



No 727481 RESERVE

D7.2 v1.0

Report on fostering support for RESERVE codes and ancillary services

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Abstract:

This report describes the communication and dissemination activities carried out in task 7.2 in order to promote the RESERVE harmonised network codes and enhanced system services between the standard development organizations (SDOs), stakeholders representing European utility operators, and the project Advisory Board.

Preliminary feedback and suggestions received by the target groups are collected and included in the report.

Keyword list:

Network Codes, Ancillary Services, Harmonization, 100% RES, SDOs, TSOs, DSOs, stakeholders.

Disclaimer:

All information provided reflects the status of the RESERVE project at the time of writing and may be subject to change.

Executive Summary

The deliverable D7.2 reviews the communication and dissemination measures implemented within the framework of WP7 and in particular within task 7.2 in order to foster the support for the new set of the network codes and ancillary services proposed as a main project output.

A number of target groups were identified outside the project as the most relevant to consult in order to validate the project findings, proposals, and to facilitate the exploitation of project results. These include: primary stakeholders, standard development organisations, members of the project advisory board, other European policy makers and the energy and ICT scientific communities. Based on the selected audience, a targeted dissemination strategy has been developed to share the current status of ongoing work and to collect feedback about the proposals on regulatory changes (network codes, new standards etc.) which are necessary for the future scenario using up to 100% renewables. These include the development of marketing and communication materials (brochures, videos etc.) aimed at attracting the attention of the different public groups to the project and to raise their interest in the RESERVE vision and content, as well as the organisation of and participation in various networking events with the objective of disseminating the project results and proposed solutions in order to pave the way for the future exploitation.

The main input for the communication and dissemination activities realised within WP7 results from the work carried out in the technical work packages and resumed by WP6, and consists of one proposal for a new network code dedicated to the storage issue and 19 proposals for potential updates of existing network codes.

Preliminary feedback resulting from the interactions with the relevant audiences highlighted the following:

- The RESERVE Advisory Board gave positive feedback about the work and path followed within the project.
- The vast majority of those consulted about the RESERVE proposals for new and updated NCs showed interest in the topics, agreed on the need of addressing them on time, but were very careful in expressing their opinion about the way things could evolve from this point of view in the next years. At the moment, most of them prefer to observe the evolving energy scenarios from the outside and try to understand what changes could or should occur, stating that any practical proposal for changes needs to be properly supported by experimental data and tested on field trials.
- Moreover many actors are focused on the implementation of the actual codes now and, although they see the importance of our work, think that it is not yet the time, or they don't have the possibility now to dedicate more resources to it.
- Special interest was shown by all people interviewed regarding the RESERVE proposal for a new NC dedicated to storage.
- All groups were also asked about the evolving relationship between TSOs and DSOs in a scenario with a high RES share (i.e. in the voltage and frequency control areas), which will mainly result in an increased involvement and responsibility of DSOs. There is the common perception that changes will necessarily occur and that building a new relationship based on a new share of responsibilities will be challenging for both parties, due to differences in perception related to the ways in which these changes will be implemented and to the timeframes. The main concern of these institutions is the need for avoiding over-regulation.

In general, all groups of interest that were consulted appeared to be open to learn more about the RESERVE findings and proposals, and there was a unanimous request for staying in contact until the end of the project and beyond, in order to find the best way to implement these proposals in practice.

Authors

Partner	Name	Phone/ e-mail
FEN		
	Marina Maicu	Phone: +49 241 80 22472 e-mail: mmaicu@fenaachen.net
CRE		
	Mihai Paun	Phone: +40 723.324.960 e-mail: mihai.paun@crenerg.org
	Mihai Mladin	Phone: +40 720.068.196 e-mail: mihai.mladin@crenerg.org
	Dan Preotescu	Phone: +40 746 233 102 e-mail: dan.preotescu@crenerg.org

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1. Introduction

This deliverable is the major output of task 7.2 of WP7, which aims at maximising the scientific, industrial and societal impact of the project. This is accomplished primarily by creating awareness of the innovative concepts and technologies developed within the project and through the dissemination of the project results. Another important measure is the collection of guiding feedback from the relevant target groups that will be further incorporated in the strategic orientation of the project.

1.1 Motivation

The increased share of renewable energy sources (RES) in the grid of up to 100% requires the development of new concepts and technologies that enable to balance the frequency and voltage and thereby ensure grid stability. Meanwhile, new concepts and services for ancillary services and new harmonised network codes supporting voltage and frequency control for high RES penetration are urgently needed. The network codes (NC) are a set of rules (regulations at national and European level) drafted by ENTSO-E, with guidance from the Agency for the Cooperation of Energy Regulators (ACER), that facilitate the harmonisation, integration and operational efficiency of the European electricity market. In order to become effective, the NC must be adopted within the framework of national and international regulations.

One of the goals of RESERVE is to pave the way for new ancillary services with harmonised network codes, which are needed to safely operate RES-based energy systems. At the same time, new business models will be needed to give energy providers guidance on how to promote their services and offer them in an ethical manner, thus maximising their social acceptance.

Within the framework of WP6, a list of the most important NCs which should be revised and adapted for facilitating the RES penetration in the power systems has been drafted. This list includes 19 items out of them higher priority was assigned to the improvement of the following five:

1. New generation of RES inverters
2. New frequency control concepts
3. System swing dynamics
4. Requirements of minimum system inertia
5. New voltage control concepts

The choice of the five proposals has been based on initial discussions with TSOs and DSOs and represents the most urgent issues that should be considered by the relevant European institutions, associations and standard development organizations working for a smooth transition towards a high-RES scenario. Details regarding the process that brought the first definition of ancillary services and network codes exceeds the scope of this deliverable and can be found in D6.3.

The priority list given above will be regularly reviewed, following further discussions with the sector actors and with the project partners, and it will be modified and updated as required to reflect the received feedback. A second version of the ancillary services and network codes definition will be included in D6.4 at the end of the project.

Moreover, other than the suggestion for the revision of the existing codes, the joint RESERVE work has contributed to the elaboration of the proposal for a new NC, which should focus on the critical issue of the storage.

