CCMD Roundtable

Part 1

September 29th, 2021

Objective and guidelines of the Roundtable

Setup of the Roundtable:

- Questions from market parties were clustered in function of 3 topics
- Each topic will be introduced via a short presentation of Elia Group, after which an open roundtable discussion will be held

  - **Objective** of the roundtable discussion is to have an open exchange and acquire additional insights

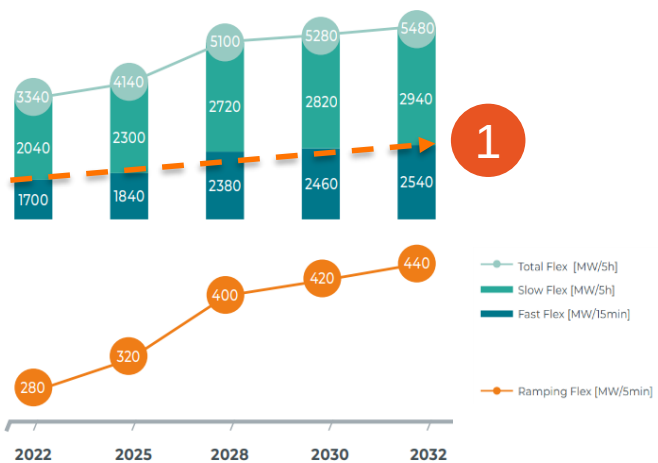
Topics:

- Consumer participation in tomorrows consumer-centric market
- Enhanced price signals at the basis of CCMD
- Increased competition behind the meter and the role of the Supplier and BRP

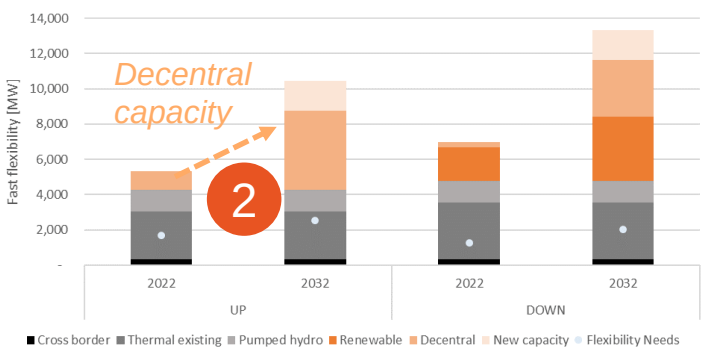
Consumer participation in tomorrow’s markets and system

The growing penetration of renewable energy sources will increase the flexibility needs of the system… 1

Upward flexibility needs in BE (MW)



Installed fast flexible means in BE (MW)



… while, in the meantime, if properly enabled, a **large potential** for flexibility means will arise with the increase of decentral battery storage and demand-side management. 2

Encouraging consumer participation in tomorrow's markets and system (with an appropriate market design, supporting digital tools, etc.) will be key to continue operating the power system in a secure and efficient way, while integrating a high amount of renewable energy sources.

Sources : Adequacy and Flexibility Study for Belgium 2022-2032

A part of transport and heat consumption will shift from fossil fuels to electricity and might either stretch or help the system

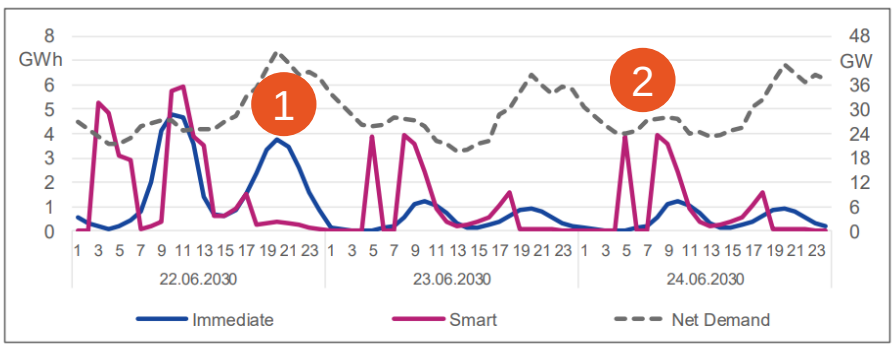


Figure 6.3: Charging Profile of Immediate and ToU Scenario, France in winter

1. Immediate charging of EV after arrival at home/office could correspond to peak consumption periods
2. Smart charging of EV shifts the charging sessions towards low demand/high RES production periods
3. In a V2G approach, the EV can even feed electricity to the grid in periods of high demand/low RES

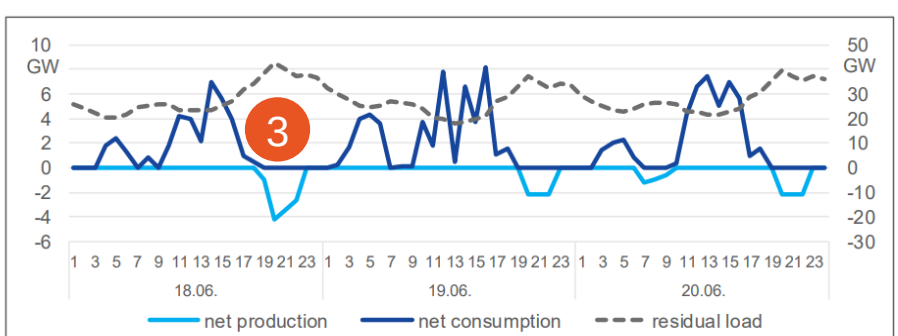


Figure 6.17: Profiles of V2G for three days in summer 2030 in France and corresponding residual load (right y-axis)

New electrical and controllable assets (electric vehicles, heat pumps) will be connected to the grid leading to :

- Either a higher peak consumption (hence stretching the system) if these assets are not properly managed;
- Or, if given proper incentives, to additional flexibility helping the system.

Figures extracted from the study "Effect of electromobility on the power system and the integration of RES" performed for the EC

The main purpose of demand side controllable resources is not to help the power system…

Unlike traditional production units, the **main purpose** of demand side controllable assets is **not to be active on the electricity markets** or help the power system.

The main purpose of an EV is to allow its owner to travel whenever and wherever he wants

The main application of a heat pump is to allow a comfortable ambient temperature to be maintained

The consumption profile of these assets will hence mainly be **driven by the objectives** of their owner **related to their main application**.

