -1	Today
Using	0.059kWH	0.005kW	0.061kW	0.077kW
Cost	£0.010	£0.001	£0.011	£0.144
KgCO2	0.025	0.002	0.026	0.033
			COM4	Active

This is the hub for all real-time access to Smart's energy monitoring. It requires Smart to be plugged in to a PC continuously for everything to work.

- Plug the cable into Smart and a spare USB port on your computer
- Start Trax_usb
- Trax will now try search for your Smart and if successful will start displaying readings
- If more than one possible port is found Trax will prompt for you to enter the correct port number (see appendix 1 for finding out what this number is).

If all is OK, after a few seconds the live graph will open as shown below. The port and status of the connection are shown under the Trax logo.

The graph will scroll and automatically change the kW scale to fit the readings currently being displayed. Re-size the window to display more or less information.
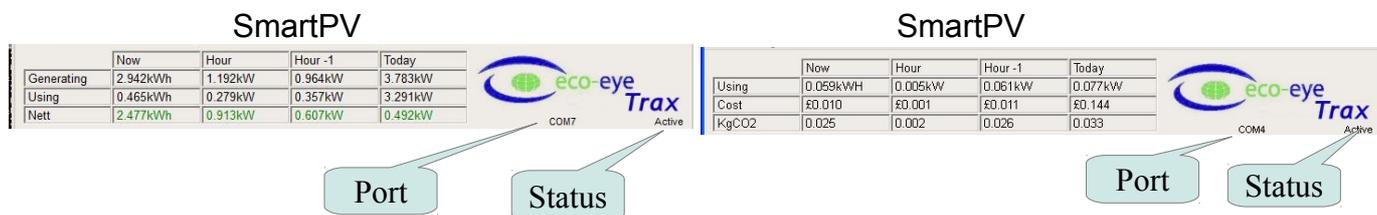
Closing the live window will disconnect from Smart and stop all logging after a short period.

The window can be minimized and logging will continue.

If your computer goes into sleep or standby mode logging will stop.

Top bar explanation

The display will be different depending on the type of Smart being monitored.

SmartPV

	Now	Hour	Hour -1	Today
Generating	2.942kWh	1.192kW	0.964kW	3.783kW
Using	0.465kWh	0.279kW	0.357kW	3.291kW
Nett	2.477kWh	0.913kW	0.607kW	0.492kW

eco-eye Trax

COM7   Active

Port   Status

SmartPV

	Now	Hour	Hour -1	Today
Using	0.059kWH	0.005kW	0.061kW	0.077kW
Cost	£0.010	£0.001	£0.011	£0.144
KgCO2	0.025	0.002	0.026	0.033

eco-eye Trax

COM4   Active

Port   Status

Generating	Amount of electricity generated	**Using**	Amount of electricity being used
Using	Amount of electricity being used	**Cost**	Cost of electricity
Nett	Difference between used and generated Green for export, red for import	**KgCO2**	Amount of CO2 released by generating that electricity
Now	Predicted – as will be seen on the display	**Now**	Predicted – as will be seen on the display
Hour	Current Hour – actual value	**Hour**	Current Hour – actual value
Hour -1	Previous hour – actual value	**Hour -1**	Previous hour – actual value
Today	Total so far today	**Today**	Total so far today including standing charge if it applies

The port shows the active communication port.
The status shows the current status of the connection to Smart.

Trax_usb Menu Options

File - CSV
A message will ask you to confirm that you want to start logging.
There will be a tick against CSV if it is active.
By default, the file is created in the _Export folder in the Smart data directory, this can be changed in the Configure menu.
There is one record for each reading with date,time and the reading in amps.
This file can be read straight into a spreadsheet program.
Multiply amps by your voltage for Kilowatts.

To stop – click on CSV and a message will ask you to confirm that you want to stop logging

File – Xively (Pachube, Cosm)
Once Pachube export has been configured this menu item switches it on and off. There will be a tick against it when it is active. Note that the interface has changed and Trax only supports the legacy interface so will not work for new feeds. This will be corrected in a future release of Trax.

File - PvOutput
Once PvOutput export has been configured this menu item switches it on and off. There will be a tick against it when it is active.

File- Thingspeak
Once Thingspeak export has been configured this menu item switches it on and off. There will be a tick against it when it is active.

File – Plotwatt
An interesting internet of things site that should be able to work out what appliances are using your electricity Available in the next version of Trax.

