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Subject: Business Scenario Input as discussed in face-to-face meeting on January 5th at IBM Research – Zurich.

Actor	Role and Goals
Smart Controller	The Smart Controller receives the price information and controls the flexible energy consumer on behalf of one EcoGrid EU Consumer. The Smart Controller can be implemented in the EcoGrid EU Consumers household or be running as an agent as an application on the ICT Platform
EcoGrid EU Direct Control by BRP System	The EcoGrid EU Direct Control by BRP System is a central Energy Management System receiving the price information and uses this information to create an integrated and optimal control strategy for all connected EcoGrid EU Consumer devices.

NFR.M1. Non Functional Requirement

Initial prototype of a price distribution in 1H2012

Attribute	Value
ID	NFR.M1.Initial prototype of a price distribution in 1H2012
Name	Initial prototype of a price distribution system to show the distribution of a real time price in 1H2012
Actors involved	<ul style="list-style-type: none"> • Real Time Market (RTM) • EcoGrid EU Consumer as Real Time Market Participant (RTMP)
Context	To show the scalable distribution of a Real Time Price to Real Time Market Participants and create the foundation of the price distribution system.
Inputs	The input for this Business Scenario is a Real Time Price
Outputs	The output of this Business Scenario is a distributed Real Time Price
Precedents	-
Successors	*
Description	The initial prototype should show the distribution of a Real Time Price from a Real Time Market (RTM) to a Real Time Market Participant within the first half of 2012 to show the technical concept of real time price distribution. Therefore the prototype will send a real time price signal from The Real Time Market to the Real Time Market Participants. The protocol above IP is undefined yet.
Open questions	<ul style="list-style-type: none"> • Protocol used above IP • Price source • Real Time Market Participants used in prototype
Business Model	The prototype should pave the way for the final Real Time Price distribution process and allow the developers to gain experience with this kind of price distribution.
Cost Driver	Prototype can be blind alley

User monitoring and control of comfort Parameters – with overwrites

Attribute	Value
ID	BS.IH.IBM1.User monitoring and control of comfort parameters – with overwrites
Name	User monitoring and control of comfort parameters to allow the user full control over the devices reacting to the Real Time Price signal
Actors involved	Smart Controller as Real Time Market Participant
Context	To increase the acceptance and give the Real Time Market Participant the ability to control the settings of his devices as well as giving him a tool at hand which allows him to get an overview of already accumulated costs and savings a human machine interface is needed.
Inputs	<ul style="list-style-type: none"> • Current Real Time Market price • State of Real Time Market Participant devices • Real Time Market Participants comfort parameters needs
Outputs	<ul style="list-style-type: none"> • HMI showing all necessary parameters to the Real Time Market Participant • A set comfort parameters to the control unit
Precedents	-
Successors	*
Description	This Business scenario should enable the Real Time Market Participant to control and monitor his devices and get an overview of the Real Time Price. The control and monitoring capabilities should include parameters like room temperature if a heat pump is controlled and let the Real Time Market Participant completely disable the Real Time Price controlled optimization.
Open questions	Way presented to the Real Time Market Participant
Business Model	To increase the acceptance of autonomously, by a Real Time Price, controlled devices it is necessary to give the Real Time Market Participants an easy accessible way to override and monitor the devices.
Cost Driver	Depending on the way of presentation additional costs for display devices and data traffic will occur.

Analytics based on historic information to compute optimal demand-response

Attribute	Value
ID	BS.IH.IBM2. Analytics based on historic information to compute optimal demand-response
Name	Analytics based on historic information to compute optimal demand-response behavior to the Real Time Market Participant needs
Actors involved	<ul style="list-style-type: none"> • Smart Controller as Real Time Market Participant • Real Time Market • Distribution System Operator
Context	The optimal control of the devices connected to the Real Time Price signal is key for acceptance of the autonomous control by the Real Time Market Participant and the optimal use for the electrical grid and balancing capabilities.
Inputs	<ul style="list-style-type: none"> • Real Time Market Price Forecast • Real Time Market Price • Collected historic data • Local congestion signal
Outputs	Optimal control to the needs of the Real Time Market Participant and the electrical grids balancing needs.
Precedents	-
Successors	*
Description	The Business Scenario describes the use of historic data and analytic methods as well as forecast data to compute an optimal reaction on a Real Time Price. Therefore the Smart Controller is collecting relevant historic data and uses it together with the Real Time Market Price Forecast and the Real Time Market Participants needs to compute the optimal demand response strategy for the Real Time Participants and the electrical grids needs.
Open questions	<ul style="list-style-type: none"> • Details of Real Time Market Price Forecast • Available computational and storage capabilities of the Smart Controller
Business Model	The Business Scenario is viable to ensure the optimal usage of the available resources for balancing the electrical grid and also ensure the best possible reward for the Real Time Market Participant
Cost Driver	The analytics need extra computational power in the Smart Controller and therefore drive ups the price of the smart controller. Alternatively the optimization can be off loaded to centralized or regional datacenter.

