UseCases

Based on IEC 62559-2 edition 1   
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Use Cases U2Demo

Business Use Cases

PT: Future EC operation with community level optimization

Description of the use case

Name of use case

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| --- | --- | --- |
| ***Use case identification*** | | |
| ***ID*** | ***Area(s)/Domain(s)/Zone(s)*** | ***Name of use case*** |
|  | Use Cases U2Demo | PT: Future EC operation with community level optimization |

Version management

Scope and objectives of use case

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| ***Scope and objectives of use case*** | |
| ***Scope*** |  |
| ***Objective(s)*** | Increase the revenue generated by sharing energy  User Engagement in P2P and Energy sharing Increase use of renewables  Reduce energy invoice Increase energy literacy |
| ***Related business case(s)*** | EC operation with internal market models and P2P models |

Narrative of Use Case

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| ***Narrative of use case*** |
| ***Short description*** |
| This Business use case (BUC) models a possible future scenario of the EC in Portugal. In this BUC there are batteries at the member level with the corresponding optimization done at the EC manager level. There is also the possibility of energy sharing. |
| ***Complete description*** |
| This BUC expands the BUC “Current EC operation*”* for a possible future scenario of the EC. In this BUC batteries will be available and connected to the EC member level. Scheduling will be optimized by the EC manager according to high-level preferences of the EC members (e.g. cost savings) and the energy sharing models available.  Summary of use case   * [**07 Scheduling with Energy Sharing/P2P Model 3**](#{B3E84D9E-50D5-464b-9BCD-7EA9FC8952C8}) Description: In this scenario, there are two participating roles: EC manager and EC member. This scenario models the scheduling of flexible loads and batteries at the member level based on the assumption of a predefined pricing mechanism set by the EC manager for internal energy exchange. Scheduling is carried out for flexible loads by the EC member and for batteries by the EC manager based on the price of energy sharing, price set by the Supplier, weather predictions, consumption and production forecasts and the high-level priorities of the EC member.   + 01. Request NWP Data Description: Request Numerical Weather Prediction using an API.   + 02. PV and Consumption Forecast Description: Forecast consumption and production based on historical data.   + 03. Request Retailer price and set EC internal price Description: Request the retailer price for the electricity to be bought from the grid and set the EC internal price.   + 04. Individual Look-Ahead Energy Resources Scheduling Description: Optimization of energy resources per house considering different objective functions based on high-level priorities, such as cost savings, green energy and comfort (decision support methods)   + 05. Battery Scheduling Description: Optimization of EC battery based on the optimization carried out for the EC members optimization   + 06. Organize scheduling information from EC members Description: Store scheduling data from EC members * [**07 Scheduling with Energy Sharing/P2P Model 4**](#{68FAB807-F741-455e-9440-2D78364832A1}) Description: In this scenario, there are two participating roles: EC manager and EC member. This scenario models the scheduling of flexible loads and batteries at the member level based on the assumption of a local market that accepts sell offers and buy bids from EC members and is cleared by the EC manager. Scheduling is carried out for flexible loads by the EC member and for batteries by the EC manager based on the prices resulting from the local market clearing, price set by the Supplier, weather predictions, consumption and production forecasts and the high-level priorities of the EC member.   + 01. Request NWP Data Description: Request Numerical Weather Prediction using an API.   + 02. PV and Consumption Forecast Description: Forecast consumption and production based on historical data.   + 03. Request Retailer price Description: Request the retailer price for the electricity to be bought from the grid.   + 04. Initial Individual Look-Ahead Energy Resources Scheduling Description: Optimize energy resources per house considering different objective functions. This optimization serves as an initial condition to get the surplus and shortages of each peer and is done based on high-level priorities, such as cost savings, green energy and comfort   + 05. Make offers and bids Description: Determine the offers and bids to make to the local market (pairs of price and quantity). The offers and bids can be made by resorting to decision support methods.   + 06. Aggregate offers and bids Description: Aggregate the offers and bids for further processing.   + 07. Market Clearing Description: Perform market clearing based on the offers and bids made.   + 08. Process results Description: Determine the offers and bids cleared, the corresponding members, the amount that each member needs to pay and be remunerated.   + 09. Ack. results Description: Acknowledge the results cleared by the market   + 10. Final Individual Look-Ahead Energy Resources Scheduling Description: Optimize energy resources per house considering the results obtained from market clearing and also the member's high-level priorities, such as cost savings, green energy and comfort.   + 11. Battery Scheduling Description: Optimization of EC battery based on the optimization carried out for the EC members optimization   + 12. Organize scheduling information from EC members Description: Store scheduling data from EC members. * [**08 Operation**](#{37279E62-73DD-4385-A568-6751E02B7143}) Description: In this scenario, there are two participating roles: EC manager and EC member. This scenario models the control of flexible loads and batteries at the EC member level, the validation of equipment correct operation and the scheduling of performance evaluation, which in case of significant deviation from the expected scheduling requests a new scheduling.   + 01. Measurement System Description: Get information from meters on consumption and production using an API.   + 02. Control Flexible Loads Description: Actuation of flexible loads and charge/discharge of EC member batteries according the scheduling previously defined.   + 03. Control BESS Description: Charge/discharge of community battery according the scheduling previously defined   + 04. Store Measurement Data Description: Store measurement data   + 05. Validation of equipment correct operation Description: Validate the equipment correct operation based on the measurements obtained from meters and the expected control actuation on flexible loads   + 06. Scheduling Performance Evaluation Description: Evaluate deviations between real and forecasted data and the corresponding impact on the previously set scheduling.   + 07. Request New Scheduling Description: request new scheduling if the deviations between real and forecasted data had a significant impact on the expected scheduling performance. * [**09 Settlement and Billing**](#{0B1904F8-6257-49b2-A446-F2DEF536E10A}) Description: In this scenario, there are five participating roles: DSO, EC manager, EC member and Supplier. This scenario models the billing and settlement processes for: (i) the energy sharing (depending on the energy sharing model chosen for the scheduling scenario), (ii) the grid fee for participating in energy sharing, (iii) consumption invoice and production remuneration from the Supplier.   + 01. Consolidation of consumption and production measures Description: Consolidate and send the data from meters to the EC manager   + 02. Acknowledge Energy Measurements Description: Receive information on energy measurements and store it in a database.   + 03. Process Energy transactions made by each EC member throughout the month Description: Based on P2P/Energy sharing model adopted, the EC manager processes the energy transactions made by each EC member throughout the month.   + 03. Process Energy transactions made by each EC member throughout the month Description: Based on P2P/Energy sharing model adopted, the EC manager processes the energy transactions made by each EC member throughout the month.   + 04. Update of consumption and production of EC Members Description: Update consumption and production of EC members based on the energy transactions made by each EC member throughout the month.   + 05. Compute grid fee Description: Compute the grid fee based on the energy transactions made by the community.   + 06. Ack. grid fee and pay it to the DSO Description: Acknowledge information on the grid fee to pay to the DSO and pay it.   + 07. Invoice EC members for grid fee Description: Invoice the EC members the corresponding share of grid fee for the participation in energy transactions.   + 08. Acknowledge invoice Description: Receives and acknowledges the invoice for the grid fee   + 09. Pay invoice (in money) to EC manager Description: Pays in money to the EC manager the invoice for grid the fee   + 10. Invoice EC members for consumption Description: Computes the invoice for the EC members regarding electricity consumption from the grid after the energy sharing.   + 11. Acknowledge invoice Description: Receives and acknowledges the invoice   + 12. Pay invoice (in money) to the retailer Description: Pays in money to the retailer the invoice for the electricity consumed from the grid   + 13. Payment to EC members for production Description: Computes the payment to be made to the EC members regarding electricity exported to the grid   + 14. Acknowledge payment Description: Receives and acknowledges the payment   + 15. Invoice EC members for energy transactions Description: invoice the EC members for the energy transactions made. The transactions made depend on the P2P/Energy sharing model adopted   + 16. Acknowledge invoice Description: Receives and acknowledges the invoice.   + 17. Pay invoice (in money) to EC manager Description: Pays in money to the EC manager the invoice for the energy transactions.   + 18. Acknowledge payment for energy shared Description: Receives and acknowledges the payment.   + 19. Request exchange of money for Municipality vouchers Description: Requests and exchanges the money received for energy transactions by vouchers for Municipality services.   + 20. Send vouchers to EC members who produced energy transacted Description: Send vouchers to the EC members who produced the energy transacted. The remuneration depends on the P2P/Energy sharing model adopted. |

