

Facilitating energy storage to allow high penetration of intermittent **renewable energy**



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stoRE: Main Facts

- From May 2011 to April 2014
- **Aim:** facilitate the high penetration of intermittent renewable energies in the European grid by unblocking the potential for energy storage infrastructure
- **Overall objective:** help creating the regulatory and market conditions that will give incentives for development of the necessary storage infrastructure



Project Summary

stoRE will support the development of ES infrastructure in Europe to the extent necessary for the accommodation of the planned RE installations to the electricity grid, through:

- Analysis of the energy storage status and potential
- Assessment of the environmental considerations for the development and operation of energy storage facilities
- Identify, assess and review together with the key stakeholders the regulatory and market framework conditions in Europe and in the target countries
- Dissemination activities for improving the understanding of the benefits of energy storage for the energy systems of Europe.

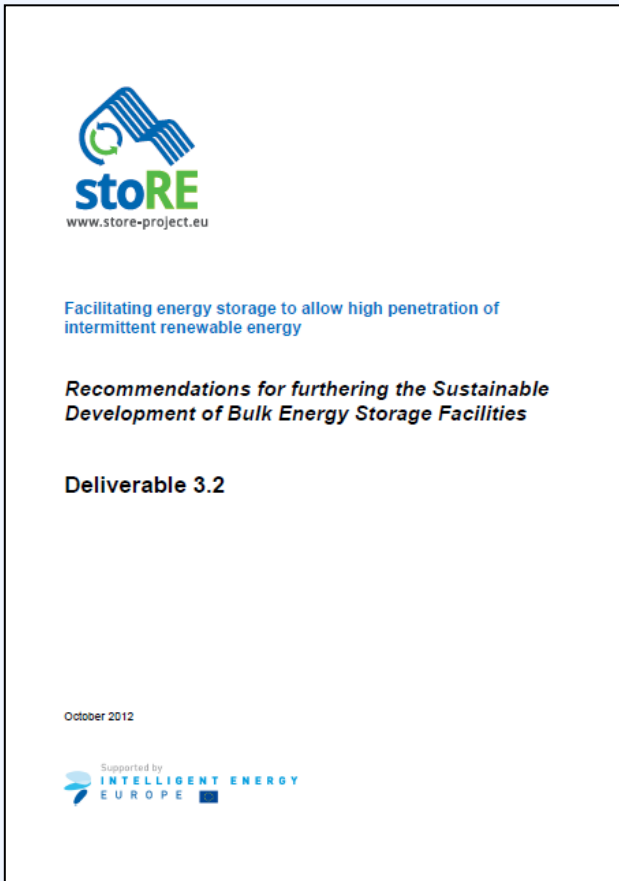


Presentation Structure

Part I: Recommendations for furthering the Sustainable Development of Bulk Energy Storage Facilities

Part II: Review of the Regulatory and Market Framework Conditions ← Open consultation

Recommendations for furthering the Sustainable Development of Bulk ES Facilities



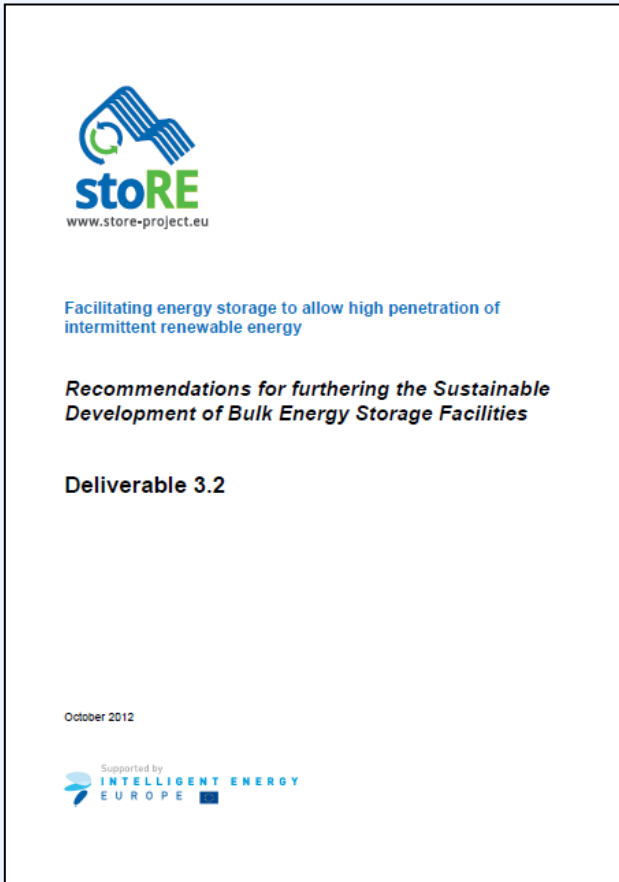
[Link to report](#)

Aim: Provide policy makers, planners & developers with recommendations to further the sustainable development of bulk EST projects by eliminating or reducing adverse environmental effects.

