



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957781.

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GRANT AGREEMENT NUMBER 957781

WP2 – Foundations

## D2.2 – PMV Methodology definition and impact assessment handbook

<b>Responsible organisation</b>	CIRCE
<b>Contributing organisation(s)</b>	RINA / CERTH / HYPERTECH
<b>Due date of Deliverable</b>	30/07/2021
<b>Actual date of submission</b>	13/08/2020
<b>Type of deliverable</b>	Report
<b>Dissemination level</b>	Public

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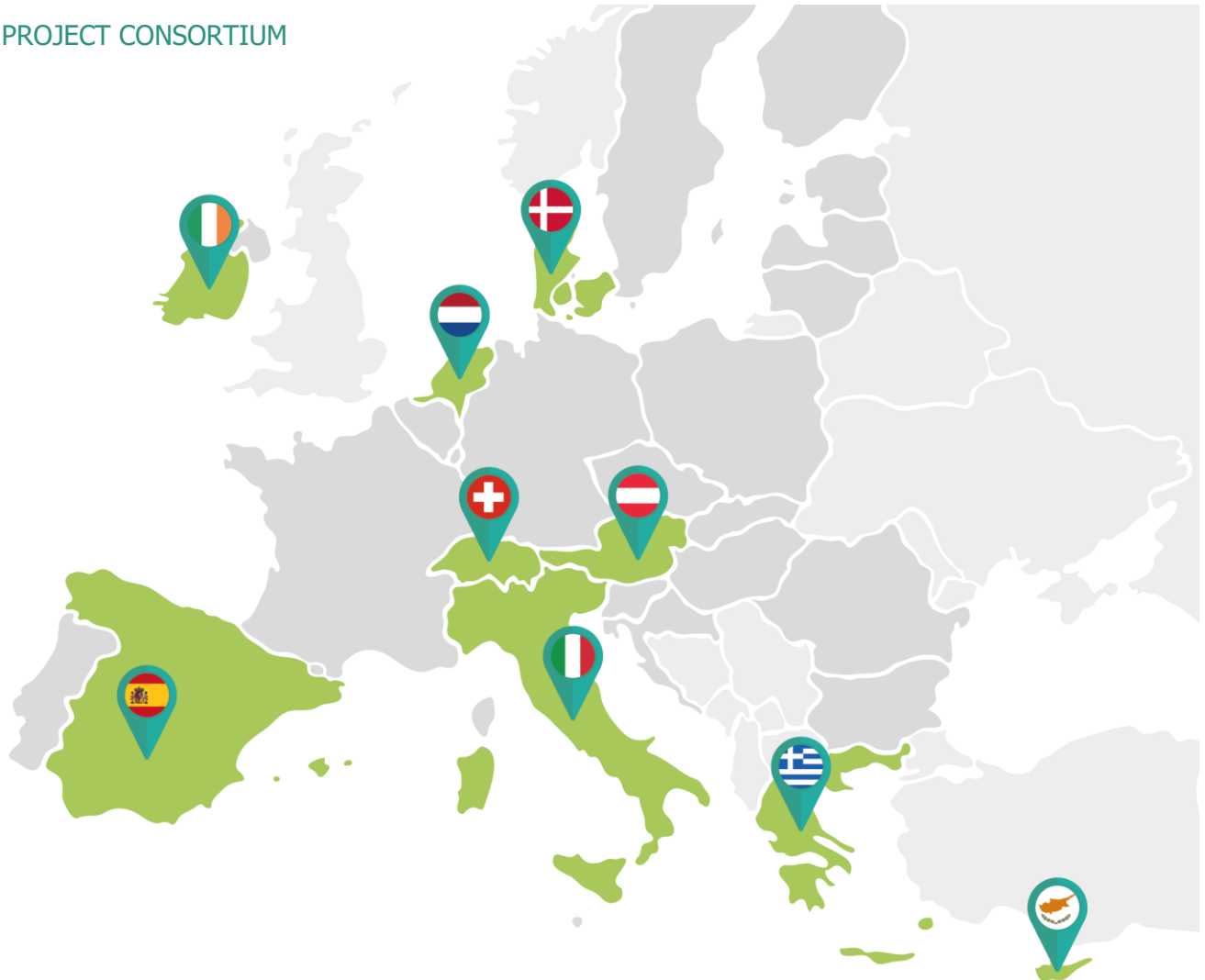
Fully Accepted	✓
Accepted with minor revisions	
Rejected unless modified as suggested	
Fully Rejected	

## Version history

Version	Date	Comments
0.0	19.07.21	Draft version
0.1	04.08.21	Second Draft
0.2	10.08.21	Final Version



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## Executive summary

Since it is not possible to directly determine the magnitude of energy savings after the implementation of energy efficiency measures, this estimate must be made by comparing a predictive model (system behavior without the improvements) and the data received from the field (with the improvements). The methodology that allows this comparison is known as Measurement and Verification (M&V) and this document serves as a guide for the work packages and subsequent tasks to best define the M&V scheme in each case.

Starting with a brief historical overview of these methodologies, we identify them as tools that were born in the industrial sector, as technology made it easier to implement sensors, data networks, storage and processing of information, the field of M&V schemes became wider and eventually reaching into the area of smart energy networks, where it plays an important role in measuring the impact of the different developments. In the specific case of European projects, there are already a considerable number of projects where the M&V methodology has been adapted. On this basis, the scheme proposed in the “International Performance Measurement and Verification Protocol” (IPMVP) has been adapted to the ACCEPT project, thus identifying the essential characteristics of the methodology, which can be grouped as follows:

- Meter installation calibration and maintenance
- Data gathering and screening
- Development of a computation method and acceptable estimates
- Computations with measured data
- Reporting, quality assurance, and third-party verification of reports

Throughout this document we will provide the tools for these aspects to be identified and evaluated in the corresponding stages of the development of the solutions.

Also, a series of KPIs will be proposed, so that specific aspects of the development and influence of the ACCEPT solutions can be measured, this will be accompanied by a preliminary plan that will indicate the stages and times for the collection and processing of the results, finally a contingency plan is shown with the objective of providing alternatives to the appearance of problems with the calculation of the KPIs in later stages.

## Acronyms and Abbreviations

<b>aFRR</b>	Automatic Frequency Restoration Reserve
<b>DR</b>	Demand Response
<b>DoA</b>	Description of Actions
<b>ECM</b>	energy conservation measures
<b>EEM</b>	Energy Efficiency Measure
<b>ESCO</b>	Energy Service Company
<b>ESI</b>	Energy Saving Intervention
<b>EVO</b>	Efficiency Valuation Organization
<b>HDD</b>	Heating Degree Days
<b>IPMVP</b>	International Performance Measurement and Verification Protocol
<b>KPI</b>	Key Performance Indicator
<b>M&amp;V</b>	Measurement and Verification
<b>PMV</b>	Performance Measurement and Verification
<b>RR</b>	Restoration Reserves

# 1 Introduction

## 1.1 Scope of the deliverable

This document will define the measurement and verification methodology (M&V) for validating the impact of the ACCEPT solution on the delivery and acceptance of demand response by consumers, prosumers and energy communities as a whole based on the proposed combination of energy and non-energy services. To this end, requirements for accurate baseline to feed the forecasting will be defined considering among other things: weather variations, changes in user profiles, occupancy patterns, etc. The latter will allow to compare the results of the solutions proposed in the ACCEPT project and the baseline and thus to determine the savings. Also, a specific set of KPI will be include, to evaluate the impact of the different solutions through demonstrations sites.

## 1.2 Structure of the deliverable

This document is divided into two main sections, the first one covers the topic of the definition of the M&V methodology, making a brief introduction to the basic concepts, then it refers to how these strategies are implemented in European projects and finally it describes the adaptation that has been made for the ACCEPT project. The second part aims to describe the results obtained in the definition of the KPIs, from their selection process to the implementation of a common format and an evaluation strategy, a final section also provides possible solutions to contingencies.

## 1.3 Interdependencies with other tasks and deliverables

The influence of this document in general terms is considered transversal to all WPs of the ACCEPT project, however there is a set of key points where it will have an added value in the development of these activities, said interdependencies are shown below.

Inputs (To this document)	This Documents	Outputs (From this document)
<p><b>WP2: Foundations</b> D2.1 Market actors &amp; prosumers requirements &amp; business case definitions</p> <ul style="list-style-type: none"> <li>Definitions of UCs</li> <li>Demo site characterization</li> </ul>	<p><b>Section 2: Measurement and verification</b></p>	<p><b>WP4: Prosumer / building modelling &amp; optimization tools</b></p> <ul style="list-style-type: none"> <li>Initial identification of models, signals, and systems to develop digital twins</li> </ul> <p><b>WP5: Energy community &amp; end users tool-suite</b></p> <ul style="list-style-type: none"> <li>Initial identification signals and systems to develop the district assets models</li> </ul> <p><b>WP6: Solution integration, pre-validation, roll out.</b></p> <ul style="list-style-type: none"> <li>Identification of potential signal for the ex-ante surveys</li> </ul> <p><b>WP8: Impact assessment &amp; business modelling</b></p> <ul style="list-style-type: none"> <li>Definition of UC contributions to the M&amp;V methodology, identification of network scenarios or variants for DR events</li> </ul>



Inputs (To this document)	This Documents	Outputs (From this document)
<p><b>WP2: Foundations</b> D2.1 Market actors &amp; prosumers requirements &amp; business case definitions</p> <ul style="list-style-type: none"> <li>• General scope of the solutions</li> <li>• Demo site characterization</li> </ul>	<p><b>Section 3: Key Performance Indicators</b></p>	<p><b>WP5: Energy community &amp; end users tool-suite</b></p> <ul style="list-style-type: none"> <li>• KPI List to measurement the user experience, first guide for the in-app surveys</li> </ul> <p><b>WP7: Demonstration and validation activities</b></p> <ul style="list-style-type: none"> <li>• KPI List</li> <li>• Monitoring and contingency plan</li> </ul> <p><b>WP8: Impact assessment &amp; business modelling</b></p> <ul style="list-style-type: none"> <li>• Conceptual basis for determining the effectiveness of ACCEPT solutions, with emphasis on the comparison of field readings with the predictive model or BaU scheme.</li> </ul>

## 2 Measurement and Verification

This section of the document covers the development of the M&V concept, refers to the historical development with emphasis on the application to projects in Europe, showing the adaptation from energy efficiency methodologies to impact studies in Demand Response (DR) events.

### 2.1 Basic concepts

The Efficiency Valuation Organization (EVO) defines the M&V as “the process of planning, measuring, collecting and analyzing data for the purpose of verifying and reporting energy savings within an individual facility resulting from the implementation of energy conservation measures (ECMs)”. The concept of measurement and verification is not new, already in the 80's in the United States the first analyses were established according to the procedures described by the "International Energy Agency"<sup>1</sup>. As time went by, more states and organizations came up with their methodologies in the areas of energy efficiency assessment, such as NAESCO, California CPUC, FEMP and more recently IPMVP, which contributed to base the methodologies in a wider field of use.

One of the most important moments came in 1994 when the US Department of Energy (DoE) began working with industries to address the lack of and develop a unified and condensed methodology to measure and verify investments in energy efficiency. As a result, the North American Energy Measurement and Verification Protocol (NEMVP) was published in 1996, which could be considered the first edition of a M&V protocol<sup>2</sup>.