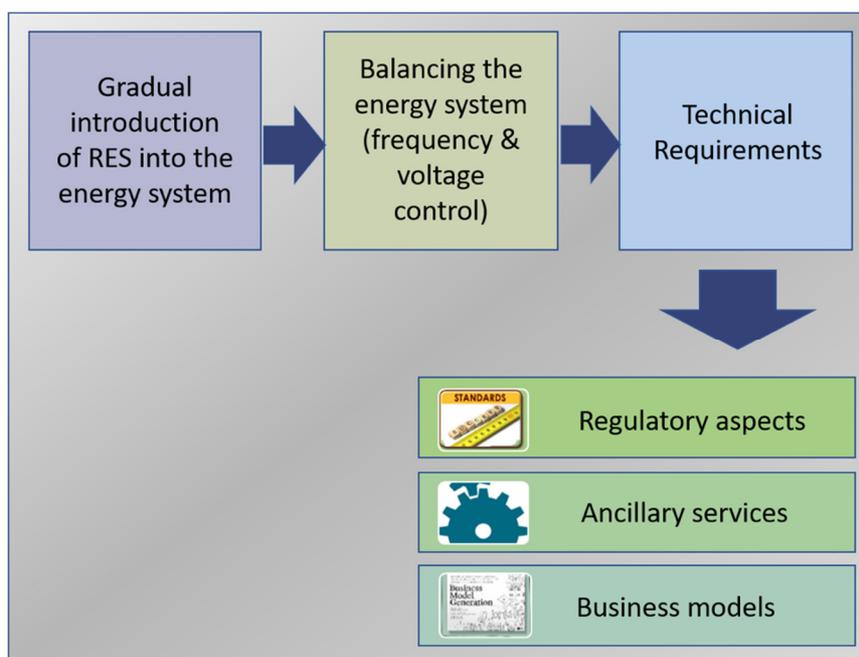


Figure 1 Aspects involved in the definition of new ancillary services and network codes

The comitology for changing the NCs is a long process and involves a large number of stakeholders, institutions, authorities etc. In order to make the transition possible, it is important to raise awareness of the requirements of the future electrical network among the relevant target groups and also to present the solutions proposed by RESERVE to support the necessary changes. This is the aim of the project task 7.2, which is designed to actively engage with the relevant stakeholders.

Three main target groups were identified before the start of the project – as reported in the description of the Task 7.2- as the most relevant entities that are in the position to give us meaningful advice and to effectively exploit the project results:

- Standards Developing Organisations (SDOs), including CEN/CENELEC, IEC and national standardisation bodies;
- Organisations representing european utility operators, such as ENTSO-E, ACER, European DSOs associations, relevant bodies at national level, TSOs and DSOs organizations, etc.
- RESERVE advisory board, composed of renowned members coming from the industry and academic sector.

During the project however we have expanded the interest group for our dissemination activities to include also European policy makers, other EU Projects and the scientific communities.

1.2 Objectives and outline of the deliverable

This report describes the activities carried out in task 7.2 during the first 24 months of the project in order to promote RESERVE's new definition of harmonised network codes and ancillary services for the transition up to 100% RES.

The objectives of this deliverable can be summarised as follows:

- To describe the communication and dissemination tools that were created for a constructive communication between the project and the relevant industry and utilities stakeholders, SDOs and the advisory board members, among others;
- To report on the events organised and attended by the project partners in order to raise awareness of the RESERVE concepts and promote the new definition of ancillary services and network codes;

- To summarise the main feedback received from the consulted audiences until now.

Chapter 2 summarises the dissemination strategy developed within WP7 and which we relied on to reach the task goals. This includes the description of the approach used, depending on the different target groups, and a comprehensive list of events attended in the first 24 months to promote our work.

Chapter 3 focuses on the description of the main activities organised by RESERVE in order to reach the main target group as defined for task 7.2 and foster the support of our work. Furthermore, a summary of the preliminary feedback received from the audience during public events and informal meetings will be given.

Chapter 4 will present the conclusions along with an overview of the work that will be implemented in the final 12 months of the project.

1.3 How to read this document

The outcomes of the project used as a basis for the dissemination activities described in this deliverable are the result of the work implemented by the technical work packages that were analysed and summarised within WP6 according to the diagram below:

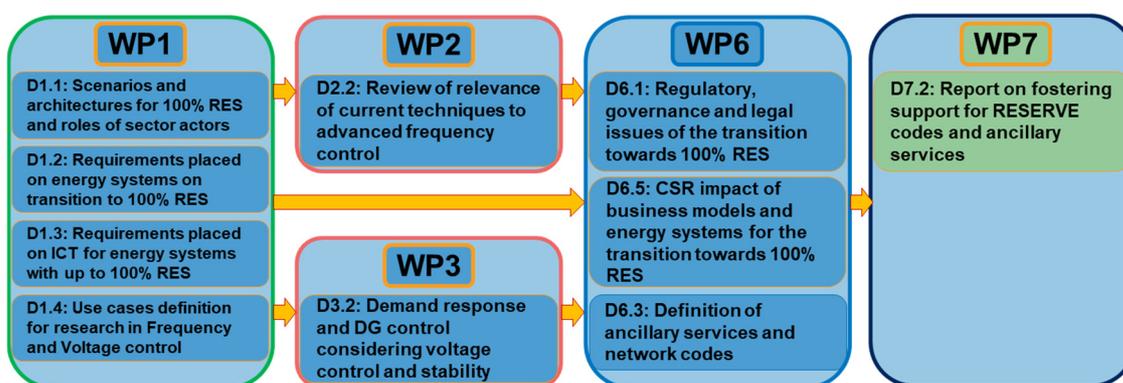


Figure 2 Contribution of the other WPs to the work described in D7.2.

This is a stand-alone document that can be read on its own, bearing in mind, however, that the objective is to report on the activities aimed at fostering the support, outside the project, for the definition of new ancillary services and network codes mostly from a communication and dissemination perspective. Related technical information about the new RESERVE proposals can be found in the relevant deliverables of WP6.

Indeed, this deliverable can be read together with D6.1 for a better understanding of the regulatory, governance and legal issues that must be addressed for the transition towards 100% RES. Additionally, D7.2 can be linked to D6.3, in which the first definition of ancillary services and network codes is given.

2. Dissemination approach

2.1 Right Messages to the Right Audiences

In order to start the comitology process for the proposals developed by RESERVE, a series of events aimed at interacting with external stakeholders and exchanging ideas on this topic were organised, paired with the participation in seminars, conferences, workshops, and one-to-one meetings.

