Proceedings of yearly workshops towards DSOs, regulatory bodies and other stakeholders - 1st year

V1.0

Deliverable D4.3

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Short Description

Deliverable 4.3 summarizes the various actions organized by the project in its first year to reach the European DSO community, the regulatory bodies, and the professional associations and public bodies related to the energy sector.

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V0.1	10/11/2017	1st draft for internal review	Anatole Weill
V0.2	18/12/2017	Added details on InterFlex 2017 Community Meeting	Anatole Weill
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Owner/Main responsible

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EXECUTIVE SUMMARY

Deliverable 4.3 summarizes the various actions organized during the first year of the project in order to reach the European DSO community, the regulatory bodies, and the professional associations and public bodies related to the energy sector.

Four events are detailed in this document:

The InterFlex Kick-Off event:

- 200 participants from the energy industry, as well as local authority representatives and European commission members
- Presentations from all participating DSOs
- Round table with participating DSO representatives, EDSO representatives and European Commission representatives.

The 6th Innogrid2020+ annual conference:

- More than 350 organizations from the energy industry
- All project DSOs were present
- 5 roll-ups were designed

The European Utility Week 2017:

- More than 12 000 participants
- 1 stand on the Horizon 2020 project zone
- 2 theatre presentations
- Participations in round tables
- 1 video designed for the project stand.

The first InterFlex Community Meeting in Eindhoven on the 29th of November, 2017:

- More than 40 participants from more than 10 European countries,
- A wide variety of stakeholders from different horizons: municipalities, regulators, energy industry associations, DSOs and aggregators, researchers, project managers, consultants and other smart grid experts,
- A full day of presentations, round tables and discussions with external stakeholders.

A list of events where InterFlex members actively participated is also given in a last section.

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1. INTRODUCTION

1.1. Scope of the document

Deliverable 4.3 summarizes the various actions organized by the project team during its first year to reach the European DSO community, regulatory bodies, professional associations and public bodies related to the energy sector.

1.2. Notations, abbreviations and acronyms

The table below provides an overview of the notations, abbreviations and acronyms used in the document.

DSO	Distribution System Operator
ESCO	Energy Service Company
EC	European Commission
EC-GA	European Commission Grant Agreement
EU	European Union
GA	General Assembly
GWP	General Work Package
KPI	Key Performance Indicator
PC	Project Coordinator
SC	Steering Committee
TC	Technical Committee
TD	Technical Director
WP	Work Package
WPL	Work Package Leader

Figure 1 - List of acronyms

2. MAIN EVENTS

2.1. InterFlex Kick Off event

Presentation of the event

Figure 2 - InterFlex kick-off event logo

Date	26th of January 2017
Location	Nice, France
Participants	International guests
Link	http://interflex-kickoff.com/about.html

Number of participants	200	Number of countries	6
Presentations	1 day of presentations	Round tables / debates	2

Figure 3 - InterFlex kick-off event main facts

The kick-off ceremony of the InterFlex project took place at the Allianz Riviera stadium in Nice (France) on January 26th, 2017 and was chaired by Philippe Monloubou, CEO of Enedis, in the presence of Philippe Pradal, Mayor of Nice, as well as Anna Colucci, Head of the Retail Market Unit; Directorate General for Energy at the European Commission.

Figure 4 - Venue of the InterFlex kick-off event (Nice Allianz Arena)

Agenda of the event

09:15
Welcome of the participants

09:45
Opening address by Philippe Pradal, Mayor of Nice

Introduction by Philippe Monloubou, Chairman of the management board, Enedis

Introduction by Anna Colucci, Head of Unit (Retail market, coal & oil), Directorate-General for Energy, European Commission

10:45
Presentation of the project goals and outline of the European demonstrators
Round table participants:
Project managers from Enedis, CEZ Distribuce, Avacon, E.ON, Enexis, RWTH Aachen

11:40
The InterFlex project: towards an optimized energy management on a local scale
Round table participants:
Richard Vidlička, Chief Executive Officer, CEZ Distribuce
Marukus Kaune, VP Business Excellence Energy Networks, E.ON
Jan Peters, Asset Manager and Innovation EVP, Enexis,
Christian Buchel, Deputy-CEO, Chief Digital & International Office at Enedis, Vice-president EDSO for Smart Grids
Rémy Denos, Policy Officer, Directorate-General for Energy, European Commission

12:20
Closing Speech
Christian Tordo, Elected member of Nice City Council and Nice Cote d'Azur Metropolis, President of EcoVallée – plaine du Var EPA
Françoise Grossetete, member of the European Parliament

13:00
Lunch

The event was moderated by Adam Malik, Managing Director at Engerati.

2.1.1. Content of the InterFlex contributions to the event

2.1.1.1. Presentation of the project goals and outline of the European demonstrators

Presentation date
26th of January 2017

Presenters
Thomas Drizard, French Demo Work Package Leader, Enedis
Stanislav Hes, Czech Demo Work Package Leader, CEZ Distribuce
Sven Reese, German Demo member, Avacon
Luis Hernández, Swedish Demo Work Package Leader, E.ON
Marcel Willems, Dutch Demo Work Package Leader, Enexis
Marco Cupelli, Interoperability Work Package Leader (GWP3), RWTH Aachen University

Moderator: **Adam Malik**

Abstract
During this presentation, the technical specificities of each demo were first highlighted separately.

The focus was then put on the fact that these demos also have common topics – they deal with common technologies or with the same innovation areas – but are coming at it from different angles or in different conditions to demonstrate interconnection and interoperability.

The transversal general work package 3 was presented, highlighting tasks concerning interoperability, impact and deployment analysis of the innovative solutions. The goal of this work package is mainly to achieve the outcome of having generalized solution and not having five particular solutions in each respective demo site. Four types of analyses should be performed in this regard: Interoperability which goes hand in hand with Interchangeability Analysis, Replicability Analysis and Cost Benefit analysis.

2.1.1.2. Round Table: "The InterFlex project: towards an optimized energy management at local scale"

Presentation date
26th of January 2017

Presenters
Richard Vidlička, Chief Executive Officer, CEZ Distribuce
Marukus Kaune, VP Business Excellence Energy Networks, E.ON
Jan Peters, Asset Manager and Innovation EVP, Enexis,
Christian Buchel, Deputy-CEO, Chief Digital & International Office at Enedis, Vice-president EDSO for Smart Grids
Rémy Denos, Policy Officer, Directorate-General for Energy, European Commission

Moderator: **Adam Malik** (Engerati)

Abstract

After presenting the technical focus of the different demonstrators and the interoperability and replicability aspects, this round table explored the strategic objective of optimized energy management on a local scale.

Presenters underlined the fact that the project will be an impulse to adapt the EU regulation – as well as national regulations – by exploring new ways to interact with and regulate the energy market, such as storage, islanding, etc. These new technologies will make new flexibilities appear on the market and the project outcome will also be to better understand who will benefit from these flexibilities. InterFlex will provide a platform to drive joint innovation through collaborative efforts from all actors of the EU industry: component manufacturers, retailers, DSOs, smart grids experts, etc.

Finally, the presenters reminded that the InterFlex project outcomes are also about end users of electricity - allowing the participation to influence cost effectiveness, CO_2 reductions, active participation and comfort to create a platform fit for the new energy consumer.

2.1.2. Dissemination material produced in the scope of the event

Press Kit
A press kit was designed and distributed in the scope of the InterFlex Kick-Off event. This pdf document (see Appendix) briefly related the kick-off event and presented the project through the following axes:

- Main figures
- Project context
- Project consortium
- Technical focus of the project
- Dissemination & Replication
- InterFlex ambition and expected impacts
- Specificities of each demonstrators

Dedicated website
A dedicated website was designed and published in order to ease communication around the event, for guests or press coverage.
The site can be found at the following address: http://interflex-kickoff.com/

Coverage via InterFlex twitter account
Live coverage of the event was produced on social networks thanks to stakeholder accounts and InterFlex' own account.

Videos
Videos were designed to allow general communication about InterFlex project and on the kick-off event, mixing smart motion design and event photographs.
Link to the first project presentation smart motion video: Link

2.2. Innogrid2020+ 2017 annual conference

Presentation of the event

Figure 5 - Innogrid 2020+ conference logo

Date	26th and 27th of June 2017
Location	Brussels, Belgium
Participants	International guests
Link	http://innogrid2020.eu/ http://innogrid2020.eu/projects/InterFlex/

Number of participants	More than 350 organizations from the energy industry	Number of countries	6

Figure 6 - Innogrid2020+ 2017 annual conference main facts

Innogrid2020+ is a European event on innovation in electricity networks organized every year by the European Network of Transmission System Operators for Electricity (ENTSO-E) and the European Distribution System Operators for Smart Grids (EDSO). More than 350 participants from the industry were invited, including associations, EU institutions, regulators, academic world and Member States to debate developments for the electricity grids of the future.

The 2017 edition took place on the 26th and 27th of June in Brussels, Belgium.

Agenda of the event

Day 1

14.00
Opening

14.30
First session
Integrating networks
Panel discussion

16.15
Second session
Enabling hard and soft technologies for the smart and sustainable energy system
Panel discussion

Day 2

09.00
Opening
Digital grids and markets - What's in it for the prosumer and the IEM

09.30
Setting priorities for Smart Grid research – ETIP SNET new implementation plan

09.40
Accelerating the integration of flexibility solutions - the BRIDGE initiative

10.20
Parallel session
Prosumer empowerment & active system management
Associated R&D PROJECTS presentation

Data management & Data hubs
Associated R&D PROJECTS presentation

14.10
Best regulation for digital grids - From vision...

15.10
...to reality - An enabling framework for a smart and sustainable energy system

16.15
End of conference

2.2.1. Dissemination material produced in the scope of the event

Roll-ups

Several roll-ups were produced to inform about the project scope and main innovation streams to be explored.

