Working Group CCMD

(Consumer Centric Market Design)

ELIA – 5 May 2022

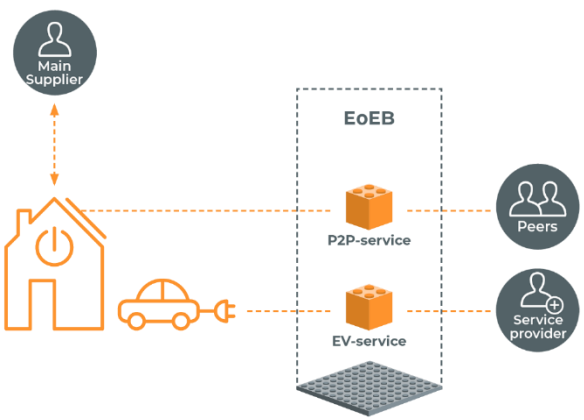
Agenda

1. Welcome
2. Elia’s ambitions and the CCMD roadmap
3. How CCMD can make flexibility seamless?
4. CCMD in practice: IO.Flexity 2.0
5. Conclusion and next steps

Roadmap and Elia’s ambitions

The Working Group CCMD intends to discuss and implement the two key features identified to deliver major benefits

Exchange of Energy Blocks (EoEB)
A decentralized exchange of energy blocks between consumers and many other parties, **on & behind the meter**



A real-time market price to reveal the true value of flexibility to consumers

Facilitating the **development of additional flexibility** (through an EoEB platform) should come **altogether** with the development of a clear incentive, the **real-time price**

EoEB & RTP (design and implementation) will be discussed in the WG CCMD

Consumer Centric Market Design: a lot has been done…

Q2 2021

CCMD Whitepaper
Making the CCMD vision public

Q3-Q4 2021

Demonstration projects
Demonstrate, test & learn

Involve stakeholders:

CCMD info session
Explain & Clarify
- 31/08 Info session

Hackathon
Involve market parties
- 13 - 15/10 Hackathon

CCMD round tables
Collect feedback
- 29/09 Round Table 1
- 29/10 Round Table 2
- 29/11 Round Table 3

Q3-Q4 2021

- Many stakeholders expressed interest for this upgraded market design enabling **flexibility behind the meter** and "**energy-as-a-service**" coupled to the valorization of **real-time price**

ELIA is now ready to define the next steps towards a phased implementation!

The round tables on Consumer-Centric vision ended up with following work-packages

Market Design	Roles and responsibilities
	Consumer (=end user) protection
Exchange of Energy Blocks (EoEB)	Design & implementation
	Integration in existing systems
Real-Time Price (RTP)	Design
	Evolution of required publications
	Evolution of BRP settlement process
Market Enablers	DSO co-creation
	Grid fee & taxes
	Data Access Management
	Metering/Measurement Device Requirements

Consumer Centric Market Design: … but still a lot to do!

Q2-Q4 2022

Working Groups CCMD (4-5)
Design discussion & implementation roadmap

Q2-Q4 2022

Demonstration projects
test & learn to feed design and implementation

Q4 2022

Public Consultation
Design & implementation note

Q1-Q2 2023

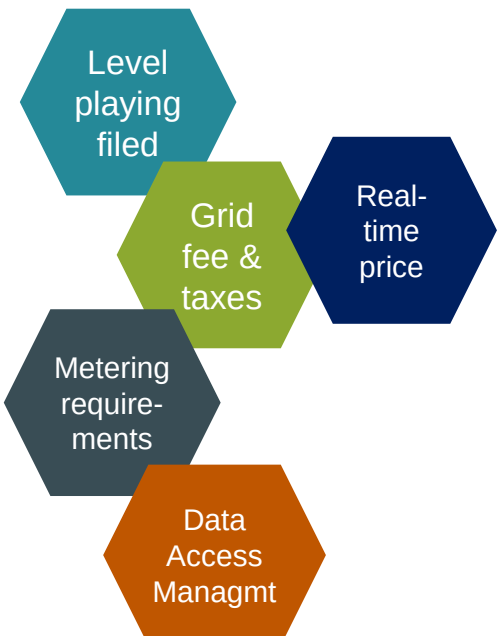
Discuss Stakeholders'
feedback & open points

Update
Design & implementation note

First Tests with stakeholders

Q4 2023 Go-Live

TSO Grid Users
Multiple BRPs Solution for ToE in aFRR



In practice…

The evolution of the imbalance price towards a real-time price will be discussed in the Working Group CCMD

- ✓ WG CCMD will be organized as much as possible jointly with the WG Balancing
- ✓ Recurrent feedback will be provided during WG Balancing but working sessions will be held in the framework of the WG CCMD

Questions

How CCMD can make flexibility seamless?

Objectives of this presentation

- **Description** of the context (link ToE) and need for a unified framework
- **Outline** the valorization of flexibility under CCMD by means of a simple example
- **Demonstrate** how the exchange of energy blocks (EoEB) can be used for a local correction
- **Show** how CCMD provides a unique framework for different configurations

Scope of this presentation

In scope	Out of scope (but under investigation)
• Consumer equipped with a digital meter or AMR • Participation in explicit flexibility services (balancing, wholesale, congestion) • Settlement of the commodity part	• Settlement of the grid tariffs, TVA, … • Participation of consumers with analog meter (without telecommunication) • Implicit participation

<u>Disclaimer:</u> note that this presentation refers to the general entity of System Operator ('SO'). The governance between DSO and TSO is not part of this presentation.

CCMD enables independent Flexibility Service Providers (FSPs) to take over the complete management of the load or only valorize the flexible part of it

Tomorrow

Exchanges between market parties

- P2P trades
- Sell solar consumption to local Supplier
- Local provision of green electricity
- PPAs

Physical reallocation between parties

- Supply splits (EV specific Supplier)
- Energy communities
- …

Valorization of flexibility via an independent FSP

- Balancing markets (aFRR, mFRR)
- Day-ahead / intraday

FSP becomes Supplier of the asset and can easily valorize the flexibility of it (both implicitly and explicitly)

FSP only valorizes the flexible part of the load, while the energy supply remains with the head Supplier

Service providers can easily develop all-inclusive business models per asset (ex. heat as a service), or alternatively chose to purely focus on the flexibility part of the load.

In todays workshop we will focus on the valorization of flexibility via an independent FSP

Tomorrow

Exchanges between market parties

- P2P trades
- Sell solar consumption to local Supplier
- Local provision of green electricity
- PPAs

Physical reallocation between parties

- Supply splits (EV specific Supplier)
- Energy communities
- …

Valorization of flexibility via an independent FSP

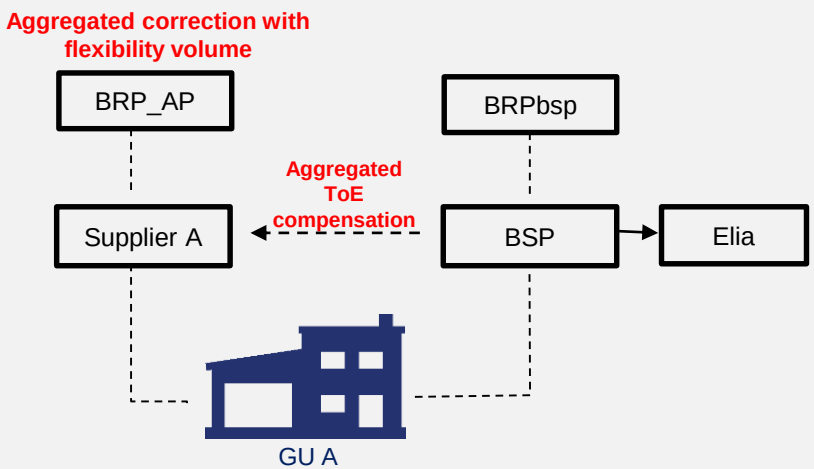
- Balancing markets (aFRR, mFRR)
- Day-ahead / intraday

FSP only valorizes the flexible part of the load, while the energy supply remains with the head Supplier

Focus of the workshop today

How does ToE currently work for MV and HV grid users?

