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User Manual

PVGuard[®]

FlexReportXL



Synopsis
Version
Date

Describes how to configure and use the PVGuard Flexreport system.
2.3
26.05.2016

Imprint

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1 Introduction to FlexReportXL

FlexReportXL is skytron energy's second generation solution for creating sophisticated business reports from the PV plant data stored in PVGuard. It leverages the power of Microsoft Excel® to allow you to display and manipulate your plants' data using one of the most familiar tools available for a desktop user.

FlexReportXL defines a simple mechanism for exporting data from your plant into reports. You define which data is to be included and its time-frame. You can then compose how your data will be presented, using all the standard worksheet, table, charting and other functions provided by Excel.

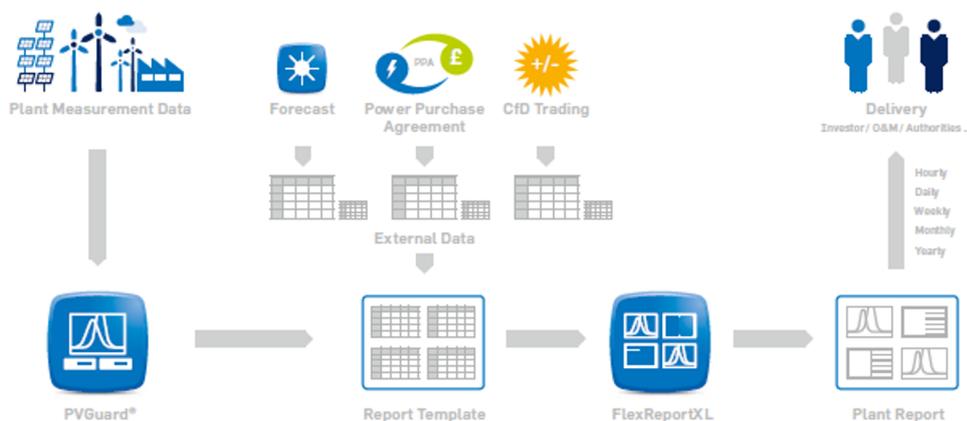


Figure 1: Using FlexReportXL to create reports

How it works

Initially you need a FlexReportXL template. An initial, blank template will be available as a starting point. Once you have finished configuring this, you upload the template into PVGuard and have it fill in the actual data for your plant.

Next, you layout the rest of the report based on this real data. You can re-generate the report as you like - so your report design can evolve over a number of iterations. Once you are happy with the report's appearance, you upload the template specifying a delivery schedule for the reports.

PVGuard will then fill-in FlexReportXL template using the actual data from your plant or plant portfolio, according to the schedule and mail it automatically to the specified recipients.

2 Principles of FlexReportXL: The Excel template

FlexReportXL uses an Excel spreadsheet to define and deliver the data you wish to retrieve from PVGuard. This spreadsheet is known as the *FlexReportXL Template*, and a specific worksheet in it, named *Data*, is used to specify the data channels and the time-frame to use for the report. On this sheet:

- The upper rows define the *data channels* whose data you want to use. These can be taken from any of the different devices in any of your plants.
- The left-hand columns define the *time-frame* for the data. This may be specified in terms of *absolute* dates or times - for example "1st June, 2000", or as relative dates or times - for example "Today" or "This month".

The cell at the intersection of one of these rows and columns on the *Data* worksheet therefore represents the data for a particular data channel of your plant at a particular date and time. These cells are initially blank but will be filled in later by PVGuard. The structure is illustrated below.

		Definitions of Data Channels				
		Ch1	Ch2	Ch3	Ch4	Ch5
Timespan of Data	Dataset A					
	T1	Data for Ch1 & T1				
	T2					
	T3					
	T4					
	T5					
	T6					
	T7					
	T8					
	Dataset B					
	T1					
	T2					
	T3					
T4						

Figure 2: Specifying the data to be retrieved in the *Data* worksheet

After you have defined the *Data* worksheet, you use the *Report* function in PVGuard to upload this spreadsheet as a *template*. You must tell PVGuard when and how frequently you wish the report to be generated. Initially you may want PVGuard to fill the data in immediately, with real data to allow you to complete designing your actual report on the remaining sheets of the spreadsheet.

PVGuard then runs a service at the times you have specified. This loads the template you have uploaded and reads the definitions from the *Data* worksheet. It then fills in the cells at the intersections with the **actual** data for the data channel and time defined by the upper rows and left-hand columns. Finally it delivers the completed report to the recipients you specify.

Each time PVGuard runs the report service, it will refresh the data with the current values, overwriting any data that was already there. However, it won't disturb any other sheets you have added to this spreadsheet, and the data you want will always appear in the same place of the data sheet. This means you can define as many other sheets as you want in the spreadsheet, which can all refer to the specific cells on the data sheet that contain the data they need. These other sheets can be formatted as you want, contain charts or images, with the plant data formatted as you need.

Steps in the Design Process

The steps in designing a report are illustrated in the figure below.

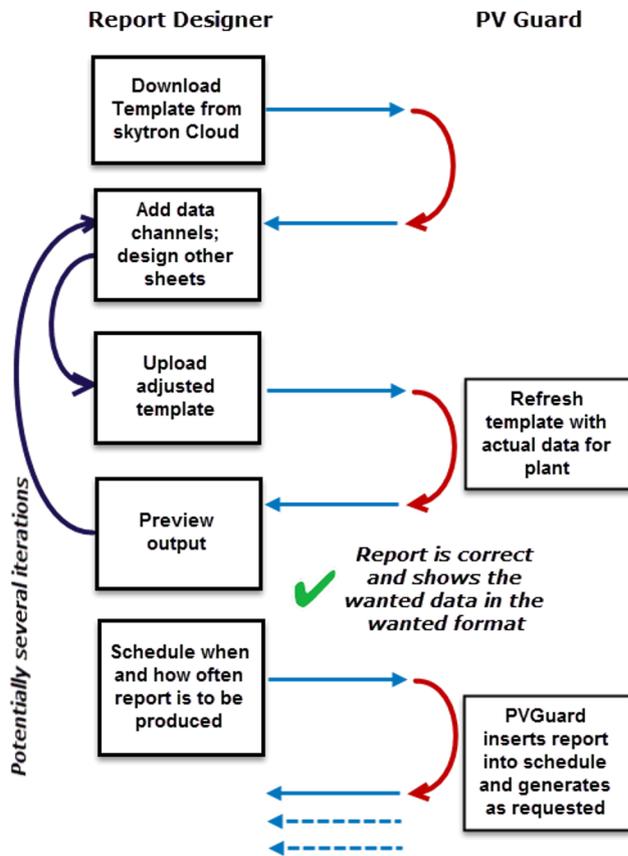


Figure 3: The report design process

Using FlexReport in practice

In practice, FlexReport is somewhat more complex than the description above, owing to the complexity of data storage and retrieval for a large and sophisticated plant monitoring system like PVGuard.

