



S2 Standard

# Current state and future developments

Ewoud Werkman (TNO)

# Key takeaways of S2

Only manages energy flexibility

Future-proof interoperability

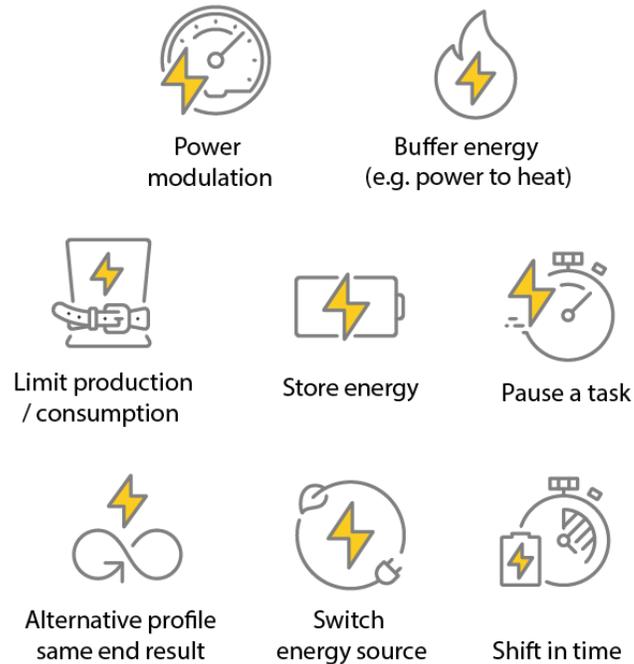
S2 does not interfere with the OEM

End-user is in control

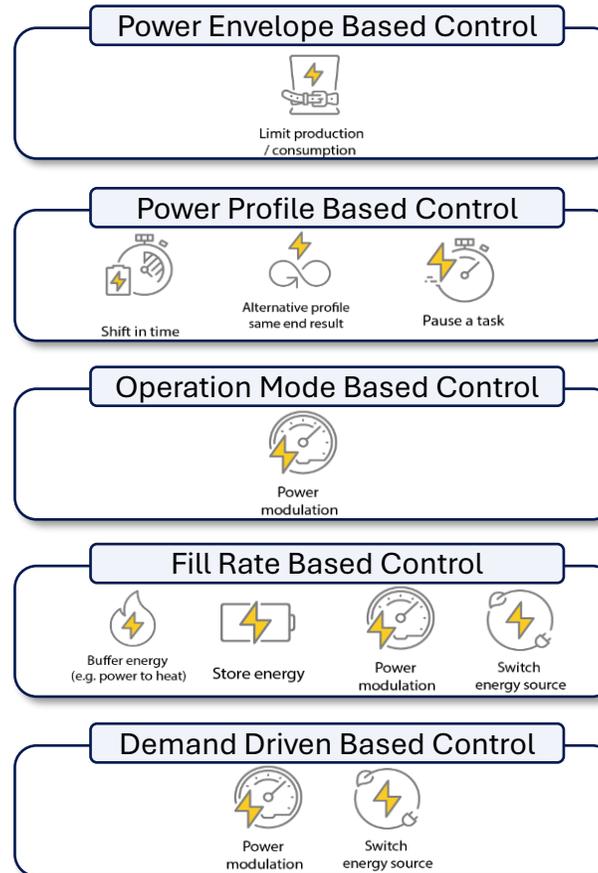
Open market for HEMS

# Flex capability-based approach of S2

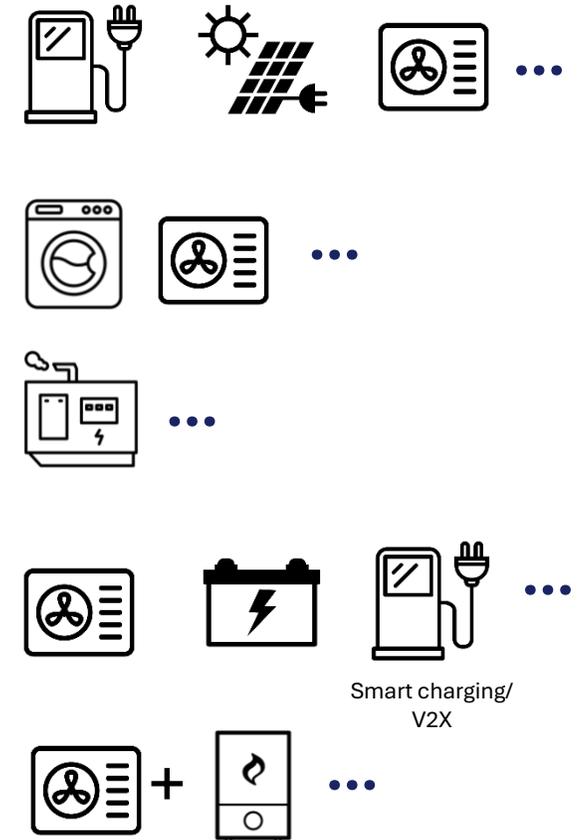
8 generic energy flexibility capabilities ...



... are combined into 5 control types ...



... to manage flexibility of energy smart appliances