Example



Baseline consumption	Inj	0
	Off	100
Activation	Reduction 10 offtake	
Real metered consumption	Inj	0
	Off	90

1. Supplier A sources 100 MW on the electricity market to cover the expected consumption of grid user A

2. At the moment of delivery, the BSP activates 10 MW of flexibility by demanding a decrease in net-offtake of the GU

3. Instead of consuming the expected 100 MW, the GU consumes 10 MW less than foreseen**.** As a result:
   - Supplier A can no longer invoice the foreseen 100MW
   - BRP_AP is left with an imbalance in his perimeter

4. ToE prescribes that the intervention of an FSP may not be detrimental to other parties. This implies:
   - An **aggregated correction** of the perimeter of the BRP_AP with the flexibility volume
   - An **aggregated compensation** between FSP and the Supplier for any sourced but not sold energy

At low voltage level, the current ToE framework has some important limitations

Elia believes the CCMD can address (among others) the following key limitations observed in the existing framework

1

Ensure an **easy market access** for new FSPs, independent from the Supplier and BRP_{source}

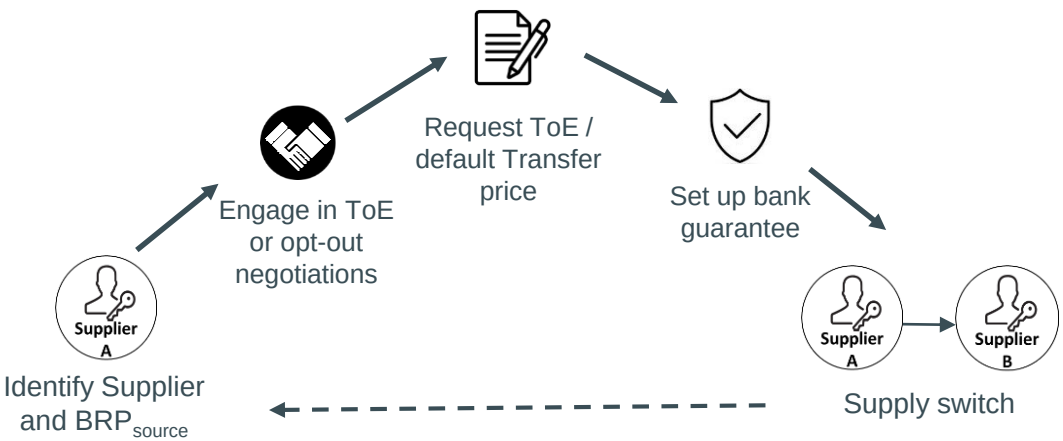
2

Facilitate the development of new services and business models via one **unified framework**

3

Ensure a **correct compensation** for the Supplier considering the increasing diversity of supply contracts

Under the current ToE framework FSPs need to engage with the associated Supplier/BRP



The administrative complex procedure forms a significant **barrier for participation:**

- Procedure of several months
- Specific knowledge required
- Little resilience against Supplier switches

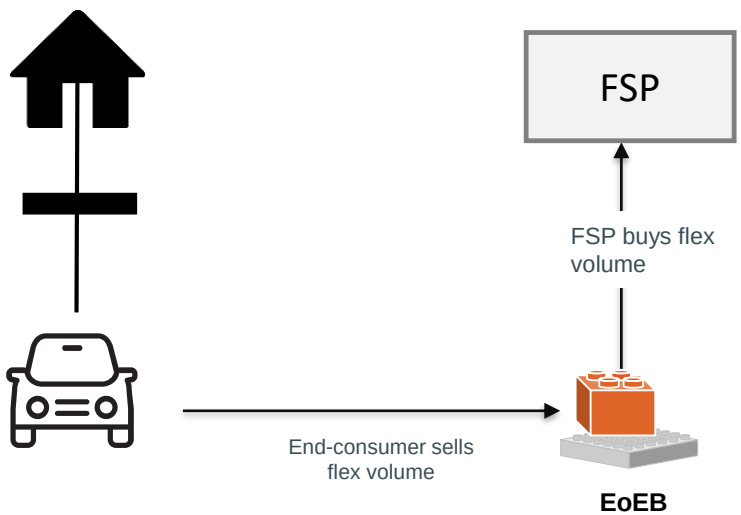
Challenge increases on LV:

- Lower value/DP
- Higher # suppliers active
- More frequent supply switches

Ultimately leading to a **barrier for market competition:**

- Few big FSPs can handle complexity
- Risk of FSP lock-in
- Risk of Supplier lock-in

Under CCMD, FSPs can freely engage with third parties



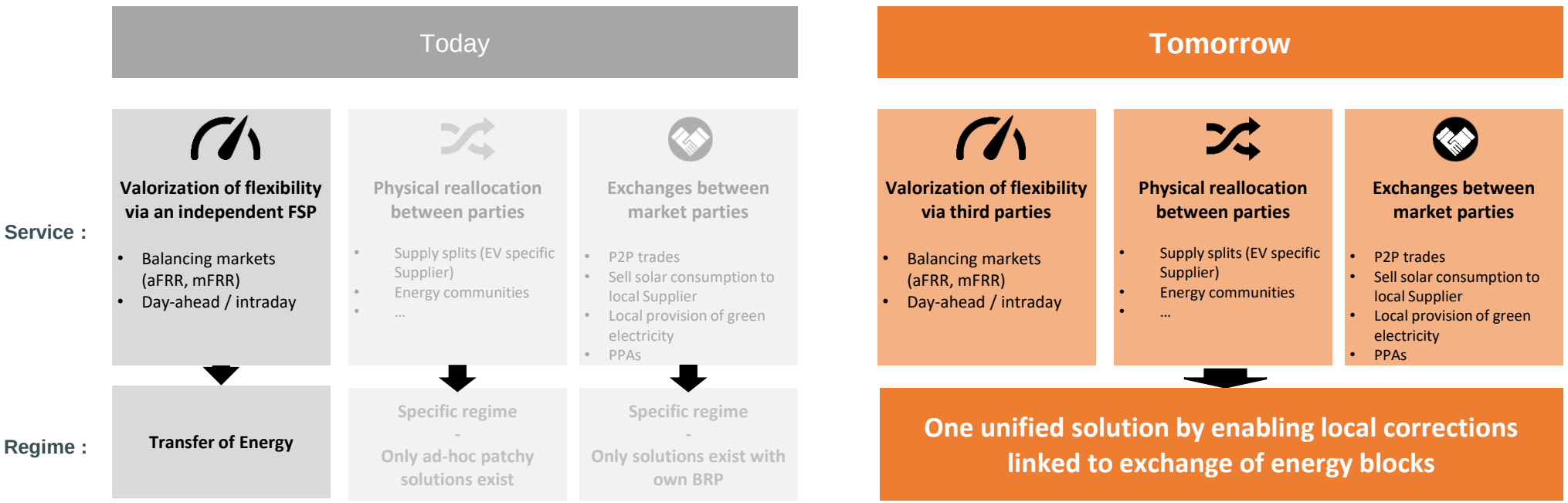
Exchange of Energy Blocks (with a local correction) strongly **reduces the barriers for participation:**

- an **easy and fast market access independent of the Supplier and BRP** (no negotiations required between FSP and Supplier/BRP_{source})
- **Resilience against Supplier switches**

Ultimately leading to a **increased market competition:**

- Reduced barriers for new entrants
- no hurdles for the GU to switch Supplier and/or FSP

CCMD provides a unified solution to facilitate the development of new services and business models that will unlock additional flexibility (implicit as well as explicit)



