Exploitation manual

Stream

**Energy
Monitoring System
HTG5xxH**

:hager

Related documents

Document	Reference
agardio.manager user manual	**6LE001606C**
stream installation manual	**6LE007612A**
stream configuration manual	**6LE007614A**

Used notations

ℹ️ Provides tips, insights, and precisions.

⚠️ Marks a risk in terms of loss of data or access to it.

Table of contents

1. Introduction

stream is an Energy Management System (EMS). Its final aim is to be used for the exploitation of energy data in a relevant context, to help to make informed decisions when it comes to load-shedding and energy savings.

To be able to do that, stream has to be configured for said context.

- If you are interested in doing this yourself, refer to the _stream configuration manual_.

- If your stream system has already been properly configured (by yourself or anyone else), and you wish to put all these preparations to good use, this document is the one for you.

In stream, data exploitation offers **dashboards** as well as some tools for a more in-depth analysis of your data, both in **real-time** and **after storage**.

Figure 1 - Data exploitation menu in stream

Dashboards have been developed for stream to allow for the consultation of **energy consumption**, both **electrical and not electrical** if measured. These consumptions can be visualised for every geographical level of your installation, based on its structure entered in configuration:

- Overall, with distribution across sites or buildings.

- For a single **site**, composed of buildings.

- For a single **building**, composed of floors and rooms.

Figure 2 - Example of stream navigation across the installation structure

Directories are purely organisational entities and do not grant access to any type of data exploitation interface.

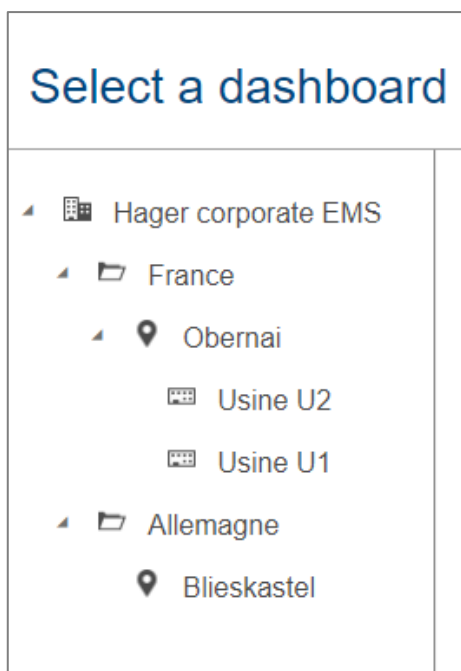This funnel organisation of dashboards allows digging deeper into details after having started with a more global overview.

Dashboards allow studying the **total** consumption of energy as well as its **evolution**, as exposed in §2.3.
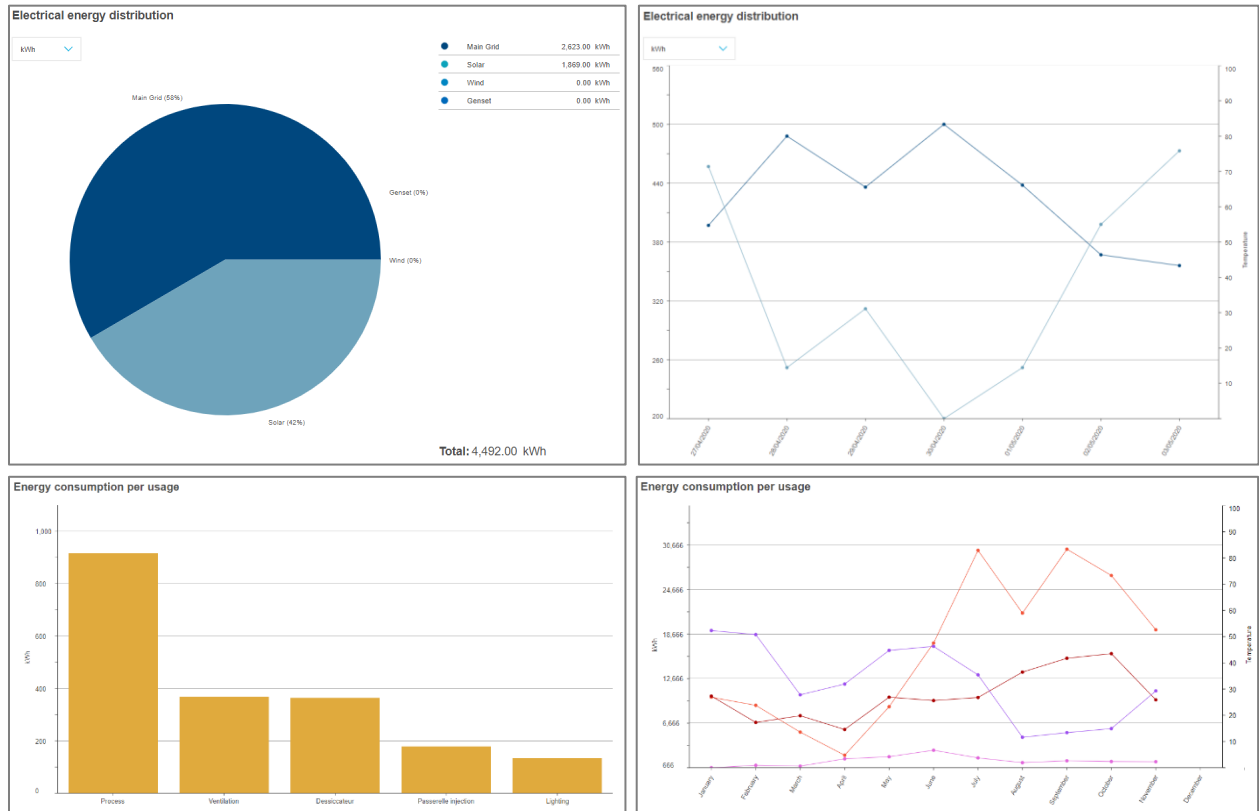
Figure 3 – Totals and evolutions in stream dashboards

They allow for the selection of various timeframes and periods, as explained in §0.

And, they show energy through various relevant lenses, as detailed in §2.5, such as:

- Per usage (Lighting, process, motor, etc.).
- Per zone category (Offices, factories, warehouses, etc.).
- Per zone of a building (individual floors and rooms of the building).
- Per sector of activity of a building (industrial, commercial, etc.).
- Per origin (Main Grid, Solar panel, etc.).

When a weather service has been configured (see *stream configuration manual*), contextualisation and normalisation of energy based on outside **weather** can be activated (see §2.7).

The **cost** and the **carbon footprint** of your electricity are also available in stream dashboards.

Additionally, you can check:

- Values of measured services in **real-time** (<u>Chapter 3</u>).

- **Protection** status and configuration (<u>Chapter 4</u>).

- **Power quality** indicators (<u>Chapter 5</u>).

- Detailed and compared **history** of stored services (<u>Chapter 6</u>).

- The **electrical efficiency** of buildings, as defined by the IEC (<u>Chapter 7</u>).

Finally, stream also handles **event notifications** (<u>Chapter 8</u>), about:

- **Measurements**, following the custom alarm configuration put in place specifically for the installation.

- Its own potential **malfunctions**, following any failure scenario anticipated during its development.

Figure 4 - Event exploitation menu in stream

Refer to <u>Chapter 9</u> to change the **password** for your account or the **language** the interface is displayed in.

If you are currently encountering what seems like an issue, refer to <u>Chapter 10</u>.

<u>Chapter 11</u> is an appendix which contains the list of existing system events and the **computation methods** used by stream for energy consumption and degree days.

2. Dashboards

2.1. Dashboard organisation

Once you have selected a level of dashboard in the installation structure, the navigation tree is put aside, and you have a whole exploitation interface at your disposal.
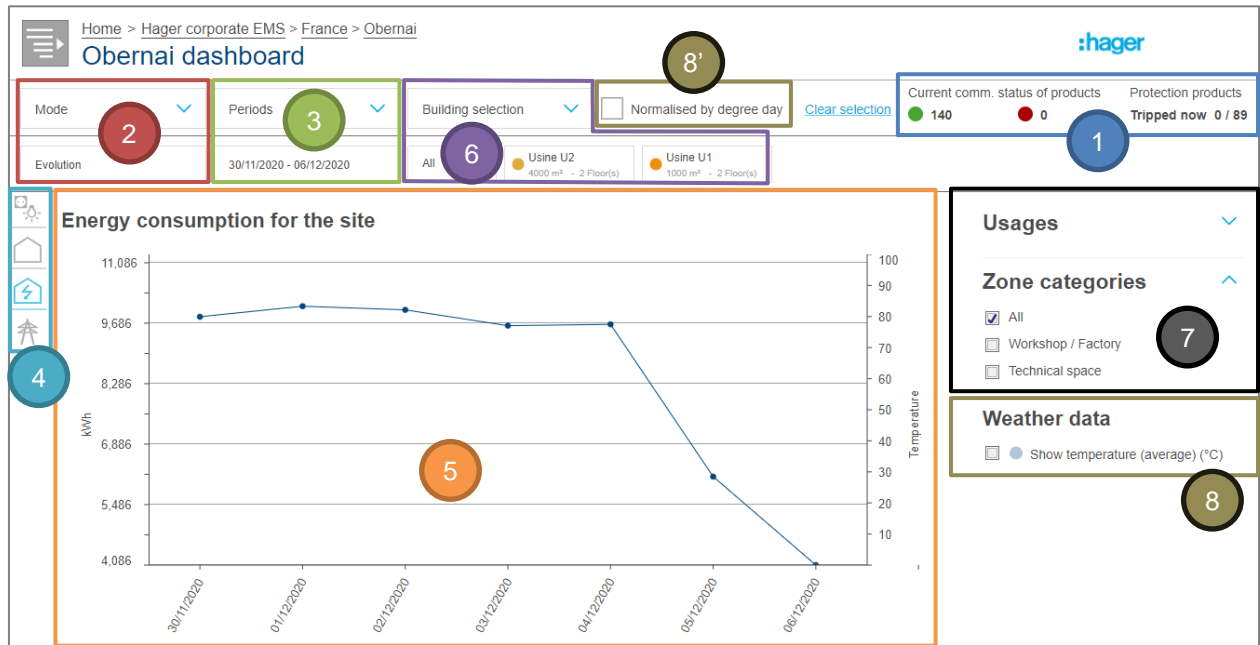

Figure 5 - General organisation of a stream dashboard

#	Element	Description	§
1	Health indicators	Summary of the communication and protection status of products in the selected perimeter.	§2.2
2	Mode selector	To switch from total energy to its evolution.	§2.3
3	Period selector	To select a timeframe and period(s).	§2.4
4	Chart selector	To determine which chart you wish to see.	§2.5
5	Chart area	Where the chart is displayed.	N/A
6	Sub-perimeter selector	To reduce the considered geographical perimeter.	§2.6.1
7	Filter area	To filter the currently displayed chart by additional parameters.	§2.6.2, §2.6.3 & §2.6.4
8	Weather contextualisation	To activate the display of temperature as a backdrop for energy.	§2.7.1
8'	Weather normalisation	To activate the normalisation of energy by degree day.	§2.7.2

Available charts vary depending on the level of dashboard considered, as explained in §2.5.

ℹ The logo in the top right corner can be customised in the properties of your installation. Refer to the *stream configuration manual* to know how to access installation properties.