The following table resumes the dissemination strategy used to reach the identified target groups.

Table 1 RESERVE Target audiences and ways of interaction.

Target audiences	Members	RESERVE messages and foreseen impact	Ways of interaction
Standard Developing Organisations	<ul style="list-style-type: none"> • CEN / CENELEC • IEC • National standardisation bodies 	<ul style="list-style-type: none"> • Methods for metrology-based measurement of ancillary services and quality of service will be promoted to the relevant standardisation groups; • The specific technical requirements proposed by RESERVE could be converted by the SDOs into new standards. 	<ul style="list-style-type: none"> • Public workshops, industrial fairs, conferences; • Bilateral meetings with relevant organisations representatives;

Stakeholder groups	<ul style="list-style-type: none"> Organisations involved in network code development, e.g. ENTSO-E, ACER; EDSO, EUR, WindEurope, EPIA, inverter manufacturers, EASE; Members of the FEN Research Campus consortium. 	<ul style="list-style-type: none"> Comprehensive presentation of the ongoing project work aimed at ensuring energy system stability through the implementation and deployment of the RESERVE concepts and the definition of a new set of ancillary services and harmonised network codes; The validation of the applicability of the methodology and of convincing test cases in the field (for voltage) and lab (for frequency) trials, as well as the clear and significant impact of the NC as proposed by RESERVE can be taken into account by the relevant stakeholders involved in the development of the new grid codes. 	<ul style="list-style-type: none"> Public workshops, industrial fairs, conferences; Bilateral meetings with relevant organizations representatives; Regular presentation of the project progresses at the FEN steering committees.
RESERVE Advisory Board	<ul style="list-style-type: none"> Prof. Goran Andersson-<i>ETH Zürich</i>, Prof. Francesco Profumo-<i>Compagnia San Paolo</i>, Dr. Marcelo Masera - <i>JRC Directorate C</i> Ing. Chiara Vergine - Terna Rete Italia S.p.A. 	<ul style="list-style-type: none"> Comprehensive presentation of the ongoing work on the definition of new network codes and discussion about the implications for the sector actors; Objective of the meetings is to collect feedback on the definition of test cases validated in the field trials and thereby ensure the European-wide acceptance and usability of the project outcomes. 	<ul style="list-style-type: none"> Advisory board meetings.
European policy makers	<ul style="list-style-type: none"> Directorate general for energy. 	<ul style="list-style-type: none"> Presentation of the RESERVE concepts and results concerning the definition of new network codes and discussion about the 	<ul style="list-style-type: none"> Answer to public consultation on network codes priorities. Various meetings and initiatives from

	<ul style="list-style-type: none"> ETIP-SNET platform members. 	<p>implications for the sector actors.</p> <ul style="list-style-type: none"> The objective is to raise awareness of the importance of the RESERVE topics and achievements among interested groups able to influence future decisions at EU level. 	<p>the EU Commission, DG Energy;</p> <ul style="list-style-type: none"> Participation to the ETIP-SNET meetings.
Scientific communities	<ul style="list-style-type: none"> ICT and Energy research communities. 	<ul style="list-style-type: none"> Promotion of further research based on the project concepts and results. 	<ul style="list-style-type: none"> Publication of scientific papers on high-level peer-reviewed journals and books; presentation at recognised conferences.
Other projects EU and initiatives	<ul style="list-style-type: none"> Members of the BRIDGE Initiative. 	<ul style="list-style-type: none"> Contribution to common information and dissemination activities to increase the visibility of the RESERVE work and create synergies with other H2020 related projects. 	<ul style="list-style-type: none"> Participation to the EU BRIDGE initiative meetings Participation to events promoted by the EC and the BRIDGE.

2.2 Communication and dissemination activities implemented so far

2.2.1 Marketing and communication

2.2.1.1 Brochures

A general project flyer and a brochure aiming at promoting the project work on the definition of new harmonised network codes have been created based on the corporate design initially developed for RESERVE and presented in D7.1 “Report on marketing tools”. The printed material is distributed during events organised and attended by the project partners (Fig.3).

The project flyer describes in a short and clear form the challenges and objectives of RESERVE as well as the approach used to meet them in order to introduce specialist and non-specialist audiences to the project topics. The layouts of the general flyers and of the network code brochure are reported respectively in the figures 4 and 5.



Figure 3. RESERVE Flyer displayed at an exhibition stand.



RESERVE

FUTURE GRIDS
fast, safe, sustainable

RESERVE TRIALS & PARTNERS

RESERVE unites a balanced network of industrial partners, renowned universities and three SMEs. The partners are regionally distributed over 4 European countries.



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FUTURE GRIDS
fast, safe, sustainable

RESERVE - RENEWABLES IN A STABLE ELECTRIC GRID

RESERVE is a research and Innovation Action (RIA) project of the H2020 Program aiming at developing and validating new techniques that can enable a stable supply of purely renewable energy sources (RES).

The RESERVE challenge

In order to minimise CO₂ emissions a transition in the future energy system is inevitable and is a global priority to tackle climate change. Consumers and utilities increasingly use renewable power sources such as solar, wind, and biomass. However, utilities face the challenge of maintaining stability of supply from weather-dependent and diverse generation sources. Climate

"We are like tenant farmers chopping down the fence around our house for fuel, when we should be using nature's inexhaustible sources of energy (sun, wind and power). I would put my money on the sun and solar energy. What a source of power! I hope we don't have to wait until oil and coal run out before we tackle that."
Thomas Edison (1931)

The RESERVE vision and objectives

The RESERVE project tackles the urgent need to find ways to stabilize energy systems with up to 100% RES to generate "RESERVEs" so that society can relax in the knowledge that it has a stable and sustainable energy supply.

The RESERVE strategic objective is to enable up to 100% penetration of renewables by researching new energy system concepts

RESERVE concept



The RESERVE concept

and developing new techniques and solutions based on 5G technology to assist energy providers with:

- balancing the voltage and frequency of the power grid to maintain a stable power supply;
- increasing the proportion of power generated by volatile renewable energy sources, such as solar and wind energy;
- defining new network codes and ancillary services;
- developing new ethical business models to support 100% RES integration in today's energy systems.