And ensures a fair/correct compensation for Suppliers and FSPs

Today

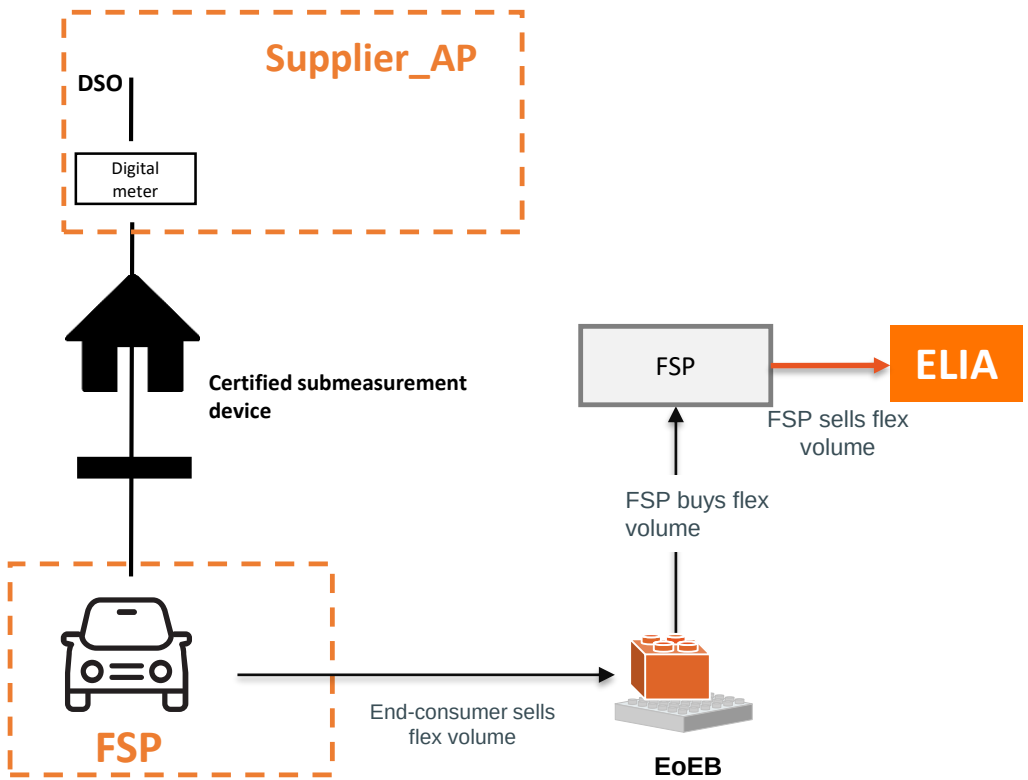
- If there is no agreement between Supplier and FSP, a default transfer price is applied
  - ➢ Any deviation between the Supply price and the **default transfer price** results in an imperfect compensation of the Supplier or FSP.
- With an expected increasing diversity of Supply contracts ensuring a correct compensation becomes even more challenging.

Tomorrow

With **Exchange of Energy Blocks** with a **local correction:**

- There is no need for a default transfer price
- A correct compensation of the Supplier is guaranteed

The target solution for the valorization of flexibility by an independent FSP

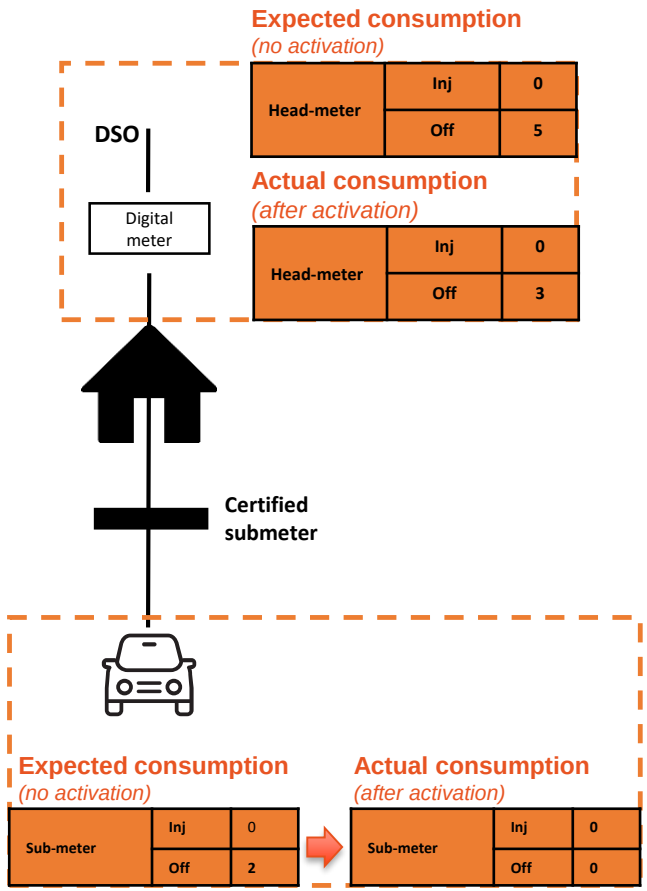


- **Set-up**
  - Supplier_AP is responsible for the load at access-point
  - **FSP_1 valorizes flexibility** of the electrical vehicle for participation in the **aFRR balancing service**

- **Objective**
  - All the activated flexibility at level of the EV will be locally corrected to avoid any impact on Supplier_AP and BRP_AP

We will demonstrate how CCMD provides a framework allowing easy and fast market access of the independent FSP.

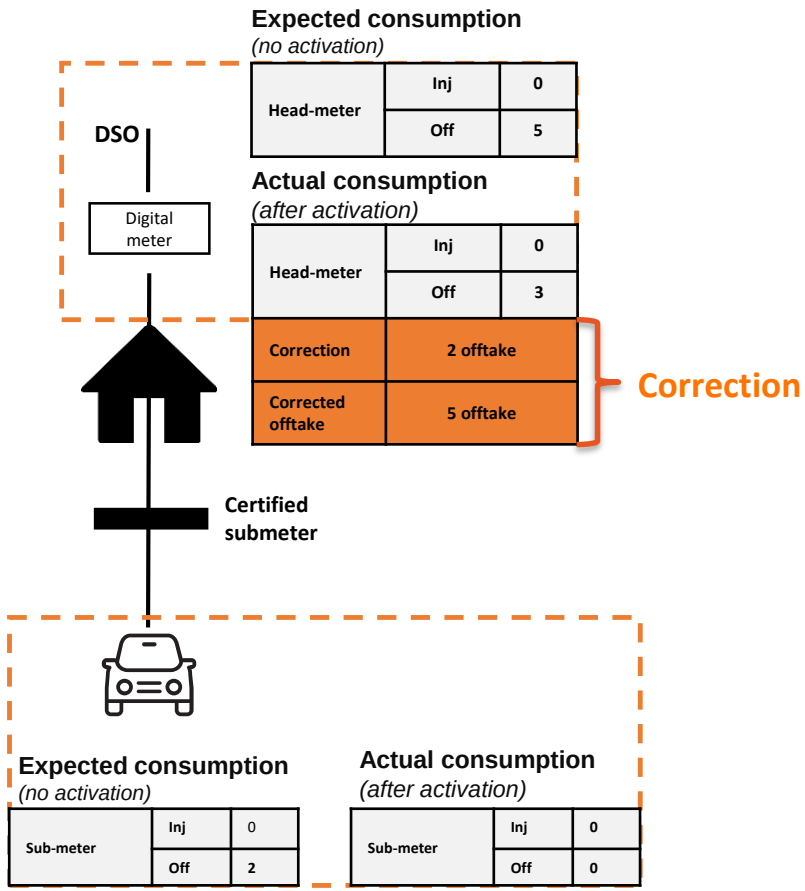
An FSP valorizes flexibility from the EV by reducing its offtake



- **Expected consumption (no activation):** If no activation occurs, consumer A has a total consumption of 5kWh. The EV consumption during this quarter-hour, without activation, is 2kWh.
  - Expected consumption at **AP**-level: 5 kWh
  - Expected consumption at **DP**-level: 2 kWh
- **In case of aFRR activation:** take the assumption the FSP interrupts the charging session of the EV completely for a certain Qh, as a result:
  - Actual consumption at **AP**-level: 3 kWh
  - Actual consumption ad **DP**-level: 0 kWh

The objective is to locally correct the meter, so the Supplier_AP is not impacted by the activation