Figure 7 - InterFlex roll-ups designed for the Innogrid 2020+ conference

Brochure

A light brochure was designed in order to ease communication during this event. It can be found below.

Figure 8 - InterFlex brochure for Innogrid2020+

2.3. European Utility Week 2017

Presentation of the event

Figure 9 - European Utility Week logo

Date	3rd to 5th of October 2017
Location	Amsterdam (The Netherlands)
Participants	International guests
Link	http://programme2017.european-utility-week.com/

Number of participants	More than 12 000	Number of countries	More than 100
Presentations	2	Round Tables	

Figure 10 - European Utility Week 2017 Main facts

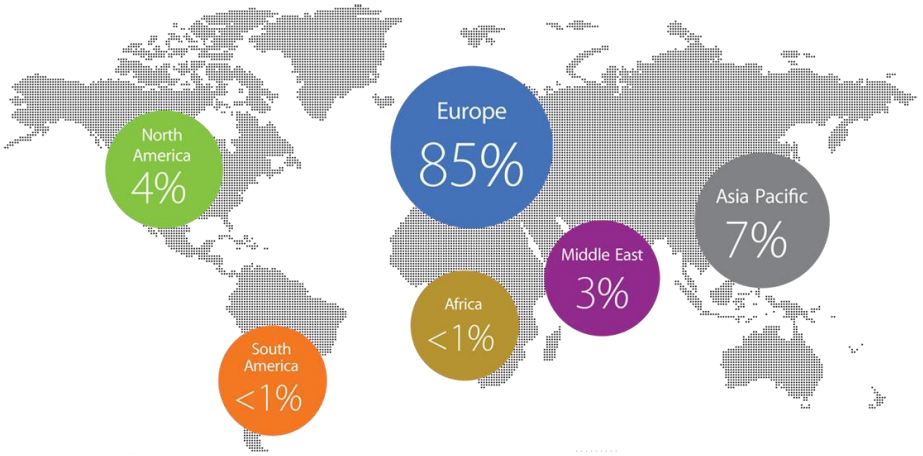

Figure 11 - European Utility Week main figures and attendees origin

The European Utility Week attendees work in various fields:

T&D Operations	Future Network Planning	Grid & Cyber Security
SCADA & Network Management	Smart Grids	IT/ICT Utility Services
Outage Management	Renewable Energy Integration	Telecoms
Asset Management, GIS & Mapping	Electric Vehicle Integration	Smart Metering
Monitoring, Control & Protection	Energy Storage	CRM & Billing
System Development & Planning	Smart Cities	Business Development & Marketing
Quality Assurance & Technical Management	ICT Infrastructures	Customer Service & Engagement
R&D	M2M solutions	Demand Response
Network Innovation	Data Analytics & Management	Smart Homes

InterFlex was present on the Horizon 2020 project zone:
http://www.european-utility-week.com/Hubs-Horizon2020

22 Horizon 2020 projects were grouped on this Hub zone. The zone included presentation pods for each projects, as well as presentation of the Bridge initiative. A theatre in the zone was dedicated to these projects presentation.

Figure 12 - Representation of the Horizon 2020 project zone at the EUW

Figure 13 - InterFlex pod on the Horizon 2020 project zone

2.3.1. Content of the InterFlex contributions to the event

2.3.1.1. Presentation on the EU H2020 Project theatre "InterFlex: European energy players join their forces to foster the energy transition"

Presentation date
Wednesday, the 4th of October 2017

Presenters
Christian Dumbs, Project Coordinator, Enedis

Abstract
Presentation introduction:
In a fast-paced and competitive world, modernization is a priority that requires Energy actors to explore new concepts. In particular, DSOs must find ways to optimize electric power systems while integrating increasing shares of renewables (more than 50% by 2030) in a stable and secure way. The InterFlex project, as a response to the Low Carbon Energy LCE-02-2016 call, investigates the interactions between flexibilities provided by energy market players and the distribution grid. InterFlex has brought together 20 partners across the European Union (5 DSOs, equipment manufacturers, research institutes) to explore flexibility solutions such as Demand Response, cross energy services, energy storage and the overall smartening of the distribution grid.

Several topics were explored:

- Customer empowerment: consumers shall participate actively in the energy market, and benefit from local flexibilities (e.g., e-mobility)
- Go-to-market : mature technologies should be tested against new business models for deployment in the near future
- Durability: Associated advanced solutions must be adapted and proven efficient to ensure replicability, interoperability and viability of the project's concepts.

Six real-scale demonstrators are exploring tangible pathways to adapt and modernize the electric distribution system, in line with the objectives of the 2020 and 2030 climate-energy packages of the European Commission.

Beyond the technical and business innovation, InterFlex aims to generate environmental (e.g., energy efficiency, power generation optimization, renewables...), socio-economic (e.g., new services, decrease of the electricity bill…) and policy impacts (recommendations for micro-grid operation, new regulatory framework…).

Link to presentation on the European Utility Week website:
http://programme2017.european-utility-week.com/presentation/interflex

Figure 14 - InterFlex presentation by Christian Dumbs at the European Utility Week

2.3.1.2. Presentation on the Storage theatre "InterFlex & Nice Smart Valley"

Presentation date
Wednesday, the 4th of October 2017

Presenters
Thomas Drizard, French Demo Work Package Leader, Enedis

Abstract
The French demonstrator of InterFlex was introduced during this presentation.

Three topics were further presented:

- Islanding of an island in case of interruption of power supply with energy storage
- Multiservice approach for storage system with a special focus on collective self-consumption ("cloud storage")
- Deployment of a local flexibility mechanism including storage systems to mitigate grid constraints

Link to presentation on the European Utility Week website:
http://programme2017.european-utility-week.com/presentation/session-development-5

2.3.2. Dissemination material produced in the scope of the event

InterFlex 1st Newsletter
The first InterFlex Newsletter was produced and shared a few days before the European Utility Week.

This was the occasion to raise awareness on the InterFlex participation at this event with a dedicated address. The newsletter also included the following elements:

- Editorial by Christian Buchel, Chief Digital and International Officer of Enedis, and Chairman of EDSO for Smart Grids
- Recall of the InterFlex participation at the Innogrid 2020+ conference

- News on the Czech demonstrator. This article related how CEZ Distribuce started the demonstration of voltage regulation of Distributed Energy Resources.
- Link to an article relating a common statement on the future of clean energy by ENTSO-E, ENTSOG, SolarPower Europe, WindEurope, EDSO, SEDC, T&D Europe.

Link to the Newsletter

Motion Design Video

In order to optimize the use of the presentation pod at the European Utility Week, a motion design video was produced to present the project scope and stakes.

This video was designed in order to be easily reused at future events, but also for diffusion on social networks or to be used to ease customer recruitment. In this regard, it presents all the main InterFlex innovation streams. It can be found at the following link:

https://vimeo.com/245996272

2.4. InterFlex 2017 Community Meeting in Eindhoven

Presentation of the event

Figure 15 - InterFlex First Community Meeting

Date	29th of November 2017
Location	Eindhoven (The Netherlands)
Participants	Project Members and external stakeholders

Number of participants	49	Number of countries	12

Figure 16 - InterFlex First Community Meeting main facts

This Community Meeting was the occasion to gather for the first time the InterFlex Replicability Board and Advisory Board members to share viewpoints and discuss challenges and project findings.

Goals of the event were multiple:

- Present the event scope and latest news to the Boards members
- Build InterFlex international notoriety and give networking opportunities
- Foster replicability discussions with external stakeholders
- Foster discussions on the business models being developed by InterFlex
- Give opportunities to exchange with regulatory bodies

The event was organized in the Netherlands, in the very heart of Eindhoven's Strijp-S neighbourhood, where Enexis' experiments will take place. An inspiring place recently converted from old Philips factories and power plants into workplaces for creative and innovative companies.

A wide variety of stakeholders from different horizons was present: municipalities, regulators, energy industry associations, DSOs and aggregators, researchers, project managers, consultants and other smart grid experts.

