

Silvair

Energy Monitoring

Application note

4 January 2023	SN-222 rev. 2.1
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SILVAIR

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1. Introduction

The Silvair Energy Monitoring service is delivered via the Silvair web app. It allows:

- Visualization of energy use data (per zone and area).
- Download of energy use data as 15-minute blocks (per device) for a calendar month.
- Calculation of annual energy cost savings on the project level for a post-upgrade (new) installation compared to a pre-upgrade (old) installation.

For the service to work correctly, the following are necessary:

- The project has been commissioned using the Silvair Commissioning tools.
- At least one Silvair Gateway has been added to the project.

 The Silvair Gateway is supplied by Silvair. See [SGW-101 Silvair Gateway product card](#) and [SGW-102 Silvair Gateway user guide](#) for details about gateway hardware and set up.

 Because gateway performance is limited, one gateway can monitor energy of up to approximately 200 devices in all areas. If the gateway monitors more than 200 devices, the reporting may not be correct.

 Access of data via APIs is a separate service. See [SN-221 Silvair APIs](#) for details.

2. Calculation of energy use

Silvair calculates the energy use of each device from an energy profile that is set up during commissioning and the actual light level recorded for each luminaire. The energy profile defines the power of a type of luminaire at a range of light levels. Every light level change is recorded, the energy use is then calculated, and the values are aggregated into 15-minute blocks before being stored in the database. Energy profiles can only be created for controllers (drivers, luminaires, sensor-controllers), and not sensors or switches.

To calculate energy use, an energy profile must be assigned to each zone. The calculation of energy use is done per zone and assumes that all devices in a zone have the same energy profile and light level. Only one energy profile can be set up per zone.

The 15-minute blocks of data are updated at regular intervals – there may be a delay of up to 45 minutes before the value is published. These 15-minute blocks are stored for 24 months. If you need real-time data, use the real-time monitoring API and calculate the energy use by yourself.

For information about how to calculate the energy use and create the energy profile, see [SN-206 Energy monitoring – calculation](#) and [SN-207 Energy monitoring – energy profiles](#).

You can visualize energy use and savings after the energy profile has been set up for each luminaire type and a Silvair Gateway has been added to the project.

3. Visualization of energy use

3.1 Energy use report for areas

To view the energy use report for an area, open the [Silvair web app](#). Then, go to the project and area, and click **Energy use**.