Key performance indicators (KPI)

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| ***Key performance indicators*** | | | |
| ***ID*** | ***Name*** | ***Description*** | ***Reference to mentioned use case objectives*** |
| 1 | vouchers | *Increase in revenue created from DER >= 25%* | [Increase the revenue generated by sharing energy](#{479B7D22-F887-4194-B906-B284C32AFE3B}) [Reduce energy invoice](#{7EF9D430-AA2E-4074-9A91-936DE893FB20}) |
| 2 | Amount of energy shared | Increase in the volume of energy shared >= 30% | [Increase the revenue generated by sharing energy](#{479B7D22-F887-4194-B906-B284C32AFE3B}) [User Engagement in P2P and Energy sharing](#{D94314B8-9F34-472e-B6DA-94364D40C51D}) |
| 3 | Number of active consumers in Energy Community | *Increase the number of active consumers, willing to engage in ECs and/or DR programs: >=* *25%* | [User Engagement in P2P and Energy sharing](#{D94314B8-9F34-472e-B6DA-94364D40C51D}) |
| 4 | Self-consumption | *Increase of collective self-consumption in ECs: >= 15% (at pilot level)* | [Increase use of renewables](#{2F2E46C9-C047-4d8e-A439-F9F1C5C82D4E}) |
| 5 | Use of DERs | *Increase in the use of DERs by active consumers >= 30%* | [Increase use of renewables](#{2F2E46C9-C047-4d8e-A439-F9F1C5C82D4E}) |
| 6 | Energy bill of the EC members | *Reduce energy invoice: >= 10%* | [Reduce energy invoice](#{7EF9D430-AA2E-4074-9A91-936DE893FB20}) |
| 7 | Energy literacy of the EC members | *Increase the energy literacy >=* *50%* | [Increase energy literacy](#{3CF3CB5C-6D8B-4aad-BB95-8CEFFB27B823}) |

Use case conditions

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| ***Use case conditions*** | |
| ***Assumptions*** | |
| ***Prerequisites*** | |
| 1 | Assumptions:   1. The EC is already formed.To add more members the EC manager needs to contact Direção-Geral de Energia e Geologia (DGEG). 2. There are storage devices at the EC member level for the purpose of pursuing community level objectives. The EC members' appliances are available to optimize by the EC member. 3. Depending on the type of energy sharing, different scheduling alternatives can be defined. Billing and settlement can also be different according to the model chosen. Decision support methods (DSM) assist the EC members in decision-making during scheduling. 4. Municipality vouchers are exchanged between EC members as payment for energy sharing. 5. Electricity can be sold to the supplier. |