Agenda of the event

	InterFlex Community Meeting - 29th of November	Duration
10:30	**Welcome coffee**	*00:30*
11:00	**Welcome presentations:** *- Agenda by Christian Dumbs (Enedis)* *- Welcome Address by Alfredo Verboom (City of Eindhoven)* *- Keynote Speech by Christian Buchel (Enedis)* *- Participants presentation* *- InterFlex Video*	*00:40*
11:40	**InterFlex presentation: objectives and challenges (1/2)** *- Demand Response – Thorsten Gross (Avacon)* *- Grid Automation – Jan Kula (CEZ Distribuce)* *- Islanding – Thomas Drizard (Enedis)*	*00:40*
12:20	**Quizz n°1**	*00:10*
12:30	**Round table: Focus on new services for and by local authorities** Chair: Christian Dumbs (Enedis) - Christian Buchel (Enedis) - Jan Peters (Enexis) - Alfredo Verboom (City of Eindhoven) - Renzo Coccioni (T&D Europe)	*00:45*
13:15	**Lunch**	*01:10*
14:25	**InterFlex presentation: objectives and challenges (2/2)** *- Storage – Luis Hernandez (E.ON)* *- Cross Energy Carrier Synergies – Alexander Krüger (E.ON)* *- Electrical Vehicle – Frank Geerts (Elaad)*	*00:40*
15:05	**Quizz n°2**	*00:10*
15:15	**Focus on the Dutch demonstration flexibility market** *Presentation by Marcel Willems (Enexis), Joost Laarakers (TNO), Patrick Rademakers (Elaad)*	*00:40*
15:55	**Break**	*00:15*
16:10	**Round table: Focus on flexibility business models & associated regulatory frameworks** Chair: Grégory Jarry (Accenture) - Thorsten Gross (Avacon) - Guillaume Lehec (Engie) - Philip Lewis (VaasaETT)	*00:45*
16:55	**Open discussions with the Community**	*00:30*
17:25	**Conclusion & Wrap-Up**	*00:05*
17:30	**Strijp-S Visit (1h30)**	*01:30*
19:30	**Dinner**	*02:00*

Figure 17 - InterFlex First Community Meeting Agenda

InterFlex Community Participants

Organization	Name
Amsterdam City Zen (Alliander)	Marisca Zweistra
Amsterdam Economic Board	Lisa Niesten
City of Eindhoven	Alfredo Verboom
CRE	Catherine Edwige
Croonwolter&Dros	Adam Kapala
Croonwolter&Dros	Rob Roodenburg
EDSO for Smart Grids	Aura Caramizaru
ENEL Distribuzione	Amador Gómez López
GoFlex (IBM)	Bradley J Eck
InteGrid (EDP Distribuição)	Nuno Santos Ferreira
JRC (Joint Research Centre)	Antonios Marinopoulos
Omnetric Group	Tom Van Boxstael
T&D Europe	Renzo Coccioni
TU Dortmund	Jonas Maasmann
VaasaETT	Philip Lewis
Vattenfall Eldistribution	Daniel Kolleck

Figure 18 - InterFlex Community Meeting – Community participants

Partner	Names
Enedis	Christian Buchel, Christian Dumbs, Thomas Drizard, Aurélia Desegaulx, Enora Paslier, Rémy Garaude Verdier
Avacon	Thorsten Gross, Benjamin Petters
CEZ Distribuce	Zdeňka Pokorná, Jan Kůla
EON	Luis Hernandez, Peder Kjellen, Alexander Krüger
ENEXIS	Jan Peters, Marcel Willems
GRDF	Isabelle Diversy
Cez Solarni	Petr Kotrba
EDF	Luc L'Hostis, Vanessa Casacci
ENGIE	Guillaume Lehec, Cécile Cordier
ELAADNL	Frank Geerts, Patrick Rademakers, Eric van Kaathoven
RWTH	Amir Ahmadifar
TNO	Joost Laarakkers, Bob Ran
ACCENTURE	Grégory Jarry, Anatole Weill

Figure 19 - InterFlex Community Meeting - Participants from the project consortium

2.4.1. Proceedings of the event

Disclaimer

This section intends to reflect, in a structured manner and as accurately as possible, the key messages delivered during the first Community Meeting of the InterFlex project on November 29th, 2017 in Eindhoven.

Therefore, it should not be considered as:

- a full transcript of the event
- a comprehensive and state-of-the-art description of addressed issues
- a position paper of the project on addressed issues.

If you consider that a message has been misinterpreted or overlooked, please send your comments to: info@interflex-h2020.com

2.4.1.1. Welcome presentations

The event was opened by **Christian Dumbs, InterFlex Project Coordinator**.

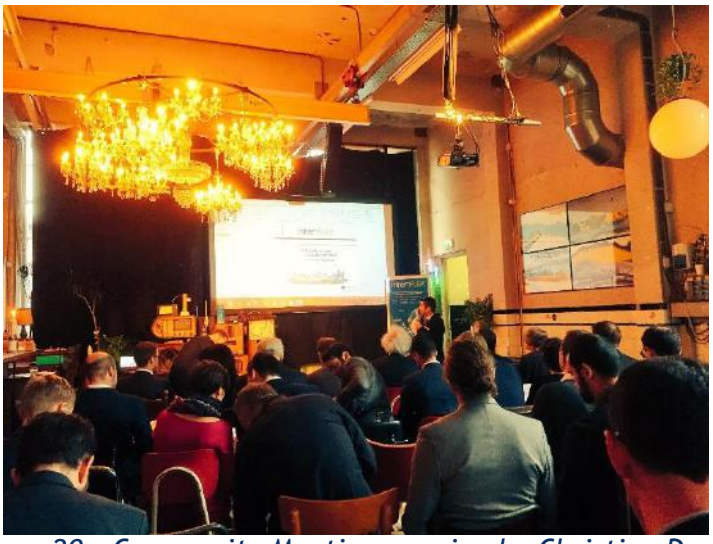

Figure 20 – Community Meeting opening by Christian Dumbs

Alfredo Verboom, Department of Mobility & Environment at the City of Eindhoven, introduced the event by presenting how the InterFlex project fits in the Eindhoven energy & climate policy. He noted that if Rotterdam can be considered as the Seaport of the Netherlands and Amsterdam as the Airport, Eindhoven can be considered as a "Brainport". Its economic success, international competitiveness and innovation capacity has become one of the pillars of the Dutch economy. He also underlined the fact that Eindhoven is a place of transformation due to its industrial heritage, which makes it fit to welcome the InterFlex project.

A keynote speech was then given by **Christian Buchel, Deputy-CEO of Enedis, chairman of the InterFlex Steering Community and Chairman of EDSO for Smart Grids.** He highlighted some of the characteristics that make InterFlex such a special project: the high level of collaboration between 5 electricity DSOs, 1 Gas DSO & other experts, as well as a good representation of European countries, inducing a large variety of conditions for the

demonstrators (Northern Europe with Simris and Malmö, South-Western with Nice, Eastern with Czech Republic and Central with Eindhoven and Lüneburg).

This will allow to test technologies and business models in various conditions but also this will be an advantage to achieve the industrialization of the energy sector & reach the European Union environmental goals. He shared his conviction that "*In Europe, we may have lost the internet revolution, but with projects like InterFlex we are on our way to make Europe become the Smart Grid world leader*", and that this leader position will help to create new jobs in the energy sector.

2.4.1.2. InterFlex presentation: objectives and challenges (1/2)

Zdeňka Pokorná, InterFlex Technical Coordinator from Cez Distribuce, introduced the first session of innovation stream presentations.

Thorsten Gross (Avacon, German demonstrator) opened this session with a presentation focused on Demand-Response, which highlighted the following points:

- In five demonstrators InterFlex develops the technology and the strategies to leverage flexible loads, addressing many challenges.
- All demos cover the RES integration and new technologies such as EVs
- Technological highlights are the full integration of residential and industrial loads with grid operation, machine learning and advanced energy coupling
- The commercial aspects include enabling 100% RES islanding, peer-2-peer markets and local energy platforms

Jan Kula (Cez Distribuce, Czech demonstrator) followed with a presentation focused on Grid Automation, which is key to drive all InterFlex innovation streams. In particular, he highlighted the innovative aspects of each demonstrators:

- Czech Demo: Cost effective and reliable approach for DER integration which could be used within existing regulatory framework
- German Demo: Use of data produced by large number of smart meters to help automatically control small flexible elements
- Dutch Demo: The connection to the data lake and the design of the Grid Management System and Local Interface Management System
- Swedish Demos: Fully automated logic of handling the microgrid within island mode and automatically keep the grid conditions by logics & algorithms
- French Demo: Involving grid automation at LV level with state estimators

Thomas Drizard (Enedis, French demonstrator) closed this session with a presentation focused on Islanding, which consists in "*Disconnecting a part of the distribution grid for a limited duration of time and supplying it with local energy resources*". He stated that Islanding will mostly be used to secure the network for emergency, but not only as it new services to the DSO will be assessed as well. He concluded by stating "*Business models and contractualization between stakeholders remain open questions that the InterFlex project will try to address*"

Answering a question from **Philip Lewis (founder and CEO at VasaaETT)** on the typical duration of Islanding planned at the French demonstrator, Thomas Drizard informed that the French demonstrator is still at the feasibility study step so far and that storage & other devices will have to be sized accordingly to the desired duration.

During the Q&A session, members from the different demonstrators informed that most experimentations will start in 2018 and results will be available end of 2019.

As a reaction to these first presentations, Christian Buchel underlined the fact that some of the innovation streams are present in different demonstrators and he asked to the project members how knowledge is shared between the different demonstrators. Thomas Drizard answered that efforts are done on a regular basis, for example for common presentations at events where the whole consortium is present, but also for workshops which are organized at each Technical Committee on various topics. He emphasized the dialogue between E.ON and Enedis on the Islanding topics, and the participation in the Bridge working groups with other Horizon2020 projects: Data Management, Business Models, Regulations, Customer Engagement. Christian Dumbs concluded that knowledge sharing should be foster to have a common approach and to extrapolate and replicate the project results in other contexts. The Interoperability work package is here to support works in this regard.

2.4.1.3. Round table: Focus on new services for and by local authorities

The round table was chaired by **Christian Dumbs, Project Coordinator**.

When introducing the participants, Christian Dumbs remarked that with representatives from Municipalities, DSOs, and equipment manufacturer, this panel gave a good representation of the various stakeholder involved in the energy transition towards smarter grids. All of these actors have a role to play in the smart grids development, even if it still has to be more precisely defined.

Jan Peters, Vice-President of public affairs at Enexis, opened the discussion by recalling the challenges that Enexis and more broadly the Netherlands will face in the coming years. His first point was that the challenge is larger than renewables and smart data generalization, it will also be to engage the customers and the industries in the energy transition. What must be developed to reach the European Union 2050 goals is huge in term of solar, wind, storage, houses isolation, and hydrogen, he said, and this will require a drastic change.