2.2. Health indicators

Whichever dashboard you are considering, and whichever geographical sub-perimeter of it, health indicators about the currently selected perimeter are always provided.

2.2.1. Communication status of products

The numbers of communicating and not communicating products are computed based on the communication status of products currently expected to communicate. This means deactivated products or products on deactivated devices are not taken into account.
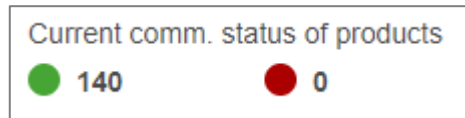
Current comm. status of products
● 140   ● 0

Figure 6 - Health indicator about the current communication status of products

- ▪ A product is considered communicating when both it and its parent device are properly communicating.

- ▪ A product is considered as not communicating when it is itself not communicating, or its parent device is the one not communicating; either way, measurements are not being retrieved from this product.

> ⚠ The more not communicating products there are, the less reliable the energy displayed in the dashboard.

When clicking the number of not communicating products, at any dashboard level, you are offered more detailed information on the issue:

- ▪ At the installation level, you are offered the number of not communicating products per site or building, depending on your current perimeter selection.

- ▪ At the site level, you are offered the number of not communicating products per building.

- ▪ At the building level, you are redirected to the overview of all energy-metering products described in §0.

2.2.2. Trip status of protection products

In case there are circuit-breakers in your installation, knowing whether they are currently tripped or not is crucial information to have. Every dashboard provides the number of tripped breakers over the total number of configured breakers in the currently selected perimeter.
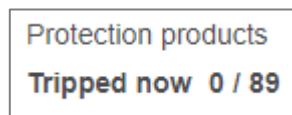
Protection products
Tripped now 0 / 89

Figure 7 - Health indicator about currently tripped protection products

ℹ A protection product is considered tripped when its trip alarm is ON.

When clicking the number of tripped protection products, at any dashboard level, you are offered more detailed information on the issue:

- At the installation level, you are offered the number of tripped protection products per site or building, depending on your current perimeter selection.

- At the site level, you are offered the number of tripped protection products per building.

- At the building level, you are redirected to the overview of the protection status of the building described in §0.

2.3. Visualisation modes

2.3.1. Total

Totals are useful to not only know consumption across certain perimeters but also compare these consumptions among themselves.

In stream, *totals* are represented as:

- ▪ *Bar charts*, when the number of pieces is unpredictable. This is true for usages, zone categories, and zones, but also sites and buildings. All of these types of elements are open for configuration.

- ▪ *Pie charts*, when the number of pieces is limited. This is true for types of sources and sectors of activity, of which there cannot be more than 5 and 3, respectively.
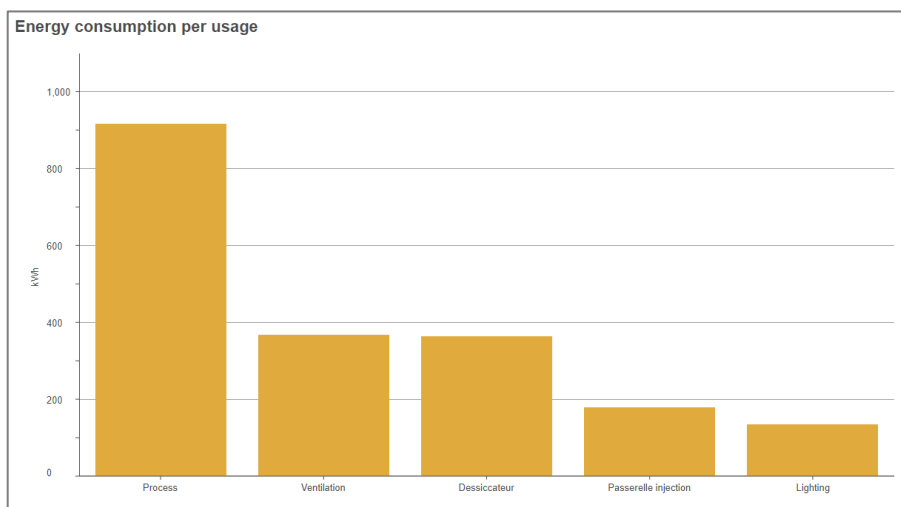

Figure 8 - Total energy consumption per usage as a bar chart
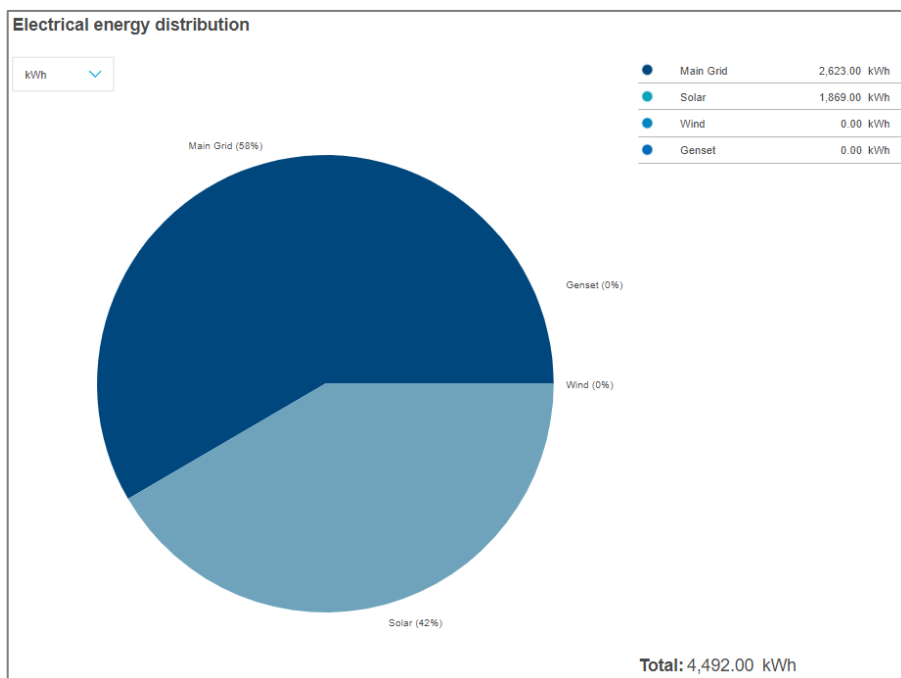
Figure 9 – Total energy distribution per origin

2.3.2. Evolution

Evolutions are useful to extract a trend in energy consumption, make sure no peak has been observed during a certain period. An evolution is essentially the details behind a total.

In stream, *evolutions* are always represented as line charts on a time axis.

- When considering a week or a month, the time axis is divided in days.

- When considering a year, the time axis is divided in months.
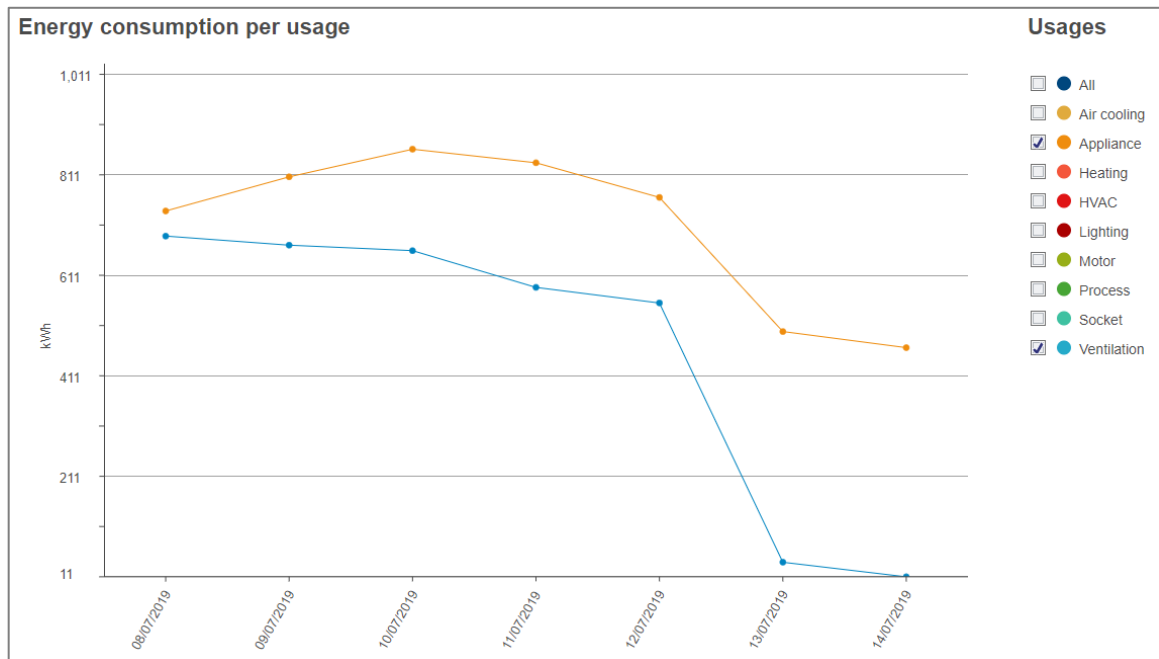
Figure 10 - Evolution over a week
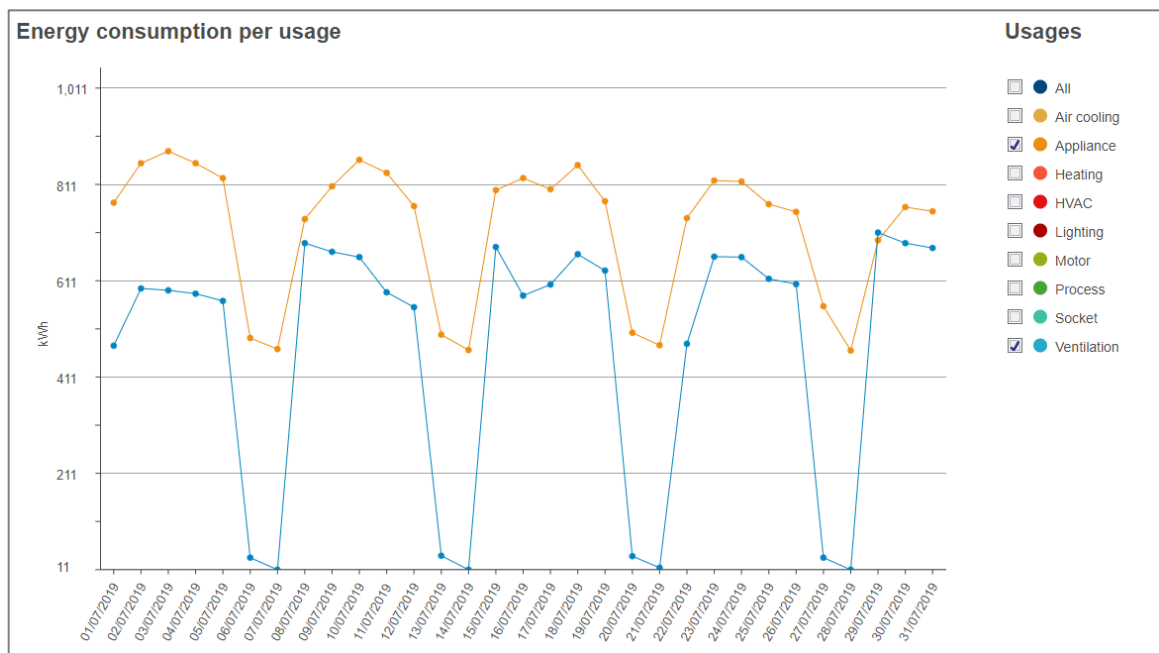
Figure 11 - Evolution over a month

Figure 12 - Evolution over a year

2.3.3. Evolution per building

Site dashboards offer a third mode, to see the evolution of energy per building of the site.