Further information to the use case for classification/mapping

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| ***Classification information*** |
| ***Relation to other use cases*** |
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| ***Level of depth*** |
|  |
| ***Prioritisation*** |
|  |
| ***Generic, regional or national relation*** |
|  |
| ***Nature of the use case*** |
| BUC |
| ***Further keywords for classification*** |
| Portuguese regulations, Batteries on member level, Energy sharing models (predefined pricing and auction based model), Battery optimization on manager level , Battery optimization according to member preferences |

General remarks

Diagrams of use case

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| ***Diagram(s) of use case*** |
| BusinessUseCase1 - overview  BusinessUseCase1 - scenarios flowchart |

Technical details

Actors

|  |  |  |  |
| --- | --- | --- | --- |
| ***Actors*** | | | |
| ***Grouping (e.g. domains, zones)*** | | ***Group description*** | |
|  | |  | |
| ***Actor name*** | ***Actor type*** | ***Actor description*** | ***Further information specific to this use case*** |
| EC Manager | Business | The EC manager has a versatile role in the ECs.  In the case of the Italian and Belgian pilot, the EC manager collects the data needed for forecasting algorithms and calculates the forecast. Additionally, the EC manager creates a schedule for the flexible assets and gives advice to the EC members to guide their energy consumption behavior.  In the Italian pilot, the flexible assets are under the governance of each EC member. In this case, the EC manager schedules these assets and gives the result as an advice to the members.  In the Belgian pilot, the EC manager has control over the flexible assets, creates the schedule and controls the assets.  In both governance models, the EC manager monitors the operation, decides on possible rescheduling and sends the measurements to the EC members for monitoring purpose.  In the Italian pilot, the EC manager has control over the bank account of the community and acknowledges the incentives received for sharing energy.  In the Dutch pilot, the EC manager is responsible for settling the bill with the supplier and for the internal billing process. Additionally, the EC manager is active in the communication of the load profile of the EC to the DSO and in the process of offering flexibility services to the DSO. In the Portuguese pilot, the EC manager can take a more passive or more active role in the EC, depending on which entity makes the scheduling for the batteries. If the EC manager optimizes the scheduling of the batteries, then it is an active entity which considers community goals and participation in flexibility or in mFRR in the optimization. Otherwise, it plays a passive role, collecting and processes data only. This role is also responsible, in the Portuguese pilot, for exchanging money from energy sharing for Municipality vouchers to be distributed among EC members. |  |
| EC Member | Business | The EC member is an entity in the community which can act as a prosumer or a consumer. Depending on the governance model of the EC, the EC member has an active role and can control the own assets or has a passive role in which the EC member does not control these assets. |  |
| DSO | Business | Distribution System Operators (DSO) are responsible for distribution and management of energy, starting at the TSO substations to the points of consumption.  The DSO plays an integral role in the management of energy communities. In the pilots in Italy, Belgium and Portugal, the DSO provides the official measurements of the consumption and injection data of EC members. Depending on country specific regulations and the configuration of the EC, the measurements are used in an internal billing process or for the billing process through a supplier.  In the Dutch pilot, the DSO does not provide the official measurements, but they are collected by a measurement company. The DSO then receives the data and drafts a bill for the grid usage of the EC. In the Italian pilot, the meter data is sent to the GSE, to compute the incentive for the shared energy, and to the suppliers of each EC Member, for the individual billing process.  In the Belgian pilot, the DSO computes the credit points for shared energy and shares the measurements with the suppliers and with Klimaan for the internal billing process.   Apart from consolidating the consumption and injection data, the DSO plays an important role in the flexibility market in the Netherlands, Italy and Portugal. The DSO evaluates the grid load and places flexibility requests, both on the DA flexibility market and on the ID flexibility market. In the Netherlands the flexibility market is managed through the platform GOPACS, in Italy and Portugal through Piclo Flex. |  |
| Supplier | Business | The supplier is the intermediate party between the wholesale electricity market and the consumer. The supplier receives the official measurements of consumption and production and drafts a bill accordingly.  In the Dutch pilot, the supplier has a relation to a wholeseller who is a Balance Responsible Party (BRP). The daily profile of the EC is thus sent to the supplier and deviations from this profile are bought/sold against the unbalance market price. |  |

References

Step by step analysis of use case

Overview of scenarios

|  |  |  |  |  |  |  |
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| ***Scenario conditions*** | | | | | | |
| ***No.*** | ***Scenario name*** | ***Scenario description*** | ***Primary actor*** | ***Triggering event*** | ***Pre-condition*** | ***Post-condition*** |
| 1 | 07 Scheduling with Energy Sharing/P2P Model 3 | In this scenario, there are two participating roles: EC manager and EC member. This scenario models the scheduling of flexible loads and batteries at the member level based on the assumption of a predefined pricing mechanism set by the EC manager for internal energy exchange. Scheduling is carried out for flexible loads by the EC member and for batteries by the EC manager based on the price of energy sharing, price set by the Supplier, weather predictions, consumption and production forecasts and the high-level priorities of the EC member. |  |  |  |  |
| 2 | 07 Scheduling with Energy Sharing/P2P Model 4 | In this scenario, there are two participating roles: EC manager and EC member. This scenario models the scheduling of flexible loads and batteries at the member level based on the assumption of a local market that accepts sell offers and buy bids from EC members and is cleared by the EC manager. Scheduling is carried out for flexible loads by the EC member and for batteries by the EC manager based on the prices resulting from the local market clearing, price set by the Supplier, weather predictions, consumption and production forecasts and the high-level priorities of the EC member. |  |  |  |  |
| 3 | 08 Operation | In this scenario, there are two participating roles: EC manager and EC member. This scenario models the control of flexible loads and batteries at the EC member level, the validation of equipment correct operation and the scheduling of performance evaluation, which in case of significant deviation from the expected scheduling requests a new scheduling. |  |  |  |  |
| 4 | 09 Settlement and Billing | In this scenario, there are five participating roles: DSO, EC manager, EC member and Supplier. This scenario models the billing and settlement processes for: (i) the energy sharing (depending on the energy sharing model chosen for the scheduling scenario), (ii) the grid fee for participating in energy sharing, (iii) consumption invoice and production remuneration from the Supplier. |  |  |  |  |