He stated: "*We need to keep in mind that today the Netherlands import 25 billion of euros every year for energy, and this might be 50 billion in 2050 if nothing changes in the way we produce and consume energy. We can think it differently and invest in wind, infrastructure, energy conversion to be sure that we don't import anymore… we have to start now!"* He also opened the debate by talking about week & seasonal flexibilities, underlining that hydrogen could be a vector for seasonal storage.

In this context, InterFlex is an occasion to grow for more innovation and for more data platforms. InterFlex should be placed in a global context and the DSOs should work with municipalities to enable the energy transition.

Alfredo Verboom, Department of Mobility & Environment at the City of Eindhoven, followed with his presentation of Eindhoven as a Smart Society, whose principles are to use data & smart technologies to improve life in the city through people, partnership, co-creation and experiments. Eindhoven has already published its Open Data principles in 2015 and its IoT Charter in 2016.

He stated that "*As a city we need to build our 2050 target, and InterFlex is a perfect example of what we want to achieve*". Today 40% of Eindhoven CO2 emissions are coming from the building sector, and two main challenges are on the rise, namely the heating of buildings with less (or without) natural gas, and emission free mobility. He shared his views on the development of electrical cars which will grow fast in the coming years. This will bring new challenges as there are limited renewable resources in Eindhoven.

Alternatives must be found, and Mr. Verboom gave different examples (renewable gasses, low or high temperature heat distribution network, all electric), emphasising the fact that the "All Electric" alternative will be a large part of tomorrow's landscape. This will drive the need for local & sustainable electricity.

Mr. Verboom then presented the Neighborhood approach which is being developed in Eindhoven to raise general awareness and interest. This approach should take into account the 4 main stakeholders involved in the energy transition: DSOs, Housing cooperation (in Eindhoven, 5 cooperation own 40% of houses), Private house owners, and Cities. However, support from the national government would still be needed.

He concluded his speech by underlining that it will be key to involve all these stakeholders in order to address the challenges which are the increase of electrical heating, electrical mobility and local intermittent energy production. "*Our future grid needs to be very smart, with maximum use of flexibilities*."

Renzo Coccioni, involved in T&D Europe Working Group on smart grids & micro grids, and Industry & Government Relations Director at Schneider Electric, then shared his views on the topic. He highlighted that the Smart Society presented by Alfredo Verboom is made possible thanks to the digitalization, which "is happening everywhere at any time, even during the night!". For this, the grids need to be smarter, and T&D Europe has developed a "Smartness Indicator" which will help assessing how ready the grid is for the energy transition and where and how it can be made smarter. More details were given by Mr. Coccioni about this indicator during the afternoon open discussion session.

Christian Buchel, Chairman of InterFlex Steering Committee, Deputy CEO at Enedis and Chairman of EDSO for Smart Grids, concluded this round of presentations. Echoing the Eindhoven Open Data principles, he highlighted the importance of data to leverage the energy transition in different territories. Open data is a key issue, he said, and two main challenges must be addressed: protect the customer's privacy and handle the open data properly to create value and new offers.

He shared his conviction that it is also about the consumer access to his own data, and in this regard one of the main topics is the website behind the meter. To be sure that customers access this data, there might be an effort to be done by the DSO in order to raise the customer’s awareness. This can be achieved for example by offering the possibility to the customers to compare their consumptions (in kWh) with each other.

He then emphasized that standards should be developed to allow an efficient access to the data. A common gateway should be privileged between DSOs, and he praised the creation of the ORE agency in France.

During the round table **Q&A session**, **Catherine Edwige (CRE Commissioner)** raised a point about the importance of biogas in the future local synergies between energies. Jan Peters answered by considering that gas and heat distribution should be preserved for existing buildings, even if new buildings are built without natural gas infrastructure.

2.4.1.4. InterFlex presentation: objectives and challenges (2/2)

Christian Dumbs, InterFlex Project Coordinator from Enedis, introduced the second session of innovation stream presentations.

Luis Hernandez (E.ON, Swedish demonstrators) opened this session with a presentation focused on Storage. He gave the examples of 2 different InterFlex demonstrators:

- The French demo trials a central battery system for emergency back-up power. As a legislative decree in France allows for collective self-consumption downstream of the same secondary substation, this "Cloud Storage" system consists in a shared community storage system.
- The Swedish demo trials a central battery system with islanding capabilities and distributed household battery systems for balancing/frequency support.

He concluded by considering that batteries are some of the most versatile assets today, but that we should still wait for a few years (or decades) before it becomes affordable.

Alexander Krüger (E.ON, Swedish demonstrators) followed with a presentation focused on Cross Energy Carriers Synergies. He gave the examples of power-to-heat applications, gas/electrical flexibilities based on hybrid heating systems and micro/mini-CHP involved in InterFlex Nice, Simris and Malmö demonstrators. He highlighted during his presentation the fact that energy systems should be designed in the future without distinct energy carrier boundaries.

Frank Geerts (Elaad, Dutch demonstrator) closed this session with a presentation focused on Electrical Mobility. He began by recalling that the Netherlands are at the foreground of electrical mobility development.

Figure 21 - InterFlex Community Meeting - Frank Geerts presentation on eMobility

He gave his insights on the fast development of electrical vehicles in the coming years, recalling that in addition to the environmental aspects, the appreciated driving experience will also play a major role in this roll-out. In his opinion, the market will keep expanding, and a steep increase should be witnessed in 3 to 5 years: "*Governments set the year 2040 to stop selling fossil fuels cars, but this might happen earlier!*". In this context, the challenge will not be the energy but the power, and if the free market is not enough to provide sufficient balance on the network, DSOs could act as a safety net to secure it.

He concluded his presentation by giving an analogy with the Hovenring, a bike ring which was built in Eindhoven on top of a crossroad which was famous for its traffic jams. In the same way that this extra layer allowed smoother circulation, the flexibilities should be the extra layer which will allow electricity to run smoothly in the future.

A question was raised by **Antonios Marinopoulos (Joint Research Centre)** on the impact of Vehicle-to-Grid on the lifetime of electrical vehicle batteries. Luis Hernandez answered that it will depend of the battery technology but also of the use case. Load shifting for example is expected to happen only once a day and should be only a portion of the whole battery. Frank Geerts added that this will mainly depend of how far the Vehicle-to-Grid solutions will bring the battery level down. Powering requirements for a residential household is lower than for driving and it could thus have lower impacts.

2.4.1.5. Focus on the Dutch demonstration flexibility market

Joost Laarakers (TNO, Dutch demonstrator) introduced the topic by recalling the complexity of the flexibility market. Indeed, many various dimensions must be taken into account:

- Different timescales, driving different markets (ancillary services markets, energy markets - day ahead or real time -, capacity market)
- Different types of flexibilities (uncontrollable, time-shiftable, buffers, unconstrained)
- Different certainties for the flexibilities
- Multiple actors on the open market: aggregators, BRPs, DSOs, end users

To maintain balance on all timescales and grid limitations, all types of flexibility should be used, also those with uncertainty. A scalable architecture with well-designed open interfaces is needed.

Marcel Willems (Enexis, Dutch demonstrator) then presented the interactions between the different actors on the demonstrator flexibility market, with the use of open protocol standards for flexibility trading.

Following a question from **Rémy Garaude-Verdier (Enedis)**, M. Willems answered that the certainty of the flexibilities would be measured with a combination of an Enexis algorithm, historical data, and forecast data (such as solar production forecast for example). He added that, in the future, flexibility contracts should not only include prices but also types of flexibility, types of day, and other relevant data.

2.4.1.6. Round table: Focus on flexibility business models & associated regulatory frameworks

This round table was chaired by **Grégory Jarry, from Accenture, involved in InterFlex Work Package 4** ("Dissemination and exploitation of the results") and on BRIDGE activities for the project.

Figure 22 – InterFlex Community Meeting – Round table on flexibility business models

The first question concerned the value of the flexibilities for the DSOs and the customers. **Guillaume Lehec (ENGIE, French demonstrator)** gave his conviction that the end customer is looking for the same comfort at a lower price, and so the aggregator should help the DSO to bring more value at a lower cost. This could be achieved by helping the DSOs to defer their future investments or to avoid power outages.

Thorsten Gross (Avacon, German demonstrator) underlined that the value for the DSO will highly depend of the regulation framework and that Capex and Opex should be considered. Moving from a Capex oriented regulation towards a Totex oriented regulation could help developing this value. He then considered that from a DSO perspective, a twofold development should be followed, which will bring different values for the flexibilities: a first step should be to provide the grid operators with "emergency switches", while at a second step the flexibilities should be integrated into standard day-to-day operations. Finally, **Philip Lewis (Founder and CEO at VasaaETT)** pinpointed the fact the reward economy could help to present the flexibility as a differentiator for the customers.

The panellists then debated the issue of the end customers motivation and engagement to provide flexibility. What motivates them? Is the bill the main lever to be considered or are there interests laying somewhere else?

Philip Lewis began by considering that today the energy bills are not big enough to incentive complex mechanisms. The customers are saving efforts by keeping the same supplier and contract. In his view, demand response economic incentives are only relevant for a fairly small segment of customers today. However, this might change in the future with the development of electrical vehicles.

He also invited to think about a new trend which is being developed in countries outside of the European Union, where, similarly to the telecommunication market, customers would only be invited to pay a fixed amount per month for their energy. With this model, it would

be harder to build economic incentives for the customer, but the customer agreement for DSO control could be included in his contract. Flexibility would then become a by-product of the customer's contract.