Figure 13 - Evolution per building of a site with 2 buildings, over a year

For readability reasons, when in this mode, only one period can be selected. If a second period was selected before switching to this mode, this selection is cancelled.

2.4. Period(s)

2.4.1. Timeframe and period(s) selection

You can consult your energy consumption over a selected period or over 2 periods, for comparison.

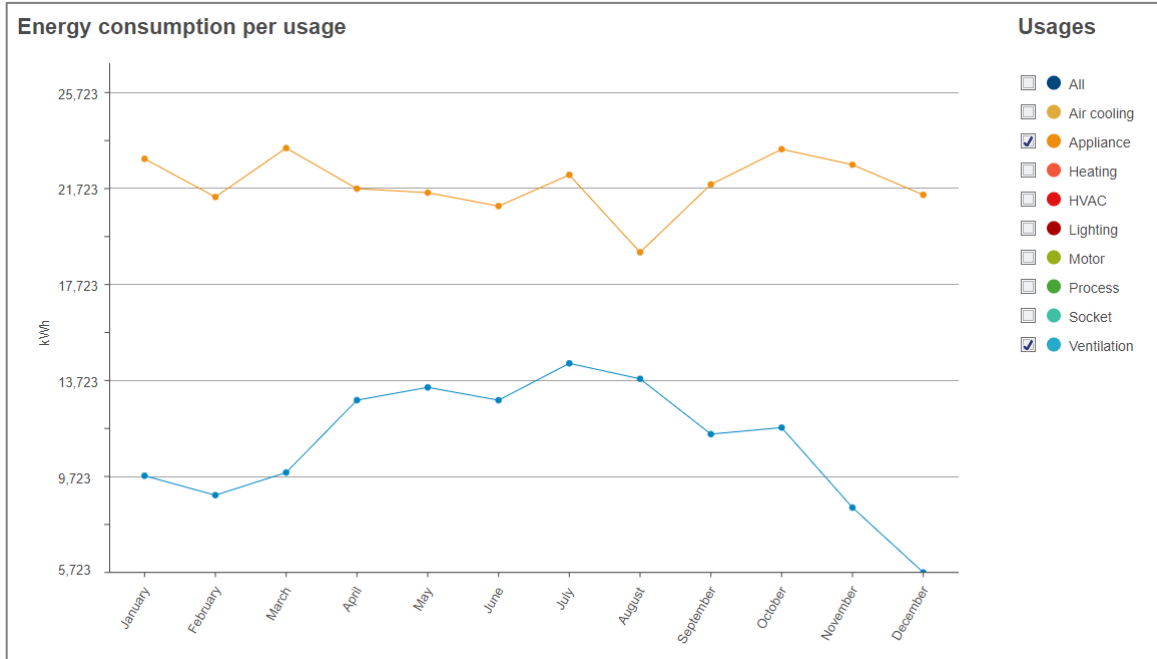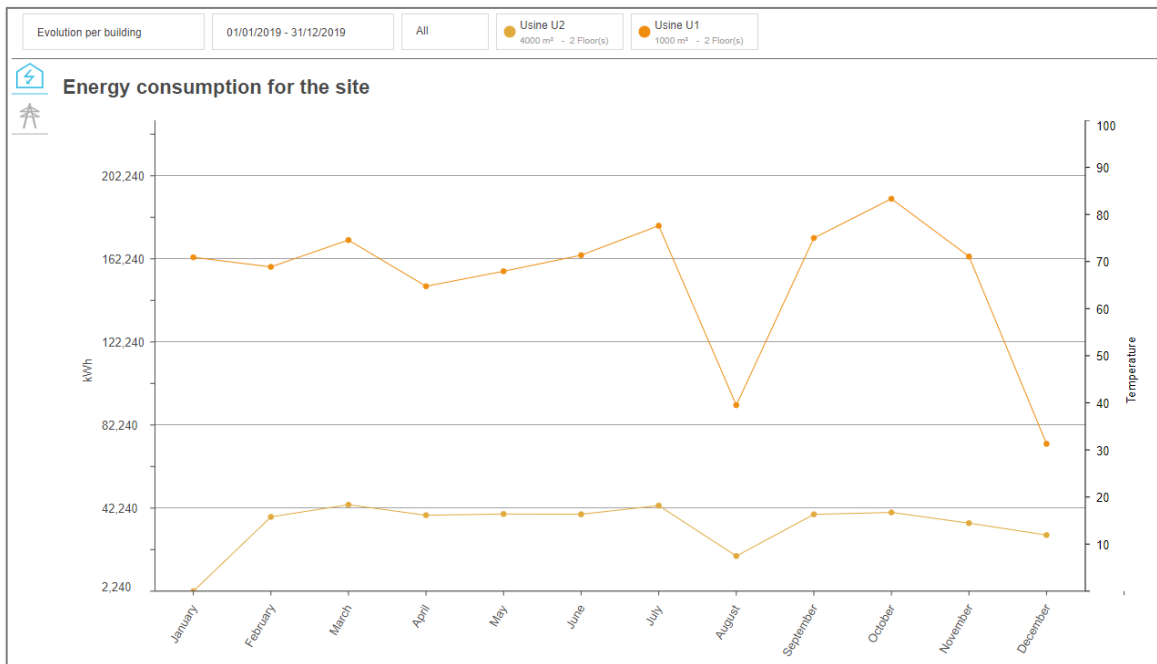The envisioned timreframes in stream are: week, month, or year. They have been deemed the most relevant ones to observe trends and take actions accordingly.

Figure 14 – Selection of timeframe and periods in stream dashboards

When opening the **When** or the **Compare with** selector, you are prompted to select a specific date. This allows you to remain centred on that same date while navigating across different timeframes.

Example: when May 4th 2020 is selected, by changing timeframe selection you can switch between the year of 2020, the month of May 2020, and the week from Monday, May 4th 2020 to Sunday, May 10th 2020.

By default, the current week is selected, and no comparison period.

Periods and their subdivisions in Evolution mode are always considered in local time based on the configured time zone for the concerned site. This way, local days, weeks, months, and years are aggregated, even though their corresponding energy consumption technically has not been observed at the same coordinated universal time (UTC). But it would not make sense to compare 3:00 in France to 10:00 in Japan, for example.

2.4.2. Impact of the selection of 2 periods

Timeframe and **When** are mandatory selections. **Compare with**, on the other hand, is optional.

When a comparison period is selected, all charts display the two periods next to the other.
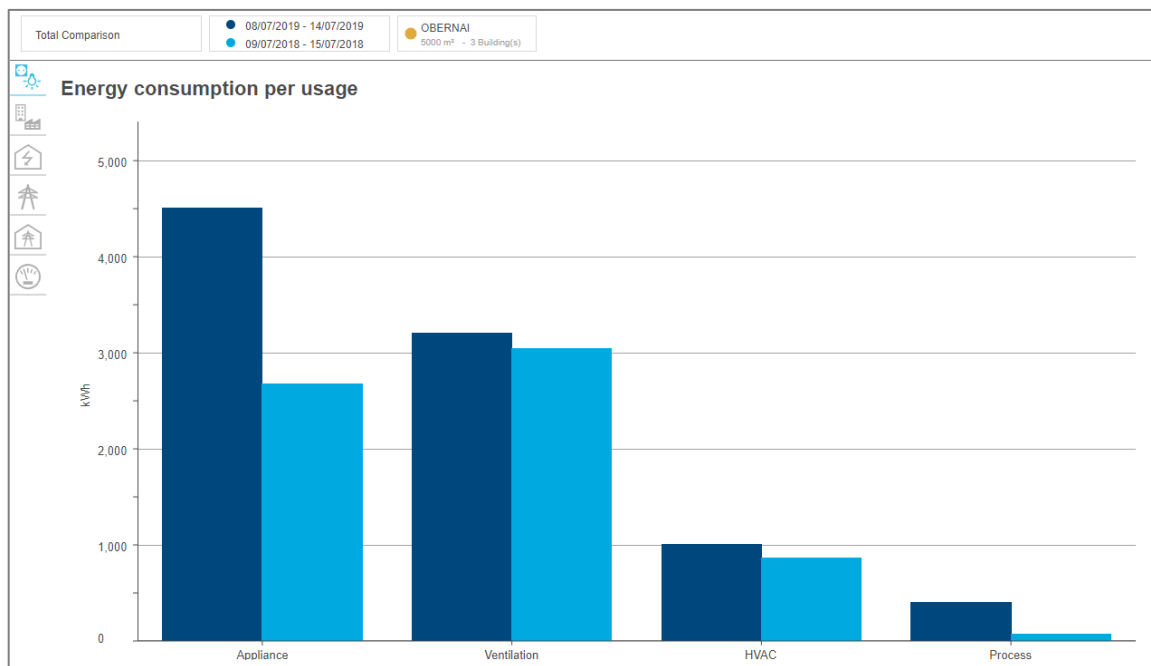
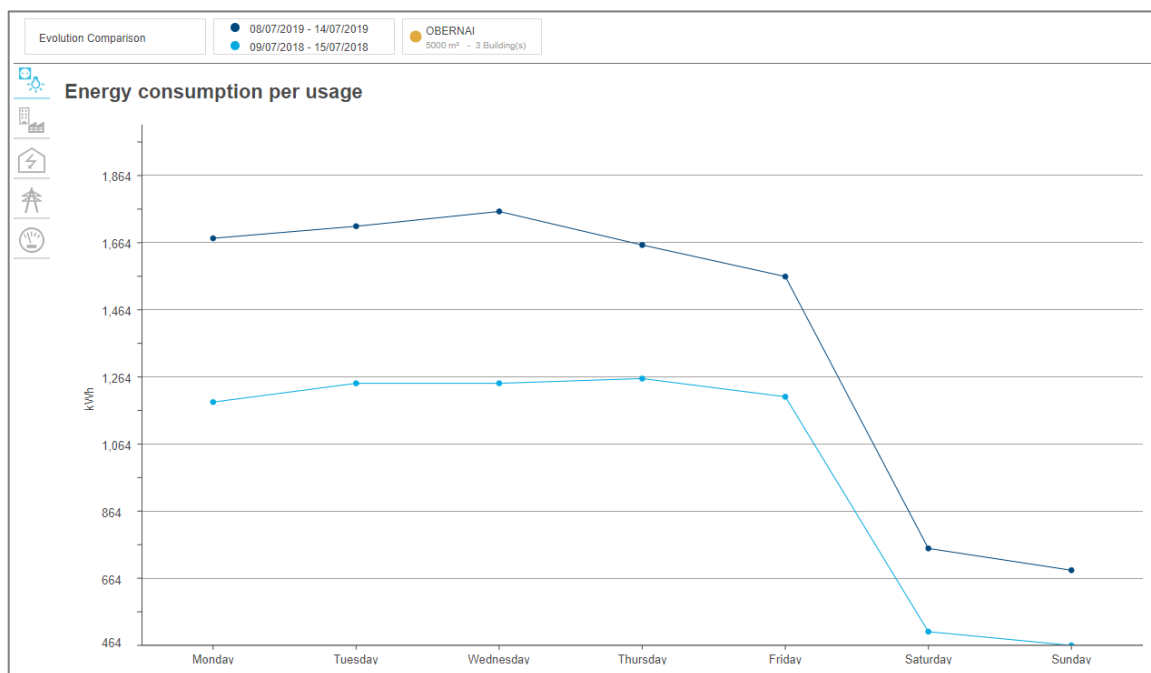Figure 15 - Impact of the selection of 2 periods on a total

Figure 16 - Impact of the selection of 2 periods on an evolution

Evolution per building mode does not offer a **Compare with** selector. If a second period was selected before switching to this mode, this selection is cancelled.