Steps - Scenarios

07 Scheduling with Energy Sharing/P2P Model 3

In this scenario, there are two participating roles: EC manager and EC member. This scenario models the scheduling of flexible loads and batteries at the member level based on the assumption of a predefined pricing mechanism set by the EC manager for internal energy exchange. Scheduling is carried out for flexible loads by the EC member and for batteries by the EC manager based on the price of energy sharing, price set by the Supplier, weather predictions, consumption and production forecasts and the high-level priorities of the EC member.

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| Scenario1 - activities flowchart |

Scenario step by step analysis

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Scenario*** | | | | | | | | |
| ***Scenario name*** | | 07 Scheduling with Energy Sharing/P2P Model 3 | | | | | | |
| ***Step No*** | ***Event*** | ***Name of process/activity*** | ***Description of process/activity*** | ***Service*** | ***Information producer (actor)*** | ***Information receiver (actor)*** | ***Information exchanged (IDs)*** | ***Requirement, R-IDs*** |
| 1.1 |  | 01. Request NWP Data | Request Numerical Weather Prediction using an API. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 1.2 |  | 02. PV and Consumption Forecast | Forecast consumption and production based on historical data. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [Info1-PT Future EC operation member level: Forecasts](#{6881A5A5-023C-483c-8947-F6D9C36EABAB}) |  |
| 1.3 |  | 03. Request Retailer price and set EC internal price | Request the retailer price for the electricity to be bought from the grid and set the EC internal price. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [Info2-PT Future EC operation member level: Electricity price information Model 3](#{88627B16-4E07-4040-B53E-7D71D6F8C6FB}) |  |
| 1.4 |  | 04. Individual Look-Ahead Energy Resources Scheduling | Optimization of energy resources per house considering different objective functions based on high-level priorities, such as cost savings, green energy and comfort (decision support methods) |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [Info3-PT Future EC operation member level: House Resources Scheduling](#{8820A0C5-9BED-4802-BCE0-A9C5A60382CD}) |  |
| 1.5 |  | 05. Battery Scheduling | Optimization of EC battery based on the optimization carried out for the EC members optimization |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 1.6 |  | 06. Organize scheduling information from EC members | Store scheduling data from EC members |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |

* 1.2. 02. PV and Consumption Forecast

Business section: 07 Scheduling with Energy Sharing/P2P Model 3/02. PV and Consumption Forecast  
Forecast consumption and production based on historical data.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation member level: Forecasts](#{6881A5A5-023C-483c-8947-F6D9C36EABAB}) | InfoInstance |  |

* 1.3. 03. Request Retailer price and set EC internal price

Business section: 07 Scheduling with Energy Sharing/P2P Model 3/03. Request Retailer price and set EC internal price  
Request the retailer price for the electricity to be bought from the grid and set the EC internal price.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation member level: Electricity price information Model 3](#{88627B16-4E07-4040-B53E-7D71D6F8C6FB}) | InfoInstance |  |

* 1.4. 04. Individual Look-Ahead Energy Resources Scheduling

Business section: 07 Scheduling with Energy Sharing/P2P Model 3/04. Individual Look-Ahead Energy Resources Scheduling  
Optimization of energy resources per house considering different objective functions based on high-level priorities, such as cost savings, green energy and comfort (decision support methods)   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation member level: House Resources Scheduling](#{8820A0C5-9BED-4802-BCE0-A9C5A60382CD}) | InfoInstance |  |

07 Scheduling with Energy Sharing/P2P Model 4

In this scenario, there are two participating roles: EC manager and EC member. This scenario models the scheduling of flexible loads and batteries at the member level based on the assumption of a local market that accepts sell offers and buy bids from EC members and is cleared by the EC manager. Scheduling is carried out for flexible loads by the EC member and for batteries by the EC manager based on the prices resulting from the local market clearing, price set by the Supplier, weather predictions, consumption and production forecasts and the high-level priorities of the EC member.

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| Scenario2 - activities flowchart |