Power market integration planning

Attribute	Value
ID	BS.IH.IBM3.Power market integration planning
Name	Integration planning of the Real Time Market controlled households into the current power markets.
Actors involved	<ul style="list-style-type: none"> • Transport System Operator (TSO) • Distribution System Operator (DSO) • TSO as Real Time Market Operator • EcoGrid EU Consumer
Context	The in EcoGrid EU EU introduced new Real Time Market has to co-exist with the other already operating markets, especially with the current balancing power markets.
Inputs	Today's market regulations, opinions of the involved actors and governmental advice
Outputs	A Real Time Market integration plan
Precedents	-
Successors	*
Description	The integration of the Real Time Market into the current electricity markets is a challenge to be solved during the EcoGrid EU EU project. The involved parties have to find a solution for it, which fit the current market situation and legal situation. This is more a political than technical decision.
Open questions	-
Business Model	In this Business Scenario the Business Model is the output. The output should be a Business Model which can integrate a Real Time Market like the 5 minute EcoGrid EU Market into the current market situation.
Cost Driver	The development cost of such a market integration model

DSO operational interfacing

Attribute	Value
ID	BS.IH.IBM4. DSO operational interfacing
Name	Interfacing to the DSO for operational purposes including local congestion management
Actors involved	<ul style="list-style-type: none"> • DSO • Smart Controller as Real Time Market Participant
Context	To avoid congestion in the local distribution grid the DSO needs to be connected to the Real Time Market Participant to know the usage profile of it. By having this information the DSO can proactive interact with the Real Time Market Participants within his distribution grid to omit local congestion.
Inputs	DSO grid status
Outputs	The DSO distributes a local congestion signal which reflects the state of the local grid
Precedents	-
Successors	*
Description	To allow local congestion management the Distribution System Operator (DSO) must be connected to the Smart Controller representing the devices of a Real Time Market Participant. The DSO needs to influence the local aspect of the optimal demand response planning as otherwise, if only the global Real Time Price, is taken into account local congestion problems can occur. Local congestion can be omitted by the DSO sending a local distribution grid price adder or another generic signal to limit the consumption of a Real Time Market Participant even in global low price situations. The local congestions can be sensed by hardware sensors in the distribution grid or by accumulation the 5-minute interval readings of all smart meters in the DSO area.
Open questions	The format and transport method in which the DSO distributes the local congestion signal
Business Model	The Business Model behind this Business Scenario is based on the limitations of the local distribution grid. If only a global optimization in form of a global Real Time Price would be used to optimize the demand response manner it is likely that the local distribution grid is partially overload. Therefore an interface to the local DSO is vital to prevent local congestion, which would result in expensive reinforcement of the local grid hardware.
Cost Driver	The investment into sensors for monitoring distribution grid

Reporting of benefits

Attribute	Value
ID	BS.IH.IBM5.Reporting of benefits
Name	Reporting of benefits to the Real Time Market Participant
Actors involved	<ul style="list-style-type: none"> • Real Time Market • EcoGrid EU Consumer as Real Time Market Participant • Transport System Operator (TSO) as Real Time Market Operator • Distribution System Operator (DSO) as Real Time Settlement Executor
Context	The reporting of benefits to the Real Time Market Participant is an important point in the project. The Real Time Market Participant should be able to see the difference to a normal tariff system and at best also environmental measures to show the Real Time Market Participant the effectiveness of his and of the whole projects commitment.
Inputs	<ul style="list-style-type: none"> • Metering data of the Real Time Market Participant • Real Time Market Data • Avoided conventional balancing power activation • Avoided conventional generation
Outputs	Dashboard for the Real Time Market Participant and the Real Market Operator showing the operation benefit the Real Time Market gives.
Precedents	-
Successors	*
Description	The reporting of benefits to the Real Time Market Participant is an important part of the user integration. It should be possible for the Real Time Market Participant to see at any time the change he made with his participation in the EcoGrid EU project. The change can include the monetary difference to a normal tariff and environmental differences. The reporting should be an easy to use interface as for example a web page. The reporting is created by the Real Time Market Operator and the Real Time Settlement Executor.
Open questions	<ul style="list-style-type: none"> • Benefits to report • Reporting method used
Business Model	The Business Model backing this Business Scenario is mainly user and therefore Real Time Market Participant motivation.
Cost Driver	The reporting tool has no further use as reporting the benefits to the Real Time Market Participant. The usage of it is unknown. There the development of it is a cost driver.