# Developments on S2

S2 Connect

S2 Alliance

Community Energy Management

Open source

International

# S2 Technology

 **Standard**  
EN 50491-12-2/IEC 63402-2-2  
(Data model, message definitions, interaction patterns)

 **JSON**  
JSON message schemas

 **Connect**  
Discovery, Pairing, Protocol selection

  
WSS    MQTT    ...

WebSocket Secure

# S2 Governance

  
**Alliance**

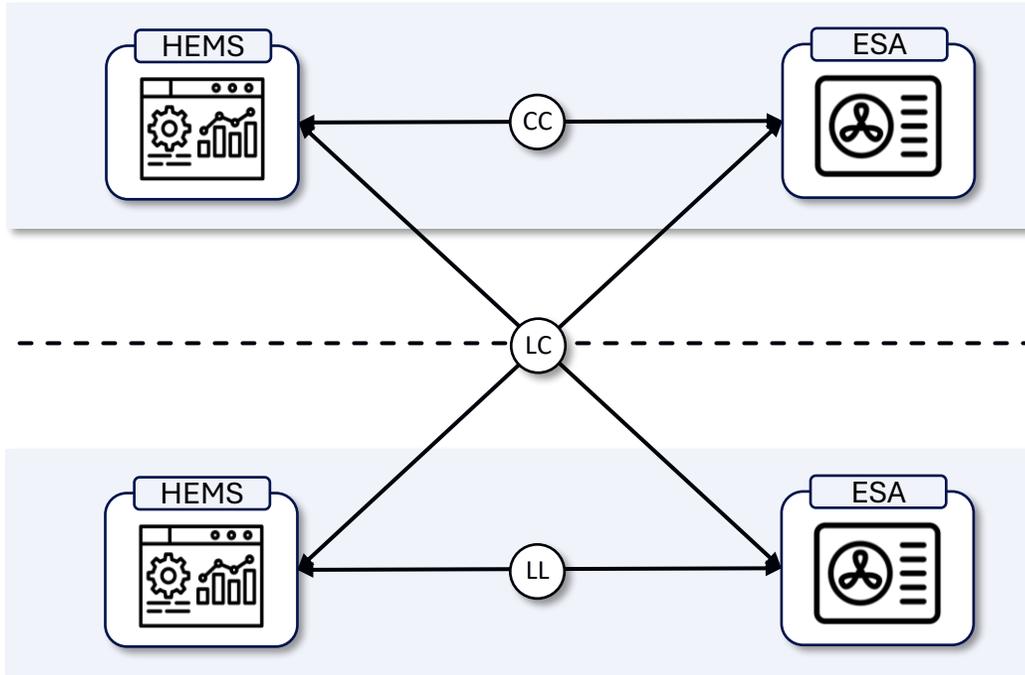
# S2 Connect requirements



Cloud



Local



- ⓁⓁ = Local - Local interaction
- Ⓛⓐ = Local - Cloud interaction
- ⒸⒸ = Cloud - Cloud interaction