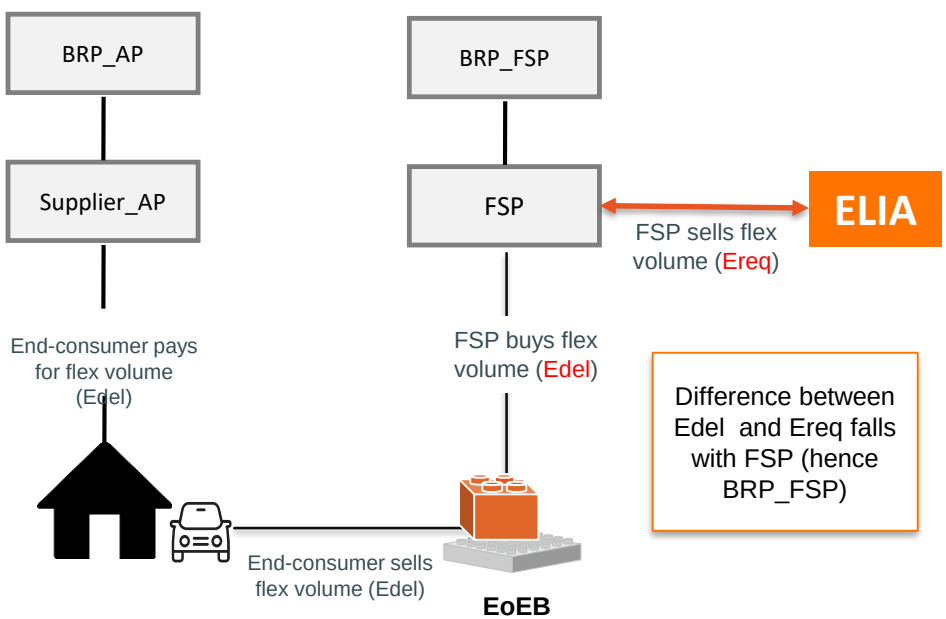
After correction with EoEB the impact on Supplier_AP is neutralized



- **Expected consumption (no activation):** If no activation occurs, consumer A has a total consumption of 5kW. The EV consumption during this quarter-hour, without activation, is 2kW.
  - Expected consumption at AP-level: 5 kW
  - Expected consumption ad DP-level: 2 kW
- **After correction via EoEB:** a local correction results in the Supplier_AP charging the metered volume (3kWh) and the flexibility volume (2kWh)
  - Corrected consumption at AP-level: 5 kWh (3- (-2)

=

The local correction will be based on the **delivered flexibility volume (Edel)**



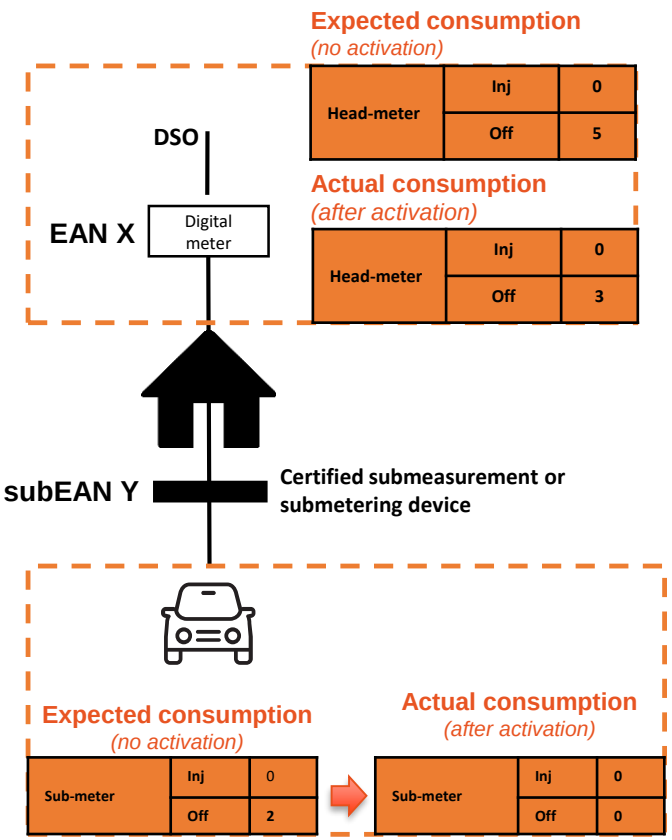
By correcting with the **delivered energy volume** (Edel) calculated by the SO, CCMD ensures that:

- Balance responsibility associated to a non-perfect delivery is carried by the BRPfsp
- the risk of gaming and manipulation is reduced since Edel is calculated by the SO

This way, a **trusted framework** is put in place while ensuring widespread market acceptance.

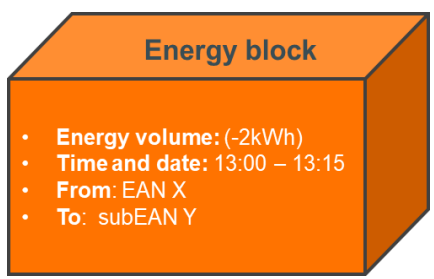
* Hence the difference between Ereq and Edel

How should we interpret an energy block ?

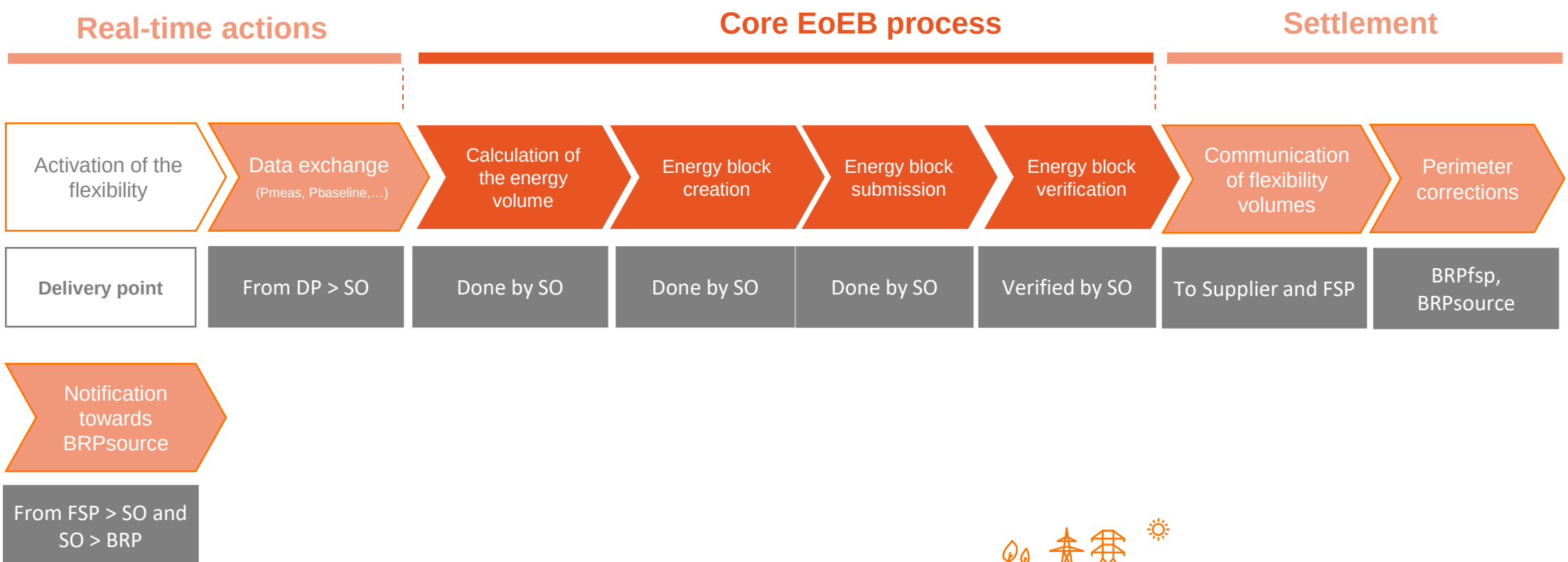


In essence, **an energy block** is an energy volume (in kWh/MWh) that is exchanged from one account to another account for a given quarter-hour. Such an exchange of energy volume(s) enables to **perform a local correction of the meter.**

