

GUIDELINE: USER-CENTRED KPIS FOR THE EVALUATION OF SMART GRIDS

Abstract

This guideline focuses on how consumer engagement can be evaluated in smart grid projects, products or roll outs from the perspective of the three roles identified in the S3C project: the smart consumer, smart customer and the smart citizen. The three different types of users have different motivations and driving forces to engage in smart grid projects. The project evaluation is preferably adjusted depending on the role you consider your customers to have.

What is it?

The evaluation criteria proposed in this guideline take their starting point from the consumer perspective – i.e. what are the needs/motivations of people to take up more ‘active’ roles in the implementation and functioning of the future energy system? In order to evaluate the performance of smart grid projects regarding the engagement of consumers, well-defined criteria should be used. The criteria must, as always, be defined based on a thorough understanding of the goals of a particular strategy or intervention. If the goals to be realised (and their relative importance) are unknown, it becomes impossible to define success or failure of a strategy or intervention.

However, different stakeholders often have different goals they want to realise, and they hold different views on the relative importance of these goals. The definition of success criteria is thus bound to (a) particular perspective(s). The definition of ‘success’ is then tied to fulfilling these needs/meeting these motivations by facilitating their incorporation in consumers’ daily practices. However, there is no such thing as ‘the’ energy user, but rather different types of users who are all pursuing different goals in their interaction with the (future) energy system. Therefore, this guideline focuses on how user engagement can be evaluated from the perspective of three roles identified in the S3C project: the smart consumer, smart customer and the smart citizen (for definitions, see text box).

The criteria developed in this guideline start from the perspective of the users involved in the project or rollout, and therefore differ from the more ‘traditional’ smart grid criteria which focus on system level achievements (e.g. peak load shifted, overall energy savings, grid stability, etc.). The user oriented evaluation criteria are preferably applied as a complement to traditional assessment criteria.

The criteria proposed can be used as a qualitative evaluation tool, allowing for a ‘quick scan’ of smart grid pilots based on a scoring on the proposed criteria by the project management. In some cases we do suggest ways to make this scoring more quantitative, e.g. by describing ways to acquire quantitative data that can provide a more objective base to the scoring of criteria. More information on quantitative scoring of criteria can be found in the guideline [KPIs for energy consumption effects](#) and [Monitoring demand response performance](#).

Evaluations are carried out either during the project cycle or during the rollout of a new product (the so-called ‘Mid-term Evaluation’, or ‘Formative Evaluation’) or at the end of a project or programme (the so-called ‘Ex-post Evaluation’, ‘Final Evaluation’, or ‘Impact Evaluation’). A less formal status of what is done in a project in relation to goals and results can be provided by implementing check-ups in on-going projects. For information on performing regular check-ups can be found in our guideline [How to improve your smart energy project through check-ups](#).

What do you need to do?

In this guideline, we present a number of criteria that are relevant when assessing a smart grid project from the user perspective. It is not likely that all criteria are equally important for a specific smart grid project, roll-out or group of users. In order to choose the criteria relevant to your project or roll-out, the following considerations apply:

- To decide whether and which of the criteria should be used, it is also helpful to get to know more about the people engaged in your smart grid project or roll-out. The guidelines [Learning about target groups](#) and [Using segmentation to better target user groups](#) are helpful in this regard.
- The criteria are arranged in a hierarchical order (cf. Fig. 2): “smart consumer” success criteria will generally also concern “smart customers” and “smart citizens”. So in general, the “smart consumer” criteria represent the most basic criteria, while the relevance of the “smart customer” and/or “smart citizen” criteria depend on the focus of your project or your customers.
- In general, the “smart customer” criteria will be relevant to projects or roll-outs which include some form of dynamic pricing and/or new products/services (cf. guideline [Designing a dynamic tariff](#)), while the “smart citizen” criteria will be relevant to projects or roll-outs operating in the context of smart city or

community initiatives (cf. guideline [How to gather community support for your smart grid](#)).

