Storage Orders

Webinar on the Public Consultation about Storage Orders in SDAC

16 June 2026

Q&A via **Slido.com**
Enter code: **1260435**

SDAC

Introduction

Content

Topic	Timing
Introduction to SDAC	12:30 – 12:35
Introduction of the Storage Order concept • *Evidence of storage behaviour in practice* • *Existing order type in SDAC for storage systems* • *Storage Orders public consultation* • *Storage Order details* • *Aggregation*	12:35 – 13:05
Explanation of the questionnaire	13:05 – 13:30
Open Q&A	13:30 – 13:50
Closing and next steps	13:50 – 14:00

Introduction to SDAC

Single Day-Ahead Coupling (SDAC)

- Single pan European cross zonal **day-ahead electricity market**
- SDAC enables cross-border trading across Europe through implicit day-ahead electricity supply auctions
  - coupling wholesale electricity markets across Europe using a common algorithm (Euphemia)
  - allocating limited cross-border transmission capacity in the most efficient way
  - taking into account cross-border transmission constraints and maximizing economic surplus
- **16 Nominated Electricity Market Operators** (NEMOs) and **30 Transmission System Operators (TSOs)** are organizing SDAC

27 countries

SDAC covers almost the whole Europe.

1900 TWh

Traded volume on SDAC amounted to 1900 TWh in 2025. (daily average is 5.2 TWh)

11.8 billion €

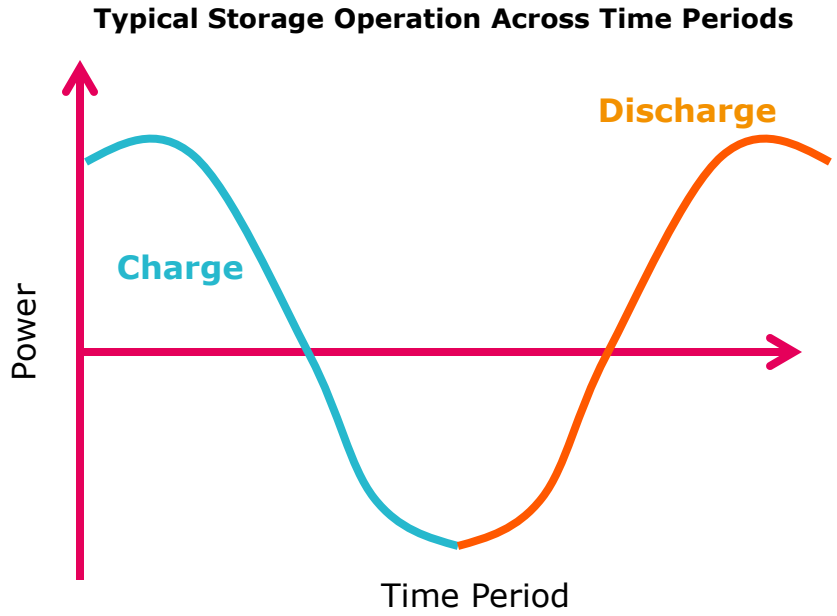
Average daily economic surplus was 11.8 billion € in 2025.

Introduction to the Storage Order concept

Evidence of storage behaviour in practice

Case Study: Great Britain

- Storage assets already operate using the core principles of Storage Orders:
  - Storage assets actively **buy and sell** within the same day
  - Continuous switching between **charging and discharging** across time periods
  - Optimised dispatch based on price spreads across **multiple intervals**
  - Participation across day-ahead, intraday and balancing markets
- What this shows
  - Storage operation is **inherently multi-period and constrained**
  - Assets already act as both **producers and consumers**
  - Value is created through **optimisation across time**, not individual hours
- Relevance for SDAC
  - These behaviours are **already present** in the market today
  - Storage Orders enable **Euphemia to capture this explicitly** within the day-ahead auction
- Key Message
  - Storage Orders reflect **existing system behaviour**, while introducing a more efficient way to capture it within the central market clearing.