The battery of the EV should be at least half-charged each morning at 7 AM

50% charged

Each morning at 7 AM

The living room temperature should be maintained within a set range of 20-22°C

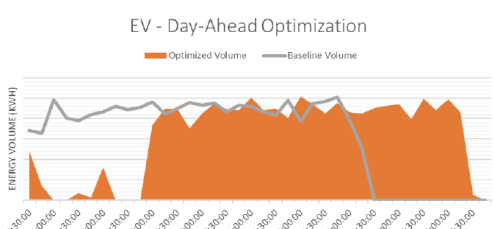
20-22°C

All year round

However, proper financial incentives and easy access services could encourage them to put their flexibility at the disposal of the system…

However, if **proper financial incentives** and **easy access services** are offered to the consumers (e.g. they can reduce their electricity bill without any additional administrative burden), demand side controllable assets could **optimize their consumption profile to help the power system** while still r**eaching their main objectives**, or, in extreme situations, even while **slightly deviating from their main objectives**.

An EV which is plugged to a charging station during the whole night could benefit from the hours where there is a (cheap) surplus of (e.g. wind) production to reach a half-charge status at 7 AM



50% charged

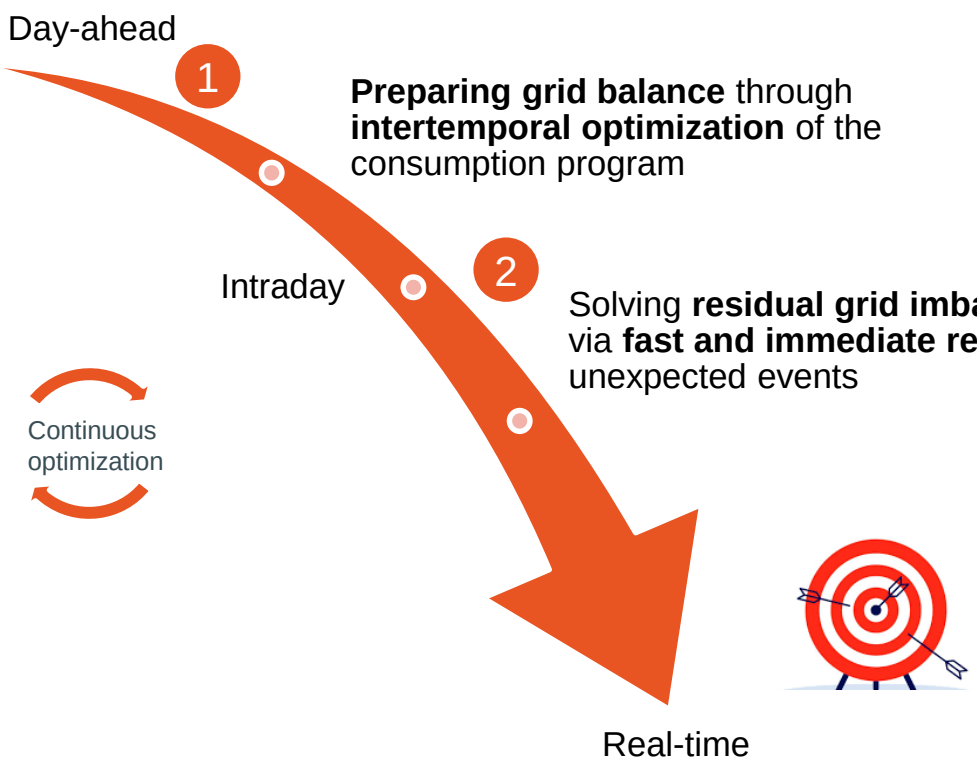
Each morning at 7 AM while minimizing the charging costs

In case of a sudden electricity shortage causing extremely high electricity prices, a heat pump could temporarily stop working and allow that the living room temperature falls slightly below 20°C

20-22°C

Except when electricity prices temporarily skyrocket

… by continuously adjusting their consumption program to the expected real-time conditions of the system*



1	In order to be able to reach their main objective, demand side controllable (e.g. storable or shiftable) assets should be able to establish a consumption program upfront. If they receive, well before real-time, (price) signals that properly reflect the real-time conditions*, these assets could **optimize their consumption pattern** to reach their main objective while helping balance the grid.
2	In case of unexpected events (forecast error, forced outage…), the real-time price of the electricity deviates from the previous price signals based on which the consumption program of an asset was made. Some assets able to quickly react to such events might either **re-optimize their consumption pattern** considering the last information available, or even **accept a small deviation from their main objective** in case of extreme real-time prices. This could help the system resorb residual imbalances in real-time.

* We here mean the real-time *balance* conditions of the system, congestion management is not the focus of this presentation

Consumption program adjustments can result from spontaneous price based reaction of the asset and/or from explicit activation by the TSO

1 Implicitly – price based reaction

An asset, which is **exposed to the real-time price** and continuously re-optimizes its consumption pattern (until real-time) to minimize its consumption costs while ensuring its main objective is (most of the time) reached, **implicitly helps the power system to be balanced**.

2 Explicitly – volume based reaction

An asset which does not want to be exposed to real-time price can hedge its consumption in different markets (DA, ID…), up to the balancing market where its **remaining flexibility can be offered explicitly** to the system operator who solves the residual grid imbalance.

3 Combination of price and volume based reactions

A service provider managing a fleet of fast and controllable assets could perform value stacking and:

- Optimize the consumption profile of these assets based on DA and ID prices
- Offer part of the remaining flexibility explicitly to the system operator (allowing to access a wider European market and making it possible to capture a capacity fee)
- Reacting implicitly to (extreme) real-time prices with the residual flexibility (even though it slightly alters the comfort objective of the assets)

The choice to opt for price-based and/or volume-based (explicit) reaction to offer the remaining flexibility in real-time will be specific to each asset

Both ways to offer remaining flexibility can indeed present different advantages for the end consumer or the service provider who manages some of his controllable assets :

	Advantages for consumers/ service providers
Explicit activation *(volume based reaction)*	• Access to a wider market (EU balancing market) • Transfer of the activation decision and risk to the TSO • (Min) activation price known ex-ante (actual price based on PAC) • Possible capacity fee
Implicit reaction *(price based reaction)*	• No specific metering or communication requirement • No pre-qualification or delivery requirement and no exposure to penalty in case of under delivery • No administrative burden linked to explicit • Optimization possible over multiple ISPs (e.g. avoiding continuous switch on/switch off leading to wear and tear)

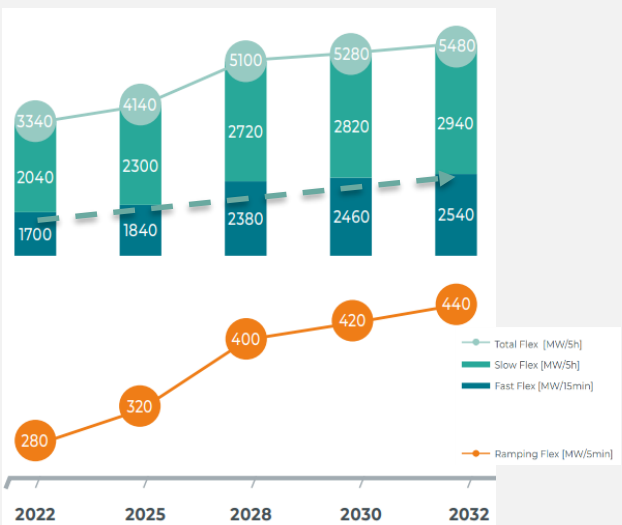
The asset characteristics, the risk profile of the asset manager, the metering and communication installations available,.. might influence the decision to help the system implicitly and/or explicitly.