- The example shows a consumer selling 2kW of upward flexibility to the FSP

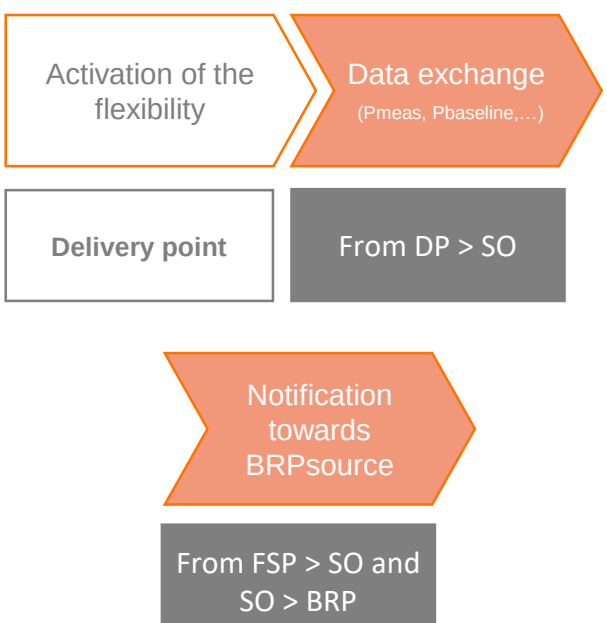


The general EoEB process



Real-time actions

Real-time actions



Activation of flexibility – the FSP activates flexibility at level of the delivery point, in function of system needs

- *Ex. FSP A reduces the consumption of the EV (=DP1) from 2kW to 0kW between 19h-19h15, following an activation request of the TSO*

Data exchange – measurement data is send in real-time per participating delivery point to the SO, in function of product requirements (aFRR, mFRR, DA/ID)

- *Ex. FSP A sends the metering data (= 0 kW) and the baseline* (2 kW) of the EV to the SO in real-time*

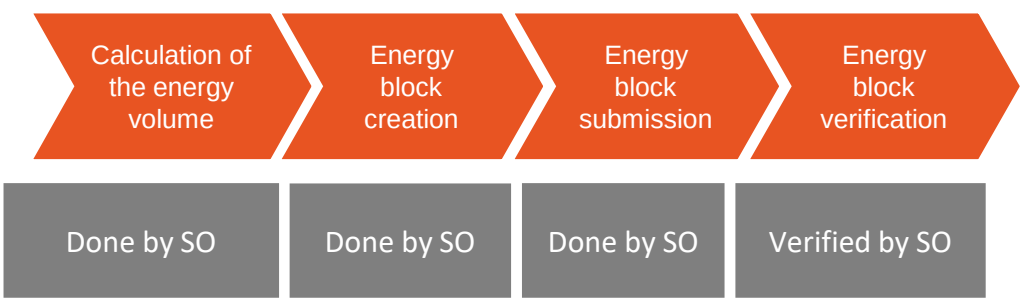
Notification of BRPsource - the FSP informs the SO about the characteristics of each activation so the SO can notify the BRPsource

- *Ex. FSP A informs the SO that DP1 will deliver 2kW, DP2 will deliver X kW, … between 19h – 19h15. The SO informs the associated BRP with the aggregated impact on its perimeter to avoid counter-balancing.*

**for aFRR the baseline is send by the FSP, for the mFRR product the SO calculates the baseline on actual metering data*

The core EoEB process

Core EoEB process



Calculation of the energy volume – the flexibility volume is calculated on a quarter-hourly basis

- *Edel = baseline – measurement = 2kW upward flex*

Energy block creation – based on the flexibility volume, the energy block is created between the account of the consumer and the account of the FSP

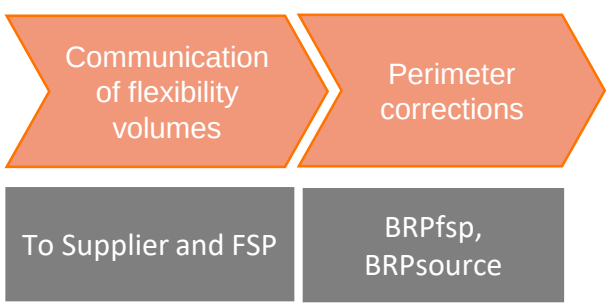
- *The consumer sells 2kW to the FSP*
- *The FSP buys 2kW from the consumer*

Energy block submission and verification - determine whether the actual energy block is in line with the submission rules.

- *Ex. the SO calculates whether the flexibility volume per DP does not surpass the contractual maximum upwards and/or downwards power (Pmax) that can be activated*

The settlement process

Settlement



Communication of flexibility volumes – the individual delivered flexibility volume per delivery point is communicated to the FSP and the Supplier receives the corrected offtake

- *Ex. the FSP receives the individual flexibility volume of 2kW and the Supplier receives the corrected offtake of 5kW*

Perimeter corrections - the balancing perimeter of the BRPsource and BRPfsp is corrected

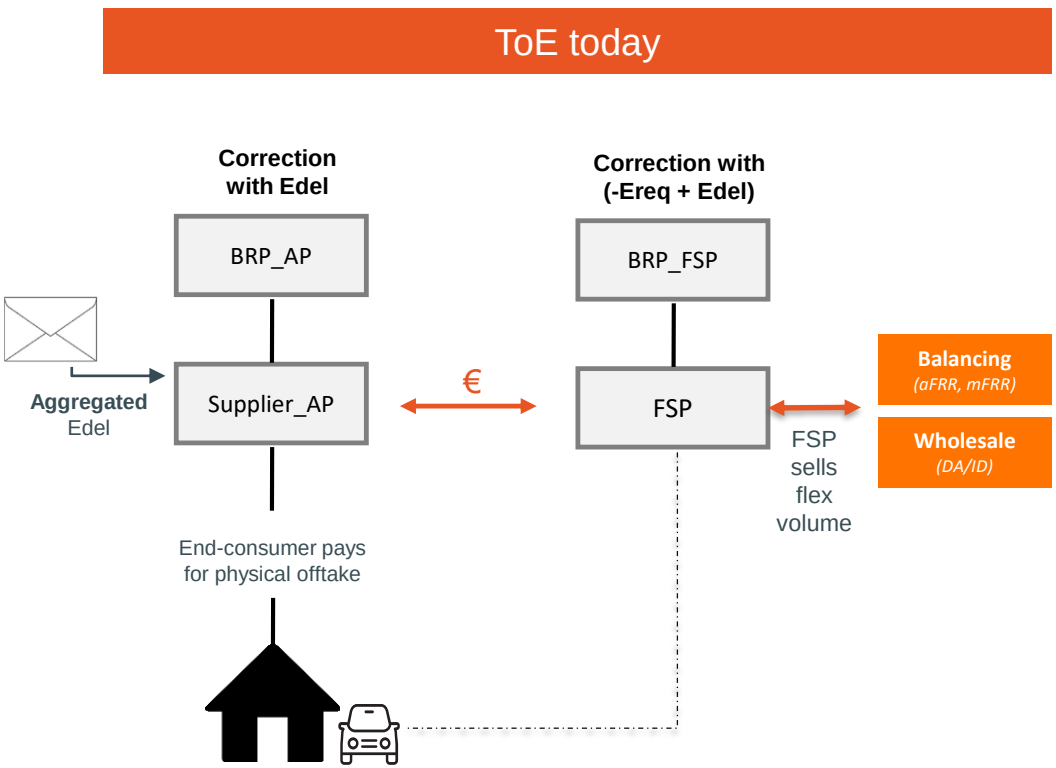
- BRPsource is corrected (/allocated directly) with the individual delivered flexibility volumes of all participating DPs (-Edel)
- BRPfsp is corrected with the requested flexibility volume (Ereq)* and the individual delivered flexibility volumes of all participating delivery points (Edel)

** In case of flex in DA/ID the BRPfsp is not corrected with the requested flexibility volume as this volume is implicitly already integrated in the calculation of his perimeter through his hub nomination*