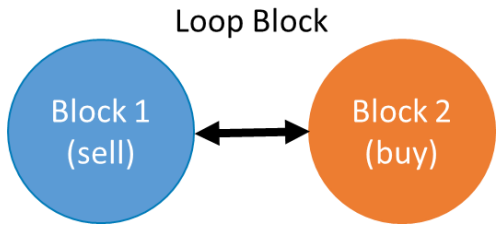


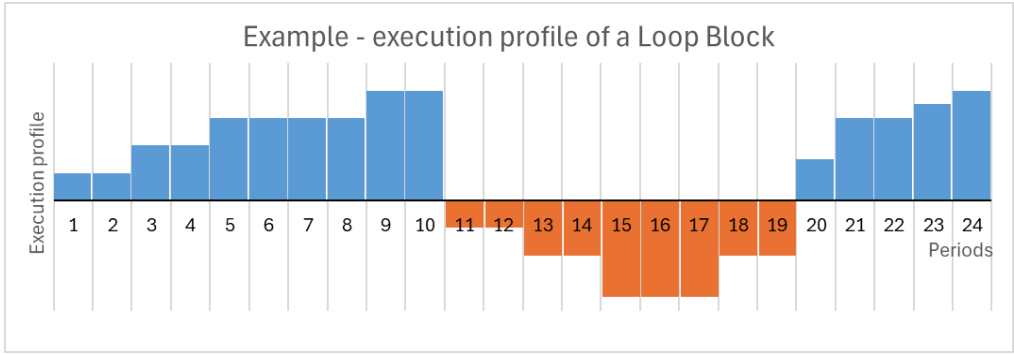
Introduction to the Storage Order concept

Existing order type in SDAC for storage systems

Loop Block

- To reflect a storage system there is an existing order on SDAC called Loop Block that is supported by the algorithm. It is up to each NEMO to decide whether they want to offer this product to their market participants.
- Loop Block allows to **link one supply and one demand block together** forming a single "family" of blocks – Loop Block
  - The two linked block orders forming the Loop Block are always accepted or rejected together





Challenges of Loop Blocks

- Market Participants must submit the **execution profile** of the Loop Block for each market period.
- Preparing the execution profile requires a **detailed market forecast** from the Market Participants.
- There is an inherent **risk of financial loss** if the forecast is inaccurate.

To address these challenges of current order types, NEMOs and TSOs have been working on developing a new order type, Storage Order, tailored for storage systems

Introduction to the Storage Order concept

Storage Orders public consultation

Public consultation

- **NEMOs and TSOs have been working on designing a new type of order, Storage Order,** that is aimed to be introduced on the day-ahead market (SDAC) and now seek market participants' view.
  - **The Public Consultation is conducted to collect the market participants' feedback on the proposed design and possible design options. The feedback will be taken into account in the final development phase.**
- Find all related information to the Public consultation on NEMO committee and ENTSO-E websites (by scanning the QR codes below):
  - Public Consultation: Storage Orders in SDAC - information document - detailed information document about the Storage order design concept
  - **Public consultation questionnaire** - we ask you to **fill it in until 30/06**

NEMO committee website

ENTSO-E website

Introduction to the Storage Order concept

Storage Orders details

What Is Meant by a Storage Order?

- **A new type of order** that would support bidding for systems that can buy and sell energy during the same day. Any system that can sell and buy energy during the MTUs of the market coupling session can be used for bidding with this new order type.
- The storage order will be **optimally allocated across all day-ahead Market Time Units** (MTUs) **by the Euphemia** algorithm. **The storage order will not lose money** and shall be profitable across the MTUs of the day-ahead auction.
- However, the physical asset shall be able to **switch between production and consumption between the adjacent market time units** (15-minute resolution in day-ahead market).

- For asset owners, having storage orders directly within Euphemia can **help maximize revenues** by reducing reliance on accurate price forecasts.
- Storage orders can **mitigate price spikes** caused by sudden changes (drops/peaks) in energy production, **enhancing market stability**.

Currently the **expected go-live** of the new storage order on the SDAC market is planned for **Q4/2027**.

Introduction to the Storage Order concept

Storage Orders details

What are the functionalities?