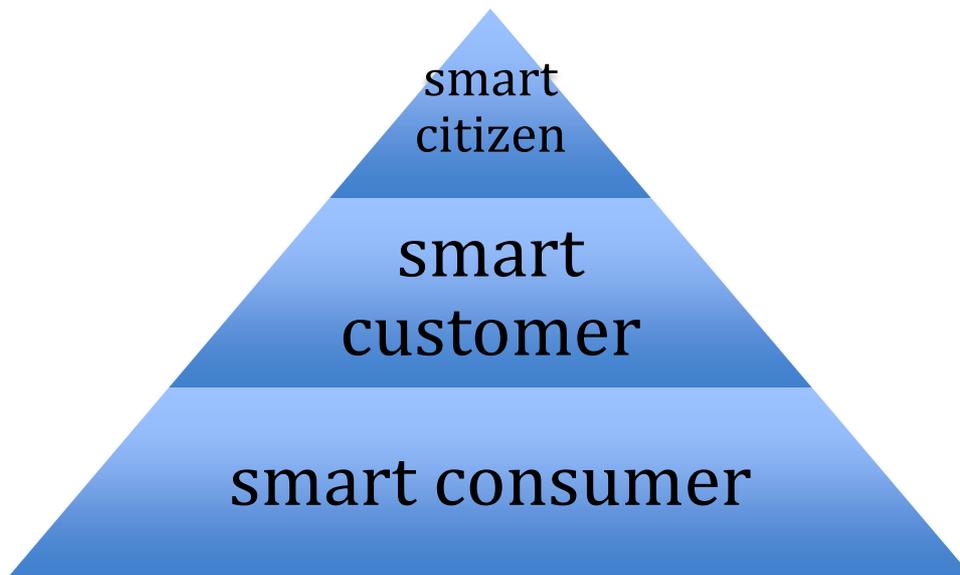


Figure 2: Hierarchy of values

Proposed Criteria for the Smart consumer

- **Lowering energy bills.** Scoring could be based on the average amount of money saved per household (or equivalent, if some kind of simulated tariff with e.g. bonus points is used) in the course of the smart grid pilot, compared to a benchmark situation without the smart grid equipment in place.
- **Complexity of new billing structure or tariff (if any).** Scoring could be based on a qualitative judgement – e.g. a new tariff based on a limited number of time blocks per day (e.g. 3) with limited price update frequency (e.g. seasonally) as compared to a new tariff based on an extended set of time blocks per day (e.g. hourly, quarterly) with a frequent price update frequency (e.g. daily, reflecting system costs).
- **Financial risk of new billing structure or tariff (if any).** Scoring could be based on a qualitative judgement – e.g. a new tariff based on a limited price spread between time blocks as compared to a new tariff based on a considerable price spread between time blocks. Note that offering a guarantee to the user that his/her bill will not be higher than what he/she would pay before the start of the pilot reduces the risk to zero.
- **Intrusiveness of the installation process at the consumer's premises.** Scoring could be based on the average time per household needed to install the necessary equipment for running the smart grid pilot.

- **Intelligibility of end-user feedback.** Scoring could be based on a qualitative judgement, supported by feedback from consumers when possible, using e.g. focus groups, surveys, etc.; or supported by evidence on the use of particular interventions such as individual coaching, sharing experiences with peers, etc.
- **Ease of use of the new technologies installed at the consumer's premises.** Scoring could be based on the average number of information requests submitted per household in e.g. a 'ticketing' system; or based on information acquired by using survey methods.
- **Reliability of the new technologies installed at the consumer's premises.** Scoring could be based on the number of malfunctions reported per household through a helpdesk (if in place).

Proposed Criteria for the Smart customer

- **'Buy in' of new products and services offered.** Scoring could be based on the % of households acquiring the new products offered in the smart grid pilots (e.g. smart appliances, smart plugs, IHDs, etc) and the total amount invested during or at the end of the pilot, or alternatively scoring could be based on the stated 'willingness to pay' for these products and services as revealed in questionnaires.
- **Freedom of choice.** Scoring could be based on the number of different tariff schemes offered in the smart grid pilot, or the freedom to choose between different types of IHDs (where applicable).
- **Development of viable business cases.** Scoring could be based on the viability of the business case(s) developed – measured in terms of financial profitability and / or other added value - as a result of the smart grid pilot – e.g. a solid business proposition and business plan has been developed for commercial players, or, in the best case, the smart grid pilot has resulted in a marketable product or service.

