

## HOW TO FOSTER SMART ENERGY BEHAVIOR OF END - USERS VIA PROACTIVE USER PARTICIPATION: S3C PROJECT (SMART CONSUMER, SMART CUSTOMER, SMART CITIZEN) KEY FINDINGS

Vera NUNES                      João NUNES                      Carlos MARQUES                      Rui GONÇALVES  
 EDP Distribuição – Portugal EDP Distribuição – Portugal EDP Distribuição – Portugal EDP Distribuição – Portugal  
 vera.nunes@edp.pt              joaofilipe.nunes@edp.pt      carlospedro.marques@edp.pt      ruimiguel.goncalves@edp.pt

### ABSTRACT

*A renewed customer focus is reshaping the utility sector! Utilities are seeking new customer engagement approaches since they realize that smart grid products and services represent not only a technological challenge, but also an opportunity for a social transformation regarding more sustainable behaviours. S3C Project aims to assist utilities in fostering this “smart transformation” by providing tools and guidelines that used by utilities will allow customers understand what may be their real benefits. End-users are still predominantly passive agents in the electricity supply chain. As such, in order to involve them with more proactive behaviours, contributing to the success of smart grid projects and Smart Cities Platforms, they should be addressed by electricity players through innovative customer engagement approaches. Marketing and social sciences can contribute to facilitate the activation and engagement of end users with smart grid projects. Specific communication content (e.g. quantification of the impact of their actions) will lead to greater customer satisfaction and brand loyalty — allowing consumers and utilities a deeper level of involvement, different from the traditional unidirectional communication flow. The purpose of this paper is to share some key results and insights from S3C project (funded by EU 7th FP under GA 30876) regarding consumer’s behaviour and engagement strategies with a main focus on EDP Distribuição tests under its smart grid project: InovGrid (<http://www.inovgrid.pt/en>). S3C provides a better understanding of the end-user interaction schemes for the promotion of ‘smart’ energy end-user behaviour towards the new metabolism of smart cities.*

### INTRODUCTION

The European Commission has been monitoring smart metering consumer information and engagement programs and finding consensus on viable options, identifying the next steps to empower consumer [1]. This project, *S3C - Smart Consumer, Smart Customer, Smart Citizen* -paves the way for successful long-term end user engagement by acknowledging that only one typical may not be applicable when human nature is involved: The rule “one size does not fits all” also applies to the preferences of end-users in the energy system[2]. Besides, users can take different roles with different responsibilities and opportunities. In order to promote cooperation between users and the energy utilities, S3C addressed the end user on three roles:

- The Smart Consumer represents the most passive role and

end-user could take up in future smart grid functioning. This end-user is mostly interested in lowering its 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. This end-user follows “I-centred” needs and motivations, e.g. conformity, image, popularity or financial success;
- The Smart Citizen values the development of smart grids as an opportunity to realize ‘we-cantered’ needs or motivations, e.g. affiliation, community [2].

DSOs, as market facilitators, with universal access to consumers, have a key role in promoting customer engagement by making the most out of the interactions during smart meter deployment and through the development of new customer oriented processes and solutions.



(Figure 1: S3C Toolkit: <http://www.smartgrid-engagement-toolkit.eu>)

Early engagement of consumers with smart grid technologies paves the way for the adoption of new energy efficiency products and services offered by retailers and other market players. From this point of view, DSOs should go beyond “grid-only services” by carefully reviewing their

smart meter installation processes and deployment of complementary tools, such as social comparison or gamification platforms, in order to foster customer engagement and acceptance of smart grid technologies right from the start. Naturally, this approach draws heavily on marketing and communication skills, which are often not core DSO competences. It also requires strong analytical and IT competences and reinforces the DSO’s role as Data Manager and provider of detailed data to consumers and market players in a secure and non-discriminatory way.

### INNOVATIVE SCHEMES FOR END-USERS ENGAGEMENT

The S3C project identified 9 key challenges in end-user engagement:

1. *Understanding the target group*: Which instruments or approaches contribute to achieving better understanding of the enablers and barriers of target groups and the type of end-user interaction scheme best suited to them?
2. *Products & services*: In what way can innovative products and services provide clear benefit to end-users?
3. *Incentives & pricing schemes*: Which (monetary or non-monetary) incentives and pricing schemes contribute to fostering smart energy behaviour?
4. *End-user feedback*: What feedback information and which feedback channels are most appropriate?
5. *Project communication*: Which communication channels, information and marketing techniques contribute to recruitment and engagement of end-users?
6. *Cooperation between stakeholders*: Does involvement of non-energy stakeholders contribute to end-user engagement and smart energy behaviour?
7. *Bottom-up support*: Which instruments or approaches contribute to facilitating end-user empowerment?
8. *New market structures*: Which features of the interaction between end-users and energy market structures contribute to end user engagement?
9. *Scalability / replicability*: Which issues hamper and/or facilitate up scaling or replication of smart energy projects? [2].

