

Akkudoktor-EOS

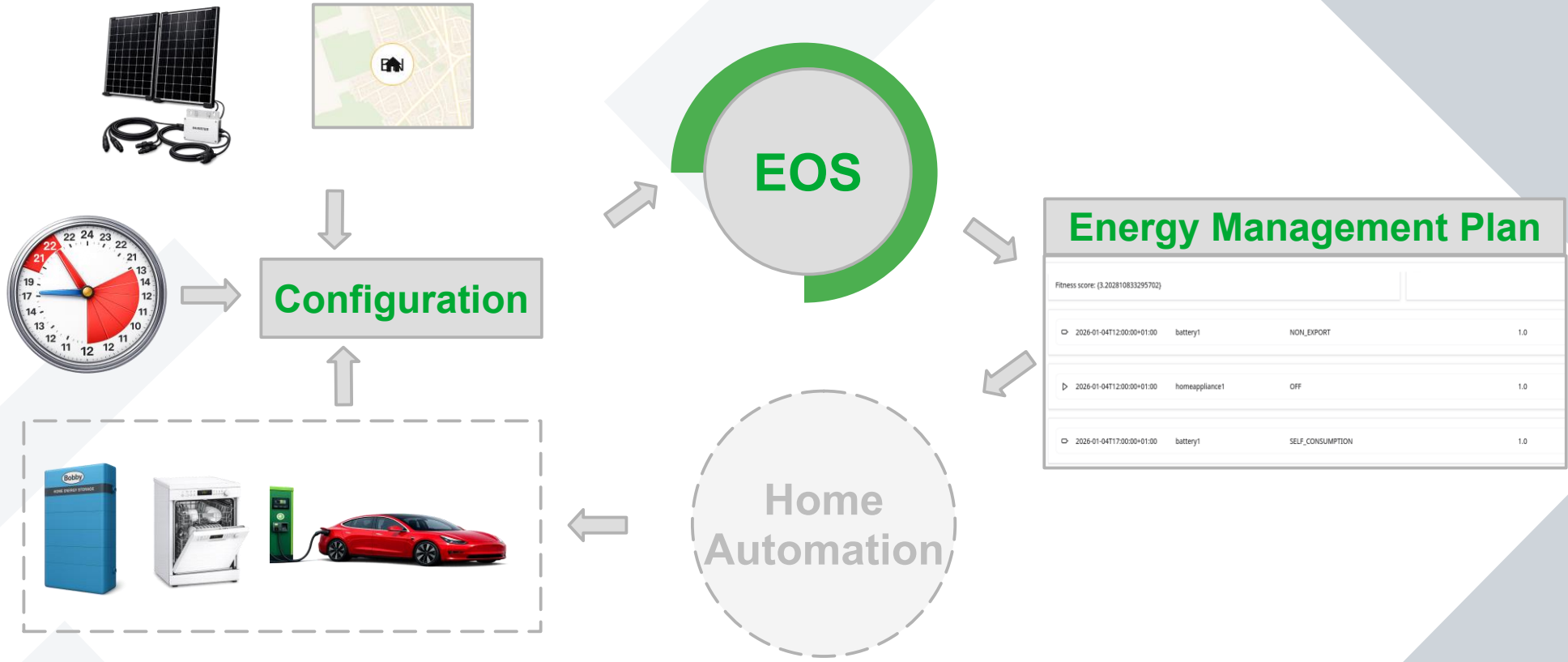
Energy Optimisation System

FOSDEM 2026

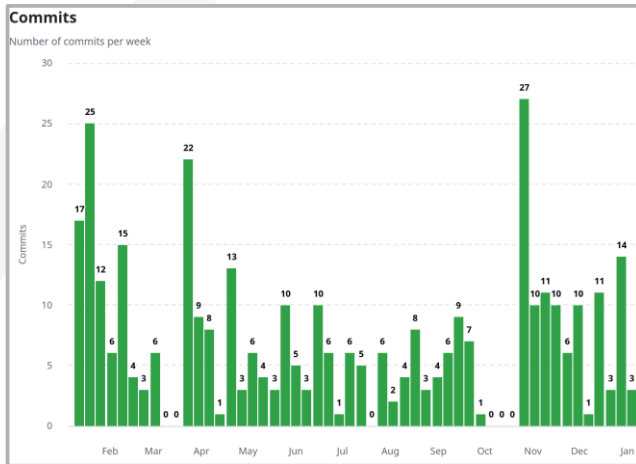
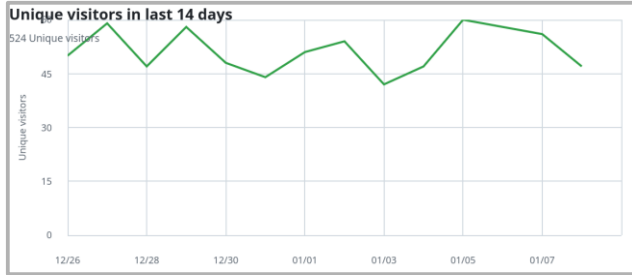
Bobby Nölte