CCMD for independent flexibility service providers

- no agreement between FSP and Supplier

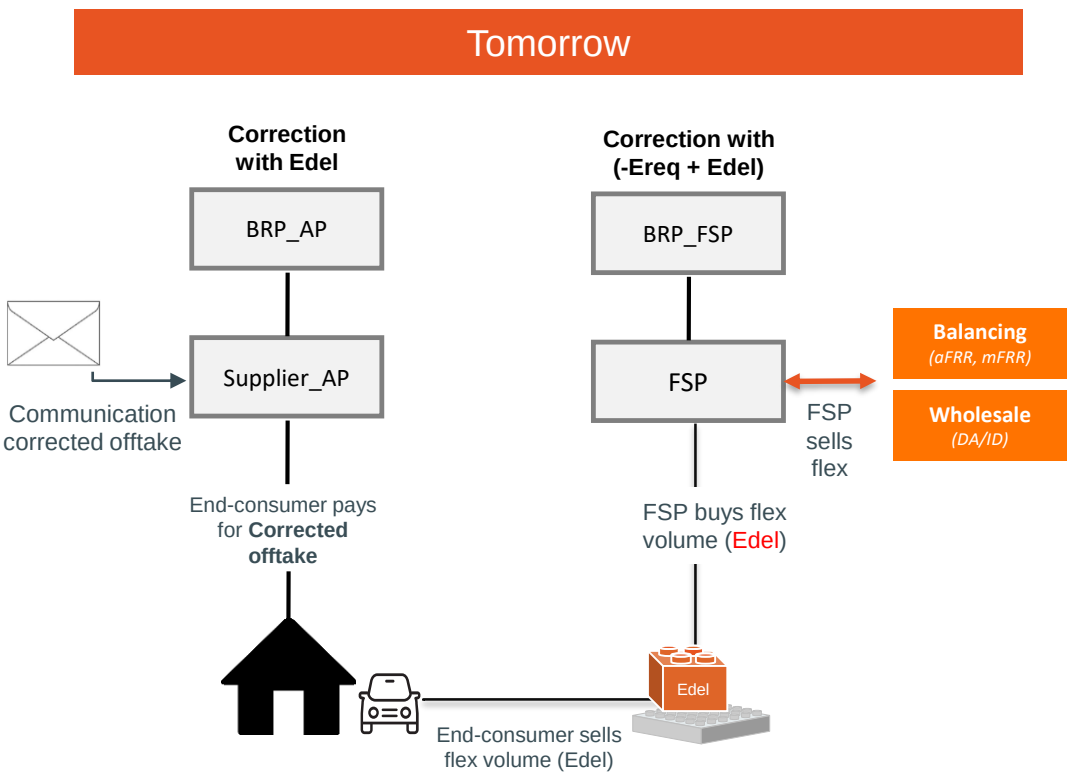
No agreement between FSP and Supplier: how does it work today?



- The FSP, Supplier, BRPfsp and BRP_AP **don't have a common agreement**
  - ToE framework is applicable
  - The SO communicate the **aggregated flexibility volumes** towards Supplier_AP and FSP
  - Perimeter correction with Edel

Even if there is no common opt-out agreement, a negotiation between FSP and Supplier is needed wrt the transfer price

No agreement between FSP and Supplier: how does it work tomorrow?



- The FSP, Supplier, BRPfsp and BRP_AP **don't have a common agreement**

  - The SO communicates the corrected offtake towards Supplier_AP
  - Perimeter correction with Edel

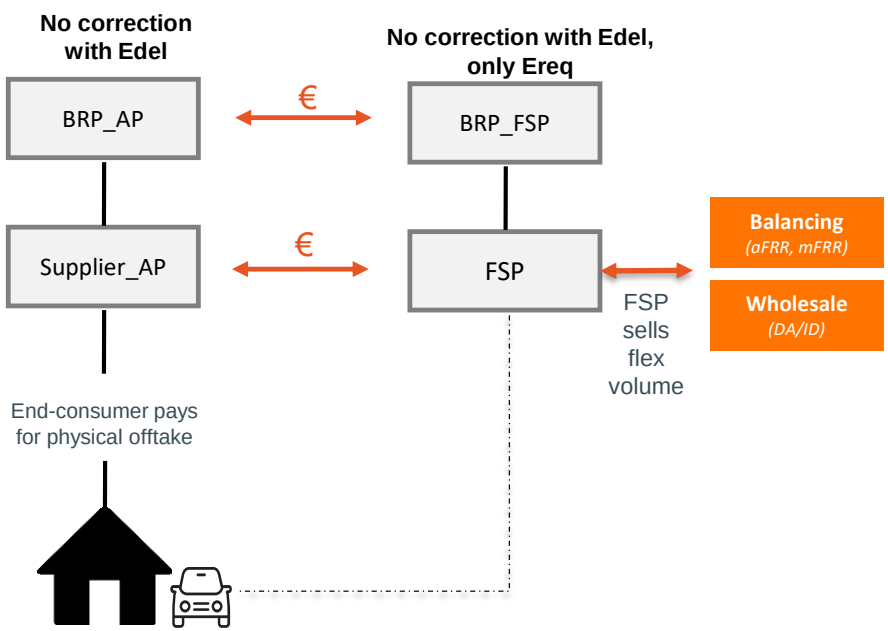
No deal is needed between FSP and Supplier on the transfer price

CCMD for independent flexibility service providers

- **an agreement exists** between FSP and Supplier

Explicit opt-out today: how does it work today?

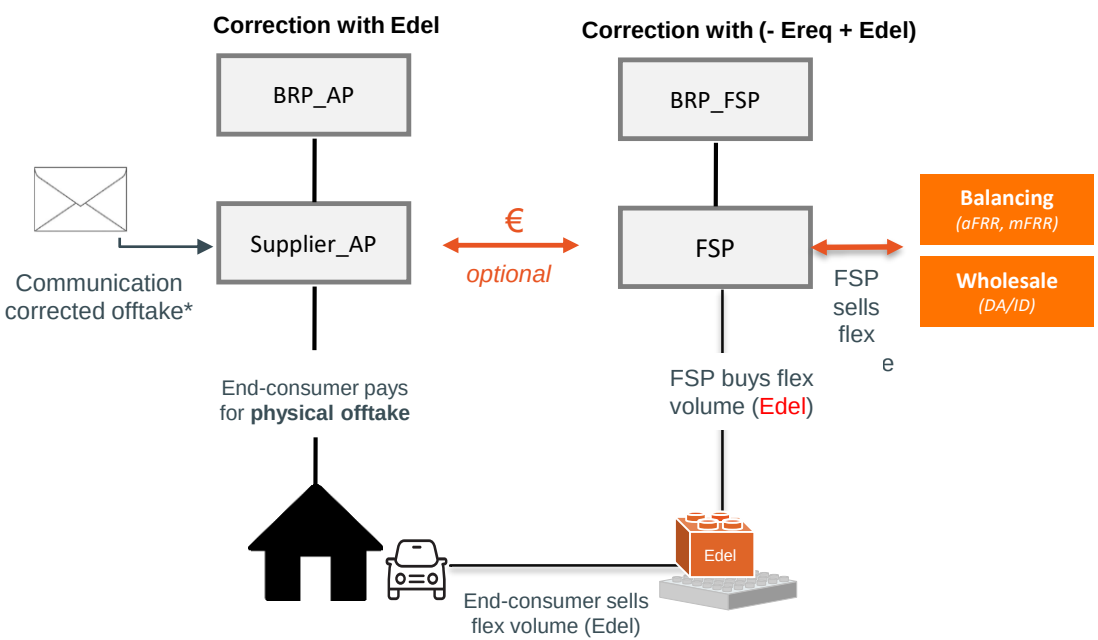
Opt-out configuration today



- The FSP, Supplier, BRPfsp and BRP_AP have a **mutual arrangement** which renounces the use of the ToE-configuration
  - The SO doesn't communicate the activated flexibility volumes towards Supplier_AP
  - No perimeter correction with Edel of BRP_AP (Edel creates imbalance in perimeter of BRP_AP)

