

PV-OPTIM DASHBOARD

Home Energy Planning, Monitor and Control
Assistant

ABSTRACT

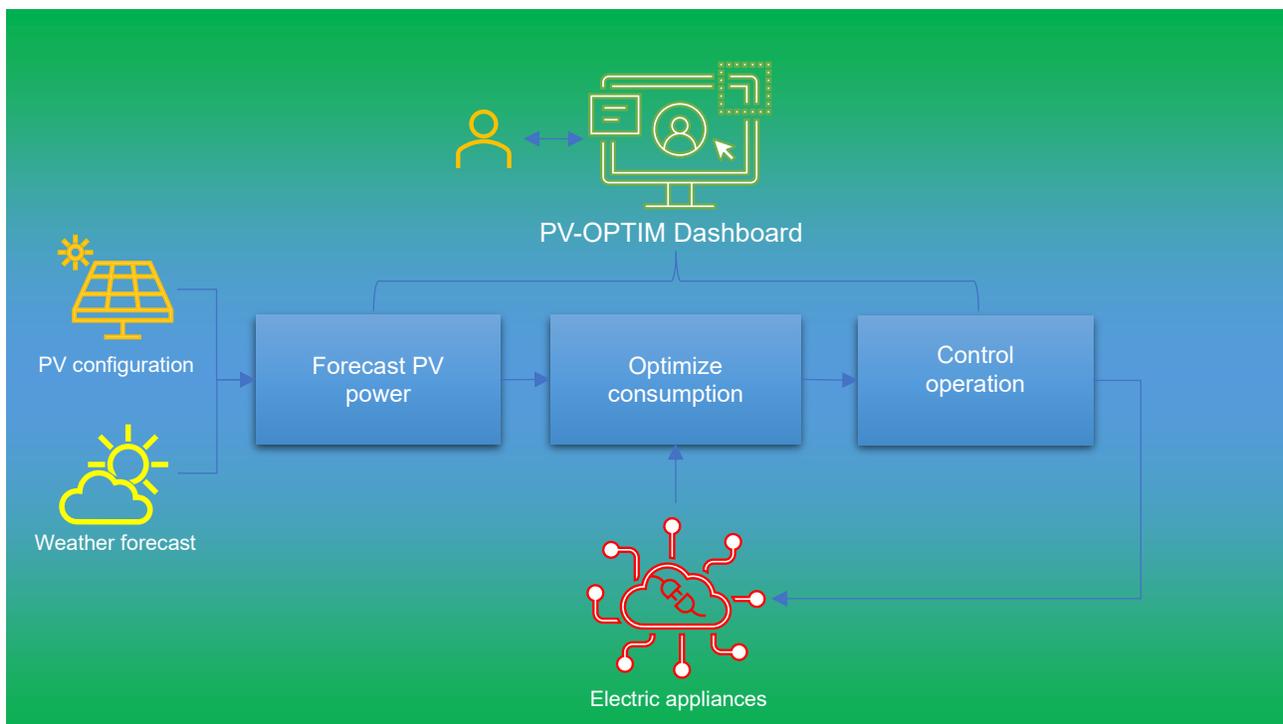
PV-OPTIM Dashboard is developed as a free software solution for prosumers to forecast the power generated by the PV systems using weather predictions and to maximize the consumption from local PV generation. If the solar energy is not available, it aims to minimize the electricity cost by finding the best operational time slots for the electric appliances.

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PV-OPTIM Dashboard: Home Energy Planning, Monitor and Control Assistant

- Forecast photovoltaic power using weather data and the configuration of the PV system
- Manage electric appliances
- Plan and optimize daily consumption
- Analyze your daily cost, revenue and performance of the PV system
- View weather forecast
- Control appliances (*only in the full version of the app – please send [email](mailto:info@smart-optim-energy.ase.ro)*)

Start using PV-OPTIM for free: <https://smart-optim-energy.ase.ro:80>



PV-OPTIM GUIDE

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PV Configuration

- Specify the type of inverter (off-grid, on-grid), Rated power (W), orientation of the PV panels and location (latitude and longitude);
- Set up the electricity prices for consumption (Time-of Use tariff) and generation (Feed-in tariff);

PV SYSTEM CONFIGURATION

Modify the data related to your PV system and set the rated power, orientation, latitude and longitude.