The next sections look in more detail about how the template spreadsheet should be formatted, and the constraints that apply.

3 Getting started

The following steps show you how to download the blank template and create a first report with three data channels. The first stage is to prepare the report:

1. Download and save the blank report template. You can find it here: http://cms.pv-guard.com/files/reporttemplate_basic.xlsx
2. Open the template. You may need to activate editing of the template, since you have downloaded it from the Internet. Save it under the name *reporttemplate1_demo.xlsx* using the **File > Save as...** command of Excel.
3. Now open PVGuard using the standard connection for your plant or plants.
4. In the **Plant Explorer**, the lower of the two panels on the right of the PVGuard program window, open the node for your plant, then the node for the *Powerplant*. You will see the data channels that are concerned with the plant's output as a whole.
5. Right-click with the mouse over the data channel *Energy Yield (Inverter)*. The context menu will appear.

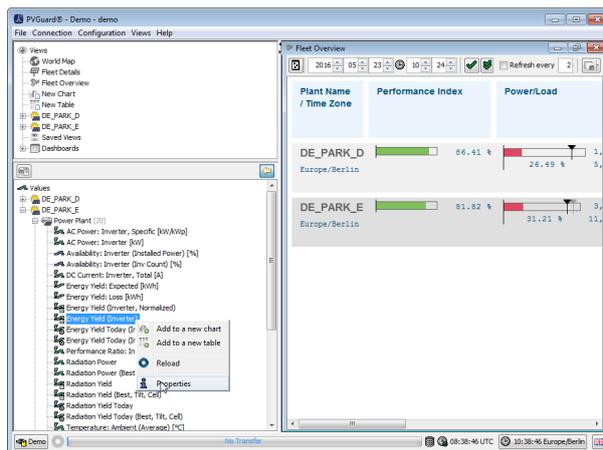


Figure 4: Opening the data channel in PVGuard

6. Click on the command **Properties**. The dialog box **Component information** will pop up.
7. Copy the name of the field *uvid* by right-clicking over the field and choosing *Copy* from the context menu.

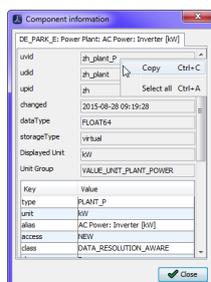


Figure 5: Copying the uvid

8. In the spreadsheet, find the row whose first column has the contents *Value (UVID)*.
9. The first *green* cell in this row will hold the value *rag_plant_elife_inv_adjusted*.

10. Replace that value with the value you copied from the **Component information** dialog of PVGuard.
11. Repeat for the data channels: *Radiation Yield*, *Performance Ratio: Inverter [%]*, pasting the UVID values into next two the cells to the right (containing *rag_plant_r_e_t_pyrano* and *rag_plant_inv_pr*).

	A	B	C	D	E	F	G	H	I
6									
7	Plant(UVID)								
8	Device(UVID)								
9	Value(UVID)						zh_plant_elife_inv_adjusted	zh_plant_r_elife	zh_plant_inv_pr
10	DeviceClass	(autofilled)					Power Plant	Power Plant	Power Plant
11	DeviceName	(autofilled)					Energy Yield (Inverter)	Radiation Yield	Performance Ratio (Inverter)
12	ValueName	(autofilled)					kWh	Wh/m ²	%
13	Unit	(autofilled)							
14	Aggregate	(mean delta max)					delta	delta	mean

Figure 6: Values to be changed

12. Then save the spreadsheet.

The next stage is to schedule the new report. Here we schedule it for manual generation. This is explained in more detail in [Report Scheduling in PVGuard](#)

1. Open the *Reports* node in the **View Navigator**. The **Report Configuration** view will open.
2. Click on the button **New** below the upper table called **Report Plans**. The **Schedule Report** wizard will start. See [Figure 22 on page 18](#).
3. On the first page, click **Template file from hard disk** and select the Excel file you just created. Click **Next**.
4. On the second page, leave the value at its default: **Manually**. Click **Next**.
5. Leave the third page blank and click **Finish**.

Finally generate the new report.

1. Still in the **Report Configuration** view, select the row containing the report template in the **Report Plans** table.
2. Click on the button **Generate now** below the table. The **Create Report Now** wizard will start. See [Figure 23 on page 19](#).
3. The wizard will start at the second page. Select the date for which you want to generate the report. Click **Next**.
4. On the last page select a directory and name for the completed report. Click **Finish**.
5. The Excel file will be generated and downloaded to the file name and location you specified, filled with data according to the plant and time-frame that you had selected.

4 Illustrations of FlexReportXL Reports

The format of the reports that can be produced by FlexReportXL is as open as the flexibility of Excel itself. The illustration below give some impressions:

Production vs. Forecast (2013-08)

2013 Month	Forecast		Net Production			Production vs. Forecast Cumulative	
	Forecast [kWh]	Forecast [€]	Energy Meter [kWh]	Production [€]	Deviation against Forecast [%]	[kWh]	[%]
Jan	17,810.00	5,063.38 €	12,777.38	3,632.61 €	-28.26%	-5,032.62	-28.26%
Feb	31,630.56	8,992.57 €	24,774.00	7,043.25 €	-21.68%	-11,889.18	-24.05%
Mar	64,116.00	18,228.18 €	77,496.40	22,032.23 €	20.87%	1,491.22	1.31%
Apr	94,036.80	26,734.66 €	89,561.03	25,462.20 €	-4.76%	-2,984.55	-1.44%
May	123,957.60	35,241.15 €	103,510.18	29,427.94 €	-16.50%	-23,431.96	-7.07%
Jun	123,102.72	34,998.10 €	119,644.74	34,015.00 €	-2.81%	-26,889.94	-5.91%
Jul	125,809.84	35,767.74 €	156,480.30	44,487.35 €	24.38%	3,780.51	0.65%
Aug	107,732.69	30,628.40 €	110,029.44	31,281.37 €	2.13%	6,077.27	0.88%
Sep	78,648.96	22,359.90 €	0.00	0.00 €	0.00%	0.00	0.79%
Oct	49,583.04	14,096.46 €	0.00	0.00 €	0.00%	0.00	0.74%
Nov	25,646.40	7,291.27 €	0.00	0.00 €	0.00%	0.00	0.72%
Dec	15,387.84	4,374.76 €	0.00	0.00 €	0.00%	0.00	0.71%
Total	857,462.45	243,776.57 €	700,834.80	199,247.33 €	0.71%	6,077.27	0.71%