File – Email
Once Email reporting has been configured this menu item switches it on and off. There will be a tick against it when it is active.

View– Event Log
Exceptions during live events are written to a log file.
The level of logging can be controlled by the number set on Configure – general.
The icon will change to a ⚠ if a new message has been written to the file since it was last viewed.
The file is Trax_log.txt in the files folder of the eco-eye installation
Print on the view window is not yet implemented.

Configure – General

(Also accessed from history graph)

Set Volts. This can be used to calibrate the readings.

The amount of CO2 released by generating 1 unit of electricity.

Tariffs
In the event of an overlap the higher rate number overrides the lower rate number.
A rate of 0.000 causes that rate band to be ignored.
Standing charge is entered as ponds per day so the example shows a standing charge of 13 pence per day

Coloured blocks allow the graph colours to be changed. (Temperature is for a new version of SmartPC)

Currency symbol can be changed

Check for updates enables Trax to check on start-up for updates.

Trax, general settings

General settings: DemoPV_2

Volts 245

KgCO2 0.43

Graph colours
Demand
Generate
Temperature

Tariffs	Rate	From	To	Standing charge per day
Standard	0.175			0.130
Rate 1	0.070	23:00	06:00	
Rate 2	0.000	14:00	16:00	
Rate 3	0.000	08:00	09:00	
Rate 4	0.000	00:00	00:00	
Rate 5	0.000	00:00	00:00	
Rate 6	0.000	00:00	00:00	

PV Tariffs
Feed in 0.210
Sell price 0.032
Event logging 5

Currency Symbol £

Check for updates? ✔

C:\smart_data   OK   Cancel

Event logging level is for diagnostics and should be left at zero unless instructed to change it by Eco-eye support

The folder name at the bottom is the folder for smart data storage.

Configure – CSV

Folder for storing CSV files from the Trax live screen.

Check "Start automatically" to get Trax to start writing a CSV file as soon as the live screen is started.

Trax: configure CSV

CSV reporting setup

Export folder C:/smart_data/_Export/Live_Export   Select

✔ Start automatically

OK   Cancel

Configure – Email

A valid email server and user is required to use this Trax service.

You will need the details for your email service, most of them you can find from your account details in your email program
As an example if you have a gmail account, try the following:
Outgoing mail server: smtp.gmail.com
Port 465, tick Authenticate and tick Use SSL
Your user name is your email address

Others may use port 25.
Use the Send Test Message to check that it is working.

2 types of email are available when Smart is attached to a computer with the USB cable.

Daily reports contain hourly Kw used in a 24 hour period.

Alerts will be sent when electricity used in any hour is over the entered trigger value.

Check "Start automatically" to get Trax to enable emailing as soon as the live screen is started.

Enable summary csv and Enable debug to Eco-eye are for special projects. Contact support for details.

Configure – Xively (Pachube, Cosm)

The details of this site have changed and it is only work for existing Trax Users. New users should look at the other internet uploads available.

Trax can send demand readings to an external internet site for viewing and analysis. Xively, which used to known as Pachube and Cosm, is suitable for both Demand and PV readings.

You will need an account – https://xively.com/signup - the free basic account is sufficient for normal Trax usage.

Once you have your account, go to "Master Keys" and click on Add a Master key. Give it a name and tick the boxes for Read, Create, Update and Delete. Click on Add Key and you will get a long string of letters and numbers

You will need to copy and paste this into Trax together with your user name.

Enter a name for your feed to Pachube and press the Create new feed button
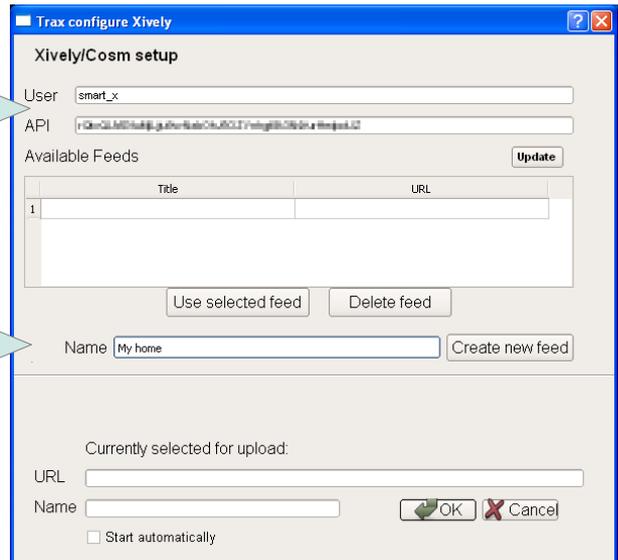
As long as all is well you should see this screen.