An important aspect that these methodologies emphasize is the fact that energy savings are impossible to measure directly, since it is the absence of energy consumption, the way to estimate the savings achieved by implementing an Energy Efficiency Measure (EEM) is to compare consumption in two time periods as shown in Figure 1. In the specific case of ACCEPT, this can be translated into a decrease in demand, through all the systems proposed in the project.

The first period is called the “**baseline period**” and correspond in our case to the time prior to the application of the of the ACCEPT solutions, in this period the regular behaviour of the demand is determined. The information could be obtained from historical data, depending on the demos and availability, and could also be inferred from nominal load data. The independent variables have a significant impact (e.g. outdoor temperature, operating hours, occupancy, etc.) therefore it is important to have them available as well. This information will then allow to

<sup>1</sup> FLEXCoop

<sup>2</sup> <https://evo-world.org/en/about-en/history-mainmenu-en>

performed predictions of the system “without considering energy improvements”, which will be the comparison value in the next stage.

The “**reporting period**” is defined after the implementation of the ACCEPT solutions and compares the demand models created from the baseline and the information from the demos. It is important that the predicted demand fits the same operating conditions that originated in the demos (adjusted by temperature, humidity, occupancy, etc.) so that both curves also have time consistency in the data.

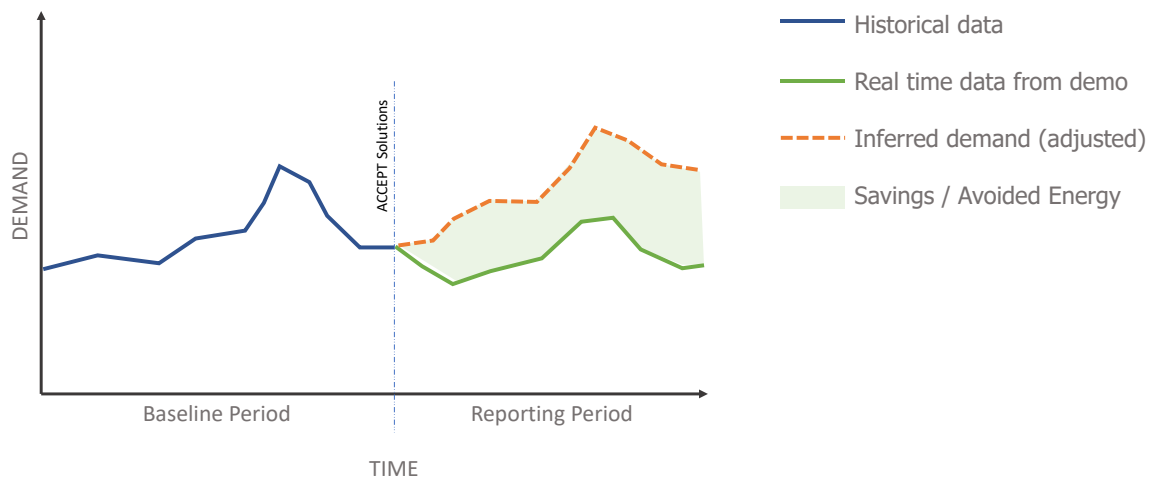


Figure 1 ACCEPT M&V periods

The amount of savings can be determined by the following formula:

$$\text{Savings} = (\text{Baseline Period Demand} - \text{Reporting Period Demand}) \pm \text{Adjustments}$$

This is the heart of the M&V concept, indicating that the proper fit to the baseline curve during the reporting period must be validated by considering external factors such as climate, housing occupancy and more recently even confinements and mobility restrictions. The goal is then to match as closely as possible the prediction to what would have occurred without the implementation of the energy improvements and thereby infer the true savings.

## 2.2 Methodology selection

M&V schemes become even more important when they leave the industrial environment and are adapted to the smart grid sector, previously, other projects in the field of smart grids and energy efficiency such as: eeMeasure, Moeebius, OrbEET, HOLISDER, FLEXCoop have developed or improved M&V methodologies for the verification and assessment of building energy performance, mainly based on IPMVP (Efficiency Valuation Organization 2012) and FEMP (U.S. Department of Energy FEMP 2015).

In the particular case of the ACCEPT project, the methodology described is the IPMVP and its reference implementation based on the Moeebius project will be used as a basis, the main reasons for this selection are: Firstly, the strategy has been adapted to the measurement of urban environments and secondly it has been well defined in a three-step scheme. ACCEPT also includes the use of districts assets, which can be considered as entities more integrated to the original style of those described in the first M&V methodologies and are therefore already compatible with these schemes.

M&V strategies and especially those coming from IPMVP methodologies aim to cover some or all definitions shown below to carry out the analysis<sup>3</sup>.

- meter installation calibration and maintenance
- data gathering and screening
- development of a computation method and acceptable estimates
- computations with measured data

<sup>3</sup> EFFICIENCY VALUATION ORGANIZATION, “What Is M&V”

- reporting, quality assurance, and third-party verification of reports

The following sections will provide general guidelines for completing these requirements in the various work packages.

Depending on aspects such as scope, available data, measurement equipment available, type of installation, budget for the M&V to calculate the savings (mainly associated with the reduction in demand), the IPMVP proposes four options to address measurements and verifications:

IPMVP Option	Name	Characteristics	Example <sup>4</sup>
<b>A</b>	Retrofit isolation: key parameter measurement.	<p>Savings are determined by direct measurement of field variables that influence energy use in the demo after implementing the solutions.</p> <p>Parameters that are not obtained from the field are estimated, either on the basis of historical, manufacturer's data or engineering criteria.</p> <p>Option A involves a partial measurement rather than an integral measurement, so it is only used when these inferences do not impact the overall savings report.</p>	<p>A lighting retrofit where power draw is the key performance parameter that is measured periodically. Estimate operating hours of the lights based on building schedules and occupant behaviour</p>
<b>B</b>	Retrofit isolation: all parameters measurement	<p>Similar to the previous one but without estimating parameters, this implies full access to all measurement variables that impact the savings calculation.</p>	<p>Application of a variable speed drive and controls to a motor to adjust pump flow; measure electric power with a kW meter installed on the electrical supply to the motor which reads the power every minute. In the baseline period this meter is in place for a week to verify constant loading. The meter is in place throughout the reporting period to track variations in power use.</p>
<b>C</b>	Whole Facility	<p>Involves the measurement of the entire installation, usually at a single point, the use of this technique is recommended only when implementing a general energy solution to the system as it is difficult to discriminate individual contributions when there is more than one energy solution or savings strategy.</p>	<p>Multifaceted energy management program affecting many systems in a facility. The energy use with the gas and electric utility meters for a twelve-month baseline period and throughout the reporting period will be measured.</p>

<sup>4</sup> Heilmann

IPMVP Option	Name	Characteristics	Example <sup>4</sup>
D	Calibrated Simulation	Savings are determined by simulating the energy use of the entire facility. The simulation routines are shown to adequately model the actual measured energy performance of the facility.	Multifunctional energy management program affecting many systems in a facility but where no meter existed in the baseline period. Energy use measurements, after installation of gas and electric meters, are used to calibrate a simulation. Baseline energy use, determined using the calibrated simulation, is compared to a simulation of reporting period energy use.

When the first M&V methods were implemented, it was very important to define the approach to be used to stay on budget since the installation of sensors, meters, recorders and processing the results resulted in significant costs, today it is much easier and cheaper these actions, allowing a more accurate and complete analysis. Taking advantage of the high degree of automation, monitoring and IoT equipment integration of the ACCEPT project, combined with the computing power available to the partners, an approach based on options B (most of the variables involved are obtained directly per system) and D (to infer some signal that cannot be measured directly and to provide prediction of system behaviour) is presented as a first choice.

This means that the data will be extracted directly from each element intervened by the ACCEPT solutions, this will allow the creation of models for each type of DR system to be assessed. In the case of simulations, different scenarios and configurations can be evaluated to determine the optimum in each situation (normal or contingency, as will be seen later).

### 2.3 ACCEPT M&V application

After establishing the methodology to follow and the cases that apply (within the IPMVP framework) to the ACCEPT project, the bases for the stages to be implemented along the work packages 6, 7 and 8 are shown below. First, identifying the relevant systems in DR events, then assigning the variables to monitor and record, then recreating the behaviour of consumers and prosumers, extrapolating said behaviour for the testing stage and finally validating the savings obtained with the implemented actions.

#### 2.3.1 Definition of Use Cases

The identification of the contribution of each use case to the overall picture of energy saving solutions and their measurement variables will allow in later stages to implement the infrastructure for data acquisition, processing, and effective actuation, as well as to improve predictive models and implement corrective actions in an efficient way. The use cases within the project will have a greater or lesser impact on the M&V methodology based on their contribution to DR events, Table 1 shows the incidence and contribution of each one. A high, medium, or low contribution indicates to the UC leader the degree of detail of the information to be provided at the time for model creation or during the reporting period, this information will be defined between the demo leader and the technology providers mainly in WP4

Table 1 impact of the use case within the M&V

Use case <sup>5</sup>	Scope	Contribution level to M&V	Contribution to M&V
UC1: Metering & Sensor Energy Data	Precise measurement and quantification of flexibility requires precise collection of data while ensuring a secure and seamless information flow across components and actors.	High	provides the infrastructure for data acquisition in the testing phase

<sup>5</sup> ACCEPT, D2.1 ACCEPT Business Scenarios, Use Cases & Requirements

Use case <sup>5</sup>	Scope	Contribution level to M&V	Contribution to M&V
UC2: Virtual Energy Storage optimization	This Use Case deals with the optimal scheduling of operation for HVAC resources at building/apartment level, combined with the heat energy storage capabilities offered by the building envelope or hot water storage tanks, so as to increase the consumption of self-generated electricity via renewable resources.	High	impact on DR events by decreasing load and/or shifting load
UC3: Consumer demand-side flexibility forecasting	To establish the pipeline from monitoring and metering of building assets to occupant and device modelling, flexibility forecasting and finally application of control actions to the flexible resources.	High	Direct actuator on DR event
UC4: Demand elasticity profiling-forecasting-aggregation	The scope of this use case is to meet and facilitate the resident's profiling needs in order energy suppliers to purchase the ideal amount of energy. This enables energy suppliers to offer variable pricing schemes and to take advantage of the potential dynamic pricing schemas.	Medium	Indirect promotor to decreasing load and/or shifting load
UC5: Intra-day district-level DER flexibility management	Develop a management tool for district-level assets (electric generation and storage) to provide them with flexibility capabilities based on forecasting and local control optimization.	Medium	Direct actuator on DR event
UC6: Day-ahead smart charging flexibility quantification	Develop or enhance already existing tools for providing the flexibility potential of EV charging	High	Direct actuator on DR event
UC7: Community-level P2P flexibility	Participation in a community level P2P flexibility/energy exchange platform based on locally produced renewable energy in order to collectively achieve demand and supply optimization.	High	direct promotor to decreasing load and/or shifting load
UC8: Participation in explicit Demand Response schemes	Establish the most appropriate sequence of actions and collaboration among the available tools, in order in both end-user level and Energy Community (LEC) Level to participate in an explicit DR event, based on flexibility potential	High	Main actuator
UC9: Participation in implicit Demand Response schemes	Establish the most appropriate sequence of actions and collaboration among the available tools, in order in both end-user level and Local Energy Community (LEC) Level to participate in an implicit DR event, based on time-dependent energy supply and dynamic network tariffs.	High	Main actuator
UC10: Community flexibility bundling for local congestion management service	Unleash the potential of the community as an aggregator for local congestion management for DSO.	High	Direct actuator on DR event