Figure 7: Table showing energy production

Production vs. Forecast Chart (2013)

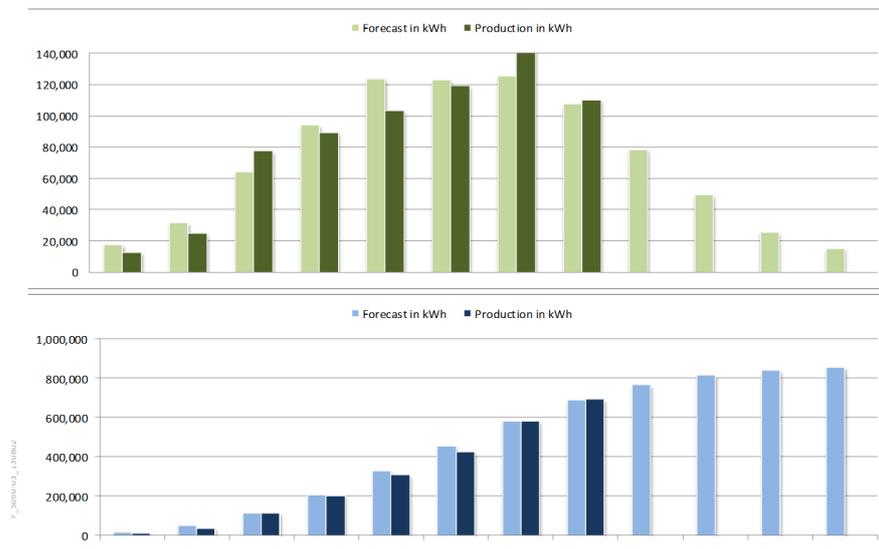


Figure 8: Chart of production against forecast

Plant Metrics (2013-08)

2013	Irradiance Yield [Wh/m ²]	Specific Irradiation Yield [kWh/m ²]	Specific Yield [kWh/kwp]	Module Temperature [°C]	Performance Ratio [%]
Month					
Jan	19,572.40	19.57	14.35	0.77	73.31
Feb	37,745.79	37.75	27.82	0.81	73.70
Mar	110,227.46	110.23	87.03	1.27	78.95
Apr	120,813.85	120.81	100.57	8.10	83.25
May	136,971.33	136.97	116.24	13.17	84.86
Jun	166,509.29	166.51	134.36	16.12	80.69
Jul	214,405.65	214.41	175.72	19.76	81.96
Aug	152,624.28	152.62	123.56	21.18	72.09
Sep	0.00	0.00	0.00	0.00	0.00
Oct	0.00	0.00	0.00	0.00	0.00
Nov	0.00	0.00	0.00	0.00	0.00
Dec	0.00	0.00	0.00	0.00	0.00
2013	958,870.06	958.87	779.64		81.31%

Figure 9: Table of plant metrics

Plant Key Metrics (2013)

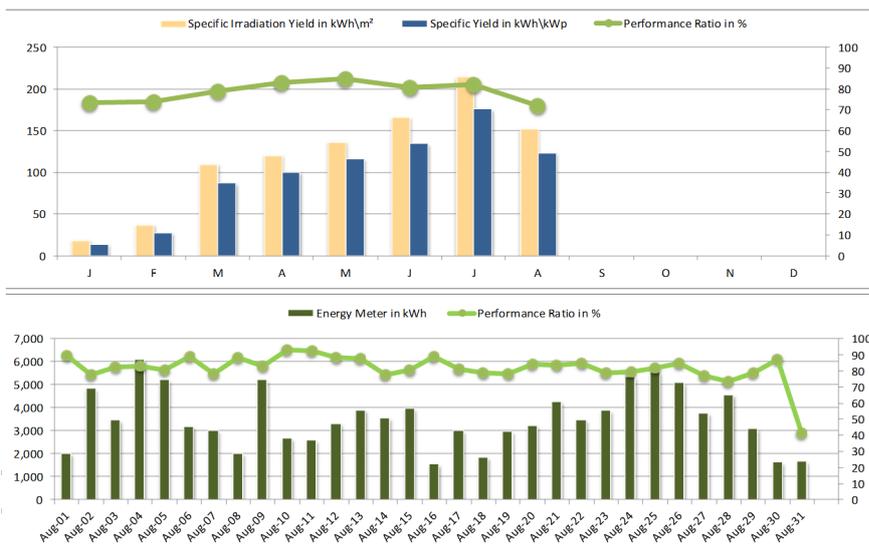


Figure 10: Charts of key plant metrics

5 The Data Sheet

FlexReportXL expects to find a special sheet in your spreadsheet called *Data*. This sheet has a particular format. If it doesn't find this sheet, the report generation process will not be able to produce your reports. The position of the *Data* sheet in the spreadsheet is not important - it could be at the front, at the back or hidden. **However, it is important that this sheet is not renamed; its name must remain exactly as above, in English.**

By default, FlexReportXL will insert a first sheet, called *Report*, at the front of the spreadsheet. However, you can change this sheet as you wish, rename it, or even delete it.

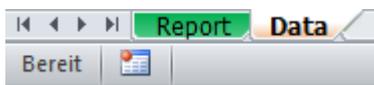


Figure 11: The initial sheets in the workbook



Note: You can insert any other sheets as you wish into your Excel workbook and at any position. Simply leave the *Data* sheet somewhere in the workbook.

5.1 Data sheet appearance

The Data sheet initially looks similar to the example below.