One of the main outcomes of S3C project was a toolkit with approximately fifty (50) guidelines and tools with actionable information and advices, based on extensive field research, for every entity involved in the development of smart grid projects, products or services in which engagement of users plays an important role.

## EDP DISTRIBUIÇÃO TRIALS:

This paper describes the detailed application by EDP Distribuição, the main Portuguese DSO, of eleven (11) Tools and Guidelines from the S3C Project toolkit, addressing different objectives and different aspects of engaging end users in a smart grid environment. The range of tools tested in the **InovGrid** project spans different domains, from field crew training and its monitoring process to new customer engagement software or communication campaigns. S3C provided learnings about how to best engage end users in a smart grid environment concerning to several approaches: continuous and innovative training installer's processes, innovative customer service and support (e.g. using social media or gaming), appropriate communication channels and face-to-face interaction.

### Gamification:

Among the innovative tools a **Gamification Platform** (<http://www.quiz-s3c.com/index.php?lang=en>) specifically developed for S3C was implemented, with encouraging results. From the theoretical perspective, Gamification is

the application of game-design elements and game principles in non-game contexts. [3]

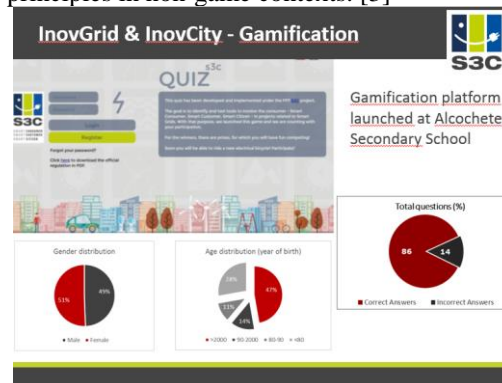


Figure 2: Gamification Platform – home page, gender and age

A review of research on gamification shows that a majority of studies find positive effects of this approach. However, individual and contextual differences exist. [3] Emotional incentives should be considered and addressed by electric energy agents, beyond the financial ones, when communicating with their customers. Examples like games and apps (**gamification**) where consumption is compared among friends and neighbourhoods may constitute a valuable tool. Variables such as the impact of increased consumption efficiency on the environment, may give customers the idea of control, competitiveness, independence and community feelings, sparking emotional drivers as basis for human action. **Can a gaming approach turn a low engagement topic as the energy related topics in engaging ones? Can a gaming approach help to introduce energy efficiency or smart grid concepts to the population and communities?** Gamification can be used to inform participants about smart energy topics or to motivate customers to reach energy efficiency or demand response objectives in a playful manner.

A gamification initiative was tested in Alcochete Municipality and involved more than 100 players, from a total of 9.200 domestic customers. A key purpose of InovGrid project is to study consumer behaviour and to enable and encourage direct involvement of consumers by providing information about their energy consumption. With this in mind, a dedicated Gamification platform was specially developed based on the S3C [Gamification guideline](#). From the standpoint of the consumer, the ability to understand their consumption patterns through this game and act accordingly, is something completely new. In this sense, a contest was created, to promote the knowledge about smart grids and “smart electricity consumption”, through the knowledge assessment about this topic and quantification of consumption reduction through a winning points system, won through two challenges:

1. Quiz - In this part of the game, specific questions related

with energy savings and call for actions (asking for new behaviours adoption) were presented to the players. The game has 3 different quizzes and each quiz has 10 questions with 4 choices and each correct answer is worth a 1000 points.

2. Consumption reduction - With the smart meters technology, all the gamers were listed with their weekly consumption. Players were defied to have extra points by reducing the energy consumption of their home since their weekly consumption was compared with the consumption in the same week of the year 2014 and they earned points if achieved a reduction on the consumption.

Based in qualitative studies to assess the impact of this Gamification initiative, EDP obtained **significant insights from end-users and on their responses to specific quizzes:**

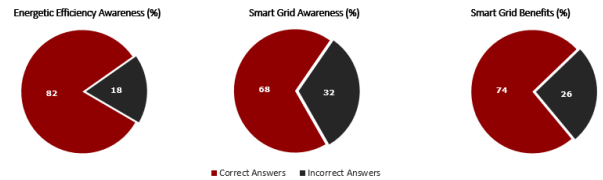
- Respondents have a high level of awareness about energy efficiency and smart grids but a lower perception about smart grids real benefits;
- 82% of respondents would recommend the installation of a smart meters at national level;
- Reduction of consumption needs a “call for action”;
- Gamification is not exclusive for young people.