Proposed Criteria for the Smart citizen

- **Contribution to the community's 'common good'.** Scoring could be based on the question whether the smart grid pilot has clearly shown the potential to contribute to the common good of the community – e.g. solving a local network congestion problem, lowering energy costs for the community, lowering community CO₂ emissions, etc.
- **Contribution to local identity.** Scoring could be based on the % of people in a local community (e.g. municipality, island, etc.) successfully recruited for the

smart grid pilot, or the extent to which the smart grid pilot successfully draws upon local partners, or connects to local topics.

- **Participation in development and implementation.** Scoring could be based on the ‘participation ladder’, which classifies projects on their level of participation using the following criteria, ranging from ‘being informed’ to ‘active co-creation’:
 - Information (users are simply informed of the feedback mechanisms/incentives etc. used in the smart grid project);
 - Consultation (asking for opinions of user before starting the project);
 - Advise (users are continuously asked for feedback on their experiences and project management takes this feedback into account);
 - Co-creation (smart grid project is set up and managed as a shared responsibility between consumers and other stakeholders).
- **Fair distribution of benefits and burdens in the community.** Scoring could be based on e.g. the distribution of financial benefits or incentives gained in the course of the project among the project participants, compared to the burdens experienced by each participant (e.g. investment of time and money). Not only should the benefits and burdens be distributed fairly between the households participating in the project, but also between the households and the other stakeholders involved in the project (DSOs, energy retailers, ICT companies, etc.).

General Criteria for all consumer roles

- **Overall process satisfaction.** Overall consumer satisfaction probes into the more ‘indirect’ but nevertheless important factors for engagement, such as feeling empowered, feeling motivated, having fun (gaming aspects), establishing good relationships with other project participants etc. Scoring could be based on survey results, or alternatively on observed behaviour of project participants – e.g. level of drop-out in the course of the project.
- **Willingness to participate in follow-up project.** (Only to be used whenever applicable)

The following table summarizes the relevant criteria for the different user perspectives.

Smart consumer	Smart customer	Smart citizen
Lowering energy bills	'Buy in' of new products and services offered	Contribution to community's 'common good'
Complexity of new billing structure or tariff	Freedom of choice	Contribution to local identity
Financial risk of new billing structure or tariff	Development of viable business cases	Participation in development and implementation
Intrusiveness of installation process		Fair distribution of benefits and burdens in the community
Intelligibility of end-user feedback		
Ease of use of new technologies installed		
Reliability of new technologies installed		
Overall process satisfaction		
Willingness to participate in follow-up project		

Further reading

- S3C consortium, Report on state-of-the-art and theoretical framework for end-user behaviour and market roles, November 2013. Available at <www.s3c-project.eu>

This guideline was developed in the S3C project, and is freely available from www.smartgrid-engagement-toolkit.eu.

S3C paves the way for successful long-term consumer engagement, by acknowledging that the "one" smart consumer does not exist and uniform solutions are not applicable when human nature is involved. Beyond acting as a passive consumer of energy, consumers can take on different positions with respective responsibilities and opportunities. In order to promote cooperation between consumers and the energy utility of the future, S3C addresses the consumer on three roles. The *smart consumer* is mostly interested in lowering his/her energy bill, having stable or predictable energy bills over time and keeping comfort levels of energy services on an equal level. The *smart customer* takes up a more active role in future smart grid functioning, e.g. by becoming a producer of energy or a provider of energy services. The *smart citizen* values the development of smart grids as an opportunity to realise "we-centred" needs or motivations, e.g. affiliation, self-acceptance or community.

S3C performed an extensive literature review and in-depth case study research in Smart Grid trials, resulting in the identification of best practices, success factors and pitfalls for consumer engagement in smart energy ventures. The analysis of collected data and experiences led to the development of a new, optimised set of tools and guidelines to be used for the successful engagement of either Smart Consumers, Smart Customers or Smart Citizens. The S3C guidelines and tools aim to provide support to utilities in the design of an engagement strategy for both household consumers and SMEs. The collection of guidelines and tools describe the various aspects that should be taken into account when engaging with consumers, customers and citizens. More information about S3C, as well as all project deliverables, can be found at www.s3c-project.eu.