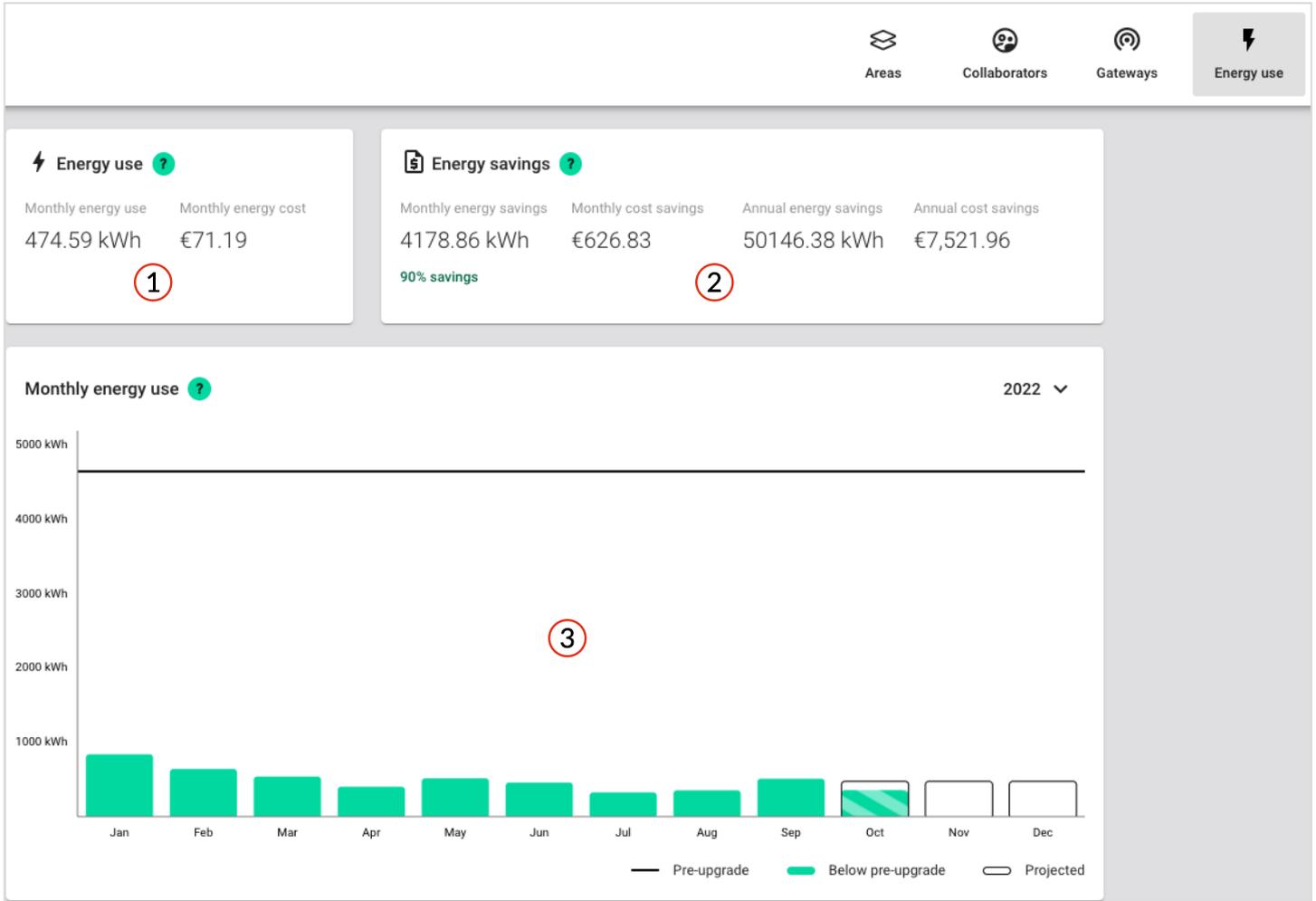


1. Date picker – selected month/day of your energy report.
2. Total energy use and cost for the selected month/day in the area.
3. Bar chart – energy use in the area per day in the selected month or per 15-minute time period in the selected day.
4. Download report – downloads a CSV file with energy use data (in kWh) aggregated over 15-minute time periods for each device in the project over the calendar month.
5. Heatmap – energy use for the selected month/day for each zone in the area. The larger the circle, the more devices are in the zone. The color indicates how much energy was used.

i To see the total and average energy use per device, move the cursor over the zone icon.

3.2 Energy use and savings for projects

To view the energy use and savings for a project, open the [Silvair web app](#), go to the project, and click **Energy use**.



1. Average monthly energy use and cost for the project from the date when monitoring started.



To calculate the energy cost, go to the project and select **Edit project > Energy monitoring**, select **Calculate cost**, and enter the energy price.

2. Monthly and annual savings for the project over 12 months.



To calculate the savings, continue as described in the [Setting up energy savings calculation](#) section.

3. Bar chart – actual and projected average monthly energy use for the new installation, and the average monthly energy use for the pre-upgrade (old) installation.

Project settings

Details Location Energy monitoring

- Calculate cost using average energy price
0,15 €/KWH
- Calculate energy savings
 - Using annual pre-upgrade baseline
 - Using pre-upgrade fixture data
- Adjust monitoring start date to 01.12.2021

4. Calculation of energy and cost savings

You can create a 12-month forecast of the energy and cost savings for an upgrade project. Energy savings can be calculated using one of two methods. The first method compares the recorded energy use of the post-upgrade (new) fixtures with the annual pre-upgrade (old) energy use of the old installation. The second method compares the recorded energy use of the post-upgrade (new) fixtures with the energy use of the pre-upgrade (old) fixtures.

