D6.2

Flexibility Characterization Customer Engagement Strategy and Implementation for Power Flexibility Users

BFLEXIBLE

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them

D6.2	Work Package No.	6	Task/s No.	6.2	
Work Package Title	Flexibility Characterization Customer Engagement Strategy and Implementation for Power Flexibility Users				
Linked Task/s Title	WP2 T2.1 Value Proposition WP2 T2.2 Engagement Strategy				
Status	Final	(Final)			
Dissemination level	PU				
Due date deliverable	2023-10-31	Submission date	2023-11-21		
Deliverable version	Final				

Document Contributors

Deliverable responsible: Smart Innovation Norway (SIN)

Contributors	Organisation	Reviewers	Organisation
Ione Lopez	IBES	Beatriz Alonso	i-DE
Rose Mathews	SIN	Ana Yurena García	i-DE
Leonor Ruiz	SOUL	Carolina Manaresi	ENEL
Beatriz Alonso	i-DE	Adam Christensson	E. ON
JC Pazzaglia	SAP	Matteo Troncia	COMI
Pau Lloret	TV	José Pablo Chaves Ávila	COMI
Daniel Davi Arderius	ENEL	Rircardo Jorge Bessa	INESC
		Leonor Ruiz	SOUL
		Ana Lumbreras	ZAB

Document History

Version	Date	Comment
0.1	2023-12-06	Table of Contents for review
0.2	2023-20-10	Draft Review
0.3	2023-26-10	Review

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Table of contents

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

List of figures

List of tables

List of abbreviations

API: Application Programing Interface
BEV: Battery Electric Vehicle
BESS: Battery Energy Management System
BMS: Building Management System
EMS: Energy Management System
EV: Electric Vehicle
HTTP(S): Hypertext Transfer Protocol Secure
ICE: Internal Combustion Engine
JSON-RPC: JavaScript Object Notation-Remote Procedure Call
LAN: Local Area Network
OCPP: Open Charge Point Protocol
PV: Photovoltaic
SOAP: Simple Object Access Protocol
TCP/IP: Transmission Control Protocol \Internet Protocol
UDP/IP: User Datagram Protocol\Internet Protocol
VPP: Virtual Power Plant.
WP: Work Package
WAN: Wide Area Network

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Executive Summary

This report highlights the key technical characteristics and communication protocols of flexibility providers included in Demo Sites, including their ability to provide grid flexibility, integrate renewable energy sources, and enhance system reliability. It also discusses the challenges faced in order to enrol flexibility providers through costumer strategy engagement. Overall, this summary aims to provide decision-makers with valuable insights into the role and importance of flexibility providers and how to engage them in active participation of flexibility services. A description of Demo Sites, resources, devices involved, communication protocols, signals to be interchanged is to be given in this document.

1. Introduction

BeFlexible aims at developing innovative business models based on energy and cross-sector customer-centric services. The primary goal is to unlock customers' flexibility by leveraging knowledge and principles from various domains, including electricity markets (WP1), social sciences (WP2), grid data and business network platforms (WP3), and grid operations. Through this comprehensive approach, we intend to establish an effective customer engagement roadmap.

This report lies under the scope of Work Package 6, South-West EU demo (DEMO 3) and it is the result of Task 6.2, Flexibility Characterization and Customer engagement Strategy. It delves into the concept of flexibility characterization in the context of customer engagement strategies and implementation for power flexibility users participating in WP6 Demos in Spain and France.

Spain:

- *Pilot 3.1*: Madrid: Iberdrola Campus (services sector) with all the DERs (PV, building management, batteries, EV) and residential customers.
- *Pilot 3.2:* Benidorm: Residential and commercial area with Heat Pumps/electric water heaters. Flexibility in buildings in buildings in Benidorm.
- *Pilot 3.3:* Bilbao: Flexibility in public buildings.
- *Pilot 3.4:* Sevilla (previously Zaragoza): Residential customers with electric water heaters.

France:

- *Pilot 3.5:* Mougins: Company sites in Mougins, Households and Residential from employees in France with Charging points and energy assets.
- *Pilot 3.6:* Caen: Company sites in Caen, Households and Residential from employees in France with Charging points and energy assets.

Figure 1 shows the pilot location and main characteristics of the area.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