2.5. Available charts

Each level of the installation structure gives access to different charts in the corresponding dashboard(s).

Icon	Chart	Dashboard level		
		Installation	Site	Building
		🏢	📍	🏛
	Energy consumption per **usage**	x	x	x
	Energy consumption per **sector of activity**	x		
	Energy consumption per **zone category**	x	x	x
	Energy consumption per **zone**			x
	Energy consumption per **site** / **building**	x	x	x *
	Energy per **mesh** [(1)]		x	x
	Electrical energy distribution per type of **source**	x	x **	x **
	Electrical energy distribution per **site** / **building**	x	x **	
	W.A.G.E.S. [(2)]	x	x	x [(3)]

Table 1 - Chart availability depending on dashboard level

* Only in Evolution mode.

** Cost and carbon footprint of energy also available.

[(1)] Energy per mesh charts are only available if some meshes have been configured for the site of the concerned perimeter.

[(2)] W.A.G.E.S. charts and tables are only available if some non-electrical resources are being monitored within the concerned perimeter.

[(3)] In building dashboards in Total mode, when available, W.A.G.E.S. data is displayed with the distribution of electrical energy per type of source.

2.6. Filters

2.6.1. Reduce the geographical perimeter
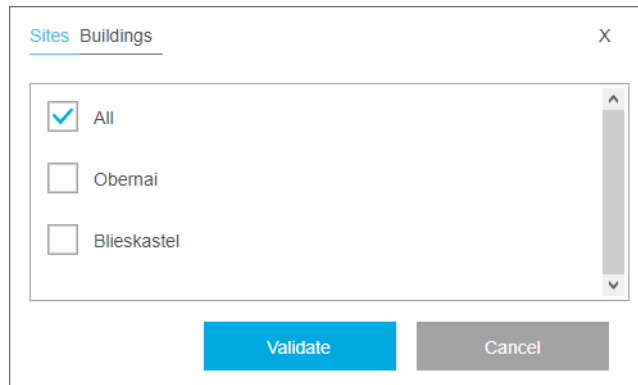
Figure 17 – Site(s) or building(s) selection in stream

For dashboards of higher level, the considered geographical perimeter can be subdivided into the lower ones it is composed of.

▪ The installation dashboard can be restricted to a selection of sites or a selection of buildings. And depending on whether you are working with sites or buildings, certain charts represent data either per site or per building.

▪ Site dashboards can be restricted to a selection of buildings.

By default, all sites are selected in the installation dashboard, and all buildings of a site are selected in its dashboard.

2.6.2. Zoom in on a bar chart

The number of bars in a bar chart can be reduced by a filter on its X-axis. This may allow for more readability, or simply help to bring forward categories of interest.

Figure 18 - Impact of a filter on the X-axis of a bar chart

2.6.3. Stack a bar chart

Bar charts can be stacked by a filter on their Y-axis, for a more detailed view of their data.

A filter on the Y-axis of a bar chart is always about another axis of analysis than the main one of the chart, to cross-reference two different points of view.
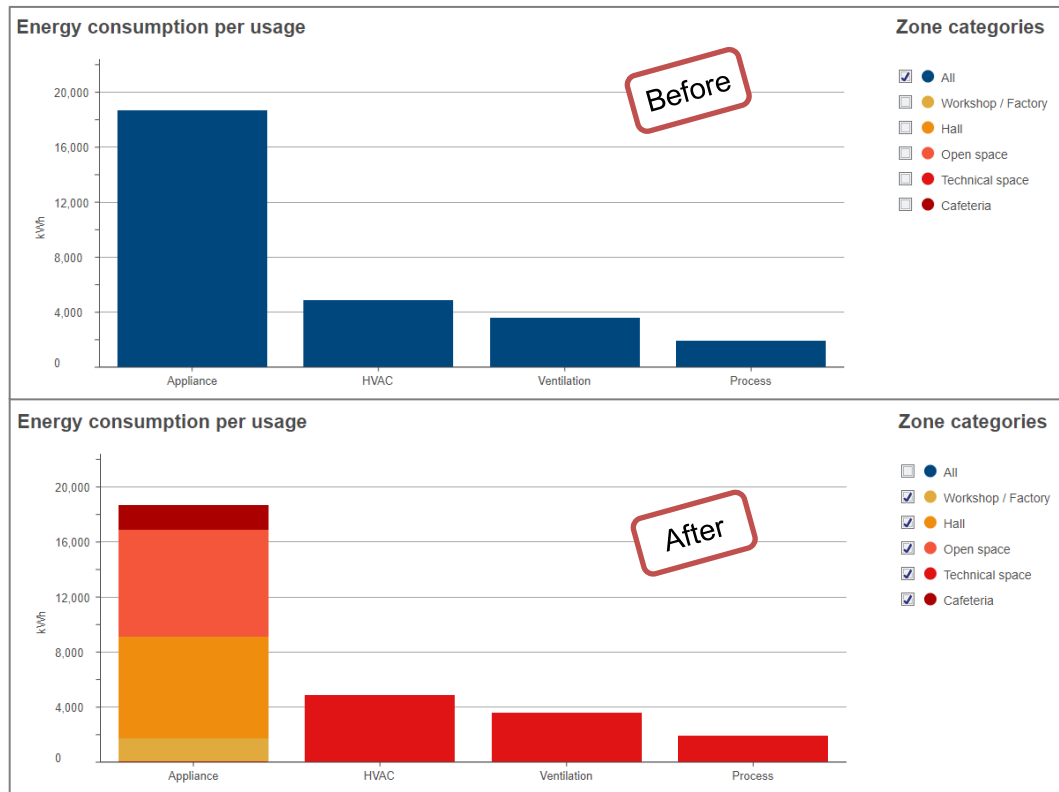
Figure 19 - Impact of a filter on the Y-axis of a bar chart

In the figure above, you can see that appliances have been the main reason for energy consumption in the considered period. After stacking the chart, you can tell that halls and open spaces are responsible for most of this consumption. When wanting to reduce energy consumption, one might therefore want to concentrate their efforts on these types of zones instead of dispersing them across all appliances indifferently.

ℹ️ For readability reasons, bar charts are never stacked when 2 periods are selected.

2.6.4. Split a line chart

Line charts can be spit by a filter on their Y-axis, for a more detailed view of their data.

A filter on the Y-axis of a line chart is always about the same main axis of analysis as the chart itself. It is not used for cross-reference but for detailed analysis.

ℹ For readability reasons, line charts are never split when 2 periods are selected.
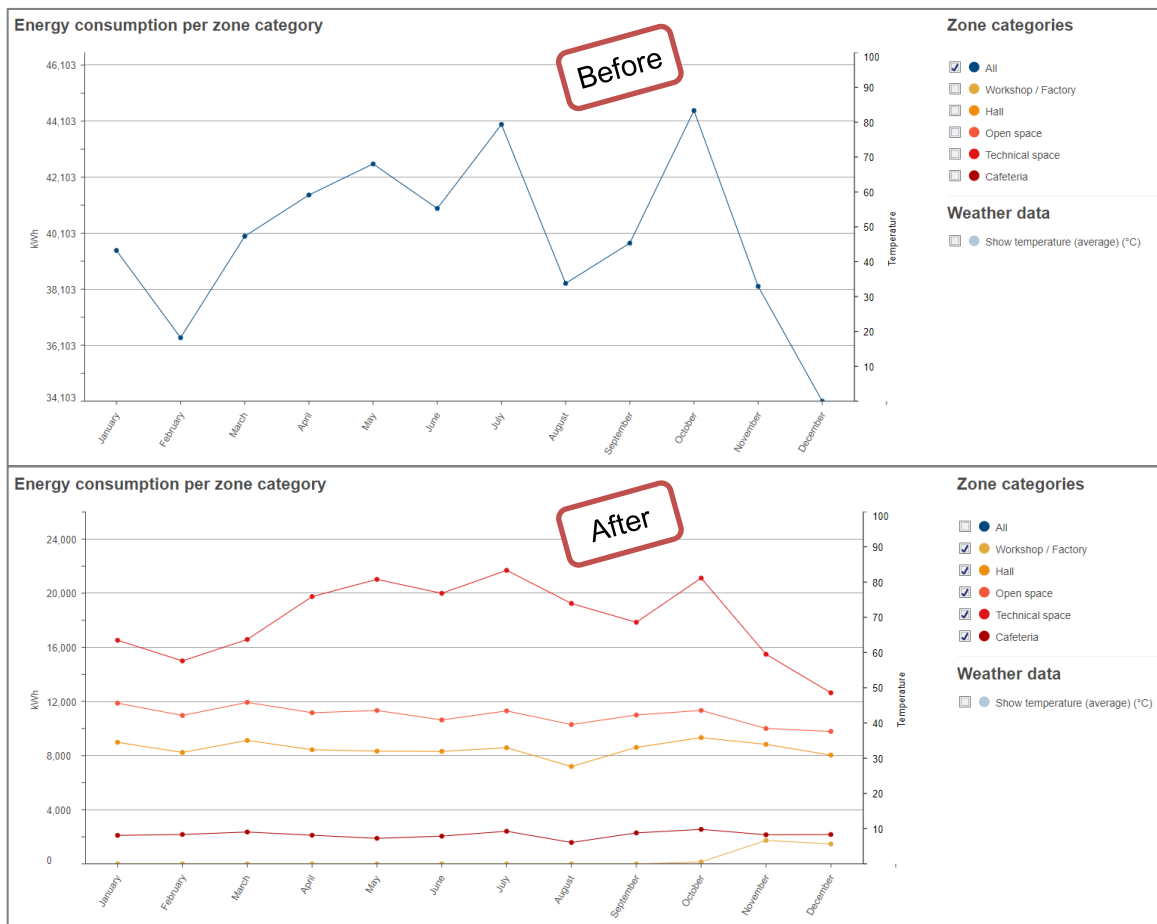
Figure 20 - Impact of a filter on the Y-axis of a line chart

In the figure above, you can see that open spaces have been the biggest consumers all year long, and they are responsible for the overall trend over the year.