As implicit and explicit are complementary, both implicit and explicit participations should be possible and even facilitated in order to allow the whole residual flexibility to find its way to the system.

In a nutshell

The challenge

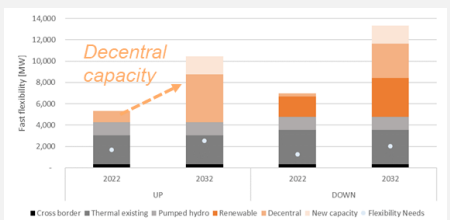
Upward flexibility needs in BE (MW)



The growing penetration of renewable energy sources will increase the flexibility needs of the system

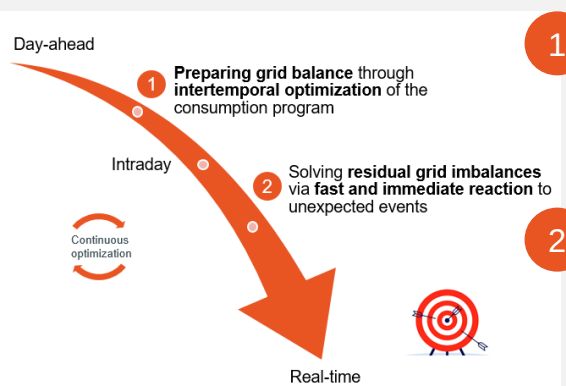
The opportunity

Installed fast flexible means in BE (MW)



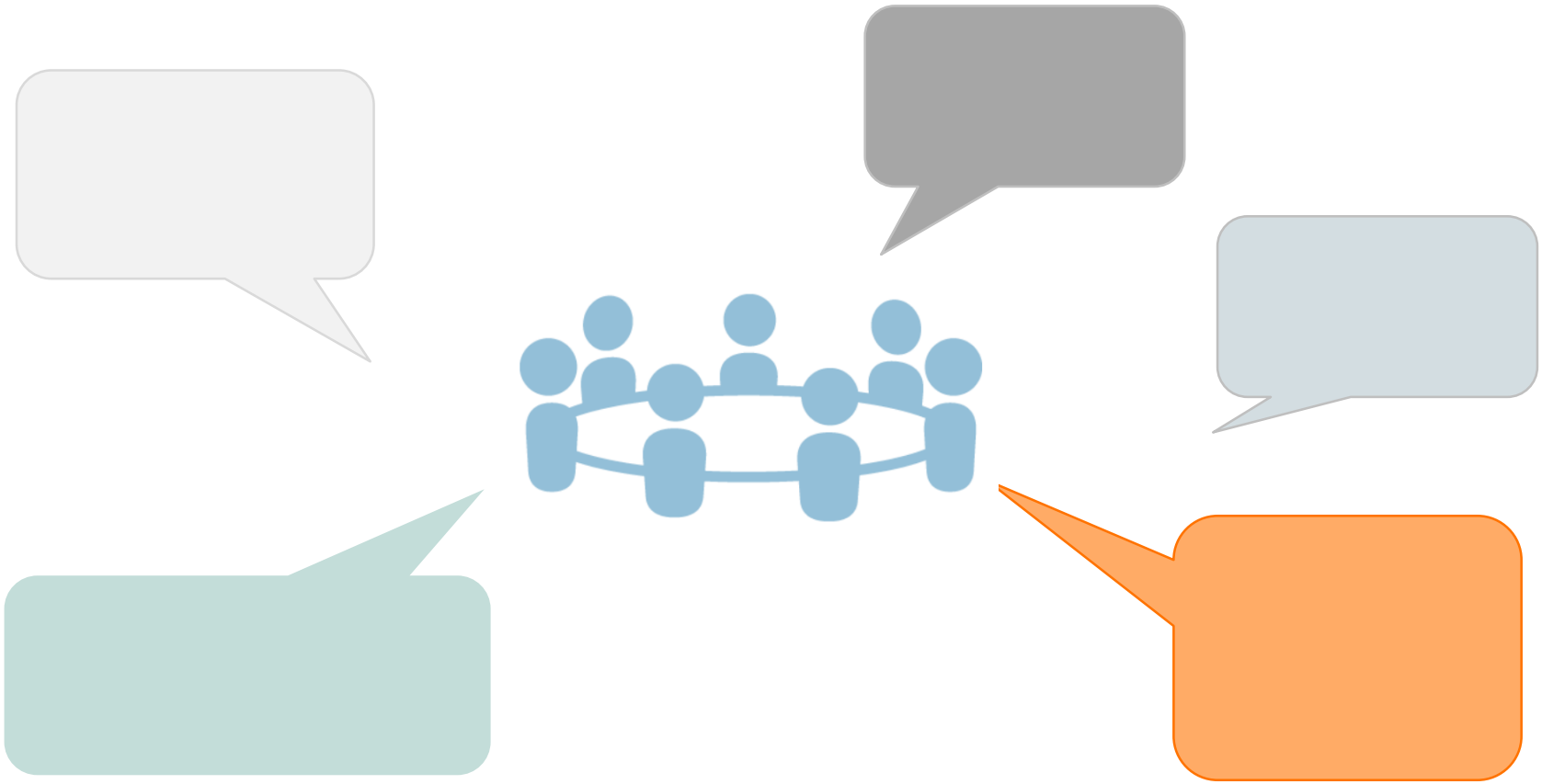
- New electrical and controllable assets (EVs, heat-pumps) will connect to the grid.
- Their consumption profile will be mainly driven by consumer's needs and habits, which might stretch the system (e.g. higher evening consumption peak)
- However, with easy access to proper incentives, these controllable assets could actually help the system

With easy access to proper incentives



1. If they receive, well before real-time, (price) **signals that properly reflect the real-time conditions***, these controllable assets could **optimize their consumption pattern** upfront, in function of system needs while maintaining comfort limits.
2. In case of unexpected events, the real-time price of electricity deviates from previous price signals. Flexible assets might either **re-optimize their consumption pattern within their comfort limit**, or even **accept a small deviation from their comfort limits** in case of extreme real-time prices.

