Table of contents

Revision History

Revision	Date	Comment
0.1	2021-01-06	Initial
0.2	2021-03-02	Updated screen shots

1 Introduction

This document describes how the Pixii PowerShaper services can be prioritized and introduces the scheduler feature. The document and functionality are subject to change without previous notice.

1.1 Purpose

The purpose of prioritization of services is to give the flexibility to define which services should have precedence in a given application or site.

The purpose of the scheduler is to be able to use simple service building blocks (peak shaving, power commands/demand response, energy levels/target SoC) to build relatively complex and highly customizable strategies/parameters at different periods to tailor the application or site needs.

1.2 Implementation

1.2.1 Priority

The services to be run may be put in order of priority. This is done in the web interface under Menu > System > Service settings. The highest priority (parent) service will be run unless it is in off or idle state. In those cases, the next priority (child) service can be run and so on down the priority chain. Table 1 shows the different states of a service.

Table 1. Service states

State	Description
Off	The service is disabled
Idle/paused	The service is enabled, but the conditions for it to be running are not met.
Pending	The service is enabled, the conditions for it to be running are met, but a higher priority service is running.
Running	The service is running. The service is enabled, the conditions for it to be running are met, and no higher priority service is running.

If a service has the “Keep service active when idle” enabled, services with lower priority will not be run in the period even if it is active.

In Figure 1 below, the Demand response service has the highest priority, followed by the Scheduler and lastly Peak shaving. All services are in idle mode.

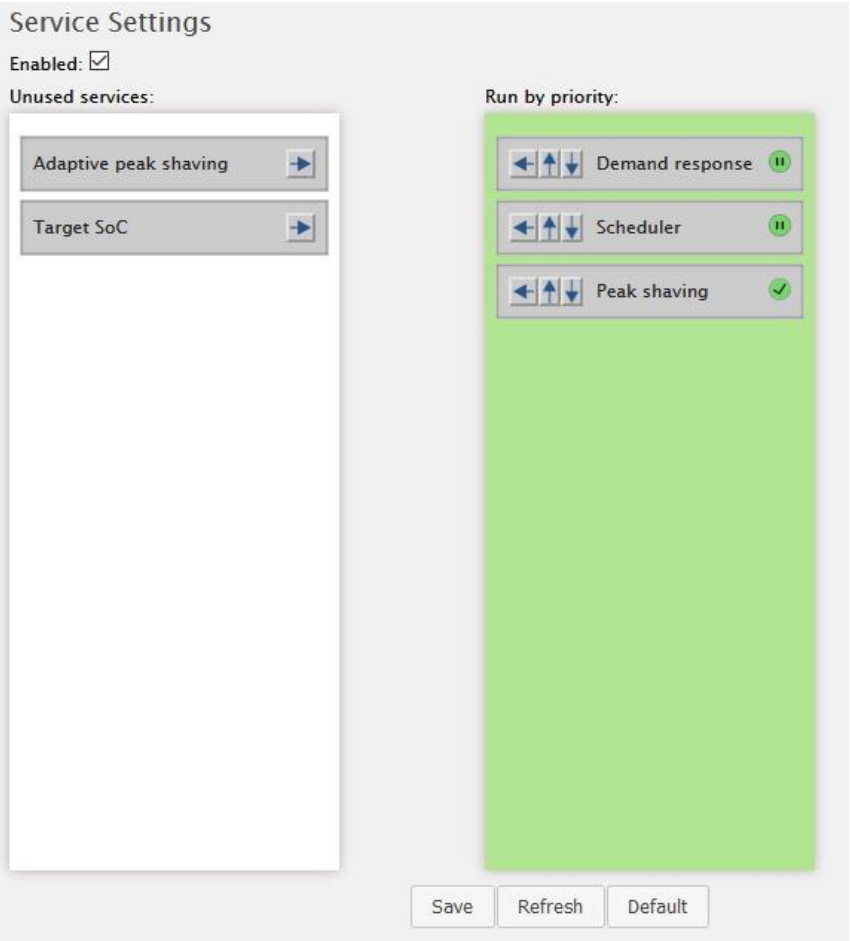

Figure 1. Prioritization of services

Note! Services with priority 2 or lower will only be able to run if the SoC is between Max Reserved SoC and Min Reserved SoC, as configured under Menu > Battery > Standard settings.

Further, the service with priority 1 will only be able to run if the SoC is between Max Reserved SoC and Min Reserved SoC, if "SoC limitation enabled" is checked. This is configured under Menu > System > General Service Settings. If "SoC limitation enabled" is **not** checked, it will run between Max SoC and Min SoC.

Note! If a Peak shaving service has higher priority than a Demand response service, the Demand response power will be limited if the resulting measured meter value gets close to the import/export limit. This is to avoid too much toggling between services.

1.2.2 Scheduler

The scheduler monitors the date and time and starts and stops services that are configured to use the scheduler. A production plan may be made of several schedule entries with different services to achieve a specific outcome of the system over time.

In case two or more events overlap partly or fully in time, the one that was configured/received last will have priority. This assumes that a newer schedule is supposed to replace an older.

Services may be scheduled in the web interface under Menu > System > Scheduler list.

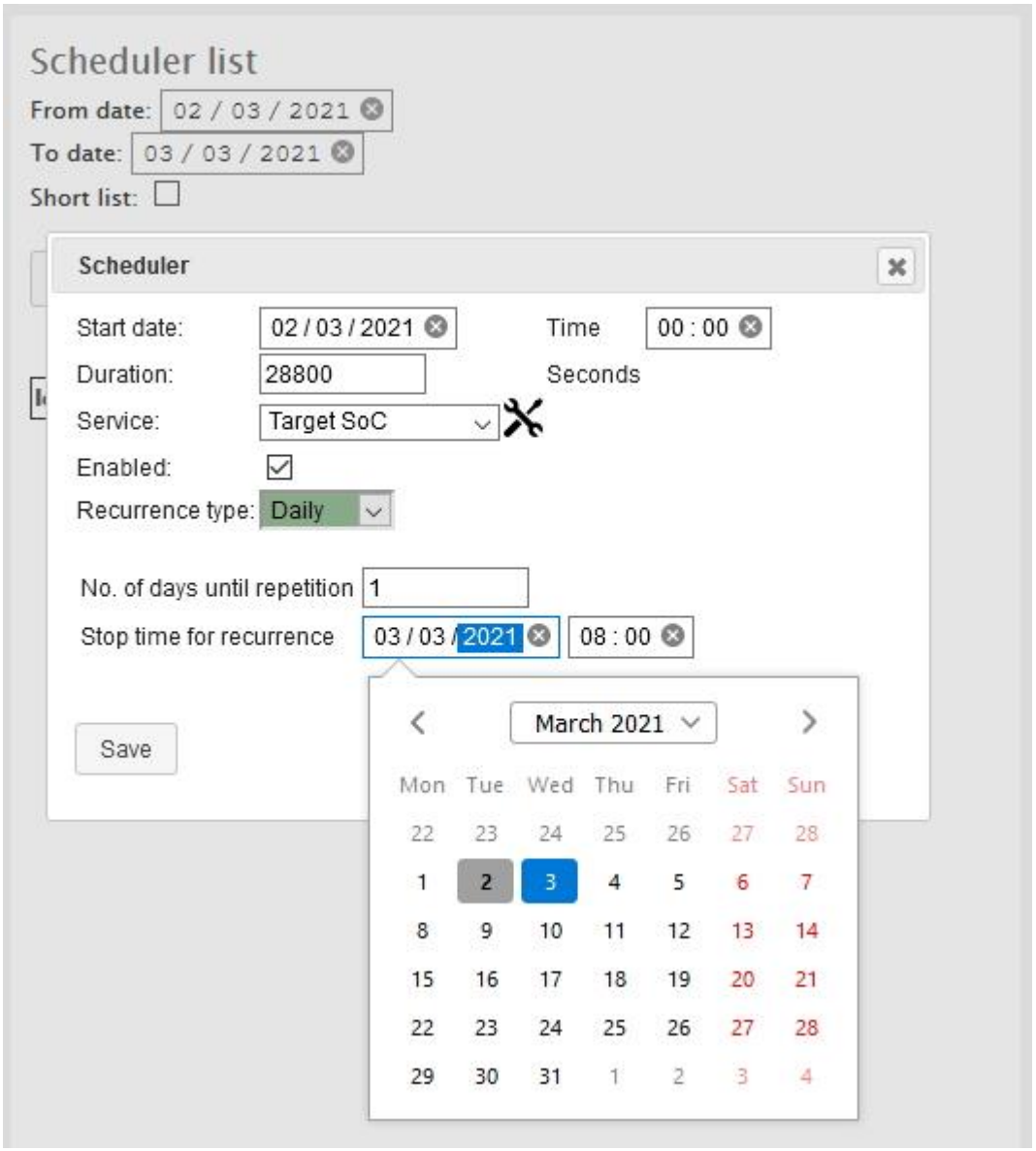

Figure 2. Example of adding a scheduled Target SoC

2 Setup

2.1 Configuration of scheduled services

2.1.1 Enable Scheduler

In the PowerShaper web interface, select Menu > System > Service settings.