Scenario step by step analysis

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Scenario*** | | | | | | | | |
| ***Scenario name*** | | 07 Scheduling with Energy Sharing/P2P Model 4 | | | | | | |
| ***Step No*** | ***Event*** | ***Name of process/activity*** | ***Description of process/activity*** | ***Service*** | ***Information producer (actor)*** | ***Information receiver (actor)*** | ***Information exchanged (IDs)*** | ***Requirement, R-IDs*** |
| 2.1 |  | 01. Request NWP Data | Request Numerical Weather Prediction using an API. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 2.2 |  | 02. PV and Consumption Forecast | Forecast consumption and production based on historical data. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [Info1-PT Future EC operation member level: Forecasts](#{6881A5A5-023C-483c-8947-F6D9C36EABAB}) |  |
| 2.3 |  | 03. Request Retailer price | Request the retailer price for the electricity to be bought from the grid. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}), [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [Info4-PT Future EC operation member level: Electricity price information Models 4,5,6](#{593F3448-26BB-413c-8B8B-11870F3C194A}) |  |
| 2.4 |  | 04. Initial Individual Look-Ahead Energy Resources Scheduling | Optimize energy resources per house considering different objective functions. This optimization serves as an initial condition to get the surplus and shortages of each peer and is done based on high-level priorities, such as cost savings, green energy and comfort |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) |  |  |  |
| 2.5 |  | 05. Make offers and bids | Determine the offers and bids to make to the local market (pairs of price and quantity). The offers and bids can be made by resorting to decision support methods. |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [Info5-PT Future EC operation member level: Offers and bids information Model 4](#{68ADE6E0-5615-4d00-9B10-7CA3E22B05E1}) |  |
| 2.6 |  | 06. Aggregate offers and bids | Aggregate the offers and bids for further processing. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 2.7 |  | 07. Market Clearing | Perform market clearing based on the offers and bids made. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 2.8 |  | 08. Process results | Determine the offers and bids cleared, the corresponding members, the amount that each member needs to pay and be remunerated. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [Info6-PT Future EC operation member level: Energy Sharing Market Clearing Results](#{4DEAAE85-254C-4c1a-AE23-98DCB82994F6}) |  |
| 2.9 |  | 09. Ack. results | Acknowledge the results cleared by the market |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) |  |  |  |
| 2.10 |  | 10. Final Individual Look-Ahead Energy Resources Scheduling | Optimize energy resources per house considering the results obtained from market clearing and also the member's high-level priorities, such as cost savings, green energy and comfort. |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [Info3-PT Future EC operation member level: House Resources Scheduling](#{8820A0C5-9BED-4802-BCE0-A9C5A60382CD}) |  |
| 2.11 |  | 11. Battery Scheduling | Optimization of EC battery based on the optimization carried out for the EC members optimization |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 2.12 |  | 12. Organize scheduling information from EC members | Store scheduling data from EC members. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |

* 2.2. 02. PV and Consumption Forecast

Business section: 07 Scheduling with Energy Sharing/P2P Model 4/02. PV and Consumption Forecast  
Forecast consumption and production based on historical data.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation member level: Forecasts](#{6881A5A5-023C-483c-8947-F6D9C36EABAB}) | InfoInstance |  |

* 2.3. 03. Request Retailer price

Business section: 07 Scheduling with Energy Sharing/P2P Model 4/03. Request Retailer price  
Request the retailer price for the electricity to be bought from the grid.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation member level: Electricity price information Models 4,5,6](#{593F3448-26BB-413c-8B8B-11870F3C194A}) | InfoInstance |  |

* 2.5. 05. Make offers and bids

Business section: 07 Scheduling with Energy Sharing/P2P Model 4/05. Make offers and bids  
Determine the offers and bids to make to the local market (pairs of price and quantity). The offers and bids can be made by resorting to decision support methods.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation member level: Offers and bids information Model 4](#{68ADE6E0-5615-4d00-9B10-7CA3E22B05E1}) | InfoInstance |  |

* 2.8. 08. Process results

Business section: 07 Scheduling with Energy Sharing/P2P Model 4/08. Process results  
Determine the offers and bids cleared, the corresponding members, the amount that each member needs to pay and be remunerated.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation member level: Energy Sharing Market Clearing Results](#{4DEAAE85-254C-4c1a-AE23-98DCB82994F6}) | InfoInstance |  |

* 2.10. 10. Final Individual Look-Ahead Energy Resources Scheduling

Business section: 07 Scheduling with Energy Sharing/P2P Model 4/10. Final Individual Look-Ahead Energy Resources Scheduling  
Optimize energy resources per house considering the results obtained from market clearing and also the member's high-level priorities, such as cost savings, green energy and comfort.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation member level: House Resources Scheduling](#{8820A0C5-9BED-4802-BCE0-A9C5A60382CD}) | InfoInstance |  |

08 Operation

In this scenario, there are two participating roles: EC manager and EC member. This scenario models the control of flexible loads and batteries at the EC member level, the validation of equipment correct operation and the scheduling of performance evaluation, which in case of significant deviation from the expected scheduling requests a new scheduling.

|  |
| --- |
| Scenario1 - activities flowchart |

Scenario step by step analysis

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Scenario*** | | | | | | | | |
| ***Scenario name*** | | 08 Operation | | | | | | |
| ***Step No*** | ***Event*** | ***Name of process/activity*** | ***Description of process/activity*** | ***Service*** | ***Information producer (actor)*** | ***Information receiver (actor)*** | ***Information exchanged (IDs)*** | ***Requirement, R-IDs*** |
| 3.1 |  | 01. Measurement System | Get information from meters on consumption and production using an API. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [Info7-PT Future EC operation member level: House Measurements](#{2AB90A0D-ACAF-48fc-AA79-B5887F058A19}) |  |
| 3.2 |  | 02. Control Flexible Loads | Actuation of flexible loads and charge/discharge of EC member batteries according the scheduling previously defined. |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) |  |  |  |
| 3.3 |  | 03. Control BESS | Charge/discharge of community battery according the scheduling previously defined |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 3.4 |  | 04. Store Measurement Data | Store measurement data |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 3.5 |  | 05. Validation of equipment correct operation | Validate the equipment correct operation based on the measurements obtained from meters and the expected control actuation on flexible loads |  |  |  |  |  |
| 3.6 |  | 06. Scheduling Performance Evaluation | Evaluate deviations between real and forecasted data and the corresponding impact on the previously set scheduling. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 3.7 |  | 07. Request New Scheduling | request new scheduling if the deviations between real and forecasted data had a significant impact on the expected scheduling performance. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |

* 3.1. 01. Measurement System

Business section: 08 Operation/01. Measurement System  
Get information from meters on consumption and production using an API.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation member level: House Measurements](#{2AB90A0D-ACAF-48fc-AA79-B5887F058A19}) | InfoInstance |  |

