FlexMeasures Technical Steering Committee

March 29th 2023

Agenda

- Welcome & Short introduction to FlexMeasures
- Features planned on Scheduling
- Roadmap
- Q&A

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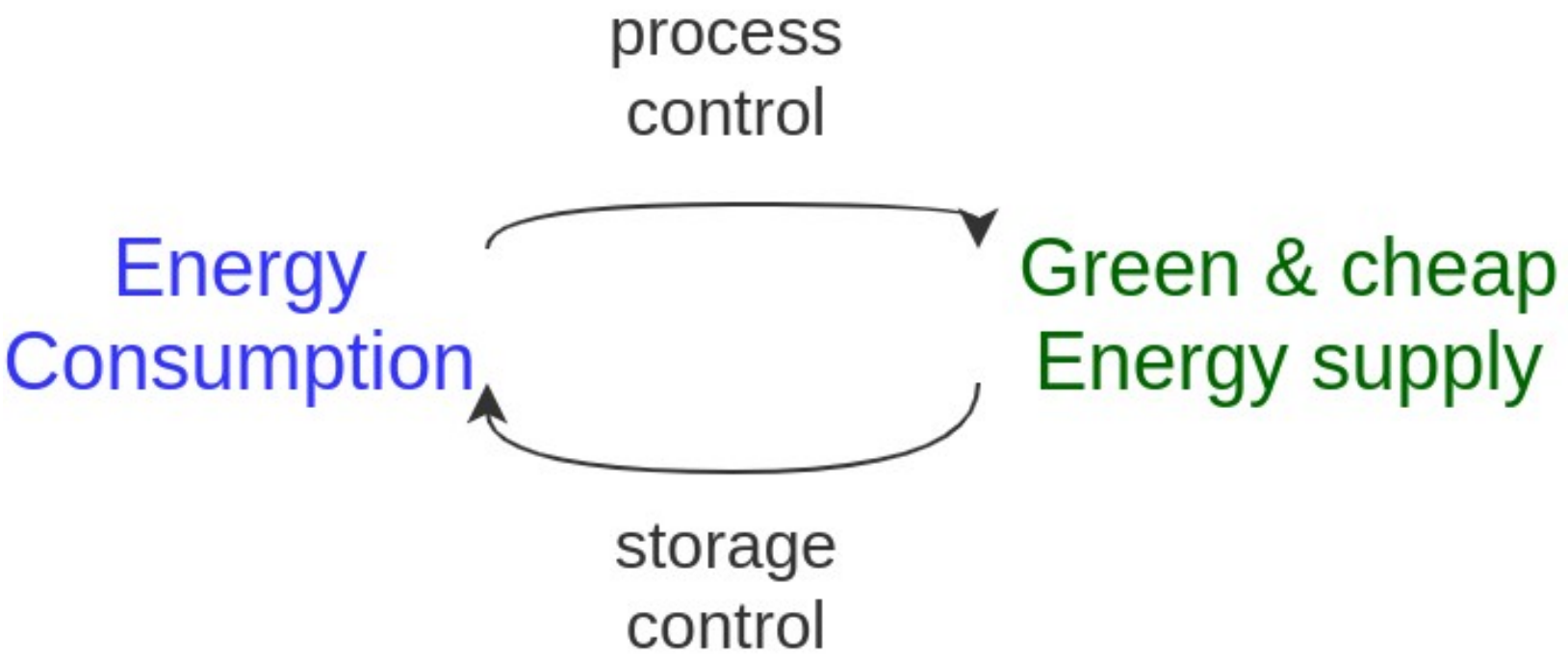
The matching challenge



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FlexMeasures is the intelligent & developer-friendly EMS to support real-time energy flexibility apps.

Sectors:

- Smart industry
- Smart city

Current focus: Storage

- Battery (e.g. EV)
- Heat storage

Functions:

- Digital Twin
- Real-time Control

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FlexMeasures - simple

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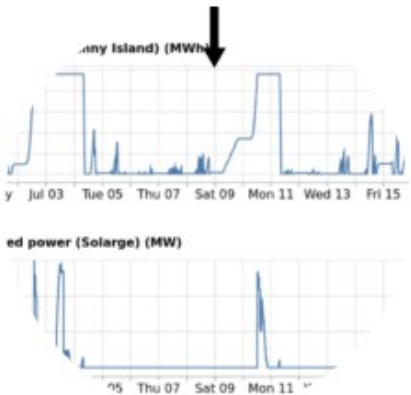
SteerOnCO_2 at Rijnland Water Board

We help water board Rijnland to only run their centrifuges for sludge dehydration when the CO_2 footprint in the grid is low. **They saved 27% CO_2 on flexible days!**

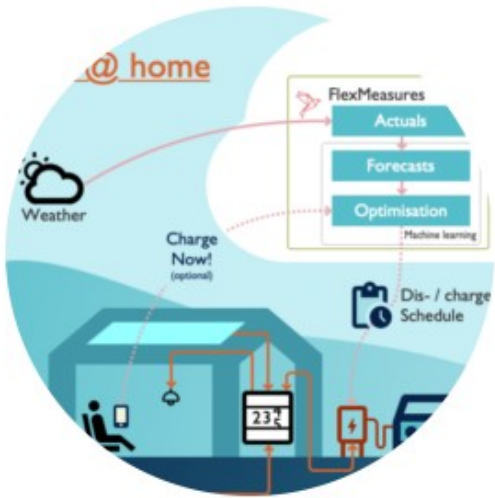
SteerOnPrice & SteerOnSolar at Heijmans

For building & installation company Heijmans, we ran scenario-based simulations. They now **contribute to strategic decision-making** in building projects based on data.



