

# Services to Support Transmission Infrastructure

## Energy Storage Applications Forms

Brussels, August 2021

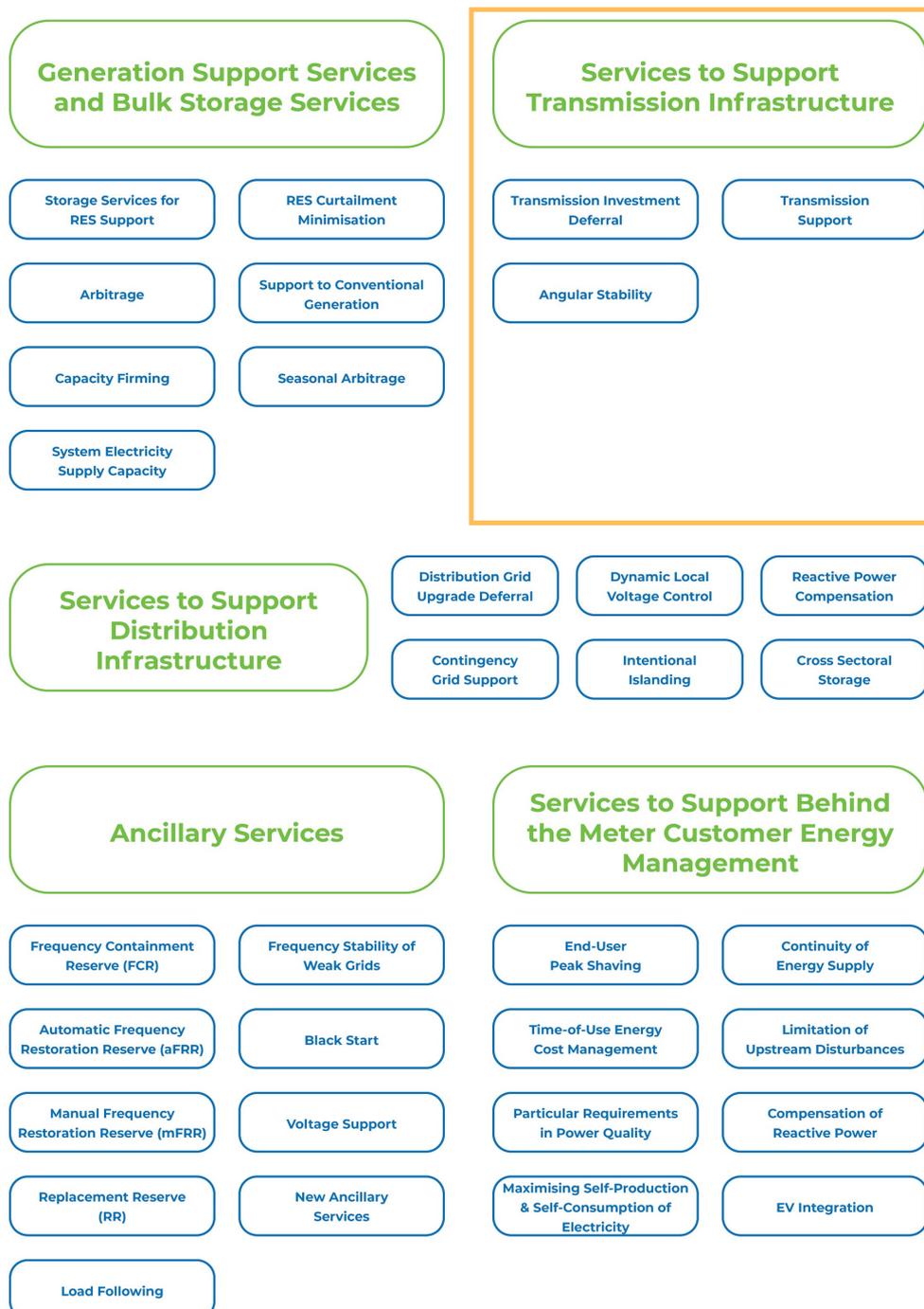


EASE would like to thank the Technology and Value Assessment Committee Task Force on Segmentation of Applications, led by Jean-Michel Durand (EASE Technical Advisor), for preparing this paper.

# Introduction

This overview provides a summary of the different energy storage applications, focused mainly on the electricity system, in order to illustrate the many services that energy storage can provide. The forms are organised according to the segment of the energy system that benefits from a given service; this categorisation does not necessarily reflect the location in which the storage device is installed. The terms for individual services, as well as their maturity (existing service vs emerging or future service) varies across different EU Member States.