The RESERVE concept and approach

RESERVE will address these challenges by developing novel research concepts, implementing them through an innovative Pan-European real-time simulation in-

Stability

- EU Society**: RESERVE enables stable energy supply based on 100% RES
- EU Economy**: RESERVE is an enabler for the completion of the EU-regulated energy market (TEM)
- EU Integration**: RESERVE brings Pan-European integration of network codes and research and real-time simulation infrastructures

The RESERVE strategic impact targets at EU level

infrastructure and validating them on field trials in two European locations, Ireland and Romania.

Figure 4 Layout of the RESERVE Flyer.

Following the need to promote the work made to define a set of adapted or new network codes, we have created a dedicated brochure in which three main topics are addressed:

- The need for new network codes for frequency control
- The need for new network codes for voltage control

- The initial plan for exploitation of the new defined network codes

With this brochure we want to reach more target groups including stakeholders that are in the position to understand the need for change in the actually implemented network codes as well as the technical requirements for voltage and frequency stability on which our considerations are based.



Figure 5. Layout of the RESERVE brochure on network codes.

2.2.1.2 Videos

In order to promote the project during the participation at events like industrial fairs and conferences, a first promotional video was made, directed towards the broad public. This not only includes the general public with easily understandable content but also a more expert audience that have the possibility to get to know the project and look for more detailed information afterwards.

Moreover, on occasion of the 1st project Advisory Board Meeting (see chapter 3.1.2), two series of video interviews were realised:

- Video clip series: interview with the project partners about the main topics investigated by RESERVE with a particular emphasis on the importance of the work for the definition of new harmonised network codes. The list of the topics is the following:

1. The RESERVE concept

2. Transition to a system with very low mechanical inertia
3. New techniques requires the definition of new ancillary services
4. Field Trials - verifying that proposed network codes are releasable
5. Adressing changes in the existing network codes
6. Corporate Social Responsibility

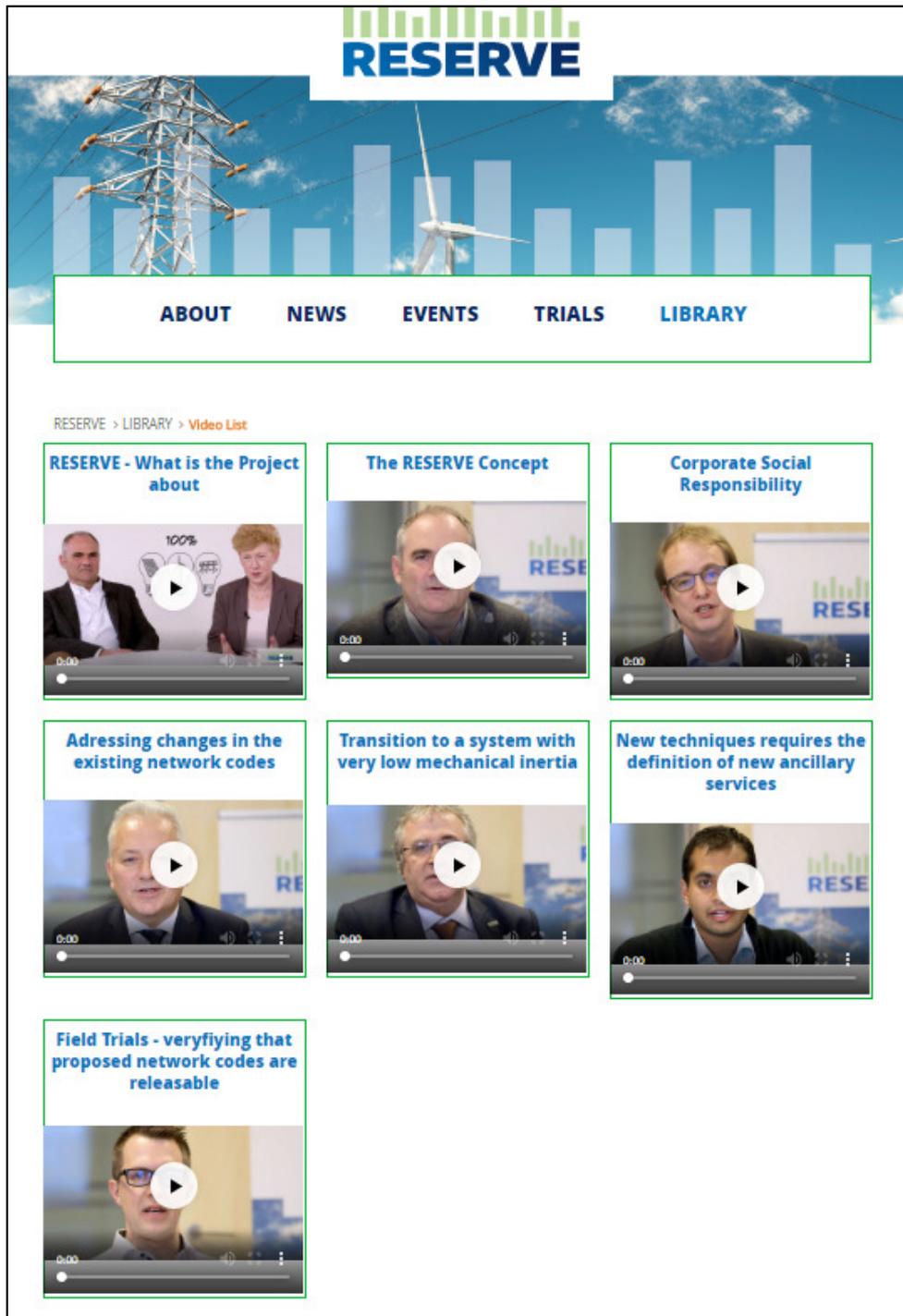


Figure 6 . RESERVE video-interviews to the RESERVE partners available under:
<http://www.re-serve.eu/video-list.htm>.

- Interview with the advisory board members about topics concerning the new definition of ancillary services and grid codes (see Chapter 3.1.2).