A storage order will be defined using the following currently considered input parameters:

Required parameters:

- **Maximum energy stored** (one per period – MWh)
  - Assets have a fixed capacity.
- **Maximum input power** (one per period – MW)
  - Assets can only charge at a certain rate.
- **Maximum output power** (one per period – MW)
  - Assets can only discharge at a certain rate.
- **Cycling costs** (one per order – €/MWh)
  - Most asset owners only want a cycle on their asset if they have enough revenues.

Optional parameters (in case not specified, the default value would be used):

- **Starting energy stored** (one per order – MWh) default 0
- **Minimum energy stored** (one per period – MWh) default 0
- **Efficiency** (one per order – %) default 100
- **Value given to energy stored at the end of the day** (one per order – €/MWh) default 0
  - End of day remaining charge can generate value for the asset owner. This parameter can be used to avoid ending up with empty storage at the end of the day, by assigning value to the remaining energy.

Introduction to the Storage Order concept

Storage Orders details

What are the technical challenges for the Euphemia algorithm?

1. **Implementation**
   - The implementation of storage orders into the optimization problem addressed by the Euphemia algorithm involves significant complexity.

2. **Number of variables**
   - A lot of variables are required to represent transfer of power between periods (similarly to how lines operate)

3. **Number of orders**
   - Large numbers of storage orders are likely challenging to tackle in practice.

From Euphemia performance point of view, it seems to be **necessary to group (aggregate) the individual storage systems** to maintain the satisfactory performance in the market coupling calculation process.

Introduction to the Storage Order concept

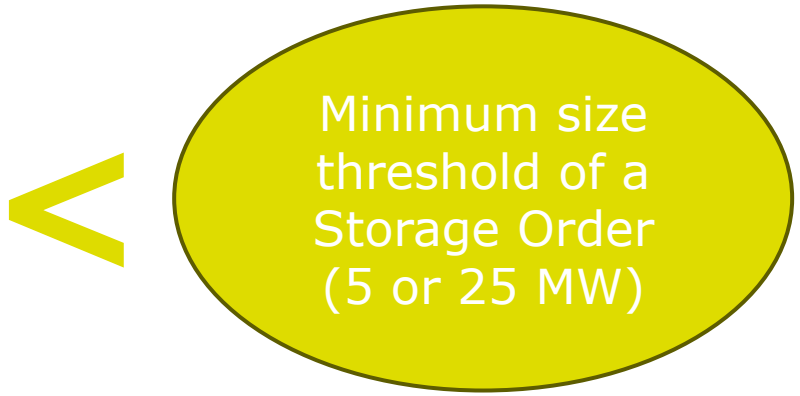
Aggregation

The need for aggregation

- Due to the identified challenges (outlined in the previous slide), there will be a **need to aggregate similar storage systems with the size in MW lower than the minimum size threshold**
  - In the algorithm simulations performed so far, we have assessed **2 potential values of the minimum size of** a single Storage Order: **5 MW or 25 MW**

Aggregated Storage Order

The storage systems with offered capacity **lower than this threshold** need to be **aggregated with other similar storage systems into a single Storage Order** that exceeds the minimum size threshold.



Unaggregated Storage Order

The storage systems with offered capacity **larger than this threshold** can be submitted as a **single (unaggregated) Storage Order** (e.g. the hydro pump stations and large batteries).

Introduction to the Storage Order concept

Aggregated Storage orders: two potential aggregation methods have been identified

- The storage systems with offered capacity lower than the minimum size threshold (values considered: 5 or 25 MW) will be aggregated with similar storage systems for the calculation and de-aggregated with the results back to individual units
  - We have identified two general options for the aggregation:
    - **A) Market Participants individually aggregate their own storage systems**
    - **B) NEMO level aggregation on each bidding zone (BZ)**

- A) On Market Participant level
  - Each MP could aggregate their own storage systems to exceed the minimum size threshold
  - Equally de-aggregation would be done by the MP

- B) On NEMO level
  - Each NEMO would aggregate the orders of its own members on every BZ separately
  - Each NEMO would then agree the aggregation criteria for its members (the same for all) - see next slide for details
    - The orders would need to be submitted to a pre-defined categories, called baskets, with predefined values
    - Market Participants would be limited with the input parameters (not all input parameters as indicated on slide 8 would be available for this type of aggregation)
  - De-aggregation would be done by the NEMO prior sharing the results to individual MPs