Open discussion



Enhanced price signals

Enhanced price signals

Price

Barriers

Variable price signals (and the contracts linked to it) are underdeveloped.

Target

All players have access to a price reflecting the true value of flexibility at any moment in time

1. Ensure the real-time price reflects the **true value of flexibility**
2. Make sure the DA and ID prices properly reflect the anticipated RT conditions
3. Allow **all the players to be exposed** to these price signals

a) Ensure the real-time price correctly **back-propagate to previous markets**/timeframes
b) Foster DA/ID market **liquidity**

Instruments needed

Enhanced price signals (incl. adequate information ex ante and back-propagation to DA/ID) so market actors can make adequate production, consumption & purchasing decisions, increasing market efficiency and fostering anticipation of potential RT issues.

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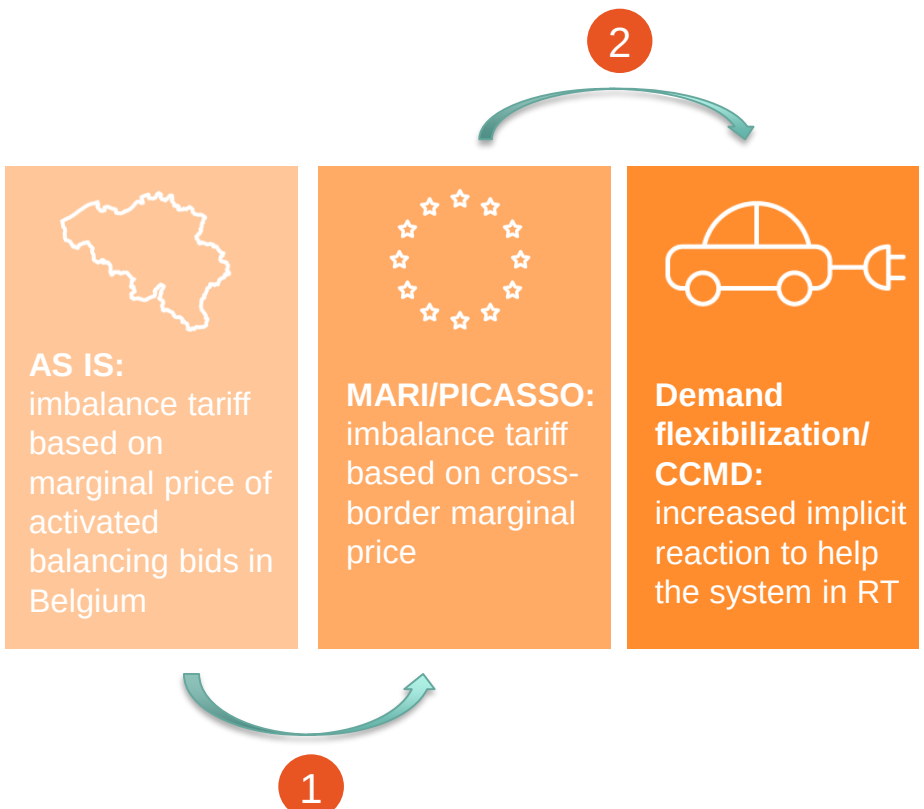
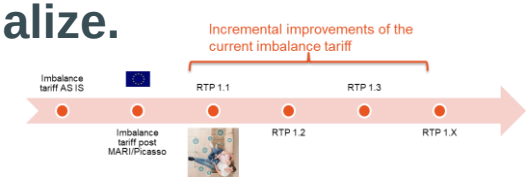
In Belgium, the current RTP* (imbalance tariff) is reputed to be a robust price signal, however upcoming evolutions raise some challenges/attention points



1. The EU integration of balancing markets will cause the decorrelation between local system imbalance, local balancing activations and local imbalance tariff and will hence raise some attention points
2. Large increase of implicit reaction might exacerbate the shortcomings of the imbalance tariff/→ some attention points might materialize and become real issue once the penetration of implicit reaction grows

* Real-time price

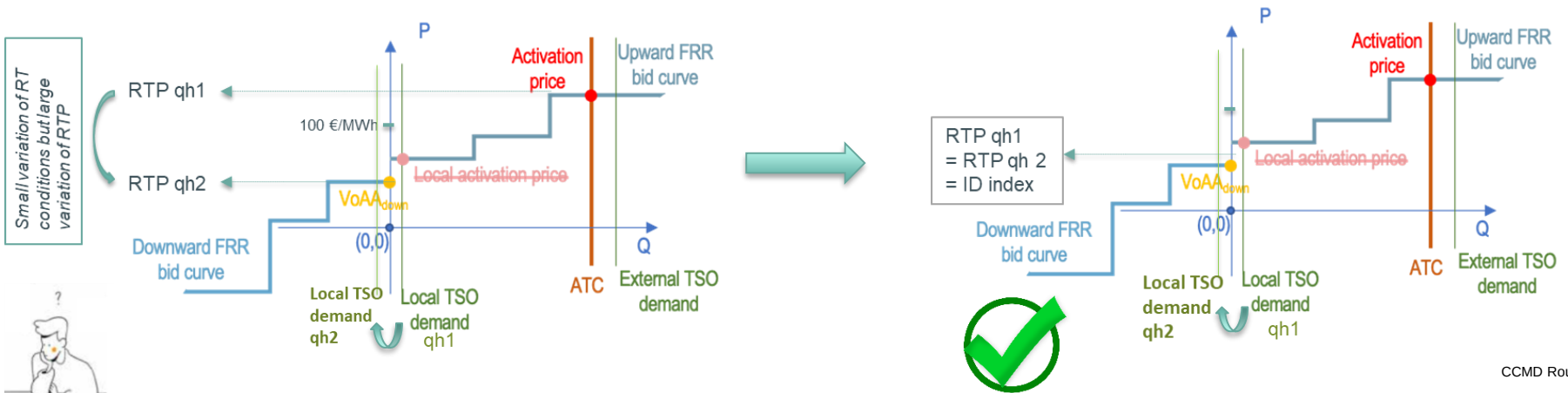
A toolbox of possible incremental improvements of the RTP should therefore be prepared, to be implemented if/when the attention points materialize.



Examples:

1 The development of a robust ID index that could be used as starting point for the calculation of the RTP

The RTP could be equal to this index for small imbalances, giving the signal to the market parties to 'keep the plan' (the market equilibrium reached in ID does not need to be modified if imbalances are small).This evolution would make the RTP more stable for small imbalances.