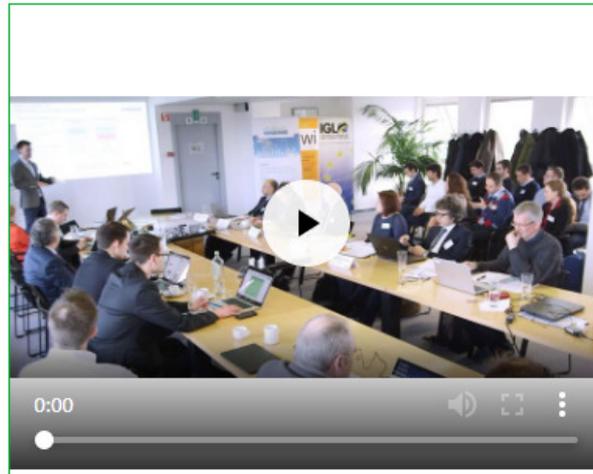


Figure 7 RESERVE video-interviews to the RESERVE advisory board members available under: <http://www.re-serve.eu/video-list.htm>.

All videos are available on the RESERVE website under the link: <http://www.re-serve.eu/video-list.html>.

2.2.2 Attended networking events

In the first 24 months RESERVE participated in numerous events in order to channel the most relevant results and conclusions about the ongoing work. The most relevant events that have been organized by RESERVE within task 7.2 were the 1st Stakeholder Meeting (Bucharest, 23 June 2017) and the 1st Advisory Board Meeting (Brussels, 23 January 2018). Objectives of these assemblies, with participants including TSOs and DSOs members as well as renowned academics, were, on the one side, to receive a feedback on the ongoing work within RESERVE (methodology and results achieved so far on the work on network codes), and, on the other side, to get useful input for the definition of the new network codes. A more detailed report on these events will be given in the next chapter.

The following table resumes the main public events organised and attended by the RESERVE partners in this context. More informal meetings, as previously mentioned, were additionally held with relevant contact in order to get first comments and opinion on our concepts and approach to the work.

Table 2 List of attended networking events

Event	Date & Place	Description
6th Romanian Energy Day 2017	30-31 May 2017, Brussels, Belgium	Title: “Regional cooperation mechanisms and initiatives for the energy industry” <u>Participants:</u> TSOs, DSOs, Ministry of Energy and ANRE, Ministry of Research, decisionmakers of RO and EU institutions, private and state energy companies, energy associations such as CNR-CME, ACUE, AFEER.
European Sustainable Energy Week (EUSEW) 2017	19-25 June 2017 Brussels, Belgium	Exhibition Stand “ <i>Stability, Security and Automation Towards 100% Renewables</i> ” together with the H2020 Projects SUCCESS & SOGNO at the EUSEW 2017, Networking Village. Promotion of the project work and key concepts, networking. <u>Participants:</u> Public authorities, energy agencies, industry associations, businesses, civil society organizations and media.
1st RESERVE Stakeholder Meeting	23 June 2017, Bucharest, Romania	Conference and Workshop: “Milestones Toward 100% RES for all Europeans”. <u>Participants:</u> TSOs, DSOs, Ministry of Energy and ANRE, Ministry of Research, decisionmakers of RO and EU institutions, private and state energy companies, energy associations such as CNR-CME, ACUE, AFEER.
Innogrid 2020+ 2017	26-27 June 2017 Brussels, Belgium	Exhibition Stand. Promotion of the project work and key concepts, networking. <u>Participants:</u> Policy and regulators, Associations, Industry (TSOs, DSOs, Consultancy, IT, RES, utilities), University and Research
Advisory Board meeting	23 Jan 2018, Brussels, Belgium	Presentation to the board members of the ongoing work and of the future plans, with special focus on the definition of a new set of harmonised network codes. <u>Participants:</u> members of the RESERVE Advisory Board
E-World 2018	6-8 Feb 2018, Essen, Germany	Exhibition Stand “SecuRenewables”. Promotion of the project work and key concepts, networking. RESERVE brochures on network codes distributed for the first time at this event. <u>Participants:</u> Utility Companies, Service Providers, Consulting, Industry, IT, Research, Press

Med-TSO conference	10 Apr 2018, European Parliament, Brussel, Belgium	Attendance to the conference, networking. Conference aimed at presenting the main results and key achievements of the Mediterranean Project, a 3-year lasting project developed by Med-TSO and co-financed by the EC, aiming at the progressive harmonization and strengthening of the electricity markets in the Mediterranean Region. <u>Participants:</u> TSOs Representatives from the Mediterranean Area, ENTSO-E
Innogrid 2020+ 2018	15-16 May 2018, Brussels, Belgium	Promotion of the project work and key concepts, networking.at the exhibition stand. Presentation of the project work on Network Codes, Governance and Regulatory issues for the Transition towards up to 100% RES at the policy conference session “Customers in the Focus”. <u>Participants:</u> Policy and regulators, Associations, Industry (TSOs, DSOs, Consultancy, IT, RES, utilities), University and Research.
7th Romanian Energy Day 2018	5-6 June 2018, Brussels, Belgium	Topic: “Regional Energy Security in the Context of the European Internal Energy market”. The conference, organized by CRE, reunited the most important specialists from the energy sector with policy and decision makers from the Romanian and European Institutions.
European Sustainable Energy Week (EUSEW) 2018	5 June 2017, Brussels, Belgium	Exhibition Stand at the EUSEW 2017, Networking Village. Promotion of the project work and key concepts, networking. <u>Participants:</u> Public authorities, energy agencies, industry associations, businesses, civil society organisations and media
SUCCESS Project Open Day	28-29 June, Bucharest, Romania	“Securing the smart grid towards up to 100% renewables”. Presentation of RESERVE. Discussion on regulatory issues for RES and panel discussion on Network Codes and changing TSOs-DSOs relationships. <u>Participants:</u> TSOs, DSOs, Regulators.
BRIDGE Initiative meetings	Every 6 months, Brussels, Belgium	BRIDGE is an EC initiative which unites H2020 Smart Grid and Energy Storage Projects to create a structured view of cross-cutting issues which are encountered in the demonstration projects and may constitute an obstacle to innovation. It fosters continuous knowledge sharing amongst projects thus allowing them to deliver conclusions and recommendations about the future exploitation of the project results through four different Working Groups. RESERVE is regularly represented at the meetings of the Coordination and Regulation WG.

