



www.store-project.eu

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

Minutes of 2nd Round Table Discussion on European Market and Framework Conditions affecting energy storage

Sustainable Energy Week, Brussels, 19th of June 2012



Acknowledgements

This report has been produced as part of the project “Facilitating energy storage to allow high penetration of intermittent renewable energy”, stoRE. The logos of the partners cooperating in this project are shown below and more information about them and the project is available on www.store-project.eu



The work for this report has been coordinated by WIP.

The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.

Table of Contents

ACKNOWLEDGEMENTS.....	2
INTRODUCTION.....	4
THE PROCESS OF THE ROUND TABLE.....	5
THE DISCUSSION	5
POINTS FOR FURTHER DISCUSSION.....	6
ANNEX 1: PRESENTATION BY THOMAS MAIDONIS	7
ANNEX 2: PRESENTATION BY RAQUEL GARDE.....	11

Introduction

The Round Table discussion was part of Work Package 4 “European regulatory market and framework analysis”. It was organized by ESHA within the frame of the Sustainable Energy Week and took place from 14:00 to 16:00 on the 19th of June 2012 at the Renewable Energy House in Brussels.

The aim of the Round Table was to talk about the outcomes of D4.1 “Analysis of the European regulatory and market framework conditions” and collect valuable feedback for the finalisation of its draft version from CENER. The highlights of the deliverable were summarized and presented by Raquel Garde at the meeting.

Table 1: Participants List

No.	Name	Organisation
1	Jean Michel Ancion	ORKA
2	Joachim Balke	DG ENER - C1
3	Bernard De Clercq	Elia
4	Maria João Duarte	EASE
5	Raquel Garde	CENER
6	Frederik Geth	K.U.Leuven
7	Jennifer Xiao Bao Huang	The Alliance for Offshore Renewables
8	Mark Johnston	WWF European Policy Office
9	Oliver Jung	ESHA
10	Thomas Maidonis	WIP
11	Christine van Oldeneel	HEA

The Process of the Round Table

At the beginning Oliver Jung (ESHA) shortly welcomed the participants who then introduced themselves. After that Thomas Maidonis (WIP) presented the stoRE project, the goals and predicted outcomes and explained to the participants the reason why this Round Table discussion is taking place. The floor was then given to Raquel Garde (CENER) who presented the relevant points of all the related European documents that have been revised (presentations included in the Annex). A discussion on regulatory and market framework issues concerning bulk scale energy storage took place in parallel to the presentation.

The Discussion

The discussion started with Bernard De Clercq (Elia) who mentioned that the problem for the operation of energy storage facilities occurs because it is seen as energy production and TSOs are not allowed to own generation capacity. Raquel Garde pointed out that privately owned businesses are allowed to provide ancillary services to the grid, however, as Christine van Oldeneel (HEA) added, such a scheme cannot be profitable within the current market conditions. This happens because the ever rising quantity of RES-E into the grid leads to a decreasing spread between peak and low electricity prices, which is the only source of income for a balancing services provider within a deregulated market. It was then mentioned that technical requirements to connect to the grid are met from storage facilities and that their operation is rather facing problems related to the administrative procedure than technical ones.

Mark Johnston (WWF) preferred to set the discussion at a different level asking first of all clarifications on why Europe should invest in energy storage and whether a storage unit should be seen differently than a generation one. Thomas Maidonis mentioned that energy storage is not the only solution to the problems caused by increasing variable RES penetration. Other options such as more extended grid interconnection between countries, higher shares of CCGT power generation in the energy mix, curtailment of wind generation when necessary or demand side management do exist, however every country is a different case and storage can play a different role in each country. Raquel Garde mentioned Spain as an example where storage is currently not needed because flexibility is provided to the grid through a high share of CCGT power generation which leads to increased dependency on imports from other countries.

Raquel Garde explained that because of the complexity of the issue and the lack of a harmonised strategy at European level, Member States tend to implement the EU regulations differently at national level. As a reaction on slide 7 from Raquel Garde, stating that in Belgium they are changing their laws to make TSOs able to operate generation plants, Bernard De Clercq replied that indeed in Belgium regulation has recently changed, by transposing the European Third Energy Package into federal law, but that it is not possible for TSO's to operate or own generating plants. They can however, in a last resort, call upon production activities via negotiated drawing rights within the framework of its needs regarding ancillary services. Raquel Garde mentioned that in Italy the regulation has also been changed and that the Italian TSO (Terna) is planning to connect 330 MW of batteries to the distribution grid. The question of whether there should be political support at European policy making level or should the Member States act independently on the issue was raised. It was stressed out that building an internal European electricity market requires seeing the issue from a broader than national perspective.