CCMD makes abstraction from mutual arrangements that exist between Supplier and FSP

Mutual agreement FSP <> Supplier under CCMD



- The FSP and Supplier have a **mutual arrangement** to settle (optionally) the delivered flexibility volumes amongst themselves. As a result the consumer simply pays the physical offtake
  - The SO communicates the corrected offtake towards Supplier_AP and FSP
  - Perimeter correction with Edel, hence imbalance is corrected

The same principles apply, regardless if there is an agreement. This allows to have a different regime per DP and not per couple FSP <> Supplier

**optionally the individual delivered flexibility volumes per delivery point can be exchanged if all involved parties agree.*

In a nutshell

CCMD addresses (among others) the limitations that were observed in the existing framework:

Ensure an easy market access for new FSPs, independent from the Supplier and BRP_{source}

Facilitate the development of new services and business models via one unified framework

Ensure a correct compensation for the Supplier considering the increasing diversity of supply contracts

Questions

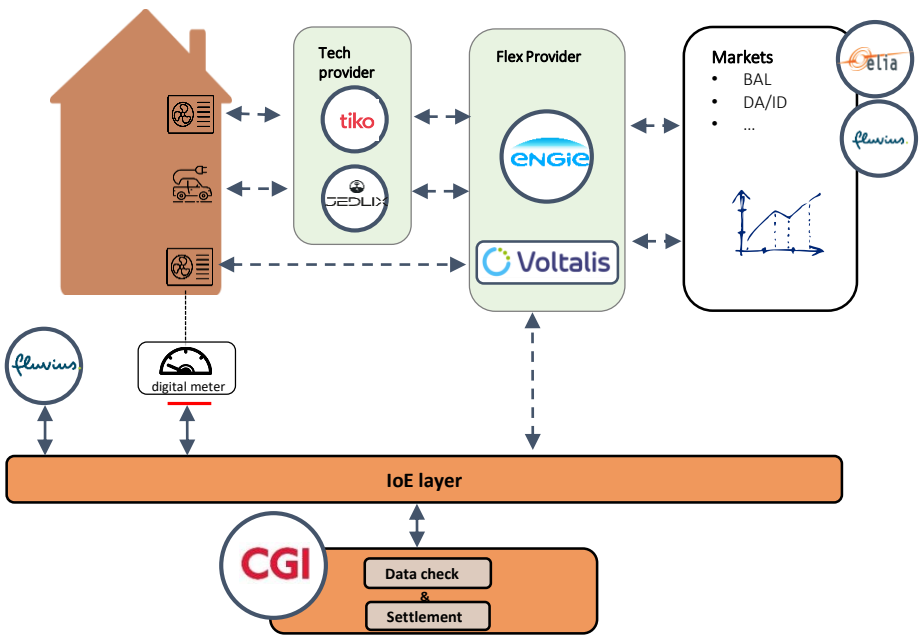
IO.Flexity 2.0

IO.Flexity as part of the IO.Energy Ecosystem

The IO.Energy Ecosystem is an ecosystem built by the Belgian grid operators to facilitate the development of new energy services. The Flexity idea was born after an intensive 5-day workshop in the first half of 2019.

ioenergy.eu

A short recap on IO.Flexity 1.0



Flexity's objectives were twofold:

1. **Objective 1:** Test which household assets (EV, boilers,…) can technically be operated and be used to create value to the end-consumer while
   - Leaving existing commercial communication set-ups (ex. OEM-cloud) untouched
   - Operating household assets without loss in comfort

2. **Objective 2:** Test if reliable data streams and a settlement mechanism can be set-up to enable participation of household flexibility in the balancing and wholesale market

IO.Flexity 1.0: different type of results obtained

Flexible assets operated via existing connectivity or installation of new infrastructure

- We tested **two distinct ways to operate residential flexibility**:
  1. Via installation of new infrastructure
  2. Via existing connectivity of the asset which is by default present via the OEM.
- This latter approach becomes popular for EVs, residential batteries, PVs, …

Drivers for consumer participation

- Flexity participants were **driven by their interest in digital monitoring tools and the savings** that they bring along. Contributing to a greener and sustainable electricity system was not considered the most important parameter for participation.
- Participants are willing to pay for the service under the condition that they have a positive return on investment after 1 year, but this should be confirmed using a larger sample

Valorization across different value streams

- **EVs** are operated **across all value streams**. Charging sessions are optimized in function of (1) Day/Night prices (2) wholesale prices and (3) balancing services such as aFRR
- **Accumulative heaters** were operated **for balancing** purposes only (**aFRR**). Accumulative heaters run exclusively at night when market prices are less volatile, therefore both D/N optimization and optimization in function of market prices were not considered feasible or attractive.
- **Heat-pumps** are primarily **optimized** by **reducing its load** instead of shifting it. This load reduction generated bill savings for the end-consumer and enables a SP to sell load reduction on the wholesale market

IO.Flexity 1.0: different type of results obtained

Data exchange: compliancy issues for participation in grid services

- Compliancy of the measurement device an issue for those set-ups that rely on existing connectivity of OEM
- The collection of individual data per delivery point is a challenge, considering the required granularity (4 seconds) for the aFRR product
- RT collection of asset-level data to IO.platform was possible during the pilot project to the extent that data was collected via new infrastructure and centrally routed via the back-end of the SP

Development of dongle prototype

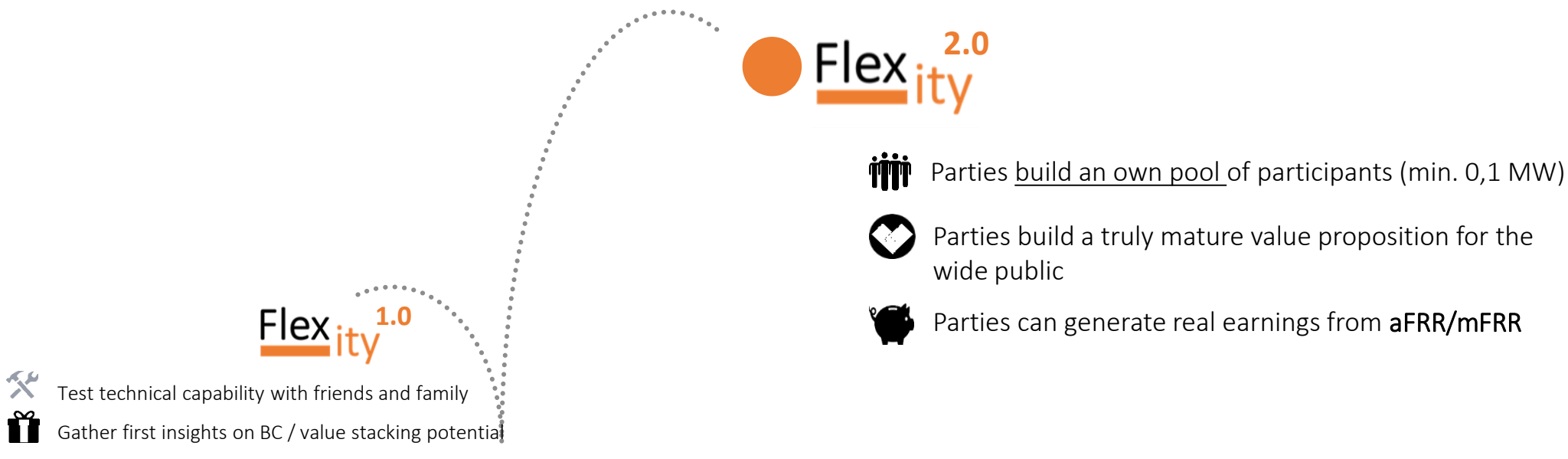
- **Collection of P1 data:** the local collection of P1 data and publishing to the IO.Platform was successful. Continuous availability and good quality of P1 data proves to be a major challenge.
- **Collection of S1 data:** Processing the S1 raw data locally (i.e. compression) was not successful due to the extreme high amount of data (2-4 kHz data). A robust local processing would most likely require advanced and expensive electronics.