Introduction to the Storage Order concept

Aggregated Storage orders: option B) NEMO level aggregation – details about baskets

- Market participants would have to **choose from a list of predefined values of the parameters (=basket)**, namely the one that is closest to (and compatible with) their system
- **Multiple baskets would be available which would represent multiple sets of values for different parameters**.
  - Market Participant would submit the value of parameter Power (one per period, MW) (input and output power would be assumed to be equal) – there will be no predefined value for this parameter
  - Baskets with pre-defined values would include the following parameters:
    - Power-to-capacity ratio (-)
    - Starting volume-to-capacity ratio (-)
    - Efficiency (%)
    - Cycling cost (€/MWh)
    - End-of-day value (€/MWh)

The pre-defined values for the basket parameters and the number of baskets are TBD

- Simplification of the basket input parameters compared to the full set of input parameters available for the unaggregated orders (slide 8) has to be done so that NEMOs are able to aggregate the orders.

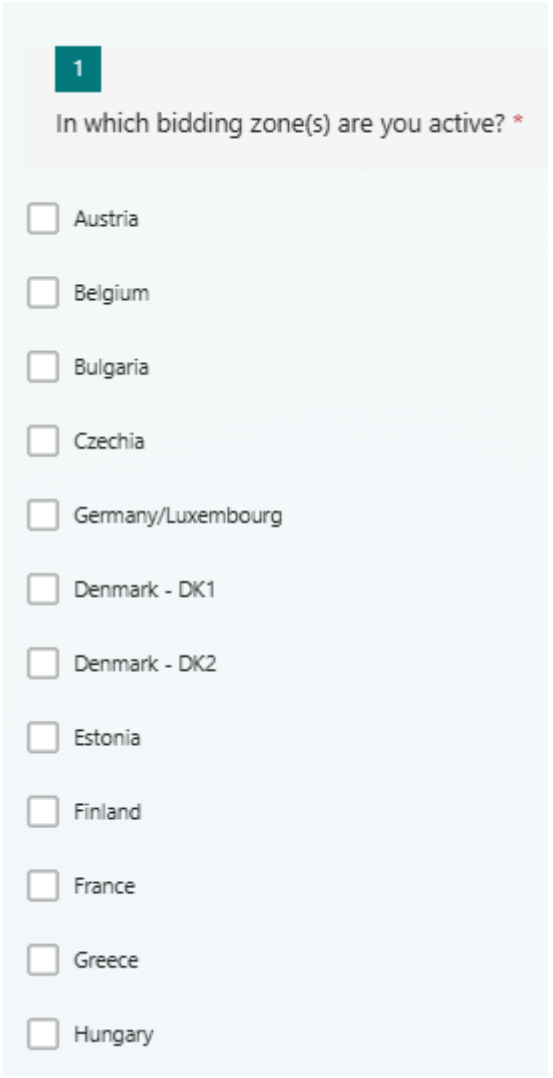
- The concept of the Storage order remains open for refinement. Therefore, we encourage market participants to provide feedback to the questions which will be considered for the finalization of the Storage order concept.