	A	B	C	D	E	F	G	H	I	
1	Data definition									
2	Plant(UID)									
3	Device(UID)									
4	Value(UID)					zh_plant_elife_inv_adjusted	zh_plant_r_elife	zh_plant_inv_pr		
5	DeviceClass	(autofilled)				PLANT	PLANT	PLANT		
6	DeviceName	(autofilled)					Power Plant	Power Plant		
7	ValueName	(autofilled)					Radiation Yield	Performance Ratio (Inverter)		
8	Unit	(autofilled)				kw/m ²	WH/m ²	%		
9	Aggregate	(mean delta max)				delta	delta	mean		
10										
11										
12	Year	Month	Day	Hour	Minute	DateTime	include	include	include	
13	currentYear	currentMonth-2	1	0	0	2015-08-01 00:00		1603360,61	159970	83,55187646
14	currentYear	currentMonth-1	1	0	0	2015-07-01 00:00		1819961,566	185413,5	81,80071348
15	currentYear	currentMonth	1	0	0	2015-08-01 00:00				
16	Year	Month	Day	Hour	Minute	DateTime	include	include	include	
17	currentYear	currentMonth-1	1	0	0	2015-07-01 00:00		73047,40479	8230,75	73,98248645
18	currentYear	currentMonth-1	2	0	0	2015-07-02 00:00		76885,34277	8137,75	78,55458929
19	currentYear	currentMonth-1	3	0	0	2015-07-03 00:00		71893,13013	7693	77,90318388
20	currentYear	currentMonth-1	4	0	0	2015-07-04 00:00		58716,2225	7869,5	62,19772656
21	current	Time Span Definition	5	0	0	2015-07-05 00:00				71,88164791
22	current		6	0	0	2015-07-06 00:00				78,14360259
23	current		7	0	0	2015-07-07 00:00				78,07999869
24	current		8	0	0	2015-07-08 00:00		62007,83765	6235,5	82,89706614
25	currentYear	currentMonth-1	9	0	0	2015-07-09 00:00		49350,00146	4962	82,90752544
26	currentYear	currentMonth-1	10	0	0	2015-07-10 00:00		59194,78931	5725,5	86,18538044
27	currentYear	currentMonth-1	11	0	0	2015-07-11 00:00		60217,27026	6027,5	83,28127939
28	currentYear	currentMonth-1	12	0	0	2015-07-12 00:00		49588,42578	4962	83,80807599
29	currentYear	currentMonth-1	13	0	0	2015-07-13 00:00		31881,96919	3120,5	83,16056415
30	currentYear	currentMonth-1	14	0	0	2015-07-14 00:00		39117,58374	3870,5	84,24972502
31	currentYear	currentMonth-1	15	0	0	2015-07-15 00:00		63781,33398	6268	84,82583695

Figure 12: An example data sheet, showing the main working areas

The main areas on the sheet are:

The upper rows

The columns here define the data channels whose data is to be included in the report.

The left-hand columns

These rows set the time period(s) for which the data is required.

The returned data area

This area will be updated by PVGuard each time that the report is produced.

The cells of the sheet are also color coded:

Green cells

These are for your input.

Gray/White cells

These will be filled in by FlexReportXL.

5.2 Data sheet: User information

 **Note:** Previous versions of PVGuard required you to fill in three cells of *User Information* at the top of the *Data* sheet: *Receiver*, *Username*, *Auth*.

	A	B
1		
2		
3	receiver	a.person@skytron-energy.com
4	username	demo
5	auth	crYptlyQsAaHqJ3kPhSrQWjhTgHi3237ufsHkxywu3wWbM=

Figure 13: The *User Information* cells on the *Data* sheet for earlier versions of PVGuard

As of PVGuard version 2.3 using the integrated scheduler, this information is no longer required and will be ignored. You may leave the cells and rows if you wish or may delete them.

5.3 Upper Rows: Defining the Data Channels

You define which *data channels* you want included in the report in the upper rows that form the headings above the data area. You should only fill in the green cells in the top and bottom rows; the other cells such as *name* and *units* will be filled out automatically when you receive the report.

Two pieces of information are required:

- Value(UVID)** The *Universal Value Identifier* that identifies this data channel in PVGuard. For example, *rag_plant_inv_pr*.
- Aggregate** The *Aggregate* defines how the reported data is aggregated (calculated) from PVGuard's raw data. It should be usually set to *delta* for energy data (Wh, kWh), and *mean* for all other data types. However, for special purposes any other valid PVGuard aggregate is possible, for example: *min*, *max*, *sum*. For more information see section [Data Aggregation](#).

5.4 Left-Hand Columns: Configuring the Time Span

Below the upper rows that define the data channels, the table is organized into *Time-Span Blocks*. These are blocks of rows that define a distinct time period for which data should be retrieved. You can have any number of these blocks as you wish. For example, you might have one block that defines the data by days in the current month, and then another with the accumulated data for the months in the current year.

Each of these time block has a heading row at the top - shown with a gray background in the illustration.

J	A	B	C	D	E	F	G	H	I
1	Data definition								
2	Plant(UVID)								
3	Device(UVID)								
4	Value(UVID)					zh_plant_elife_inv_adjusted	zh_plant_r_elife	zh_plant_inv_pr	
5	DeviceClass	(autofilled)				PLANT	PLANT	PLANT	
6	DeviceName	(autofilled)				Power Plant	Power Plant	Power Plant	
7	ValueName	(autofilled)				Energy Yield (Inverter)	Radiation Yield	Performance Ratio (Inverter)	
8	Unit	(autofilled)				kWh	Wh/m ²	%	
9	Aggregate	(mean delta max)				delta	delta	mean	
10									
11									
12	Year	Month	Day	Hour	Minute	DateTime	include	include	include
13	currentYear	currentMonth-2	1	0	0	2015-06-01 00:00		1603360,61	159970
14	currentYear	currentMonth-1	1	0	0	2015-07-01 00:00		1819561,566	185413,5
15	currentYear	currentMonth	1	0	0	2015-08-01 00:00			81,80671348
16	Year	Month	Day	Hour	Minute	DateTime	include	include	include
17	currentYear	1	1	0	0	2015-01-01 00:00		257978,0391	26467,5
18	currentYear	2	1	0	0	2015-02-01 00:00		742413,2622	69126
19	currentYear	3	1	0	0	2015-03-01 00:00		1107476,169	100844,5
20	currentYear	4	1	0	0	2015-04-01 00:00		1649796,847	153015,25
21	currentYear	5	1	0	0	2015-05-01 00:00		1850963,291	176533
22	currentYear	6	1	0	0	2015-06-01 00:00		1603360,61	159970
23	currentYear	7	1	0	0	2015-07-01 00:00		1819561,566	185413,5
24	currentYear	8	1	0	0	2015-08-01 00:00		1700852,499	170132,75
25	currentYear	9	1	0	0	2015-09-01 00:00		1210302,503	118662
26	currentYear	10	1	0	0	2015-10-01 00:00		827359,6686	77594,5
27	currentYear	11	1	0	0	2015-11-01 00:00		402012,6735	43449
28	currentYear	12	1	0	0	2015-12-01 00:00			77,13003031
29	Year	Month	Day	Hour	Minute	DateTime	include	exclude	
30	currentYear	currentMonth	currentDay	1	0	2015-08-31 01:00			
31	currentYear	currentMonth	currentDay	2	0	2015-08-31 02:00		0	
32	currentYear	currentMonth	currentDay	3	0	2015-08-31 03:00		0	
33	currentYear	currentMonth	currentDay	4	0	2015-08-31 04:00		0	
34	currentYear	currentMonth	currentDay	5	0	2015-08-31 05:00		0	
35	currentYear	currentMonth	currentDay	6	0	2015-08-31 06:00		0	
36	currentYear	currentMonth	currentDay	7	0	2015-08-31 07:00		65,5883789	
37	currentYear	currentMonth	currentDay	8	0	2015-08-31 08:00		794,9892378	

Figure 14: Time-Span blocks

You can also *Include* or *Exclude* the data for the data channel columns in a time block. To do this you should include the term **Include** or **Exclude** in the heading row for each block. No data will be returned for that column in the block if its heading is set to *Exclude*.