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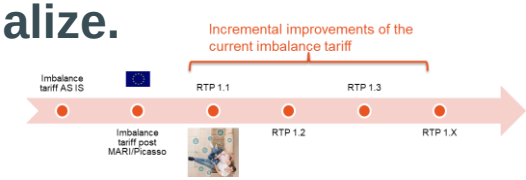


Examples:

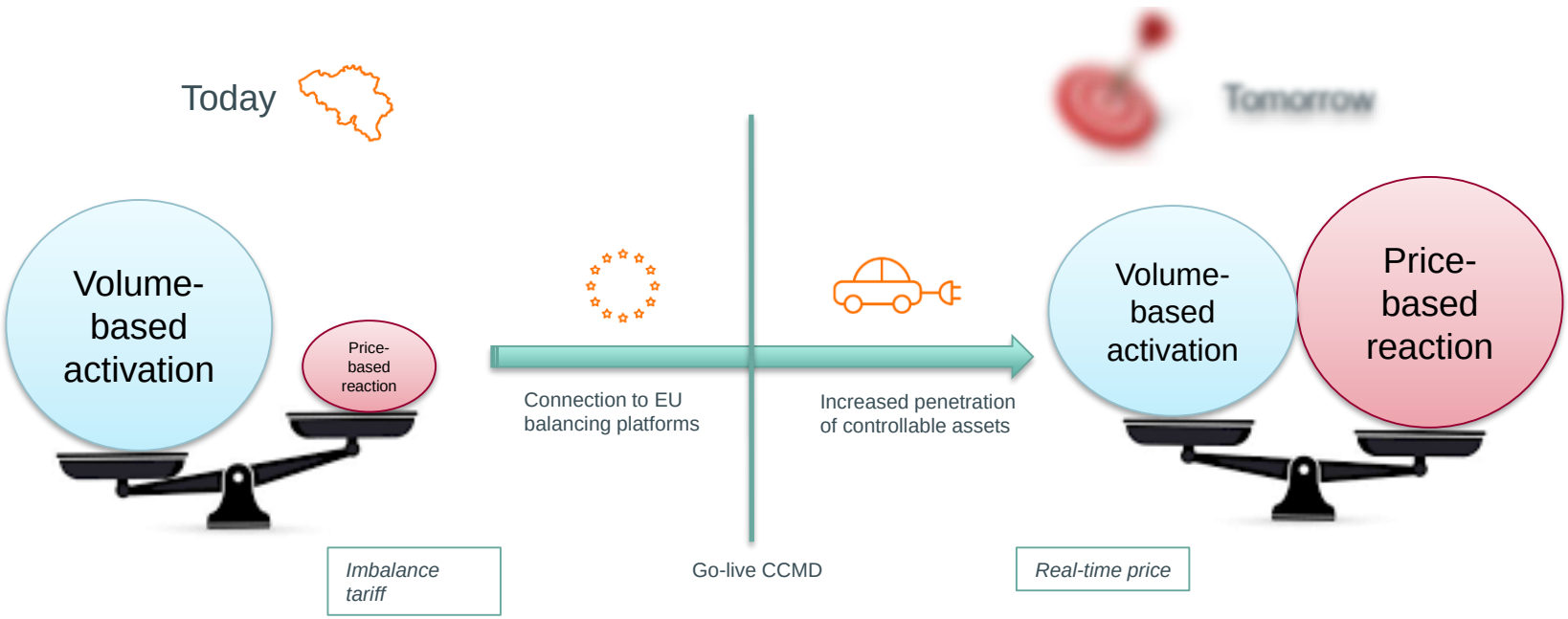
2 Adjust the adders to make sure the incentive to reduce the local System Imbalance is adequate in any situation

- Avoid situations where the RTP is high (set by the cross-border marginal price) when the local system is closed to be balanced, hence preventing large local implicit reactions to imbalances of neighboring countries

High RTP, possibly triggering a large implicit reaction of local assets even though the local system is closed to be balanced

- Or contrariwise, ensure the adders trigger adequate reaction from the local market in case of high and persistent local System Imbalance and small cross-border marginal price (f.i. when the local needs are netted by the needs of neighboring countries)

Ensuring a smooth and incremental evolution towards a more sophisticated/dynamic construction of the RTP



Imbalance tariff based on the **marginal price of the explicit activations** made by the TSO and quite **"static" adders**

AI based

Smart balancing controller setting the **RTP in a more dynamic way,** in order to trigger a given reaction from the market which complements **the explicit balancing bids** activated by the TSO (locally or abroad)

Enhanced price signals

Price

Barriers

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Instruments needed

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a) Ensure the real-time price correctly **back-propagate to previous markets**/timeframes
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The true value of real-time energy can only be computed ex-post*…

… However, enough information should be provided ex-ante so that the RTP can be predicted as far as possible.

Short term

Mid-term

Long term

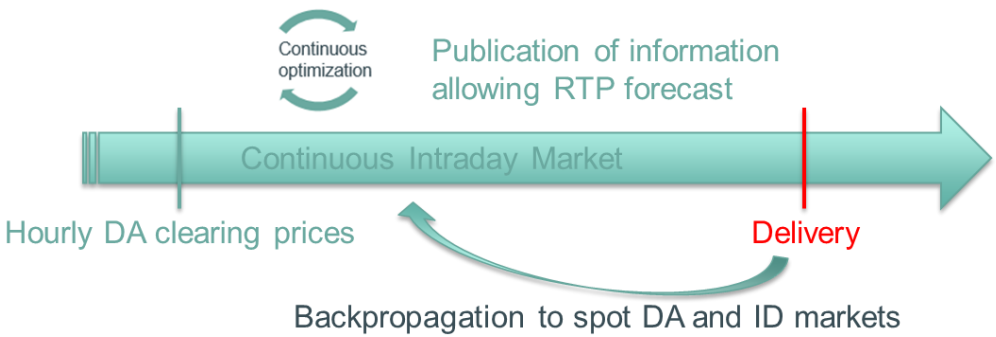
Ex-ante publication of data and information to help market parties forecast the RTP (SI estimation, MARI clearing price, etc.)