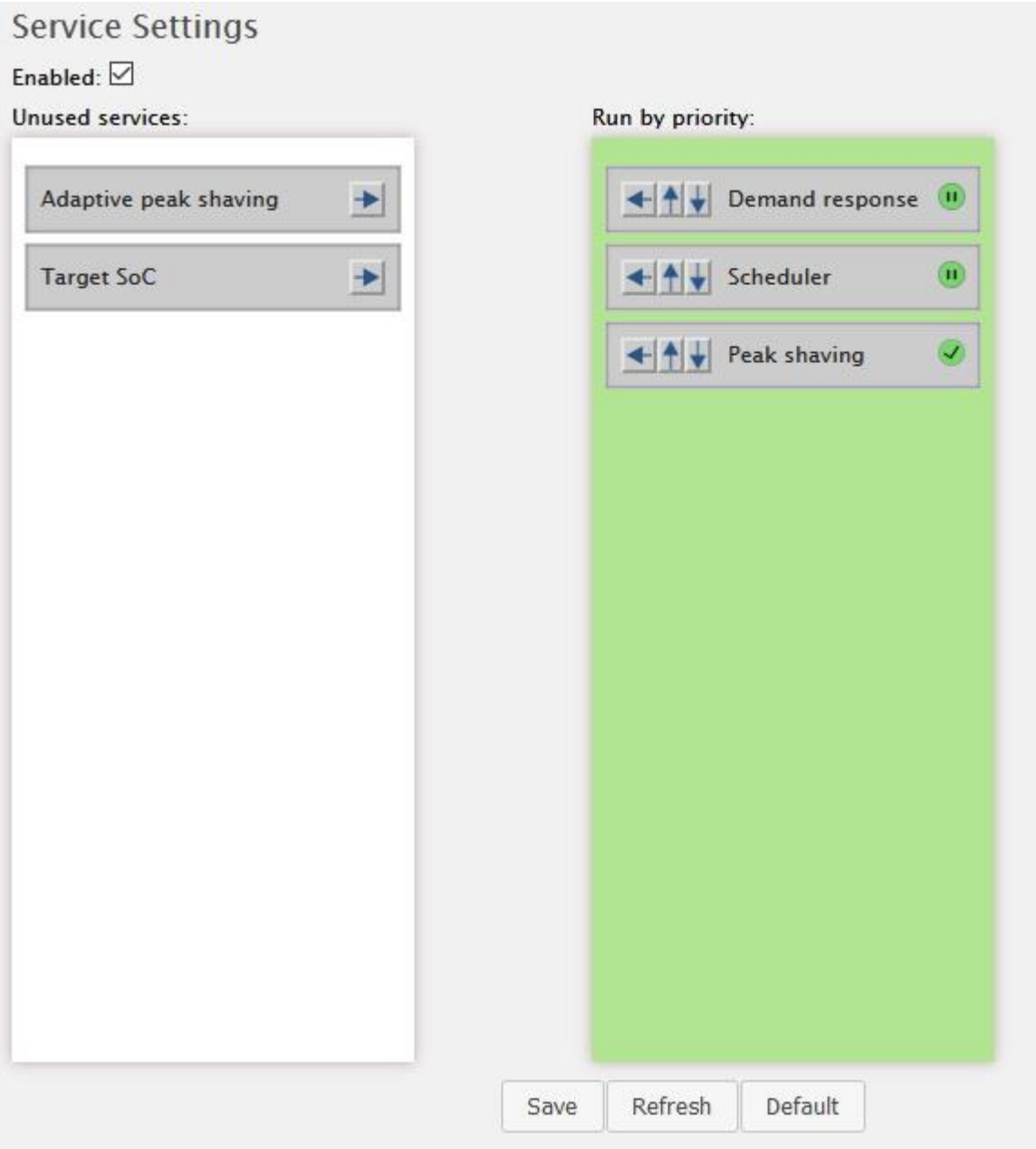

Figure 3. Three services in order of priority, where Demand Response has the highest priority

If not already configured, click the “right” arrow on the box labelled “Scheduler” to move it from the “Unused services” field to the right-hand side field labelled “Priority”. Use the up and down arrows to change the priority.

Click “Save”

2.1.2 Add scheduled services

Navigate to Menu > System > Scheduler list to view, add new and modify existing scheduled services. Note that when entering the page, no scheduled services are listed. To get a list of scheduled services in a given period, set the “From date” and “To date” and click “Get list”.

A scheduled service may be run only once or repeating in different interval types. The expired schedules are deleted seven days after last run. This is checked once per day. Table 2 lists the options that are available in the schedule list page.

Table 2. Scheduler list options

Name	Description	Default value
From date	Input box to select the “from date” when displaying list of scheduled services.	Today’s date.
To date	Input box to select the “to date” when displaying list of scheduled services.	Tomorrow’s date.
Short list	When checked, only show unique services. This means that if a service is configured as repeating, it will only show once. If not checked, all instances of the repeating service are shown in the list.	Disabled
Get list	Click this to get the list of scheduled services in the from – to date range	No schedules shown
Add scheduler	Click this button to be able to add and configure a scheduled service	-
Time column	Shows the date and time when the service will run.	
Type column	Shows the type of service for this schedule.	
Edit column	Press the wrench/screwdriver symbol to change the settings	
Recurring column	If this is a recurring schedule, “y” will be displayed, if it is a single event, then “n” will be displayed.	
Remove column	When “Short list” is checked, the Remove column is shown. Click the trashcan symbol to delete a scheduled task. If it is recurring, all the recurring items will be deleted.	

The expanded and short list of the same scheduled services are shown in Figure 4 and Figure 5, respectively.