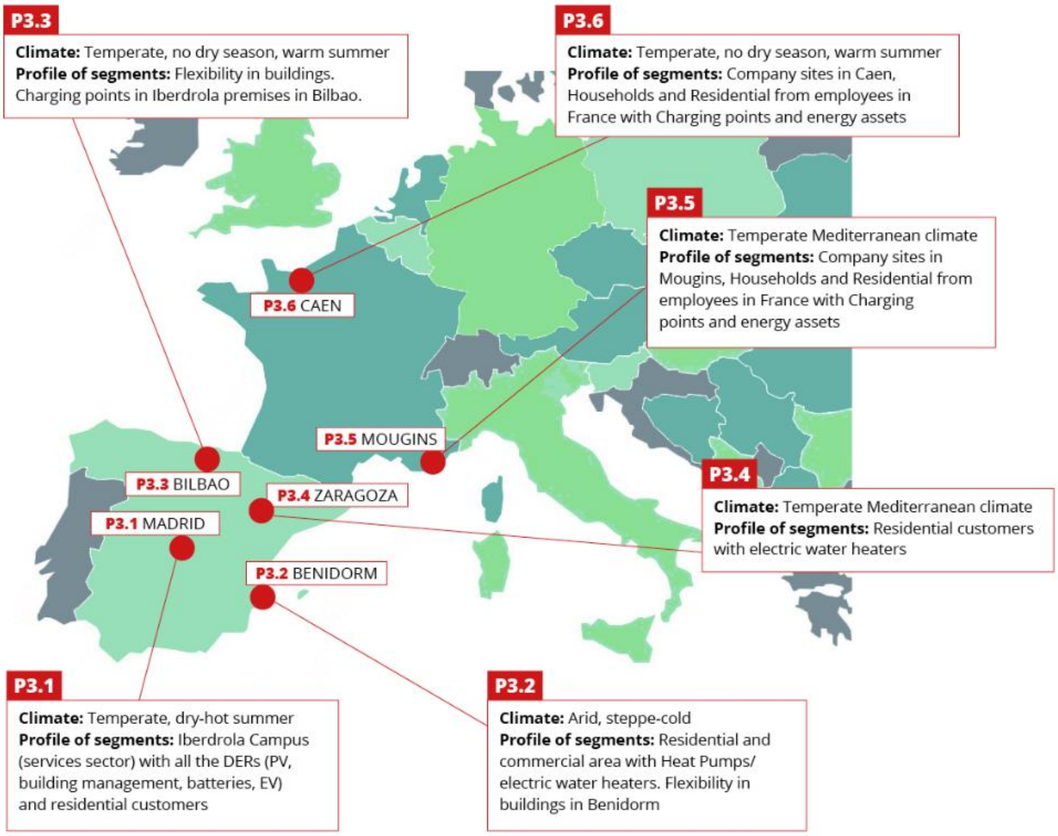


Figure 1. Pilot location and main characteristics of the area

Power flexibility, a key component of modern energy systems, allows users to adjust their energy consumption and production patterns to align with grid requirements. This report examines the significance of flexibility characterization, analyzes customer engagement strategies, and presents a comprehensive plan for its successful implementation.

2.1 Scope and objectives of the task

This task details the technical specifications in the prosumer environment. These technical specifications include the characterization of the end devices being controlled: type and number of devices, electrical characteristics, associated End-use processes and their characteristics, needed or existing control hardware, communication protocols, control variables, etc. All this in order to define flexibility resources and provide inputs for the customer engagement strategy, as this task will also detail the customer engagement strategy to be used for the selected services and the flexibility characterized in the pilot. This work has been built upon WP2 and the general customer engagement plan. The document is structured in the following way: chapter 3 includes Demo Site descriptions and description of the meetings and methodologies that have been implemented in the customer engagement strategy. Chapter 4 gives details on the communication protocols going to be used to connect Demo Site devices with aggregator platform. Finally, chapter 5 will explain signals to be shared for metering and control asset devices in different Demos.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

3. Site & Resources description

This chapter includes the site description for each of the Demos included in WP6, to do that, table 1 includes Archetypes segmentation description and it is used to cluster under WP2 D2.1 headers.

Table 1. WP2 D2.1 Archetypes segmentation description.

Adopter	Gadger	Eco	Comfy
Adopters perceive energy and digital as the perfect match. They are proud of being the early adopter; moreover, they feel that they are ahead of technology. They seek unified and integrated data and devices to optimize their efficiency.	Gadgers find excitement in technology, but energy is the most exciting thing to "gadget" with; however, it allows them to interact with different devices and try to make the best of them. They love data even if it is not disaggregated.	Energy is just one of the many things that can be done for the environment. They are not very into technology, but they accept it when it enables them to decarbonize or degrow their lifestyle. Distrust in the sector.	Energy is important but not very salient for them. They want to make a difference but are not willing to make a great effort. They will not trade off comfort for other forms of value.

3.1 Bilbao Pilot

3.1.1 Flexibility from municipality building

Bilbao City Hall is participating in Bilbao Demo Site. The City Hall is located on the right bank of the Estuary of Bilbao across the Puente del Ayuntamiento bascule bridge that links it to the central Abando district. The building was built in 1892 by Joaquín Rucoba, on the former site of a convent in the district of Uribarri (Bilbao City Hall - Wikipedia)

(**Adapter WP2 T1**) Bilbao City Hall has implemented measures to optimize power consumption by utilizing renewable energy sources. Solar panels have been installed on the roof top to harness solar energy and generate electricity for internal use. These initiatives not only contribute to reducing environmental impact but also serve as a model for other public buildings in the region.
In first place, to engage Bilbao city Hall several meetings were hold. Main topics discussed:

3.1.2. Facilitating Renewable Energy Integration (Education and AwarenessWP2.T2.2)

As in the Bilbao pilot there are plans for integrating new self-consumption renewables in the site. It comes with the challenge of intermittency due to weather patterns. Flexibility characterization addresses this challenge by enabling consumers to synchronize their energy consumption with periods of optimal

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

renewable energy availability. For instance, a city hall may strategically power up climate comfort during hours of peak solar generation. This not only reduces strain on the grid but also maximizes the utilization of green energy resources.