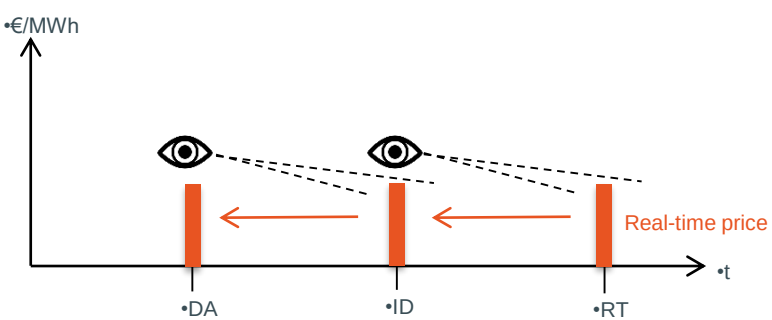
Continuous assessment whether more info should be made available

Ex-ante publication of a RTP forecast, which, except in case of totally unexpected event (e.g. FO, large forecast error…), is equal to the actual RTP

** A value calculated ex-ante will never be able to reflect unexpected events (such as FO) that could happen during the settlement period*

Besides, this RTP should back-propagate to previous markets to allow global and intertemporal optimization of flexible assets





Temporal arbitrage fosters the back-propagation of the real-time prices to previous markets, hence allowing shiftable/storable assets to optimize their consumption upfront using a signal reflecting the true value of flexibility at any moment in time

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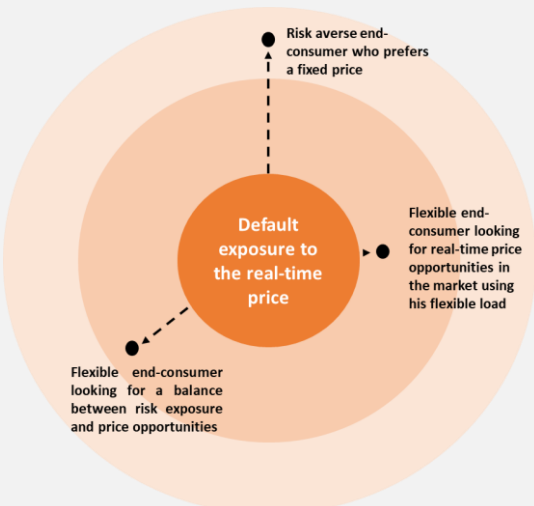
A menu of various contracts will naturally arise when price signals become better accessible

Contract	Price risk for the consumer
Real time price contract	
Day-ahead/intraday pricing contract (DA, ID)	
Time of Use contract	
Day/Night contract	
Flat price contract	

All end consumers can participate implicitly in the market in function of their own individual preferences



But how to protect end-consumers from excessive price risk?

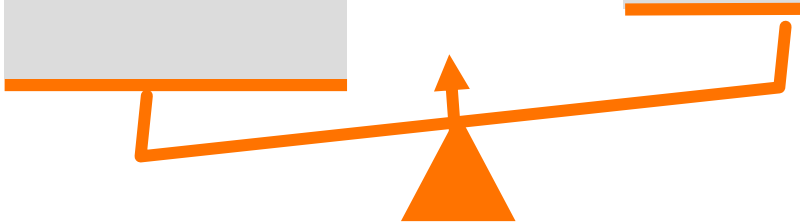
CCMD provides the tools to split the flexible from the inflexible load, striking a balance between price opportunities and risks.

Inflexible load
Lower price risk
Lower opportunity

The residual inflexible part of the load is covered via a flat price (/static) contract by the default Supplier at AP-level.

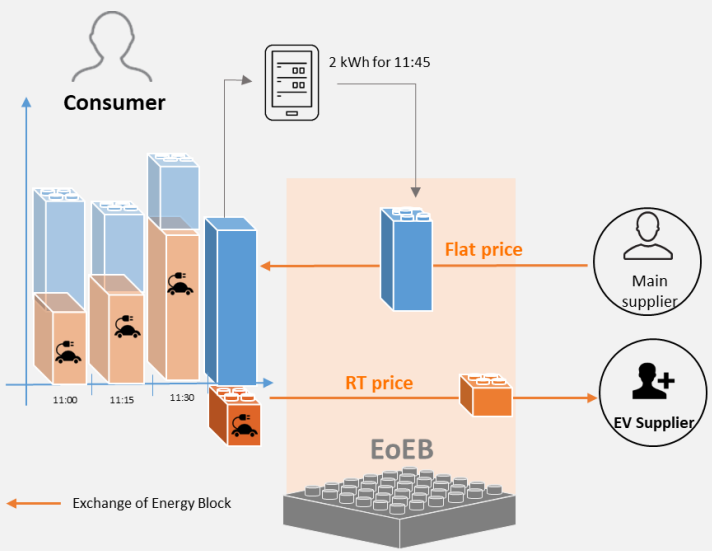
Flexible load
Higher price risk
Higher opportunity

Via EoEB end-consumers can outsource the full management (electricity, flexibility) of their EV to a 3rd party. The charging process is optimized in function of market prices & benefits are directly captured by the end-consumer via a dynamic price contract (DA, ID, RT)