[Find latitude and longitude](#)

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<input type="checkbox"/>	Name	Type	Rated power (W)	Orientation	Latitude	Longitude	City	Country	Options
<input type="checkbox"/>	PV	off-grid	5900.0	180	44.43	26.85	Stefanesti, Calarasi	Romania	Update configuration

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TARIFF RATES

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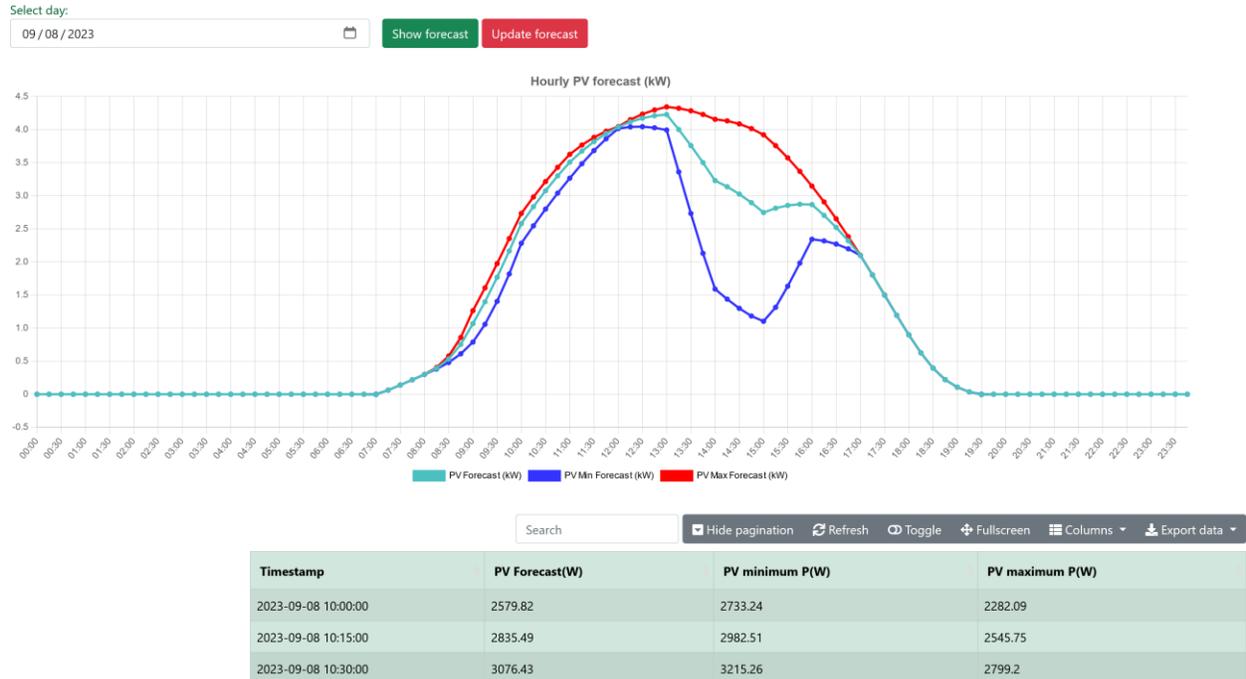
<input type="checkbox"/>	Consumption price (EUR)	Generation price (EUR)	Start hour	End hour	Options
<input type="checkbox"/>	0.68	0.3	0	23	Update rates

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PV Forecast

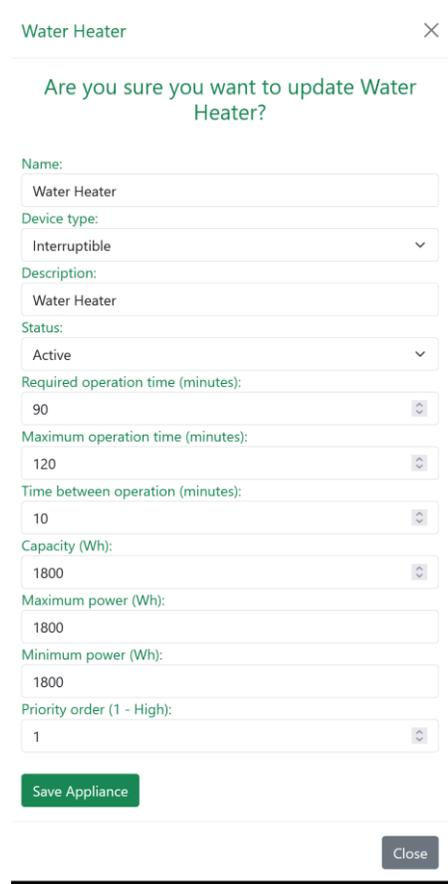
The forecast model uses the weather predictions from <https://open-meteo.com/> to estimate the PV power for the next 7 days. The PV forecast strongly depends on the weather predictions, so it is highly recommended to update the forecast daily to get the most recent weather predictions.

- Select the day and click *Show forecast* to display the prediction of the PV power;
- Click *Update forecast* to run the forecast model and update the predictions for the next 7 days;
- The chart and table provide the predictions as minimum, average and maximum values.