Methodology:

- Wide stakeholder consultation process
- 3 RT discussions with relevant stakeholders
- Previous stoRE reports + extens. literature review
- Expert input from the assessment team

Recommendations for furthering the Sustainable Development of Bulk ES Facilities



Relevant Directives for Project Development:

- Renewable Energy Directive (Directive 2009/28/EC)
- Water Framework Directive (Directive 2000/60/EC)
- Directives Relating to Biodiversity and Natura 2000 Network
 - Habitat Directive (Directive 92/43/EEC)
 - Birds Directive (Directive 2009/147/EC)
- Directives Relating to Environmental Assessment
 - SEA Directive (Directive 2001/42/EC)
 - EIA Directive (Directive 2011/92/EEC)

[Link to report](#)

Recommendations for furthering the Sustainable Development of Bulk ES Facilities

Recommendation 1: Identify the Need

Once the need for bulk EST has been identified, it is essential that energy storage policy and clearly discernible objectives are developed at EU and MS level.

Recommendation 2: Develop Plans and Programmes

Where MS acknowledge the need for energy storage in their NREAP they should consider this technology at a strategic planning level, the early stage of the decision-making cycle, and develop sustainable plans and programmes to facilitate the national and regional deployment of bulk EST as appropriate.



Recommendation 3: Identify Viable Sites at Strategic Level

It is recommended that physically viable sites be identified and tested (subject to environmental assessment) at a strategic level during the development of PHES plans and programmes.

Recommendations for furthering the Sustainable Development of Bulk ES Facilities

Recommendation 4: Develop Clear Guidelines and Document Best Practice

Clear MS guidelines for sustainable project development, best practice guidelines and guidelines for planning are required to further the sustainable development of bulk EST.

Recommendation 5: Facilitate Planning and Approval Procedures

It is recommended that the efficiency and speed with which bulk EST projects are considered during the planning approval stage be improved with the establishment of appropriate mechanisms.

Presentation Structure

Part I: Recommendations for furthering the Sustainable Development of Bulk Energy Storage Facilities

Part II: Review of the Regulatory and Market Framework Conditions ← Open consultation

Review of the Regulatory and Market Framework Conditions

Aim:

Identify the key elements of the existing European framework that potentially create unfavorable conditions for the development and operation of ES infrastructure and provide recommendations for improvements

Methodology:

- A critical review of EC Directives and energy market regulations
- Open stakeholder consultation
- 3 RT discussions with relevant stakeholders
- Expert input from the assessment team

Collected feedback

Current Business Model: Feasibility

The **spread between off-peak and peak prices** has been **decreasing** (partly because of high generation by volatile RES) ---> Smaller profit margins for ES plants ---> Uneconomic to build new PHES

Additional income streams for ESF vary in different MS and include reserve markets, ancillary services markets, balancing markets, capacity markets and portfolio effects. **But** market design is not clear and price trends in these markets are difficult to foresee ---> Financing difficulties

ESF have to pay **grid fees** for both consuming and generating energy ---> further profitability reduction

Collected feedback

Market Design: Grid Fees

Possible recommendation:

- No double grid access fees
- Common rules across the EU regarding grid access fees in order to avoid deployment of an ESF in one MS for use in another MS with less favourable rules

Collected feedback

Current Business Model: Financial Support

Infrastructure package: Financial support possible for transmission lines and certain types of ESFs but not for PHES ---> Market distortion

Equally open support to all ESTs

Removing support from all ESTs

} Level-playing field between PHES and other ESTs

Collected feedback

Regulatory Framework: Unbundling principle

Electricity Directive:
Electricity generation
not controlled by TSOs

+

ES is treated
as generation

=

**TSOs shouldn't have
any control over ESFs**

TSOs should define the products needed for balancing and stability of the system and use **market based mechanisms** for procuring these products

However, there is still **legal uncertainty** regarding the implementation of the unbundling principle on ES ---> Example: controversial regulation in Italy where TSO owns and operates batteries.