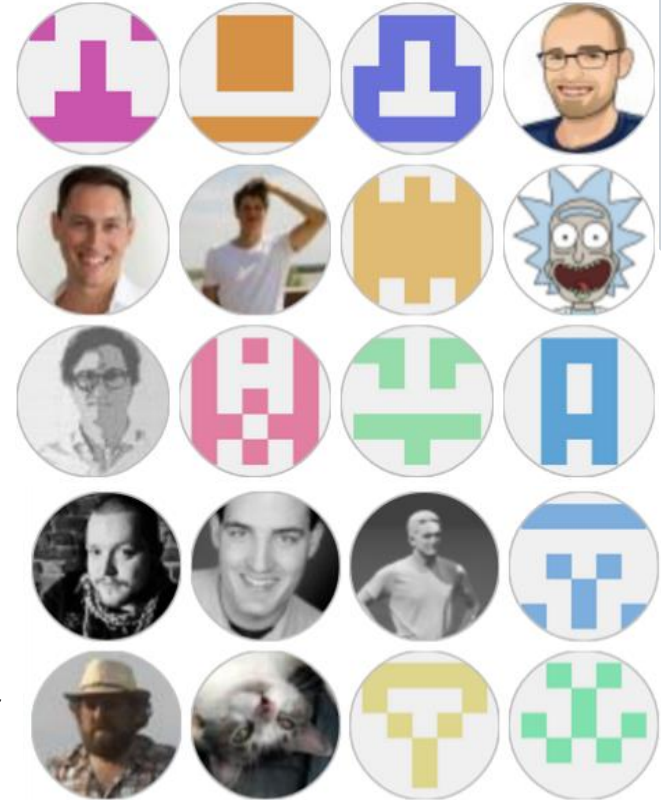
Akkudoktor-EOS



Akkudoktor-EOS



<https://www.youtube.com/@Akkudoktor>



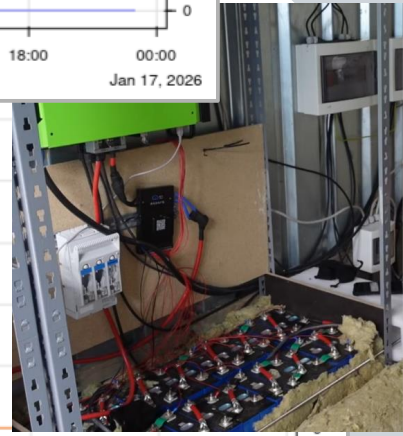