3.1.3 Incentives and Benefits (WP2.T2.2)

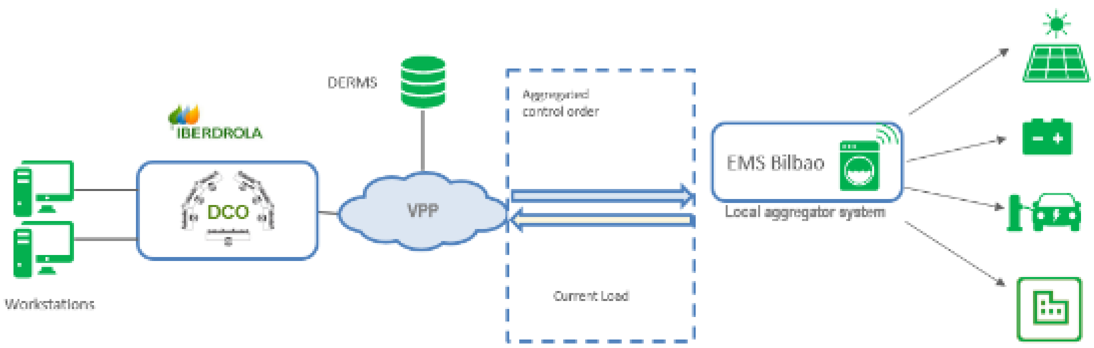
The economic dimension of energy optimization cannot be overlooked. Flexibility characterization presents a pathway to cost reduction by facilitating efficient energy consumption patterns during off-peak hours or when renewable generation exceeds demand. By identifying flexibility potential among various consumer segments, utilities can implement demand-response programs. This encourages consumers to adjust their consumption timing, reducing peak load demands and resulting in cost savings for both providers and users.

3.1.4 Data Collection and Analysis (Continuous Feedback and Support WP2 T2.2)

The foundation of any successful implementation lies in robust data collection and analysis. Historical energy consumption data is the key to understanding consumption patterns and potential for flexibility. This step involves gathering comprehensive data from a range of consumers, industries, and sectors. The analysis of this data reveals usage trends, peak demand periods, and opportunities for load shifting. Such insights form the bedrock for tailoring engagement strategies and optimizing energy consumption patterns.
In this site Local Energy Management System, EMS, already collects historical data to their Building Management System, BMS.

A Virtual Power Plant (VPP) is a network of decentralized power sources, such as solar panels and batteries, that are connected and managed as a single entity. This allows for efficient energy management, grid stability, and the integration of renewable energy sources into the power system.

Figure 2. Communication architecture for Bilbao pilot



Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

3.2 Abadiano BESS Pilot

(**Gadger WP2 T2.1**) Abadiano Stand Alone Battery is located in Abadiano substation (Bizkaya), this is an energy storage solution with exceptional flexibility capabilities. This cutting-edge battery system provides power flexibility and efficiently stores and utilizes excess of energy according to changing demands. The stand-alone design enables the flexibility to adapt to different energy management strategies. With its advanced technology, the Abadiano Stand Alone Battery can seamlessly switch between charging and discharging modes, enabling its operator to optimize energy usage, reduce peak demand, and ensure a reliable power supply. This flexibility capability empowers its operator to meet the dynamic energy needs of the grid while promoting sustainability and efficiency in the power ecosystem.

Figure 3. Abadiano Stand Alone

Table 2. Abadiano Stand Alone

DEMO LOCATION	CLUSTER OF PRACTICES	APPLIANCES INVOLVED	RESOURCE	TYPE OF USER	TIMING-RELEVANCE	FLEX POTENTIAL	NOMINAL POWER	NUMBER OF DEVICES	COMUNICATION PROTOCOLS	STAGE OF POSSIBLE ENGAGEMENT
Bizkaia	Abadiano	Stand alone battery	Storage	Utility	Short Term Daily /Hourly	High	6MW/6MWh	1	IEC 104	High

3.3 Madrid Pilot

(**Gadger WP2 T2.1**) The Guadalix Iberdrola campus (Innovation and Training Campus - Iberdrola) is a facility located in Guadalix de la Sierra, in the Community of Madrid. This campus serves as the operational hub for Iberdrola, spanning approximately 140 hectares. The campus is surrounded by natural surroundings and features sustainable architecture. It is designed to seamlessly integrate with the surrounding landscape and minimize its environmental impact.