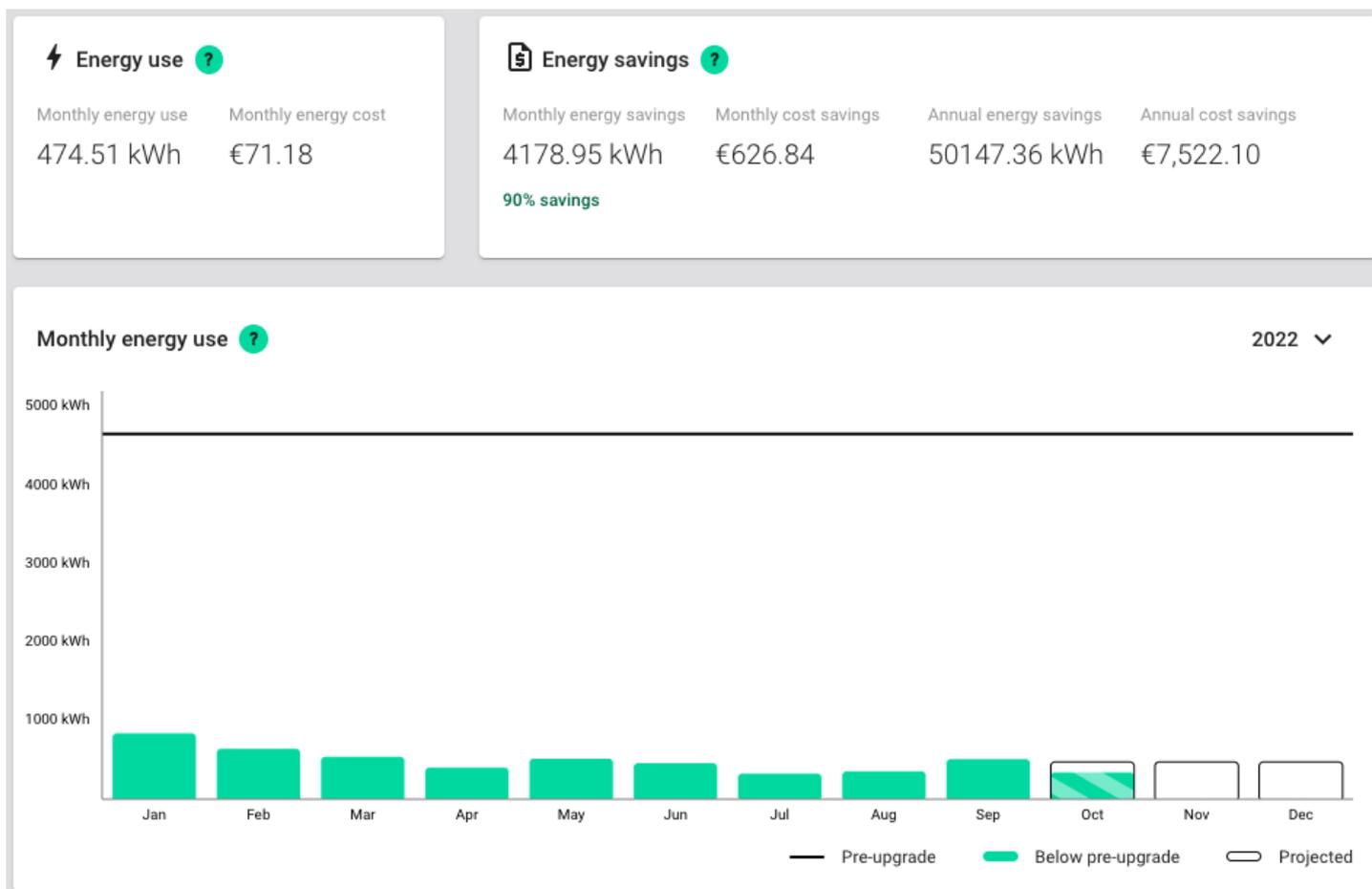
To calculate energy savings, the following data must be entered via the Silvair web app:

- Average energy price (per kWh)
- An energy profile for each type of the post-upgrade fixtures (see [SN-207 Energy monitoring – energy profiles](#) for more information about how to set up an energy profile)
- For calculation using *annual pre-upgrade (old) energy use* of the old installation:
 - Total annual energy use of the pre-upgrade installation (in kWh)
- For calculation using *energy of the pre-upgrade (old) fixture types*:
 - Number of fixtures of each pre-upgrade (old) type in the whole old installation
 - Wattage of each pre-upgrade fixture type
 - Estimated number of operating hours of fixtures of each pre-upgrade type



The monitored energy use is used to calculate the annual energy use for the upgraded project as an indicator of the savings that could be achieved.

4.1 Calculation method



The values shown in the view are calculated as follows:

$$\text{Monthly energy use} = \text{energy use} / \text{days of data} * (365 / 12)$$

$$\text{Monthly energy cost} = \text{monthly energy use} * \text{energy price}$$

$$\text{Monthly energy savings} = \text{baseline energy use} - \text{monthly energy use}$$

$$\text{Monthly cost savings} = \text{monthly energy savings} * \text{energy price}$$

$$\text{Annual energy savings} = \text{monthly energy savings} * 12$$

$$\text{Annual cost savings} = \text{annual energy savings} * \text{energy price}$$

$$\text{Pre-upgrade energy use (bar chart)} = \text{baseline energy use}$$

$$\text{Energy use (bar chart)} = \text{sum of 15-minute blocks of energy use in the month for all zones in the project}$$

$$\text{Projected energy use (bar chart)} = \text{monthly energy use}$$

where:

Energy use = sum of 15-minute blocks of energy use for all zones in the period (either from the last 12 months, or from the monitoring start date)

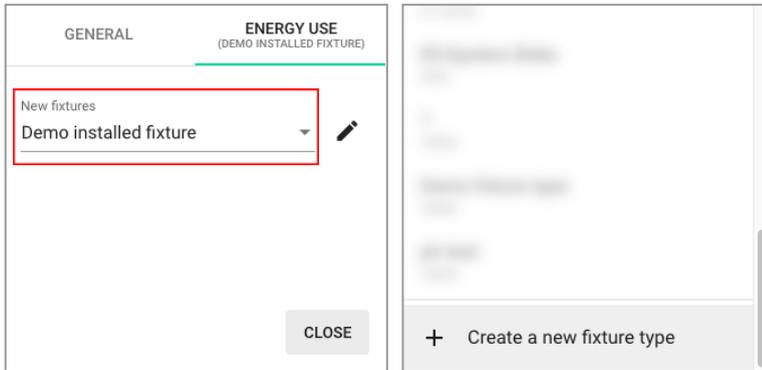
Days of data = number of days from the monitoring start date, or 365 days if 12 months of data is available

Energy price = price entered in the project settings

Baseline energy use = pre-upgrade energy use for the project (entered in the project settings) averaged over 12 months

5. Setting up energy savings calculation

1. In the [Silvair web app](#), create the project, and set up the zones and lighting profiles as normal.
2. For each zone, set up an energy profile.
 - a. In the floor plan, click a zone and then **Energy use**.
 - b. Expand the **New fixtures** list, and select which type of fixture is being installed in this zone or select **Create a new fixture type**.



- c. If you have selected **Create a new fixture type**:
 - i. In the **Name** field, enter the name for the energy profile.
 - ii. In the **Wattage** fields, enter the power measured for the fixture at light levels of at least 0%, 1%, and 100%. Add more light levels for a more accurate calculation.