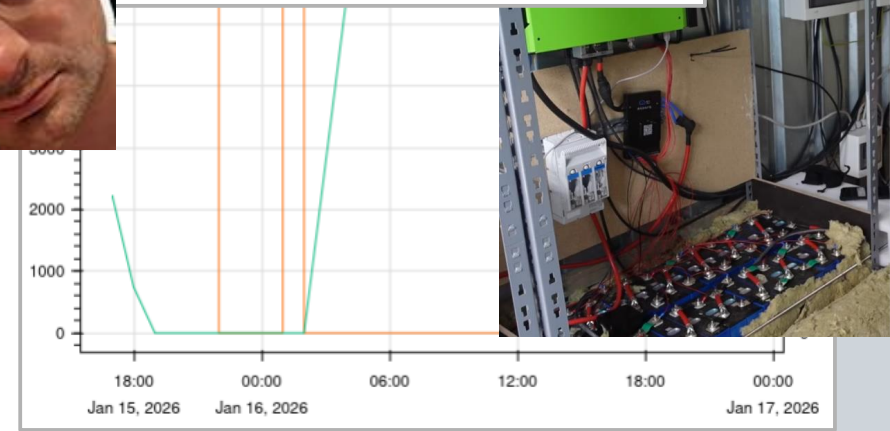
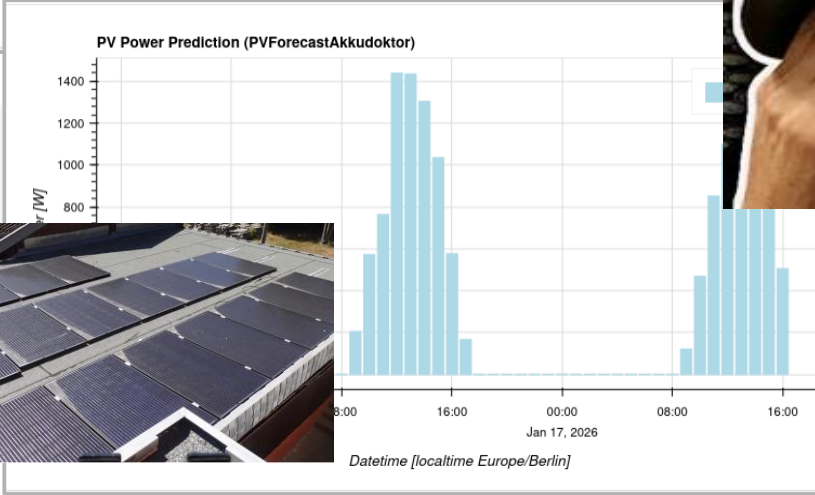
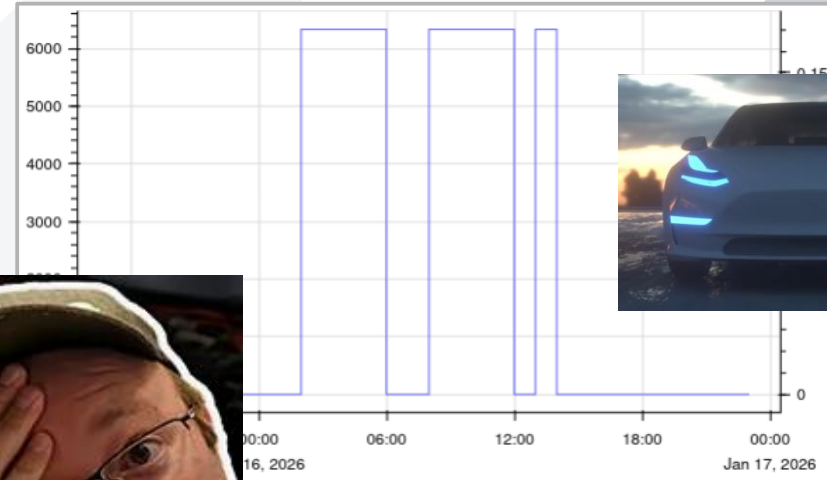
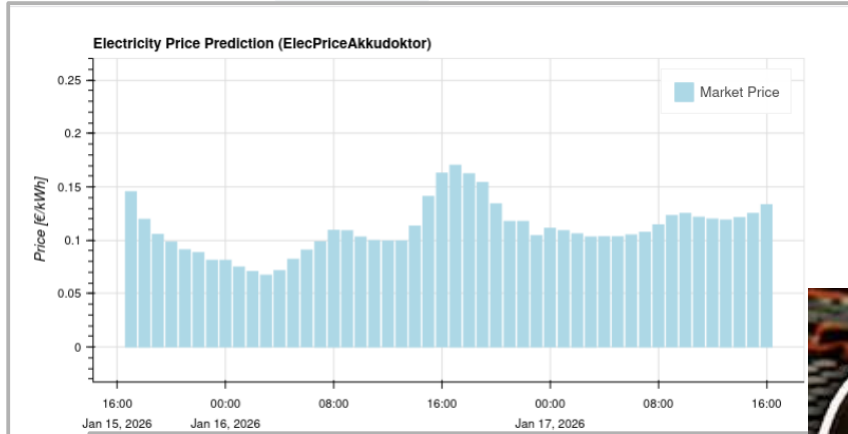
1.2 Akkudoktor-EOS – Who made it?