The campus houses various facilities, including administrative buildings, research and development centers, laboratories, and spaces for employee training and collaboration.

The main goal of the campus is to foster innovation and sustainable development in the energy sector.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Iberdrola invests in research and development to find cleaner and more efficient energy solutions. The campus serves as a collaborative hub for energy experts, scientists, and engineers working together to drive the transition towards a more sustainable energy future.

Figure 4. Iberdrola Campus in Guadalix

Table 3 shows technical Parameters Guadalix/Madrid Demo Site and figure 4 shows Communication architecture for Guadalix/Madrid pilot.

Table 3. Technical Parameters Guadalix/Madrid Demo Site.

DEMO LOCATION	CLUSTER OF PRACTICES	APPLIANCES INVOLVED	RESOURCE	TYPE OF USER	TIMING-RELEVANT	FLEX POTENTIAL	NOMINAL POWER	NUMBER OF DEVICES	COMUNICATION PROTOCOLS	STAGE OF POSSIBLE ENGAGEMENT
Madrid	Guadalix	PV phase1	PV	Public building	Short Term Daily /Hourly	Low	40kW	1	MODBUS (BMS)	High
Madrid	Guadalix	PV Solar Farm	PV	Public building	Short Term Daily /Hourly	Low	12kW	1	MODBUS (BMS)	High
Madrid	Guadalix	PV phase2	PV	Public building	Short Term Daily /Hourly	Low	40kW	1	MODBUS (BMS)	High
Madrid	Guadalix	BESS	BESS	Public building		High	250kW/175 kWh	1	EIC 104	High
Madrid	Guadalix	BESS	BESS	Public building	Short Term Daily /Hourly	High	250kW/175 kWh	1	EIC 104	High
Madrid	Guadalix	EV charger Unidirectional	EV charger	Public building	Short Term Daily /Hourly	Medium	7,3kW	4	MODBUS (BMS)	High
Madrid	Guadalix	EV charger Bidirectional	EV charger	Public building	Short Term Daily /Hourly	Medium	charge 7,4kW\ discharge7,2kW	2	MODBUS (BMS)	High
Madrid	Guadalix	Climate		Public building	Short Term Daily /Hourly	Low			MODBUS (BMS)	High
Madrid	Residential							10		Low

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

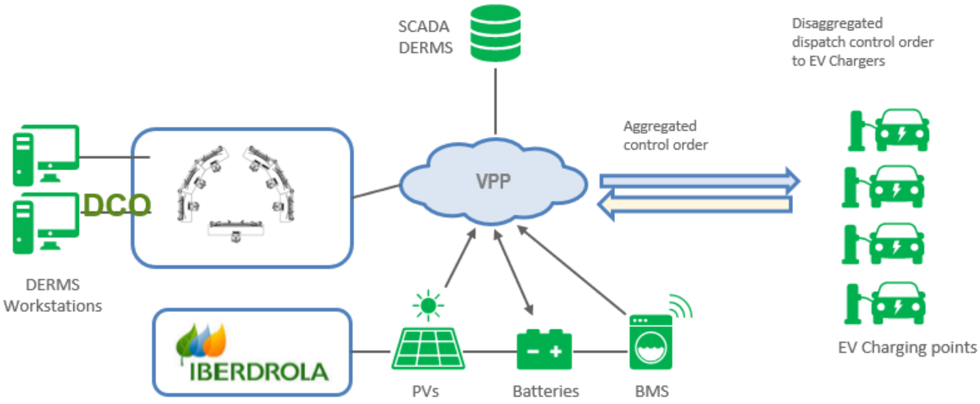


Figure 5. Communication architecture for Guadalix/Madrid pilot.

In addition, 10 residential customers are intended to participate in Madrid pilot. These participants could have devices as climate air condition, heat pumps, electrical vehicles, or PV panels.

3.4 Benidorm Pilot

(**Comfy WP2 T2.2**) The Benidorm employee tourist apartments are an accommodation option located in the city of Benidorm, on the eastern coast of Spain. These apartments are specifically designed to cater to the needs and preferences of employees who are visiting or working in the area. Main reason why these apartments are clustered into the comfy Archetype is because of the proper nature of vocational building and use aspects. Flexibility providers want to participate in services which can make their use of energy more efficient and lower their costs but always trying not to be heavily bothered their levels of comfort.

Apartments hold climatization devices, which will be used in short term congestion management Demos.

3.4.1 Incentives and Benefits (WP2 T2.1)

Flexibility characterization enables residential users to optimize their energy usage. During periods of intense sunlight, these homeowners can run energy-intensive appliances, such as climate devices, lowering electricity bills.

Table 4 shows technical Parameters Benidorm Demo Site and Figure 5 shows the communication architecture for Benidorm pilot.

Table 4. Technical Parameters Benidorm Demo Site.