2.7. Weather contextualisation and normalisation

2.7.1. Display temperature

If a weather service has been configured for the considered perimeter, then you have the option to display the evolution of energy against the backdrop of average temperature.
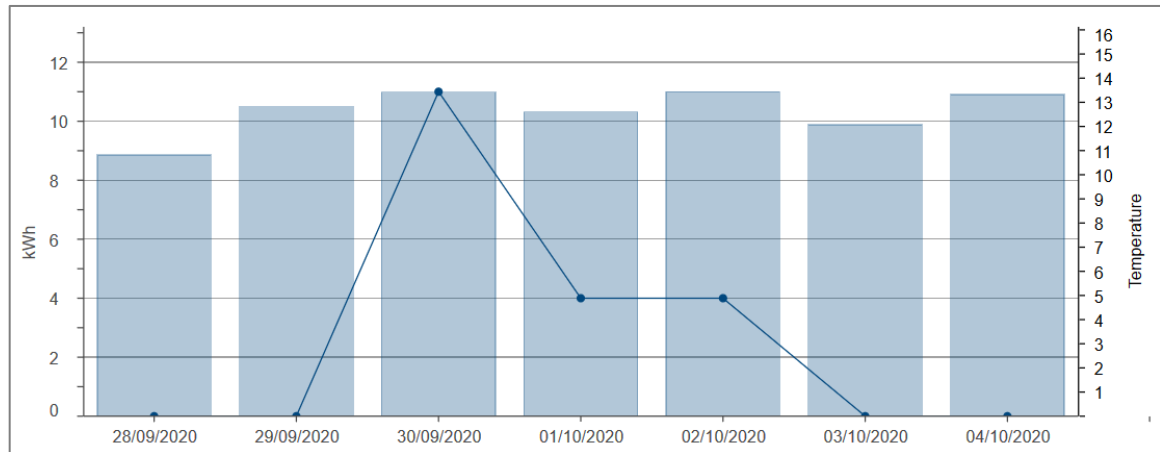
Figure 21 - Example of the evolution of energy consumption with average temperature display

> **i** The average temperature displayed is based on hourly samples, gathered for a site. Because the installation can be composed of several sites, its dashboard does not offer weather contextualisation.

> **i** Temperature samples are preserved for 20 years.

2.7.2. Normalise energy per degree day

If a weather service has been configured for the considered perimeter, then degree days have been computed for every day since, based on the hourly temperature samples gathered for the site.

> **⚠** The amount of degree days for a day is only computed when at least 22 hourly temperature samples have been gathered for that day. Indeed, with temperature samples for less than 22 hours of the day, the resulting amount of degree days would not be reliable.

Degree days reflect the difference between the outside air temperature and an inside reference temperature, and indirectly the necessary energy consumption for maintaining a building to or around a comfortable set point. They basically measure how much (in degrees) and how long (in days) the outside air temperature has been either:

- ▪ higher than a base cooling temperature, for very warm periods requiring air conditioning.
- ▪ lower than a base heating temperature, for very cold periods requiring heating.

Essentially, degree days are supposed to quantify what proportion of energy consumption can be attributed to heating or cooling. As such, they allow for the **normalisation of energy** when wanting to compare periods of different weather conditions. This helps to flatten increases in energy that could be due to outside temperature, to make sure differences are significant.

Example: the consumption of an office building in a heatwave cannot be directly compared to its consumption during a more clement summer. Its base consumption may be the same across both periods and the difference only attributed to the heat.

Weather configuration and therefore degree day computation are site-specific. Because the installation can be composed of several sites, the installation dashboard does not offer weather normalisation.

To compare the energy consumed in a site or building during different seasons without the bias of weather-induced heating or cooling, the energy for each period is divided by the number of degree days computed for it. Normalised energy is therefore expressed in kWh/degree day.

When the amount of degree days for a day or month is zero (which more or less means that the temperature hasn't gone below base heating temperature or above base cooling temperature), then the energy obviously cannot be normalised by this number. Because you cannot divide by 0.

In consequence, in a normalised chart, when no data point is present for a day or month during which energy was measured and enough temperature samples were gatehred, it means no correlation can be established between energy and outside temperature. At least according to the way computation of degree days is configured for the considered site.

Weather data – temperature samples and degree days - is preserved for 20 years.

3. Real-time data

steam grants access to data in real-time, both for all measurements, in a generic view, and for energy measurements specifically, in dedicated views.

3.1. Generic visualisation

When you wish to consult the values of measurements acquired by one or more products of your installation:

1. In the navigation tree, select the building which contains the product(s) you are interested in.
2. Get to **Product measurements**.
3. Select the product(s) you are interested in.
4. Select the service(s) you are interested in.
5. Click "**Apply**".

Service	Product	Value	Unit	Timestamp
Σ Active Power +/-: P	Q9	4.30	kW	07/10/2020 10:23:26
Σ Active Power +/-: P	C2Q10 (General measures)	0.09	kW	07/10/2020 10:22:27
Σ Active Power +/-: P	C1	157.20	kW	07/10/2020 10:23:27
Σ Active Power +/-: P	C3	5.06	kW	07/10/2020 10:23:42
Σ Active Power +/-: P	C4	0.02	kW	07/10/2020 10:22:49
Σ Reactive Power +/-: Q	Q9	7.40	kvar	07/10/2020 10:23:26
Σ Reactive Power +/-: Q	C2Q10 (General measures)	0.02	kvar	07/10/2020 10:22:27
Σ Reactive Power +/-: Q	C1	153.60	kvar	07/10/2020 10:23:40
Σ Reactive Power +/-: Q	C3	3.44	kvar	07/10/2020 10:23:42
Σ Reactive Power +/-: Q	C4	-0.04	kvar	07/10/20
Σ Apparent Power: S	Q9			
	C2Q10 (General			

Figure 22 - Glimpse of real-time consultation of monitored values

3.2. Specific view for electrical energy

When it comes to energy, specialised views have been imagined, to put it in context. For electrical energy, energy-metering products are listed with their main active positive energy index and gathered by place in the hierarchy.

1. In the navigation tree, select the building whose monitoring architecture you are interested in.
2. Get to **Characteristics**.
3. Get to **Products**.

This interface is mostly intended to help to check that the monitoring architecture has been correctly input.

Product's place in the electrical hierarchy	What it means	Charts using its energy index
Initial	The product monitors an **entry of the electrical network**; it measures energy consumption at its origin.	Charts per type of source Charts per mesh
Intermediary	The product is **redundant** with both initial and terminal products; it is in the middle of the electrical network.	Charts per mesh
Terminal	The product monitors energy at the other end of the electrical network; it measures energy consumption at a **load**.	Charts about energy consumption per usage, zone category, zone, and sector of activity Charts about meshes

Table 2 - Meaning and implications of a product's place in the electrical hierarchy

Figure 23 - Overview of products monitoring the electrical network of a building

3.3. Specific view for non-electrical resources

A dedicated view is also available for products monitoring the consumption of non-electrical resources such as **water**, **air**, **gas**, and **steam**.

1. In the navigation tree, select the building whose non-electrical resources you are interested in.
2. Get to **Characteristics**.
3. Get to **W.A.G.E.S.**.

Figure 24 - Overview of indexes for non-electrical resources

4. Protection information

The protection of your installation relies on protection products. Both their status and their settings are important.

4.1. Protection status

To access a list of all currently activated protection products of a building, along with their pre-trip and trip status:

1. In the navigation tree, select the building whose protection status you are interested in.
2. Get to **Protection**.
3. Get to **Dashboard**.

Figure 25 - Building protection status overview

4.2. Protection configuration

1. In the navigation tree, select the building whose protection settings you are interested in.
2. Get to **Protection**.
3. Get to **Products**.
4. In the drop-down selector, select the protection product whose protection settings you are interested in.

Figure 26 - Protection settings of a protection product

5. Power quality indicators

Some products offer indicators about the quality of the electrical network, and stream has dedicated interfaces for their consultation.

5.1. Basic power quality indicators

Basic power quality is about statistics on **voltages**, **currents**, and **frequency**.

1. In the navigation tree, select the building whose power quality you are interested in.
2. Get to **Power quality**.
3. Get to **Regular**.
4. In the drop-down selector, select the product whose basic power quality indicators you are interested in.

The **instantaneous** value, its **maximum**, and its **average** are available for each measurement of voltage, current, and frequency, as long as the interrogated product provides them and the system has been configured to read them from it.

Example: in the figure below, product Q9 does not provide averages, only maximums and instantaneous values.

Q9					Export
U: Phase to Phase Voltage (Instantaneous RMS, Average of RMS, Maximum of RMS) (V)					Export
	U12		U23		U31
Inst.	407.30		408.10		408.10
Avg.	----		----		----
Max.	428.50		428.00		426.50
I: Current Per Phase (Instantaneous RMS, Average of RMS, Maximum of RMS) (A)					Export
	I1	I2	I3	IN	Ig
Inst.	3.70	2.90	2.70	0.00	0.00
Avg.	----	----	----	----	----
Max.	39.90	36.80	17.20	37.60	0.00
V: Phase to Neutral Voltage (Instantaneous RMS, Average of RMS, Maximum of RMS) (V)					Export
	V1		V2		V3
Inst.	235.60		235.10		235.70
Avg.	----		----		----
Max.	247.00		247.40		246.40
F: Frequency (Instantaneous, Average, Maximum) (Hz)					Export
	F				
Inst.	49.99				
Avg.	----				
Max.	50.16				

Figure 27 - Basic power quality statistics

The information of a **maximum** for a voltage, current, or frequency informs of recent peaks and helps to determine the potential damages they may have had on the electrical network.

ℹ️ Keep in mind that the maximum measured by a product can be locally reset by an electrician so a particularly high peak does not hide subsequent smaller ones, or quite simply a peak which happened a long time ago does not influence you into thinking it occurred recently.

The information of the **average** of a value, on the other hand, is a good reference to determine whether an anomalous increase is happening right now.

5.2. Advanced power quality indicators

Advanced power quality is about **power factors**, **harmonics** of ranks 3, 5, 7, 9, and 11, and the associated **Total Harmonic Distortions**.