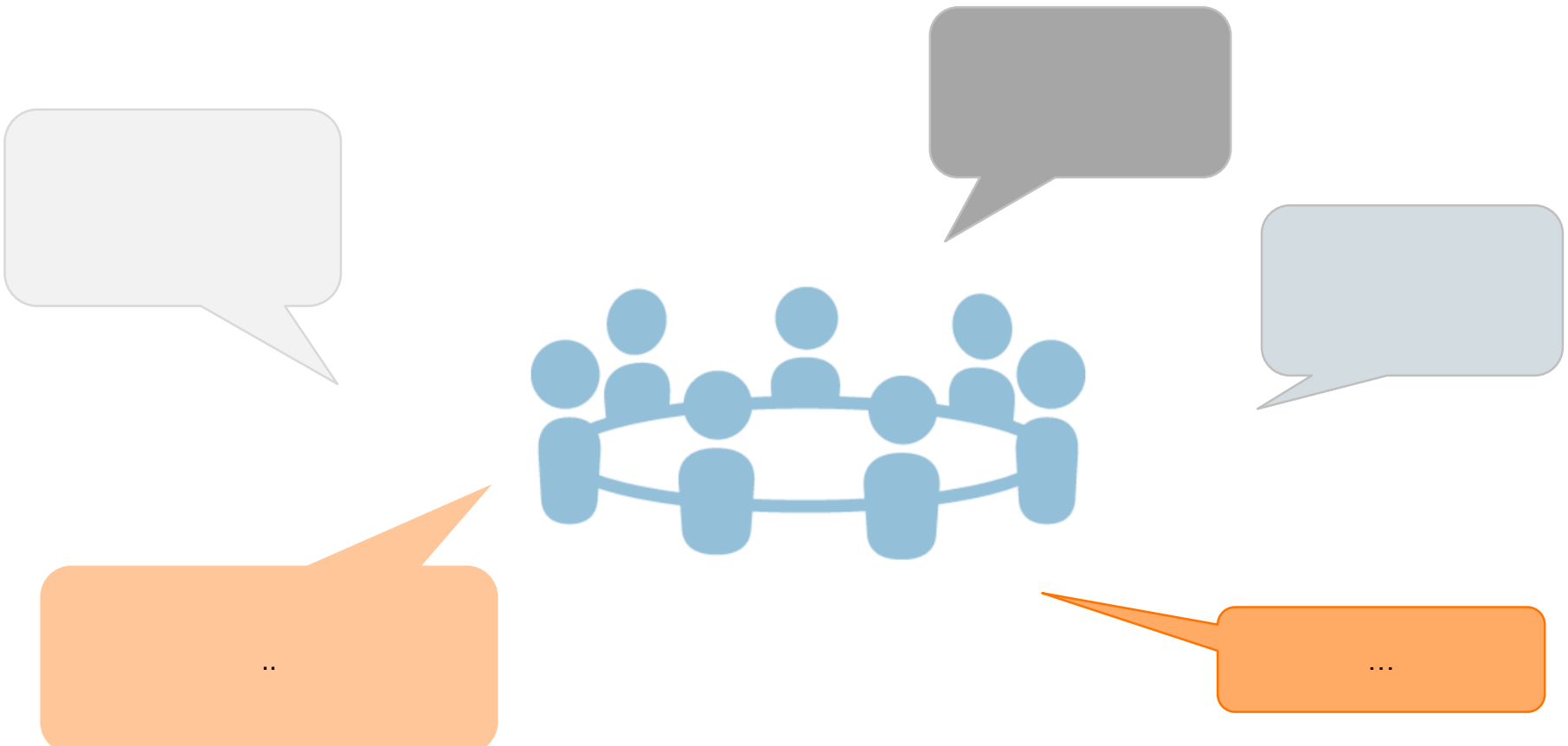


Example

When the RTP is high (ex. 11:45-12:00), the end-consumer is able to sell electricity to market (V2G) and generate a revenue. He can safely consume his residual load at a fixed cost.



Roundtable discussion

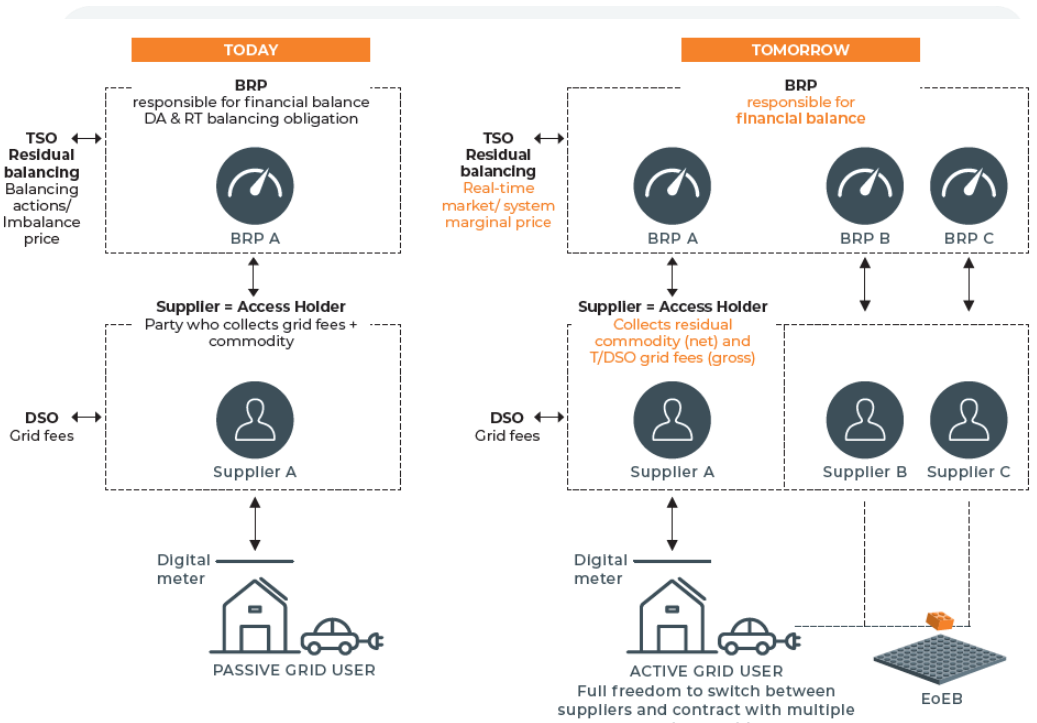


Increased competition and the role of Supplier and BRP

EoEB as an instrument to unlock LV-flexibility and induce competition behind the meter

	Price	Competition
Barriers	Variable price signals (and the contracts linked to it) are underdeveloped.	End consumer cannot engage with a third parties behind the meter
Target	All players have access to a price reflecting the true value of flexibility at any moment in time	End consumers can easily contract with independent service providers behind the meter
Instruments needed	**Enhanced price signals** (incl. adequate information ex ante and back-propagation to DA/ID) so market actors can make adequate production, consumption & purchasing decisions, increasing market efficiency and fostering anticipation of potential RT issues.	**Exchange of Energy Blocks (EoEB)** a decentralised exchange of energy between consumers and many other parties, significantly lowering entry barriers for new market players who can offer innovative energy services.

This requires to rethink the role of the Supplier and BRP



— EoEB provides freedom to consumers
to enter into commercial relations with parties, and get access to multitude of services behind the meter on appliance level, or to keep current contract

— Via a transactional mechanism
the sum of all transactions per grid user per quarter-hour are used to adjust the digital metered energy at the connection point

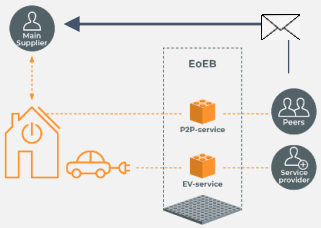
— It seems necessary to relax the physical balancing obligation as BRPs cannot take by default balancing responsibility for clients with unpredictable and non-controllable* behaviour.

*expected even without EoEB

From physical obligation towards enhanced financial incentives

Today
Physical and financial balancing obligation

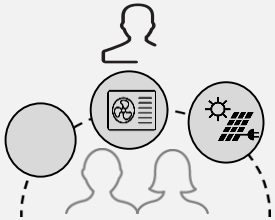
Potential for EoEB and development of services behind the meter is strongly limited



Coordination mechanism (ex ante notification of transaction) is required towards the Supplier, strongly limiting the freedom of the SP to deliver new services

Restrained access to price signals
(low accessibility for dynamic price contracts)

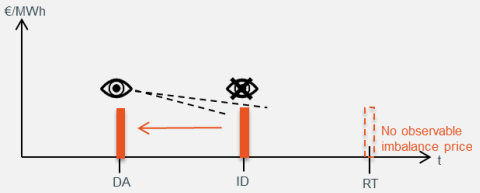
Supplier today



BRP/Supplier is restrained in offering dynamic price contracts (or PT-contract)[1] since this could lead to price reactions for which he does not have the physical means to restore his balanced position.