Akkudoktor-EOS



2.1 What can you do with EOS?

Akkudoktor-EOS



2.2. The Challenge

Akkudoktor-EOS



2.3 Fully Automated Energy Management

Akkudoktor-EOS

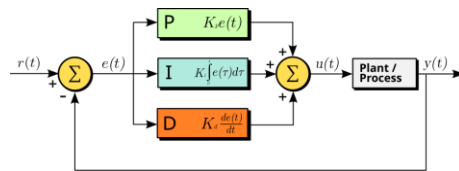


Short Term Control (Seconds - Minutes)

PV surplus charging

Power limitation

Inverter & battery control



Local control loops
Linear or well-linearized behavior
Fast response & stability



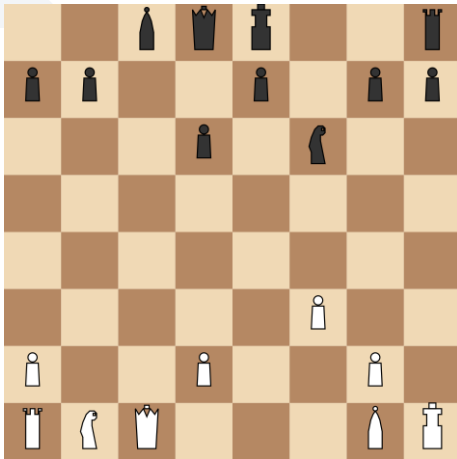
3.1. Two time horizons – short term control

Long Term Planning (Days – Weeks)

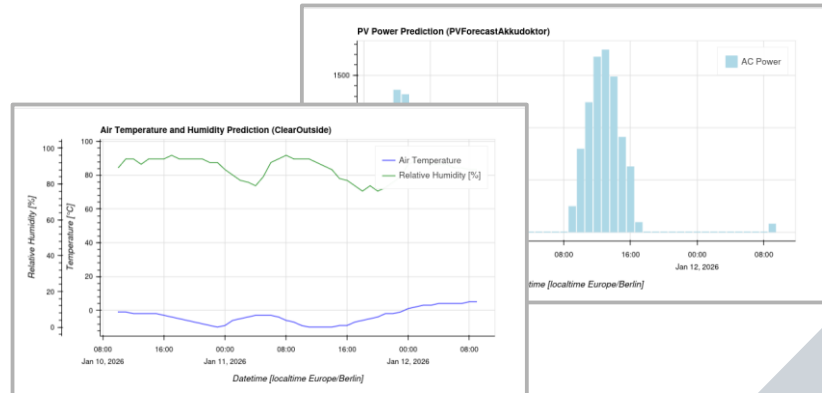
“When should stored energy be used?”

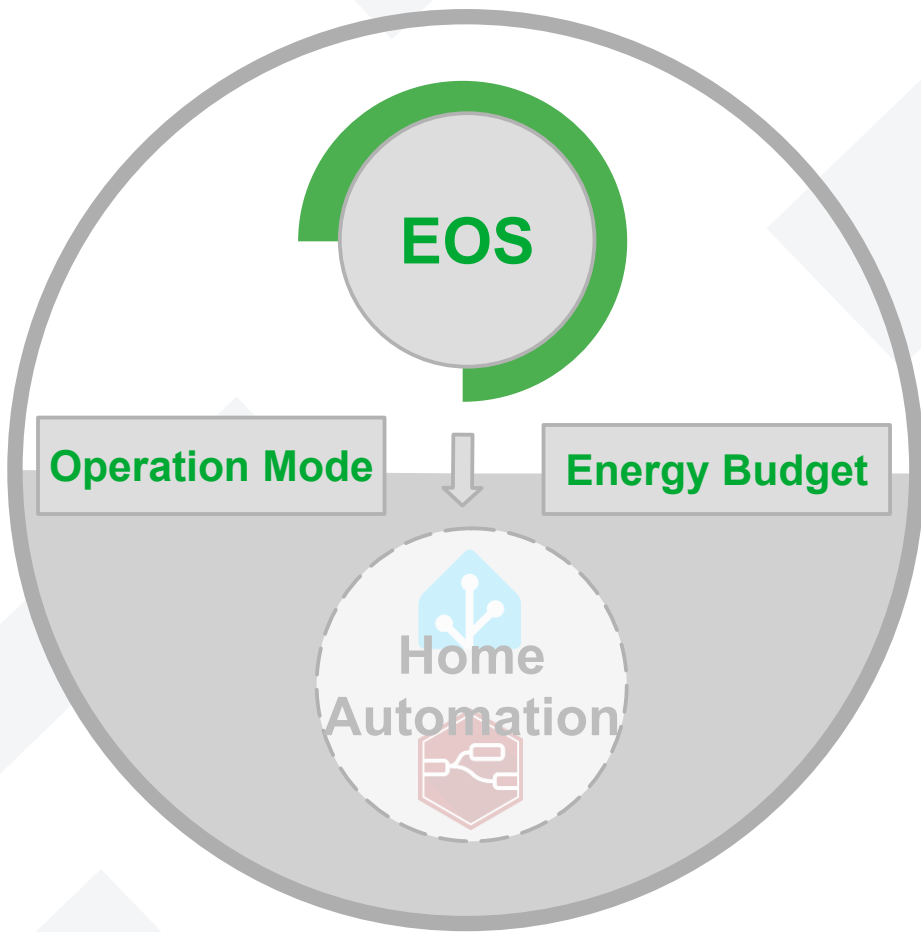
“Probability of price spikes (2×–3×)”

