

TRANSITIONPROOF ENERGYMANAGEMENT

September 13th 2023 – Energy Data Spaces

DG ENER & DG CONNECT



TRANSITIONPROOF ENERGYMANAGEMENT

FAN: INTRODUCTION



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Mission

Unlock energy flexibility in the built environment in the best possible way, and make maximum use of it

Goal

Use Energy Flexibility to absorb surpluses and shortages so that the energy system remains reliable, affordable and accessible in the future

Raising the value of sustainable energy

FAN connects parties with the common goal to raise the value of sustainable energy

Not a branche-organisation

FAN members include DSO/TSO, ESCO's, research organization, system integrators and other energy system stakeholders

Open standards

FAN promotes open standards for unlocking energy flexibility.

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FAN: WHAT WE DO



FAN activities

- Promote and share industry knowledge through events and publications
- Research in state of affairs in energy management;
- Development and adoption of technology and standards for energy management;
- Create awareness in other industries and general public;
- Strategic development, position papers and representation in commercial and governmental organizations

Flex monitor Report: Solar
energy needs smart
inverters (2021)



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Flexmonitor: Connected
Heat pumps in the
Netherlands (april 2023)



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TRANSITIONPROOF ENERGYMANAGEMENT FAN: WHAT WE DO



SOLD OUT!



FLEXCON 2023
20 & 21 September 2023

Brussels, Belgium

<https://flexcon.energy>

20 - 21 SEPTEMBER 2023 IN BRUSSELS, BELGIUM

FLEXCON 2023

ENGAGE WITH SMART ENERGY EXPERTS FROM ALL OVER THE WORLD

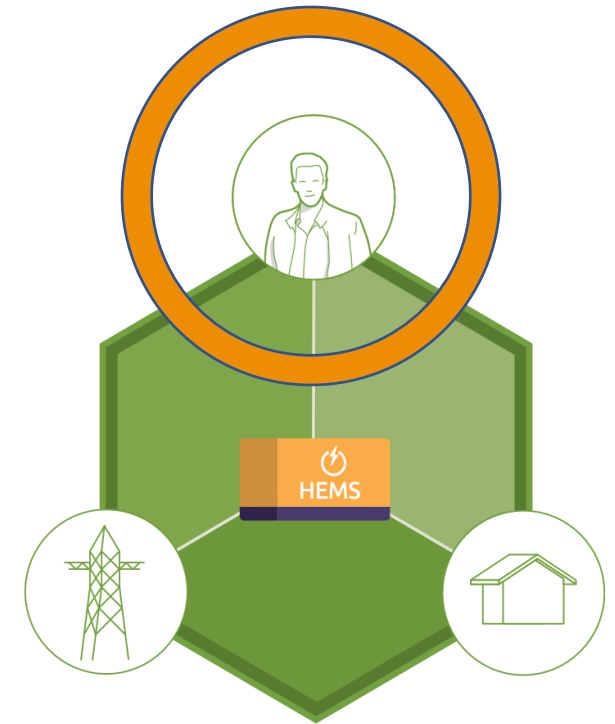
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TRANSITIONPROOF ENERGYMANAGEMENT ENGAGING WITH THE CONSUMER



Energy Consumer / Prosumer

- Create awareness on the need for Flex
- Create awareness on possibilities and opportunities
- Requires communication and information to increase the willingness to accept Flex.
- Not only from the energy system parties, but also governments and consumer organizations
- Consumers are overwhelmed: Take consumers by the hand. !
- General: no incentives == no interest: !
 - ✓ Comfort ✓ Sustainability
 - ✓ Financial ✓ Innovative character, coolness



