Direct - load / generation / storage management

Link to explanations, examples and the selection list for indicated fields, please refer to document "Use Case Description draft ver0.55"

<http://www.cen.eu/cen/Sectors/Sectors/UtilitiesAndEnergy/SmartGrids/Pages/default.aspx>

Version of Template: 0.55, Sept 2011

# Description of the Use Case

* + *General*
  + *Name of Use Case*

|  |  |  |  |
| --- | --- | --- | --- |
| ***ID*** | ***Domain*** | ***Name of Use Case*** | ***Level of Depth***  *Cluster, High Level Use Case, Detailed Use Case* |
| WGSP-2121 | Smart Home/Commercial/Industrial/DR-Customer EMS | Primary use case - Direct - load / generation / storage management | Detailed Use Case |

* + *Version Management*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Changes / Version*** | ***Date*** | ***Name  Author(s) or Committee*** | ***Domain Expert*** | ***Area of Expertise / Domain / Role*** | ***Title*** | ***Approval Status***  *draft, for comments, for voting, final* |
| 0.4 | 30/07/2012 | ESMIG - Willem Strabbing &Tim Sablon | Primary | AMI | - | Proposed |
| 0.5 | 12/11/2012 | ESMIG - Willem Strabbing &Tim Sablon | Primary | AMI | - | Validated |

* + *Basic Information to Use Case*

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| --- | --- | --- |
| ***Source(s) / Literature*** | ***Link*** | ***Conditions (limitations) of Use*** |
| - | - | - |

|  |  |
| --- | --- |
| ***Relation to Higher Level Use Case*** | |
| ***Cluster*** | ***Higher Level Use Case*** |
| - | - |

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| ***Maturity of Use Case*** *- in business operation, realized in demonstration project, realised in R&D, in preparation, visionary* |
| - |
| ***Prioritisation*** |
| - |
| ***Generic, Regional or National Relation*** |
| Generic |
| ***View*** *- Technical / Business* |
| Technical |
| ***Further Keywords for Classification*** |
| - |

* + *Scope and Objectives of Use Case*

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| --- |
| ***Scope and Objectives of Function*** |
| See WGSP2120 |

* + *Narrative of Use Case*

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| ***Narrative of Use Case*** |
| ***Short description*** *- max 3 sentences* |
| See WGSP2120 |
| ***Complete description*** |
| A load/generation management signal is sent by an upstream actor to increase, reduce or limit the load, generation or stored energy.  A load/generation management signal is sent from actor A or B to the CEM. The CEM can forward the signal directly to the appliance/generator/storage or it may (based on a number of parameters) translate it into individual control signals to the smart devices that were found to best suited to fulfill the operation. A smart device may be an appliance, generator or storage device (e.g. storage batteries, heat pumps, fuel cells, etc...).   Based on the load management signal from the CEM, the smart device may change the power consumption, generation or storage depending on the kind of device, what the device is currently doing and the consumer settings. The start of the device may also be shifted in order to avoid taking energy during the peak time or to avoid exceeding a set power limit or may shift the activation of certain features.   The CEM may provide feedback to the external actor requesting the load/generation change, so this actor can have an idea of which change in consumption/generation to expect and to update his demand/generation forecast. The feedback may also be used for billing purposes |

* + *Actors: People, Systems, Applications, Databases, the Power System, and Other Stakeholders*

|  |  |  |
| --- | --- | --- |
| ***Actor Name*** | ***Actor Type*** | ***Actor Description*** |
| - | - | - |

* + *Issues: Legal Contracts, Legal Regulations, Constraints and others*

|  |  |  |
| --- | --- | --- |
| ***Issue -*** ***here specific ones*** | ***Impact of Issue on Use Case*** | ***Reference -*** *law, standard, others* |
| URL contains the sequence diagram of only the first scenario | - | - |

* + *Preconditions, Assumptions, Post condition, Events*

|  |  |  |  |
| --- | --- | --- | --- |
| ***Actor/System/Information/Contract*** | ***Triggering Event*** | ***Pre-conditions*** | ***Assumption*** |
| ***-*** | - | - | - |

* + *Referenced Standards and / or Standardization Committees (if available)*

|  |  |  |
| --- | --- | --- |
| ***Relevant Standardization Committees*** | ***Standards supporting the Use Case*** | ***Standard Status*** |
| - | - | - |

* + *General Remarks*

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| --- |
| ***General Remarks*** |
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# Drawing or Diagram of Use Case

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| ***Drawing or Diagram of Use Case*** ***- recommended "context diagram" and "sequence diagram" in UML*** |
| http://www.lupiupload.de/images/2012/08/22/fc142a03e1be0995a426144626ceebae6627eaf5.jpg |

# Step by Step Analysis of Use Case

| **S.No** | **Primary Actor** | **Triggering Event** | **Pre-Condition** | **Post-Condition** |
| --- | --- | --- | --- | --- |
| Load / generation / storage management | Actor A or Actor B | Actor A or Actor B wants to send a load management signal to the market | Communication connection between all actors is established The consumer configured the CEM and/or the participating devices. The consumer configured the device settings and thresholds Information on total consumption or consumption per device is availab | The Smart device executed the load management signal and Actor A or Actor B received the feedback with a load curve recorded for this period |