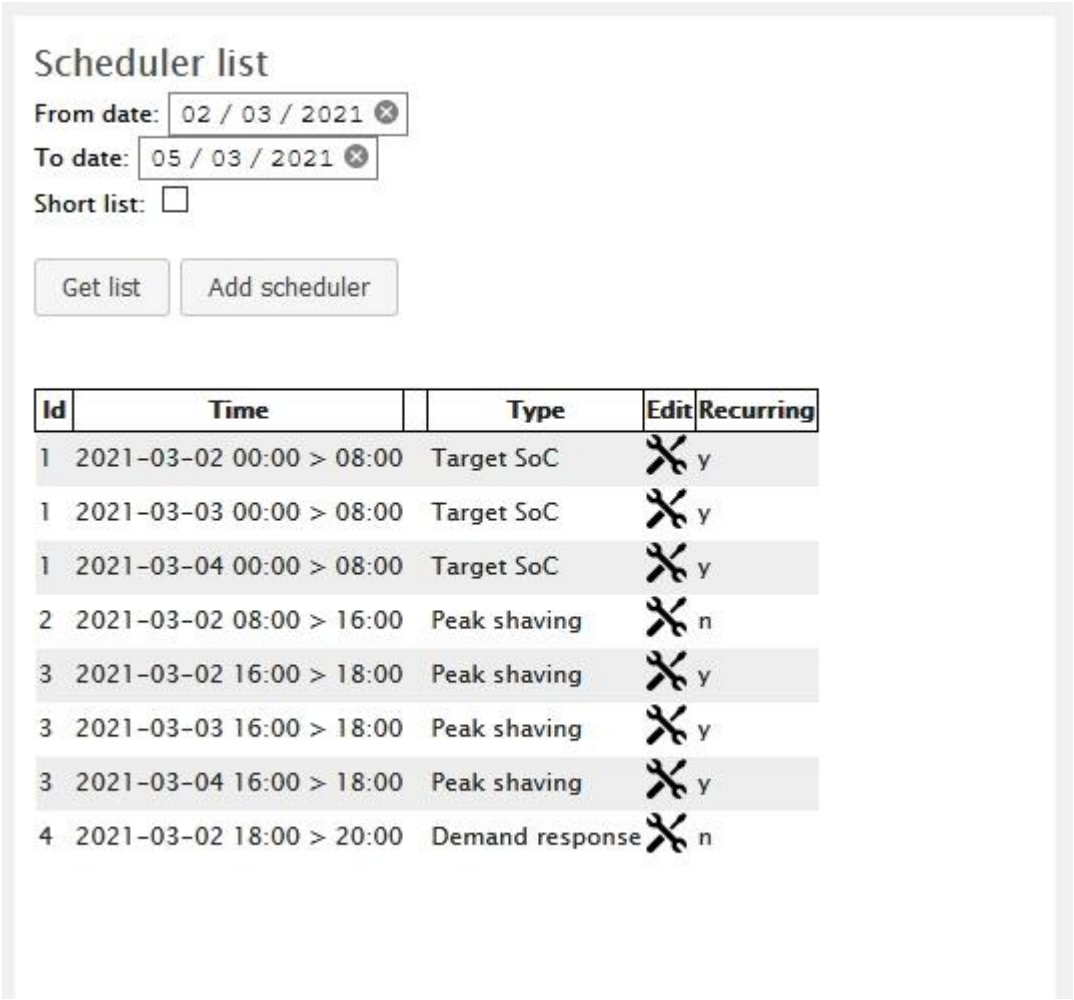

Figure 4. A time range of scheduled services as an expanded list

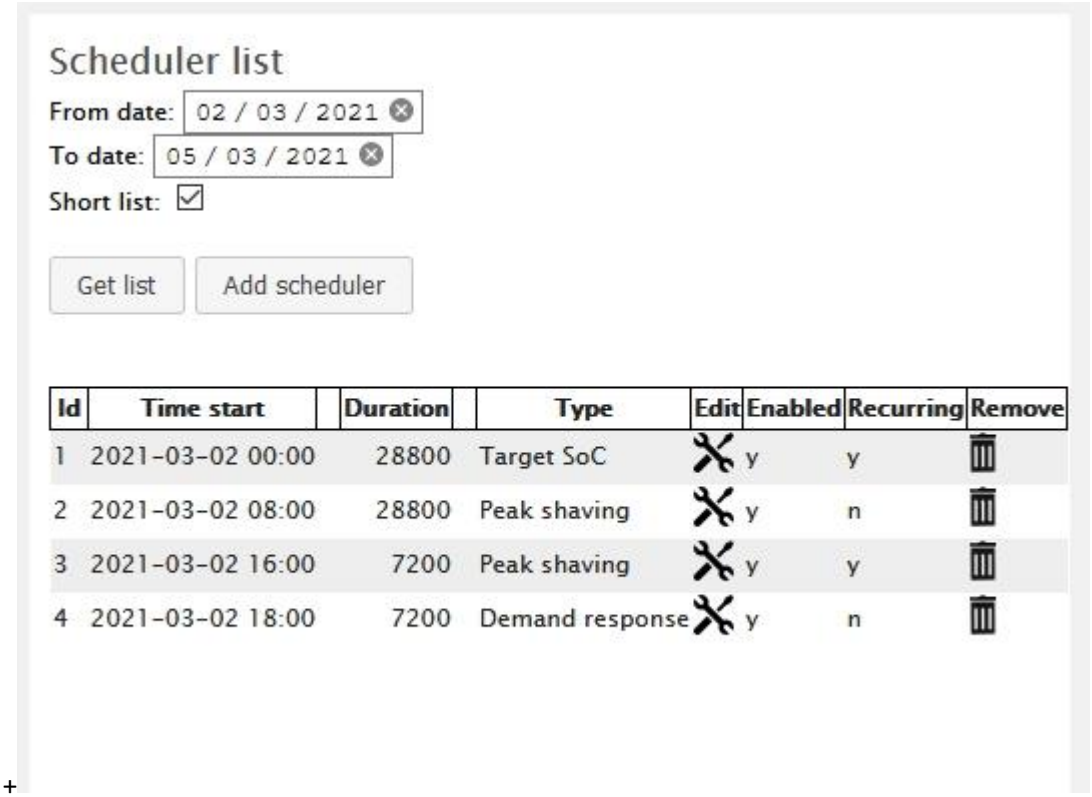

Figure 5. A time range of scheduled services as a short list

To add a new scheduled service, click the “Add scheduler” button. A new dialog will pop up, as shown in Figure 6.

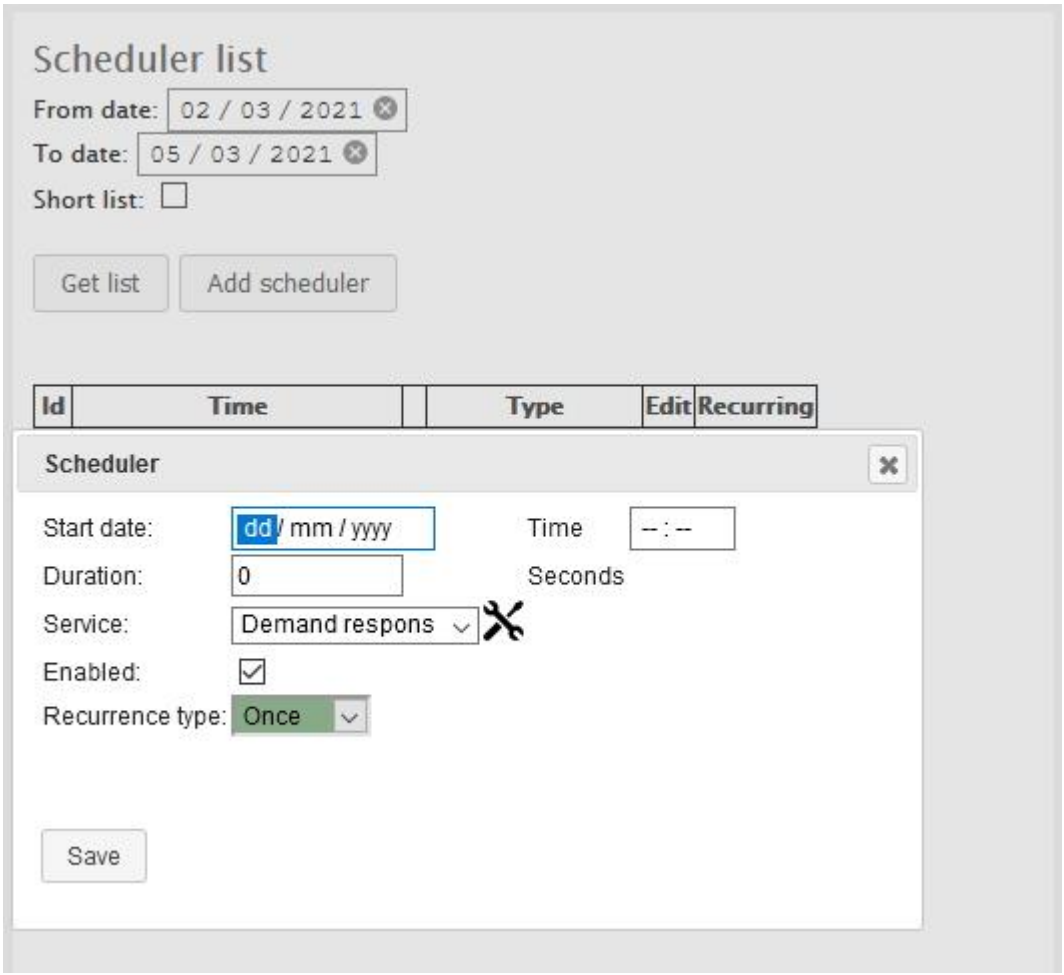

Figure 6. Scheduler list

Table 3 lists the details of the options.