DEMO LOCATION	CLUSTER OF PRACTICES	APPLIANCES INVOLVED	RESOURCE	TYPE OF USER	TIMING-RELEVANCE	FLEX POTENTIAL	NOMINAL POWER	NUMBER OF DEVICES	COMUNICATION PROTOCOLS	STAGE OF POSSIBLE ENGAGEMENT
Benidorm	Benidorm	Daikin Exterior Split R410A	Climate	Residential	Short Term Daily /Hourly	Low	0,5 Kw	6	API	High
Benidorm	Benidorm	Daikin Interior FDXM-F3	Climate	Residential	Short Term Daily /Hourly	Low	0,5 Kw	6	API	High

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

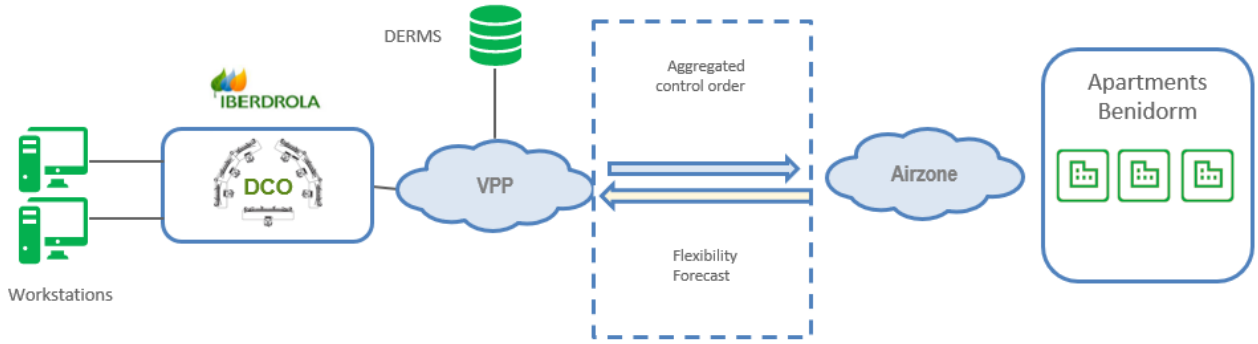


Figure 6. Communication architecture for Benidorm pilot.

3.5 Seville Pilot

(Comfy WP2 T2.1) After long conversations with the Zaragoza Council, this Demo had to move to Seville. In this new location, conversations with the Seville Council and other Regional/Local Administrations are being addressed to find a proper location to retrofit electric water heaters. The aim is to engage tenants from social households with electrical water heaters. The strategy followed to engage the social housing companies is showing all the potential benefits for the end-users (economic savings on their electricity bills due to a more efficient usage of the water heaters) in exchange for the remote controllability of their electric water heaters.

The last updated technical parameters about this Demo are included in the next Table 5.

Table 5. Technical Parameters Seville Demo Site.

DEMO LOCATION	CLUSTER OF PRACTICES	RESOURCE	TYPE OF USER	TIMING-RELEVANCE	FLEX POTENTIAL	NOMINAL POWER	NUMBER OF DEVICES	COMUNICATION PROTOCOLS	STAGE OF POSSIBLE ENGAGEMENT	RISK MITIGATION	POSSIBLE INSTRUMENTS AND STRATEGIES FOR FLEX	FLEX POWER
Seville	To be defined	Electric water heater	Residencial	-Day-ahead planning -Comfort and control over timing is relevant	Medium	2kW	30	Propietary/API	Low	Looking at 3 different locations in parallel	-Explicit demand response flexibility through the Thermovault platform	60kW

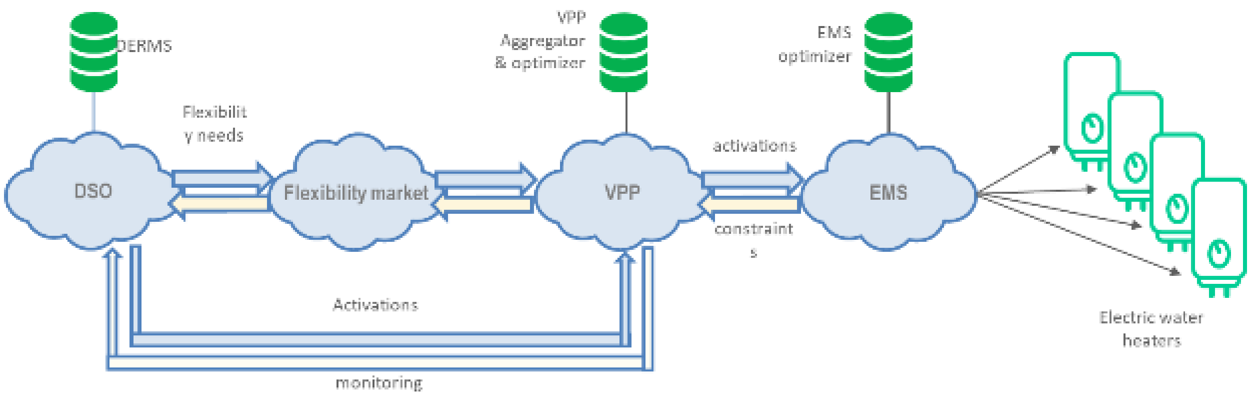


Figure 7. Communication architecture for Seville pilot.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

3.6 France Pilots

(**Eco WP2 T2.1**) The early transition of SAP Labs France (e.g. first Electric Vehicles, EVs in 2014, Solar panels in 2017, ban of ICE cars in 2018) changed drastically facilities and fleet managers but also employees' awareness around energy. The French pilot is aiming to investigate how can be leveraged a 100% BEV employee fleet coupled with renewable energy generation and storage to support flexibility. It will combine the aggregated capacity of the Sites in Mougins and Caen together with the house from piloting employees.