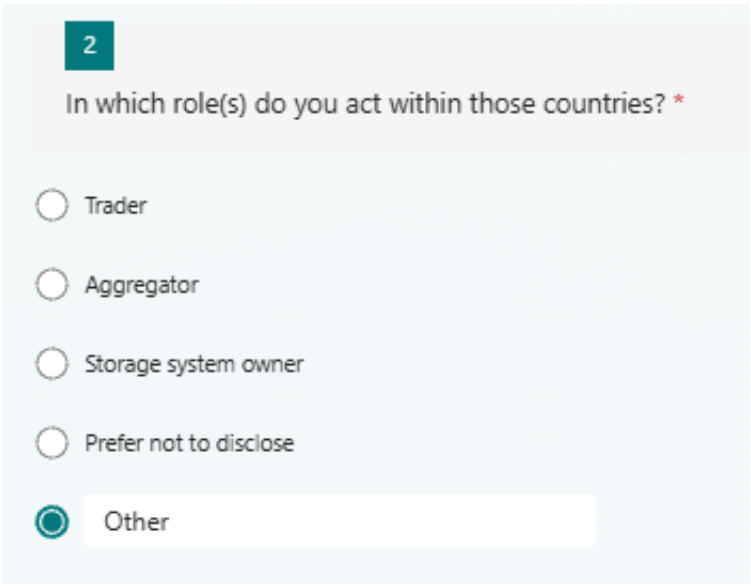
Questionnaire

Explanation of Questionnaire

Questions 1-2

General Questions





Questionnaire:
Storage Order usage

SDAC

Explanation of Questionnaire

Questions 3-6

Questions on Storage Order usage

3

Do you use current order types (e.g. loop blocks) as a way to bid for energy storage systems? (for Other, please explain)

- ◯ Yes
- ◯ No
- ◯ Other

4

Would you use storage orders?
(for Other, please explain what are your concerns)

- ◯ Yes
- ◯ No
- ◯ Other

5

Which types of storage systems would you intend to represent by the storage order? Note: Simulations that have been done so far considered parameters representing only battery and hydro pump storage systems.

- ☐ Battery storage systems
- ☐ Hydro pump storage systems
- ☐ Other

6

How much power in MW would you bid in a single storage order? Indicate your intended value, or if you assume that the power could differ a lot day-by-day then please indicate your expected min to max power range that you would use in a single storage order. (If you are involved in multiple bidding zones, please indicate numbers per individual bidding zone):

Enter your answer

Explanation of Questionnaire

Questions 7-9

Questions on Storage Order usage

7

If you assume that the power in MW that you would bid in a single storage order would change in the coming years (beyond 2027 and further), please indicate the expected outlook. (If you are involved in multiple bidding zones, please indicate numbers per individual bidding zone):

Enter your answer

8

How many storage orders would you use to bid in one day-ahead session (If you are involved in multiple bidding zones, please indicate numbers per individual bidding zone)?

Enter your answer

9

Would you combine different storage systems for submitting a single storage order? (For Other, please explain)

- ◯ Yes
- ◯ No
- ◯ Other

Unaggregated Storage Orders

Part 1a and 1b

SDAC

Explanation of Questionnaire

Questions 10-14

Questions on Storage Order design
Part 1a, unaggregated storage orders

Storage orders design (part 1a)

This page contains questions about the storage order input parameters (considering the parameters for an **unaggregated storage order**, not the baskets)

10

Do the storage order input parameters, both "required" and "optional parameters", meet your needs to define a storage order?
(If not, please explain)

- ◯ Yes
- ◯ Other

11

Do you find any other input parameter that should be available for the storage orders apart from the input parameters defined in the document?

Enter your answer

→ See slide 8

Required parameters:

- **Maximum energy stored** (one per period – MWh)
  - Assets have a fixed capacity.
- **Maximum input power** (one per period – MW)
  - Assets can only charge at a certain rate.
- **Maximum output power** (one per period – MW)
  - Assets can only discharge at a certain rate.
- **Cycling costs** (one per order – €/MWh)
  - Most asset owners only want a cycle on their asset if they have enough revenues.

Optional parameters (in case not specified, the default value would be used):

- **Starting energy stored** (one per order – MWh) default 0
- **Minimum energy stored** (one per period – MWh) default 0
- **Efficiency** (one per order – %) default 100
- **Value given to energy stored at the end of the day** (one per order – €/MWh) default 0
  - End of day remaining charge can generate value for the asset owner. This parameter can be used to avoid ending up with empty storage at the end of the day, by assigning value to the remaining energy.

Explanation of Questionnaire

Questions 10-14

Questions on Storage Order design
Part 1a, unaggregated storage orders

Storage orders design (part 1a)

This page contains questions about the storage order input parameters (considering the parameters for an **unaggregated storage order**, not the baskets)

12

Do you find any of the input parameters defined in the document as useless (i.e. you would not consider these parameters for bidding for a storage order)?