Table 3. Add new scheduled service options

Name	Description	Default value
Start date and Time	Input boxes to set the start date and time	-
Duration	The duration of the schedule in seconds	0
Service	A dropdown box containing the available services that may be run	-
Enabled	If checked, the schedule is enabled, and the service will run.	Disabled
Recurrence type	Dropdown box to select the recurrence, which may be Once, Hourly, Weekly, and Monthly. It is then possible to set the frequency and end date/time (if applicable).	Once
Save	Save the settings	

Set the start date, time, and duration.

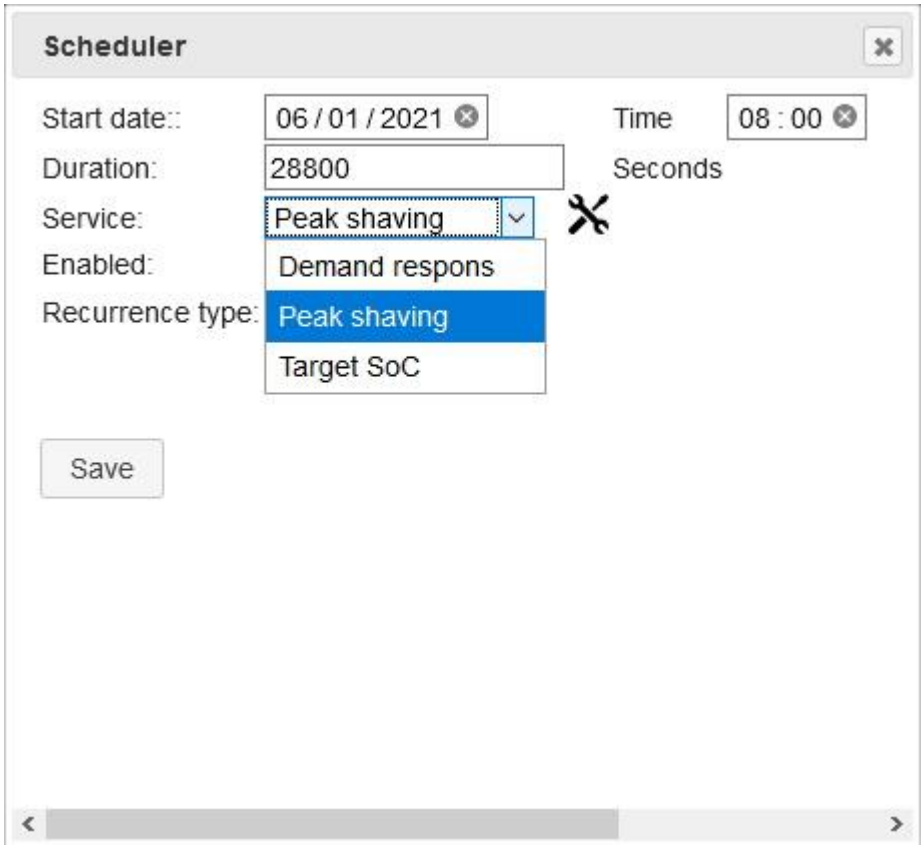

Figure 7. List of Service options

The available service options are shown in Figure 7. Select the appropriate service and click the "Edit" icon to edit the settings of a schedule.

The setting for Demand response is shown in Figure 8, and the functionality is explained in more detail in the document Pixii PowerShaper Demand Response.

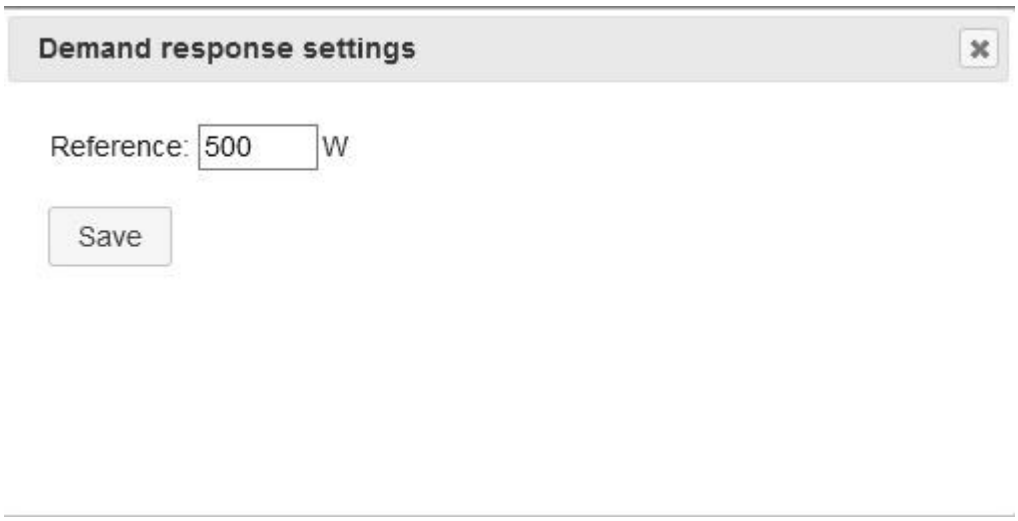

Figure 8. Edit box for Demand response settings

The settings for Peak shaving are shown in Figure 9, and the functionality is explained in more detail in the document Pixii PowerShaper Peak Shaving.

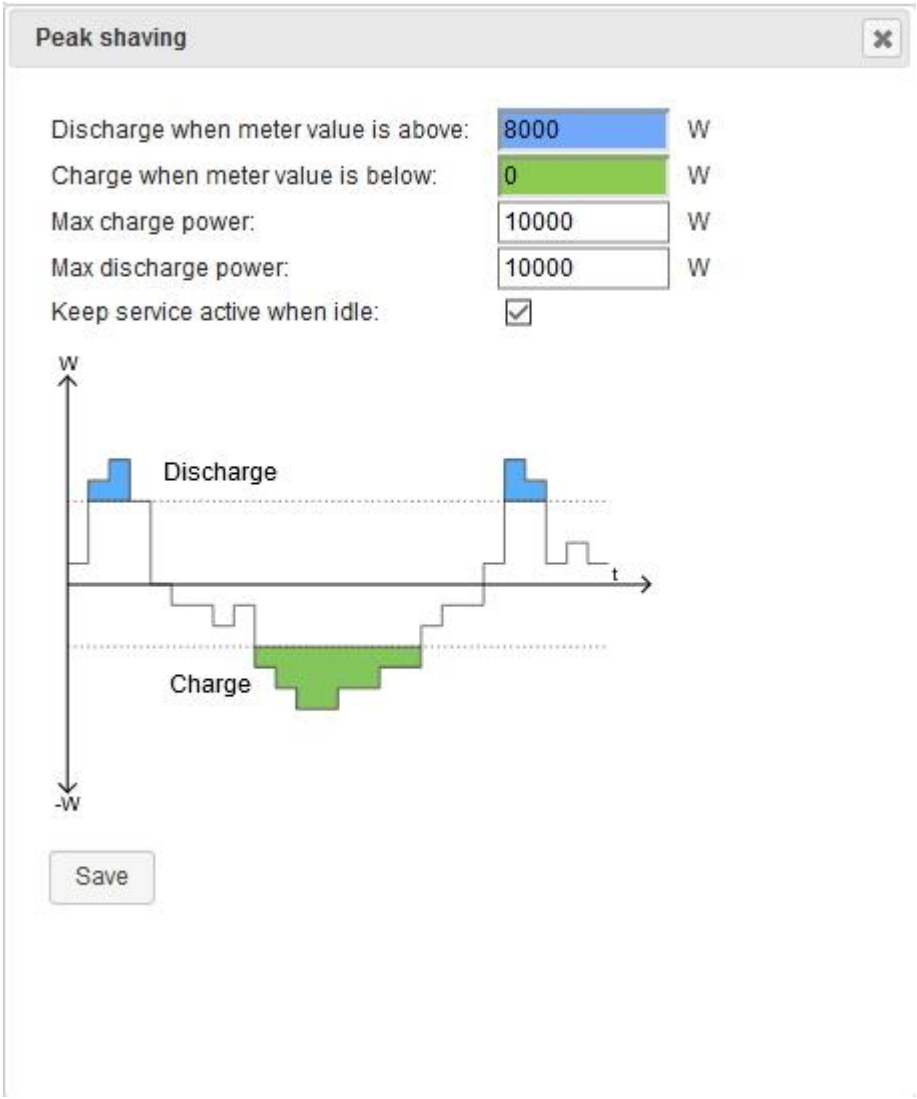

Figure 9. Edit box for Peak Shaving settings

The setting for Target SoC is shown in Figure 10, and the functionality is explained in more detail in the document Pixii PowerShaper Target SoC.