09 Settlement and Billing

In this scenario, there are five participating roles: DSO, EC manager, EC member and Supplier. This scenario models the billing and settlement processes for: (i) the energy sharing (depending on the energy sharing model chosen for the scheduling scenario), (ii) the grid fee for participating in energy sharing, (iii) consumption invoice and production remuneration from the Supplier.

|  |
| --- |
| Scenario1 - activities flowchart |

Scenario step by step analysis

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Scenario*** | | | | | | | | |
| ***Scenario name*** | | 09 Settlement and Billing | | | | | | |
| ***Step No*** | ***Event*** | ***Name of process/activity*** | ***Description of process/activity*** | ***Service*** | ***Information producer (actor)*** | ***Information receiver (actor)*** | ***Information exchanged (IDs)*** | ***Requirement, R-IDs*** |
| 4.1 |  | 01. Consolidation of consumption and production measures | Consolidate and send the data from meters to the EC manager |  | [DSO](#{B9728693-DE6D-4ab7-B4C4-B0B1C1CF0779}) | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [Info8-PT Future EC operation: Metering Data](#{D9FDBE88-0740-46ba-9A3E-D4A8712C5E0B}) |  |
| 4.2 |  | 02. Acknowledge Energy Measurements | Receive information on energy measurements and store it in a database. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 4.3 |  | 03. Process Energy transactions made by each EC member throughout the month | Based on P2P/Energy sharing model adopted, the EC manager processes the energy transactions made by each EC member throughout the month. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [DSO](#{B9728693-DE6D-4ab7-B4C4-B0B1C1CF0779}) | [Info9-PT Future EC operation: Energy sharing information:](#{A779F40E-3DCD-4cbb-BB97-6497DD4F9442}) |  |
| 4.4 |  | 03. Process Energy transactions made by each EC member throughout the month | Based on P2P/Energy sharing model adopted, the EC manager processes the energy transactions made by each EC member throughout the month. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [Supplier](#{34C5B059-CA4B-46ba-AAB9-51DBA945F605}) | [Info10-PT Future EC operation: Payment production preliminary Information](#{0A7BEF52-50E9-4d76-A542-F849A2575DAF}) |  |
| 4.5 |  | 04. Update of consumption and production of EC Members | Update consumption and production of EC members based on the energy transactions made by each EC member throughout the month. |  | [DSO](#{B9728693-DE6D-4ab7-B4C4-B0B1C1CF0779}) | [Supplier](#{34C5B059-CA4B-46ba-AAB9-51DBA945F605}) | [Info11-PT Future EC operation: Invoice preliminary information](#{FEB5E683-62A1-4b17-AB75-17430229D508}) |  |
| 4.6 |  | 05. Compute grid fee | Compute the grid fee based on the energy transactions made by the community. |  | [DSO](#{B9728693-DE6D-4ab7-B4C4-B0B1C1CF0779}) | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [Info12-PT Future EC operation: Grid fee information](#{70BCA8BA-C8F2-48c4-BC8E-AABBFC8C572E}) |  |
| 4.7 |  | 06. Ack. grid fee and pay it to the DSO | Acknowledge information on the grid fee to pay to the DSO and pay it. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 4.8 |  | 07. Invoice EC members for grid fee | Invoice the EC members the corresponding share of grid fee for the participation in energy transactions. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [Info13-PT Future EC operation: Invoice grid fee](#{176F5E84-2853-41c5-97E0-6AD2BD63FFFF}) |  |
| 4.9 |  | 08. Acknowledge invoice | Receives and acknowledges the invoice for the grid fee |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) |  |  |  |
| 4.10 |  | 09. Pay invoice (in money) to EC manager | Pays in money to the EC manager the invoice for grid the fee |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) |  |  |  |
| 4.11 |  | 10. Invoice EC members for consumption | Computes the invoice for the EC members regarding electricity consumption from the grid after the energy sharing. |  | [Supplier](#{34C5B059-CA4B-46ba-AAB9-51DBA945F605}) | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [Info14-PT Future EC operation: Invoice retailer consumption](#{21987769-A653-4b76-8C6A-67295256744B}) |  |
| 4.12 |  | 11. Acknowledge invoice | Receives and acknowledges the invoice |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) |  |  |  |
| 4.13 |  | 12. Pay invoice (in money) to the retailer | Pays in money to the retailer the invoice for the electricity consumed from the grid |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) |  |  |  |
| 4.14 |  | 13. Payment to EC members for production | Computes the payment to be made to the EC members regarding electricity exported to the grid |  | [Supplier](#{34C5B059-CA4B-46ba-AAB9-51DBA945F605}) | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [Info15-PT Future EC operation: Payment production Information](#{19893880-B464-42f3-87C1-0578E0F315CB}) |  |
| 4.15 |  | 14. Acknowledge payment | Receives and acknowledges the payment |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) |  |  |  |
| 4.16 |  | 15. Invoice EC members for energy transactions | invoice the EC members for the energy transactions made. The transactions made depend on the P2P/Energy sharing model adopted |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [Info16-PT Future EC operation: Invoice for energy transactions](#{92C5AD86-9B22-4471-A407-8F712BB2D441}) |  |
| 4.17 |  | 16. Acknowledge invoice | Receives and acknowledges the invoice. |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) |  |  |  |
| 4.18 |  | 17. Pay invoice (in money) to EC manager | Pays in money to the EC manager the invoice for the energy transactions. |  | [EC Member](#{D236E56F-8F7A-436e-917A-37A096594B02}) | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) | [Info17-PT Future EC operation: Payment for energy transacted](#{4E7F5934-E381-4b1d-AF08-8A771E7090C1}) |  |
| 4.19 |  | 18. Acknowledge payment for energy shared | Receives and acknowledges the payment. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 4.20 |  | 19. Request exchange of money for Municipality vouchers | Requests and exchanges the money received for energy transactions by vouchers for Municipality services. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |
| 4.21 |  | 20. Send vouchers to EC members who produced energy transacted | Send vouchers to the EC members who produced the energy transacted. The remuneration depends on the P2P/Energy sharing model adopted. |  | [EC Manager](#{BF6EE37F-C53B-469a-B171-2699A1A42E7F}) |  |  |  |