Cross-checking methodology

- First results show we can have a reasonable insight on the probability that the overall commercial sub-metering data is authentic when considering only thrusted P1 data

IO.Flexity 2.0: bring value on a large scale

Flexity 2.0 aims to validate consumer appetite on a **large scale**, not limiting ourselves to a pool of colleagues and friends.



Preconditions for participation

- Minimum 0,1 MW of LV flexibility for aFRR or mFRR
- Maximum 0,5 MW
- Low-voltage clients only
- Build own consumer pool

Solution

We offer an **all-in retrofit solution** that transforms space & water heaters into an energy-saving storage device

Solution: energy efficiency

We offer an **all-in retrofit solution** that transforms space & water heaters into an **energy-saving** storage device

1/ EU Ecodesign savings:

12 - 28% (zero comfort loss)

2/ External lab test:

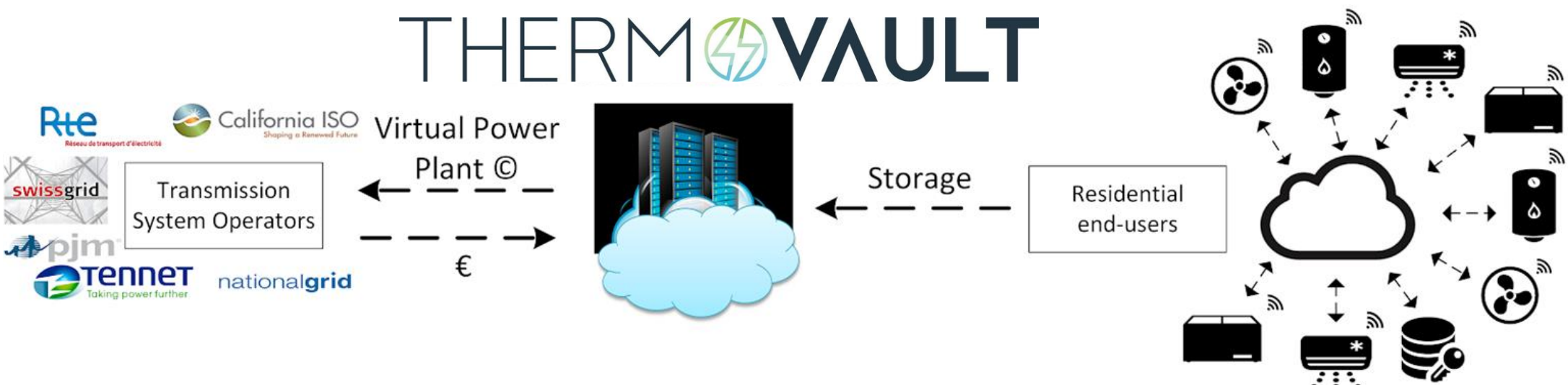
33.16% (zero comfort loss)

3/ Deployments Flanders:

20+% (no angry phone calls)

Solution: storage

We offer an **all-in retrofit solution** that transforms space & water heaters into an energy-saving **storage device**



Current activities

1. Retrofit business

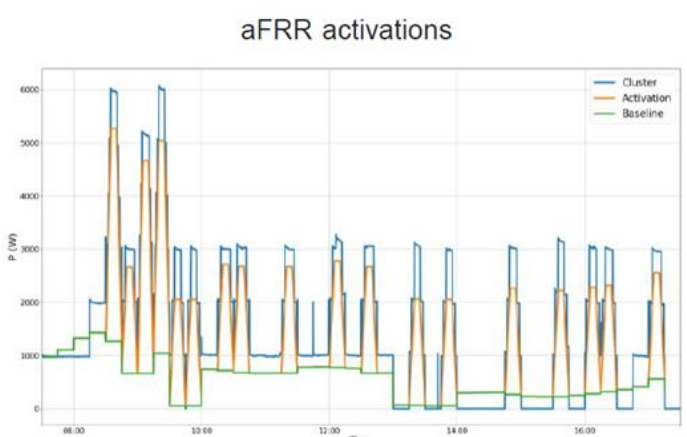
- Active in Belgium and France
- Unique offering
  - Now: combined EE and DR
  - Future : combined HE(E)M and DR
- Universally applicable solution for:
  - Electric water heaters
  - Electric space heaters
  - Heat pumps

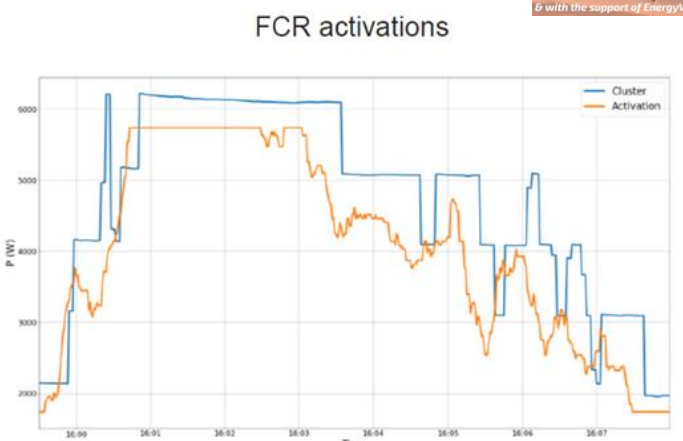
Current activities

2. Flexibility valorisation - Retrofit appliances

- Several MW's under control
- FCR - commercially active since end 2021
- FCR & aFRR - first pilot experience in IO.Energy Soteria

- ✓ End-to-end software integration
- ✓ 8 weeks field tests
- ✓ 31 residential boilers
- ✓ 2 Fluvius transformer station grid logic forecasts



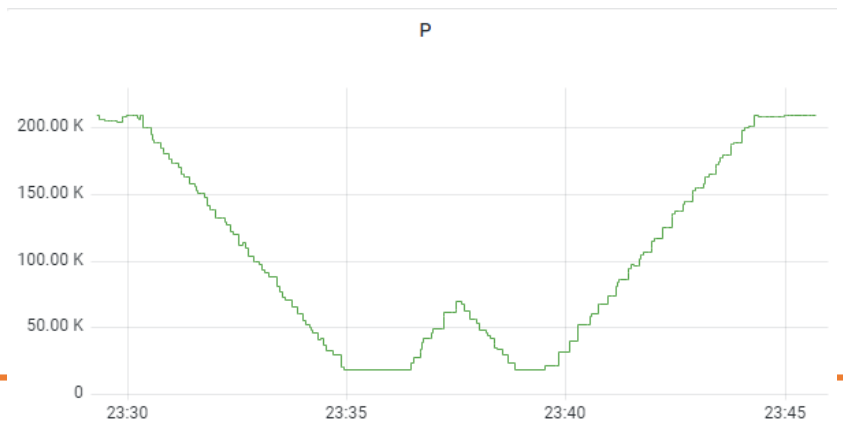


Current activities

2. Flexibility valorisation - Retrofit appliances

- Several MW's under control
- FCR - commercially active since end 2021
- FCR & aFRR - first pilot experience in IO.Energy Soteria
- **aFRR & … - second pilot experience in IO.Flexity 2.0**

- aFRR$_{up}$ delivery with space and water heaters
- Full IT integration with Elia
- Discussions on remaining barriers & future-proofness of processes
- Experimentation with value stacking



Current activities

2. Flexibility valorisation - Factory appliances

Questions

Conclusion and next steps

First conclusions

- CCMD makes flexibility seamless. CCMD addresses (among others) the limitations that were observed in the existing framework:
  - ✓ Ensure an easy market access for new FSPs, independent from the Supplier and BRPsource
  - ✓ Facilitate the development of new services and business models via one unified framework
  - ✓ Ensure a correct compensation for the Supplier considering the increasing diversity of supply contracts

- CCMD tested out through a real use case validate consumer appetite on a large scale

Next Steps

- Take under consideration first remarks/feedback
- Present the benefits of CCMD in case of a supply split in the next Working Group CCMD (Proposal: 22/06 – altogether with WG Bal)
- Moving towards a common T-DSO market consultation