Use case <sup>5</sup>	Scope	Contribution level to M&V	Contribution to M&V
UC11: Retailer day-ahead optimal pricing configuration	Digital, automated and ex-ante process in optimizing pricing configuration, enabling us to achieve aggregated portfolio balancing. This use case will examine the high value achieved through optimal pricing methodology in increasing impact of optimal pricing configuration demand method and subsequently portfolio balancing, in relative programs. The main outcome of this UC is due to elasticity, forecasting and aggregation the energy supplier to avoid imbalances and to encourage consumers to proceed with the new dynamic pricing schemas.	Medium	Indirect promotor to decreasing load and/or shifting load
UC12: Optimal scheduling and operation of heating generation	Provide adaptive scheduling oriented to an optimal operating scheme of district heating assets, with the objective of obtaining maximum savings and preserving the proper operating point during peak demand.	Low	Limited as it does not change the residential customer's consumption habits.
UC13: Increase self-consumption at local level	To allow energy communities to maximize the use of their renewable resources. Related components are vertical tools for energy communities, demand flexibility management, district asset management	High	Direct actuator on DR event
UC14: Active Citizen and LEC Engagement	Promoting the engagement of the local community in the energy transition and raising customer's environmental and energy efficiency awareness.	High	direct promotor to decreasing load and/or shifting load

### 2.3.2 Grid operations conditions

The contribution to the reduction of user demand will be conditioned by the state of the network, for which three basic types of operation are distinguished, each with a different degree of demand as indicated below:

Grid operation condition	Characteristics
Normal	The network does not show symptoms of congestion such as: low voltages, overloaded lines, or transformers, thus allowing P2P operations under the limits and restrictions previously defined among all participants. In this scenario the DR environment is defined by the availability of the system and the minimum considerations of comfort that will impact the user as little as possible.
Contingency	Short-term congestion or undesirable conditions in the network are predicted by monitoring systems, the priority is given to the DSO as a buyer of flexibility. P2P energy transactions are no longer allowed.
Emergency	Congestion or critical conditions that compromises safety or stability have occurred, and the DSO assumes control, in this case minimum comfort conditions are not considered.

Each operating condition generates a different response in DR events, so their influence must be considered when implementing models, predictions, and analysis of results. As far as the ACCEPT project is concerned, given the characteristics and scope to be evaluated, in principle only the normal and critical operation will be considered, since a direct intervention of the DSO is not contemplated, will be left for further evaluation by demo leaders and developers to incorporate in case of emergency scenario.

### 2.3.3 Preliminary analysis

The preliminary analysis allows to establish and identify the conditions, equipment, and systems in which the effectiveness of the ACCEPT solutions will be evaluated, in addition, the limits and agreements with the customers must be established in order to provide a realistic and effective offer, this activity will be carried out during the life of work packages 6 (solution integration, pre-validation, roll-out) of the ACCEPT project. The following are the three main aspects to consider during this preliminary stage.

**Definition of DR events and criteria for remuneration:** The aggregator/DSO must define what types of DR events the customer could potentially participate in (normal, critical and emergency network conditions), including also information on their frequency or expected schedule over a year or over the duration of the contract between the customer and the aggregator. At the same time, information on the remuneration of each condition (i.e., whether it will be made monthly, annually and the unit price) and the timing of the event notification (e.g., 2 hours before the event, the day before the event, etc.) must also be agreed upon. For the latter, although the ACCEPT solution provides an automated response to DR events (with no user interaction requirements), sending a notification to users prior to the start of the event to inform them that a DR event will be initiated is not necessary, but is recommended in order to address potential issues about trust and perception of the actual usefulness of the solutions offered to users.

**Definition of DR systems and minimum comfort conditions:** Depending on the type of DR events and user pilots, the electrical systems to be used to participate in the DR events should be defined. All selected power systems should be audited to collect their most relevant information (e.g., power rating, efficiency, type of technology, etc.).

In case of participation in a DR event (e.g., in normal network operation scenarios or during a contingency), a minimum comfort agreement should be established for each scenario. These comfort conditions should be tailored to the characteristics of the building and, since end-users cannot always explicitly specify their comfort limits, this will be inferred by the models developed in WP4, and as service level agreements with a bypass option.

**Identification of static and dynamic variables that affect the demand and that need to be measured:** Depending on the type of DR events and the systems that will be used to provide a response, this activity should define all the variables that need to be monitored to enable demand reduction assessment. These variables will also be used for the creation and self-calibration of the ACCEPT forecasting models and are typically related to indoor and outdoor weather conditions (e.g., temperature, humidity, etc.) and user behaviour (e.g., occupancy, electrical equipment schedule, etc.). As a result of this analysis, the specification of a set of variables and their dependence on the energy uses in the systems involved during DR events is expected.

A summary listing the systems involved in DR, the minimum conditions of compliance and the variables affected are shown in Table 2.

*Table 2 Preliminary analysis specifications: minimum comfort conditions and variables per system*

DR System	Network conditions	Minimum comfort conditions	Variables that affect demand
<b>Battery Energy Storage System</b>	Normal, Contingency	There is no specific comfort level assigned for the occupant. Battery wear can only be described alternatively as a "minimum comfort condition".	Battery status, peak demand, flexibility requirements, management to increase self-consumption of photovoltaic energy.
<b>EV charger</b>	Normal, Contingency	EV owner comfort limits (e.g., minimum state of charge after charging) should be established. Depending on one's usage pattern and willingness to sell flexibility, different levels of charging predictability will be acceptable.	Charger power, EV model/battery characteristics, EV state of charge (SoC), preferred minimum-maximum EV SoC, EV owner profile usage patterns and schedules, dynamic electricity pricing, geolocation (number of EVs serviced), etc.
<b>Lights</b>	Normal, Contingency	Brightness level set by the user or automatically selected for visual comfort depending on the type of space and external light input	Weather conditions, occupancy and usage patterns, time of the day
<b>Heat pumps / HVACs</b>	Normal, Contingency	Individual temperature comfort levels are inferred from user actions.	Thermal behaviour of building, Occupancy, Weather conditions

DR System	Network conditions	Minimum comfort conditions	Variables that affect demand
		Minimum levels can also be defined based on user preferences or user comfort standards such as: ASHRAE 55, ISO 7730, EN15251.	(external temperature, humidity), set-point temperature
<b>Water heaters</b>	Normal, Contingency	Minimum preferred water temperature entered by the user, or based on comfort standards	Water heater capacity, Rated and actual power, Set-point temperature, Occupancy, Activity patterns
<b>PV</b>	Normal, Contingency	N/A	Specifications, Irradiation, temperature

**Baseline definition:** M&V methodologies in DR vary by program type (e.g., energy, reserve, etc.), load (e.g., weather-sensitive, flat load, etc.), and customer (e.g., residential, or commercial). The most critical aspects for its design and implementation are usually related to achieving a correct definition of a baseline estimation methodology that also includes the definition of methods for historical data analysis, baseline adjustments and baseline accuracy assessment, thanks to the algorithms and forecasting models developed in the project, user actions and behaviour will be modelled and can be predicted very accurately using the digital twin, In addition to a continuous calibration of the model based on real-time data fed by sensor information (such as temperature, humidity, etc.), the calibration also takes into account user feedback on actions performed by the ACCEPT control modules on the home systems involved in DR events, providing a more robust basis for estimates.

The baseline is characterized by:

- The analysis of the energy consumption over a sufficient period (about one year) and with sufficient resolution (hourly if possible) to identify variations in consumption.
- Estimated breakdown in energy consumption according to use (e.g. lighting, HVAC, EWH, etc.).
- Independent and fixed variables that affect the energy consumption and the relevant values (i.e. degree days for heating or cooling, floor area for lighting, building opening hours, metering period length, etc.).

These data should be measured at the same time as the energy consumption data. It is also necessary to define a calibrated simulation model that will be used to evaluate the difference between the predicted consumption (estimated by the simulation) and the actual consumption.

### 2.3.4 Deployment Requirements

**Definition of existing monitoring system and specification of metering units and sensors:** here, an evaluation of the monitoring system (if it existed) already installed in the building will be performed, among the information to be collected are the communication infrastructure, the transmission mode, the communication protocols, the parameters measured, and the devices installed. Once this information is gathered, the variables identified in the previous step as those that need to be monitored, as well as the electrical systems that will participate in DR events, will provide the basis for the specification of the characteristics of the monitoring system (e.g., performance, accuracy, communication protocol, etc.). Different monitoring requirements may be necessary depending on the participation in each different grid condition (normal or contingency).

**Technical and economic reliability of loads/generators measurements:** In this procedure, the economic and technical reliability of the installation of the ACCEPT monitoring and control system should be evaluated. This analysis should be performed taking into account the audit performed in the previous steps, as well as the definition of the specifications of the monitoring system (e.g. location of sensors, communication protocol, etc.). Considering that in ACCEPT the load measurements are expected to be individual (following in this sense a similar approach to the IPMVP protocol option B), this step will provide relevant information to verify that the M methodology can be successfully implemented. Most of these activities will be carried out mainly in WP6.

**Conduct post-installation verification activities for algorithm calibration:** In this step, the models of the elements involved in DR events must be defined and calibrated. This implies that each system identified in Table 2 must have its predictive model and be calibrated with historical or literature-based data, and then contrasted with field data.

After identifying the parameters of each model from the cross-validation data sets, each model is validated using relevant indicators. In the case of regression models (for example with an approach using machine learning), two widely used metrics are used to quantify the performance of the identified model:



- The mean squared error (RMSE)

$$RMSE = \left( \frac{1}{n} \sum_{k=1}^n (\hat{Y}_k - Y_k) \right)^{1/2} \quad (1)$$

where,  $n$  is the number of samples of the validation set and  $\hat{Y}_k - Y_k$  represents the difference between the output predicted by the data-driven model and the respective measured value.

- level of fit (FIT)

$$FIT = 100(1 - NRMSE) \quad (2)$$

$$NRMSE = \left( \frac{1}{m} \sum_{i=1}^m \left( \frac{\hat{Y}_k - Y_k}{Y_k} \right)^2 \right)^{1/2} \quad (3)$$

where,  $m$  is the number of samples of the training set.

A well-identified model corresponds to low values of  $RMSE$  for the validation set and high values of  $FIT$  for the training set.

Once acceptable values (defined by the model developers, based on the characteristics of the input data and the method used to obtain the inferences.) of the above metrics are achieved for the cross-validation datasets, initial versions of the identified models are available, although they are continuously self-calibrated. In fact, the models are self-calibrated with measured data that monitor not only energy consumptions or indoor conditions, but also user behaviour. Depending on how much user behaviours vary, data from the last few days or a few weeks are used to increase the short-term predictive capability of the models.