1. In the navigation tree, select the building whose power quality you are interested in.
2. Get to **Power Quality**.
3. Get to **Advanced**.
5. In the drop-down selector, select the product whose advanced power quality indicators you are interested in.
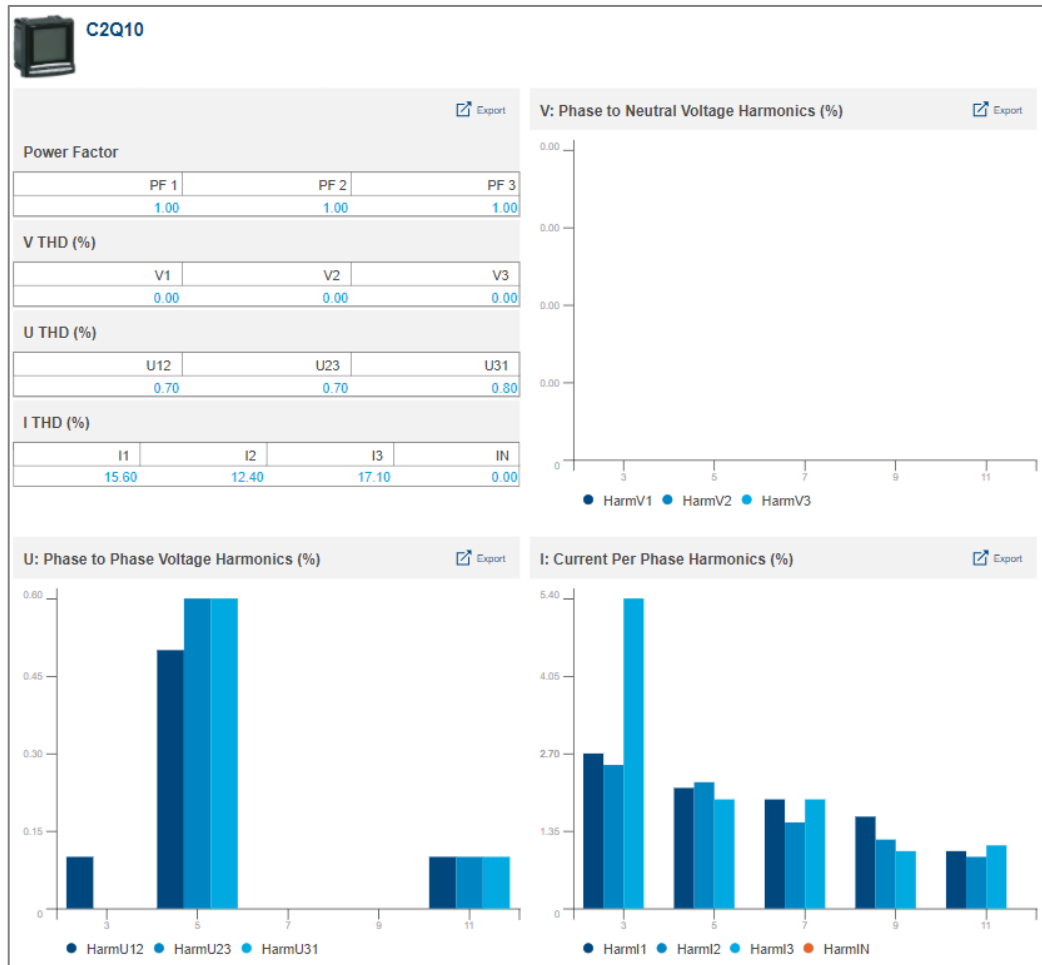
Figure 28 - Advanced power quality metrics (for a product without neutral phase)

Power Factor PF is the ratio between active and apparent power. It indicates how much of the total power being supplied is spent in active power consumption.

- When Power Factor is **positive**, it is said to be **leading**, which means the corresponding load is **capacitive**; it **consumes** energy from the network.

- When Power Factor is **negative**, it is said to be **lagging**, which means the corresponding load is **inductive**; it **provides** energy to the network.

In an industrial context, PF should be as close to 0 as possible because energy providers request monetary compensation for noise added to their signal.

Total Harmonic Distortion is the ratio of total harmonics to the value at fundamental frequency times 100%. It can be computed for voltages and currents.

$$THD(X) = \frac{\sqrt{\sum_{n=2}^{\infty} X_{n\,RMS}^2}}{X_{1\,RMS}}$$

Where:

- X is either phase to phase voltage U, phase to neutral voltage V, or current I.
- THD(X) is the Total Harmonic Distortion for X.
- $X_{n\,RMS}$ is the RMS of X for the nth harmonic.
- $X_{1\,RMS}$ is the RMS of X for the fundamental harmonic.

A high THD means distortions due to nonlinear loads (electrical ballasts or computer power supplies, for example) and should be avoided.

6. Historical data

Storing the values of the services monitored by products allows for a detailed analysis of their evolution. It creates a record which can be studied for anomalies or to confirm the impact of any action which has been taken.

6.1. Stored history

To display the stored history of a service for one or more product(s):

1. In the navigation tree, select the building whose stored history you are interested in.
2. Get to **Product measurements**.
3. Get to **History**.
4. Select one or more products.
5. Select a service.
6. Select an aggregation function. (See §0 for more information.)
7. Select one or more of the channels available for the selected product(s).

> To be available for selection, a channel needs to be storing the selected service, or have stored it at one point in the past. Service storage is explained in the _stream configuration manual_.

8. Select a period of up to 3 months. By default, the last seven days are selected.
9. **Apply** that period.

> Stored history of measurements is preserved for 20 years.

6.2. Stored history comparison in time

To display a compared history of a service of a single product:

1. In the navigation tree, select the building whose stored history you are interested in comparing to itself.
2. Get to **Product measurements**.
3. Get to **Compare**.
4. Select a product. You can only select one in this interface.
5. Select a service.
6. Select an aggregation function. (See §0 for more information.)
7. As a first period, select one of up to 3 months. By default, the last seven days are selected.
8. For the second period, select a start date. By default, the date for fourteen days ago is selected. The end date of the second period is automatically selected so both periods have the same number of days.
9. **Apply** the periods.

> Stored history of measurements is preserved for 20 years.

6.3. Aggregation functions

As mentioned earlier, when consulting stored measurements, aggregation functions are available.

6.3.1. Average

The **average** function is available for all non-cumulative analogue services, meaning all services except indexes and binary services, for which it would not make sense.

This function returns the average of all stored measurements for each day of the selected period, and the average of all measurements stored for each hour of the selected day.

> The average for a day is placed at 00:00 that day.
> The average for an hour is placed on that hour, at HH:00.

6.3.2. Last value

Last value is available for all types of services.

This function returns the last value stored for each day of the selected period, and the last value stored for every hour of the selected day.

> stream history takes time of day into account when displaying the last value for a day or an hour.
>
> Depending on the configured storage frequency for the type of service you are interested in, the last stored value for a day in the past might have been stored between 23:00 and 23:55, and the last stored value for an hour in the past between HH:00 and HH:55. This is why, when using Last value as an aggregation function, the data point for a day may appear closer to the next day than the one it is about, and the data point for an hour closer to the next hour than the one it is about.

6.4. Drilling down charts

When consulting a history or compared history chart, th selecte period(s) contain(s) at least one whole day.

- When first displayed, representation is done **day by day**. The value of the data point for a day is the aggregation of all the measurements stored for that day, following the selected aggregation function.

- At this point, a day can be selected to be displayed **hour by hour**. The value of the data point for an hour is, again, the aggregation of all measurements stored for that hour, following the selected aggregation function.

- Finally, an hour can be selected to display **every measurement stored** for it. At this stage, the selected aggregation function is no longer taken into consideration.

> The storage frequency of a service can be configured for every 5, 10, 15, 20, 30, or 60 minutes, depending on the appreciation of the importance of the considered physical quantity by the configuring user. This has an impact on how many measurements may be available for a single hour (12, 6, 4, 2, or 1, respectively).
>
> You can refer to the *stream configuration manual* for more details about the management of data storage frequencies.
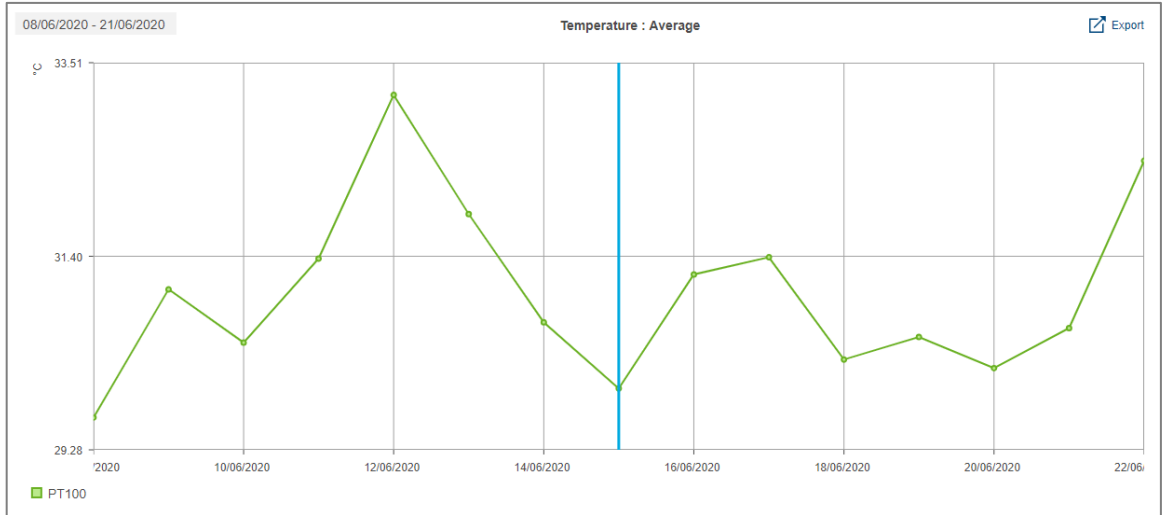
Figure 29 - History over two weeks
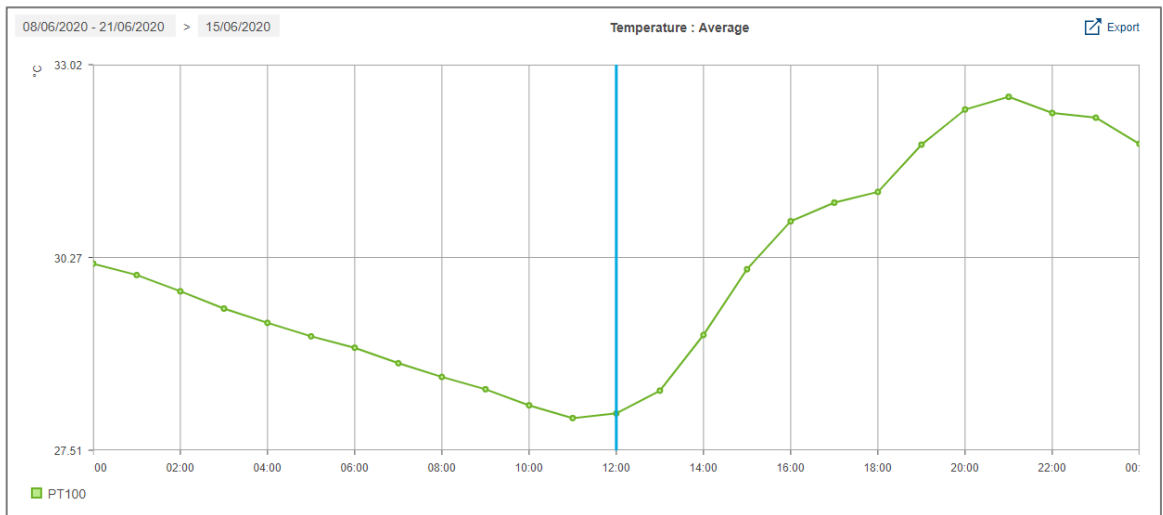
Figure 30 - History for a selected day of the selected period
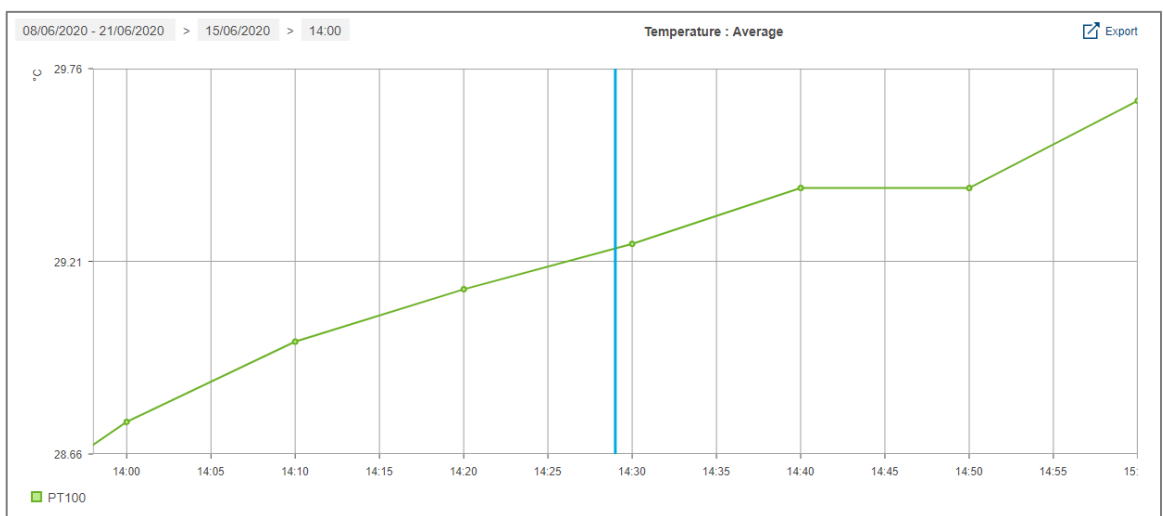
Figure 31 - History for an hour of a selected day of the selected period, for a measurements stored every 10 minutes

7. Electrical efficiency

The Electrical Installation Efficiency Class of a building is determined by a list of criteria elaborated by the International Electrotechnical Commission. Depending on a building's sector of activity and how well this building fits each of these criteria, it is granted more or fewer points, based on its sector of activity. It is the total of all these points which grants the building an efficiency class, from EE0 (the lowest and least favorable) to EE5 (the highest and best).