TRANSITIONPROOF ENERGYMANAGEMENT TREND



Not just heat pumps; EV and PV too.
+ 500 % electricity flows possible

Report 2023: of the 2021 sales of
new HP in NL: ± 17 % are connected

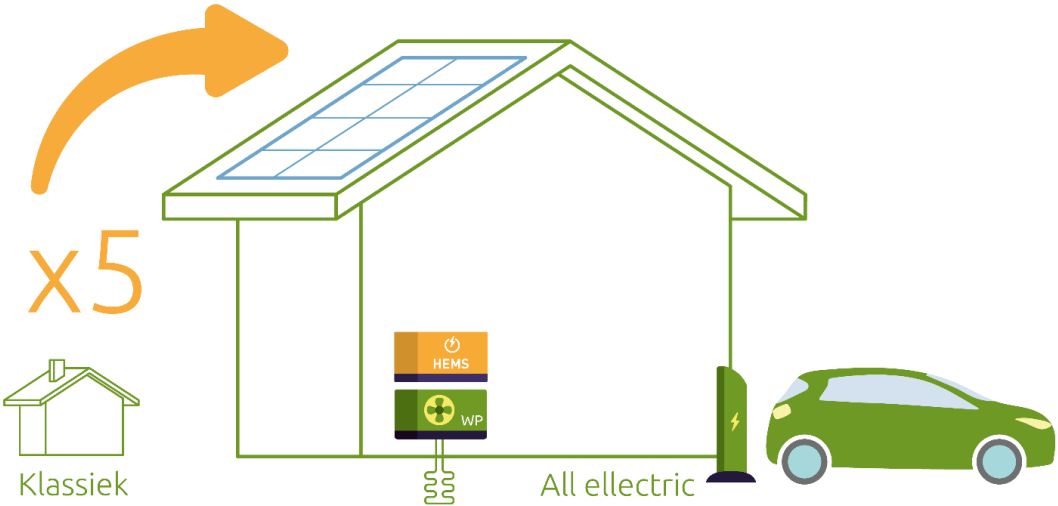
Communication protocols

This table provides an overview of communication protocols used in connectable heat pumps by key manufacturers (blue shaded cells).

OEM	Proprietary	OpenTherm	KNX	Modbus	Other
Itho Daalderop					
Mitsubishi Electric	(MELCloud)				
Daikin					IFTTT compatible
Nibe	(their own API)				IFTTT compatible
Inventum					
Nefit/Bosch					EMS-BUS
Vaillant	eBUS*	(only for boilers)			Smart Home API, EEBus
Remeha	eSmart inside platform				
Intergas					



* eBUS is not to be confused with EEBus, eBus is a proprietary communication protocol for Vaillant: <https://www.vaillant.co.uk/for-installers/products/controls-and-thermostats/why-vaillant-controls/>



Classic home

All electric
home

* See references last slide

TRANSITIONPROOF ENERGYMANAGEMENT ACCENTURE REPORT 2021



Accenture Report 2021 (supported by FAN):

Some estimates of the impact on homes:

Home and type of Heat Pump	Electrical Usage kWh / year	Peak reduction (hybrid)Peak Shift. (all-e) kWh / year	Shift up kWh / year	Shift down kWh / year
Terraced House, all elec	1300 - 1940	220 - 320	100-150	170-250
Terraced Houses hybrid	900 - 1080	360 - 430	55-65	55-65
Detached house Standing all elec	2930 - 4280	480 - 680	250-360	420-600
Detached house hybrid	1940 - 2330	770 - 930	120-140	120-140

* Accenture report (in dutch) available via
<https://nl.flexible-energy.eu/>

See references last slide


TRANSITIONPROOF ENERGYMANAGEMENT FAN ELAAD HEMS REPORT 2022




The energy flexibility of HP's


* Fan & Elaad report (in English) available. See references


ALL ELECTRIC HEAT PUMP

 Value All Electric HP for consumer	Use	Potential in 2030	Complexity
Dynamic energy price utilization	●	● ●	High
Production and consumption optimization	●	● ●	Medium
Grid connection optimization	● ●	● ●	Medium

 Value All Electric HP for energy system	Use	Potential in 2030	Complexity
Portfolio optimization	●	●	Medium
Balancing / frequency	●	●	High
Congestion management	● ●	● ●	Medium

HYBRID HEAT PUMP

 Value HHP for consumer	Use	Potential in 2030	Complexity
Dynamic energy price utilization	● ● ●	●	Medium
Production and consumption optimization	●	●	Medium
Grid connection optimization	● ● ●	●	Medium

 Value HHP for energy system	Use	Potential in 2030	Complexity
Portfolio optimization	● ● ●	●	Medium
Balancing / frequency	●	●	Medium
Congestion management	● ● ●	●	Medium



Open Flex Alliance:

Towards a standard API for the flexibility of (hybrid) heat pumps.

TRANSITIONPROOF ENERGYMANAGEMENT OPEN FLEX ALLIANCE



One standard API for the flexibility of (hybrid) heat pumps.

Mission: Bring the energy industry and the heat pump industry together to work on one standard API for the flexibility of (hybrid) heat pumps.

Collaboration FAN, RVO, TKI Urban Energy and Association Heat Pumps Netherlands.

Phase 2: start December 2022. Ambition: beta version 2023

Goal: Unlock the Energy Flexibility of all new (Hybrid) Heat Pumps sold in NL in 2024 in a standardized way

Subgoals

- Use and combine knowledge of last 12 years of projects and research
- Get Energy System stakeholders and OEM's together state of affairs

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S2: TRANSITIONPROOF ENERGYMANAGEMENT OPEN FLEX ALLIANCE



- OEM's may want to offer energy services themselves
- OEM's want to supply proprietary (connected) control devices like thermostats.
- Many proprietary HP control protocols and control approaches
- OEMS reluctant to allow 3rd party control
- Shake out & convergence to standards via market: too slow. May not happen in next 3 - 8 years
- Challenge NL versus Eur: go fast or go far?
 - Specific Dutch challenges: Move away from gas laws & many individuele heaters?
 - HP OEMS operate on European or Worldwide scale. Development centers worldwide
 - EU or Eur legislation is preferred route for standard



S2 Standard

“Energy Management Done Right”

CEN / CENELEC certification started in 2018

May 2022: “S2” smart energy standard EN 50491-12-2 is a formal European standard.