Tip: Excluding data where you don't need it will make it clearer for you when working with your spreadsheet, and keep the spreadsheet smaller. It also makes the report faster to generate.

Under the heading come a series of rows that define the individual dates/times for the data. There are five green cells at the right in which you can enter the date/time definition for that row. To the right of these comes a single column which is filled in automatically, and shows the actual time-stamp for the retrieved data. After this comes the data itself, filled in by PVGuard.

Year	Month	Day	Hour	Minute	DateTime	include	include	exclude
currentYear	currentMonth-2	1	0	0	2015-06-01 00:00		1603360,61	159970
currentYear	currentMonth-1	1	0	0	2015-07-01 00:00		1819561,566	185413,5
currentYear	currentMonth	1	0	0	2015-08-01 00:00			

Figure 15: Format of an individual Time-Span block

The five columns that define the time or date for the data are:

- Year** An absolute value (e.g. 2010), or a relative date such as *currentYear* or *currentYear-1*
- Month** An absolute (1-12) or a relative value such as *currentMonth* or *currentMonth-1*
- Day** An absolute (1-31) or a relative value such as *currentDay* or *currentDay-1*
- Hour** An absolute value, 0 to 23
- Minute** An absolute value, 0-59

As indicated in the examples above, relative time or date values may also be defined by giving an offset relative to one of the special terms *currentYear*, *currentMonth*, *currentDay*. For example, *currentDay-1* or *currentYear+1*.

There may be any number of rows in each Time-Span Block. However the time or date interval between consecutive rows must be the same throughout the block. Note here that the difference between the first two rows of the block defines the time or date interval for the whole block. **The remaining rows must also be defined with the same interval.**

For example, if the first row defines data for the current day at 08:00, and the next row defines the data at 08:15, then the time interval is 15 minutes and all other rows must be in increments of 15 minutes; the third row must be for 08:30, the fourth for 08:45, and so on.

5.5 Finding a UVID from PVGuard

If you want to find the *UVID* for a data channel in the PVGuard program, first locate the desired data channel in the **Plant Explorer** (lower left-hand panel) of the program. Then right-click on the channel and select **Properties** in the context menu.

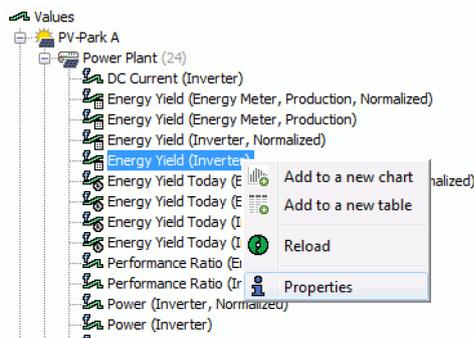


Figure 16: The context menu in *Plant Explorer*

The **Component Information** dialog will appear, with the UVID shown as the first entry. Select this text, then right click the selection and choose Copy to save the UVID in the clipboard.

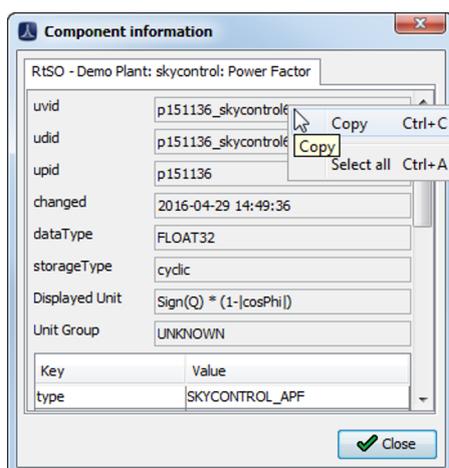


Figure 17: The *Component Information* dialog

You can then paste the value into the cell in the *Data* sheet.

6 The PVGuard Report Scheduler

Once you have defined the template, FlexReportXL reports can easily be generated using PVGuard's in-built report planning and scheduling function. This chapter explains how this works.

➤ **Note:** Previous versions of PVGuard used a separate, web-form based scheduler. This will continue to be available for a cut-over period and then will be completely superseded by the integrated functionality described here.

6.1 The PVGuard Report Scheduler

To open the Report Scheduler, click on the **Configuration > Reports** node in the **View Navigator** (see illustration below). The **Report Configuration** view will open.

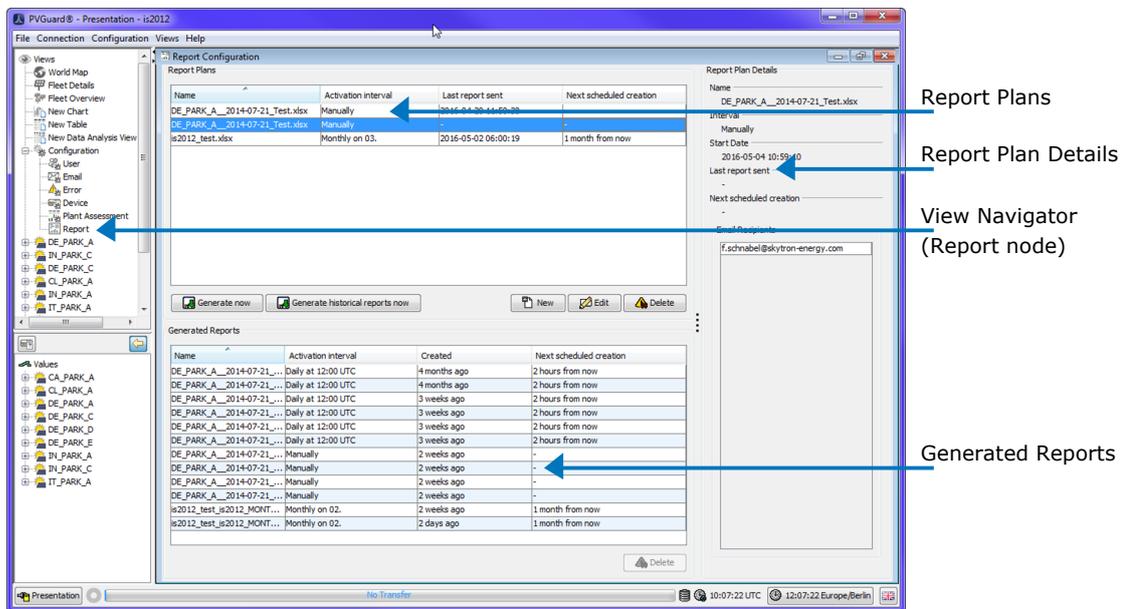


Figure 18: The Report Configuration view

This view is split into the sections: **Report Plans**, **Generated Reports** and **Report Plans Details**. These are described below.