The discussion was then focused on different potential business models that could provide a smooth future operation to storage facilities. Bernard De Clercq mentioned that maybe different market frameworks, one for large and one for small scale could be more effective. Thomas Maidonis added that, according to other studies, energy storage can be connected to transmission, distribution or consumption even. That includes different stakeholders in each case and therefore a different market framework might be needed respectively. Raquel Garde suggested to further investigate the option of having energy storage capacity owned by a publicly owned entity other than the TSOs or the DSOs and that we also need to approach the issue from a TSO and DSO perspective and not only from an energy storage perspective.

Maria João Duarte (EASE) stressed out the importance of first making a technological assessment and then an economic assessment that will be taking into account the requirements of energy storage in the future. Then, a road map could be developed with recommendations on what should be done at EU and national level.

Points for Further Discussion

As a result of the two round table discussions a comprehensive exchange of views has taken place, resulting in the following points which will be further discussed in the next steps of the consultation process:

- Have the requirements for bulk EST in future European electricity systems been sufficiently studied or is further research needed?
- Does the current electricity market structure provide adequate incentives for the development of the energy storage that will be needed or are the price signals and policy commitments not enough to trigger the investments, especially for pumped hydro plants that can take many years to be completed?
- In order to better exploit the potential for storage would it help to make changes in the regulatory framework, for example by treating it as a new type of entity that is neither a generation, nor a load?
- In Italy regulation allows TSOs to operate energy storage facilities for balancing and stability purposes only. Does this help overcome any existing regulatory obstacles to effectively and efficiently operate storage?
- Does the introduction of ESS in the market reduce the value of other technologies in utilities' portfolios and how should this conflict of interest be dealt with?

Annex 1: Presentation by Thomas Maidonis



Contract N° :
IEE/10/222/ SI2.591026
Duration: 05/2011 – 04/2014

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



The sole responsibility for the content of this presentation lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.



Background

- Wind and solar energy are expected to be a major contributor to achieve the 20% target of energy consumption by 2020 from renewable energy sources.
- In order to allow higher penetration of intermittent renewable energy in the electricity system, an integrated approach including grid reinforcement, demand management and **energy storage** is necessary.
- The value of energy storage in the power system of most European countries is not fully reflected in the current regulatory and policy framework.
- The **environmental requirements** are often listed as one of the key barriers by the project developers.



Project Summary

stoRE will support the development of energy storage infrastructure in Europe to the extent necessary for the accommodation of the planned renewable energy 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 key stakeholders the European regulatory and market framework conditions
- Identify, assess and review together with the key stakeholders the regulatory and market framework conditions in the target countries
- Dissemination activities for improving the understanding of the benefits of energy storage for the energy systems of Europe.



Objectives and main steps

Project aim:

Facilitate the high penetration of intermittent renewable energies in the European grid by unblocking the potential for energy storage infrastructure

Specific Objectives

- Remove environmental regulation barriers while ensuring that the environment is protected
- Assess and review the regulatory and market conditions:
 - on a European level
 - in the 6 target countries
- Engage key actors to implement the recommendations for regulatory reform
- Improve the general understanding of the role energy storage can play in a sustainable future



Expected Results

- Status of the bulk storage technologies and assessment of the potential and the requirements for storage in future energy systems.
- Develop EIA practices that do not impose barriers but still protect the environment.
- Identify key elements in the regulatory and market frameworks that affect the development and operation of storage infrastructure.
- Improve the understanding of the benefits that additional energy storage capacity can bring to the energy systems of Europe.