You must let Trax create the feed for you as it sets up all the details correctly. You can have multiple feeds and this section lists any feeds you have and allows them to be used or deleted

This is the feed that Trax will update with your electricity usage and this is what you will need to view the details in your internet browser
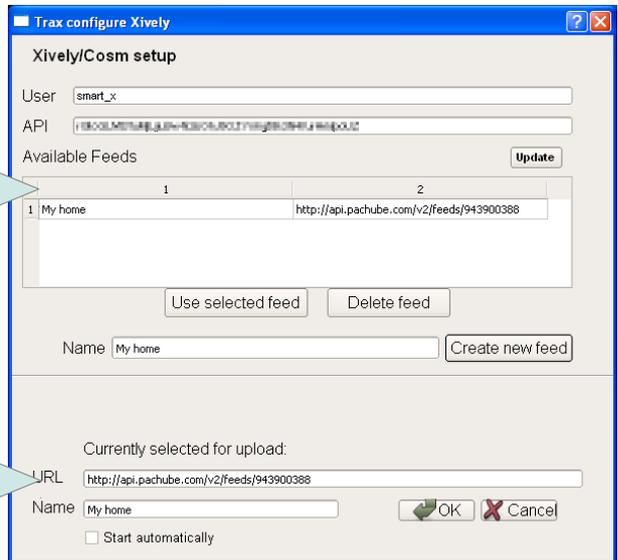
You will probably want this to start automatically whenever you start the Trax real-time window so tick the start automatically before clicking OK

The last step is to enable Xively in the Real-time file menu. Readings are sent every 10 minutes and can be seen in the Legacy feeds section of workbench in your account at the Xively web site.

Configure – PVOutput

PVOutput.org offers a really nice set of tools for owners of PV systems.

To get started, go to http://pvoutput.org/register.jsp and enter your details

You will then be asked to add a system, supply a name and the other details required, then click the Save button.
The next screen allows you to enter details manually but as you are going to be sending live data you need to configure your account to allow this and get the required API code.
Click on Settings in the menu bar and scroll down to API Settings. Set API Access to Enabled and then click on New Key which will generate your key. Click on Save.

On the Trax Real-time window click on Configure then PVOutput.

From your account settings on pvoutput.org, copy and paste the API key into the API key field then enter your system id (right down at the bottom of the account settings screen) into the System ID field.

Leave the adjustment fields as they are at the moment.
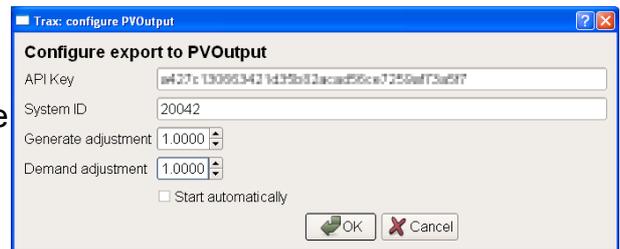
Tick the box to start automatically and click OK.

The last step is to enable PVOutput in the Real-time file menu. Readings are sent every 10 minutes.

Adjustments
The adjustment figures in the configuration are to allow you to get the PVOutpout graphs as close as possible to your actual system.
After a complete day has been recorded you will probably see that the the total generated is slightly different to the amount on you inverter or meter.
E.G.
The Smart output to PVOutput is 18.65kWh but the inverter says 19.07kWh.
Divide 19.07 by 18.65 = 1.022520107.
Enter 1.0225 into the Trax, configure, PVOutput, generate adjustment field.

You should find that the next day is much closer.

The same can be done for demand by using meter readings.

Configure – Thingspeak

Thingspeak.com is an open source internet of things site that can be used to store and view readings. It also has some nice tools to make use of that data.

Create a user on thingspeak.com.
Create a write API key.
Enter details as required in channel settings

Trax currently uses field 1 for used electricity and optionally field 2 for generated power from SmartPV.