Enter your answer

13

Regarding the optional input parameters of a storage order, are the default values indicated in the document fine for you?
(If not, please explain which values you prefer)

- ◯ Yes
- ◯ Other

14

Do you have any other comment to the input parameters?

Enter your answer

→ See slide 8

Required parameters:

- **Maximum energy stored** (one per period – MWh)
  - Assets have a fixed capacity.
- **Maximum input power** (one per period – MW)
  - Assets can only charge at a certain rate.
- **Maximum output power** (one per period – MW)
  - Assets can only discharge at a certain rate.
- **Cycling costs** (one per order – €/MWh)
  - Most asset owners only want a cycle on their asset if they have enough revenues.

Optional parameters (in case not specified, the default value would be used):

- **Starting energy stored** (one per order – MWh) default 0
- **Minimum energy stored** (one per period – MWh) default 0
- **Efficiency** (one per order – %) default 100
- **Value given to energy stored at the end of the day** (one per order – €/MWh) default 0
  - End of day remaining charge can generate value for the asset owner. This parameter can be used to avoid ending up with empty storage at the end of the day, by assigning value to the remaining energy.

Explanation of Questionnaire

Questions 15-22

Questions on Storage Order design
Part 1b, unaggregated storage orders

Storage orders design (part 1b, input parameters)

This page contains questions about the storage order input parameters (considering the parameters for an **unaggregated storage order**, not the baskets)

Could you please provide indicative value(s) of the input parameters that you would submit for defining a storage order?

- ***Please indicate a value, multiple values or the range of values*** *for each of the input parameters. (If you are involved in multiple bidding zones, please indicate numbers per individual bidding zone)*
- *Note: Your answer would substantially help us to perform simulations with values that could be expected in the market.*

15. Maximum energy stored (one per period – MWh): _____
16. Maximum input power (one per period – MW) :_____
17. Maximum output power (one per period – MW):_____
18. Cycling costs (one per order – €/MWh) :_____
19. Starting energy stored (one per order – MWh):_____
20. Minimum energy stored (one per period – MWh):_____
21. Efficiency (one per order – %):_____
22. Value given to energy stored at the end of the day (one per order – €/MWh): _____

Aggregation options

Part 2

Explanation of Questionnaire

Questions 23-25

Questions on Storage Order design
Part 2, aggregation options (orders lower than minimum MW threshold)

Storage Order design (part 2)

This page contains questions about **aggregation options** for the storage orders with the size (in MW) **lower than the predefined minimum MW threshold**:

23

Would it be acceptable for you that for a storage order a minimum size (power value in MW) would be imposed and only market participants could aggregate the storage systems themselves into a single storage order (i.e. only market participants' aggregation option would be available, not the NEMO aggregation with defining a storage order using baskets as defined above)?

Yes? please indicate which minimum power value (in MW) would be acceptable for you (currently considered options are 5 MW or 25 MW)
No? please explain
Other? please explain

Enter your answer

24

Would you have the need to define the storage order with lower size than the minimum size threshold (currently considered options for the minimum size are 5 MW or 25 MW), i.e. the market participants' aggregation option would not be possible for you?

Yes
No? please explain
Other? please explain

Enter your answer

25

Would you use the possibility to define the storage order using baskets for the storage orders with the power in MW below the minimum size (currently considered options for the minimum size are 5 MW or 25 MW)?

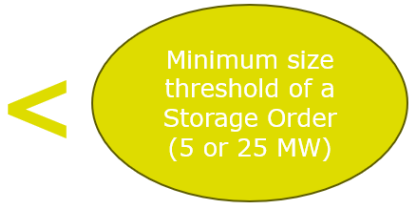
Yes
No? Please explain
Other? Please explain

Enter your answer

→ See slide 10

Aggregated Storage Order

The storage systems with offered capacity **lower than this threshold** need to be **aggregated with other similar storage systems into a single Storage Order** that exceeds the minimum size threshold.



Unaggregated Storage Order

The storage systems with offered capacity **larger than this threshold** can be submitted as a **single (unaggregated) Storage Order** (e.g. the hydro pump stations and large batteries).