### 2.3.5 Validation of models and report

**Model accuracy and reliability:** The main objective at this stage of the methodology is to evaluate the overall performance of the calibrated model in terms of prediction accuracy, but also to ensure that the developed model is reliable; this means that the model must have "generalizability" and can maintain the same levels of prediction accuracy under different environmental conditions and occupancy patterns, as well as for different devices models. Once the testing phase is completed, the client must be informed of the level of accuracy of the model and must accept it if the client wishes to participate in the DR program.

A common and simple way to quantify the accuracy of the prediction is by means of the parameter  $R^2$  which is described below.

$$R^2 = 1 - \frac{\sum_{k=1}^n (Y_k - \hat{Y}_k)^2}{\sum_{k=1}^n (Y_k - \bar{Y})^2} \quad (4)$$

Where,  $n$  is the number of samples,  $\hat{Y}_k$  correspond with the predicted output,  $Y_k$  represent the respective measured value and  $\bar{Y}$  is the mean.

**PMV report:** Two types of reports are proposed, the first more technical one will be intended to measure the effectiveness of the solutions implemented in the project by means of direct comparison of the data obtained and the calibrated models. The second type of report will be for home users/aggregators where their participation will be presented in a simpler way. For the latter purpose a PMV report will be issued for each customer following their participation in DR events. It will include the explanation of the demand reduction assessment performed through ACCEPT PMV. The detailed information that the report will provide to the customer should be defined in this step of the methodology. It will typically include information about the event, such as the type for example: an Automatic Frequency Restoration Reserve (aFRR), a Restoration Reserves (RR), etc., the schedule and duration, the amount of demand reduced (kWh or kW), the unit price (€/kWh or €/kW), the comfort conditions during the event (temperature, humidity, etc. ), the state of the grid during the event (normal or contingency), information on remuneration, the increase in the self-consumption rate, the entity that requested participation in the event (DSO or aggregator), etc.

### 3 Key Performance Indicators

This section covers the development of the KPIs, the common data sheet and the proposed monitoring and contingency plan for later stages

#### 3.1 Datasheet template

A common datasheet for all KPIs was agreed among all partners in work package two, the objective was to establish the same structure of requirements for all indicators and to facilitate their dissemination and understanding, Figure 2 shows the different sections, and a description is presented below.

Section	Description
A	Basic information: where the short name (ID) and a brief description of the KPI will be indicated and indicates the version of the data sheet.
B	Location: Demo sites and use cases where the performance indicator can be applied will be indicated. (It may change according to the criteria set out in the demonstration stage)
C	Calculation: This section describes the KPI calculation process and indicates the scenarios to be calculated. At the beginning of the demonstration phase the baseline or business as usual will be calculated, and a final scenario based on the use of ACCEPT solutions will be calculated at the end of the demonstration phase.  Baseline: is a reference value based on the state of the demo/UCs before the deployment of the ACCEPT solution. BaU (Business as usual): is a projection (forward) of the baseline based on the regular behaviour of the system without the implementation of the ACCEPTS solutions, this is important mainly for the PMV methodology which is related to the effective measurement of the impact of the ACCEPT solutions for DR events. ACCEPT: are the results obtained under the improvements and systems proposed under the project (in the reporting period).
D	Calculation methodology: The methodology indicates the steps to perform the KPI calculation, including the necessary input data, the intermediate processes, and the final value, as well as the engineering units
E	Data sources/types: In this section the required data, its sources, and the way to obtain it, as well as the responsible for providing the data can be found. Information on the data collection period is also included
F	Baseline / Bau: This section defines the method used to determine the baseline conditions of the KPI, either through historical data, simulations, reference to literature or others. It is possible to determine the baseline condition by direct measurement of the demonstration site data at the beginning of the demonstration stage, in which case check the "measured at start" box. Baseline
G	comparison with the baseline indicates the environment in which data will be obtained to calculate/compare versus base values
H	Other KPIs related: cross-referenced with other project KPIs
I	General section for comments and notes.

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ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Model Accuracy			<b>KPI ID:</b>	MR-01		
<b>Description:</b>	The different prediction models developed in ACCEPT will be evaluated using this KPI, such models can be the result of traditional statistical analysis or a prediction based on machine learning techniques.						
<b>Units</b>	various (The unit of RMSE varies depending on the predicted variable)						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	$RMSE = \left( \frac{1}{n} \sum_{k=1}^n (\hat{Y}_k - Y_k) \right)^{1/2}$ <p>where, n is the number of samples of the validation set and <math>\hat{Y}_k - Y_k</math> represents the difference between the output predicted by the data-driven model and the respective measured value.</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b>	<b>Business as usual</b>	<b>ACCEPT</b>				
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	collect data to train the model					demo leader	
M02	define model for prediction (BaU)					solution provider	
M03	collect demo data after implementation of ACCEPT solutions					solution provider	
M04	calculate RMSE using M02 and M03					solution provider	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
historical data	D01	gather information	methers	demos	once	1 year	demo leader
forecast	D02	inference	ML model	ACCEPT server	on demand	all demo stage	solution provider
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b>		<b>Literature</b>		<b>Historical data</b>		<b>Measured at start</b>
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	BL ( )	BaU(X)	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( ) BaU ( )
<b>Responsible</b>	demo leader / solution provider						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<b>Simulation</b>	<b>Laboratory</b>	<b>Pilot</b>		
			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>Responsible</b>	solution provider						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>

Figure 2 KPI Common datasheet template (example)

### 3.2 Selection procedure

Starting from the original list of KPIs from the DoA<sup>6</sup>, a summary was sent to the rest of the WP2 partners, which replied with comments and new KPIs that were included for their final development and the filling of the respective data sheets. Figure 3

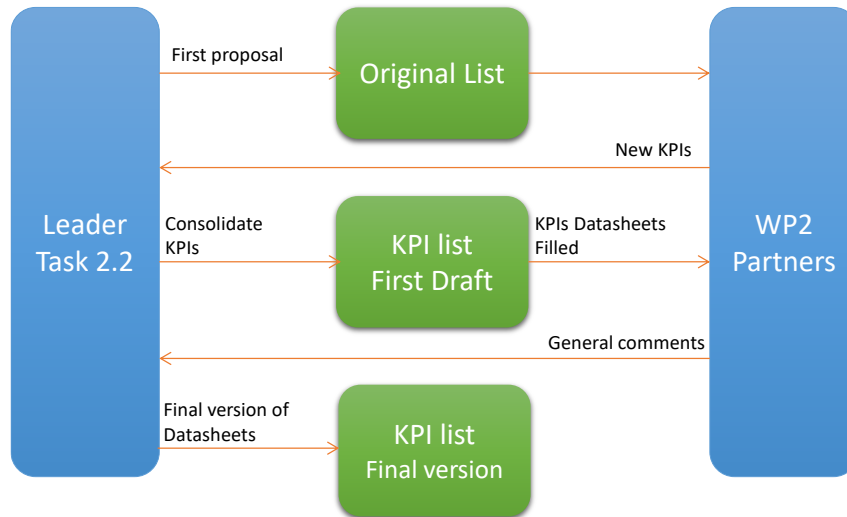


Figure 3 KPI selection procedure

After performing the precedence described above, the final list of KPIs is shown in Table 3, by default all KPI will be measured in all demos, during the demonstration and validation activities in WP7 this could be modified at the discretion of demo leaders and tech providers.

Table 3 KPI List

ID	Name	Category	Unit (**)
<b>AE-01</b>	Perceived annoyance from home control automation	Acceptance & engagement	%/Score
<b>AE-02</b>	Conscious acceptance of Smart Home control automation	Acceptance & engagement	%/Score
<b>AE-03</b>	Citizen time spent on ACCEPT app	Acceptance & engagement	[minutes]/[day]
<b>AE-04</b>	Citizen satisfaction	Acceptance & engagement	%/Score
<b>AE-05</b>	Market actor time spent on ACCEPT app	Acceptance & engagement	[minutes]/[month]
<b>AE-06</b>	Net Promoter Score	Acceptance & engagement	Score
<b>BU-01</b>	Number of consumers engaged	Business	Customers
<b>BU-02</b>	Number of consumers reached	Business	Customers
<b>BU-03</b>	Willingness to pay	Business	%/Score
<b>BU-04</b>	Business plans for how many different roles for market actors/communities	Business	Number of business plans
<b>BU-05</b>	Good practices on community creation	Business	Number of good practices
<b>SR-01</b>	Number of data security incidents	Data security & privacy / Reliability	Incidents
<b>SR-02</b>	Mean-Time-to-Detect of security incidents	Data security & privacy / Reliability	[days]
<b>SR-03</b>	ACCEPT solution downtime	Data security & privacy / Reliability	%
<b>EC-01</b>	Payback for citizens	Economic	[years]
<b>EC-02</b>	Payback for energy community	Economic	[years]
<b>EC-03</b>	Residential energy cost reduction	Economic	%
<b>ER-01</b>	Increase of self-sufficiency at the energy community level	Energy-Related	%

<sup>6</sup> ACCEPT – Annex 1 Description of Actions (Part B)

ID	Name	Category	Unit (**)
ER-02	Increase of self-consumption at the community level	Energy-Related	%
ER-03	Achievable demand flexibility	Energy-Related	%
ER-04	Achievable peak load reduction	Energy-Related	%
ER-05	Flexibility potential	Energy-Related	%
ER-06	Maximum Hourly Deficit improvement	Energy-Related	%
ER-07	Number of DR actions sent per user/building/pilot	Energy-Related	DR actions
ER-08	Energy consumption reduction	Energy-Related	%
MR-01	Comfort degradation for flexibility delivery	Modelling-Related	%/score
MR-02	Model Accuracy	Modelling-Related	various (*)

(\*) The unit of RMSE varies depending on the predicted variable  
 (\*\*) For reference values see: Annex 1 Description of Actions (Part B)

### 3.3 Monitoring and contingency plan

#### 3.3.1 Monitoring plan

The KPIs can be calculated once the solution deployment activities start in the demos and the field data are received, these activities correspond to those that will be carried out mainly during WP7 "Demonstration and validation activities" and WP8 "Impact assessment & business modelling". Taking into account the duration of these work packages, the evaluation schedule shown in Figure 4 is suggested, this can be modified at later stages if required.

Activity	Jun-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	
Pre-assessment of KPI																							
Baseline and BaU model definition																							
Preliminary report 1																							
Preliminary report 2																							
Final report																							

Figure 4 Proposed monitoring plan

The objective of the activities shown is described below.

**Pre-assessment of KPI:** This activity includes the selection of the KPIs to be evaluated by demo, determining the feasibility of calculation based on the available data.

**Baseline and BaU model definition:** Here, historical, bibliographic or reference data are evaluated, in the case of historical data these come from the M&V collection process, the ultimate goal of this stage is to create the reference "snapshot" at the time the ACCEPT solutions are implemented. Some KPIs may not apply (especially dissemination KPIs since the project must be compared to itself).

**Reports:** correspond to the milestone dates in WP7, which cover the initial, intermediate, and final period of field testing of ACCEPT solutions. Effectiveness and possible deviations in performance can be determined even with more frequent evaluations, the latter being left to demo leaders and technology providers.