Consortium

Participant name	Country	Main activities in the project
WIP - Wirtschaft und Infrastruktur GmbH&Co Planungs KG	DE	Coordinator / communication
ESHA - European Small Hydropower Association	BE	Industry / Policy promotion
NTUA - National Technical University of Athens, Mechanical Engineering	EL	Activities in Greece / PHS specialist
UCC - University College Cork, Sustainable Energy Research Group	IE	Activities in Ireland / Environmental specialist
HSU - Helmut-Schmidt-Universität, Electrical Engineering Department	DE	Activities in Germany / Power systems specialist
CENER - National Renewable Energy Centre - RE Grid Integration Department	ES	Activities in Spain / RE grid integration specialist
EMD - Energy System Department	DK	Activities in Denmark / Wind Energy specialist
EEG - Energy Economics Group - TU Wien	AT	Activities in Austria / Energy systems and economics specialist
MWP - Malachy Walsh & Co Ltd T/A	IE	EIA specialists

Contact

Thomas Maidonis

WIP Renewable Energies

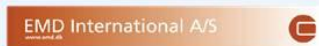
Sylvensteinstr. 2, 81369

Munich, Germany

Phone: +49-89-720 12 720

Email: thomas.maidonis@wip-munich.de

<http://www.wip-munich.de>



Malachy Walsh and Partners
Engineering and Environmental Consultants



Annex 2: Presentation by Raquel Garde



SUSTAINABLE ENERGY
WEEK 18-22 JUNE 2012




EU SUSTAINABLE ENERGY WEEK
18-22 JUNE 2012


Roundtable discussion:
European Regulatory and Market framework
conditions affecting energy storage

Raquel Garde Ph.D
June 20th 2012

Energy




Overview of the work-plan





Assess European regulatory and market frameworks for their effect on energy storage infrastructure and use:


1. Review of the Directives that can have an effect
2. Review of the energy and electricity markets structure imposed by the European Commission to the member countries
3. Open Consultation to identify the key elements of the existing European framework that potentially create unfavourable conditions for the development and operation of energy storage infrastructure
4. Concrete recommendations for improvements
5. Policy promotion of the recommendations



SUSTAINABLE ENERGY
WEEK 18-22 JUNE 2012


2

 		
"Package"	Date	Name
First	19 Dec 1996	Directive 96/92/EC concerning common rules for the internal market in electricity
Second	26 June 2003	Directive 2003/54/EC concerning common rules for the internal market in electricity
		Regulation (EC) No 1228/2003 on conditions for access to the network for cross-border exchanges in electricity
	13 Nov 2003	Commission Decision 2003/796/EC on establishing the European Regulators Group for Electricity and Gas
	9 Nov 2006	Commission Decision 2006/770/EC amending the annex ("Congestion Management Guidelines") of Regulation 1228/2003
Third	13 Jul 2009	Directive 2009/72/EC concerning common rules for the internal market in electricity
		Regulation (EC) No 714/2009 on conditions for access to the network for cross-border exchanges in electricity
		Regulation (EC) No 713/2009 establishing an Agency for the Cooperation of Energy Regulators ("ACER")

3

 	
Consulted documents	
<ul style="list-style-type: none"> • Framework Guidelines from ACER <ul style="list-style-type: none"> • on Electricity System Operation, 2nd December 2011, FG-2011-E.003. • on Electricity Grid Connections, 20th July 2011, FG-2011-E-001. • on Capacity Allocation and Congestion Management for Electricity, 29th July 2011, FG-2011-E-002. • Network Codes from ENTSO-E <ul style="list-style-type: none"> • Requirements for Grid Connection applicable to all Generators, 24th January 2012. • Capacity Allocation and Congestion Management, Draft for consultation, 23rd March 2012 • Capacity Allocation & Congestion Management (CACM), Supporting document 	

4



Consulted documents



- DIRECTIVE 2001/77/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27th September 2001 on the promotion of **electricity produced from renewable energy sources** in the internal electricity market.
- DIRECTIVE 2009/28/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on the promotion of the **use of energy from renewable sources** and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC
- **Energy infrastructure** priorities for 2020 and beyond - A Blueprint for an integrated European energy network, COM(2010) 677 final
- Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on guidelines for trans-European **energy infrastructure** and repealing Decision No 1364/2006/EC, COM(2011) 658 final.
- **Energy Roadmap 2050**, COM(2011) 885/2.
- Investing in the Development of Low Carbon Technologies (**SET-Plan**) COM(2009) 519 final



5



Electricity Directives



Directive 2009/72/EC 13th July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC.

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0072:EN:NOT>

This Directive repeals the Directive 2003/54/EC and has the same objective and scope but it also lays down universal service obligations and the rights of electricity consumers and clarifies competition requirements.

It is worth mentioning some points of the Directive regarding the role of the TSOs and other energy market stakeholders.