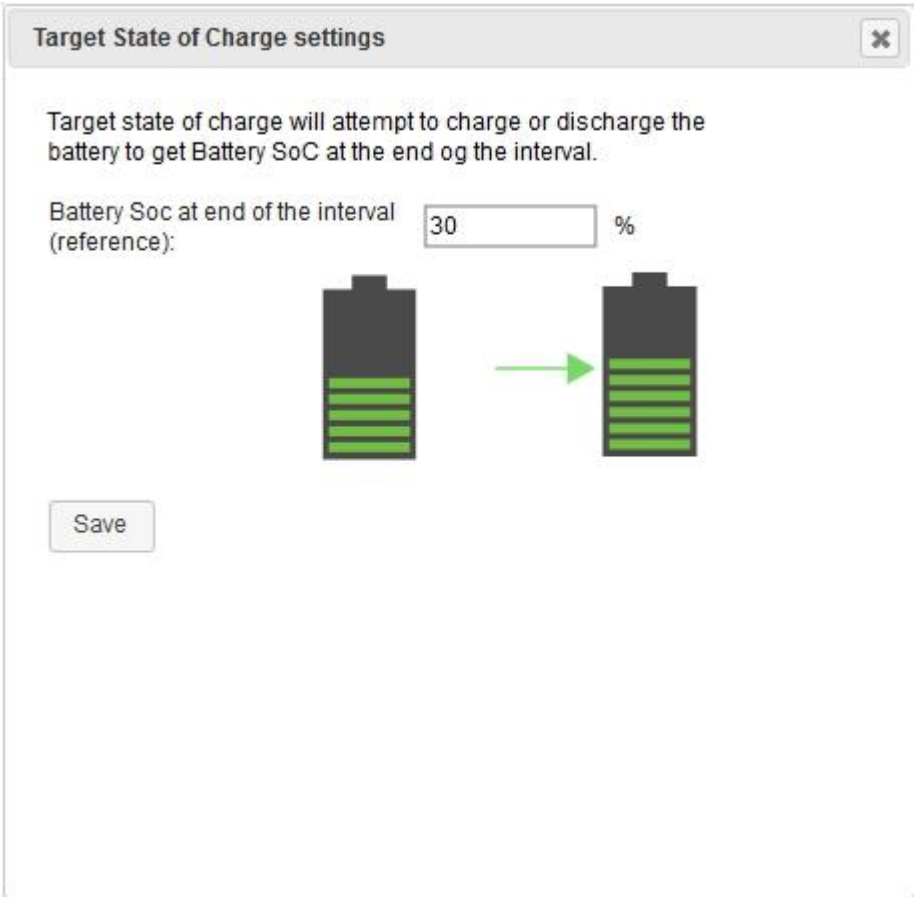

Figure 10. Edit box for Target State of Charge settings

2.1.3 Setting recurrence type of a scheduled service

The recurrence type of a service can be set using the drop-down box next to “Recurrence type” as shown in Figure 11.

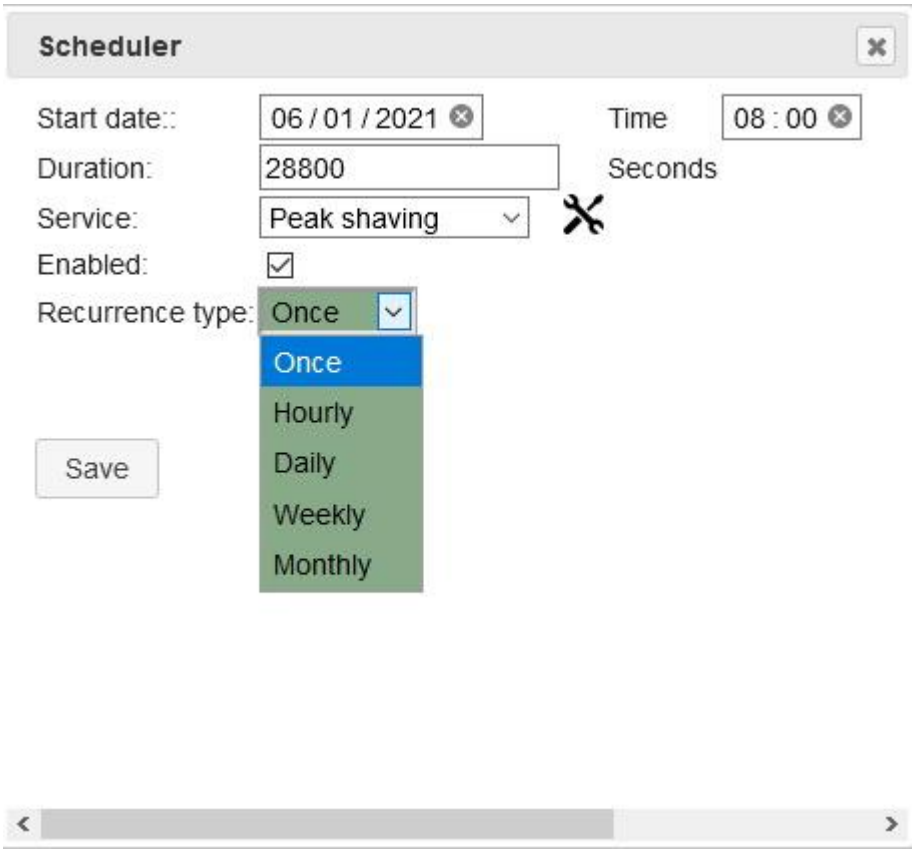

Figure 11. List of recurrence types

The parameters for each recurrence type are listed in Table 4:

Table 4. Recurrence types

Recurrence type	Parameter	Description
Once	None	Service does not repeat
Hourly	No. of hours until repetition.	Number of hours before the service is repeated. If set to 1, the service will be repeated once pr hour, if set to 2, the service will be repeated once pr 2 hours etc.
	End time	End time of recurrence.
Daily	No. of days until repetition.	Number of days before the service is repeated. If set to 1, the service will be repeated every day, if set to 2, the service will be repeated once every second day etc.
	End time	End time of recurrence.
Weekly	No. of weeks until repetition.	Number of weeks before the service is repeated. If set to 1, the service will be repeated every week, if set to 2, the service will be repeated once every second week etc.
	Weekdays	List of weekdays the service shall run.
	End time	End time of recurrence.
Monthly	Months	List of months the service shall run.

	Days of months.	List of days during the months the service shall run.
	End time	End time of recurrence.

Please note that if the Start time + Duration gives an end time that is in the next recurring schedule of the same scheduled service, the next time the service is supposed to run, it will not run. For this reason, one second is automatically subtracted from the duration.

Example: if a service is supposed to run every day the whole day (from midnight to midnight, 86400 seconds), one should configure it to have a start time from 00:00 and a duration of 86400. However, the actual duration will be 86399 seconds (i.e., 1 second less than 24 hours). This also applies to weekly and monthly durations. For hourly repetitions, the maximum duration should be 3600 seconds, but will be run for 3599 seconds.

The possibility to use durations exceeding the interval time is kept providing the flexibility to run a service for longer times where this is desired.

