

Energy storage - application and technology

1 – Introduction

2 – Introduction to energy storage

- 1 Introduction
- 2 Options for renewable energy integration
- 3 Storage cycles
- 4 Components of EESS
- 5 Installed capacity and technologies of EESS world wide

3 – Terminology and definitions

- 1 Definitions I
- 2 Definitions II
- 3 Definitions III

4 – EESS applications according to system integration method and duration of power supply

- 1 Overview of EESS classifications
- 2 Class A
- 3 Class B
 - Class B1: short-term EESS
 - Class B2: medium-term storage
 - Class B3: long-term storage
- 4 Class C

5 – Storage applications in different sectors

- 1 Electro-mobility
- 2 Residential energy storage
- 3 Industrial energy storage and uninterruptible power supply (UPS)
- 4 Island grids

6 – Storage technologies

- 1 Introduction: Storage categories according to the type of energy stored

2 Mechanical energy storage systems

- Introduction to mechanical energy storage
- Flywheels (FES)
- Compressed air energy storage (CAES) systems
- Pumped hydro storage (PHS)

3 Electrical energy storage systems

- Introduction to electrical energy storage
- Super capacitors (SuperCaps)
- Superconductive magnetic energy storage (SMES)

4 Electrochemical energy storage systems

- Introduction to chemical energy storage
- Internal storage systems
- External storage

5 Thermal energy storage (TES)

- Introduction to Thermal energy storage (TES)
- Low-temperature TES
- High-temperature TES

7 – Economics of energy storage systems

1 EESS costs

- Levelised cost of storage
- Life cycle cost calculation parameters
- Cost calculation examples
- Future costs and performance outlook of EESS

2 Competition among technologies

- Electricity-to-electricity
- Large versus small systems
- Double or multiple use of EESS

8 – Summary of the course

- 1 Summary
- 2 References / further reading