Rust Meets the Grid: Building OpenLEADR-rs for Real-World Demand Response

Fosdem 2026 – January 31, 2026 – Brussels, Belgium

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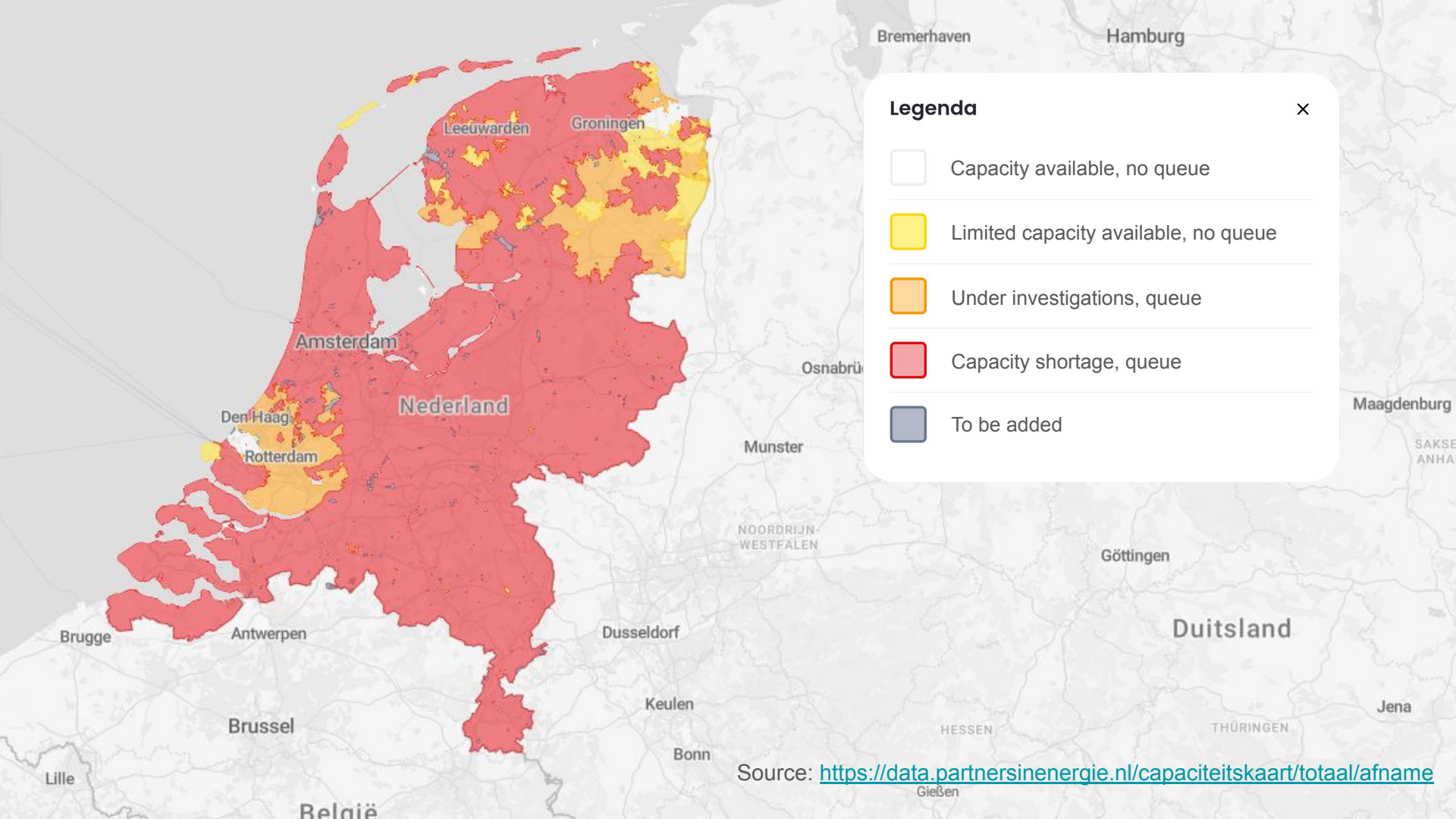
About us

- Maximilian Pohl (DE)
- Software developer at Tweede Golf (Located in NL)
- Technical lead of OpenLEADR-rs