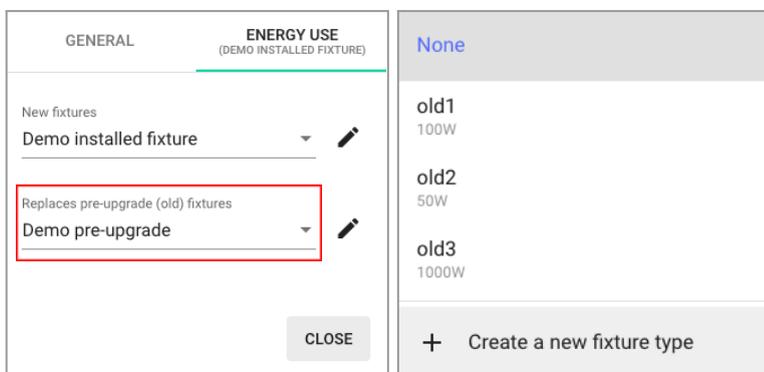
See [SN-207 Energy monitoring – energy profiles](#) for more information about how to set up energy profiles.

- iii. Click **Save**.

3. Go to the project, click **Edit project**, and enter the currency in the **Details** tab of the project settings.
4. Go to the **Energy monitoring** tab.
 - a. Enter the average energy price.
 - b. Select a method to calculate energy savings:
 - i. Using annual pre-upgrade baseline, and enter the total annual energy use of the pre-upgrade installation.
 - ii. Using pre-upgrade fixture data.
 - c. Select the date for the monitoring to start.
5. Click **Save**.

6. If you have selected **Using pre-upgrade fixture data**, go to one of the zones and create all types of fixtures that were used in the whole pre-upgrade installation.

- a. In the floor plan, click the zone and then **Energy use**.
- b. Expand the **Replaces pre-upgrade (old) fixtures** list and select **Create a new fixture type**.



- i. In the **Name** field, enter the name for the pre-upgrade (old) fixture.
- ii. In the **Quantity** field, enter how many of these fixtures were installed in total in the pre-upgrade installation.
- iii. In the **Wattage** field, enter the rated power (in watts) of this fixture type.
- iv. In the **Annual operating hours** field, enter how many hours these fixtures operated in a year.
- v. Click **Save**.

i Information about pre-upgrade fixture types must relate to the whole pre-upgrade installation.

- c. Create the remaining types of fixtures that were used in the pre-upgrade installation, until all pre-upgrade types are added to the **Replaces pre-upgrade (old) fixtures** list.

i Energy use of the pre-upgrade installation is calculated as the sum of energy use of each type of pre-upgrade fixtures added to the list.

- d. For each zone, go to **Energy use**.
 - i. Select which type of pre-upgrade fixtures is replaced by the new fixtures in this zone.
 - ii. If the new fixture type does not replace any of the types found in the pre-upgrade installation, select **None**.

The screenshot shows the 'Pre-upgrade fixture' form. It has a title 'Pre-upgrade fixture' with a refresh icon. Below the title is a 'Name' field. There are two rows of input fields: 'Quantity' (with a sub-label 'Number of fixtures') and 'Wattage' (with a sub-label 'e.g. 150 W per fixture' and a unit 'W'); and 'Annual operating hours' (with a sub-label 'Estimated number of operating hours' and a unit 'H'). At the bottom right, there are 'CANCEL' and 'SAVE' buttons.

i Setup is now complete. Soon the dashboard will start displaying the projected savings based on the monitored energy use. Over time, the projection will become more accurate.

6. Document revisions

Revision	Date	Editor	Changes
2.1	4 January 2023	GM	Changes to the description of the “Using pre-upgrade fixture data” option. Minor edits.
2.0	25 October 2022	GM	Added that occupancy can be shown for a specific day per 15-minute time period. Redrafted the document. Implemented template v. 1.2.
1.0	26 January 2022	ES	Initial release

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