* + ***Steps - Normal Scenario***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Scenario*** ***Name:*** | | ***Load / generation / storage management*** | | | | |
| ***Step No.*** | ***Event*** | ***Description of Process/Activity*** | ***Information Producer*** | ***Information Receiver*** | ***Information Exchanged*** | ***Technical Require-ments ID***  *see* *Annex A Selection List* |
| 1 | Actor A wants to send a load management signal to the market (alternative) | Actor A sends a load management signal to Energy Management Gateway | Actor A (external actor) | Energy management gateway | Load management signal |  |
| 2 | Actor B wants to send a load management signal to the market (alternative) | Actor B sends a load management signal to Smart Metering Gateway (LNAP) (via the metering channel) | Actor B (external actor) | Smart Metering gateway (LNAP) | Load management signal |  |
| 3 | Smart Metering Gateway (LNAP) receives the load management signal | Smart Metering Gateway (LNAP) forwards the load management signal to the Energy Management Gateway | Smart Metering gateway (LNAP) | Energy management gateway | Load management signal |  |
| 4 | Energy Management Gateway receives a load management signal | Energy Management Gateway forwards the load management signal to CEM | Energy management gateway | Customer Energy Manager (CEM) | Load management signal |  |
| 5 | CEM receives load management signal | Optionally, when a notification needs to be displayed on the simple external consumer display, the CEM sends a notification to the Energy Management Gateway | Customer Energy Manager (CEM) | Energy management gateway | Start of load adjustment notification |  |
| 6 | Energy Management Gateway receives the load management signal | Energy Management Gateway sends the notification to Smart Meter | Energy management gateway | Smart Metering gateway (LNAP) | Start of load adjustment notification |  |
| 7 | Smart Metering Gateway (LNAP) receives the load management signal | Smart Metering Gateway (LNAP) sends the notification to Smart Meter | Smart Metering gateway (LNAP) | Smart meter | Start of load adjustment notification |  |
| 8 | Smart Meter receives the load management signal | Smart Meter sends the start of load management notification to the Display | Smart meter | Simple external consumer display | Start of load adjustment notification |  |
| 9 | CEM received the load management signal | CEM, based on consumer settings, decides to adjust the smart device and sends a load adjustment signal to it | Customer Energy Manager (CEM) | Smart device | Order of load adjustment |  |
| 10 | Smart devices receive the order of load adjustment | The smart device adjusts its power consumption and sends a feedback to CEM | Smart device | Customer Energy Manager (CEM) | Load adjustment feedback |  |
| 11 | CEM receives feedback from smart devices | CEM informs Energy Management Gateway on which change in consumption to expect. | Customer Energy Manager (CEM) | Energy management gateway | Change in consumption |  |
| 12 | Energy Management Gateway receives the change in consumption | Energy Management Gateway forwards the change in consumption to Actor A (alternative) | Energy management gateway | Actor A (external actor) | Change in consumption |  |
| 13 | Energy Management Gateway receives the change in consumption | Energy Management Gateway forwards the change in consumption to Smart Metering Gateway | Energy management gateway | Smart Metering gateway (LNAP) | Change in consumption |  |
| 14 | Smart Metering Gateway receives the change in consumption | Smart Metering Gateway forwards the change in consumption to Actor B (via the metering channel) | Smart Metering gateway (LNAP) | Actor B (external actor) | Change in consumption |  |
| 15 | Load adjustment period is finished | CEM sends an end of load adjustment to Smart devices | Customer Energy Manager (CEM) | Smart device | End of load adjustment |  |
| 16 | Smart devices receive the end of load adjustment from CEM | The Smart devices switch on/off and send feedback to CEM | Smart device | Customer Energy Manager (CEM) | End of load adjustment feedback |  |
| 17 | CEM receives the feedback from Smart devices | CEMS sends load adjustment notification to the Energy Management Gateway | Customer Energy Manager (CEM) | Energy management gateway | End of load adjustment feedback |  |
| 18 | Energy Management Gateway receives feedback | Energy Management Gateway sends the end of load adjustment notification to the Smart Metering Gateway (LNAP) | Energy management gateway | Smart Metering gateway (LNAP) | End of load adjustment notification |  |
| 19 | Smart Metering Gateway (LNAP) received notification | Smart Metering Gateway (LNAP) sends end of load adjustment notification to Smart Meter | Smart Metering gateway (LNAP) | Smart meter | End of load adjustment notification |  |
| 20 | Smart Meter received notification | Smart Meter sends the end of load adjustment notification to Display | Smart meter | Simple external consumer display | End of load adjustment notification |  |
| 21 | Smart Meter received notification | Smart Meter sends the load curve recorded for this period to Smart Metering Gateway (LNAP) | Smart meter | Smart Metering gateway (LNAP) | Load curve |  |
| 22 | Smart metering gateway (LNAP) receives load curve | Smart metering gateway (LNAP) sends load curve to Energy Management Gateway | Smart Metering gateway (LNAP) | Energy management gateway | Load curve |  |
| 23 | Energy Management Gateway receives load curve | Energy Management Gateway sends load curve to CEM | Energy management gateway | Customer Energy Manager (CEM) | Load curve |  |
| 24 | CEM receives load curve from smart meter | CEM sends the end of load adjustment period to Energy Management Gateway and sends a load curve recorded for this period | Customer Energy Manager (CEM) | Energy management gateway | Load adjustment feedback |  |
| 25 | Energy Management Gateway receives the feedback | Energy Management Gateway forwards the feedback to Actor A (alternative) | Energy management gateway | Actor A (external actor) | Load adjustment feedback |  |
| 26 | Energy Management Gateway receives the feedback | Energy Management Gateway forwards the feedback to Smart Metering Gateway (LNAP) (alternative) | Energy management gateway | Smart Metering gateway (LNAP) | Load adjustment feedback |  |
| 27 | Smart Metering Gateway (LNAP) receives the feedback | Smart Metering Gateway (LNAP) forwards the feedback to Actor B (via the metering channel) | Smart Metering gateway (LNAP) | Actor B (external actor) | Load adjustment feedback |  |