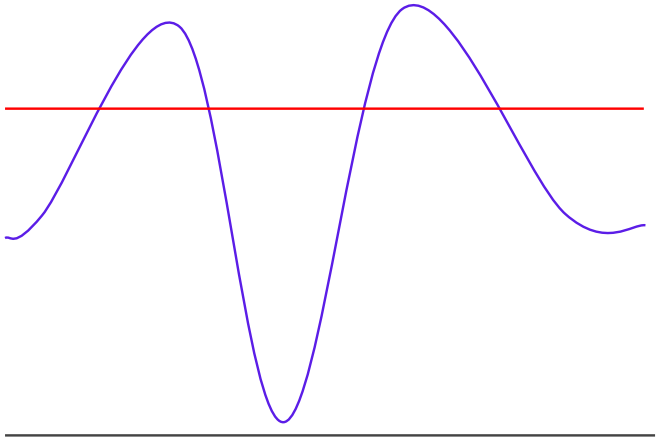
- Stijn van Houwelingen (NL)
- Spec writer and software developer at ElaadNL
- Power user of OpenLEADR-rs



Source: https://data.partnersinenergie.nl/capaciteitskaart/totaal/afname

Demand Response (DR)

- DR Program: respond to the status of the grid
- Goal: limit usage peak times, shift to valleys
- Benefits:
  - Less pressure on grid
  - Greener
  - Cheaper



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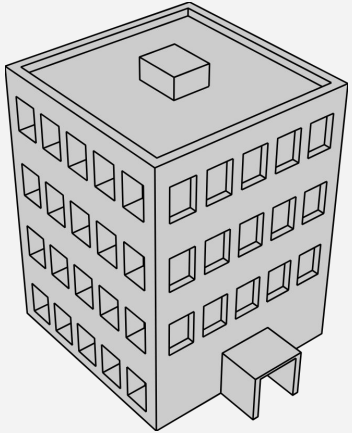
OpenADR

- Originated from Lawrence Berkeley National Laboratory in 2009
- OpenADR Alliance
- Versions: 2.0b (2015), **3.0 (2024), 3.1 (August 2025)**
- Generic messaging protocol supporting many use cases
- Use case specific OpenADR profile (E.g. Grid Aware Charging at ElaadNL)

Distribution System Operator (DSO)

Business Logic (BL)
Virtual Top Node (VTN)