* 4.1. 01. Consolidation of consumption and production measures

Business section: 09 Settlement and Billing/01. Consolidation of consumption and production measures  
Consolidate and send the data from meters to the EC manager   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation: Metering Data](#{D9FDBE88-0740-46ba-9A3E-D4A8712C5E0B}) | InfoInstance |  |

* 4.3. 03. Process Energy transactions made by each EC member throughout the month

Business section: 09 Settlement and Billing/03. Process Energy transactions made by each EC member throughout the month  
Based on P2P/Energy sharing model adopted, the EC manager processes the energy transactions made by each EC member throughout the month.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation: Energy sharing information:](#{A779F40E-3DCD-4cbb-BB97-6497DD4F9442}) | InfoInstance |  |

* 4.4. 03. Process Energy transactions made by each EC member throughout the month

Business section: 09 Settlement and Billing/03. Process Energy transactions made by each EC member throughout the month  
Based on P2P/Energy sharing model adopted, the EC manager processes the energy transactions made by each EC member throughout the month.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation: Payment production preliminary Information](#{0A7BEF52-50E9-4d76-A542-F849A2575DAF}) | InfoInstance |  |

* 4.5. 04. Update of consumption and production of EC Members

Business section: 09 Settlement and Billing/04. Update of consumption and production of EC Members  
Update consumption and production of EC members based on the energy transactions made by each EC member throughout the month.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation: Invoice preliminary information](#{FEB5E683-62A1-4b17-AB75-17430229D508}) | InfoInstance |  |

* 4.6. 05. Compute grid fee

Business section: 09 Settlement and Billing/05. Compute grid fee  
Compute the grid fee based on the energy transactions made by the community.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation: Grid fee information](#{70BCA8BA-C8F2-48c4-BC8E-AABBFC8C572E}) | InfoInstance |  |

* 4.8. 07. Invoice EC members for grid fee

Business section: 09 Settlement and Billing/07. Invoice EC members for grid fee  
Invoice the EC members the corresponding share of grid fee for the participation in energy transactions.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation: Invoice grid fee](#{176F5E84-2853-41c5-97E0-6AD2BD63FFFF}) | InfoInstance |  |

* 4.11. 10. Invoice EC members for consumption

Business section: 09 Settlement and Billing/10. Invoice EC members for consumption  
Computes the invoice for the EC members regarding electricity consumption from the grid after the energy sharing.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation: Invoice retailer consumption](#{21987769-A653-4b76-8C6A-67295256744B}) | InfoInstance |  |

* 4.14. 13. Payment to EC members for production

Business section: 09 Settlement and Billing/13. Payment to EC members for production  
Computes the payment to be made to the EC members regarding electricity exported to the grid   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation: Payment production Information](#{19893880-B464-42f3-87C1-0578E0F315CB}) | InfoInstance |  |

* 4.16. 15. Invoice EC members for energy transactions

Business section: 09 Settlement and Billing/15. Invoice EC members for energy transactions  
invoice the EC members for the energy transactions made. The transactions made depend on the P2P/Energy sharing model adopted   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation: Invoice for energy transactions](#{92C5AD86-9B22-4471-A407-8F712BB2D441}) | InfoInstance |  |

* 4.18. 17. Pay invoice (in money) to EC manager

Business section: 09 Settlement and Billing/17. Pay invoice (in money) to EC manager  
Pays in money to the EC manager the invoice for the energy transactions.   
Information sent:

|  |  |  |
| --- | --- | --- |
| ***Business object*** | ***Instance name*** | ***Instance description*** |
| [PT Future EC operation: Payment for energy transacted](#{4E7F5934-E381-4b1d-AF08-8A771E7090C1}) | InfoInstance |  |