#### 3.3.2 Contingency procedure

Due to the changing nature of the deployment conditions of the solutions in the demos, it is possible that inconveniences may arise when calculating the KPIs, either due to unavailability of data, changes in scope during the deployment stage or other factors that were not previously contemplated. To solve this scenario, a method is proposed to adjust the KPI definitions in later stages, mainly during WP7 where testing and validation actions are carried out.

The following are the actions available in the contingency plan:

- KPI modification** Modification of an existing KPI is possible, this request comes from a demo leader or a solution developer. If the modification only affects the demonstration involved (the KPI is not used in another demonstration) the datasheet of the modified KPI can be updated to the final list (by increasing the version number), in case the KPI to be modified is also applied in another demonstration, the modified version is issued and it is indicated that it only affects a specific demonstration the version number is changed and the suffix ES, CH, GR or NL is used depending on the country concerned.  
For example, the modification of a datasheet with the original version 0.1 for the Spanish demonstration gives as new version 0.2ES, this code must be indicated in section "A" of the datasheet.
- New KPI** If none of the proposed KPIs can supply the need for a particular calculation, it is possible to incorporate a new one, for this the partner proposing the KPI must fill out the entire data sheet and distribute it to the interested parties, it should be taken into account that there may be time limits for these inclusions, so first consult with the leader of the task or package that is affected.
- Exclude KPI** If a KPI is no longer valid for all the demos and solutions of the project, it should be removed from the data sheet by including the text "removed from the calculation" in box "I". All affected partners and tasks will be notified in a timely manner.

## 4 References

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## 5 Annexes

### 5.1 KPI datasheet template (blank)





V0.1

ACCEPT KPI DATASHEET							
Basic Information							A
Name:				KPI ID:			
Description:							
Units							
Location							B
Demo site (Use Case)							
Calculation							C
Formula or Calculation procedure							
Scenarios to be measured / calculated	Baseline <input type="checkbox"/>	Business as usual <input type="checkbox"/>	ACCEPT <input checked="" type="checkbox"/>				
Calculation Methodology							D
N°	Step description					Responsible	
Data sources / types							E
Data	TAG	Methodology	Source/ Tools/ Instruments	Location of data collection	Frequency of data collection	Min. Monitoring period	Responsible
Baseline definition / BaU methodology							F
Source	Simulation		Literature		Historical data		Measured at start
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )
Responsible							
Notes							
Comparison with the baseline							G
Environment	Simulation		Laboratory		Pilot		
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		
Responsible							
Notes							
Other KPIs related							H
General comments							I

## 5.2 KPI datasheets (filled)



ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Increase of self-sufficiency at the energy community level			<b>KPI ID:</b>	ER-01		
<b>Description:</b>	This KPI will compare the self-sufficiency in energy consumption at the community level between Baseline levels and ACCEPT improvements levels. Self-sufficiency refers to autonomy from the national electricity grid and the energy that it supplies, still currently generated primarily from non-renewable sources.						
<b>Units</b>	%						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <p>- % self-sufficiency in Baseline/BaU. - % self-sufficiency with ACCEPT improvements.</p> <p><math>\% \text{ self-sufficiency} = (\text{Total energy generated inside the community} / \text{Total energy consumed in the community}) * 100</math></p> <p><b>KPI Calculation Formula:</b></p> <p><math>(\% \text{ self-sufficiency with Improvements} / \% \text{ self-sufficiency in Baseline/BaU}) - 1</math></p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b>		<b>Business as usual</b>		<b>ACCEPT</b>		
	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>						<b>Responsible</b>
M01	Establish the value of self-sufficient in Baseline						demo Leader
M02	Establish the value of self-sufficient in ACCEPT improvements.						demo Leader
M03	KPI calculation using formula.						demo Leader
-	-						-
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
nominal data	D01	info from	manual, field	demos	once	none	demo leader
load	D02	data analysis	field	demos	hourly	year	demo leader
generation	D03	data analysis	field	demos	hourly	year	demo leader
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b>		<b>Literature</b>		<b>Historical data</b>		<b>Measured at start</b>
	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>
	BL ( )	BaU ( )	BL ( X )	BaU ( )	BL ( X )	BaU ( )	BL ( )
<b>Responsible</b>	demo leader						
<b>Notes</b>	the baseline can be defined according to the installed generation and load capacity.						
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<b>Simulation</b>		<b>Laboratory</b>		<b>Pilot</b>		
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Responsible</b>	demo leader / technology provider						
<b>Notes</b>	as an option, a simulation can evaluate other scenarios where more local generation is included.						
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Increase of self-consumption at the community level			<b>KPI ID:</b>	ER-02		
<b>Description:</b>	This KPI will compare the self-consumption in energy at the community level between Baseline levels and ACCEPT improvements levels. Self-consumption is the consumption of energy produced by your own system.						
<b>Units</b>	%						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- % self-consumption in Baseline</li> <li>- % self-consumption with Improvements.</li> </ul> <p>% self-consumption = (Total energy generated and consumed <b>instantly</b> inside the community/Total energy consumed instantly in the community)*100</p> <p><b>KPI Calculation Formula:</b></p> <p>(% self-sufficiency with Improvements/% self-sufficiency in Baseline) - 1</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b>		<b>Business as usual</b>		<b>ACCEPT</b>		
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Establish the value of self-consumption in Baseline at start					TBD	
M02	Establish the value of self-consumption in ACCEPT improvements					TBD	
M03	KPI calculation using formula.					TBD	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
instant generation	D01	data from field	meters	demos	hourly	1 year	demo leaders
instant demand	D02	data from field	meters	demos	hourly	1 year	demo leaders
demand/gen historical	D03	data from field	meters	demos	hourly	hourly	demo leaders
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b>		<b>Literature</b>		<b>Historical data</b>		<b>Measured at start</b>
	<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL (X)	BaU ( )	BL (X) BaU ( )
<b>Responsible</b>	demo leader						
<b>Notes</b>	can be the average hourly/daily rate, to be defined by the demo leader or technology provider.						
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<b>Simulation</b>		<b>Laboratory</b>		<b>Pilot</b>		
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Responsible</b>	demo leader / technology provider						
<b>Notes</b>	can be the average hourly/daily rate, to be defined by the demo leader or technology provider.						
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
a complementary report can be generated only with the increase of self-consumption for other analytics (daily, monthly, yearly average, etc.).							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Achievable demand flexibility			<b>KPI ID:</b>	ER-03		
<b>Description:</b>	This KPI will compare the maximum residential (or community) flexible energy demand with the total residential (or community) energy demand.						
<b>Units</b>	%						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Maximum residential flexible demand (kWh)</li> <li>- Total residential demand (kWh)</li> </ul> <p><b>KPI Calculation Formula:</b></p> $(\text{Maximum residential flexible demand} / \text{Total residential demand}) * 100$						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b>	<b>Business as usual</b>	<b>ACCEPT</b>				
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Total residential/community demand estimation					demo leader	
M02	Establish the maximum possible flexible energy (1)					solution provider	
M03	Data collection (flexible and non-flexible demand)					demo leader	
M04	KPI calculation using formula					solution provider	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
Max demand	D01	data analysis	field / historical	registers	hourly	1 year	demo leader
flexible demand	D02	data analysis	field	registers	hourly	1 year	provider
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b>		<b>Literature</b>		<b>Historical data</b>		<b>Measured at start</b>
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( X ) BaU ( )
<b>Responsible</b>	demo leaders / solutions providers						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<b>Simulation</b>		<b>Laboratory</b>		<b>Pilot</b>		
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Responsible</b>	solutions providers						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
(1) In the case of residential loads it can be inferred based on customer surveys or contracts, at the community level it can be estimated by the demand flexibility module development team based on the limits indicated by them.							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Achievable peak load reduction			<b>KPI ID:</b>	ER-04		
<b>Description:</b>	This KPI will compare the maximum peak load achievable with the ACCEPT improvements and the maximum peak load in BaU levels. (can be at the community or building level)						
<b>Units</b>	%						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Maximum Peak Load in BaU levels (kW)</li> <li>- Maximum Peak Load with improvements (kW)</li> </ul> <p><b>KPI Calculation Formula:</b></p> $(\text{Maximum Peak Load in BaU levels (kW)} / \text{Maximum Peak Load with improvements (kW)}) - 1$						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b>	<b>Business as usual</b>	<b>ACCEPT</b>				
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Establish the maximum peak load in BaU (forecast model using D01)					solution provider	
M02	Establish the maximum peak load with improvements (data from field)					solution provider	
M03	KPI calculation using formula					solution provider	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
Demand	D01	data analysis	historical	registers	hourly	1 year	demo leader
Demadn	D02	data analysis	data from field	registers	hourly	1 year	solution provider
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b>		<b>Literature</b>		<b>Historical data</b>		<b>Measured at start</b>
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>
	BL ( )	BaU(X)	BL ( )	BaU( )	BL ( )	BaU(X)	BL ( ) BaU( )
<b>Responsible</b>	solutions providers						
<b>Notes</b>	a regression model (or any other estimated model) is used to infer future peak demand values.						
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<b>Simulation</b>		<b>Laboratory</b>		<b>Pilot</b>		
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		
<b>Responsible</b>	solutions providers						
<b>Notes</b>	field data are compared vs. Prediction						
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
This KPI can be used as a validation tool for the PMV.							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Increase in Flexibility potential			<b>KPI ID:</b>	ER-05		
<b>Description:</b>	This KPI will compare the maximum residential (or community) flexible energy demand in Baseline/BaU with the maximum residential(or community) flexible energy demand with ACCEPT improvements.						
<b>Units</b>	%						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	TBD						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Maximum residential flexible demand in BaU (kWh)</li> <li>- Maximum residential flexible demand with improvements (kWh)</li> </ul> <p><b>KPI Calculation Formula:</b></p> <p>(Maximum residential flexible demand with improvements (kWh)/Maximum residential flexible demand in Baseline/BaU (kWh)) - 1</p>						
<b>Scenarios to be measured / calculated</b>	<i>Baseline</i>		<i>Business as usual</i>		<i>ACCEPT</i>		
	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Establish the maximum possible flexible energy in BaU					solution provider	
M02	Establish the maximum possible flexible energy with improvements					solution provider	
M03	KPI calculation using formula					solution provider	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
nameplate	D01	field data	survey	database	once	-	demo leader
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<i>Simulation</i>		<i>Literature</i>		<i>Historical data</i>		<i>Measured at start</i>
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	BL ( )	BaU(X)	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )
<b>Responsible</b>	solution providers						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<i>Simulation</i>		<i>Laboratory</i>		<i>Pilot</i>		
	<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Responsible</b>	solutions providers						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>