Events

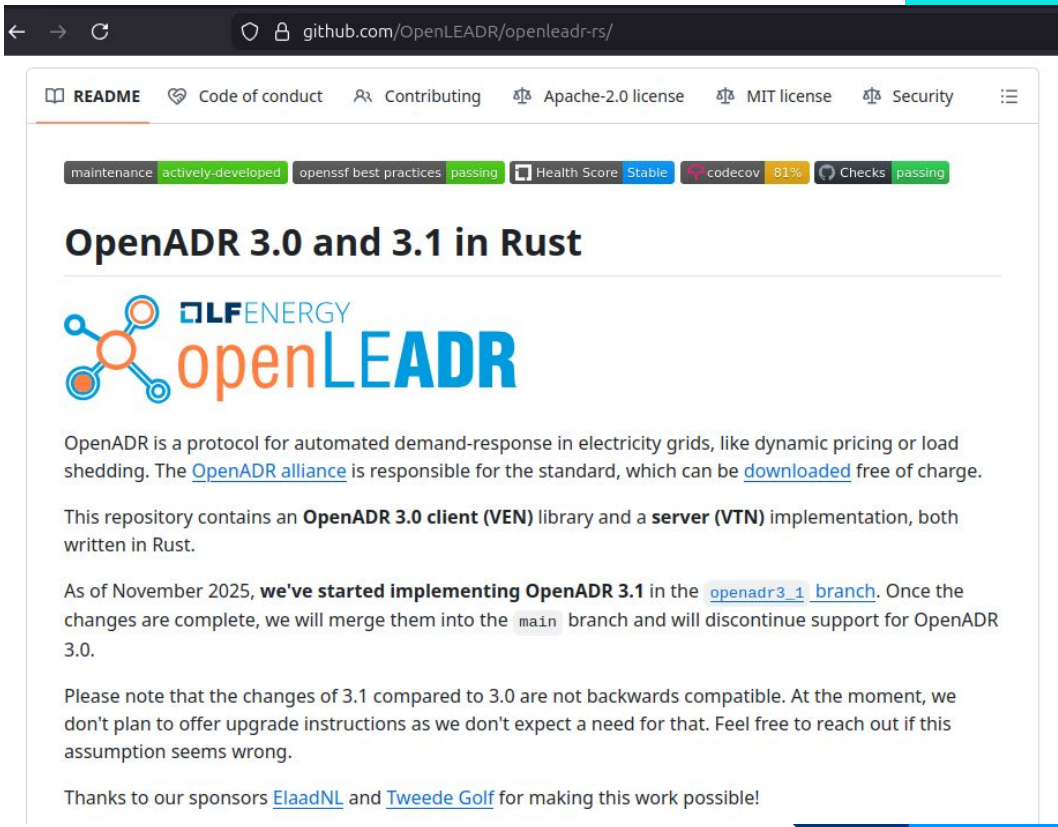
Reports

Charge Point Operator (CPO)

Customer Logic (CL)
Virtual End Nodes (VENs)

OpenLEADR-rs

- Joint effort by ElaadNL and Tweede golf
- Part of the existing LF Energy OpenLEADR project since fall 2024



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OpenLEADR-rs features

- Well-tested OpenADR 3.0 implementation
- Used in production (more later)
- Beta release of the OpenADR 3.1 implementation
- Implementing the subscription feature
- Finishing the CLI
- Funding for maintenance in 2026 secured

Why Rust?

- **Reliability:** digital infrastructure should be implemented in a language that yields reliable, memory-safe, and efficient code.
- **Ease of deployment:** just a single binary
- **Growing Rust adoption**: across infrastructure and embedded systems communities
- **Interop is easy:** communication via HTTP requests

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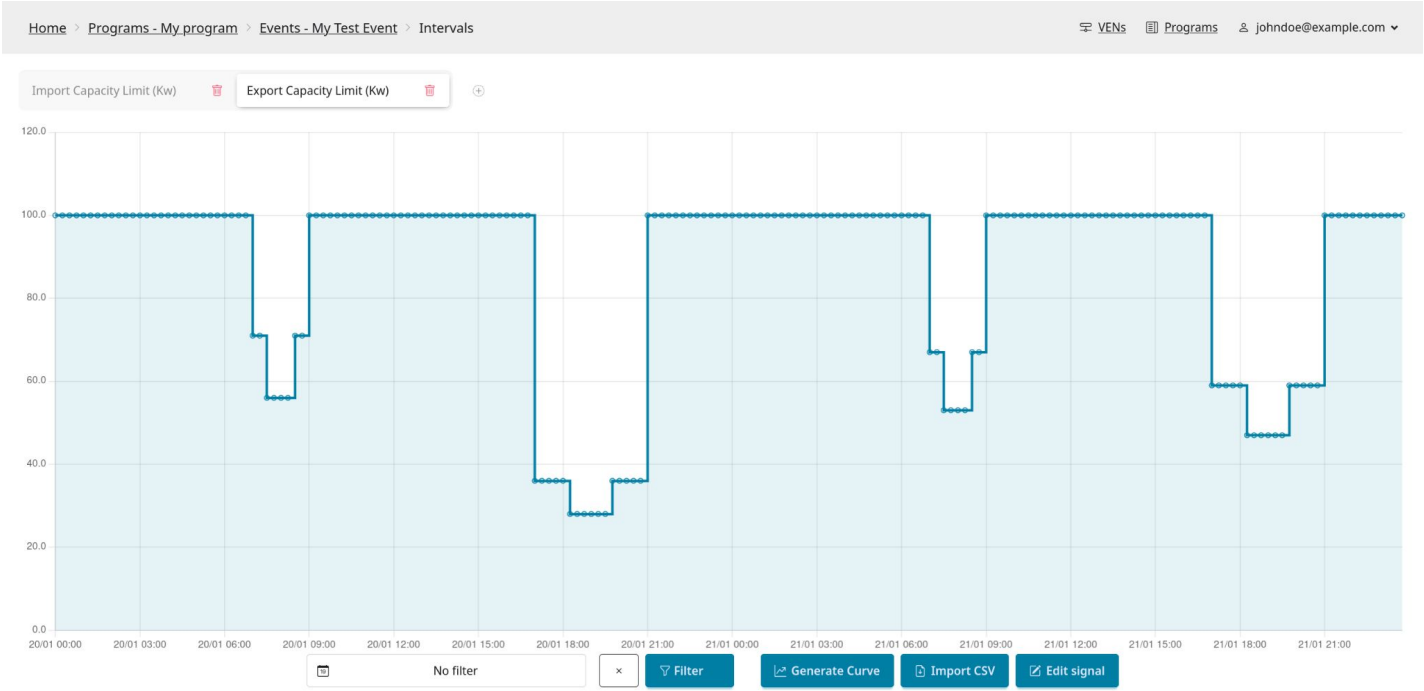
Who's on board?