(9) Without effective separation of networks from activities of generation and supply (effective unbundling), there is an inherent risk of discrimination not only in the operation of the network but also in the incentives for vertically integrated undertakings to invest adequately in their networks.

(10) ... At its meeting on 8 and 9 March 2007, the European Council therefore invited the Commission to **develop legislative proposals for the 'effective separation of supply and generation activities from network operations'**.



6



Electricity Directives



(11) ... Member States should therefore be required to ensure that the same person or persons are not entitled to exercise control over a generation or supply undertaking and, at the same time, exercise control or any right over a transmission system operator or transmission system. Conversely, control over a transmission system or transmission system operator should preclude the possibility of exercising control or any right over a generation or supply undertaking. Within those limits, a generation or supply undertaking should be able to have a minority shareholding in a transmission system operator or transmission system.

According to this, TSOs cannot be involved in supply or generation. However, some countries are changing their laws to make TSOs able to operate these plants as a grid support for balancing purposes (eg. Italy, Belgium...). There is no consensus whether TSO's or DSO's should be allowed to own and operate an ESS, either for regulation or for merchant activities.



7



Electricity Directives



COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN COUNCIL AND THE EUROPEAN PARLIAMENT - AN ENERGY POLICY FOR EUROPE

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0001:FIN:EN:PDF>


The Communication makes reference to the establishment of an Energy Policy for Europe with the objective of meeting the three main European energy challenges: Competitiveness, Sustainability and Security of supply. The Action Plan is based on the Internal Energy Market, Solidarity between Member States and Security of Supply for oil, gas and electricity, a long-term commitment to greenhouse gases reduction and the EU Emissions Trading System, and an ambitious programme of energy efficiency measures at Community, national, local and international level.


The Action Plan **does not take into account the energy storage** as a potential contributor to any action.



8






www.store-project.eu


ENTSO-E Network Codes


ENTSO-E Draft Network Code for Requirements for Grid Connection applicable to all Generators, 24th January 2012.

https://www.entsoe.eu/fileadmin/user_upload/library/consultations/Network_Code_RfG/120124_Network_Code_for_Requirements_for_Grid_Connection_applicable_to_all_Generators.pdf


This Network Code defines a common set of requirements for Power Generating Facilities, including Synchronous Generating Units, Power Park Modules and Offshore Generation Facilities and sets up a common framework for grid connection of Power Generating Facilities.


In the definition list, a **storage device** operating in electricity generation mode is **considered** to be a **Generation Unit**. Also, Pump-storage Generation Units are mentioned and **shall fulfil all requirements** in both generating and pumping operation mode.


SUSTAINABLE ENERGY
WEEK 18-22 JUNE 2012



9




www.store-project.eu

ENTSO-E Network Codes


Network Code on Capacity Allocation and Congestion Management, Draft for consultation, 23rd March 2012


<https://www.entsoe.eu/consultations/download.php?id=ffff-be6a-cda7-0d06-47b2>

This Network Code aims at setting a common set of rules for capacity allocation and managing cross bidding zone congestion in the Day Ahead and Intraday timeframe. This will involve the establishment of common methodologies for determining the volumes of capacity simultaneously available between Bidding Zones and methodologies for definition of Bidding Zones.

The requirements set forth by this Network Code shall apply to Transmission System Operators, National Regulatory Authorities, the Agency, Power Exchanges, Capacity Traders and all Market Participants active in the Cross Zonal trading of electricity.

There is no specific mention to the energy storage systems.


SUSTAINABLE ENERGY
WEEK 18-22 JUNE 2012



10



Renewable sources Directives

DIRECTIVE 2009/28/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 2 April 2009 on the **promotion of the use of energy from renewable sources** amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC



<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF>


This Directive establishes a common framework for the promotion of energy from renewable sources. It sets mandatory national targets for the overall share of energy from renewable sources in gross final consumption of energy and for the share of energy from renewable sources in transport. It lays down rules relating to statistical transfers between Member States, joint projects between Member States and with third countries, guarantees of origin, administrative procedures, information and training, and access to the electricity grid for energy from renewable sources. It establishes sustainability criteria for biofuels and bioliquids.

The Directive mentions "storage" as a support for RES development but does not define rules for energy storage development.