6.1.1 Sections of the Report Scheduler View

The Report Plans Table

The rows here show you all the reports that you have scheduled for generation. It has four columns:

Name Name of the report. Initially this is the name of the report template on which the report is based. Can be changed by the **Rename** function of the context menu.

Activation Interval	How often the report will be produced. This shows the interval and starting point (date/time) you set when scheduling the report.
Last report sent	The data and time, given in the time zone of your local PC.
Next scheduled creation	How long until the next report will be created.

At the bottom there are buttons to **Add**, **Edit**, **Delete** reports, together with special functions to **Generate now** and **Generate historical reports now**. These buttons are described below in [Chap. 6.2, "Scheduler Functions", on page 17](#).

Right-clicking on any of the entries in the table brings up a context menu as illustrated below.

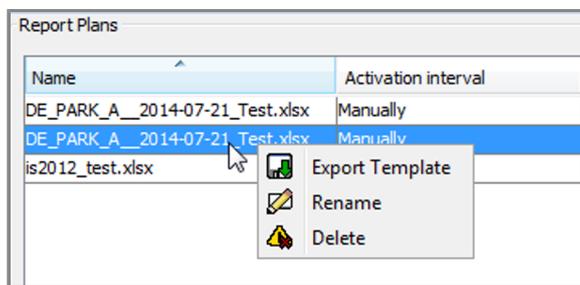


Figure 19: The Report Plans context menu

The entries are:

Export Template	Saves the report as a template that can be used for the basis of other reports. Initially the template is stored on your local PC, where you can adjust it before uploading it for report generation.
Rename	The default name for the reports is the file name of the template. This command lets you change it to another name.
Delete	Deletes this entry in the table.

The Report Plan Details

This area gives you a full summary of the report that is selected in the **Report Plans Table** to the left. In particular, it lists the chosen email recipients.

The Generated Reports Table

This table lists all the reports that have been created using the scheduler. The table has columns listing the report name, generation interval, creation date, and period until the next report will be generated.

You can re-sort the entries by clicking on the corresponding column heading (an arrow in the heading shows the sort column and the direction of sort).

Double clicking on any of the reports will open it straight away in your standard spreadsheet program.

To delete a report, select it and press **Delete** at the bottom of the table or right click it and select *Delete* from the context menu.

Right-clicking on any of the entries in the table brings up a context menu as illustrated below.

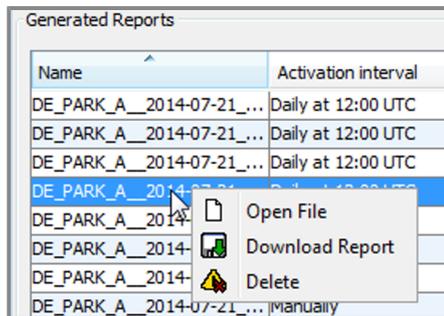


Figure 20: The Report Plans context menu

The entries are:

- | | |
|------------------------|--|
| Open File | The same as double clicking the entry; opens the report using your standard spreadsheet program. |
| Download Report | Allows you to download and save the report on your PC. |
| Delete | Deletes this generated report from the cloud storage. |

6.2 Scheduler Functions

The following functions are available using the buttons at the bottom of the **Report Plans** table.



Figure 21: The scheduler function buttons

6.2.1 Adding a new report

Clicking the button **New** will start the **Schedule Report** wizard, which allows you to schedule a new report.

The steps in the wizard include:

- 1. Select the template.** This is a file in Excel® format as described in the earlier chapters. The file can be loaded from your local PC or can be one of the existing ones that have been loaded in the *skytron Cloud*. If you select a file from your local PC, it will be uploaded into the *skytron Cloud* as part of this process.
- 2. Select the interval between successive reports.** Intervals are: *Daily, Monthly, Quarterly Yearly*. In addition you must choose the date and time of first generation. The time should be according to the local time on your PC.

An option *Manual* is also provided for producing one-off reports. This can be especially useful during the development of your template.

➤ **Note:** Any reports scheduled with the *Manual* interval must be generated using the **Generate now** button.

- 3. Set any email recipients.** The system will automatically email your report (in Excel format) to all the email addresses you set here. If you don't enter any email recipients, the report will still be generated, and will be available to download from the **Generated Reports** area.

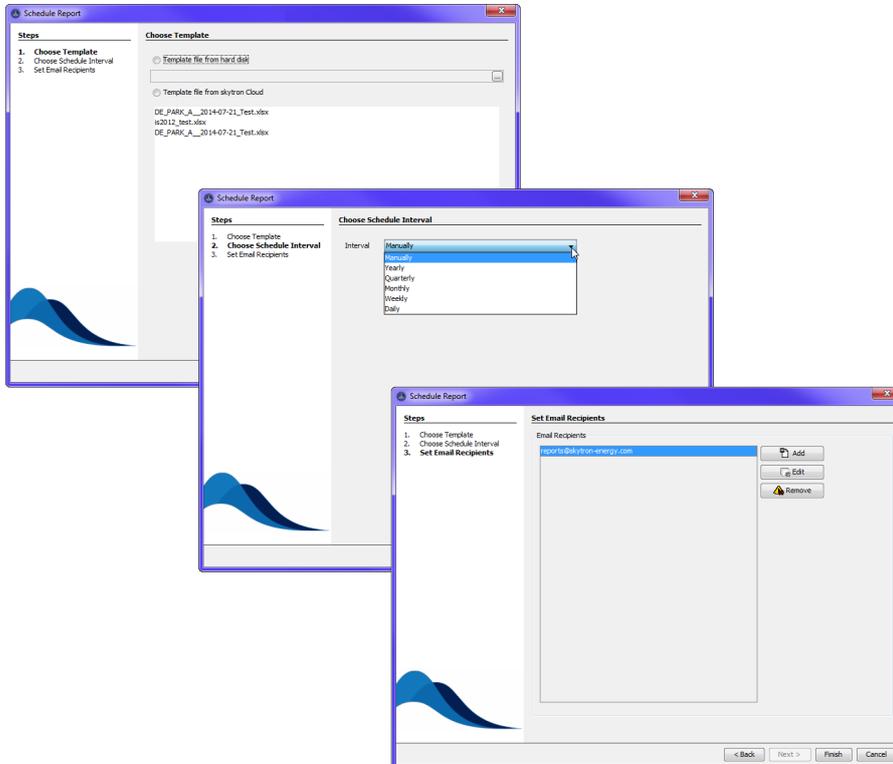


Figure 22: Schedule Report wizard

6.2.2 Editing a report's schedule or recipients

If you want to change the schedule at which the report is produced, or add or delete email recipients, then select the report's row in the table and click the **Edit** button at the bottom of the table. This will again start the **Schedule Report** wizard but starting at the second page (setting the interval). The steps are then identical to those described above.