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S2 BASICS



In S2, a Central Energy manager (CEM) receives
input / information from markets, energy
system, internal user preferences, etc

CEM

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In S2, a Central Energy manager (CEM) receives input / information from markets, energy system, internal user preferences, etc

CEM

The CEM also receives input from the devices in the building. This happens via the Resource Manager (RM) of the various devices

RM

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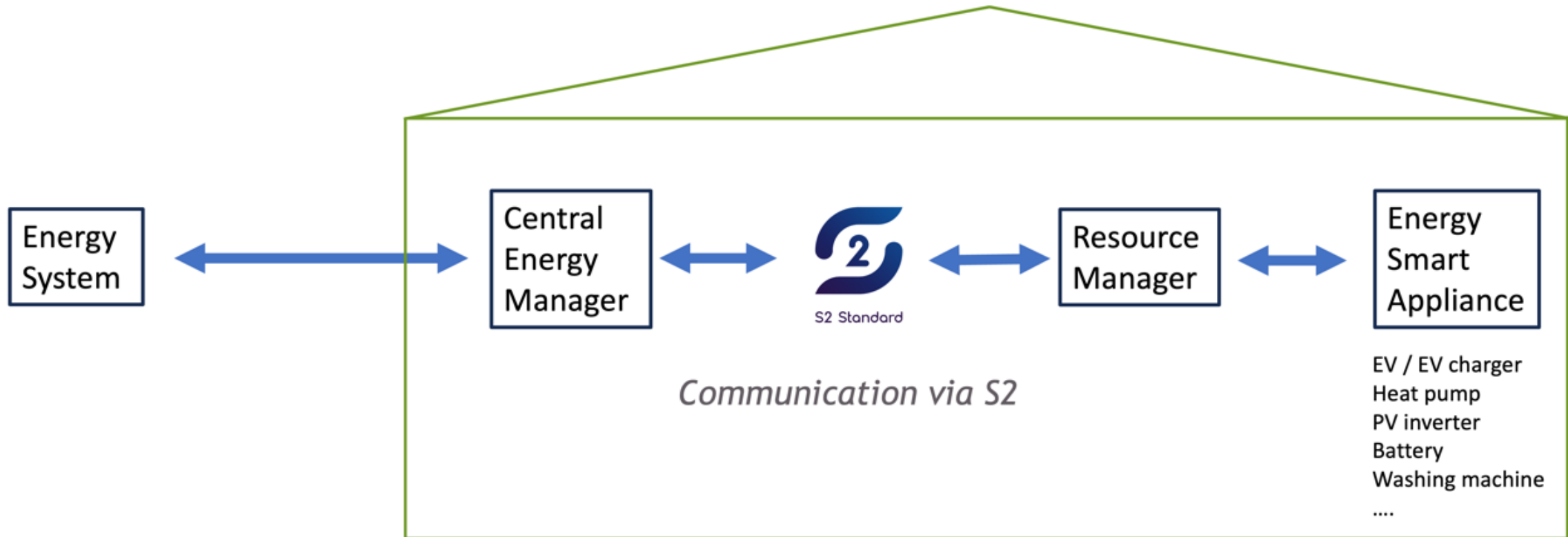
They communicate via S2