ACCEPT KPI DATASHEET							
Basic Information							A
Name:	Maximum Hourly Deficit improvement			KPI ID:	ER-06		
Description:	This KPI will compare the reduction in the gap between hourly local generation minus local consumption deficit between Baseline/BaU levels and with ACCEPT improvements.						
Units	%						
Location							B
Demo site (Use Case)	ALL						
Calculation							C
Formula or Calculation procedure	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Hourly local generation in Baseline/BaU levels</li> <li>- Hourly local consumption in Baseline/BaU levels</li> <li>- Hourly local generation with Improvements</li> <li>- Hourly local consumption with Improvements</li> </ul> <p><b>Establish the Maximum Hourly Deficit</b></p> <ul style="list-style-type: none"> <li>- Maximun Hourly Deficit in Baseline/BaU: Maximum hourly difference (energy generated - energy consumed) in Baseline/BaU (kWh)</li> <li>- Maximun Hourly Deficit with improvements: Maximum hourly difference (energy generated - energy consumed) with imprvements (kWh)</li> </ul> <p><b>KPI Calculation Formula:</b> (MHD in Baseline/BaU levels/MHD with improvements) - 1</p>						
Scenarios to be measured / calculated	Baseline <input type="checkbox"/>		Business as usual <input checked="" type="checkbox"/>		ACCEPT <input checked="" type="checkbox"/>		
Calculation Methodology							D
Nº	Step description					Responsible	
M01	obtain consumption and generation data (baseline) D01					demo leader	
M02	obtain forecasted consumption and generation data (BaU) D02					solution provider	
M03	obtain field consumption and generation data D03					demo leader	
-	-					-	
Data sources / types							E
Data	TAG	Methodology	Source/ Tools/ Instruments	Location of data collection	Frequency of data collection	Min. Monitoring period	Responsible
gen - demand	D01	data analisys	historical data	database	once	TBD	demo leader
gen - demand	D02	regression	model	model	on demand	TBD	solution provider
gen - demand	D03	field data	meters	meters	hourly	all demo stage	demo leader
Baseline definition / BaU methodology							F
Source	Simulation <input checked="" type="checkbox"/> BL ( ) BaU(X)		Literature <input type="checkbox"/> BL ( ) BaU( )		Historical data <input type="checkbox"/> BL ( ) BaU( )		Measured at start <input checked="" type="checkbox"/> BL ( ) BaU(X)
Responsible	solution provider						
Notes							
Comparison with the baseline							G
Environment	Simulation <input type="checkbox"/>		Laboratory <input type="checkbox"/>		Pilot <input checked="" type="checkbox"/>		
Responsible	solution provider						
Notes							
Other KPIs related							H
General comments							I



ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Number of DR actions sent per user/building/pilot			<b>KPI ID:</b>	ER-07		
<b>Description:</b>	This KPI will show how many DR actions have been sent per user/building/pilot						
<b>Units</b>	DR Actions						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p style="text-align: center;"><b>Calculation Formula:</b> sum(Number of DR actions sent)</p>						
<b>Scenarios to be measured / calculated</b>	<i>Baseline</i> <input checked="" type="checkbox"/>		<i>Business as usual</i> <input type="checkbox"/>		<i>ACCEPT</i> <input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Data collection (DR interventions)					solution provider	
-	-					-	
-	-					-	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
Number of DR actions sent	D01	direct measurement	DR modules	database	real time	all demo stage	solution provider
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<i>Simulation</i>		<i>Literature</i>		<i>Historical data</i>		<i>Measured at start</i>
	BL ( ) <input checked="" type="checkbox"/>	BaU( )	BL ( ) <input type="checkbox"/>	BaU( )	BL ( ) <input type="checkbox"/>	BaU( )	BL ( ) <input checked="" type="checkbox"/>
<b>Responsible</b>	solution provider						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<i>Simulation</i> <input type="checkbox"/>		<i>Laboratory</i> <input type="checkbox"/>		<i>Pilot</i> <input checked="" type="checkbox"/>
<b>Responsible</b>	solution provider						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase.							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Energy consumption reduction			<b>KPI ID:</b>	ER-08		
<b>Description:</b>	This KPI will compare the energy consumption at the community level between Baseline/BaU levels and ACCEPT improvements levels.						
<b>Units</b>	%						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Total energy consumption in Baseline/BaU. (MWh)</li> <li>- Total energy consumption with Improvements. (MWh)</li> </ul> <p><b>KPI Calculation Formula:</b></p> $\left( \frac{\text{Total energy consumption in Baseline/BaU. (MWh)}}{\text{Total energy consumption with Improvements. (MWh)}} \right) - 1$						
<b>Scenarios to be measured / calculated</b>	<i>Baseline</i> <input type="checkbox"/>		<i>Business as usual</i> <input checked="" type="checkbox"/>		<i>ACCEPT</i> <input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	collect data to train the model					demo leader	
M02	define model for prediction (BaU)					solution provider	
M03	collect demo data after implementation of ACCEPT solutions					solution provider	
M04	calculate reduction using M02 and M03					solution provider	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
historical data	D01	gather information	methers	demos	once	1 year	demo leader
forecast	D02	inference	ML model	ACCEPT server	on demand	all demo stage	solution provider
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<i>Simulation</i> BL ( ) <input checked="" type="checkbox"/> BaU(X)		<i>Literature</i> BL ( ) <input type="checkbox"/> BaU ( )		<i>Historical data</i> BL (X) <input checked="" type="checkbox"/> BaU ( )		<i>Measured at start</i> BL ( ) <input checked="" type="checkbox"/> BaU ( )
<b>Responsible</b>	demo leader / solution provider						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<i>Simulation</i> <input type="checkbox"/>		<i>Laboratory</i> <input checked="" type="checkbox"/>		<i>Pilot</i> <input checked="" type="checkbox"/>		
<b>Responsible</b>	solution provider						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Comfort degradation for flexibility delivery			<b>KPI ID:</b>	MR-01		
<b>Description:</b>	Ratio between the automatically inferred comfort level and the one achieved after executing the demand flexibility actions, alternatively it can also be compared with the limits explicitly indicated by the customer.						
<b>Units</b>	%/score						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p style="text-align: center;"><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Flexibility delivery Score for Baseline/BaU levels</li> <li>- Flexibility delivery Score with ACCEPT implementation</li> </ul> <p style="text-align: center;"><b>KPI Calculation Formula</b></p> <p style="text-align: center;">(Flexibility delivery Score for Baseline/BaU levels)/(Flexibility delivery Score with ACCEPT implementation)</p>						
<b>Scenarios to be measured / calculated</b>	<i>Baseline</i>		<i>Business as usual</i>		<i>ACCEPT</i>		
	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Obtaining explicit comfort limits from customers					demo leader	
M02	Inferring comfort limits by modeling or by means of local standards and regulations					solution provider	
M03	KPI calculation using formula					solution provider	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
explicit limits	D01	direct survey	APP/contract	database	once(*)	all demo stage	demo leader
inferred limits	D02	inference	model / regulations	model	-	all demo stage	solution provider
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<i>Simulation</i>		<i>Literature</i>		<i>Historical data</i>		<i>Measured at start</i>
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( ) BaU ( )
<b>Responsible</b>	solutions providers						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<i>Simulation</i>		<i>Laboratory</i>		<i>Pilot</i>		
	<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Responsible</b>	solutions providers						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
(*) a customer may change its limits at a later date							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Model Accuracy			<b>KPI ID:</b>	MR-01		
<b>Description:</b>	The different prediction models developed in ACCEPT will be evaluated using this KPI, such models can be the result of traditional statistical analysis or a prediction based on machine learning techniques.						
<b>Units</b>	various (The unit of RMSE varies depending on the predicted variable)						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	$RMSE = \left( \frac{1}{n} \sum_{k=1}^n (\hat{Y}_k - Y_k) \right)^{1/2}$ <p>where, n is the number of samples of the validation set and <math>\hat{Y}_k - Y_k</math> represents the difference between the output predicted by the data-driven model and the respective measured value.</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b> <input type="checkbox"/>		<b>Business as usual</b> <input checked="" type="checkbox"/>		<b>ACCEPT</b> <input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	collect data to train the model					demo leader	
M02	define model for prediction (BaU)					solution provider	
M03	collect demo data after implementation of ACCEPT solutions					solution provider	
M04	calculate RMSE using M02 and M03					solution provider	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
historical data	D01	gather information	methers	demos	once	1 year	demo leader
forecast	D02	inference	ML model	ACCEPT server	on demand	all demo stage	solution provider
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b> <input checked="" type="checkbox"/> BL ( ) BaU(X)		<b>Literature</b> <input type="checkbox"/> BL ( ) BaU ( )		<b>Historical data</b> <input type="checkbox"/> BL ( ) BaU ( )		<b>Measured at start</b> <input type="checkbox"/> BL ( ) BaU ( )
<b>Responsible</b>	demo leader / solution provider						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<b>Simulation</b> <input checked="" type="checkbox"/>		<b>Laboratory</b> <input checked="" type="checkbox"/>		<b>Pilot</b> <input type="checkbox"/>
<b>Responsible</b>	solution provider						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Number of data security incidents			<b>KPI ID:</b>	SR-01		
<b>Description:</b>	This KPI will show how many incidents have happened during the project demonstration activities.						
<b>Units</b>	Incidents						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p style="text-align: center;"><b>Data entry:</b></p> <p style="text-align: center;">- Number of security incidents during demonstration activities</p> <p style="text-align: center;"><b>Calculation Formula:</b></p> <p style="text-align: center;">Number of security incidents during demonstration activities</p>						
<b>Scenarios to be measured / calculated</b>	<i>Baseline</i> <input type="checkbox"/>		<i>Business as usual</i> <input type="checkbox"/>		<i>ACCEPT</i> <input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	definition of the type of incident					solution provider	
M02	deployment of the audit system					solution provider	
M03	collect events					solution provider	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
incident counter	D01	direct measurement	security analytics	database	real time	all demo stage	solution provider
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<i>Simulation</i> <input type="checkbox"/>		<i>Literature</i> <input type="checkbox"/>		<i>Historical data</i> <input type="checkbox"/>		<i>Measured at start</i> <input type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )
<b>Responsible</b>	solution provider						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<i>Simulation</i> <input type="checkbox"/>		<i>Laboratory</i> <input type="checkbox"/>		<i>Pilot</i> <input checked="" type="checkbox"/>
<b>Responsible</b>	solution provider						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
<p>1) alternatively they can be classified by nature and criticality</p> <p>2) due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase</p>							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Mean-Time-to-Detect of security incidents			<b>KPI ID:</b>	SR-02		
<b>Description:</b>	This KPI will show the average time it takes to find a security incident (in days)						
<b>Units</b>	days						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <p>- Average time it takes to find a security incident (in days)</p> <p><b>Calculation Formula:</b></p> <p>Average time it takes to find a security incident (in days)</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b>	<b>Business as usual</b>	<b>ACCEPT</b>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>				
<b>Calculation Methodology</b>							<b>D</b>
<b>N<sup>o</sup></b>	<b>Step description</b>					<b>Responsible</b>	
M01	definition of the type of incident					solution provider	
M02	deployment of the audit system					solution provider	
M03	collect events					solution provider	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
incident counter	D01	direct measurement	security analytics	database	real time	all demo stage	solution provider
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b>		<b>Literature</b>		<b>Historical data</b>		<b>Measured at start</b>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )
<b>Responsible</b>	solution provider						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<b>Simulation</b>		<b>Laboratory</b>		<b>Pilot</b>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Responsible</b>	solution provider						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	ACCEPT solution downtime			<b>KPI ID:</b>	SR-03		
<b>Description:</b>	This KPI will show the average time the system(*) is unavailable in % referred to the total time is working/available. (During pilot demonstrations a 5% is reserved for updates and bug fixes)						
<b>Units</b>	%						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Average time the sytem is working</li> <li>- Average time the system is unavailable</li> </ul> <p><b>Calculation Formula:</b></p> <p>(Average time the system is unavailable/Average time the sytem is working)*100</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b> <input type="checkbox"/>		<b>Business as usual</b> <input type="checkbox"/>		<b>ACCEPT</b> <input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Establish the average time the system is working					app developer	
M02	Establish the average time the system is unavailable					app developer	
M03	KPI calculation using formula					app developer	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
up time counter	D01	direct measurement	app servers	app servers	real time	all demo stage	app developer
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Literature</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Historical data</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Measured at start</b> <input type="checkbox"/> BL ( )      BaU ( )
<b>Responsible</b>	app developer						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<b>Simulation</b> <input type="checkbox"/>		<b>Laboratory</b> <input type="checkbox"/>		<b>Pilot</b> <input checked="" type="checkbox"/>
<b>Responsible</b>	app developer						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
<p>(*) can be divided by module: citizen application, aggregator application, flexibility, scheduling, etc.</p> <p>(-) due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase</p>							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Perceived annoyance from home control automation			<b>KPI ID:</b>	AE-01		
<b>Description:</b>	This KPI will show in % how many of the citizens are annoyed with the automatization of home control. The Score will be determined by the average of the score the interviewed citizens have given to the annoyance of home control automatization. This score will show how annoyed are the citizens with home control automatization.						
<b>Units</b>	%/Score						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Number of citizens annoyed</li> <li>- Total number of citizens (Interviewed)</li> <li>- Average of the citizens Score</li> </ul> <p><b>Calculation Formula:</b></p> <p>(Number of citizens annoyed/Total number of citizens (Interviewed))*100 Alternative: Average of the citizens Score</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b> <input type="checkbox"/>		<b>Business as usual</b> <input type="checkbox"/>		<b>ACCEPT</b> <input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	survey creation and distribution					demo leader	
M02	collection of responses and evaluation of results					demo leader	
-	-					-	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
survey	D01	direct survey	APP / letter	database	monthly	all demo stage	demo leader
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b> BL ( ) <input type="checkbox"/> BaU ( )		<b>Literature</b> BL ( ) <input type="checkbox"/> BaU ( )		<b>Historical data</b> BL ( ) <input type="checkbox"/> BaU ( )		<b>Measured at start</b> BL ( ) <input checked="" type="checkbox"/> BaU ( )
<b>Responsible</b>	demo leader						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<b>Simulation</b> <input type="checkbox"/>		<b>Laboratory</b> <input type="checkbox"/>		<b>Pilot</b> <input checked="" type="checkbox"/>		
<b>Responsible</b>	demo leader						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
including the survey in the APP could be more effective.							



ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Conscious acceptance of Smart Home control automation			<b>KPI ID:</b>	AE-02		
<b>Description:</b>	This KPI will show in % how many of the citizens accept the Smart Home control automatization. The Score will be determined by the average of the score the interviewed citizens have given. This Score will show how the citizens willingly accept the (conscious is the acceptance of) Smart Home control automatization.						
<b>Units</b>	%/Score						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Number of citizens that accept the home control automatization</li> <li>- Total number of citizens (Interviewed)</li> <li>- Average of the citizens Score</li> </ul> <p><b>Calculation Formula:</b></p> <p>(Number of citizens that accept the home control automatization / Total number of citizens (Interviewed))*100</p> <p>alternative: Average of the citizens Score</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b> <input type="checkbox"/>		<b>Business as usual</b> <input type="checkbox"/>		<b>ACCEPT</b> <input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	survey creation and distribution					demo leader	
M02	collection of responses and evaluation of results					demo leader	
-	-					-	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
survey	D01	direct survey	APP / form	database	monthly	all demo stage	demo leader
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Literature</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Historical data</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Measured at start</b> <input type="checkbox"/> BL ( )      BaU ( )
<b>Responsible</b>							
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<b>Simulation</b> <input type="checkbox"/>		<b>Laboratory</b> <input type="checkbox"/>		<b>Pilot</b> <input checked="" type="checkbox"/>		
<b>Responsible</b>	demo leader						
<b>Notes</b>	The three periods of the wp7 reports will be compared.						
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
<p>1) including the survey in the APP could be more effective.</p> <p>2) due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase</p>							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Citizen time spent on ACCEPT app			<b>KPI ID:</b>	AE-03		
<b>Description:</b>	This KPI will show ho much daily time on average the citizens spend using the app.						
<b>Units</b>	[minutes]/[day]						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <p>- Average time the citizens spend on the app</p> <p><b>Calculation Formula:</b></p> <p>- Average time the citizens spend on the app [min]/[day]</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b>		<b>Business as usual</b>		<b>ACCEPT</b>		
	<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Data collection (app usage time)					app dev	
M02	KPI calculation using formula					app dev	
-	-					-	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
time of use	D01	direct measurement	APP	database	daily	all demo stage	app dev
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b>		<b>Literature</b>		<b>Historical data</b>		<b>Measured at start</b>
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( ) BaU ( )
<b>Responsible</b>							
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<b>Simulation</b>		<b>Laboratory</b>		<b>Pilot</b>
			<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>
<b>Responsible</b>	demo leader / app developer						
<b>Notes</b>	The three periods of the wp7 reports will be compared.						
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Citizen satisfaction			<b>KPI ID:</b>	AE-04		
<b>Description:</b>	This KPI will show in % how many of the citizens are satisfied with the implementation of the project. The Score will be determined by the average of the score the interviewed citizens have given to the project. This score will show how satisfied are the citizens with the project.						
<b>Units</b>	%/Score						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Number of citizens satisfied</li> <li>- Total number of citizens (Interviewed)</li> <li>- Average of the citizens Score</li> </ul> <p><b>Calculation Formula:</b></p> <p>Average of the citizens Score Alternative: (Number of citizens satisfied/Total number of citizens (Interviewed))*100</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b>	<b>Business as usual</b>	<b>ACCEPT</b>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>				
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	survey creation and distribution					app dev	
M02	collection of responses and evaluation of results					demo leader	
-	-					-	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
survey	D01	direct survey	APP / letter	database	monthly	all demo stage	app dev
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b>		<b>Literature</b>		<b>Historical data</b>		<b>Measured at start</b>
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )
<b>Responsible</b>							
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<b>Simulation</b>	<b>Laboratory</b>	<b>Pilot</b>		
			<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<b>Responsible</b>	app developer						
<b>Notes</b>	The three periods of the wp7 reports will be compared.						
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
<p>1) including the survey in the APP could be more effective.</p> <p>2) due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase</p>							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Market actor time spent on ACCEPT app			<b>KPI ID:</b>	AE-05		
<b>Description:</b>	This KPI will show how much daily time on average the Market Actor spend using the app.						
<b>Units</b>	[minutes]/[month]						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <p>- Average time the Market actor spend on the app</p> <p><b>Calculation Formula:</b></p> <p>- Average time the Market actor spend on the app</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b>		<b>Business as usual</b>		<b>ACCEPT</b>		
	<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	in app survey deployment					app dev	
M02	collection of responses and evaluation of results					demo leader	
-	-					-	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
in app survey	D01	direct survey	APP / letter	database	monthly	all demo stage	app dev
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b>		<b>Literature</b>		<b>Historical data</b>		<b>Measured at start</b>
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( ) BaU ( )
<b>Responsible</b>							
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<b>Simulation</b>		<b>Laboratory</b>		<b>Pilot</b>
			<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>
<b>Responsible</b>	app developer						
<b>Notes</b>	The three periods of the wp7 reports will be compared.						
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
<p>1) including the survey in the APP could be more effective.</p> <p>2) due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase</p>							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Net Promoter Score			<b>KPI ID:</b>	AE-06		
<b>Description:</b>	This KPI will show in % how many users are willing to recommend the ACCEPT solution to others. The Score will be determined by the average of the score the interviewed citizens have given to the project. This score will show how much the citizens are willing to recommend the ACCEPT solution to others.						
<b>Units</b>	Score						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Number of citizens willing to recommend</li> <li>- Total number of citizens (Interviewed)</li> <li>- Average of the citizens Score</li> </ul> <p><b>Calculation Formula:</b></p> <p>(Number of citizens willing to recommend/Total number of citizens (Interviewed))*100 alternative: Average of the citizens Score</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b> <input type="checkbox"/>		<b>Business as usual</b> <input type="checkbox"/>		<b>ACCEPT</b> <input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	survey creation and distribution					demo leader	
M02	collection of responses and evaluation of results					demo leader	
-	-					-	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
survey	D01	direct survey	APP / letter	database	TBD	all demo stage	demo leader
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Literature</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Historical data</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Measured at start</b> <input type="checkbox"/> BL ( )      BaU ( )
<b>Responsible</b>							
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<b>Simulation</b> <input type="checkbox"/>		<b>Laboratory</b> <input type="checkbox"/>		<b>Pilot</b> <input type="checkbox"/>		
<b>Responsible</b>	demo leader						
<b>Notes</b>	The three periods of the WP7 reports will be compared.						
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Payback for citizens			<b>KPI ID:</b>	EC-01		
<b>Description:</b>	This KPI will show the number of years required to recover the initial capital of the citizens investment. refinement of the algorithms during the testing phase may accelerate this return, so it can be measured at different stages throughout the testing phase.						
<b>Units</b>	Years						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Initial citizen investement (€)</li> <li>- Saving per year with the ACCEPT solution (€)</li> </ul> <p><b>Calculation Formula:</b></p> <p>Initial citizen investement (€)/Saving per year with the ACCEPT solution (€)</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b>		<b>Business as usual</b>		<b>ACCEPT</b>		
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Establish the initial citizen investement					solution provider	
M02	Establish the average savings per year with the ACCEPT solution					solution provider	
M03	KPI calculation using formula					solution provider	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
initial investment	D01	-	invoices	database	once	-	solution provider
amount of bills	D02	bill reduction	bills	database	monthly	all testing	demo leaders
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b>		<b>Literature</b>		<b>Historical data</b>		<b>Measured at start</b>
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( ) BaU ( )
<b>Responsible</b>	solutions providers						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<b>Simulation</b>		<b>Laboratory</b>		<b>Pilot</b>
			<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>
<b>Responsible</b>	demo leaders						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Payback for energy community			<b>KPI ID:</b>	EC-02		
<b>Description:</b>	This KPI will show the number of years required to recover the initial capital of the community investment. refinement of the algorithms during the testing phase may accelerate this return, so it can be measured at different stages throughout the testing phase.						
<b>Units</b>	Years						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	The KPI will be applicable to any demonstration where assets are available at the district level.						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Initial community investement (€)</li> <li>- Saving per year with the ACCEPT solution (€)</li> </ul> <p><b>Calculation Formula:</b></p> <p>Initial community investement (€)/Saving per year with the ACCEPT solution (€)</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b> <input checked="" type="checkbox"/>		<b>Business as usual</b> <input type="checkbox"/>		<b>ACCEPT</b> <input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Establish the initial community investement					solution providers	
M02	Establish the average savings per year with the ACCEPT solution					solution providers	
M03	KPI calculation using formula					solution providers	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
initial investment	D01	-	invoices	database	once	-	solution providers
amount of bills	D02	bill reduction	bills	database	monthly	all testing	demo leaders
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b> BL ( ) <input type="checkbox"/> BaU ( )		<b>Literature</b> BL ( ) <input type="checkbox"/> BaU ( )		<b>Historical data</b> BL ( ) <input type="checkbox"/> BaU ( )		<b>Measured at start</b> BL ( ) <input checked="" type="checkbox"/> BaU ( )
<b>Responsible</b>	solutions providers						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<b>Simulation</b> <input type="checkbox"/>		<b>Laboratory</b> <input type="checkbox"/>		<b>Pilot</b> <input checked="" type="checkbox"/>		
<b>Responsible</b>	demo leaders						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Residential energy cost reduction			<b>KPI ID:</b>	EC-03		
<b>Description:</b>	This KPI will compare the energy cost at the residential level between baseline/BaU levels and ACCEPT improvements levels due to improved self-consumption of locally generated renewable energy.						
<b>Units</b>	%						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>KPI Calculation Formula:</b></p> <p>[M03] Total difference of energy (imported) = Energy from the network in Baseline/BaU levels (KWh) - Energy from the network with ACCEPT implementation (KWh)</p> <p>[M04] cost of energy that was not required = Total difference of energy (imported) * price of the energy</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b> <input type="checkbox"/>		<b>Business as usual</b> <input type="checkbox"/>		<b>ACCEPT</b> <input type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>						<b>Responsible</b>
M01	obtain the total energy consumption [D01]						demo leader
M02	obtain the total energy provided by renewables [D02]						demo leader
M03	calculate the total difference of energy (imported).						solution provider
M04	calculate cost of energy that was not required						solution provider
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
total energy consumption	D01	direct lecture	methers	database	hourly	all testing stage	demo leaders
total energy generated by renewable	D01	direct lecture	methers	database	hourly	all testing stage	demo leaders
price of the energy	D03	pooling	energy market API	database	hourly	all testing stage	demo leaders
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b> <input type="checkbox"/>		<b>Literature</b> <input type="checkbox"/>		<b>Historical data</b> <input checked="" type="checkbox"/>		<b>Measured at start</b> <input checked="" type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )
<b>Responsible</b>	demo leader / solutions providers						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<b>Simulation</b> <input type="checkbox"/>		<b>Laboratory</b> <input type="checkbox"/>		<b>Pilot</b> <input checked="" type="checkbox"/>		
<b>Responsible</b>	demo leader / solutions providers						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
predictive models will be used to describe BaU, savings can be compared to baseline or BaU Vs cost after implementing ACCEPT solutions.							



ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Number of consumers engaged			<b>KPI ID:</b>	BU-01		
<b>Description:</b>	This KPI will show how many Citizens are directly involved in demonstration activities. In principle, customers per demo will be compared in months M26, M33 and M40; if customer data is available in M20, it can be used as a baseline.						
<b>Units</b>	[customers]						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p style="text-align: center;"><b>Data entry:</b> Number of Citizens directly involved in demonstration activities</p> <p style="text-align: center;"><b>Calculation Formula:</b> Sum(Citizens directly involved in demonstration activities)</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b> <input checked="" type="checkbox"/>		<b>Business as usual</b> <input type="checkbox"/>		<b>ACCEPT</b> <input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Number of consumers engaged					demo leaders	
M02	KPI calculation using formula					demo leaders	
-	-					-	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
number of clients	D01	count	number of contracts	demos	per milestones	all demo campaing	demo leader
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b> <input type="checkbox"/>		<b>Literature</b> <input type="checkbox"/>		<b>Historical data</b> <input type="checkbox"/>		<b>Measured at start</b> <input checked="" type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )
<b>Responsible</b>	demo leader						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<b>Simulation</b> <input type="checkbox"/>		<b>Laboratory</b> <input type="checkbox"/>		<b>Pilot</b> <input checked="" type="checkbox"/>
<b>Responsible</b>	demo leader						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Number of consumers reached			<b>KPI ID:</b>	BU-02		
<b>Description:</b>	This KPI will show how many Citizens have been reached through dissemination activities. In principle, customers per demo will be compared in months M26, M33 and M40; if customer data is available in M20, it can be used as a baseline. If deemed appropriate, it is possible to discriminate the activity that has originated the interest to the customer.						
<b>Units</b>	[customers]						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p>Data entry: - Number of Citizens reached through secondary activities</p> <p>Calculation Formula: sum(Citizens reached through secondary activities)</p>						
<b>Scenarios to be measured / calculated</b>	<b>Baseline</b> <input checked="" type="checkbox"/>	<b>Business as usual</b> <input type="checkbox"/>					<b>ACCEPT</b> <input checked="" type="checkbox"/>
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	determine number of potential customers reached by type of event					dissemination team	
M02	KPI calculation using formula					dissemination team	
-	-					-	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
customers reached	D01	results analysis	list of participants	databases	per milestone	all demo campaign	dissemination team
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<b>Simulation</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Literature</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Historical data</b> <input type="checkbox"/> BL ( )      BaU ( )		<b>Measured at start</b> <input checked="" type="checkbox"/> BL ( )      BaU ( )
<b>Responsible</b>	dissemination team						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<b>Simulation</b> <input type="checkbox"/>	<b>Laboratory</b> <input type="checkbox"/>	<b>Pilot</b> <input checked="" type="checkbox"/>		
<b>Responsible</b>	dissemination team						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Willingness to pay			<b>KPI ID:</b>	BU-03		
<b>Description:</b>	<p>This KPI will show in % how many users are willing to pay in advance to cover the revenue requirements for a viable community business model.</p> <p>The Score will be determined by the average of the score the interviewed citizens have given to the project. This score will show how willing the citizens are to pay in advance to cover the revenue requirements for a viable community business model.</p> <p>Revenue requirements will be quantified based on the cost-benefits analysis.</p>						
<b>Units</b>	%/Score						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b></p> <ul style="list-style-type: none"> <li>- Number of citizens willing to pay in advance</li> <li>- Total number of citizens (Interviewed)</li> <li>- Average of the citizens Score</li> </ul> <p><b>Calculation Formula:</b></p> <p>(Number of citizens willing to pay in advance/Total number of citizens (Interviewed))*100            alternative: Average of the citizens Score</p>						
<b>Scenarios to be measured / calculated</b>	<i>Baseline</i>		<i>Business as usual</i>		<i>ACCEPT</i>		
	<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
D01	survey creation and distribution					dissemination team / demo leader	
D02	response collection and interpretation					dissemination team / demo leader	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
survey	D01	direct survey		database	once (*)	all demo campaign	dissemination team
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<i>Simulation</i>		<i>Literature</i>		<i>Historical data</i>		<i>Measured at start</i>
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( ) BaU ( )
<b>Responsible</b>	dissemination team						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<i>Simulation</i>		<i>Laboratory</i>		<i>Pilot</i>
			<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>
<b>Responsible</b>	dissemination team						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
<p>* one possibility is to evaluate the perception over time, resending the survey after campaigns or events. another possibility is to send the surveys to groups divided by time and evaluate the evolution.</p> <p>1) due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase</p>							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Business plans for how many different roles for market actors/communities				<b>KPI ID:</b>	BU-04	
<b>Description:</b>	This KPI will show the number of business plans for different stakeholders in the market communities. The plans should be financially viable based on the merits of validated technical solutions and citizens willing to pay. The business plan for aggregators will only be developed when the activity is allowed by regulations/market codes.						
<b>Units</b>	Number of business plans						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p style="text-align: center;"><b>Data entry:</b></p> <p style="text-align: center;">- Number of plans for different roles in market communities.</p> <p style="text-align: center;"><b>Calculation Formula:</b></p> <p style="text-align: center;">- Number of plans for different roles in market communities.</p>						
<b>Scenarios to be measured / calculated</b>	<i>Baseline</i>		<i>Business as usual</i>		<i>ACCEPT</i>		
	<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Data collection (Number of plans)					TBD	
M02	KPI calculation using formula					TBD	
-	-					-	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
Plans(*)	D01	Evaluation	plans / strategies	technical committee	TBD	TBD	technical committee
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<i>Simulation</i>		<i>Literature</i>		<i>Historical data</i>		<i>Measured at start</i>
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( X ) BaU ( )
<b>Responsible</b>	technical committee						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>			<i>Simulation</i>		<i>Laboratory</i>		<i>Pilot</i>
			<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>
<b>Responsible</b>	technical committee						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>
<p>*the technical committee could be made up of those responsible for the demonstrations and the developers of the solutions, both will define the plans, their scope and technical objective, the economic and contractual aspect will be dealt with by the WP8 team.</p> <p>1) due to the nature of this KPI it is not possible to determine the baseline before the deployment of ACCEPT solutions, so the baseline will be defined in the first report of the testing phase</p>							

ACCEPT KPI DATASHEET							
<b>Basic Information</b>							<b>A</b>
<b>Name:</b>	Good practices on community creation			<b>KPI ID:</b>	BU-05		
<b>Description:</b>	Good practices are generally defined as any action that is taken by either the consumer or prosumer, which implies a positive change in terms of energy savings and efficiency, this can be carried out through changes in equipment (e.g. more efficient) or by modifications in the consumption pattern (e.g. dynamic tariff scheme).						
<b>Units</b>	Number of good practices						
<b>Location</b>							<b>B</b>
<b>Demo site (Use Case)</b>	ALL						
<b>Calculation</b>							<b>C</b>
<b>Formula or Calculation procedure</b>	<p><b>Data entry:</b> - Number of good practices</p> <p><b>Calculation Formula:</b> sum(Number of good practices)</p>						
<b>Scenarios to be measured / calculated</b>	<i>Baseline</i> <input checked="" type="checkbox"/>	<i>Business as usual</i> <input type="checkbox"/>					<i>ACCEPT</i> <input checked="" type="checkbox"/>
<b>Calculation Methodology</b>							<b>D</b>
<b>Nº</b>	<b>Step description</b>					<b>Responsible</b>	
M01	Definition of good practice, its scope and characteristics for validation					dissemination team	
M02	Monitoring the implementation of good practices in order to determine their effective implementation.					demo leader	
M03	Calculate the best practices implemented (validated during project engagement activities).					demo leader	
-	-					-	
<b>Data sources / types</b>							<b>E</b>
<b>Data</b>	<b>TAG</b>	<b>Methodology</b>	<b>Source/ Tools/ Instruments</b>	<b>Location of data collection</b>	<b>Frequency of data collection</b>	<b>Min. Monitoring period</b>	<b>Responsible</b>
good practices validated	D01	data analysis	Document	surveys	TDB	TDB	dissemination team
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
<b>Baseline definition / BaU methodology</b>							<b>F</b>
<b>Source</b>	<i>Simulation</i> <input type="checkbox"/>		<i>Literature</i> <input type="checkbox"/>		<i>Historical data</i> <input type="checkbox"/>		<i>Measured at start</i> <input checked="" type="checkbox"/>
	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )	BaU ( )	BL ( )
<b>Responsible</b>	dissemination team						
<b>Notes</b>							
<b>Comparison with the baseline</b>							<b>G</b>
<b>Environment</b>	<i>Simulation</i> <input type="checkbox"/>		<i>Laboratory</i> <input type="checkbox"/>		<i>Pilot</i> <input checked="" type="checkbox"/>		
<b>Responsible</b>	dissemination team						
<b>Notes</b>							
<b>Other KPIs related</b>							<b>H</b>
<b>General comments</b>							<b>I</b>