SDAC

NEMO aggregation

Part 3a and 3b

Explanation of Questionnaire

Questions 26-28

Questions on Storage Order design
Part 3a, NEMO aggregation

Storage Order design (part 3a)

This page contains questions about **baskets (option of NEMO aggregation)** for defining storage orders that have **lower size (MW) than the pre-defined minimum MW threshold)**

26

Would the suggested baskets (i.e. the sets of the combinations of the values of the basket parameters) meet your needs for defining the storage orders that have lower size (in MW) than the predefined minimum MW threshold?
Note: for the exact values of the basket parameters to be defined please see other questions.

(For other, please explain)

- ◯ Yes
- ◯ No
- ◯ Other

27

There is a simplification meaning that the basket parameters including Power (in MW) assumes that the input and output power (in MW) is equal. Is such simplification acceptable for you to define a storage order?

Yes
No? please specify which parameters would you prefer
Other? please explain

Enter your answer

28

How many baskets (with different values) do you see necessary to be available for the market?

Enter your answer

→ See slide 12

Aggregated Storage orders: option B) NEMO level aggregation – details about baskets

- Market participants would have to **choose from a list of predefined values of the parameters (=basket)**, namely the one that is closest to (and compatible with) their system
- **Multiple baskets would be available which would represent multiple sets of values for different parameters.**
  - Market Participant would submit the value of parameter Power (one per period, MW) (input and output power would be assumed to be equal) – there will be no predefined value for this parameter
  - Baskets with pre-defined values would include the following parameters:
    - Power-to-capacity ratio (-)
    - Starting volume-to-capacity ratio (-)
    - Efficiency (%)
    - Cycling cost (€/MWh)
    - End-of-day value (€/MWh)

The pre-defined values for the basket parameters and the number of baskets are TBD

Explanation of Questionnaire

Questions 29-45

Questions on Storage Order design
Part 3b, NEMO aggregation

Storage Order design (part 3b, input parameters)

This page contains questions about **baskets (option of NEMO aggregation)** for defining storage orders that have **lower size (MW) than the predefined minimum MW threshold)**

Which values of basket parameters would you suggest? Please indicate a suggested combination of values of basket parameters for each basket(s):

Basket 1:

29. Power-to-capacity ratio (-) :_____
30. Starting volume-to-capacity ratio (-):_____
31. Efficiency (%) :_____
32. Cycling cost (€/MWh) :_____
33. End-of-day value (€/MWh):_____

Basket 2:

34. Power-to-capacity ratio (-) :_____
35. Starting volume-to-capacity ratio (-):_____
36. Efficiency (%) :_____
37. Cycling cost (€/MWh) :_____
38. End-of-day value (€/MWh):_____

Basket 3:

39. Power-to-capacity ratio (-) :_____
40. Starting volume-to-capacity ratio (-):_____
41. Efficiency (%) :_____
42. Cycling cost (€/MWh) :_____
43. End-of-day value (€/MWh):_____

44

Additional baskets:

Enter your answer

45

Would you have any other comment regarding the baskets?

Enter your answer

Explanation of Questionnaire

Questions 46-48

Questions on Storage Order design
Part 3b, NEMO aggregation

46

If you wish, please provide your further comments/considerations relevant to the storage orders:

Enter your answer

47

Do you have any questions regarding the introduction of the storage orders (that could be answered during the planned webinar or also after the webinar during the next MCCG meeting (Market Coupling Consultative Group))?

Enter your answer

48

Would you be willing to be contacted for giving potential further elaboration on your answers if necessary?

If yes, please provide your e-mail below.

Enter your answer

Q&A

Are there any questions?

If so, use the Slido link.

Q&A via **Slido.com**
Enter code: **1260435**

Questions received before the webinar:

1) Does there always exist a solution so that changing buy/sell profile would not increase MPs‘ income?
2) How will Storage Order change prices on DAM?

Thank you for attending!

The public consultation will run until 30/06.
Please find all related information by scanning the QR codes below.

Further questions can be raised to us via info@mcsc-communication.eu

A short update on the public consultation will be given during the MCCG webinar on 08/07.

NEMO committee website

ENTSO-E website

SDAC