Manage appliances

- Add appliances to the dashboard and configure the following parameters: Capacity (Wh), Required operation time, Maximum operation time, time between operation:



Water Heater ×

Are you sure you want to update Water Heater?

Name:
Water Heater

Device type:
Interruptible

Description:
Water Heater

Status:
Active

Required operation time (minutes):
90

Maximum operation time (minutes):
120

Time between operation (minutes):
10

Capacity (Wh):
1800

Maximum power (Wh):
1800

Minimum power (Wh):
1800

Priority order (1 - High):
1

Save Appliance

Close

- The list of all appliances that are currently managed by the PV-OPTIM are display in the table. You may update their configuration by using the *Update* button:

ADD APPLIANCES TO THE DASHBOARD

Add new appliance

Search

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<input type="checkbox"/>	Name	Device type	Description	Priority	Required operation time	Capacity (Wh)	Info	Options
<input type="checkbox"/>	Water Heater	Interruptible	Water Heater	1	90	1800	More Info	Update
<input type="checkbox"/>	AC	Interruptible	Air Conditioner	3	15	1000	More Info	Update
<input type="checkbox"/>	Water Pump	Interruptible	Water Pump	4	10	1000	More Info	Update
<input type="checkbox"/>	Electric Oven	Shiftable	Electric Oven	5	10	1500	More Info	Update
<input type="checkbox"/>	Washing Machine	Shiftable	Washing Machine	2	120	1500	More Info	Update
<input type="checkbox"/>	Electric Heater	Interruptible	Electric Heater	6	10	1400	More Info	Update
<input type="checkbox"/>	Convector	Interruptible	Convector	7	10	1800	More Info	Update
<input type="checkbox"/>	Electric Stove	Shiftable	Electric Stove	8	20	1500	More Info	Update

Showing 1 to 8 of 8 rows

10

rows per page

Plan and optimize

- To optimize consumption, add the appliances to the daily plan and specify the minimum start time and maximum end time, depending on your preferences (e.g., the AC device will start at 1:46 PM at the earliest and stop working at 9:46 PM at the latest). Also, specify the number of cycles and their duration (e.g., the AC will operate in 4 cycles of 30 minutes each).

Select appliance from the list and specify your preferences regarding its operation

Name: AC

Date: 09 / 08 / 2023

Start time: 01 : 46 PM

Last start time: 09 : 46 PM

Priority (High=1): 1

Maximum Power coefficient: 1

No of cycles: 4

Duration (minutes): 30

[Save Schedule](#) [Cancel](#)

- After adding all the appliances that you want to operate on the selected day, click on *Optimize the plan* to specify the options for the optimization model. Select day, maximum load power acceptable by your meter and an estimation for your background consumption (e.g., lights, media, fridge). By default, the background consumption is set to 150Wh. Select the time interval for the optimization schedule (between 5 and 60 minutes).

OPTIMIZE THE DAILY PLAN

Select day: 09 / 08 / 2023

Maximum load power (kWh): 5

Time interval (minutes): 30

Maximum background load (Wh): 150

[View plan](#) [More metrics](#)

[More info](#)

First update the PV forecast, then add appliances to the daily plan for the selected day. The optimal plan tries to schedule the operation of the appliances during the hours with PV generation. When PV generation is not available, the appliances are scheduled to minimize the daily cost.

- To run the optimization model click *View plan*. The optimal plan will be displayed on a chart.



- To view more metrics, including the daily cost, revenue and PV performance metrics click on *More metrics* or access *View daily schedule* page:



- To modify the optimal plan or to customize it, click *Edit plan* and update each record by using the *Edit schedule* button. You can delete a record by using the *Delete schedule* button. To delete old plans, click on the *Delete old schedules* option on the bottom of the page.