From an aggregator point of view, Guillaume Lehec noted that several questions should be considered before thinking about the customer engagement: why is this flexibility needed? Can a customer provide the flexibility that the aggregator will offer to the DSO? How can these flexibilities be aggregated? Then only the right offers - which will both maximize value for the DSO and engagement from the customer - should be designed. In this process, both the global value and the local value for flexibility should be considered.

Going further into the analysis of the customers' expectations, he remarked that different cases should be considered for residential or for industrial (B2B) targets. In his opinion, while the residential customers are mainly focused on prices, the B2B targets are looking for savings and also for simplicity. He added "energy is not expensive enough to allow B2B offers which are too complex". He concluded with the fact that customers are not always as rational as they seem and that the design of new offers and contracts should also take into account the customer experience as a whole (eventually thinking the flexibility as a by-product).

Through the discussion, an analogy was built with other markets, such as telecoms or air travels, which went through drastic changes due to ever decreasing costs. Philip Lewis reminded that the development of low cost airlines was a surprise, as they did bet on a lower quality which seemed unacceptable at that time for the travellers. Thorsten Gross also mentioned that standard airlines with higher quality did not disappear but they had to cope with this major market changes and invest in new services.

Philip Lewis concluded: "This is the end of the traditional supplier. Developing new services is the solution". In this regard, grid automation will be key to develop flexibilities.

During the Q&A session, **Bradley Eck, coordinator of the GOFLEX project**, shared his experience about customer engagement, remarking that most of the customers involved in Horizon 2020 experiments are already very interested in the projects and don't represent the general population. The panellists confirmed this experience. Thorsten Gross also highlighted that attention should be paid to the privacy issues to expand to a larger segment of customers. Guillaume Lehec added that a local interest should be created to allow efficient communication with the participants, as the recruitment scope is often narrow and accurate. This is for example illustrated with the French demonstrator name "Nice Smart Valley".

Antonios Marinopoulos (Joint Research Centre) opened the debate by asking if the DSOs should be allowed to control the flexibility assets. Guillaume Lehec answered that the first task should be to define the value of the flexibility and how to extract it, and only then the question of the operation should be considered.

2.4.1.7. Open discussions with the Community & closing speech

The last part of the meeting was dedicated to an "open discussion" session. Representatives of the project Work Packages were invited to answer questions from the audience:

- **Amir Ahmadifar (RWTH Aachen) - Work Package 3: Impact and deployment analysis of the innovative solutions.**
- **Thorsten Gross (Avacon) - Work Package 5: Germany use case demonstrations**
- **Jan Kula (CEZ Distribuce) - Work Package 6: Czech Republic use case demonstrations**

- **Joost Laarakers (TNO) - Work Package 7: The Netherlands use case demonstrations**
- **Peder Kjellen (E.ON) - Work Package 8: Sweden use case demonstrations**
- **Thomas Drizard (Enedis) - Work Package 9: France use case demonstrations**

Figure 23 - InterFlex Community Meeting - Open discussion with the Community

Following discussions on the value of flexibility, Thomas Drizard pinpointed the fact that Enedis published an economic study on this topic, showing that depending on the local configuration, the way we operated the grid could evolve to provide positive outcomes. He added that economic elements will be incorporated in the French Demo deliverables.

Eric Van Kaathoven (Elaad) asked what would be the main actions undertaken to make sure that project members will keep learning from each other. Multiple answers were given: Amir Ahmadifar (RWTH Aachen) underlined the Interoperability analysis to be carried out in the scope of Work Package 3, Thomas Drizard (Enedis) recalled the implication of several project members in the BRIDGE workshops.

The final topic which was addressed concerned the cybersecurity of the developed solution. It was mentioned that demanding cybersecurity guidelines already exist, but that this will be a major concern with the scalability of the solutions.

Christian Dumbs gave a closing speech, giving his view on the Customer Empowerment and the future roles of the DSO. He highlighted that the demonstration phases will start soon for most demonstrators and that the next Community Meeting will be the occasion to discuss further on the project outcomes.

2.4.2. Dissemination material produced in the scope of the event

Roll-ups

Several roll-ups were produced to inform about the project scope and main innovation streams to be explored.

Brochure

A brochure was designed to give information on the project consortium, outcomes, innovation streams and challenges. It can be found below.

Figure 24 – InterFlex Community Meeting – Brochure 1/2

Figure 25 - InterFlex Community Meeting - Brochure 2/2

3. LIST OF EVENTS

The table below summarized the events were members of the InterFlex project actively participated.

Event name	Date	Place	Country	Partners Involved	Link
Conference "Electricity trends in the European context"	11/4/2017 to 12/04/2017	Spindleruv Mlyn	Czech Republic	CEZ Distribuce	Link
Smart Energies Expo	06/06/2017 to 07/06/2017	Paris	France	Enedis, GRDF	Link
Stakeholders Workshop for EC study on "Interoperability for Demand Side Flexibility"	19/06/2017	Brussels	Belgium	Trialog	Link
EURELECTRIC Annual Convention & Conference	19/06/2017 to 20/06/2017	Estorial (Lisbon)	Portugal	Enedis	Link
Innogrid 2020+	26/06/2017 to 27/06/2017	Brussels	Belgium	Consortium	
Innovative City Convention	05/07/2017	Nice	France	Enedis, EDF, Engie, GRDF, GE	Link
IoT Week	06/09/2017 to 09/09/2017	Geneva	Switzerland	Trialog	Link
Integridy International Conference	14/09/2017	Milano	Italy	Enedis	Link
European Utility Week	03/10/2017 to 05/10/2017	Amsterdam	Netherlands	Consortium	Link
CCI Nice Côte d'Azur - Club Smart Grids Creative Evening	10/10/2017	Carros	France	Enedis	Link
Pubs-Affair Brussel: What role for 'Local Energy Communities' in the EU energy transition?	16/10/2017	Brussels	Belgium	E.ON	Link
Conference & Exhibition "Operation of distribution networks"	17/10/2017 to 19/10/2017	Trebon	Czech Republic	CEZ Distribuce	Link
CK CIRED 2017	07/11/2017 to 08/11/2017	Tabor	Czech Republic	CEZ Distribuce	Link
Forum Industria	23/11/2017	Nice	France	Enedis	Link
1st InterFlex Community Meeting	29/11/2017	Eindhoven	The Netherlands	Consortium	
Digitalization of European Power & Utility Industry 2017	29/11/2017 to 01/12/2017	Berlin	Germany	RWTH	Link
Power Circle and E.ON "Local Energy System" workshop	04/12/2017	Ystad	Sweden	E.ON	Link
Tenerrdis Workshop on Energies Complementarities	13/12/2017	Grenoble	France	Enedis, GRDF	Link
Workshop on Samsø and Simris experiments	19/12/2017	Malmö	Sweden	E.ON	Link
Nice Smart Valley Showroom Inauguration	20/12/2017	Nice	France	Enedis	

Figure 26 - List of other events

4. REFERENCES

1. Grant Agreement number – 731289 - INTERFLEX – H2020-LCE-2016-2017/H2020-LCE-2016-SGS
2. Innogrid Website http://innogrid2020.eu/
3. European utility week website: http://programme2017.european-utility-week.com/

5. APPENDIX

January 26th, 2017

Press Kit

Kick Off Event

Enedis Press Department

InterFlex

Interactions between automated energy systems and Flexibilities brought by energy market players

Five European distribution system operators (DSOs) join their forces to foster the energy transition

Selected by the European Commission among 28 other candidates, in the framework of the biggest EU Research and Innovation programme, Horizon 2020, the smart grid project **InterFlex** has officially been launched on January 1st, 2017.

During three years, 20 project partners will explore new ways to use various forms of flexibilities in the aim of optimizing the electric power system on a local scale.

InterFlex investigates the INTERactions between FLEXibilities provided by energy market players and the distribution grid, with a particularly focus on energy storage, smart charging of electric vehicles, demand response, islanding, grid automation and the integration of different energy carriers (gas, heat, electricity).

Furthermore, aspects related to the interoperability of systems, replicability of solutions and the identification of relevant business models constitute major objectives.

The project associates electricity retailers, power component manufacturers and smart grid experts with the 5 European distribution companies ČEZ Distribuce (Czech Republic), Enedis (France), E.ON (Sweden), Enexis (The Netherlands) and Avacon (Germany).

The kick-off ceremony of this ambitious project took place at the Allianz Riviera stadium in Nice (France) on January 26th, 2017 and was chaired by Philippe Monloubou, CEO of Enedis, in the presence of Philippe Pradal, Mayor of Nice, as well as Anna Colucci, Head of the Retail Market Unit; Directorate General for Energy at the European Commission.

InterFlex in figures:

- 20 project partners from 6 European countries working together
- 6 real-scale demonstrators in 5 different European countries
- 3-year project duration
- 22.8 M€ total budget

The context

An electric system which integrates a local vision

The European electric power systems have undergone dramatic changes within the last two decades. Distributed renewable energy sources such as wind or solar power have reached significant shares while new uses of electricity have emerged, and there is still much to come with the ongoing e-mobility development. Today, the vast majority of the renewable energy sources is connected to the distribution grid. On that same grid, millions of electric vehicle charging stations all over Europe are likely to be deployed within the upcoming years. The distribution grid will need to adapt to rapidly changing energy flows. In the aim of minimizing the corresponding grid investments the distributed system operators will play a major role, within a more local approach, exploring the various means of managing temporarily the exchanged energy with the grid: a customer reducing his consumption at peak time, a storage system charging when renewable energy is available, etc.