“Strategic value of energy today vs. tomorrow”



Nonlinear optimization
Probabilistic evaluation
Trend & scenario awareness
Time-coupled decisions





| Hours ... Days ... Weeks

Charge 1 kW	Idle 0 kW	Charge 2kW	Idle 0 kW	
Discharge 1 kW	Idle 0	Charge 0.5 kW	Discharge 2 kW	Discharge 0.5 kW
Off 0 kW	On 1 kW	Off 0 kW		

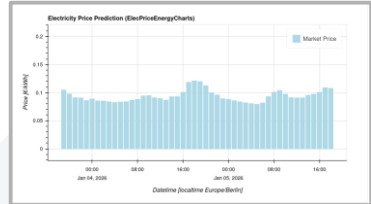
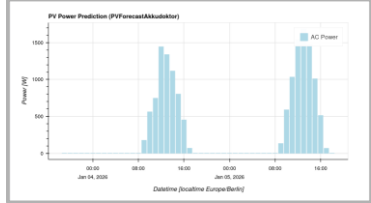
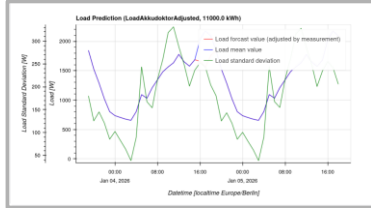
Charge
1 kWh

Discharge
1 kWh

Off
0 kWh

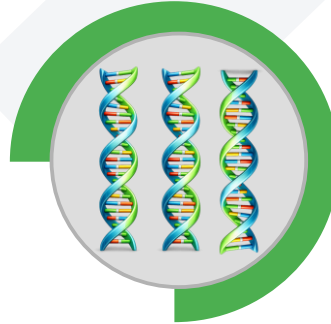
| 1 Hour |





Forecasts

Genetic Algorithm



Simulations

Charge 1 kW	Idle 0 kW	Charge 2kW	Idle 0 kW	
Discharge 1 kW	Idle 0	Charge 0.5 kW	Discharge 2 kW	Discharge 0.5 kW
Off 0 kW	On 1 kW	Off 0 kW		



3.4 How EOS creates an energy management plan.

Akkudoktor-EOS

Akkudoktor-EOS

v0.2.0.dev44099868 OAS 3.1

/openapi.json

Comprehensive solution for simulating and optimizing an energy system based on renewable energy sources

This project provides a comprehensive solution for simulating and optimizing an energy system based on renewable energy sources. With a management (consumer requirements), heat pumps, electric vehicles, and consideration of electricity price data, this system enables forecast

Apache 2.0

admin

POST /v1/admin/cache/clear Fastapi Admin Cache Clear Post

POST /v1/admin/cache/clear-expired Fastapi Admin Cache Clear Expired Post

POST /v1/admin/cache/save Fastapi Admin Cache Save Post

POST /v1/admin/cache/load Fastapi Admin Cache Load Post

GET /v1/admin/cache Fastapi Admin Cache Get

POST /v1/admin/server/restart Fastapi Admin Server Restart Post

POST /v1/admin/server/shutdown Fastapi Admin Server Shutdown Post

health

GET /v1/health Fastapi Health Get

config

POST /v1/config/reset Fastapi Config Reset Post

GET /v1/config/backup Fastapi Config Backup Get

PUT /v1/config/revert Fastapi Config Revert Put

PUT /v1/config/file Fastapi Config File Put

GET /v1/energy-management/plan Fastapi Energy Management Plan Get

Get the latest energy management plan.