In stream, each parameter defined by the second edition of norm **IEC 60364-8-1 (Ed 2)** is listed, along with its current score for the building and a target score. The difference between the two illustrates a margin of progression for each parameter so as to be able to better the overall score of the building.

1. In the navigation tree, select the building whose electrical efficiency you are interested in.
2. Get to **Characteristics**.
3. Get to **EIEC**.
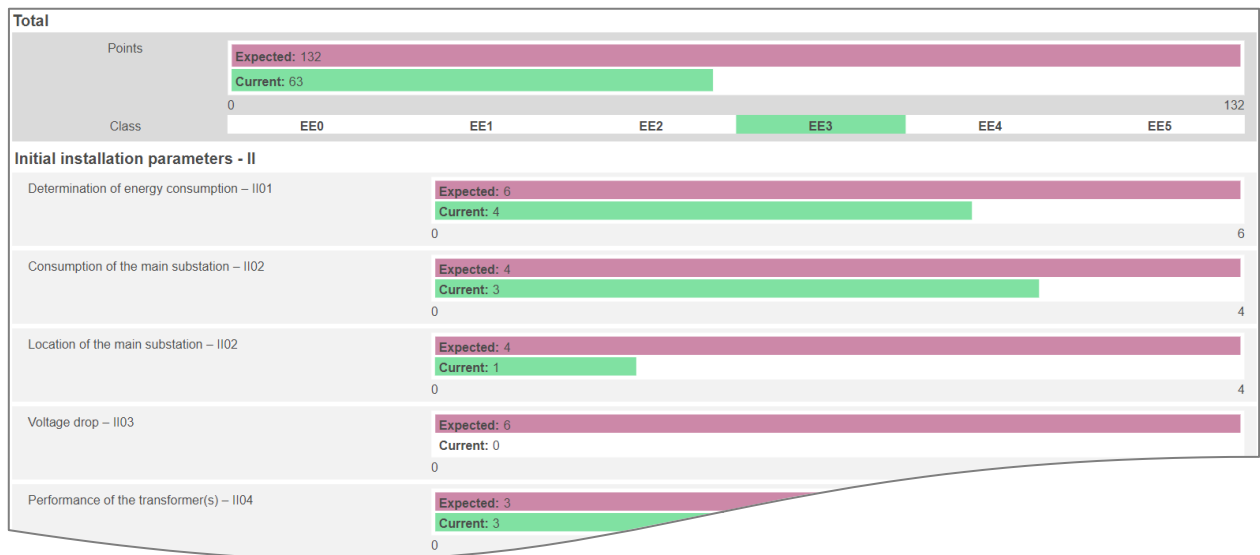
Figure 32 - First rows of EIEC visualisation in stream

As explained in the _stream configuration manual_, how a building fits each EIEC criteria is entered in stream configuration based on the answers to a multiple choice questionnaire.

8. Event exploitation

Figure 33 - Event exploitation menu in stream

8.1. Organisation of events

8.1.1. Scopes of events

In stream, event instances are organised into 2 groups:

- ▪ **_Process_** events are specific to your installation and concern the data you are monitoring. They have been configured by users with configuration permission, as explained in the _stream configuration manual_.

- ▪ **_System_** events are generic to any installation. They are mainly about losses of communication (with an agardio.manager device, with a product, with a FTP server, with the SMTP server), among other technical issues. See §11.1 for the detailed list of available system events.

ℹ Depending on the permission(s) granted to your account, you may only be able to see one of the event interfaces.

8.1.2. Statuses of event instances

Instances have 1 of 3 possible statuses, which provide information about what is happening in regards to the definition of the concerned alarm.

Event status	Meaning
Warning	Warning conditions are currently applicable but not main triggering conditions.
ON / Active	Triggering conditions are currently applicable.
DOWN / Inactive	Triggering conditions are no longer applicable, although they previously were.

Table 3 – Meaning of each instance status

Example: a high threshold alarm is ON when its high threshold is reached, and DOWN when the monitored value goes under its hysteresis threshold.

ℹ Only threshold and differential alarms can have warning conditions.

Also, some system alarms do not have DOWN / Inactive conditions, for they notify a punctual occurrence whose end cannot be determined.

8.1.3. Distribution of events

Both process and system events are distributed in 2 lists: **Active alarms** and **Event history**.

List	Content
Active alarms	All ON / Active and/or unacknowledged alarm instances, as well as warning instances.
Event history	All event instances.

Table 4 – Lists of events and associated content

ℹ Event history is preserved for 5 years.

8.1.4. Alarm instance management

To remove an alarm instance from the list of Active alarms, it has to be acknowledged.

1. Select the alarm instance you are interested in acknowledging.
2. Click the acknowledgement button.
3. Enter an acknowledgement message.
4. Confirm.

ℹ Warnings do not require acknowledgement. They disappear from the list of Active alarms as soon as they go DOWN.

Acknowledging an alarm means having taken note of what it is alerting to, and having taken actions so the notified anomalous behaviour should no longer be observed.

For alarms with a DOWN status, acknowledgement is not enough to remove an instance from the list of Active alarms; the stream system also has to register that its triggering conditions are no longer applicable.

8.2. Event priority

Notified occurrences may require more or less urgency in dealing with them. This is quantified by their priority.

Priority	Meaning
Critical	Immediate danger which requires immediate action.
Major	High impact but no immediate danger.
Minor	Limited impact.
Warning	Incitation to continued vigilance.

Table 5 – Accepted meaning of each alarm priority

9. Personal interface
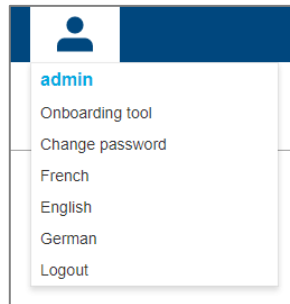
Figure 34 - Personal menu

9.1. Change the language of your interface

To change the language of the interface, open your personal menu, in the top right corner, and select your preferred language.

9.2. Change your password

To change the password to your account, open your personal menu, in the top right corner, and select the corresponding option. Your current password is required to perform this action.

Figure 35 - Password update interface

10. Troubleshooting

10.1. "You have selected more service than your licence allows"

Figure 36 - Licence limit reached during data exploitation

Symptom

A message about having selected more service than your licence allows appears while navigating through stream data exploitation.

Cause

As explained in the _stream installation manual_ and the _stream configuration manual_, stream licences are dimensioned based on the amplitude of your energy-monitoring installation. A simplification is to consider that the more services you intend on storing, the bigger the licence you need. A small proportion of your licence is however also consumed when you navigate through your exploitation and consult data in real-time. This banner appearing means the unavailability of data is not necessarily due to communication issues.

Workarounds

Depending on how close you are to having reached your licence with your data storage, the message might only be temporary. In this case, wait a few minutes for it to subside, and the values you asked to see should appear shortly.

If the message remains after several minutes, it means the limits of your licence have been reached through data storage, and navigation through runtime has become impossible. In this case, you either need a licence extension or for someone with Configurator permission to reduce your data storage demands.

10.2. Missing data points in dashboards

10.2.1. No average temperature

Symptom

Even though a weather service has been configured for a site, evolution charts for it and its buildings do not display average temperature when the option is activated.

Possible causes

- There hasn't been enough temperature samples gathered for the period to be able to compute an average.

- The geographical information for the site is incorrect.

- The geographical information for the site yields no result through the weather service.

- The weather service is unreachable.

- The weather service is malfunctioning.

Workarounds

In stream, there is no direct way to catch up on missed temperature and degree day samples. All that can be done is fix the issue to ensure future gathering and computation.

10.2.2. No normalised energy consumption

Symptom

Even though an energy consumption and an average temperature are available for a specific day / month in Evolution mode, when normalising by degree day, there is no data point on the chart for that day / month.

Possible causes

- ▪ The amount of degree days for the considered day / month is 0, making normalisation impossible as well as irrelevant.

- ▪ There hasn't been enough temperature samples gathered for all days of the periods to be able to reliably compute a number of degree days for it.

> A temperature sample for at least 22 hours of a day is required for the amount of degree days for that day to be computed.

Workarounds

In stream, there is no direct way to check temperature and degree day samples. If you are convinced you have enough samples for each day of the period and that the resulting number of degree days should not be null, then you may contact support.

10.3. Data unavailability in real-time

10.3.1. No data for some services of a product

Possible causes

- ▪ Product type mismatch.

- ▪ Missing hardware module.

- ▪ Service acquisition has been locally deactivated and no arbitration has been given in stream yet.

Workarounds

- ▪ Check product type. Some product types are somewhat compatible and mismatching them can lead to intermittent communication issues only.

- ▪ Check product settings. Some product types only provide certain services when in a certain configuration.

Example: SM103E can accommodate additional temperature modules, and H3+ require a specific module to properly handle AX and AL contacts.

- ▪ Check that no local change is awaiting arbitration for the product.

10.3.2. No data for some products of an agardio.manager device

Possible causes

- The product is no longer communicating.
- The product has been locally removed and no arbitration has been given in stream yet.

Workarounds

Check product status, both in terms of communication and deployment.

- If the product is not communicating, check its fieldbus address, and make sure it is physically available in the electrical cabinet.
- If there are still local changes on the product awaiting arbitration, arbitrate them.

10.3.3. No data for any product of an agardio.manager device

Possible causes

- The device is no longer communicating.
- No product of the device is currently communicating with it.
- All of it products have been locally removed.
- There has been an issue with the deployement of the device.

Workarounds

Check device status, both in terms of communication and connection.

- If the device is not communicating, check its connection settings, and make sure it is physically available and turned on in its electrical cabinet.
- If the device is communicating but none of its products are, check their fieldbus addresses, the Modbus RTU communication settings, and their availability in the electrical cabinet.
- If all its products have local changes awaiting arbitration, arbitrate them.