Discontinuity between DA and RT timeframes, preventing further price convergence and market improvement

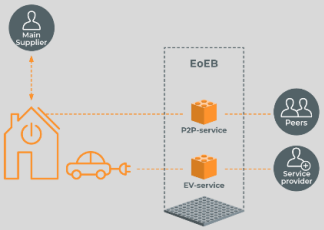
With the formal balancing obligation in RT



BRPs cannot close in real-time open positions taken in prior markets and thus are not able to anticipate real-time issues (system-wise).

Tomorrow
Enhanced financial balancing obligation

EoEB operated at its full potential



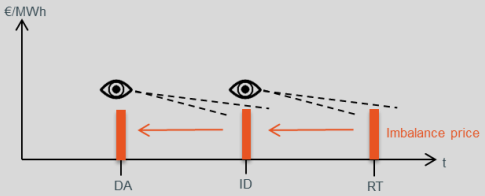
Coordination mechanism (ex-ante notification of transactions) towards the Supplier is fully optional, providing complete freedom to SPs to provide new services

Enhanced access to price signal for all market actors
(full accessibility to # contract types)

BRP/Supplier can offer a set of dynamic price contracts / PT (DA, ID, RT) at a large scale to a significant part of its portfolio

Better back-propogation of prices, increasing market efficiency and anticipation of RT issues

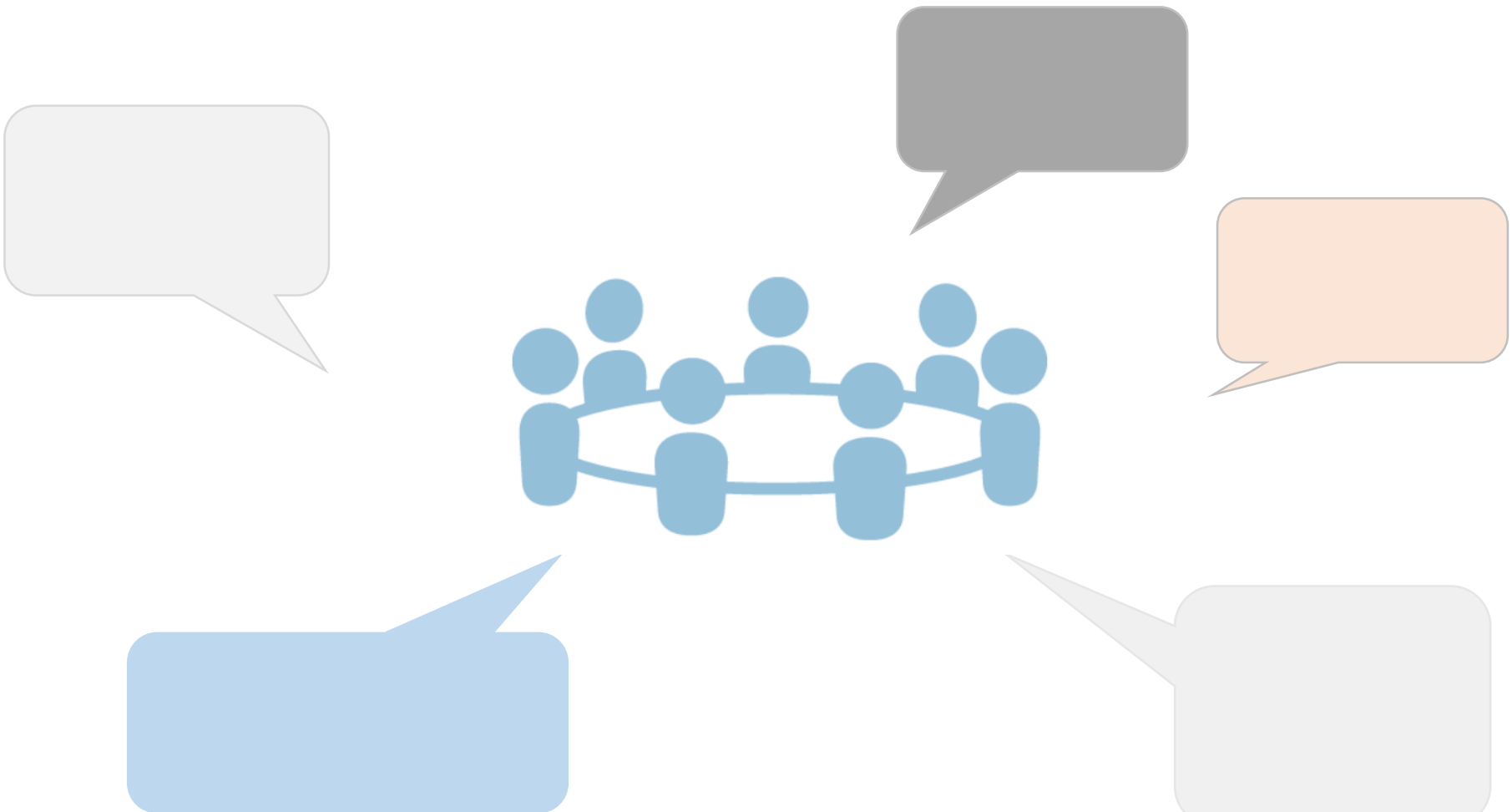
Without the formal balancing obligation in RT



BRPs pursue system optimization by increased reactive balancing opportunities.

1. Presence of a digital meter and current allocation based on standard load profiles is a barrier as well

Open discussion



Focus of Next Roundtable

	Price	Competition	Technical
Barriers	Variable price signals (and the contracts linked to it) are underdeveloped.	End consumer cannot engage with a third parties behind the meter	Tedious requirements (administrative, prequalification, metering, …) for participation energy services
Target	All players have access to a price reflecting the true value of flexibility at any moment in time	End consumers can easily contract with independent service providers behind the meter	Simplified consumer journey build on software based solutions.
Instruments needed	**Enhanced price signals** (incl. adequate information ex ante and back-propagation to DA/ID) so market actors can make adequate production, consumption & purchasing decisions, increasing market efficiency and fostering anticipation of potential RT issues.	**Exchange of Energy Blocks (EoEB)** a decentralised exchange of energy between consumers and many other parties, significantly lowering entry barriers for new market players who can offer innovative energy services.	• Digital tools (consent mgmt ,…) to support the development of new CC services • EoEB-HUB – A platform to register & treat EoEB transctions, trusted by the end consumer • Real-time communication platform facilitating data exchange between market actors

Next steps to achieve our ambitions

Q2 2021

CCMD Whitepaper
Making the CCMD vision public

Q3-4 2021

Demonstration projects
Demonstrate, test & learn

Q1 2022

Implementation roadmap
Regulatory & Technical

2023

Demonstrate XB EoEB
European implementation

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

GO Live TSO grid

End 2023

GO Live DSO grid

End 2024