This early adoption of EV and the integration of photovoltaic, PV in the electricity mix of the labs was combined with different events around carbon footprint reduction and the use of renewable for transport. This general awareness together with the willingness to push employees on the transition path by the management of SAP Labs France gave life to a unique agreement with the Unions to incentivize energy transition that was discussed at the same time as the project proposal and that started on January 1st 2023, called Accord Collectif sur la transition énergétique often referred as Plan Vert internally.

Figure 8 includes extract of the Plan Vert Agreement.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Accord Collectif sur la transition énergétique au sein de la société SAP LABS FRANCE (Résumé)

En juillet 2022, la Société a ainsi atteint son objectif fixé de longue date de disposer à 100% d'une flotte de véhicules de société à batterie électrique.

L'investissement moral et financier de la Société dans la promotion des bonnes pratiques environnementales s'est accentué au fil des années et s'inscrit également dans une stratégie globale du groupe SAP.

Les dernières années ont donné raison à la Société dans cette vision à long terme de la réduction et l'optimisation des énergies puisque désormais, le législateur semble enfin ouvrir la voie à un dialogue économique, social et environnemental comme en témoigne la Loi d'orientation des mobilités (LOM) du 24 décembre 2019, complétée par le décret d'application du 9 mai 2020 ou encore la loi Climat et Résilience du 21 août 2021 qui a ajouté une dimension environnementale aux missions générales du Comité Social et Économique par l'intermédiaire notamment de la BDSE qui devient la « *base de données économiques, sociales et environnementales* » (BDESE), complétée par le décret du 26 avril 2022.

L'objectif clairement affiché est désormais d'ouvrir la voie au dialogue avec les partenaires sociaux et à une prise de conscience de tous.

Forte de son engagement environnemental renouvelé chaque année, la société SAP LABS France a souhaité, avec les Organisations Syndicales, être précurseur dans le dialogue social, économique et environnemental et négocier un accord collectif sur ce thème.

Le présent accord dénommé « Plan Vert » se veut innovant et force d'une nouvelle dynamique afin de permettre à chacun des collaborateurs de l'entreprise de se saisir de cet enjeu environnemental autant dans la vie professionnelle que personnelle.

Chaque initiative compte.

C'est la raison pour laquelle les parties signataires ont décidé de retenir des actions concrètes, permettant de profiter au plus grand nombre de ses collaborateurs, tout en répondant à la crise énergétique et le besoin d'optimiser et de réduire sa consommation d'énergie.

Les actions retenues sont les suivantes :

- Produire, optimiser et réduire la consommation d'énergie aux domiciles des collaborateurs avec un accompagnement financier ;
- Faciliter les déplacements vertueux ;
- Sensibiliser, communiquer et partager autour de l'optimisation et la réduction de la consommation d'énergie

L'ensemble de ces actions font partie intégrante de la stratégie de la Direction de SAP Labs France.

Mougins, le 22 septembre 2022

Figure 8. Extract of the Plan Vert agreement.

The BeFlexible pilot is an extension of this plan to create a community of 'shifters'.
The strategy to onboard employees is therefore threefold:

1. Financial: 0% loan facilities and incentives to invest in transition, this includes production, storage, insulation, heat pump or any type of investment to promote renewable and reduce consumption of energy and water.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

2. Community for in-house Expertise sharing: 4 Working groups related to smart home, photovoltaic panels, transition in condominium and funding opportunities with 3 to 5 sharing know how, quotes and assessment of providers with colleagues during bimonthly meetings.
3. Experimenters: set of colleagues involved in innovation projects, mainly BeFlexible pilot for the time being.

The involvement of the experimenters was initially done during the community meetings:

- March: initial dissemination of BeFlexible objectives
- July: General presentation by the pilot partners of
  - Flexibility value for solving distribution network problems by i-DE
  - Smart home and Stemy scenarios
  - Vertical flexibility with Ariston boilers by Thermovault
  - Integration of SAP e-mobility chargers
- July-October
  - Answering employees' questions around security, privacy, Term & conditions
  - Continuous recruitment and information collection of Phase 1 participants (circa 20 employees as of October 1st)

The phase 1 participants will be used as ambassadors to recruit phase 2 participants after early experimentation.

Table 6. Technical Parameters France Demo Site.