There is a lack of administrative procedures to develop energy storage facilities





11





Energy infrastructure


EUROPEAN COMMISSION – ENERGY INFRASTRUCTURE




The EU aims to make sure that strategic energy networks and storage facilities are completed by 2020. It concerns energy production, transmission and **storage**. Modern energy infrastructure is crucial for an integrated energy market and to enable the EU to meet its broader climate and energy goals. Europe must modernise and expand its energy network to absorb energy from renewable sources and ensure secure supplies everywhere. It also needs smart grids to save energy and better manage the network.

12



European Commission



stoRE
www.store-project.eu

Energy infrastructure



COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Energy infrastructure priorities for 2020 and beyond - A Blueprint for an integrated European energy network, COM(2010) 677 final


[http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SPLIT_COM:2010:0677\(01\):FIN:EN:PDF](http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SPLIT_COM:2010:0677(01):FIN:EN:PDF)

This Communication outlines a Blueprint which aims to provide the EU with a vision of what is needed for making our networks efficient. It puts forward a new method of strategic planning to map out necessary infrastructures, qualify which ones are of European interest on the basis of a clear and transparent methodology, and provide a toolbox to ensure their timely implementation, including ways to speed up authorisations, improve cost allocation and target finance to leverage private investment.


This Communication mentions the energy storage in some points but only as another component

13



European Commission



stoRE
www.store-project.eu

Energy infrastructure



Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on guidelines for **trans-European energy infrastructure** and repealing Decision No 1364/2006/EC, COM(2011) 658 final.

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0658:FIN:EN:PDF>


This proposal lays down rules for the timely development and interoperability of trans-European energy networks in order to achieve the energy policy objectives of the Treaty on the Functioning of the European Union to ensure the functioning of the internal energy market, to ensure security of supply in the Union, to promote energy efficiency and the development of new and renewable forms of energy, and to promote the interconnection of energy networks.

However, the articles regarding Incentives or Financial Assistance exclude specifically the pumped-hydro electricity storage projects. It means that PHES are not considered as projects of common interest.

There is not a market framework neither a regulation that supports funding and investment in storage.

14



Energy infrastructure


Energy Roadmap 2050, COM(2011) 885/2.

http://ec.europa.eu/energy/energy2020/roadmap/doc/com_2011_885_2_en.pdf


The Energy Roadmap 2050 explores routes towards decarbonisation of the energy system and has developed different scenarios with different shares of renewable energies. From these scenarios, it analyses the needs for energy infrastructure in Europe to achieve the objectives in 2020 and afterwards.


Storage is included in some of these scenarios, such as high efficiency and high penetration of RES. However, the analysis concludes that "Storage technologies remain critical".

With sufficient interconnection capacity and a smarter grid, the need for storage could diminish.




www.store-project.eu





15



SET-Plan

Investing in the Development of Low Carbon Technologies (SET-Plan) COM(2009) 519 final

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0519:FIN:EN:PDF>


The European Strategic Energy Technology Plan (SET-Plan) has been developed by the EU and adopted since 2008 with the aim of strengthening industrial participation in energy research and demonstration, boosting innovation and accelerating deployment of low-carbon energy technologies by involving the European Industrial Initiatives (EII).


There are 8 European Industrial Initiatives included in the SET-Plan but there is no specific initiative related to energy storage technologies. Energy storage is included in the European electricity grid, solar and wind Initiatives.

There is a lack of specific budget among the European Framework Programs to promote and support the development of ESS.



www.store-project.eu





16

Conclusion

- TSOs cannot be involved in supply or generation. However, some countries are changing their laws to make TSOs able to operate these plants as a grid support for balancing purposes (eg. Italy, Belgium...). There is no consensus whether TSO's or DSO's should be allowed to own and operate an ESS, either for regulation or for merchant activities.
- In most of the European documents consulted, there is no specific mention to the energy storage systems.
- There is a lack of administrative procedures to develop energy storage facilities.
- There is not a market framework neither a regulation that supports funding and investment in storage.
- There is a lack of specific budget among the European Framework Programs to promote and support the development of ESS.



Summary of 1st RT Comments

- Most of the people think ESS are not generating systems and a specific regulation should be developed
- There is not a market framework; that makes difficult to define a business model
- Regulation and market should take into account and quantify the services provided by storage (ancillary services, supply cost reduction, ensuring grid stability, ...)
- Any independent "entity" could be owner and operate energy storage plants but a business model ensuring a return is needed (no TSO or DSO)
- Some support measures should be implemented (feed-in tariffs, subsidies, obligation of a minimum storage, ...)



Thank you!