10.4. Missing data in history

10.4.1. Missing history for all products of an agardio.manager device

- Check Security Audit trail and system event history, looking for any loss of communication with the device.
- Check Data import to confirm there are data retrieval tasks being processed.
- Check History of the agardio.manager device, looking for traces of deactivation.

10.4.2. Missing history for all services of a product

- Check system event history, looking for any loss of communication with the product.
- Check product history for any trace of deactivation.
- Check Modbus RTU communication settings.
- Check product fieldbus address, including with identification if it is available.

Workaround

In the case of a temporary loss of communication with a product, or a temporary deactivation, there is no way to retrieve the measurements which should have been stored during that time. They were never actually gathered. Products have no local history of the values they monitor.

10.5. Product unavailability

10.5.1. In real-time

- If the product is available in history but not in real-time, then it or its agardio.manager device has been deactivated.

- If the product is not available in history either, then it or its agardio.manager device has been removed.

10.5.2. In history

If a product is unavailable in history, then it or its agardio.manager device has been removed.

For certain very specific types of products, it is also possible for none of their services to have ever been configured for storage.

10.6. Service unavailability

10.6.1. In real-time

- If a service of a product is available in history but not real-time, then its product or its agardio.manager device has been deactivated.

- If a service of a product is not available in either view, even though its product is still present, then it has been removed from acquisition.

10.6.2. In history

- If a service of a product is unavailable in history even though it is available in real-time, it means it has never been configured for storage, or its stored history has been purged and it was never set for storage again after that.

- If a service of a product is not available in either view, even though its product is still present, then it has been removed from acquisition.

11. Appendix

11.1. List of system events

Description	Origin
Firmware update failure for agardio.manager device	EMS
Communication timeout with agardio.manager device	EMS
agardio.manager certificate rejection	EMS
agardio.manager login rejection	EMS
agardio.manager permission rejection	EMS
agardio.manager serial number mismatch	EMS
End of data import from agardio.manager device	EMS
agardio.manager CPU usage	agardio.manager
agardio.manager memory usage	agardio.manager
Free available space on agardio.manager eMMC	agardio.manager
Free available space on agardio.manager µSD	agardio.manager
Unavailable µSD for agardio.manager device	agardio.manager
agardio.manager CPU temperature	agardio.manager
agardio.manager power on	agardio.manager
agardio.manager power fail	agardio.manager
Unreachable agardio.manager services	agardio.manager
Unavailable NTP server for agardio.manager device	agardio.manager
Modbus communication error	agardio.manager
Communication timeout with Modbus product	agardio.manager
Tariff synchronisation command rejection	agardio.manager
Three consecutive failed login attempts	EMS
Unreachable RDBM server	EMS
Unreachable FTP server	EMS
Wrong login for FTP server	EMS
FTP server certificate rejection	EMS
Lack of writing permission on FTP server	EMS
Unreachable SMTP server	EMS
Wrong login for SMTP server	EMS
SMTP certificate rejection	EMS
Weather service unavailability	EMS

11.2. Energy

11.2.1. Computation method

In dashboards of every level, the energy for a period (day, week, month, year) is the difference between the sum of all active positive energy indexes first measured right after the end of the considered period, and the sum of all the active positive energy indexes first measured during the considered period.
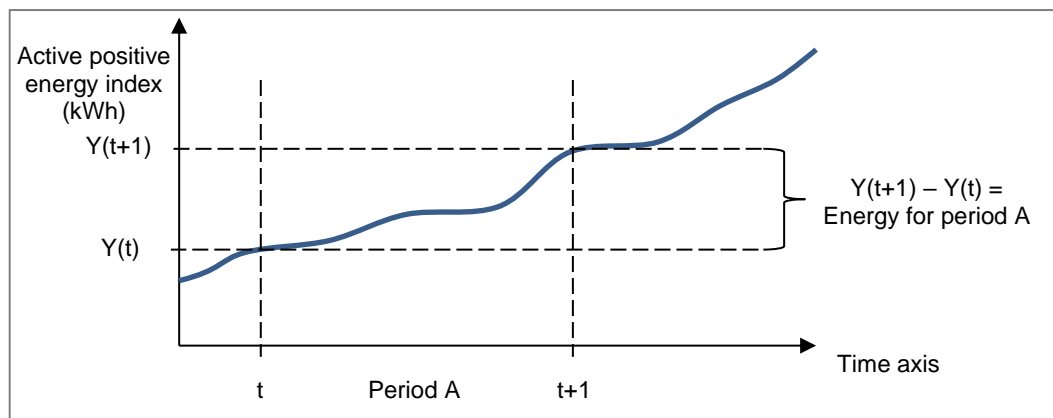
Figure 37 - Computation of energy based on energy index

> ℹ To avoid approximations, the current day is never taken into account in dashboards. Only the energy for past days is available. The values stored for the current day are however available in History views.

11.2.2. Impact of the configuration of energy-metering products

To avoid redundancies – meaning the same quantity of energy being taken into account more than once - the index of which products is used to compute energy is based on the configuration of your monitoring architecture.

Figure 38 – Representation of a monitoring architecture

- In charts about sources, the energy metered at the origin of your electrical network is used, meaning the energy metered by Initial products.
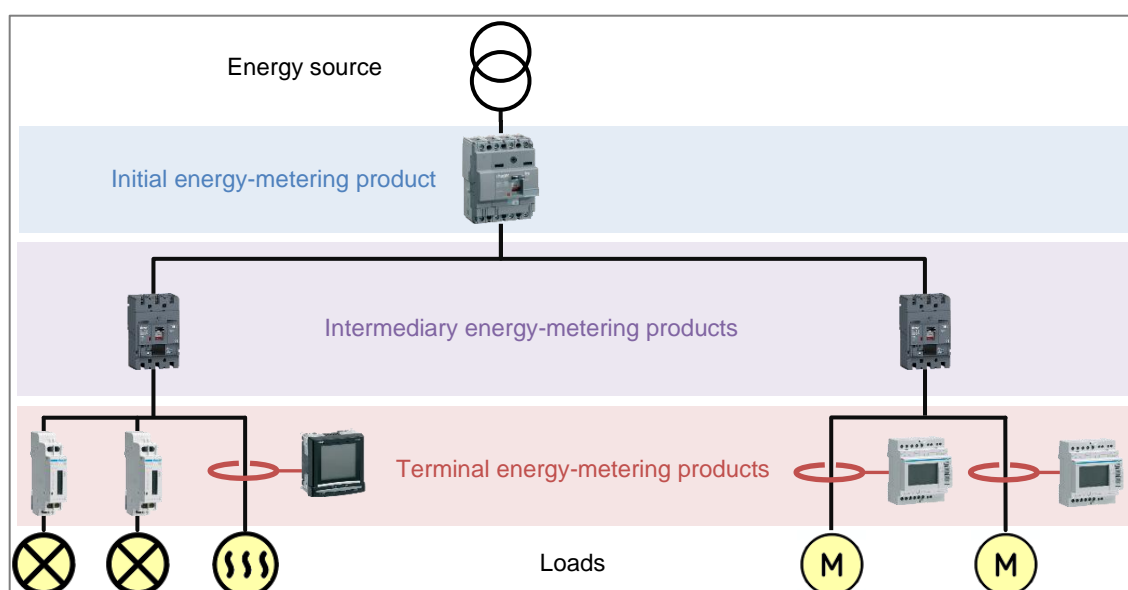
- In charts about any other association besides mesh and source, the energy metered at the ends of your electrical network is used, meaning the energy metered by Terminal products.

- In charts about meshes, the energy metered at all ends of the network can be accumulated, meaning metered by Initial, Intermediary, or Terminal products. Indeed, meshes are custom groups of metering points, and if so configured can gather inputs and outputs of your electrical system. This is entirely up to the configuring users.

Relying on the structure of your monitoring architecture also allows for determination of the proportion of energy is not equally monitored at both ends of the network. This proportion is computed as the ratio of the difference between the energy measured by all Initial products and the energy measured by all Terminal products, over the energy measured by all Initial products.

Ideally, the difference is close to zero and the monitoring architecture is balanced.

A negative difference means your architecture is lacking in products monitoring inputs.

A positive difference means your architecture is lacking in products monitoring outputs.

11.3. Degree days computation methods

There are several ways to calculate degree day depending on the country and depending on the organisation that processes it.

> ℹ In order for normalisation by degree day to be used for comparison purposes, degree days must have been computed using the same method and temperature samples in the same unit.
>
> This is why stream gathers temperature samples from a single weather service, and computes degree days using a single method.
>
> Refer to the _stream configuration manual_ to know where weather service and degree day computation method are configured.

11.3.1. Mean degree-hours

The mean of **heating degree hours** consists in computing the mean of the difference between the base heating temperature and the outside air temperature for every hour of the day.

For hours when outside air temperature was **above** base heating temperature, the difference is considered null and never negative.

The mean of **cooling degree hours** consists in computing the mean of the difference between the outside air temperature and the base cooling temperature for every hour of the day.

For hours when outside air temperature was **below** base cooling temperature, the difference is considered null and never negative.

$$HDD_d = \frac{\sum_{j=1}^{24}(T_{HB} - T_{O,j})_{\left((T_{HB}-T_{O,j})>0\right)}}{24}$$

$$CDD_d = \frac{\sum_{j=1}^{24}(T_{O,j} - T_{CB})_{\left((T_{O,j}-T_{CB})>0\right)}}{24}$$

Where:

- HDD_d is the heating degree day of one day
- CDD_d is the cooling degree day of one day
- T_{HB} is the heating base temperature, meaning the outside temperature below which a building requires heating
- T_{CB} is the cooling base temperature, meaning the outside temperature above which a building requires cooling
- $T_{O,j}$ is the outside air temperature for the hour j

11.3.2. Costic method

In France, energy management professionals have adopted the Costic (*Comité Scientifique et Technique des Industries Climatiques*) formula.

$$\begin{cases} T_{min} > T_{HB} \Rightarrow HDD_d = 0 \\ T_{min} < T_{HB} < T_{max} \Rightarrow HDD_d = (T_{HB} - T_{min}) \times \left(0.08 + 0.42 \times \dfrac{T_{HB} - T_{min}}{T_{max} - T_{min}}\right) \\ T_{max} < T_{HB} \Rightarrow HDD_d = T_{HB} - \dfrac{T_{min} + T_{max}}{2} \end{cases}$$

$$\begin{cases} T_{min} > T_{CB} \Rightarrow CDD_d = \dfrac{T_{min} + T_{max}}{2} - T_{CB} \\ T_{min} < T_{CB} < T_{max} \Rightarrow CDD_d = (T_{max} - T_{CB}) \times \left(0.08 + 0.42 \times \dfrac{T_{max} - T_{CB}}{T_{max} - T_{min}}\right) \\ T_{max} < T_{CB} \Rightarrow CDD_d = 0 \end{cases}$$

Where:

- HDD_d is the heating degree day of one day
- CDD_d is the cooling degree day of one day
- T_{HB} is the heating base temperature
- T_{CB} is the cooling base temperature
- T_{min} is the minimal outside air temperature of the day
- T_{max} is the maximal outside air temperature of the day

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