## Requirements

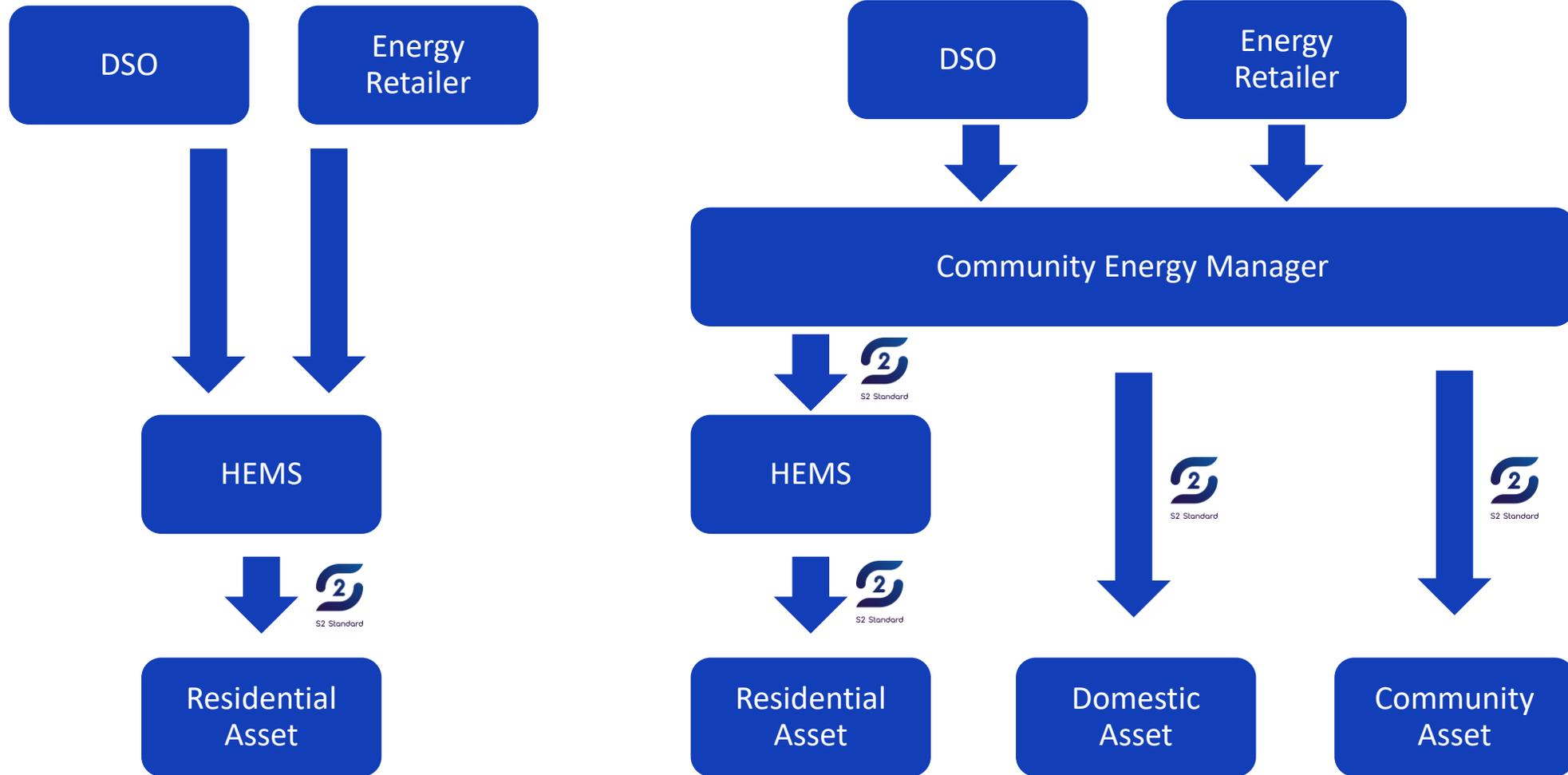
- Should work behind a firewall without additional firewall configuration
- Discovery and pairing
- IP based full duplex communication
- (Future proof) encryption
- Communication latency  $\leq 1s$ 
  - ESA  $\rightarrow$  HEMS or HEMS  $\rightarrow$  ESA
- Support for multiple comm. protocols
  - Default communication protocol for all connectivity options
- Easily scalable
- Use widely accepted technology
- Easy to implement