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S2 BASICS



Integrated overview



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S2 BASICS



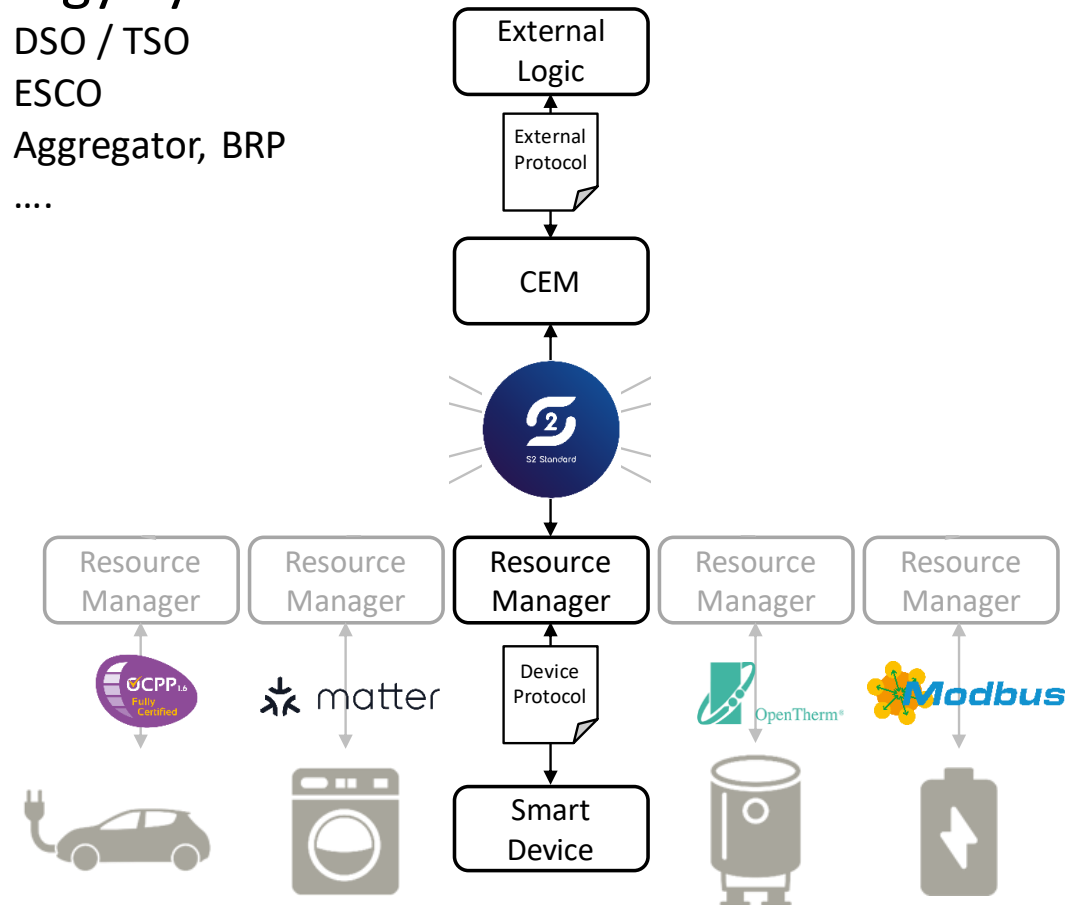
The Central Energy manager

Central Energy Manager (CEM): The CEM orchestrates the flexibility that is being provided by the Resource Managers in the building.

Based on its optimization objectives and additional external information/incentives, it will decide how to use that flexibility by sending instructions to the Resource Managers over S2.

Energy System

- DSO / TSO
- ESCO
- Aggregator, BRP
-





S2 : Future proof, thanks to the focus on energy usage characteristics.

1. Limit production / consumption
2. Shift in time
3. Pause a task
4. Alternative profile, same end-result
5. Power modulation
6. Buffer energy (e.g. power to heat)
7. Store energy
8. Switch energy source

No focus on use cases like PV generation, EV charging or Heat Pump.

 **S2 Standard**





Staged implementation of S2 is possible

- 1) OEM can implement Resource Manager in firmware of a devices... but it is not necessary
- 2) OEM can run CEM and / or RM in the cloud → Good options for Retrofit
- 3) OEM can run CEM and RM in a device that is the EMS / HEMS / BEMS:
 - Metering cabinet
 - Smart Thermostat / Smart Home device
 - Apple TV
 - Raspberry Pi
 - ...



FAN and S2 key principles

- focus on exchanging energy flexibility information between devices and an EMS (HEMS / BEMS)
- Works for the ‘Big 4 + HEMS’ but is future proof: AC units, whitegoods, swimming pools ...
- S2 is device-agnostic: **no focus on specific (types of) devices nor specific use cases**
- Electricity system needs will be translated in incentives, not in ‘commands’ from DSO or ESCO: **user is in control.**
- S2 is modeled in SAREF, and will be included in the next SAREF4ENER release.
- Management of S2 is open and well managed in CENELEC standardization body
- We are working on making S2 one of the implementations for the **EU Code of Conduct for Energy Smart Appliances.**

ENERGIEMANAGEMENT IN EN OM DE WONING

THANK YOU



FAN website (English)
<https://flexible-energy.eu/>

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- Web and newsletter: <https://nl.flexible-energy.eu/contact-fan/>
- LinkedIn: <https://www.linkedin.com/company/flexiblepower-alliance-network/>

FAN Flexmonitor: research on protocols of home devices: <https://nl.flexible-energy.eu/flexmonitor/>

FAN HEMS in the Netherlands 2022 (in English) :

<https://flexible-energy.eu/energy-management-in-and-around-the-home-offers-great-opportunities/>

KNX and S2:

<https://www.knx.org/knx-en/for-professionals/newsroom/en/news/Smart-Home-Energy-Management-with-KNX/>

Accenture HP report 2021 in Dutch

<https://nl.flexible-energy.eu/nieuws-events/geld-verdienen-met-de-flexibele-inzet-van-warmtepompen-haalbaar/>

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