BS.ICT.E1.Business Scenario

User administration

Attribute	Value
ID	BS.ICT.E1.User administration
Name	User administration for the access to the EcoGrid EU EU prototype
Actors involved	<ul style="list-style-type: none"> • EcoGrid EU Operator • ICT Platform Operator
Context	The EcoGrid EU ICT platform provides a platform for the different applications from the various partners, which form the EcoGrid EU system. To allow a smooth system usage for all participating parties a central user administration is needed to prevent having multiple accounts on different parts of the EcoGrid EU system.
Inputs	<ul style="list-style-type: none"> • Usernames • User access rights
Outputs	Single sign on solution for EcoGrid EU
Precedents	-
Successors	*
Description	The user administration solution should allow all users of the system to only have one username\password pair for the whole EcoGrid EU system. To achieve this a user administration system is need, which manages all user accounts and access rights and is connected to the subsystems of EcoGrid EU. Usually directory based user management systems are used for this.
Open questions	<ul style="list-style-type: none"> • Interfaces to subsystems • Access rights definition language
Business Model	Such a centralized user administration system eases the usage of the EcoGrid EU systems for end-users and developers and reduces the administrative complexity, as users only have to be managed in one place.
Cost Driver	User administration software components

Real Time Market installation and operation

Attribute	Value
ID	BS.AP.I1.Real Time Market installation and operation
Name	Installation and operation of the Real Time Market and the required supporting systems
Actors involved	<ul style="list-style-type: none"> • TSO as Real Time Market Operator • Real Time Market Developer • EcoGrid EU Operator
Context	The Real Time Market needs to get installed, operated and maintained. Therefore somebody needs to setup the system on the EcoGrid EU ICT platform.
Inputs	<ul style="list-style-type: none"> • Real Time Market Software • Service Level Agreement
Outputs	An operational Real Time Market within the Service Level Agreement
Precedents	-
Successors	*
Description	The during the EcoGrid EU project to be built Real Time Market needs to be installed and maintained. Therefore the System Maintainer has to get in contact with the Real Time Market Developers and ensure the availability of the needed resources, install the Real Time Market and the prepared resources on the ICT platform and install updates as well as new software releases.
Open questions	<ul style="list-style-type: none"> • Service Level Agreement Parameters • Resources
Business Model	To enable a fully operational Real Time Market for being used in the EcoGrid EU project the Real Time Market has to be up and running
Cost Driver	Installation and maintenance costs

BS.AP.I2.Business Scenario

User administration integration

Attribute	Value
ID	BS.AP.I2.User administration integration
Name	Integration of the Real Time Market user administration into the global user administration system
Actors involved	<ul style="list-style-type: none"> • User Administrator • System Maintainer
Context	The global EcoGrid EU System has to deal with user accounts for different purposes as for example the user accounts for the Real Time Market Operator and Real Time Market user. The centralized user management should manage the user accounts.
Inputs	Access details for the global user administration service and access rights for each user.
Outputs	Access for all approved user accounts with the respective user rights
Precedents	BS.ICT.E1.User administration
Successors	*
Description	To realize the Business Scenario the Real Time Market implementation has to be integrated to the global EcoGrid EU user administration. Therefore the Real Time Market has to provide the needed interfaces to a separate user administration service (as for example LDAP) and a system administrator installing the Real Time Market has to configure the system in the right way.
Open questions	<ul style="list-style-type: none"> • API to the global EcoGrid EU user administration service • Granularity of user rights
Business Model	A global user administration service and connected subsystems as the Real Time Market offer a better integration and therefore less management effort and a better user experience.
Cost Driver	System setup complexity increases

NFR.I1.Non Functional Requirement

RTM required licenses

Attribute	Value
ID	NFR.I1.RTM required licenses
Name	Required licenses to run the Real Time Market and its subcomponents legally
Actors involved	<ul style="list-style-type: none"> • ICT Platform Operator • System Architect • Real Time Market Developer
Context	The Real Time Market will be running on the EcoGrid EU ICT platform within one or more virtual machines. To ensure that all software components e.g. operating systems, libraries and databases are licensed right the Business Scenario is needed.
Inputs	License requirements of all software components and subcomponents.
Outputs	Licenses as required by software components and subcomponents
Precedents	-
Successors	*
Description	The ICT Platform Operator, System Architect and the Real Time Market Developer are collecting all software license requirements from the Real Time Market Developer and releases a license-purchasing request if the license is not already available.
Open questions	-
Business Model	Insufficient software licensing puts the Real Time Market and the EcoGrid EU Consortium at a risk of being sued for software piracy.
Cost Driver	Collection and auditing of the software requirements process adds extra work to the involved actors.