# S2 Alliance activities

- Tooling
  - Libraries for programming languages
  - Debugging tools
  - HEMS and ESA simulators
- Documentation
  - Specifications
  - Concept explanation
  - Examples
  - S2standard.org
- Governance Standard
  - Contribute to IEC/CENELEC standards
  - Development of S2 Alliance specifications
  - Certification

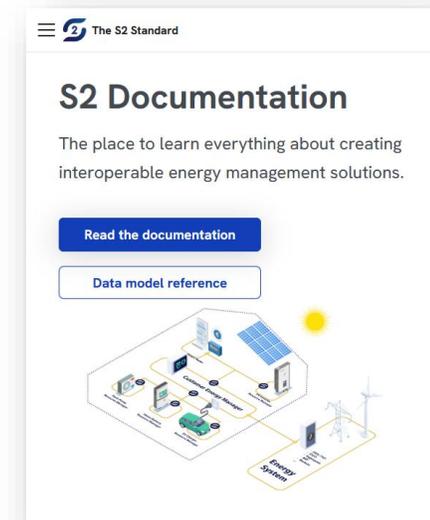


# Community Energy Management



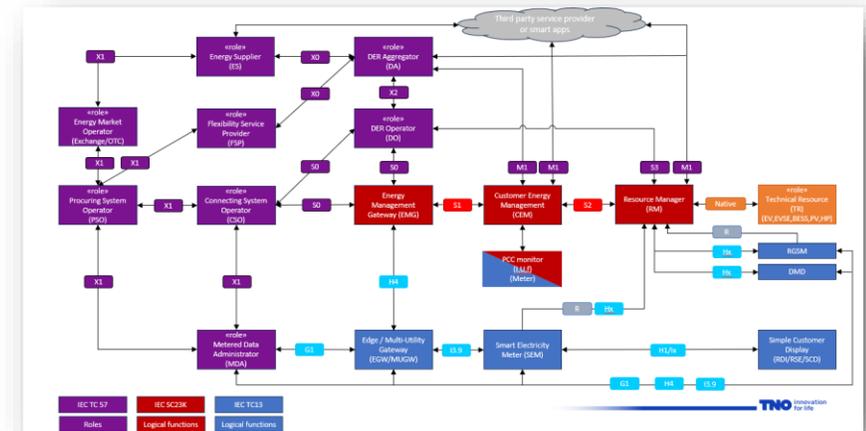
# Open source

- Discord channel <https://discord.com/invite/NyFMuPmuDw>
- Developer resources
  - S2 JSON <https://github.com/flexiblepower/s2-ws-json>
  - S2 Connect
    - Python <https://github.com/flexiblepower/s2-python>
    - Rust <https://github.com/flexiblepower/s2-rust>
    - Ruby <https://github.com/stekker/s2-ruby>
  - Message analysis / debugging <https://github.com/flexiblepower/s2-analyzer>
  - Documentation <https://docs.s2standard.org/>



# International developments

- EC DG Ener and JRC: Code of Conduct for Energy Smart Appliances (CoC)
  - Version 2.0 extends from HVAC to EMS, PVI, Batteries, EVSE
- EC DG Ener and DG CNECT: Smart Energy Expert Group – Data for Energy (D4E)
  - Focus on integration of energy system and the e-mobility system (e.g. bi-directional charging)
  - Standardisation of Data Exchange
    - Architecture that integrates different sectors (e-mobility, power management, home energy management)
- International Standardisation - IEC SC23K (Energy Management)
  - Proposal on Energy Manager
  - Collaboration with TC13 (Smart Metering) and TC57 (Power management)
  - Alignment with NEN NTA activities





Flexible



S2 Standard



Together