DEMO LOCATION	CLUSTER OF PRACTICES	APPLIANCES INVOLVED	RESOURCE	TYPE OF USER	TIMING-RELEVANCE	FLEX POTENTIAL	NOMINAL POWER	NUMBER OF DEVICES	COMUNICATION PROTOCOLS
France	Area FastCharger	Battery (150 kwh)	BESS		Short Term Daily /Hourly	High	150 kWh		API
France	Area FastCharger	Solar Panels Roof (50 kWp)	PV		Short Term Daily /Hourly	Low	50 kW	1	API
France	Area FastCharger	Solar Panels Parking 1 (20 kWp)	PV		Short Term Daily /Hourly	Low	20 kW	1	API
France	Area FastCharger	Solar Panels Parking 2 (10 kWp)	PV		Short Term Daily /Hourly	Low	10 kW	2	API
France	Area FastCharger	6 x 25 l boiler	HC	Bathroom !	Short Term Daily /Hourly	Med		6	API
France	Area FastCharger	1 x 200 l boiler	HC		Short Term Daily /Hourly	Med		1	API
France	?	2 x 1000 l boiler	HC		Short Term Daily /Hourly	Med		2	API
France	Area FastCharger	4 x 50 kW DC	EV charger		Short Term Daily /Hourly	Med	50 kW DC	4	OCPP
France	Area FastCharger	2 x 150 kW DC	EV charger		Short Term Daily /Hourly	Med	150 kW DC	2	OCPP
France	Area FastCharger	2 x 120 kW DC	EV charger		Short Term Daily /Hourly	Med	120 kW DC	2	OCPP
France	Area South	1 x 24 kW DC			Short Term Daily /Hourly		24 kW DC	1	API
France	Area South	2 x 11 kW (AC)			Short Term Daily /Hourly		11 kW AC	2	API
France	Area South	20 x 22kW (AC)			Short Term Daily /Hourly		22 kW AC	20	API
France	Area North	Grid (150 kW x 3 phases)			Short Term Daily /Hourly		150 kW	1	API
France	Area North	8 x 22 kW (AC)			Short Term Daily /Hourly		22 kW AC	8	API
France	Area Parking	Grid (180 kW x 3 phases)			Short Term Daily /Hourly				API
France	Area Parking	Solar Panels Parking (36 kWp)	PV		Short Term Daily /Hourly		36 kWp	1	API
France	Area Parking	12 x 11 kW (AC)	EV charger		Short Term Daily /Hourly		11 kW AC	12	OCPP
France	Area Parking	2 x 22 kW (AC)	EV charger		Short Term Daily /Hourly		22 kW AC	2	OCPP
France	SLF Employees	To refine per pilot participant	EV charger		Short Term Daily /Hourly				OCPP
France	Mougins	32 x 3,7 kW	EV charger		Short Term Daily /Hourly		3,7 kW	32	OCPP
France	Mougins	15 x 7 kW	EV charger		Short Term Daily /Hourly		7 kW	15	OCPP
France	Mougins	2 x 11kw	EV charger		Short Term Daily /Hourly		11 kW AC	2	OCPP
France	Mougins	13 x 22kw	EV charger		Short Term Daily /Hourly		22 kW	13	OCPP
France	Caen	20 x 3,7kW	EV charger		Short Term Daily /Hourly		3,7 kW	20	OCPP
France	Paris	9 x 3,7 kW	EV charger		Short Term Daily /Hourly		3,7 kW	9	OCPP
France	Paris	10 x 7 kW	EV charger		Short Term Daily /Hourly		7 kW	10	OCPP
France	Paris	2 x 22kw			Short Term Daily /Hourly		22 kW	2	OCCP

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

4. Communication protocols

4.1 BESS Battery Energy Management System Communication Protocols

The IEC 104 protocol, also known as IEC 60870-5-104, is a communication standard used in the field of industrial automation and control systems. It defines a set of rules and procedures for exchanging data between a master station and remote devices, such as sensors, actuators, and other control equipment, over a network.

At its core, IEC 104 is a companion standard to the widely adopted IEC 60870-5-101 protocol. It provides enhanced functionality and improved efficiency in terms of data transmission and system performance. The protocol operates on top of standard transport layer protocols, such as TCP/IP or UDP/IP, making it suitable for use in both local area networks (LANs) and wide area networks (WANs).

IEC 104 uses a client-server architecture, where the master station acts as the client initiating requests for data from the remote devices, which act as servers. The communication between the master and remote devices is based on a set of predefined information objects that represent various data points or parameters within the control system.

One of the key features of IEC 104 is its support for flexible data formats. It allows the transmission of different types of data, including binary values, analog values, measured values, single-point information, and more. This flexibility enables the protocol to cater to a wide range of industrial applications with diverse data requirements.

This is going to be use in the Spanish Demo Sites where battery storage systems are present.