DAILY OPERATION PLAN

<input type="checkbox"/>	Name	Start time	End time	Maximum end time	Power	Options
<input type="checkbox"/>	AC	2023-09-08 14:00:00	2023-09-08 16:00:00	2023-09-08 22:16:00	1000.0	Delete schedule Edit schedule
<input type="checkbox"/>	Water Heater	2023-09-08 10:00:00	2023-09-08 11:30:00	2023-09-08 23:19:00	1800.0	Delete schedule Edit schedule
<input type="checkbox"/>	Water Heater	2023-09-07 13:30:00	2023-09-07 15:00:00	2023-09-07 20:12:00	1800.0	Delete schedule Edit schedule
<input type="checkbox"/>	AC	2023-09-07 10:30:00	2023-09-07 13:00:00	2023-09-07 19:12:00	1000.0	Delete schedule Edit schedule
<input type="checkbox"/>	AC	2023-09-01 11:30:00	2023-09-01 14:30:00	2023-09-01 21:00:00	1000.0	Delete schedule Edit schedule
<input type="checkbox"/>	Water Pump	2023-09-01 11:00:00	2023-09-01 13:00:00	2023-09-01 18:00:00	1000.0	Delete schedule Edit schedule
<input type="checkbox"/>	Water Heater	2023-09-01 09:30:00	2023-09-01 11:00:00	2023-09-01 22:00:00	1800.0	Delete schedule Edit schedule
<input type="checkbox"/>	Water Pump	2023-09-01 08:30:00	2023-09-01 09:30:00	2023-09-01 18:00:00	1000.0	Delete schedule Edit schedule
<input type="checkbox"/>	AC	2023-08-31 11:00:00	2023-08-31 12:00:00	2023-08-31 17:31:00	1000.0	Delete schedule Edit schedule
<input type="checkbox"/>	Water Heater	2023-08-31 10:00:00	2023-08-31 11:30:00	2023-08-31 15:30:00	1800.0	Delete schedule Edit schedule

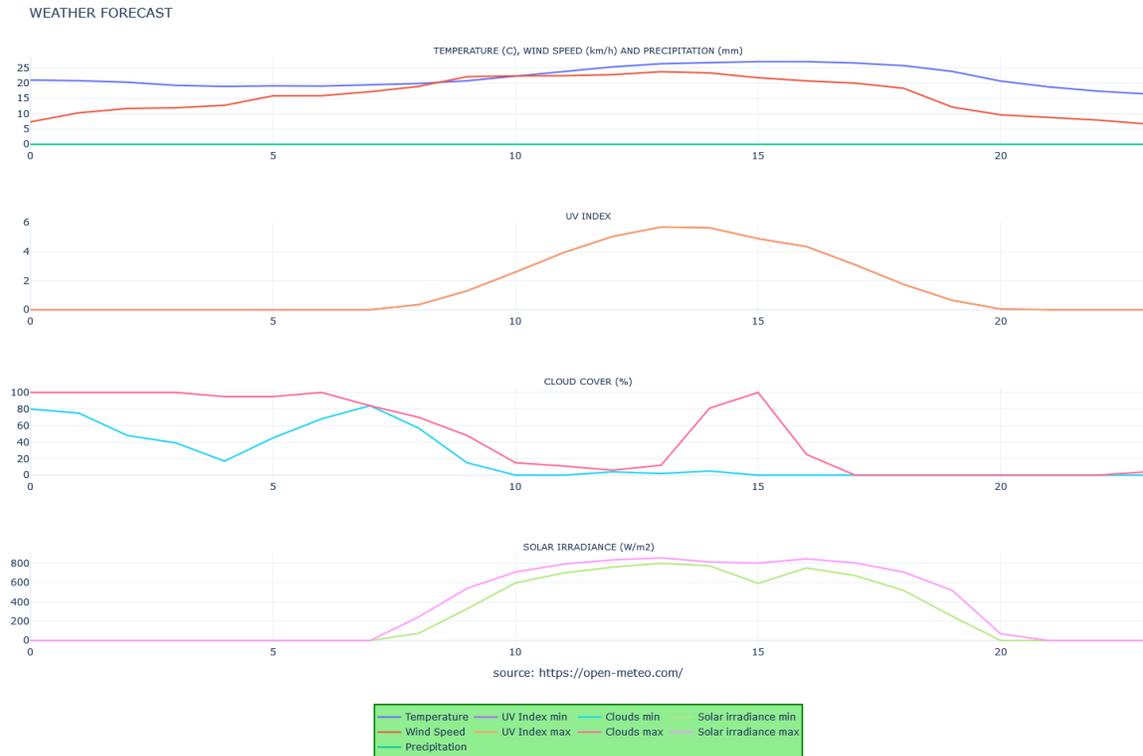
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Delete old schedules

- The daily plan can be downloaded in .csv or .xlsx format by using the Export data option from the right-side menu bar of the table. You can save the optimal plan and use it with other apps that allow you to control the appliances. In case you want to automatically implement the plan (control the appliances to start and stop at the planned hours) you need access to the full version of PV-OPTIM Dashboard. Please contact the authors (see below) for more details.

Weather forecast

- To see the most relevant weather parameters that influence the PV output, select the day, and click *Show readings*. The weather predictions are available for the next 7 days, extracted from <https://open-meteo.com/>.



The source code is available at: <https://github.com/AdelaBara/PV-OPTIM>

For full description of the components please access: <http://ssrn.com/abstract=4348790>

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Acknowledgement: *This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI-UEFISCDI, project number 462PED/28.10.2020, project code PN-III-P2-2.1-PED-2019-1198, within PNCDI III.*