Note: If you want to change the template on which the report is based, we recommend creating a new report.

6.2.3 Deleting a report's production

If you want to stop a report from being produced then select the report's row in the table and click the **Delete** button at the bottom of the table. Alternatively, select and right-click the desired report entry, and then choose **Delete** from the context menu.

6.2.4 Generating a report now

You might need to produce an ad-hoc report, showing the conditions for a specific date. This is possible using the **Generate now** button at the bottom left of the table. Clicking this will start the **Create Report Now** wizard.

The steps in this wizard include:

1. Choosing and loading the report template (this page only appears if no report has been selected in the *Report Plans* table).
2. Setting the report date. By this is meant the date/time of the plant readings for which the report is to be produced.
3. Selecting a directory and file name for the output.

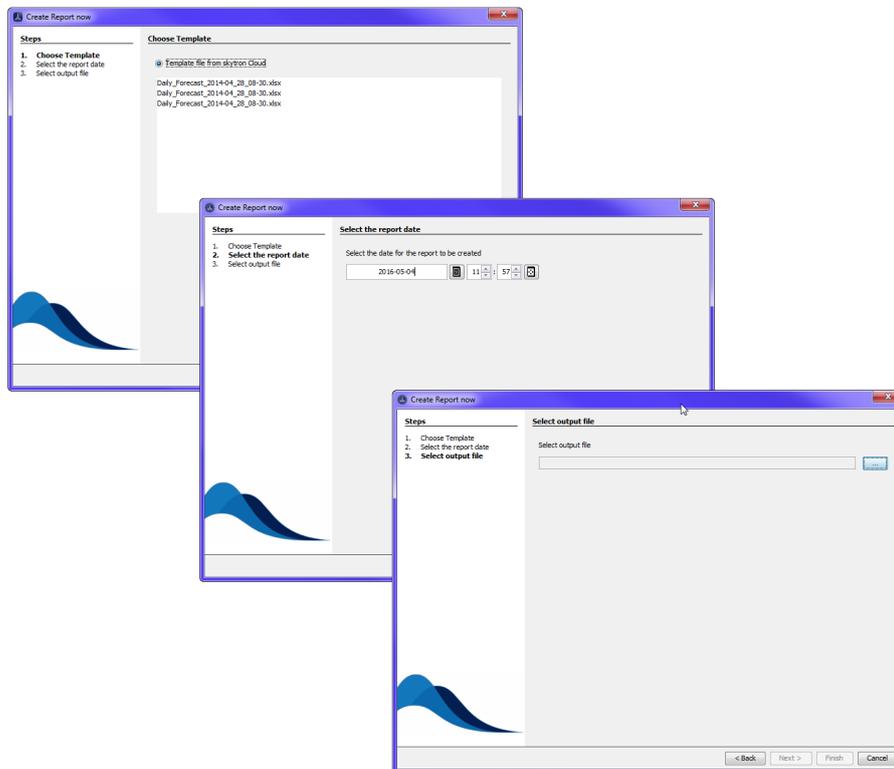


Figure 23: Create Report Now wizard

The report will then be generated and downloaded into the chosen file.

6.2.5 Generating a series of Historical Reports now

Similar to the mechanism for generating a single report, you can also produce a complete series of historical reports - for example, monthly reports over the last two years. To do this, click the **Generate historical reports now** button.

Again a wizard appears, whose steps include:

1. Choosing the report template.
2. Setting the start and end report dates of the report series.

In this case the reports are generated and displayed in the **Generated Reports** table, from where they may be downloaded.

7 Data Aggregate Functions

Data aggregation

Assume data is being logged from a plant every 5 minutes. Over the course of a month this would come to around 8,500 data points. If you wanted to look at a chart for this data over a month, you usually wouldn't want to see the output to a 5-minute resolution – you would be more likely be interested, for example, in the daily output over that time. Plotting the data at a 5-minute resolution would provide much more detail than needed, with the added overhead of gathering and transmitting this data.

So a means is required for PVGuard to consolidate the data into sensible and usable chunks. This process is called *data aggregation*. The chart below illustrates the process. In the chart, data is being logged at 5-minute intervals, but you want it to be plotted to a 20-minute resolution. So on the graph, the value to be plotted for every 20-minute interval has to be calculated from the four raw data readings.

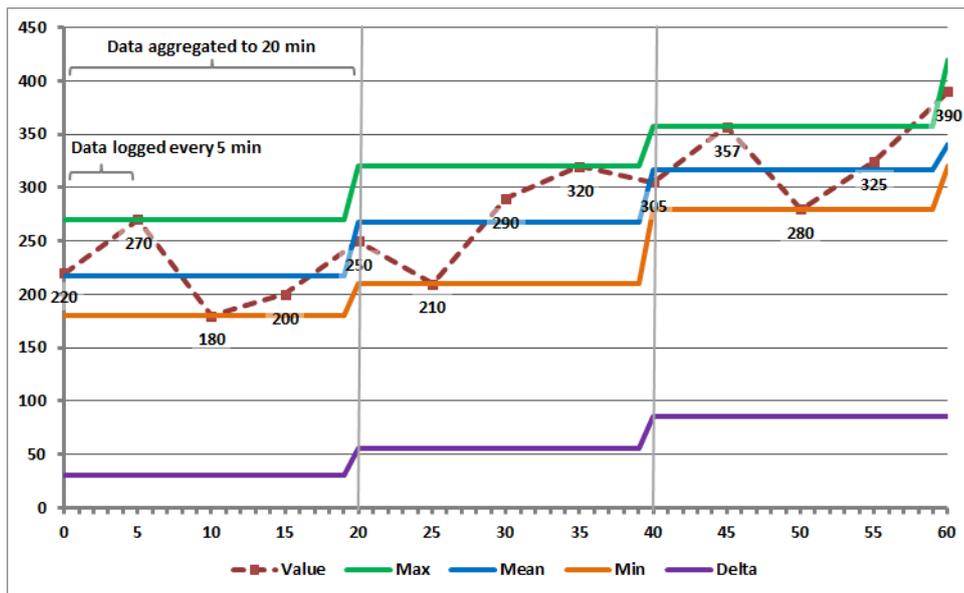


Figure 24: Aggregation of plant data

The question is how should the plotted data be aggregated from the low-resolution logged data? There is no single way of doing this; the answer depends on what you intend to use the data for. Therefore PVGuard provides a number of ways of doing it. These are known as the *Data Aggregation* functions.