NFR.AP.S3.Non Functional Requirement

IT quality, like data storage, backup, availability

Attribute	Value
ID	NFR.AP.S3.Quality requirements on the ICT platform
Name	Quality requirements on the ICT platform defining data storage, backup and availability
Actors involved	<ul style="list-style-type: none"> • System Architect • Software Provider(s) • EcoGrid EU Operator
Context	The ICT platform must fulfill certain quality requirements on availability, backup and data storage to host different software components and ensure a fast recovery in case of an incident.
Inputs	Quality requirements requested by the System Architect, the Software Provider and the EcoGrid EU Operator.
Outputs	Provide an ICT platform which meets the requested requirements
Precedents	-
Successors	*
Description	A System Architect in combination with the Software Provider(s) and the EcoGrid EU Operator collects the requirements and plans the ICT platform in such way that the requirements are met by the architecture of the ICT platform and during daily operation
Open questions	<ul style="list-style-type: none"> • Requirements of the different software components • Legal requirements on storage of personal and financial data
Business Model	To ensure service availability and legal compliance the ICT platform needs to meet certain requirements on availability, backup and data.
Cost Driver	Redundancy

NFR.AP.S4.Non Functional Requirement

Safety, reliability, security

Attribute	Value
ID	NFR.AP.S4.Safety, reliability, and security
Name	Safety, reliability and security requirements for ICT application hosting
Actors involved	<ul style="list-style-type: none"> • System Architect • Software Provider(s) • EcoGrid EU Operator
Context	The ICT platform must fulfill certain quality requirements on safety, reliability and security to host different software components and ensure safe and reliable operation of the hosted applications
Inputs	Safety, reliability and security requirements request by the System Architect, Software Provider and EcoGrid EU Operator. As for example requirements a reliability requirement that the EcoGrid EU System must not be inoperational for more than a week in year and not for more than one consecutive day.
Outputs	A operation of the ICT Platform with the requested requirements
Precedents	-
Successors	*
Description	A System Architect in combination with the Software Provider(s) and the EcoGrid EU Operator collects the requirements and plans and creates the ICT platform in such away that the requirements are meet by the architecture of the ICT platform and during daily operation
Open questions	Exact specification of requirements based on requirements of the three Actors and statutory provisions
Business Model	To ensure service availability and legal compliance the ICT platform needs to meet the given requirements.
Cost Driver	Most likely the adherence of the given safety, reliability and security requirements need additional hardware, software or process definitions. This can be seen as a cost driver.

NFR.AP.S5.Non Functional Requirement

Software change management

Attribute	Value
ID	NFR.AP.S5. Software change management
Name	Software change management of the on the ICT platform hosted applications
Actors involved	<ul style="list-style-type: none"> • ICT Platform Operator • EcoGrid EU Operator • Software Provider
Context	Due to the multiplicity of hosted applications and Software Providers Software change management process is needed as software changes in one component can have side effects on other software components. Such a process minimizes unplanned outages and therefore reduces administrative effort.
Inputs	Inputs to this Business Scenario are software change requests from participating Actors and the responses of the other involved parties.
Outputs	A working software change management process
Precedents	-
Successors	*
Description	To allow a working software change management process and therefore a running system a software change management process needs to be implemented. Therefore, if a Software Provider or the ICT Platform Operator wants to do a software change, he has to inform the involved parties by a change request. The involved parties can accept, deny or postpone (for test or clarification) the change request with a reason.
Open questions	<ul style="list-style-type: none"> • Exact process definition • Depth of involved parties
Business Model	The Business Model for this Business Scenario is to avoid outages and therefore cost due to uncoordinated software changes, which introduce incompatibilities and other errors.
Cost Driver	The increased coordination effort drives cost but avoided outages are likely to be more expensive.

Administration of ICT platform and installed applications

Attribute	Value
ID	BS.ICT.A1.Administration of ICT platform and installed applications
Name	Administration of the EcoGrid EU ICT Platform and the installed virtual machines including comprising applications
Actors involved	ICT Platform Operator
Context	The ICT platform for the EcoGrid EU project will host a multiplicity of applications from different vendors. To ensure the service availability the ICT platform including all applications must be maintained and kept up to date.
Inputs	Maintenance requirements from Software Provider(s)
Outputs	Outage and vulnerability minimization.
Precedents	-
Successors	*
Description	The ICT platform requires administration on different levels. The ICT hosting platform itself, the operating systems of the virtual machines running the hosted applications and the network subsystem. While the hosting, network and standard operating system administration can be combined for all hosted environments and efficiently done by the ICT Platform System Administrator the specific applications need more specific know how and therefore need to be done by and application administrator.
Open questions	<ul style="list-style-type: none"> • Update approval process for hosted operating systems
Business Model	The integration of the administration, at least up to the operating system, helps to save time and resources as not every owner of a virtual machine has to monitor operating systems updates and the installation of it.
Cost Driver	-