		<p><u>Participants</u>: 36 Low-Carbon Energy, Smart-Grid and Energy Storage projects funded under Horizon 2020</p>
ETIP- SNET meetings	Brussels, Belgium Various Locations	<p>The ETIP-SNET role is to guide Research, Development & Innovation (RD&I) to support Europe's energy transition. Four members of the RESERVE consortium act as experts in the following working groups, bringing the project vision and concepts in the discussion rounds:</p> <ul style="list-style-type: none"> • WG1: Reliable, economic and efficient smart grid systems. • WG4: Digitisation of the electricity system and customer participation. • WG5: Innovation implementation in the business environment. <p><u>Participants</u>: stakeholders and experts from the energy sector</p>
Research Campus FEN Consortium Steering Committees	Every 3 months, Aachen, Germany	<p>The results and activities of the RESERVE project are regularly reported to the industrial partners of the Flexible Electrical Network research campus FEN.</p> <p><u>Participants</u>: representatives of 15 Institutes of the RWTH Aachen university and 24 Industrial partners.</p>
One-to One meeting	SDOs TRANSELECTRICA, ESB, CEZ, EON, ELECTRICA, ENEL, Regulatory National and International Authorities	<p>At the centre of the one-to-one discussion with the decision makers of the relevant organisations are following topics:</p> <ul style="list-style-type: none"> • Standardization: analys of the state of the art; raise awareness of the need for measures to be taken for the operation of a grid with up to 100% RES; possibility to include in the future some technical requirement identified by RESERVE into standards; identification of next steps. • Storage: importance of the storage for the operation of high-RES grids and possibility to make it as a subject of a new NC. • Changing TSO-DSO relationship: in a grid with up to 100%RES certain services regarding the operation and stability of the network, now provided exclusively by TSOs, will become also competence of DSOs, bringing necessarily to a change in the relationship between the two entities. <p><u>Participants</u>: Decision makers from TSOs, DSOs organizations and Regulatory bodies: COOs, Development Managers, Representative specialist.</p>

3. Dissemination of Results and first steps to the exploitation

3.1 Report on networking events addressing the main RESERVE target audiences

In this chapter, a more detailed report on the events organised by RESERVE within the framework of task 7.2, addressing the main categories defined in the introduction (Advisory Board, Stakeholders, SDOs), is given.

3.1.1 1st RESERVE Stakeholder Meeting

The 1st RESERVE Stakeholder meeting took place in Bucharest on Friday 23 June 2017 and was organised by the RESERVE partner Romanian Energy Centre (CRE) as part of the European Sustainable Energy Week (EUSEW) 2017. The event, named "Milestones towards 100% RES for all Europeans", promoted the two main themes of the EUSEW Energy Days: the integration of renewable energy sources (RES) and energy efficiency (EE).



Figure 8 Impressions from the 1st RESERVE Stakeholder Meeting.

Over 70 representatives of Transmission and Distribution System Operators (TSOs and DSOs) together with officials from the Ministry of Energy and ANRE, Ministry of Research, decision-makers of national and European institutions, representatives of private and state energy companies, other active energy associations such as CNR-CME, ACUE and AFEER, the RESERVE project partners, general public interested in responsible energy consumption practices and further stakeholders interested in understanding the operation of a 100% RES system for safe and sustainable power supply have contributed to the event's discussions.

The main topics addressed in the event included:

1. Network integration scenarios of up to 100% RES,
2. Network codes, governance and regulatory issues regarding the transition to 100% RES,
3. Legal and regulatory models, business models for RES,
4. Development of open, smart, stable, secure and customer centric European smart grid,
5. Innovative practices for efficient energy consumption.

The conference was structured in four sections: an introductory session, two discussion panels and a workshop; it brought together 20 speakers from the Romanian and European energy sector.

During the introductory session, Fiona Williams, coordinator of RESERVE, introduced the two interconnected objectives of the project to the audience: the creation of new harmonised European network codes as well as the definition of new innovative ancillary services to meet the integration of up to 100% RES in the power transmission network. She pointed out that *"the new*

network codes will support the development of the European Energy Union by focusing on the three levels of the domestic electricity market: operational, connections and markets". The introductory session was complemented by the interventions of ANRE Vice-President Emil Calota and by the TRANSELECTRICA CEO Corina Popescu, who referred to the legal and regulatory issues of RES and the challenges towards network integration of up to 100% of RES.



Figure 9 RESERVE 1st Stakeholder Meeting. Press conference.

3.1.2 1st RESERVE Advisory Board Meeting

The first RESERVE advisory board meeting took place on 23 January 2018 in the offices of the Kooperationstelle EU der Wissenschaftsorganisationen (KoWi) in Brussels.

Objective of the meeting was to present and discuss the project work, enabling the RESERVE advisory board to:

- provide us with feedback on the focus and progress of our work to date and to
- propose potential changes which would enhance the project results and impact in the second half of the project.

The members of the advisory board that took part in the meeting were:

- Prof. Goran Andersson - ETH Zürich, Switzerland
- Prof. Francesco Profumo - Compagnia di San Paolo, Italy
- Dr. Georgios Antonopoulos - JRC Directorate C: Energy, Transport and Climate Petten, the Netherlands (in substitution for the official board member Mr. Marcelo Masera),
- Ing. Chiara Vergine - Terna Rete Italia S.p.A., Italy



Figure 10 RESERVE 1st Stakeholder Meeting. Impressions from project team (left) and board members (right).

During the half-day meeting, a summary of the results obtained so far as well as the plans for the future work were presented by the project partners in front of the board. The board members participated actively in the session, interacting with the speakers by asking questions and making comments about the presentation, thus initiating very vivid and constructive discussions.

Very positive feedback was received from all the advisory board members that praised the good work and the excellent progress made so far.

Regarding the topic of the network codes and governance and regulatory issues for the transition towards 100% RES, the board members asked details about our plan for the interaction with stakeholders, TSOs and DSOs. They further suggested to invest in technical resources for iterating work that supports the recommendations for WP6, as it will improve the quality of the outcome codes significantly. Ing. Chiara Vergine, representative of the Italian TSO Terna, mentioned that the Italian ministry published a RES strategy aiming for a 35% RES use. Therefore, they are planning a new synchronous generation in their network to keep the system balanced. In light of the RESERVE work, she will consider other possible options that could be adopted by Terna in this respect.



Figure 11 RESERVE 1st Stakeholder Meeting. Presentation about the NCs and regulatory issues for 100% RES.