In the Trax live window, go to configure Thingspeak.
Enter your API key (if using copy and paste, make sure you do not get a space at the beginning of this field)

Select the timing of the sends, this should be a number that divides 60 minutes into equal segments. E.G. 1, 2, 5 or 10 but not 7.

Tick "Start automatically" so that it starts when Trax loads.

Click OK to save the configuration.

Click on File and make sure that Thingspeak is ticked.

Go back to the Thingspeak website and in private view you should start to see your readings being graphed.

Smart– Version
Displays the Smart firmware version in a message box

Smart– History
This downloads and displays the daily demand history from Smart

Date	Mo	Tu	We	Th	Fr	Sa	Su	Total
25/7	3.76KwH	12.01KwH						15.77KwH
	£0.75	£2.40						£3.15
	30.06%	96.12%						63.09%
18/7	9.26KwH	8.48KwH	8.76KwH	13.28KwH	11.32KwH	0.00KwH	0.00KwH	51.10KwH
	£1.85	£1.70	£1.75	£2.66	£2.26	£0.00	£0.00	£10.22
	74.10%	67.81%	70.08%	106.26%	90.53%	0.00%	0.00%	58.40%
11/7		11.73KwH	11.99KwH	10.09KwH	3.52KwH	6.18KwH	6.20KwH	49.72KwH
		£2.35	£2.40	£2.02	£0.70	£1.24	£1.24	£9.94
		93.85%	95.94%	80.74%	28.14%	49.46%	49.63%	56.82%

This report shows a weekly history analysis with each week totalled and an average target is calculated. The tariff and target information are downloaded from Smart.

The same report from a SmartPV shows different information.

| Week start		Mo	Tu	We	Th	Fr	Sa	Su	Total
1/10/2012	Gen kWh	0.39	0.02	0.44					0.85
	Used kWh	0.81	0.04	0.90					1.75
	Nett kWh	0.42	0.02	0.46					0.90
24/9/2012	Gen kWh	0.00	0.00	0.04	0.42	0.37	0.00	0.00	0.83
	Used kWh	0.00	0.00	0.09	0.85	0.74	0.00	0.00	1.68
	Nett kWh	0.00	0.00	0.04	0.44	0.37	0.00	0.00	0.85
17/9/2012	Gen kWh	0.42	0.39	0.33	0.37	0.39	0.00	0.00	1.90
	Used kWh	0.85	0.83	0.68	0.76	0.79	0.00	0.00	3.91
	Nett kWh	0.44	0.44	0.35	0.39	0.39	0.00	0.00	2.01
10/9/2012	Gen kWh					0.04	0.00	0.00	0.04
	Used kWh					0.09	0.00	0.00	0.09
	Nett kWh					0.04	0.00	0.00	0.04

**Appendix 1**

Finding the port number on Windows XP

Plug your USB cable into a spare USB port on your computer.

You need to establish what number has been assigned by windows to this USB port.

<u>Right click</u> on "My Computer" and select "Properties" or "Device Manger" if this is an option.