The InterFlex project

InterFlex is a response to the Horizon 2020 Call for proposals LCE-02-2016 of the European Commission ("Demonstration of smart grid, storage and system integration technologies with increasing share of renewables: distribution system"). The project receives funding from the European

Union's Horizon 2020 research and innovation programme under Grant Agreement No 731289 — InterFlex — H2020-LCE-2016-2017.

InterFlex explores pathways to adapt and modernize the electric distribution system in line with the objectives of the 2020 and 2030 climate-energy packages of the European Commission. Therein the Member States have committed to lower significantly the greenhouse gas emissions (20% by 2020 and 40% by 2030, with respect to 1990), and to increase the share of renewables (20% by 2020 and ≥27% by 2030, 40-60% by 2050).

InterFlex is built upon a twofold approach. Six demonstration projects are conducted in five EU Member States (Czech Republic, France, Germany, The Netherlands and Sweden) in order to provide deep insights into the market and development potential of the orientations that were given by the call for proposals, i.e., demand-response, smart grid, storage and energy system integration.

In the long run, InterFlex prepares the deployment of the validated solutions where:

- business model options have been identified
- policy recommendations are built thanks to the BRIDGE process initiated by the EC-DGENER and now continued operationally by four working groups (business modelling, data management, consumer engagement and regulations) which will be nourished by the demonstration results
- Replication rules will be proposed based on the studied use cases

InterFlex aims at improving the global performance of electricity networks at a local or regional scale, while dealing with new challenges, such as the steadily increasing complexity of power flows and growing interactions between the market players. The InterFlex project translates the aim of its consortium members to explore the local optimization potential that can be addressed through grid automation and the use of flexibilities for the electricity system. InterFlex designs the way towards an energy system approach dealing with multiple interactions between power generation (renewables), multi-energy consumers (electricity, heat, gas) in the context of newly appearing customer needs (e-mobility) and behaviours. The DSO, as an enabler, may emit market signals to power producers, consumers, prosumers, their aggregators, or even to third parties such as municipalities which will in return stimulate the market players to offer generation and/or consumption flexibilities.

The project Consortium

20 industrial partners (utilities, manufacturers and research centers) from 6 different European countries are engaged within this 23 M€ project in order to deploy smart grid technologies at an industrial scale, in the context of high renewable energy penetration.

InterFlex project Partners

InterFlex combines among its consortium members the key competences along the value chain of the distribution grid and electricity retail markets:

- 5 major European electric power DSOs (Avacon, CEZ Distribuce, Enexis, E.ON, Enedis) and one gas DSO (GrDF)
- 2 large-scale European retailers (EDF, ENGIE),
- 2 major IT solution providers (GE and Siemens)
- 4 suppliers of smart inverters and solutions for smart grids (Schneider Electric, Siemens, Fronius, Socomec)
- 3 research centres (AIT, TNO, RWTH) with key competences in smart grids and computer science
- A knowledge and innovation centre (ElaadNL) in the field of EV charging infrastructures
- A consulting company involved in the smart energy system development (Accenture)
- 2 SMEs (Trialog, Socomec) with expertise for innovative technologies in embedded and industrial systems

The technical focus of the project

With Enedis as the global coordinator and ČEZ Distribuce as the technical director, InterFlex relies on a set of innovative use cases. Six industry-scale demonstrators are being set up in the participating European countries:

- The French demonstrator of Enedis, located in Nice and its surroundings, investigates flexibilities to support the grid, storage systems and islanding operation.
- The Czech demonstrator led by ČEZ Distribuce uses grid automation and energy storage to integrate decentralized renewable energy within the distribution grid and smart functions of charging stations for electric vehicles as a source of flexibility, in different areas of the country.
- The German demonstrator of Avacon, located in a rural area between Helmstedt and Salzgitter (central Germany) manages a centralized platform of flexibilities and distributed energy resources to use energy where it is generated in order to relieve the distribution grid.
- A 1st Swedish demonstrator of E.ON, located in Malmö investigates the energy carrier integration using heat inertia of buildings as a flexibility measure in order to attain a more optimized and environmental friendly production in a distributed energy system.

- A 2nd Swedish demonstrator of E.ON, located in the Skåne region (Southern Sweden), is exploring means to island a portion of the distribution grid, supported by the client through a “peer to peer” approach, while assessing the benefit of advanced control of Local Energy Systems for the DSO.
- The demonstrator in Eindhoven with Enexis proposes a multi-service approach to unleash all available local flexibilities such as stationary storage and electric vehicle batteries, by using

interactions between the distribution system operators, balance responsible parties and the charge point operators for electric vehicles.

Through the different demonstration projects, InterFlex will assess how the integration of the new solutions can lead to a local energy optimisation. Technically speaking, the success of these demonstrations requires that some of the new solutions, which are today at TRLs 5-7, are further developed reaching TRLs 7-9 to be deployed in real-life conditions.

This allows new business models and contractual relationships to be evaluated between the DSOs and the market players.

The following table shows the match between the technical focuses and flexibility levers explored within the 6 demonstrators:

The InterFlex demonstrators have been structured into different focus areas that represent the technical business innovation axes of the project.

Dissemination and replication

The InterFlex project is today in its starting phase. Beyond the general objective to bring the technical performance of the tested solutions to the highest level, the dissemination of the project's findings as well as the preparation of their industrial replication constitute major goals of the project.

RWTH Aachen University is in charge of the General Work Package 3 which focuses on the replication of the project's achievements. Together with Austrian Institute of Technology (AIT) and Trialog, the interoperability of the demos will be ensured and the interchangeability of flexibility devices will be demonstrated, which will lead to a framework that will allow the interoperability of the future European flexibility market. This work package will collect the experiences from the different field tests with the goal to identify common points and typical interactions among stakeholders. This internal activity of knowledge collection will then be reported at European Level supporting the European Commission in the cross-projects efforts aimed at defining common solutions for all the network operators.

The project partners aim at delivering the new knowledge gained in a packaged way suited to meet the multi stakeholder expectations. An Advisory Board is built to challenge the project findings each year.

The project findings shall conduct the consortium members to replicate the demonstrated solutions and the developed business models. The results shall be an incentive to other services providers or investors to test and replicate the developed business models in order to further develop advanced monitoring, local energy control and flexibility services at EU level.

RWTH Aachen University

RWTH Aachen University is among the leading European scientific and applied research institutions, comprising 260 institutes in nine faculties.

The E.ON Energy Research Centre, a public private partnership between E.ON SE and RWTH Aachen University funded in 2006, fosters innovative energy research with a strong link with industry in an interdisciplinary approach, with five institutes from four different faculties. Within this research centre, the Institute for Automation of Complex Power Systems (ACS) focuses on research for the automation, modernisation and restructuring of electrical energy distribution systems. This research area deals with solutions for monitoring, maintaining and developing complex power systems.

InterFlex' ambition and expected impacts

Beyond the technical and business innovation, the project expects to generate environmental, socio-economic and policy impacts:

Environmental impacts: Through the optimisation of the local energy system, the project generates benefits in terms of

- Increased energy efficiency (load shifts to off peak hours; optimized self-consumption in case of prosumers, increased awareness leading to active DSM and reduced electricity consumption),
- power generation optimization (peak shaving, avoiding electricity generation from carbonized peak load generation units),
- increased share of renewables (optimized integration of intermittent renewable energy sources),

resulting in the overall reduction of GHG emissions.

Socio-economic impacts: The project stimulates the development of new services for end-customers allowing for instance the development of demand response service packages for small and large consumers as well as prosumers. The provision of community storage solutions or the optimal use of multiple source flexibilities will help to decrease the electricity bill without any noticeable impact on the supply quality.

Policy framework: The Use cases of the project will help to

- formulate recommendations for micro grid operation (control schemes and observability),
- elaborate an appropriate regulatory framework for self- consumption and storage solutions (community or individual residential storage)
- provide guidelines on the participation of distributed resources in DSO operations (modifications of grid codes).

The active contribution of InterFlex to the BRIDGE process of the European Commission feeds in complementary regulatory recommendations.

Specificities of the six Demonstrators

The French demonstrator

The French demonstrator Demo1 is located in and around the city of Nice, a metropolis that is already heavily involved in the "smart city" innovation. Nice is ranked 4th "Smart City" on a global scale by the international firm Juniper Research, specializing in new technologies, behind Barcelona, London, New York and ahead of Singapore.

The demonstrator will be a continuation of the GRID4EU / NICE GRID experiment, a European project in the field of smart grids, renewable energies and energy transition which terminated in 2016. Demo1 will cover a wider geographical area, initially encompassing the western districts of Nice, the business parks of the Plaine du Var, the ski resort of Isola 2000 and the Mediterranean islands of Lérins.

Demo1 will follow an industrialization approach and will test different innovative approaches with respect to the management of the electrical system while taking into account the specific local environment (production of renewable energies, electric vehicle charging stations, changes in consumer behaviour, new uses etc.). Involving residential, commercial and industrial customers, Demo1 will offer several types of electrical flexibilities: "hybrid" flexibilities that will be interacting with both the electric and the natural gas network (cogeneration, hybrid boilers), modulation of electric vehicle charging, battery storage... Beyond technical developments, Demo1 also aims to set up business models of electrical flexibility.