- Dutch OpenADR profile for Grid Aware Charging (GAC) by ElaadNL
- Limiting capacity of EV chargers during peak times
- In tandem with the Dutch National Charging Infrastructure Agenda
- DSOs: Alliander, Enexis, Stedin. Some use OpenLEADR-rs
- 9 CPOs on board (as of now)
- CPO polls for data and receives a 48h rolling window of capacity limits
- Custom GAC compliance tooling for Dutch DSOs and CPOs

Use cases

- Currently, public ev charging stations
- Broaden the scope to also target homes via Home Energy Management Systems, for example
- Define model for grid congestion on multiple levels
    - High voltage, medium voltage, low voltage

OpenADR-GUI



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Looking ahead

- ElaadNL and Tweede golf are committed to the project,
  but we could use your help!
- Talk to us! (Or engage via Slack)
- Join one of the monthly Technical Steering Committee meetings
- Create a PR for one of the good first issues
- European Flexibility Initiative in March with V2G demo @ ElaadNL in Arnhem (NL)

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Thank you!

Questions? Yes, please! Or contact us:

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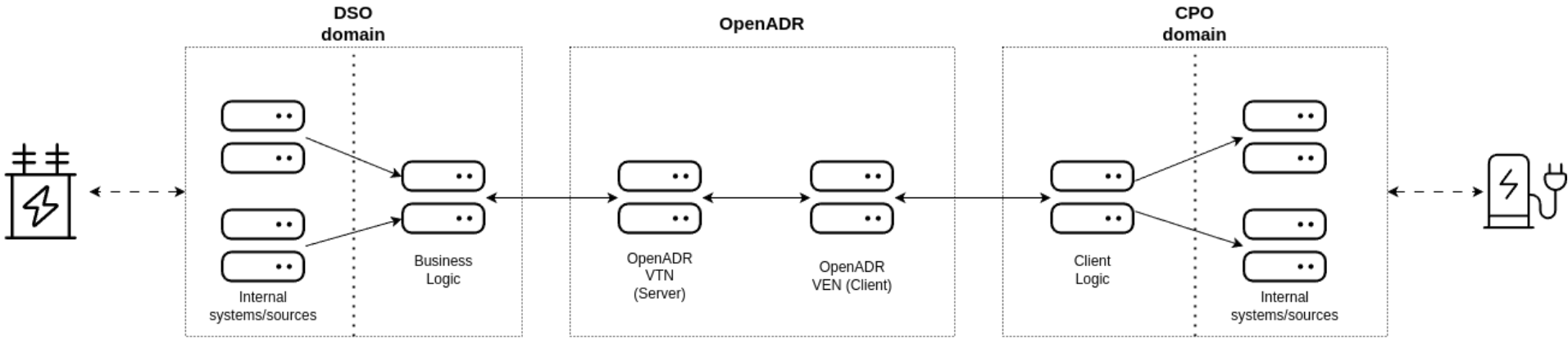
Domain/OpenADR split



Icons: Free Icons (https://free-icons.github.io/free-icons/)

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Developing the broader OpenADR ecosystem

Open source ecosystem development from ElaadNL:

- A Python OpenADR VEN: Openadr3-client (and openadr3-client-gac-compliance)
- A Graphical User Interface to manage VTNs: Openadr-GUI