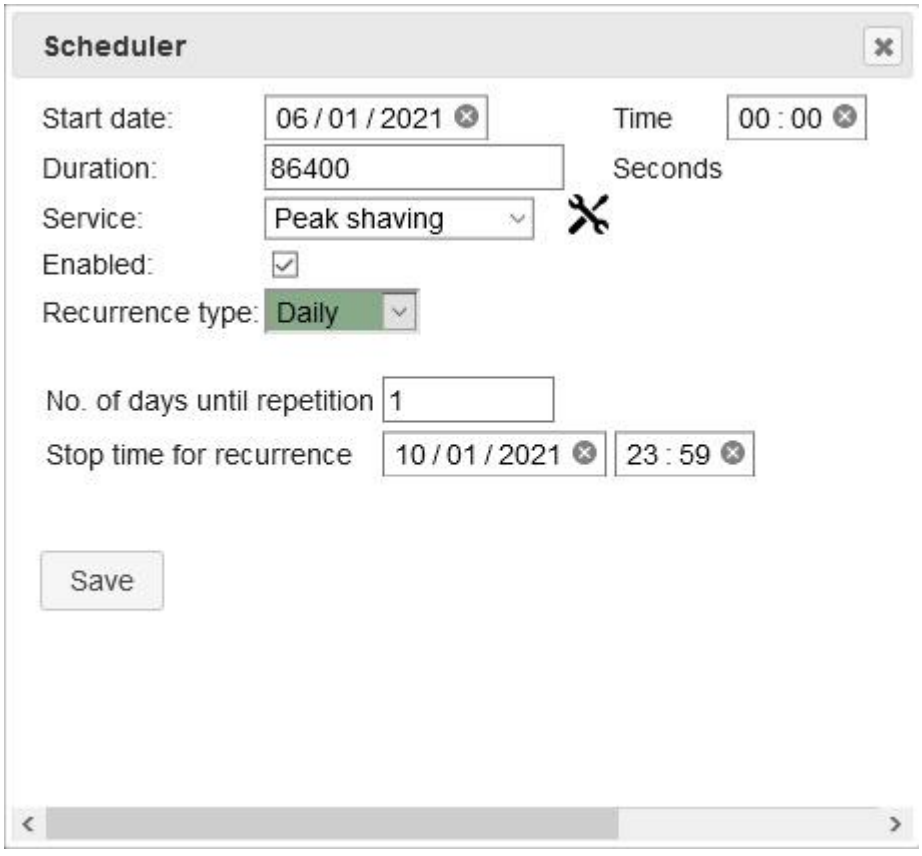

Figure 12. Configuration of Duration for recurring types, daily repetition. Will run 24 hours minus 1 second.

The following figures illustrate the other repeating types.

Please note that the parameter “No. of hours/days/weeks until repetition” needs to be set to at least 1 for the service to run.

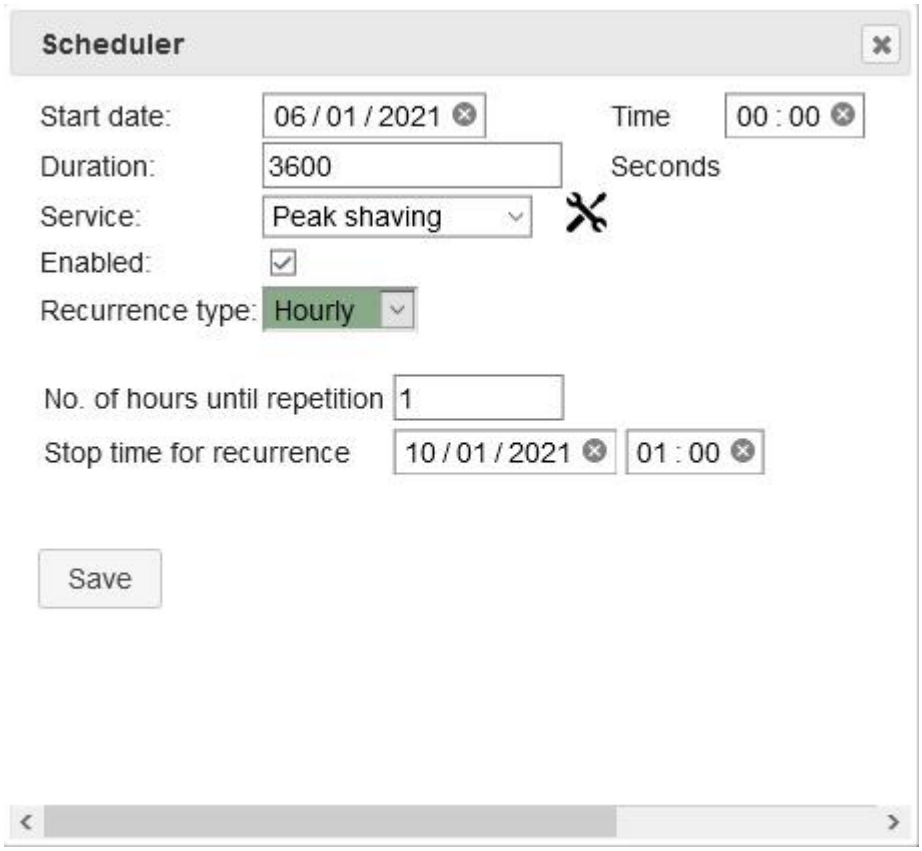

Figure 13. Hourly repetition. Will run 1 hour minus 1 second from midnight every day in until 10.01.2021

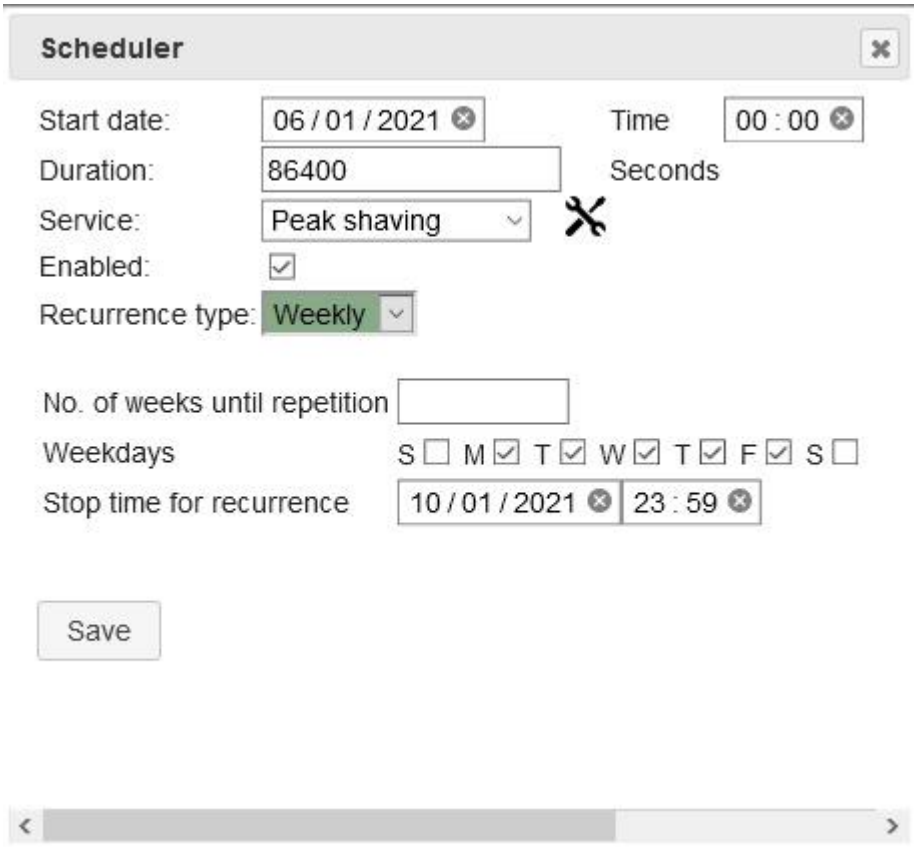

Figure 14. Weekly repetition. Will run 24 hours minus 1 second from midnight every weekday until 10.01.2021