Select the Hardware tab, then "Device Manager".
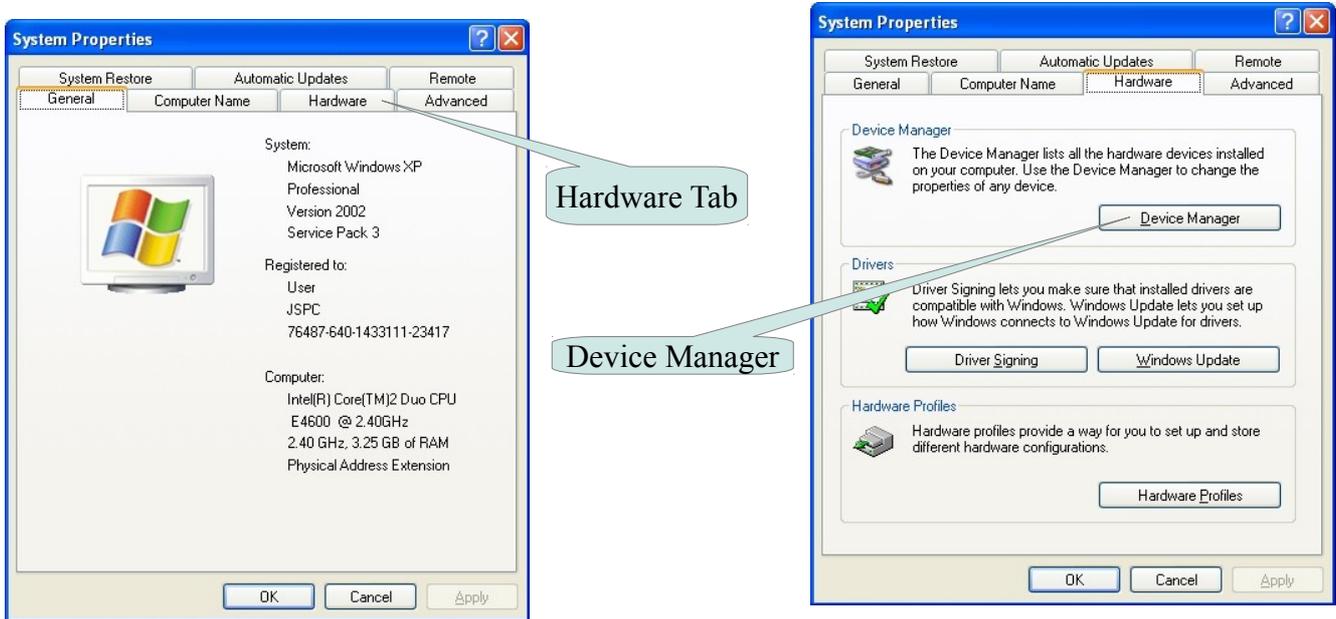
Expand the Ports list by clicking on the + next to Ports(COM &LPT)
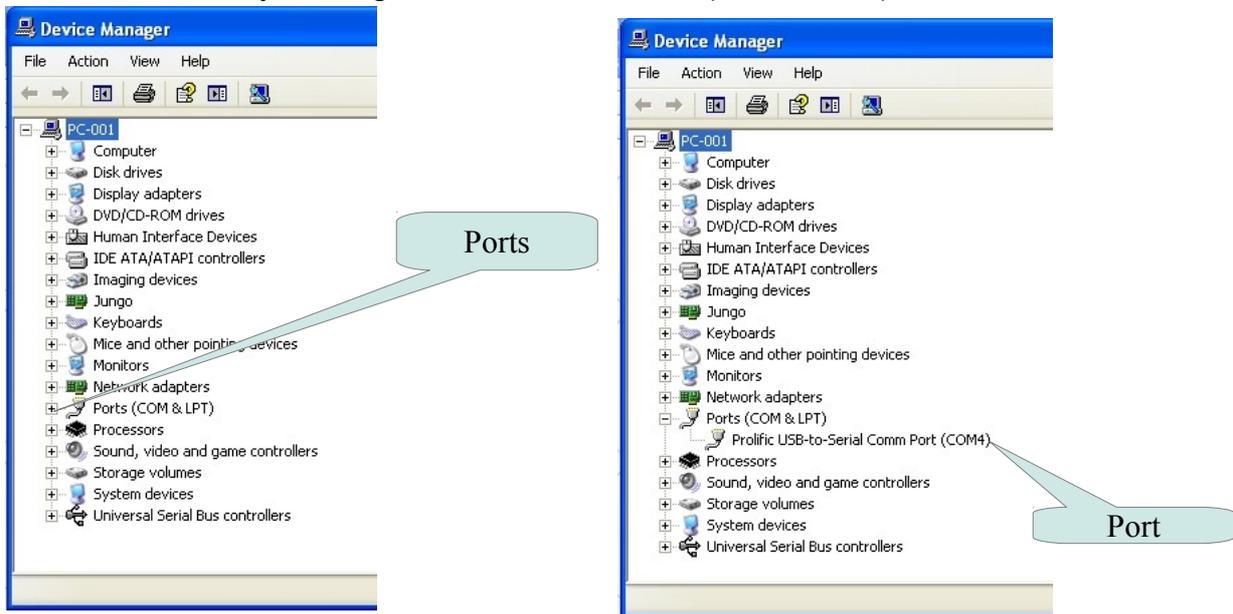
In this example there is just the one port and it has been assigned to COM3. However you may have a number of entries. Hopefully there will just be one Prolific USB-to-Serial Comm Port entry and that is what you want. If there is more than one you will need to unplug the cable, wait a few seconds for the list to change and one of them will disappear. That is the one you unplugged, so plug it back in and see what number is assigned.

Finding the port number on Windows 7

Click on start then Devices and Printers