Information exchanged

|  |  |  |  |
| --- | --- | --- | --- |
| ***Information exchanged*** | | | |
| ***Information exchanged, ID*** | ***Name of information*** | ***Description of information exchanged*** | ***Requirement, R-IDs*** |
| Info1 | PT Future EC operation member level: Forecasts | * EC Member ID * Time Stamp * Time-series for the next 24 hours in 15 min steps:   - PV production (kWh) - Consumption (kWh) |  |
| Info2 | PT Future EC operation member level: Electricity price information Model 3 | * Time stamp * Time series for the day in 15 min intervals:   - Retailer price (€/kWh) - Internal EC price (€/kWh) |  |
| Info3 | PT Future EC operation member level: House Resources Scheduling | * EC Member ID * Time Stamp * Time-series for the next 24 hours   - PV Production per 15-min (kWh) - Consumption per 15-min (kWh) - Battery - State of Charge (%) |  |
| Info4 | PT Future EC operation member level: Electricity price information Models 4,5,6 | * Time stamp * Time series for the day in 15 min intervals:   - Retailer price (€/kWh) |  |
| Info5 | PT Future EC operation member level: Offers and bids information Model 4 | * EC Member ID * Time Stamp * Time series for the day in 15 min intervals:   - Offer quantity (kWh) - Offer price (€/kWh) - Bid quantity (kWh) - Bid price (€/kWh) |  |
| Info6 | PT Future EC operation member level: Energy Sharing Market Clearing Results | * EC Member ID * Time Stamp * Time series for the day in 15 min intervals:   - Offer quantity cleared (kWh) - Offer price cleared (€/kWh) - Bid quantity cleared (kWh) - Bid price cleared (€/kWh)   * Total amount to pay (€) * Total amount to be remunerated (€) |  |
| Info7 | PT Future EC operation member level: House Measurements | * EC Member ID * Timestamp * PV:   - S\_AC (VA) - S\_AC\_L1 (VA) - S\_AC\_L2 (VA) - S\_AC\_L3 (VA) - P\_AC (W) - P\_AC\_L1 (W) - P\_AC\_L2 (W) - P\_AC\_L3 (W) - Q\_AC (VAr) - Q\_AC\_L1 (VAr) - Q\_AC\_L2 (VAr) - Q\_AC\_L3 (VAr) - PF\_L1 (Real) - PF\_L2 (Real) - PF\_L3 (Real) - U\_AC\_L1 (V) - U\_AC\_L2 (V) - U\_AC\_L3 (V) - I\_AC\_L1 (A) - I\_AC\_L2 (A) - I\_AC\_L3 (A) - Ump\_DC\_St1 (V) - Imp\_DC\_St1 (A) - P\_DC\_St1 (W) - Ump\_DC\_St2 (V) - Imp\_DC\_St2 (A) - P\_DC\_St2 (W) - P\_DC (W) - f (Hz) - Temperature (ºC) - Inverter State (Integer)   * House   - S\_Imp (VA) - S\_Imp\_L1 (VA) - S\_Imp\_L2 (VA) - S\_Imp\_L3 (VA) - S\_Exp (VA) - S\_Exp\_L1 (VA) - S\_Exp\_L2 (VA) - S\_Exp\_L3 (VA) - P\_Imp (W) - P\_Imp\_L1 (W) - P\_Imp\_L2 (W) - P\_Imp\_L3 (W) - P\_Exp (W) - P\_Exp\_L1 (W) - P\_Exp\_L2 (W) - P\_Exp\_L3 (W) - Q\_Imp (VAr) - Q\_Imp\_L1 (VAr) - Q\_Imp\_L2 (VAr) - Q\_Imp\_L3 (VAr) - Q\_Exp (VAr) - Q\_Exp\_L1 (VAr) - Q\_Exp\_L2 (VAr) - Q\_Exp\_L3 (VAr) - PF\_L1 (Real) - PF\_L2 (Real) - PF\_L3 (Real) - U\_L1 (V) - U\_L2 (V) - U\_L3 (V) - I\_L1 (A) - I\_L2 (A) - I\_L3 (A) - f (Hz)   * BESS   - SOC (%) - Temperature (ºC)  - S\_Imp (VA) - S\_Imp\_L1 (VA) - S\_Imp\_L2 (VA) - S\_Imp\_L3 (VA) - S\_Exp (VA) - S\_Exp\_L1 (VA) - S\_Exp\_L2 (VA) - S\_Exp\_L3 (VA) - P\_Imp (W) - P\_Imp\_L1 (W) - P\_Imp\_L2 (W) - P\_Imp\_L3 (W) - P\_Exp (W) - P\_Exp\_L1 (W) - P\_Exp\_L2 (W) - P\_Exp\_L3 (W) - Q\_Imp (VAr) - Q\_Imp\_L1 (VAr) - Q\_Imp\_L2 (VAr) - Q\_Imp\_L3 (VAr) - Q\_Exp (VAr) - Q\_Exp\_L1 (VAr) - Q\_Exp\_L2 (VAr) - Q\_Exp\_L3 (VAr) - PF\_L1 (Real) - PF\_L2 (Real) - PF\_L3 (Real) - U\_L1 (V) - U\_L2 (V) - U\_L3 (V) - I\_L1 (A) - I\_L2 (A) - I\_L3 (A) - f (Hz) |  |
| Info8 | PT Future EC operation: Metering Data | * EC Member ID * Time series of the whole month in 15 min. intervals   - Consumption (kWh)  - Production (kWh) |  |
| Info9 | PT Future EC operation: Energy sharing information: | * EC Member ID * Sharing coefficients for each EC member (% and kWh) |  |
| Info10 | PT Future EC operation: Payment production preliminary Information | * EC Member ID * Time series of the whole month in 15 min. intervals   - Production updated (kWh) |  |
| Info11 | PT Future EC operation: Invoice preliminary information | * EC Member ID * Time series of the whole month in 15 min. intervals   - Consumption updated (kWh) |  |
| Info12 | PT Future EC operation: Grid fee information | * Grid fee for the total energy shared (€) |  |
| Info13 | PT Future EC operation: Invoice grid fee | * EC Member ID (who participated in energy sharing) * Participation in energy sharing (% and kWh) * Total amount to pay for grid usage (€) |  |
| Info14 | PT Future EC operation: Invoice retailer consumption | * EC Member ID * Time series of the whole month in 15 min. intervals   - Consumption updated (kWh) - Consumption price (€/kWh)   * Total amount to pay for consumption (€) |  |
| Info15 | PT Future EC operation: Payment production Information | * EC Member ID * Time series of the whole month in 15 min. intervals   - Production updated (kWh)   * Total amount to be remunerated (€) |  |
| Info16 | PT Future EC operation: Invoice for energy transactions | * EC Member ID (who participated in energy transaction) * Participation in energy transaction (% and/or kWh) * Consumption price through energy transacted (€/kWh) * Total amount to pay (€) |  |
| Info17 | PT Future EC operation: Payment for energy transacted | * EC Member ID * Total amount to pay (€) |  |

Requirements (optional)

Common terms and definitions

Custom information (optional)