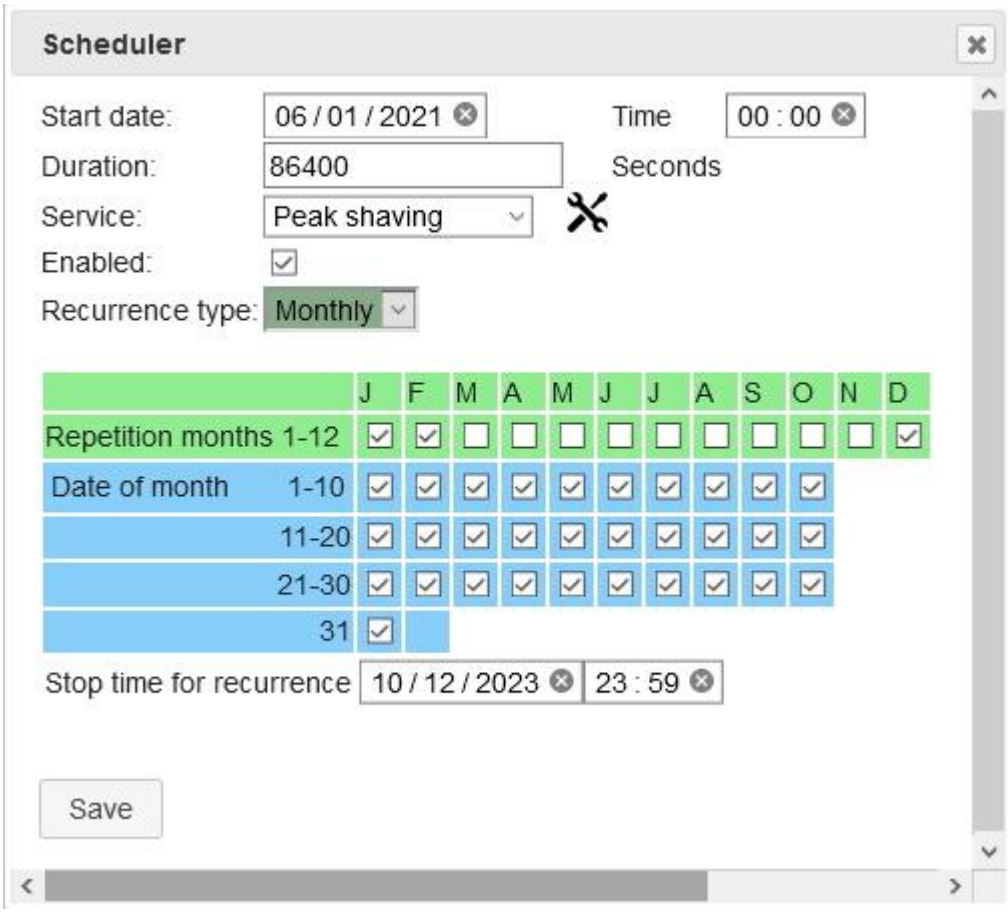

Figure 15. Montly repetition. Will run 24 hours from midnight every day in January, February, and December until 10.12.2023

2.1.4 Modify an existing scheduled service

Click in the Time column in a line in the scheduler list to read and edit the schedule for a given service:

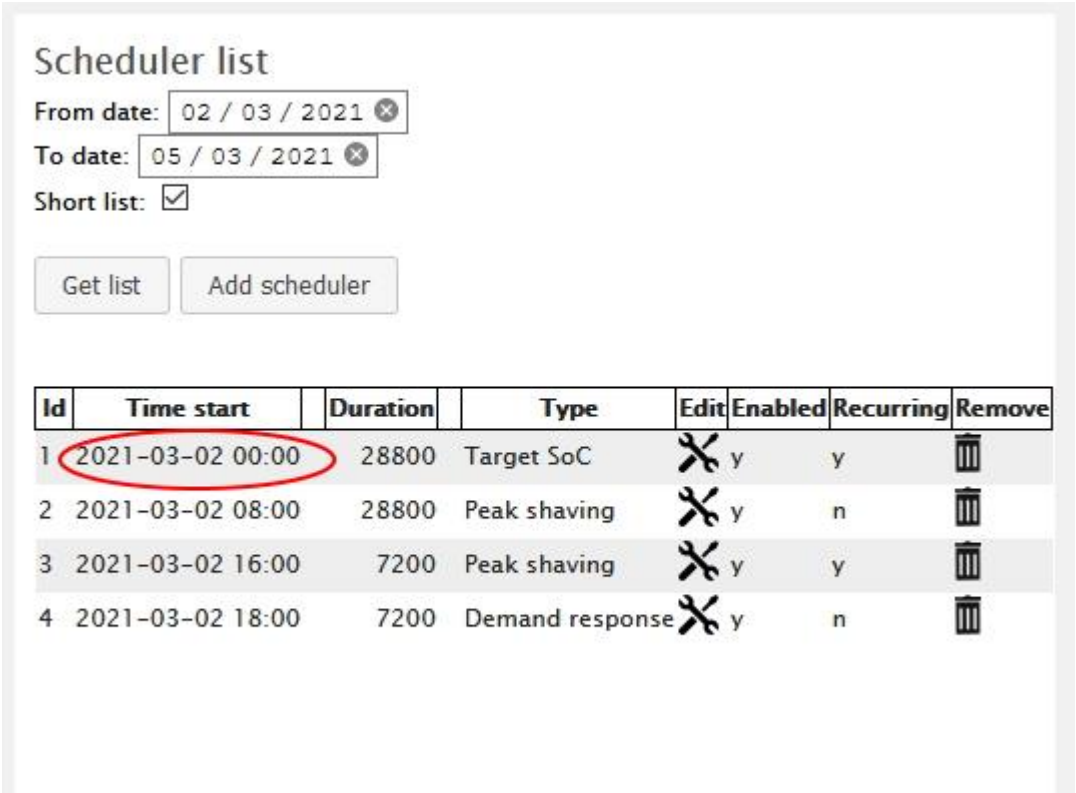

Figure 16. Edit a schedule for a service

The scheduler dialog for this event will pop up and can be edited:

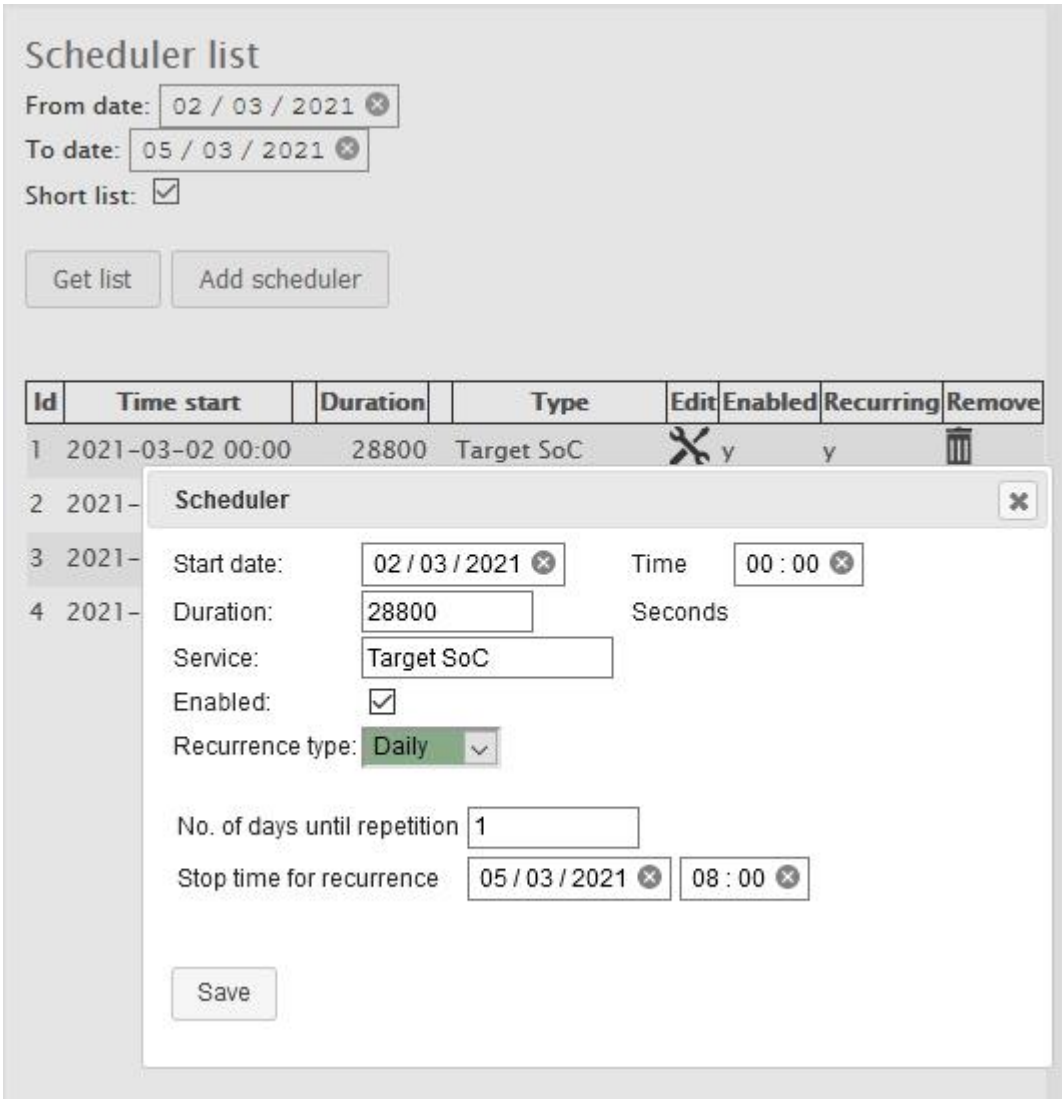

Figure 17. Dialog for editing a schedule for a service

Click in the “Wrench and screwdriver” symbol in the Edit column in a line in the scheduler list to read and edit the service parameters:

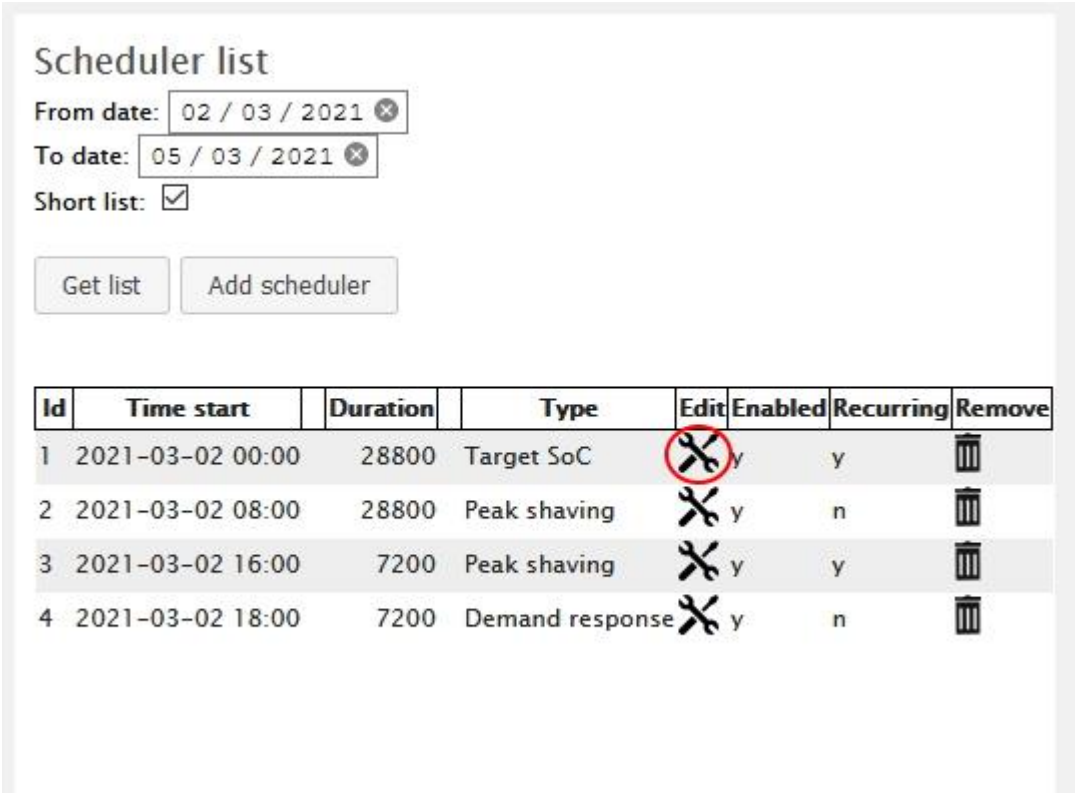

Figure 18. Edit the service parameters

The service dialog for this event will pop up and can be edited:

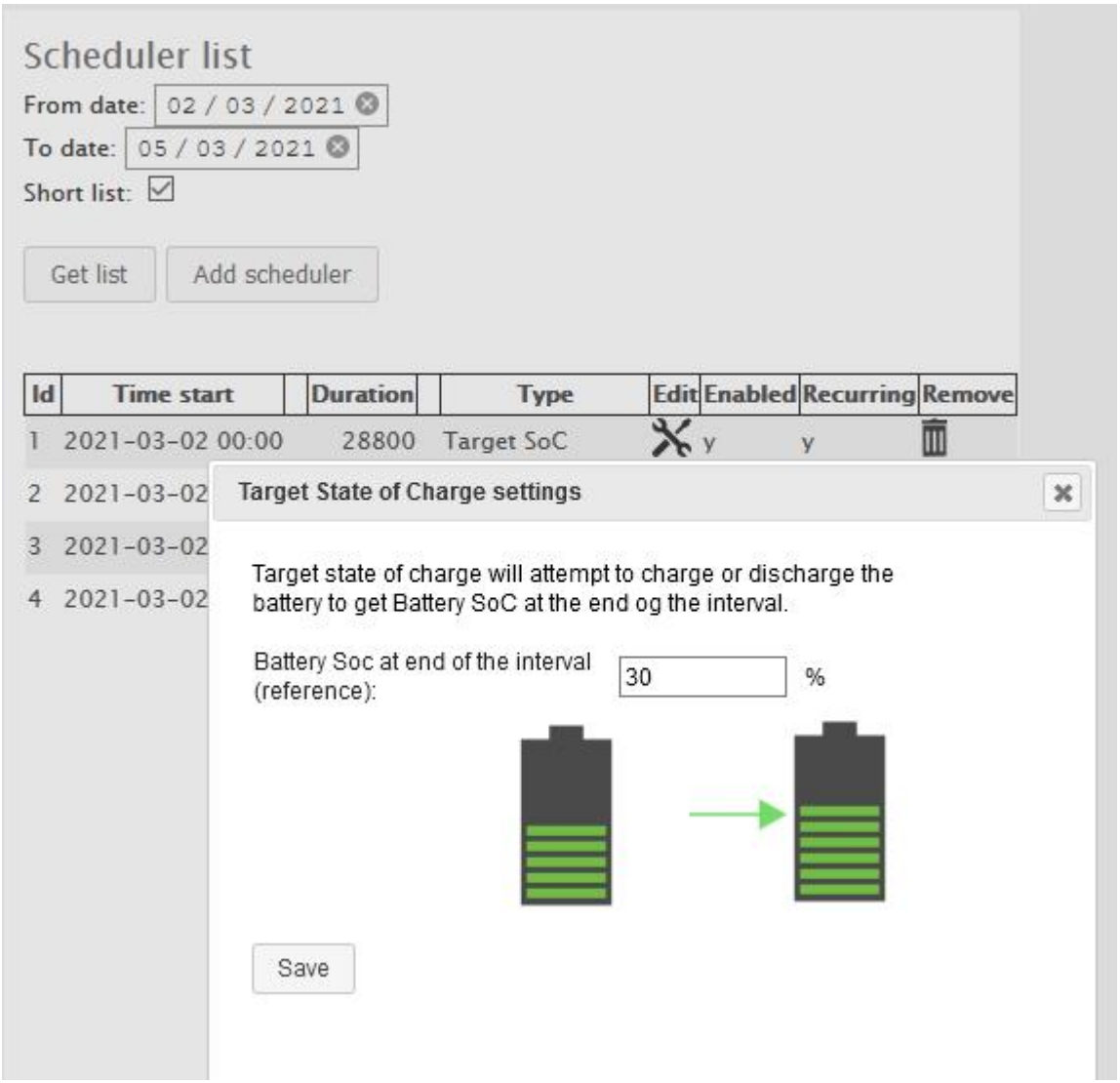

Figure 19. Dialog for editing the service parameters

3 Troubleshooting

There may be several reasons for why the services are not performed as wished. The most common are:

- The battery settings do not allow charge/discharge. Check the voltage and SoC settings.
- The battery BMS imposes limits, such as charge / discharge limitations due to temperature or voltage.
- The power value is higher than the installed power.
- Another service with higher priority is active.
- The settings were not saved.