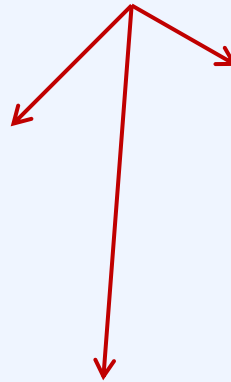
ENTSO-E in the latest TYNDP: *“In terms of regulatory issues, open questions are related to which players (private market operators contributing to system optimization or regulated operators) shall own and manage storage facilities*

Collected feedback

Regulatory Framework: Unbundling principle

The on-going discussion does not help ES to progress in a clear framework. **A definition of storage should be included in the Electricity Directive, the unbundling principle has to be officially clarified**

Option 1: The unbundling principle should apply also to ES
---> No TSO control over ESFs



Option 2: Allow control by TSOs on ESFs but subject to conditions that would ensure the functioning of an open, fair and transparent market

Option 3: None of the above gives the optimal technical, economic and social result on a system level when transmission vs. storage decisions need to be made ---> introducing the option of exceptions defined with clear and transparent criteria implemented under the supervision of ACER

Collected feedback

Market Design: Market failure

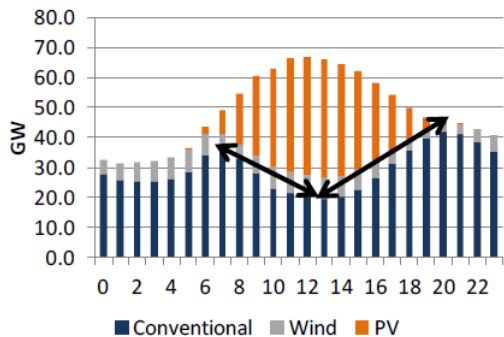
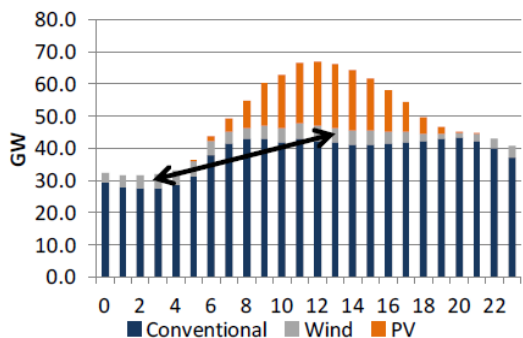
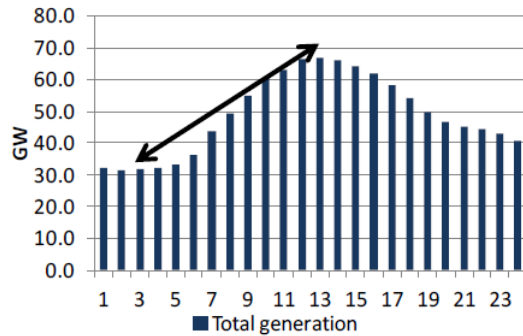
Clear **market signals** on expected income from the provision of their services are needed ---> These signals would be interpreted by ES operators

Adequate market signals are in place. If PHES or other ESS are not viable in certain MS, this means that there are **other resources** that can provide the needed services **more efficiently**

Market signals alone are not enough for the **timely** indication of the need for storage in a market with financial support for RES and transmission infrastructure

Collected feedback

Market Design: Market failure



Source: Simon Mueller, IEA

Medium term: Solar energy helps to smooth the residual load curve reducing the need for ES.

Long term: The need for ES is expected to grow again.

Currently there is no market signal pointing in this direction. But **PHES** has **development** times that can be **over 10 years**. So, if energy storage will be required in the period 2020 to 2030, the **markets signals should be available now**. *<--- Market failure*

Use models for predicting future ES needs in order to design a suitable intervention in the market design

Collected feedback

Market Design: Ways to overcome the market failure

Introduction of elements that **reward flexibility in RES support mechanisms** could reduce distortion in the market and make the market signals for flexibility and storage requirements more clear

Support storage only when storing **excess RES-e**

Establish a **forward services market** in which the service is bought sufficiently far forward

Capacity payments or tenders where the capacity contribution of ESF will be defined according to clear and widely accepted rules

Collected feedback

Market Design: Balancing Market

Stakeholders are keen to see the full transposition of **transparent and market based mechanisms for balancing** and the development of the **network guidelines on balancing**, allowing them to participate in cross border balancing activities

- Draft report available for feedback in a couple of weeks
- stoRE event within EUSEW (late June 2013)

Thank you!