Geographical area of DEMO1

Specification sheet

DEMO1

Location	Several areas in "Alpes Martimes" Department, including ▪ City of Carros ▪ Western disctrict of Nice ▪ Several towns of the "Plaine du Var area" ▪ Isola 200 ski resort ▪ Nice international airport ▪ Lerins islands
Demographic density	Rural / Suburban / urban
Project scope	3 HV/MV primary substations
Climate	Warm and stormy (Mediterranean)
Specific conditions	▪ High share of distributed photovoltaic generation ▪ "Electric peninsula": electricity import-dependent region. Only 10% of its consumption is locally generated.
Project partners	Enedis, GE, Engie, GRDF, EDF, Socomec
Use Cases tested	▪ Automatic islanding ▪ Mutliservice approach for storage systems ▪ A local flexibility mechansim operated by the DSO
BUDGET	5,1 M€

Enedis

Enedis, is a 100% owned subsidiary of EDF (Electricité de France) since 1st January 2008. Enedis assumes electricity distribution activities of 95% of French communes. It's currently conducting an active investment policy to meet growing electric consumption (+9.6% investment each year)

Key Figures (2014):

Turnover	12,2 bn €	Number of primary substations	2,247
EBITDA	3,531 bn €	Number of secondary substations	769,294
Total staff	38,859	Length of the grid	1,332,942 km

The French distributed renewable power generation capacity rises constantly every year. The wind power generation capacity was about 9,8 GW in June 2015, whereof 89% connected to the medium- and low-voltage distribution grid, with an additional 4,9 GW of pending connections to the distribution grid. At the same time, the photovoltaic generation capacity was about 5,7 GW, resulting from 330,000 generation sites, while the pending connections were about 1,9 GW. 94% of this generation capacity is connected to the distribution grid. The initial government target of 5,4 GW for solar PV in 2020 was raised and set to 8 GW.

Enedis is conducting 18 smart grid projects on the French territory, covering different environments (urban, suburban, rural), technical challenges (wind and solar intermittency, e-mobility, cyber-security, energy conservation, big data) and innovations (smart meters, storage solutions, telecommunications...).

Enedis is chairing the French association "*Think Smart Grid*" promoting smart grid development.

The Czech demonstrator

The Czech demonstration project Demo2 will be located in several areas in Czech Republic where ČEZ Distribuce operates distribution networks. The demonstration is not concentrated to one region in order to prove replicability and interoperability of designed solutions.

The demonstration project will be partially built on the experience gained in the GRID4EU/ Smart Region Vrchlabí (a European project in the field of smart grids, renewable energies and energy transition which was finished in January 2016).

Demo2 is focused on the implementation of solutions which are not so far usual in distribution systems but which have a strong potential for future roll out. Tested solutions within Demo2 cover the most urgent challenges of DSOs (increasing DER hosting capacity, EV charging stations implementation and energy storage). Beyond the technical developments, Demo2 also aims to propose grid codes and standards updates in order to secure future smoother integration of selected smart grid solutions.

Specification sheet

DEMO2

DISTRIBUCE

Location	Different areas in Czech Republic ▪ 3 villages, each with different topology of LV distribution grid, (Central Bohemia region and East Bohemia region) where smart PV inverters or energy storage are tested ▪ Areas in Central Bohemia region, North Moravia region, East Bohemia region where volt-var control of different DER connected to the MV distribution network is tested ▪ Hradec Kralove (East Bohemia region) and Decin (North Bohemia region) where smart EV charging stations are tested
Demographic density	Rural / Suburban / urban
Project scope	▪ 3 different LV distribution networks ▪ 3 different DER connected to the MV distribution networks (Biogas, Wind, PV)
Climate	Cold (continental)
Specific conditions	▪ High integration of PV in LV distribution network ▪ Existing communication interface between DSO an DER connected to the MV distribution network
Project partners	ČEZ Distribuce, Siemens, ČEZ Solarní, Fronius, AIT, Schneider
Use Cases tested	▪ Increasing PV hosting capacity in the LV grid with smart PV inverters ▪ Increasing DER hosting capacity in the MV grid with the volt-var control ▪ Smart EV charging ▪ Smart energy storage
Budget	1,0M€

CEZ Distribuce

ČEZ Distribuce, a. s. is a member of CEZ Group, a power utility that operates in a number of countries of Central and Southeast Europe. The main mission of company ČEZ Distribuce is to distribute electricity to private individuals and legal entities and to continually improve the quality and reliability of supplies to all customers. The company administers the assets comprising the distribution grid, the

operation of which it controls through a technical dispatch (grid control centre). ČEZ Distribuce is the major DSO in Czech Republic with more than 3.6 mio of supply points. The main capital expenditures of the company focus on distribution system development, most importantly ensuring sufficient distribution system capacity and taking care of connection requests by customers and generating facilities. Main capital construction activities focus on renovating distribution system infrastructure with the aim of improving the quality of supplies and the reliability and safety of distribution system operation. The MV and LV development projects include, in particular, upgrades and renovations of medium and low-voltage underground cables and overhead power lines and construction of new MV/LV distribution transformer stations. Capital expenditures on HV projects consist mostly of HV/MV substations, overhead HV lines (rebuilds and new construction), and projects undertaken to meet customer demand. The company has in 1470 employees out of whom for the InterFlex activities contribute experts mainly from Strategy Section and Grid Control.

ČEZ Distribuce is involved in the EDSO for Smart Grids and chairs its Project Committee. Via the EDSO association ČEZ Distribuce has been participating in GRID+ and GRID+Storage projects. ČEZ Distribuce led the demonstration project 5 (Smart Region) of the GRID4EU project.

CEZ Distribuce areas in Czech Republic (in orange colour)

Key Figures (2015):

Turnover	1,93 bn €	Number of primary substations	239
EBITDA	0,56 bn €	Number of secondary substations	45412
Total staff	1470	Length of the grid	163211 km

The German Demonstrator

The power system of the future will involve a very large number of decentralized active participants such as RES generators or flexibility providers of different scales and types. Complexity thus grows: the communication between these participants and the DSO to coordinate the services they provide for the system, the dynamic requirements which they have to fulfil, the requirements for themselves to align these with grid operation and grid restrictions. Guaranteeing the system's resilience and security requires developing tools which enable DSOs to efficiently, effectively and reliably control hundreds of thousands of distributed active units while adhering to high standards of data protection and IT security.

AVACON is developing a new technology – the *"Smart Grid Hub"* –which makes the communication and coordination tasks feasible, but also makes possible to optimize interactions between the various involved players. The Smart Grid Hub is a technology that is supposed to work with any smart meter infrastructure, provided that it complies with EU-recommendations. It therefore accelerates the automation of network operations while being adaptable to any flexibility situation.

The prototype is developed under AVACON specifications to be linked with the grid control system. Three use cases are studied during a 24 months demonstration involving more than 200 real customers in the low- and medium voltage regime:

- Feed-in management (Controlling small RES-units)
- Ancillary services provided by generation, consumption and storage devices
- Distributed sources of flexibility within the distribution grid

Specification sheet

DEMO3

avacon

Location	Area in Lower Saxony and Saxony-Anhalt located between the cities Luneburg, Salzgitter and Helmstedt
Demographic density	Rural
Project scope	▪ Develop the *Smart Grid Hub* (SGH) - an IT tool designed to make use of and enhance the capabilities of any existing smart metering, remote control and communication system within state-of the art security standards. ▪ Test and enhance the abilities of the system of SGH, grid control system and smart meter infrastructure by showing how it is applied to the use cases.
Climate	cold (continental)
Specific conditions	▪ Centralized control of interregional ancillary services provided by generation, consumption and storage devices. ▪ Optimizing growing needs for flexibilities within all electrical services covering low and medium voltage levels. ▪ Ensuring reliable and efficient power supply while putting the focus to clear processes communication to the customers especially in the scope of using intelligent metering systems. ▪ Effective flexibility management of RES units such as private photo voltaic, onshore wind farms and storage capacities in rural areas.

Project partners	▪ AVACON AG and its Affiliates: ▪ E.ON Business Services GmbH (EBS) ▪ e.kundenservice Netz GmbH (EKN)
Use Cases tested	Three use cases are studied during a 24 months demonstration involving more than 200 real customers: ▪ Feed-in management ▪ Ancillary services provision ▪ Demand response
Budget	3,7 M€

Avacon

AVACON's network area for electricity covers over 55,000 square kilometres and stretches from the North Sea coast to southern Hesse. With approximately 66,000 km of high, medium and low voltage cables and over 20,000 km of natural gas pipelines, AVACON provides a secure supply of energy to our customers. The energy needs of around 16 million people are met by their networks.

As a utility company with a rural emphasis, AVACON is at the heart of the energy revolution and bears a particular responsibility for connecting decentralized generating plants in a timely fashion and expanding the distribution networks to meet demand.

Today, AVACON is already receiving and transporting over 14 billion kilowatt hours of green energy from wind, sun, biogas and hydropower. With a share of green electricity of over 130%, AVACON is exceeding the German Federal average by four times. Successfully integrating these volumes into the system would not be possible without the ideas and the commitment of the employees. 1700 employees and 200 apprentices are working in 14 locations to ensure a reliable supply of electricity and gas. They are also developing solutions to help turn the challenges of the energy revolution into technical innovations.

AVACON is expanding what are currently one-way energy streets between power plants and households and turning them into high-performing, intelligent networks that distribute renewable energies in an efficient manner. To this end, in the next 15 years AVACON plans to invest 2.8 billion euros.

The AVACON Group owns the regional and local energy companies, SVO Holding Celle, LandE and WEVG, the high pressure gas network operator, AVACON Hochdrucknetz, the water company, Purena, and AVACON Natur.

AVACON is part of the E.ON Group, but at the same time has a strong regional focus. Over 80 municipal and district councils hold 38.5 percent of the shares in AVACON.