SteerOnPrice & SteerOnSolar with V2GLiberty

We optimize (dis)charging of Nissan Leaf cars with Wallbox chargers to save costs and use solar power, with zero user interaction needed. **We recorded several hundred EUR of savings per year.**



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Features planned on Scheduling

- Which algorithms are planned
- Next iteration for a more REST-like API
- Heat optimization: Current work & integrations
- Add more powerful solver (non-linear capability)
- Two new feature ideas of interest to emerging markets

Which algorithms are planned

- The current storage algorithm can be expanded to be able to model simple heat storage. [soon]
- A simple shiftable algorithm from Seita can be added. [ETA unclear]
- Sector coupling within the storage scheduler (allowing heat storage as well as batteries in one site) is another extension. [ETA unclear]

https://github.com/FlexMeasures/flexmeasures/discussions/598

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Next iteration for a more REST-like API

- POST /scheduling-job/storage: triggers a job - needs sensor ID, flex-model and flex-context
- GET /scheduling-job/: gets the schedule status
- DELETE /scheduling-job/: kills a non-computed job (otherwise return 404 or fitting code)

This way, we can make the extensions we'll need later, e.g.:

- POST /scheduling-job/shifting
- POST /forecasting-job: trigger a forecasting job

https://github.com/FlexMeasures/flexmeasures/discussions/598

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Heat optimization: Current work & integrations

On the roadmap due to ongoing Seita projects:

- A first heat buffering algorithm
- Support for the S2 Flex Standards (by TNO)
- HomeAssistant integration

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Add more powerful solver (non-linear capability)

- Are there current practical limits of the Cbc solver (energy “disappearing”?)
- Candidates: Ipopt, HiGHS
- Bake in Docker image, use Pyomo
- Can we reformulate our LP problem?

https://github.com/FlexMeasures/flexmeasures/discussions/614

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Two new feature ideas of interest to emerging markets

iRASUS

1) Let inflexible sensors be priced by distinct price sensors

Use case: government gives different subsidy to wind & solar, so their prices differ.
→ Issue 618

2) Let some storage activities be fed in through the API as (semi-)fixed constraint.

Use case: Some outside constraints which are (currently) not handled within FlexMeasures (e.g. a pre-known blackout) need to come out in the schedules (e.g. that a battery discharges at the rate a factory needs to work throughout the blackout hours).

https://github.com/FlexMeasures/flexmeasures/discussions/615

Roadmap – Big goals

- [2022 - mature] Model & pilot e-mobility optimization (price-based, V2G)
- [2023 - started] Model & pilot heating optimization (price-based, also with heat buffers)
- [2023] Congestion support (e.g. for DSOs in GOPACS)
- [2023] Sector coupling (optimize e-mobility and heating in one site)
- [2024] VPP (optimize multiple sites towards one market)

Roadmap – projects

- [Q1 2023] **More powerful algorithm configurations**, to support more use cases and more custom situations (e.g. research). For scheduling, as well as for forecasting. [work has started in Q4 2022]
- [Q1 2023] **Build out the flexibility modelling,** by supporting TNO's S2 standard and Fraunhofers Energy Flexibility Data Model (EDFM)
- [Q2 2023] **KPIs support** (e.g. reporting of daily totals), customizable
- [Q2 2023] **Scheduling algorithm for heat buffering**
- [Q2 2023] **Easily run simulations** (with multiple scenarios) on cloud CPUs, using Terraform.
- [Q3 2023] **Production deployment** to Kubernetes clusters, maybe based on the docker compose file (using Kompose)
- [Q4 2023] Let users provide **annotations on time series** (e.g. for feedback) by API and UI.
- [tbd] **Authorization model for allowing "super-accounts"** to manage other accounts (e.g. for ESCos) or add data to them (e.g. meter data companies).
- [tbd] **Smarter monitoring.**
- [tbd] **Scheduler compatible with ShapeShifter** (based on USEF flex trading protocol)
- [tbd] **Better plotting support** (via API/vega-lite), for plugins to define their own plots which are then made available in the FlexMeasures API (usable in custom frontends).

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https://flexmeasures.io/roadmap/

Q&A

- What are you working on?
- What is unclear?

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Resources – do get in touch!

- https://github.com/FlexMeasures/flexmeasures/
- https://www.flexmeasures.io
- https://lists.lfenergy.org/g/flexmeasures
- https://twitter.com/flexmeasures
- LF Energy Slack: #flexmeasures

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Developer support

- I need help with integrating real-time data and continuously computing new data
- It's hard to correctly model data with different sources, resolutions, horizons and even uncertainties
- I want to build new features quickly, not spend days solving basic problems

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Architecture vision: Out-of-the-box use cases vs power users

Out of the box – the 90 % cases

- Battery/EV + solar (self-consumption)
- Battery/EV + solar + congestion (also grid support)
- Solar + Heat pump (self-consumption & comfort)
- ...
- FM: Pre-made schedulers, Setup wizard, excellent tutorials

Power users – bring your own

- Simulations (researchers, investment decision moments)
- New services (e.g. startups) with custom scheduling
- Microgrids
- Industry
- FM: Examples, support

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FlexMeasures - integration