As previously mentioned, on occasion of the meeting, the project team conducted short interviews with the members of the advisory board, asking them the following questions:

1. Do you consider that storage is required to be the subject of a distinct network code?

2. It may be foreseen as a better solution the increase of the responsibility for DSOs regarding the provision of ancillary services and/ or the usage of new data transmission technologies (4G, 5G) to manage large volumes of data while meeting the requirements for data transfer speed and data security?

Regarding the first question, all members agreed on the importance of the storage system in terms of integrating renewable energy sources in the network and consider that this subject has definitely to be included in the network codes, either as a specific topic or as part of other codes.

Concerning the second question, the members approached the problem from different perspectives. In order to pass from the existing power system network (generators-network-consumers) to a smarter management of the system, a closer collaboration between TSOs and DSOs has to be established, explained Dr. Antonopoulos. Additionally, the management of large data is very important and the work on the communication side must be underpinned by the research, while considering, however, that at the end of the day, it is a matter of costs to decide which technology will be adopted. For Prof. Andersson, data transfer is not just limited to ancillary services and the first step to approach the data transfer problem should be to identify and classify all available data that are differently important for the grid depending on their different use (security, communication...). Prof. Profumo highlighted the importance of the relation between IT and energy, mentioning that the use of new telecommunication technologies like the upcoming 5G is a great opportunity for the DSOs and it will be a good chance to grow, not only in Europe but in the entire world.

3.1.3 Interaction with the Standard Developing Organisations SDOs

On occasions of the events organized by the project as well as in the context of the participation in other meetings and exhibitions, as listed in Table 2, various interactions with relevant people took place. Most of these were between representatives of different organisations active in the energy field, firstly to outline the state of the art on standardisation issues. The aim of those preliminary discussions was to identify the relevance of some issues that may become subject of new standards, starting from the technical requirements already tested or still being tested in the project as well as to identify the steps to be taken to raise awareness of these issues among SDOs and thereby starting the comitology process.

Two fields have been identified for the potential implementation of new standards: standards for inverters and standards for storage.

For the first category it is relevant to consider the possibility of having two types of standards, one for inverters in the context of solar energy and one in the context of wind energy.

In relation to the standards for storage, there are already initiatives supporting such a measure and it was proposed to come up with additional arguments based on the RESERVE activity to further support this process.

The actions to be undertaken will consider interactions with the national standardisation authorities, CEN and CENELEC and will be supported by the results produced in the RESERVE implementation process of the standards mentioned above. As the implementation of new standards is a very difficult and long process that must be supported by specific data and convincing results, this activity will progress even more quickly and successfully in the last year of the project when more concrete results and conclusions will be available.

3.2 Feedback of external stakeholders on the RESERVE proposals for new Network Codes and Ancillary Services

The preliminary technical findings and regulatory proposals were discussed by the RESERVE team with the most significant stakeholders during the events detailed in paragraph 2.2.2. "Attended Networking Events". These discussions dealt with all RESERVE proposals, including the new network code regarding the storage and the suggestions made in order to adapt 19 more NCs already in use or under implementation.

Below, a summary of the feedback resulted from the interactions with different groups of interest is given. It has to be mentioned here that, currently, both the network operators and the national regulatory bodies are fully involved in the implementation of the recently approved ENTSO-E

codes in the national regulatory framework. This process, having the deadline this year, requires significant amount of resources in order to be properly finalized in time.

- Power Network Operators

Considering the close deadline for the implementation of the existing network codes, as mentioned above, and the significant impact that this implementation is foreseen to have, the network operators are currently focused on this process. Consequently, they have shown little interest for further modifications and updates of the documents suggested by RESERVE so far.

Nevertheless, one issue that considerably attracted their attention was the RESERVE proposal for a new generation of inverters. The discussions covered almost all main aspects related to this issue such as what the new required capabilities and functions are and how soon the new inverters should be available on the market, among others. The network codes operators' representatives expressed their high interest in this issue and requested to be informed about further developments made in this context of the project.

Another issue that generated a high level of interest was the RESERVE proposal for a new network code dedicated to storage. In a power system with up to 100% RES, the storage facilities will play a bigger role and will have to provide much more ancillary services than today. Furthermore, the technologies required are different from one service to another. The current approach (each functionality of storage is regulated respectively in a different network code) it is thus bound to generate confusion and difficulties for potential investors. The RESERVE proposal was therefore received with interest and optimism.

The changing relationship between TSO's and DSO's was also proposed to the network operators as a topic of discussion and it increased their interest. As mentioned before, certain services regarding the operation and stability of the network, now provided exclusively by TSOs, will, in a grid with high share of RES, also become a competence of DSOs, modifying necessarily the relationship between them itself. Among the ancillary services and NC changes that will be required, many are subject of the updates proposed by RESERVE and include for example concepts like new frequency control, system swing dynamics, requirements of minimum system inertia or new voltage control concept. The almost unanimous opinion was that changes in the relation between TSO's and DSO's are required but the details of this process are still to be clarified depending on the modification of the regulations itself and on the pace of change. The perception is that network operators would prefer to maintain the actual situation, which is more comfortable for both. DSOs are not eager to take more responsibility in matters like the frequency and voltage control, but in this evolving scenario TSOs cannot be anymore the only one dealing with those problems, and they have to find a way to collaborate and share responsibilities with the DSOs.

Anyway, the representatives of the network operators have expressed their interest to be further informed about the findings of the RESERVE project.

- Regulatory bodies

As previously mentioned, the regulatory bodies are also currently focusing on the proper implementation of the ENTSO-E regulations in the national regulatory framework. Nevertheless, they have shown a strong interest for the need of updates and improvements of the existing codes requested in order to facilitate the penetration of up to 100% RES in the power systems and asked us to provide them with more details and information.

RESERVE's proposal for a new network code dedicated to storage was also enthusiastically received by the regulatory bodies, their representatives showing great interest in the technical aspects studied and the consequent findings of the RESERVE project related to this issue. The proposal was considered in line with the basic principle that regulations must be simple and effective in supporting a certain activity without causing disadvantages to the other actors of the power system and electricity market involved.