Parameters

Cancel

No parameters

Execute

Clear

Responses

Curl

```
curl -X 'GET' \
  'http://192.168.178.4:8503/v1/energy-management/plan' \
  -H 'accept: application/json'
```

Request URL

http://192.168.178.4:8503/v1/energy-management/plan

Server response

Code Details

200

Response body

```
{
  "id": "plan-geneticp2026-01-04T09:16:30.236136+01:00",
  "generated_at": "2026-01-04T09:16:30.236214+01:00",
  "valid_from": "2026-01-04T09:00:00+01:00",
  "valid_until": null,
  "instructions": [
    {
      "id": "battery18d56fe68-5d77-4cd5-bcfb-89a0bdabde72",
      "execution_time": "2026-01-04T09:00:00+01:00",
      "abnormal_condition": false,
      "type": "FRBCInstruction",
      "actuator_id": "battery1",
      "operation_mode_id": "HOM_EXPORT",
      "operation_mode_factor": 1,
      "resource_id": "battery1"
    },
    {
      "id": "homeappliance1e2b11e4c8-451c-4cc5-9569-d724db22cea3",
      "execution_time": "2026-01-04T09:00:00+01:00",
      "abnormal_condition": false,
      "type": "DBMInstruction",
      "actuator_id": "homeappliance1",
      "operation_mode_id": "OFF",
      "operation_mode_factor": 1,
      "resource_id": "homeappliance1"
    }
  ]
}
```



Download

Response headers



3.5.1 Interoperability – REST

Akkudoktor-EOS

Home Assistant

Overview

Karte

Energy

Activity

History

AdGuard Home

Akkudoktor-EOS

ESPHome Builder

HACS

Media

Studio Code Server

Terminal

Developer tools

Settings

Notifications

BN Bernhard Nölte

Plan Prediction Config Admin About

Optimization Solution - last run: 2026-01-04T09:05:27.384136+01:00

Prediction

☒ elec_price_amt_kwh

☐ loadakkudoktor_mean_energy_wh

☐ loadforecast_energy_wh

☐ pvforecast_dc_energy_wh

☐ feed_in_tariff_amt_kwh

☐ loadakkudoktor_std_energy_wh

☒ pvforecast_ac_energy_wh

☐ weather_air temp celcius

Node-RED

Akkudoktor-EOS

Current version: 0.2.0 dev84352035 [Changelog](#)

7 Rating

Core

Ingress

Akkudoktor-EOS add-on.

Visit the [Akkudoktor-EOS](#) page for more details.

Start on boot

Make the add-on start during a system boot

Watchdog

This will restart the add-on if it crashes

Autoupdate

Autoupdate the add-on when there is a new version available

Add to sidebar

Allows users to show or hide the add-on

Stop Restart

Entity	State	Attributes
sensor.eos_battery1	forced_charge	operation_mode_factor: 1
sensor.eos_costs_amt	0.563762339210326	
sensor.eos_homeappliance1	off	operation_mode_factor: 1
sensor.eos_revenue_amt	0.0	

Home Assistant

Overview

Map

Energy

Activity

History

Akkudoktor-EOS

HACS

Media

To-do lists

Plan Prediction Config Admin About

adapter.nodered.host

rw

"10.10.1.109"