The 1st Swedish Demonstrator

The first Swedish demonstrator optimizes the small scale energy systems, e.g. local thermal grids for district heating by applying demand response to specific conditions. In one application we want to utilize a buildings thermal capacity and use the building as an energy carrier in order to shave off peak load production. Another application is to optimize power2heat production with heat pumps and optimize on the power production variations.

One of the most important steps in the demonstration is to commercialise the optimization and find new business models for shared responsibilities and benefits collection of the optimization.

By applying the technique we are able to lower emissions and reduce overall cost since we can even out peak hours. The essence is to adapt to demand flexibility in the short term (1-6 hours) by utilizing either thermal capacity already in the system or other energy carriers from other energy systems.

Specification sheet

DEMO4A

Location	Several areas in Sweden where E.ON owns thermal grids ▪ Malmö ▪ Sub-urban Stockholm ▪ Norrköping ▪ Etc.
Demographic density	Urban
Project scope	Real-estate and larger buildings, no private households
Climate	Hemi boreal climate with warm summers
Specific conditions	Thermal grid owned by E.ON
Project partners	▪ E.ON Sverige ▪ RWTH Aachen University
Use Cases tested	▪ Operation of distributed DSR using the building´s envelope thermal inertia and the district heating/cooling network´s thermal inertia as a source of flexibility for grid management purposes. ▪ Optimal use of a centralized Power to Heat unit (large heat pump) providing the district heating grid with heat and electricity flexibility for grid management purposes
Budget	4,0 M€

The 2nd Swedish Demonstrator

The demonstration aims at testing technical and commercial interactions with the E.ON's micro-grid site in Simris in Sweden. E.ON Elnät is deploying a first of a kind micro-grid project that can run with 100% renewable generation to be deployed and commissioned in 2017. It consists of wind power as main generation, supported by PV's and a battery system as well as a back-up generator used for some test periods in case there is not enough available power from renewables, when the system is run in an islanded mode. The micro-grid has about 150 B2C customers, today existing customers of E.ON Elnät. The demonstration is highly customer centric and seeks to leverage their increased participation within the context of the micro-grid to drive new insight, learning and solution development outcomes.

The demonstration validates the commercial implications surrounding the roles, responsibilities and relationships between the following electricity system players (drawing on ENTSO-E generic role model descriptions). Grid Access Provider, Grid Operator and Resource Provider are assumed in this pilot project to have a bundled role held by the micro-grid operator. (E.ON Elnät as micro-grid operator).

The use cases that will be executed as part of this demo are the three following:

1.-To provide passive customers (which only consume electricity and have no remote influence in their consumption) the possibility of becoming active customers by allowing them to install decentralized balancing technologies that will allow the DSO to perform Demand Side Response. These DSR technologies will be based on Power to Heat (e.g. hot tap water boilers and heat pumps) and Power to Power units (e.g. Battery Systems) to achieve an improved performance (e.g. increase renewable self-consumption and enhance power quality) of a micro grid when in islanded mode.

2.-To create a Local Energy Market for the customers in Simris. This platform will enable increased direct consumer participation in the balancing of the micro-grid (by delivering a 'peer to peer' market platform) in order to, incentivize deployment of distributed DSR technologies, increase LV network visibility and reduce system operation costs for balancing purposes.

3.-To develop advanced algorithms that will allow a high degree of automation, steer ability and response of the micro-grid. The goal of this use case is twofold. On the one hand, it aims at minimizing the need for behavioral change of the customers by including smart models and algorithms that will allow the system to maintain the customer´s comfort and in parallel enable their technologies to provide balancing support to the grid. On the other hand, advanced controls will be developed, which will increase the ability to observe and steer the operations of a micro-grid in response to distribution network constraints.

The micro-grid project will allow the distribution operator to explore and understand the technical challenges of the future energy world by operating a system with a high penetration of renewables, low rotating mass inertia and distributed balancing technologies.

Specification sheet

DEMO4B

Location	Simris (Skåne region, Southern Sweden)
Demographic density	Rural
Project scope	1 MV/MV and 6 MV/LV substations, 1 steerable Wind Turbine, 1 steerable PV farm, several distributed balancing technologies.
Climate	Hemi boreal climate with warm summers
Specific conditions	Isolated energy system
Project partners	RWTH Aachen
Use Cases tested	▪ Deployment of distributed balancing technologies at customer´s houses (Use case #3) ▪ Creation of a local energy market platform (Use case #4) ▪ Performance enhancement of the micro-grid operation by using advanced controls (Use case #5).
Budget	3,5M€

E.ON Sverige

E.ON in Sweden is engaged in Energy Networks, Customer Solutions and renewable power production in the Nordic region.. We generate heat and produce biomethane for use as a vehicle fuel. We operate regulated power and gas distribution systems serving a total of 1 million customers in Sweden. We sell power, heat, and gas to 850,000 customers, mainly in Sweden but also in Denmark. Across all these businesses, we focus on providing low-carbon energy solutions and on helping our customers and communities to become more sustainable and more energy efficient. Our flagship projects for sustainable urban development are the Western Harbor and Hyllie districts in Malmö, Sweden. We're committed to supplying 100 percent renewable or recycled energy to Hyllie by 2020.

E.ON Sverige AB as DSO and heat network operator optimizing the use of flexibility arising from local heat production (incl. power2heat) alternatives and consumption

E.ON Sverige AB as DSO providing merit orders for flexibility to rural micro-grid.

The Dutch Demonstrator

Dutch Silicon Valley

Eindhoven is a significant technical development region for Netherlands and Europe due to Philips and the Technical University. The Technical University produces many IT start-ups and a company in Eindhoven worked extensively on the next step in chip evolution with the development of photons semiconductors. With Business Park Strijp-S, where many start-ups work, and the High Tech Campus Eindhoven the Netherlands seems to have its own Silicon Valley. In 2011, Eindhoven is named the smartest region in the world by the international policy organization International Community Forum. The ICF praised Eindhoven to stay in competition with high-quality technology products in relation to producers in cheaper countries. Also Brainport, a collaboration of various tech-producers, government agencies and educational institutions, is seen as a driving factor of the region.

The Dutch demonstrator is located in a former industrial area from Philips called Strijp-S.

With the departure of Philips, the plan picked up at Strijp-S to develop into a breeding ground for the creative sector. Under the flag Old Buildings, New Ideas is activity attracted primarily on design and technology. Open studios in the old factory buildings arise where creative entrepreneurs find their workplace.

The scope of the project is to enable ancillary services, congestion management, and voltage support for PV integration using, grid connected storage systems which improve grid observability of prosumers, while promoting batteries in a multi-service approach.

We try to do this by enabling the optimal activation of all available local flexibilities, using interactions between the DSO and the Charge Point Operator, in the role of aggregator using local installed EVSE's for congestion management and voltage control.

Our goal is to validate technically, economically and contractually the usability of an integrated flex market based on a combination of static battery storage and EV

Specification sheet

DEMO5

Location	Eindhoven
Demographic density	Urban
Project scope	Strijp_S
Climate	temperate climate
Specific conditions	Mix of habitation and creative companies
Project partners	▪ Enexis ▪ TNO ▪ ELAAD
Use Cases tested	▪ Multiservice approach for battery-based storage ▪ Flexible use of local resource for charging electrical vehicles ▪ Creation of an integrated flex market for local storage and electrical vehicles
Budget	2,7M€

Enexis

Enexis channels energy in the right direction. Enexis provides for the transmission of electricity to 2.7 million customers and of gas to over 2 million customers in the Dutch provinces Groningen, Drenthe, Overijssel, Noord-Brabant, Limburg and, through Endinet, in the Eindhoven region.

Vision & Mission

Everybody wants to be able to make use of energy always and everywhere. That is why we transport energy in a safe, reliable, affordable and customer-oriented manner. The Netherlands is on its way towards a sustainable energy supply. This requires efficient consumption of energy from more and more sustainable sources. Enexis works together with other organizations on a sustainable and responsible energy supply, for today and tomorrow.

TNO

TNO is the Netherlands Organisation for Applied Scientific Research, is the largest independent not-for profit research organization in the Netherlands. TNO has about 3000 employees working in various research areas; energy is one of the five innovation themes.

Elaad

ElaadNL is the knowledge and innovation centre in the field of (smart) charging infrastructure and is owned by the Dutch DSOs. ElaadNL coordinates the connections of public charging stations to the electricity grid and has been working from the beginning to adapt the grid connection demands to make these more fitting to charge points. The existing charging stations are managed by EVnetNL to provide an innovative charge network, a living lab for ElaadNL and the Netherlands. ElaadNL developed e-clearing.net and the de-facto standard for connecting different charge stations, the Open Charge Point Protocol (OCPP).

The emergence of electric mobility and sustainable charging is a significant development for the electricity grid. Through their mutual involvement via ElaadNL, the DSOs acquire an overview of the measures to be taken to ensure that the network remains reliable and affordable, whilst enabling the development of E-mobility. Innovative solutions are explored that will generate great benefits for society.

Smart Charging market standard

Based on the results of the living lab, ElaadNL is coordinating and developing, in co-creation with partners, a comprehensive international market standard for Smart Charging. This (set of) standard(s) is targeted to be ready for large scale roll-out in 2020, together with massive market adoption. Before ElaadNL has developed the leading standard for managing Charge Points, which has been adopted and implemented worldwide. ElaadNL is passionate to do repeat this for Smart Charging! We want to build a Smart Charging Ecosystem – together with European leading countries, cities and companies. The Netherlands prepare for mass market, we are looking for partners to prepare Europe.