Data aggregation functions

The functions provided include:

- The average of the data points over the resolution period
- The maximum or minimum values over that period
- The overall change (delta) in the value over the period

In addition there are other aggregates for digital (status) values.

In the illustration, the original data is shown by a red dashed line, with points every 5 minutes. The mean, maximum and minimum are shown by the solid blue, green, and orange lines. These only change every 20 minutes – the period of the aggregation.

Often the differences between the mean, maximum or minimum figures will be insignificant. When you want to get an overall impression of a plant's output over a day, it probably doesn't matter which you use. In most cases the default – often the mean – will suffice. However, there may be times when using one of the other aggregates can reveal useful information.

Aggregate

Description

Mean (average)

The mean is probably the most useful aggregate function, producing an average of the values over the period.

Minimum

The minimum aggregate could be useful in identifying short-term plant outages, where the output might drop to a low value or even zero for a short period during the aggregation interval. In this case the mean might only show a slight reduction, especially if many data points are involved. The minimum might also be useful in identifying short-term reverse string currents.

Maximum

The maximum aggregate could be useful in establishing the absolute maximum radiation or output for the plant over the day. In addition it may be useful in establishing whether any of the components – especially the inverters – are overloaded over the period.

Delta

This aggregate shows the difference between the value at the start of one aggregate period and the start of the next. Being a difference, its absolute value will be much smaller than the original data value, and can even be negative. The delta graph identifies changes in, or the rate of change of the data value concerned.

Delta aggregates can be used to identify periods of rapid change in a plant's output, for example, when there is intermittent cloud cover or when there are transient problems in the equipment. For cumulative values such as total energy yield, the delta can identify fluctuations that would be difficult to spot on the steadily rising line.

For certain tables and charts showing output values, the following additional aggregates may be available. These are illustrated in the diagram below.

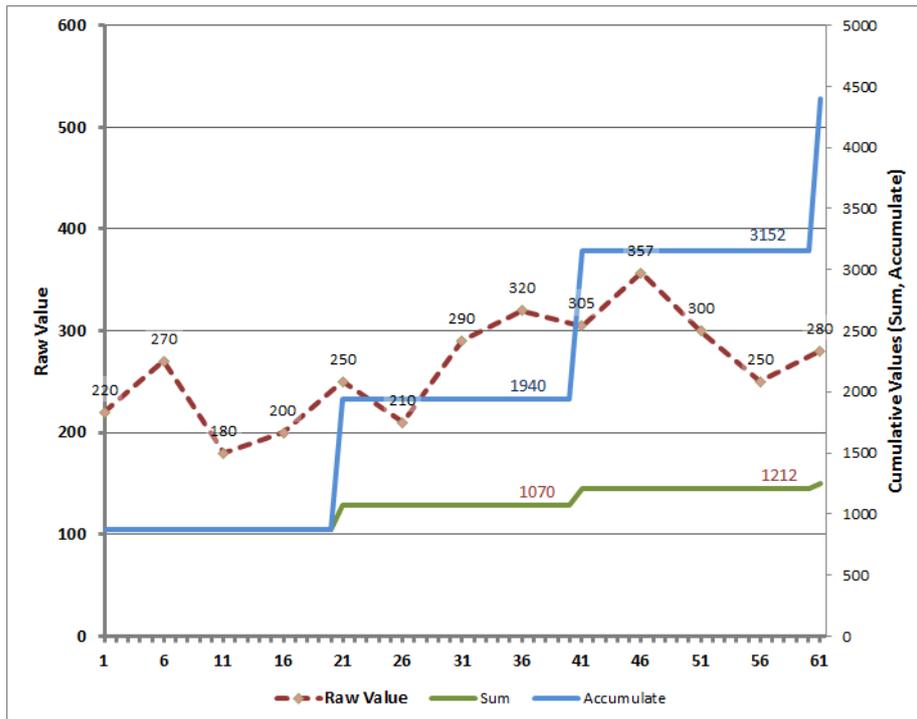


Figure 25: Aggregation of plant data

Aggregate

Description

Sum

In the Sum aggregate the values of each of the raw data points are summed over each of individual aggregate period. For example, if the raw data values for two periods are [2, 5, 7] and [5, 6, 8] the Sum aggregate will show [14 and [19].

Accumulate

The Accumulate aggregate is similar to the sum aggregate except that sums the values over the whole period of the display. It will therefore show a continually rising line. For example, if the raw data values for two periods are [2, 5, 7] and [5, 6, 8] the Accumulate aggregate will show [14] and [33].

The last aggregate only applies to digital status data:

List

The List aggregate only applies to digital (status) values in a tabular display. When chosen, all the individual status values that occurred over the period will be listed in the output.

- **Note:** If the data logging period and the aggregation period are the same, then all aggregates other than delta will show the same value, the one that was actually logged.
- **Note:** When aggregated data is plotted, the specific date or time against which it is plotted on the horizontal axis. depends on the data resolution used. When the data is plotted with a resolution *less than a day*, the time at the *end* of the interval is used. When the resolution is a *day or more*, the date at the *start* of the aggregation interval is used.

8 Terms Used

8.1 Terms Used

The following terms are used in this manual:

Alias	The name you assign in PVGuard to any of the devices in a plant. Can be adjusted in PVGuard.
View Navigator	The upper-left hierarchical panel in PVGuard that you can use to browse through the different PVGuard plant views and charts.
Plant Explorer	The lower-left hierarchical panel in PVGuard that you can use to browse through the devices in your plants and their data channels.
skytron Cloud	The storage area on the skytron PVGuard servers for user data such as images and template files.
UPID	This is a unique identifier used by PVGuard to identify each power plant. No two plants can have the same <i>UPID</i> . In addition to their <i>UPID</i> , plants will also have an <i>Original Device Name</i> and a <i>Customizable Device Name</i> (otherwise known as <i>Alias</i>) to identify them. The former is the name which is initially used when the plan is being configured in PVGuard. The latter is the name commonly used to refer to them by the plant operator. This can be changed by the operator.
UVID	A unique identifier used by PVGuard to identify any single data channel. No two data channels across the whole PVGuard system can have the same <i>UVID</i> .