The transmission infrastructure services are ones that energy storage could provide as an alternative or complement to traditional transmission infrastructure assets.



# Table of Contents

Introduction ..... 3

Abbreviations ..... 5

1. Transmission Investment Deferral ..... 6

2. Angular Stability ..... 7

3. Transmission Support ..... 8

# Abbreviations

List of abbreviations used in this form:

- CAES: Compressed Air Energy Storage
- DSO: Distribution System Operator
- ES: Energy Storage
- LAES: Liquid Air Energy Storage
- PHS: Pumped Hydro Storage
- TSO: Transmission System Operator

# 1. Transmission Investment Deferral

## 1. Definition

The objective is to use energy storage to defer transmission infrastructure upgrades and solve transmission congestion issues by installing energy storage systems instead of new lines.

## 2. Technical characteristics

- ES size range: 50 → 500 MW
- Target discharge duration range: 1 h → 8 h
- Minimum cycles/year: > 100
- Ramp-up: some minutes

## 3. Application providers

- ES operator
- TSOs

## 4. Application beneficiaries

- TSOs
- DSOs

## 5. Market value of the application

- TSO saving when it defers a transmission upgrade investment for  $n$  years
- Transmission congestion charges

## 6. Application synergies for stacking

- Arbitrage
- Electric supply capacity
- Transmission congestion relief
- Voltage support
- Capacity firming

## 7. Potential energy storage technologies

- Electrochemical: classical & flow batteries
- Mechanical: PHS, CAES
- Thermal: LAES

# 2. Angular Stability

## 1. Definition

Use of energy storage to charge and discharge high levels of energy in short periods when an accident occurs; this may contribute to reduce the load-angle variations, thereby improving angular stability of the system.

## 2. Technical characteristics

- ES size range: 10 → 100 MW
- Target discharge duration range: 0.5 sec → 60 seconds
- Minimum Cycles/Year: 20 → 100
- Ramp-up:  $\leq$  some ms

## 3. Application providers

- ES operator
- TSOs

## 4. Application beneficiaries

- TSOs
- ES operators
- Traditional power plant owners

## 5. Market value of the application

- Higher reliability of the production
- Power quality improvement

## 6. Application synergies for stacking

- Electric energy time shift
- Electric supply capacity
- Ancillary Services
- Voltage support

## 7. Potential energy storage technologies

- Electrical: Ultracapacitors
- Electrochemical: Lithium-ion & classical electrochemical batteries
- Mechanical: Flywheels

# 3. Transmission Support

## 1. Definition

The objective is to use energy storage to improve the performance of the transmission system by compensating for electrical anomalies and disturbances such as voltage sag, unstable voltage, and sub-synchronous resonance.

## 2. Technical characteristics

- ES size range: 10 → 100 MW
- Target discharge duration range: 5' → 2 h
- Minimum cycles/year: 20 → 100
- Ramp-up: ≤ some ms

## 3. Application providers

- ES operator
- TSOs

## 4. Application beneficiaries

- TSOs

## 5. Market value of the application

- Improvement of the power quality
- Higher system security
- Reduction of the power supply disturbances

## 6. Application synergies for stacking

- Transmission congestion relief
- Ancillary services
- Voltage support

## 7. Potential energy storage technologies

- Electrical: Flywheels
- Electrochemical: Classical & flow batteries
- Mechanical: PHS, CAES
- Thermal: LAES

\*\*\*

#### About EASE:

The European Association for Storage of Energy (EASE) is the leading member - supported association representing organisations active across the entire energy storage value chain. EASE supports the deployment of energy storage to further the cost-effective transition to a resilient, carbon-neutral, and secure energy system. Together, EASE members have significant expertise across all major storage technologies and applications. This allows us to generate new ideas and policy recommendations that are essential to build a regulatory framework that is supportive of storage.

For more information please visit [www.ease-storage.eu](http://www.ease-storage.eu)

\*\*\*

#### Disclaimer:

This content was elaborated by EASE and reflects a consolidated view of its members from an energy storage point of view. Individual EASE members may adopt different positions on certain topics from their corporate standpoint.

\*\*\*

Policy Contact: Susan Taylor | Energy Storage Analyst |  
| [s.taylor@ease-storage.eu](mailto:s.taylor@ease-storage.eu) | +32 (0)2 743 29 82



**European Association  
for Storage of Energy**

Avenue Adolphe Lacombé 59/8

1030 Brussels | Belgium

Tel: +32.2.743.29.82

@EASE\_ES

[www.ease-storage.eu](http://www.ease-storage.eu)

[info@ease-storage.eu](mailto:info@ease-storage.eu)