4.2 API, Application programming interface Connectivity Software description

An API, or Application Programming Interface, is a set of rules and protocols that allows different software applications to communicate and interact with each other. It serves as a bridge that enables developers to access the functionality and data of an existing application or service, without needing to understand the underlying code.

APIs define a consistent way for applications to request or provide services, exchange data, and perform specific operations. They act as intermediaries, receiving requests from one application and translating them into a format that can be understood by another application. This allows developers to leverage the capabilities of other applications or services without having to build everything from scratch.

APIs can be used for various purposes, such as retrieving data from a database, performing calculations, accessing external services like weather information or social media platforms, or controlling hardware devices. They provide a standardized interface that simplifies the development process and promotes interoperability between different software systems.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

APIs can be accessed through web-based protocols like HTTP(S), which allows developers to make requests to an API using URLs and receive responses in a structured format like JSON or XML. They can also be provided as libraries or software development kits (SDKs) that developers can integrate directly into their applications.

4.3 OCPP, Open Charge Point Protocol Communication Protocol (EV)

The Open Charge Point Protocol (OCPP) is a standardized communication protocol used in the electric vehicle (EV) charging industry. It enables interoperability between various charging stations and central management systems, allowing seamless communication and control of EV charging processes.

OCPP defines a set of messages and rules that govern the exchange of information between the charging station and the central system. It supports both basic charging functions, such as starting and stopping a charging session, as well as more advanced features like load management and tariff integration.

The protocol is designed to be platform-independent and technology-neutral, allowing different manufacturers to implement OCPP in their charging stations and central systems. This promotes competition, innovation, and choice in the EV charging market.

OCPP supports different transport protocols, including WebSocket, SOAP, and JSON-RPC, providing flexibility for developers to choose the most suitable option for their implementation.
By using OCPP, EV charging infrastructure operators can easily manage and monitor their charging stations remotely. They can retrieve real-time data such as energy consumption, session status, and error codes, enabling efficient troubleshooting and maintenance.

In summary, OCPP is a vital protocol in the EV charging industry that facilitates seamless communication between charging stations and central management systems. Its standardization promotes interoperability, competition, and innovation, ultimately contributing to the widespread adoption of electric vehicles.

This is going to be use in the French pilot for EV connections.

5 Signals and Telemetry

This chapter includes signals to be shared by devices in Demo Sites to participate in short term congestion management.
Telemetry involves monitoring voltage (V), power (P), and reactive power (Q) values, as well as the state of connectivity and availability in real time. This enables the tracking and analysis of power system performance.

Baseline Consumption refers to forecasting the expected consumption for assets, allowing for better planning and optimization of energy usage.

Events are triggered when the Virtual Power Plant (VPP) receives a specific value from DSO, enabling the

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

activation or deactivation of services based on predefined conditions.

Alarms provide real-time warnings when unexpected behavior occurs, such as trips or abnormal events, ensuring prompt response and mitigation.

In short-term congestion management demonstrations, these features are crucial for efficient monitoring, control, and optimization of power systems, promoting stability and reliability.

6 Conclusions

This document on Flexibility Characterization, Customer Engagement Strategy and Implementation for Power Flexibility Users provides valuable insights into the importance of flexibility in the energy sector. It emphasizes the need for a customer-centric approach that focuses on engaging and empowering users.

The document emphasizes the role of advanced technologies, such as communication protocols and demand response systems, in enabling customers to actively participate in energy management and contribute to a more sustainable future.

The customer engagement strategy methodology outlined in the documents directly influenced on WP2 (deliverables D2.1 and D2.2) and emphasizes the importance of educating users about the benefits of flexibility and providing them with tools and resources to make informed decisions. It promotes continuous meetings with flexibility devices owners on the different Demos, online platforms to facilitate real-time interaction between energy providers grid managers as DSOs'.

It highlights the need for collaboration between energy providers, regulators, and technology partners to ensure seamless integration of flexibility measures into existing infrastructure. The plan also highlights the importance of monitoring and evaluation to continuously improve the effectiveness of implemented strategies.

Overall, the document underscores the need for a comprehensive customer engagement strategy that empowers users and encourages their active participation. Energy providers can unlock the full potential of power flexibility and create a more resilient and responsive energy ecosystem.

In conclusion, the document provides a comprehensive overview of flexibility in characterization and customer engagement strategy for power flexibility users in Demo Sites. It highlights the benefits, outlines an effective implementation plan, and emphasizes the importance of collaboration and continuous improvement. By adopting these strategies, energy providers can successfully navigate the evolving energy landscape and meet the needs of their customers while contributing to a greener future.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

7 References

BeFlexible deliverable 2.1 "Value Propositions", available here: https://beflexible.eu/wp-content/uploads/2023/10/BEFLEXIBLE-D2.1-Value-Propositions-for-market-actors.pdf

BeFlexible deliverable 2.2 "Engagement Strategy",

Accord Collectif sur la transition énergétique (SAP) (internal info)

Wikipedia (General location description) available here https://es.wikipedia.org/wiki/Ayuntamiento

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.