adapter.nodered.port

rw

1880

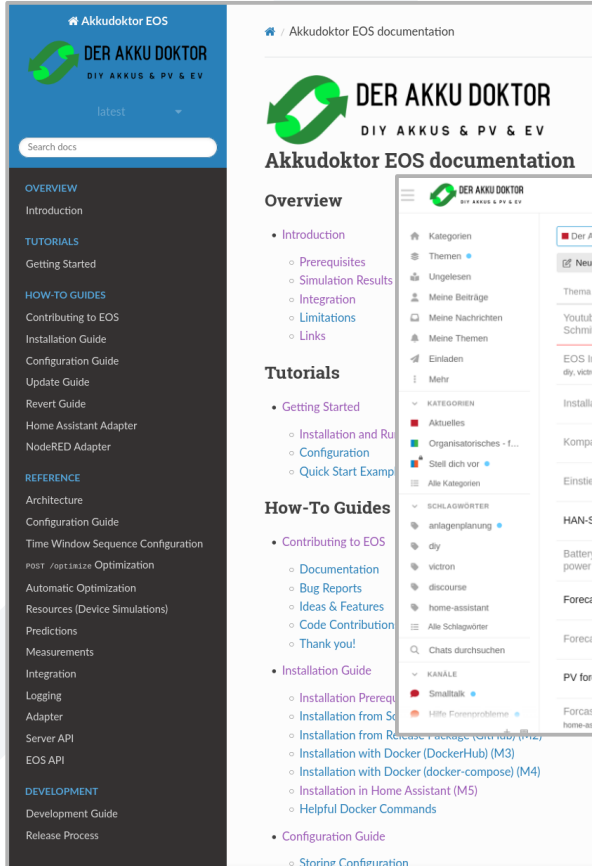
adapter.provider

rw

{ "homeassistant": "nodered" }

3.5.2 Interoperability/ Adapters – Home Assistant/ Node-RED

Akkudoktor-EOS

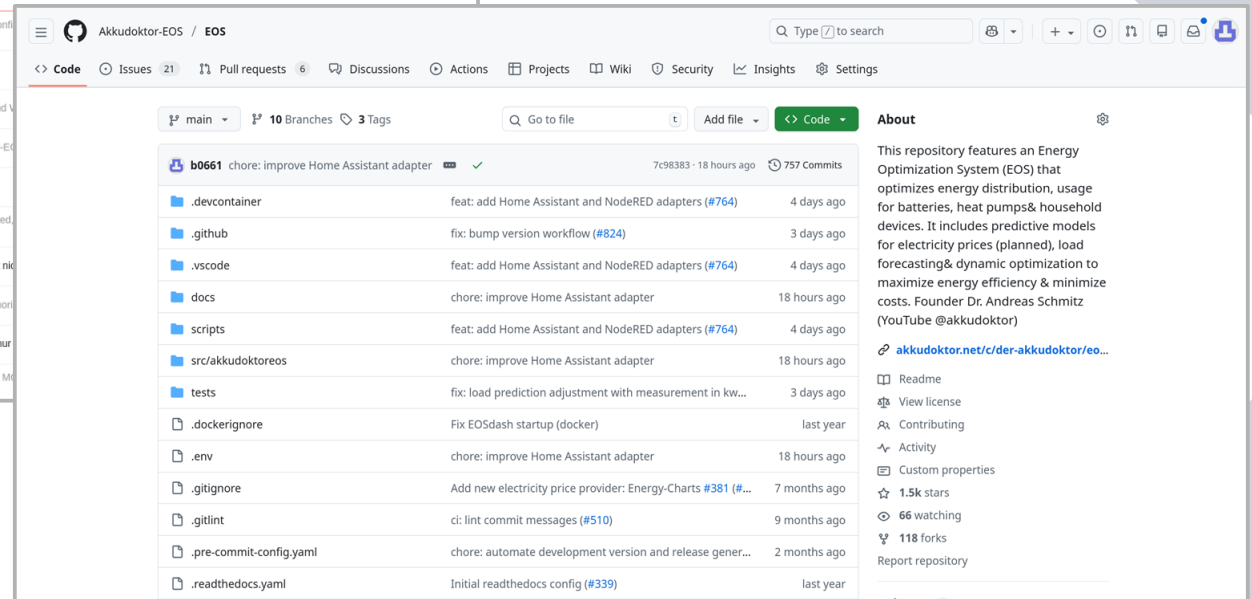


<https://github.com/Akkudoktor-EOS/EOS>

<https://github.com/Akkudoktor-EOS/EOS/issues>

<https://akkudoktor-eos.readthedocs.io/en/latest/>

<https://akkudoktor.net/c/der-akkudoktor/eos>



Thank You!

Q&A



Python ≥ 3.11

EOS:

- FastAPI

- uvicorn

EOSdash:

- FastHTML

- uvicorn



Pictures:

- chat-gpt.com
- Andreas