The necessity for a new generation of inverters proved to be a very interesting subject. The discussion focused on the timeframe in which this change can happen. It emphasised the idea that a new generation of inverters (with new capabilities and functions) has to be synchronized with the refurbishment of the old generation in order to minimise the costs of this operation and, consequently, minimise the cost of electricity generated from RES. Taking into account that the

RES industry in Europe is a very recent one and that real available data and information is only related to one very short period of time, one may conclude that in a time horizon of 4÷7 years most of the invertors in operation nowadays will finish their life and will need to be substituted. Given these conditions, the design of the new generation have to be finalized in due time in order to be cost-effective.

The changing relationship between TSO's and TSO's involving a new distribution of competences regarding the definition of new ancillary services or the need for a novel approach towards the existing ones were also a topic of interest for the representatives of the regulatory bodies. The discussions related to this issue mainly revealed the concern of these institutions for avoiding over-regulation.

- Industry representatives

The stakeholders included in this group were: WindEurope, the European Photovoltaic Industry Association (EPIA), the European Association for Storage of Energy (EASE) and EURELECTRIC.

The main concerns expressed by the industry representatives were related to the costs necessary to implement RESERVE proposals and this because the investment costs have been reduced to a level where the operation of the parks is barely sustainable without financial support schemes and any further cost increase may change this favourable situation.

The costs on their turn may be classified in two categories:

1. Equipments development cost.

This category includes the costs for developing the new generation of inverters. On the one hand, the new capabilities and the new functions required from the inverters will make this equipment more complex and therefore more expensive but the new ancillary services proposed in RESERVE, on the other hand, will be able to generate new incomes. Thus the main issue will be to find an optimal balance between these two tendencies.

2. Operational costs.

The significant increase in the complexity of the power system operation and electricity market structure it is bound to increase the operational costs and therefore to hinder the increase of RES penetration up to 100% in the power systems.

The inverter manufacturers expressed concerns regarding the timing of the implementation of the new requirements for the inverters. They explained that structural modification of an inverter in the field is either extremely costly or even not possible and it has to be avoided as much as possible. The best solution for the existing RES generators seems to be the upgrade of the inverter at the end of its lifetime.

4. Conclusions and outlook on the next 12 months

In conclusion we can say that RESERVE has implemented numerous actions aimed at creating awareness of the ongoing work for the definition of a new set of ancillary services and harmonised network codes in the first 24 months of the project by sharing the acquired knowledge and achieved results during informal consultations with representatives of relevant categories (TSOs, DSOs, SDOs, manufacturers ...), as well as by collecting feedback and inputs from Stakeholders and Advisory Board members during the organization of dedicated events and from the interaction with representatives of European institutions.

Following the trial test of the technical concepts and the fine tuning of the NC proposals developed so far, the targeted dissemination work will continue until the end of the project in order to trigger the comitology process for NC modification and prepare the way for the exploitation of the project solutions. A non-exhaustive list of already planned events, focused on networking with relevant target audiences, is reported below.

Table 3 List of planned networking events.

Event	Date & Place	Details
RESERVE-MIGRATE Workshop	t.b.d.	A joint workshop is planned to be organized by the end of the year
2nd RESERVE & SOGNO stakeholder meeting (Consultation Workshop)	October 2018, Brussel, Belgium	Organiser: Romanian Energy Center with other RESERVE & SOGNO partners. Participants: DG Energy, ACER, ENTSO-E, CENELEC, EDSO, Eurelectric, EVEA, EPIA, EASE, Inv. Pr.
European Utility Week 2018	6-8 Nov 2018, Vienna, Austria	RESERVE will have an exhibition stand at the EU project Zone together with the other BRIDGE projects.
ENTSO-E Annual Conference	End 2018, not announced yet	Planned participation.
2nd Advisory Board Meeting	Jan 2019, Brussels, Belgium	RESERVE will report to the advisory board on the progress made during the second year of the project and on the plans for the last few months.
Open Day at the Irish trial site	Q2 2019,	ESB Open Day at the Field Trial Site in Portlaoise, Co. Laois to demonstrate the realisation of the Voltage Control Concept Developed in RESERVE
One to one meetings and consultations	Various location	- National Energy Regulators (IE, DE, IT and RO) - EU regulatory bodies and associations
Final event	European Parliament, Brussels, Belgium	Presentation of the main project achievements to relevant stakeholders and debate on future challenges and perspectives.

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7. References

Deliverable D6.1 “Regulatory, Governance and legal issues of the transition towards 100% RES, V1” http://www.re-serve.eu/files/reserve/Content/Deliverables/727481_reserve_D6.1.pdf

Deliverable D6.3 “Definitions of ancillary services and network codes, V1”, ‘soon available at <http://www.re-serve.eu/deliverables.html>

D7.1 “Report on marketing Tools” <http://www.re-serve.eu/files/reserve/Content/Deliverables/D7.1.pdf>

ETIP-SNET website: <https://www.etip-snet.eu/>

BRIDGE website: <https://www.h2020-bridge.eu/>

FEN Research Campus website: <https://fenaachen.net/>

8. List of Abbreviations

ACER	Agency for the Cooperation of Energy Regulators
ACUE	Federation of Association of Energy Utility Companies
AFEER	Association of Electric Energy Suppliers in Romania
ANRE	National Regulatory Authority for Energy
BRIDGE	Cooperation Group for Smart-Grid and Storage
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardization
CNR-CME	Association for Sustainable Energy Development and Efficient Use of Energy Resources
DG Connect	Directorate-General for Communications Networks, Content and Technology - European Commission
DG Energy	Directorate-General for Energy - European Commission
DSO	Distribution System Operator
EASE	European Association for Storage of Energy
EC	European Commission
EDSO	European DSO associations
ENTSO-E	European Network on Transmission System Operator in Electricity
EPIA	European Photovoltaic Industry Association
ETIP-SNET	European Technology and Innovation Platform Smart Networks for Energy Transition
EUR	EURELECTRIC
FEN	Flexible Electrical Networks
H2020	Horizon 2020
IEC	International Electrotechnical Commission
Inv. Pr.	Inverters producers
JRC	Joint Research Centre
MS	Milestone
NRA	National Regulatory Authorities
RES	Renewable Energy Sources
SDO	Standard Developing Organization
SOGNO	Service Oriented Grid for the Network of the Future
TSO	Transmission System Operator
WG	Working Group
WP	Work Package