**Key learnings from Gamification:**

- ❖ Gamification works! **Fun + Experimentation = Learn.** Since experiments were able to demonstrate real value to customers, the effect of “smarter” actions were posted in the Gamification platform, and consumers were able to understand they play the main role. Meaningful information and creating awareness from interacting with customers is one of the most powerful key learning: For the forty top players, when comparing with the consumption of the previous weeks 2015 (before launching the game), the energy efficiency increased 16,28%;
- ❖ The gamer who figured in 1st place performed the highest reduction for consumption and decreased 2015’s consumption to lower levels than the ones registered in the previous year. The reduction for this player, during the whole period of the game, was 22,80 kWh (31,9%, comparison 2014/2015);
- ❖ Social comparison is a strong and motivating tool and regularly used among the youngest;
- ❖ Utilities need to engage consumers by developing new solutions and become **more consumer focused:** consumer engagement drives consumer satisfaction and social comparison can be a strong beyond-the-grid “service”. Consumers are changing – traditionally, they were defined for paying the bill, but addressing the different consumer segments (young

people and families in this specific case) and serving them with the proper set of channels favoured by their segment will mostly drive to results;

- ❖ **Meaningful and understandable information** is one of the most powerful learning story from developing this game.



**Figure 3: Respondents awareness towards energy efficiency and smart grids**

**Stakeholders Engagement:**

The experience of InovGrid in Évora InovCity, the 1<sup>st</sup> Iberian smart city, is an indicator that it is wise and advisable to collaborate with local stakeholders and involve them with the project since from the very beginning, in order to take advantage of their strengths, communication channels and links with the community. The initiative Stakeholders engagement was tested in several **InovGrid** demo sites: S. João da Madeira, Alcochete, Lamego and involved interaction with more than 42.000 customers.



**Figure 4: Citizen looking at the energy data consumption for the City Hall. This figure reflects that there are multiple ways to communicate, and that sharing common results contributes to raising awareness among citizens**

**Key learnings from Stakeholders Engagement:**

- ❖ It is important to increase the information, within the population, by clarifying all the meters functionalities and the benefits for people’s daily life by making sure they understand the advantages, by using clear and simple language and by making them feel safe (as there is also some degree of anxiety towards any change);
- ❖ Increasing stakeholders engagement is basically a matter of a more frequent and systematic feedback and a continuous support. Stakeholders expect to be constantly informed and involved in what is

happening and in what is planned.

- ❖ Increasing the population engagement requires a multidimensional strategy: to be close and clear are the key words. It's important to promote a policy of closeness, by organizing several small information sessions at parish councils, city hall departments with direct contact with the population, local associations and neighbourhoods;

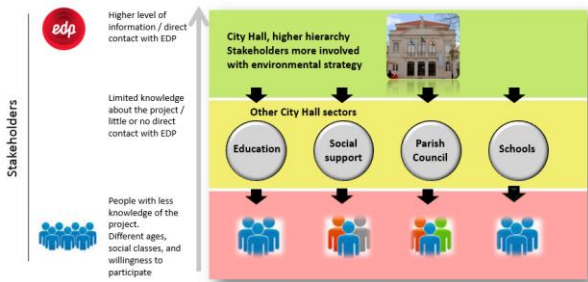


Figure 5: Different role perceptions according to stakeholder knowledge

### Meter Installation:

The installation process of smart meters can be seen as the backbone of a smart grid project and the enabler of a closer relationship between consumers and DSOs. The main goal of this initiative was to optimize the meter installation process in a way that it would contribute positively to the engagement of the end-users with the project. This initiative was tested in 5 **InovGrid** demo sites: Parque das Nações, Alcochete, Lamego, Évora and S. João da Madeira and involved reciprocal interaction with 43.000 customers. **EDP Distribuição tested 3 guidelines, Meter installation, Training Installers and FAQ during installation process, with several purposes:**

1. To understand the process of Smart Meters installation, namely interaction between installers and consumers;
2. To identify challenges during the installation process mainly in terms of the interaction and relation with consumers;
3. To identify ways of improving the installation process focusing on the relationship with the consumer;
4. To collect and embody the feedback of customers into utility processes;

Based on an analysis of all respondents of a survey developed for this initiative, the main expected benefits and impact for consumers from the installation of smart meters can be summarized as follows:

1. Energy savings
  2. Meaningful information should be continuously supported by communication
  3. More than 80% of surveyed customers recommend smart meter installation to take place at a national level.
- We've also concluded that topics related to energy consumption and production have high level of interest and importance (88% and 82% respectively).

### **Key learnings from Meter installation:**

- ❖ It's important that training processes should be reviewed frequently to make sure that the installers understand all updates on the equipment. Additionally, by repeating the training with installers in a regular way, this can provide a safe feeling that the utility top management is supporting their activities. Providing them with additional social skills and having role-play sessions in order to develop the behavioural training will certainly increase the level of service and decrease the complaints level due to the regular installation process;

- ❖ Improvements in the smart meter interface, making it more intuitive and its features evident to the user are undoubtedly aspects that should also be improved in the future.

### Home Energy Management Systems:

The new energy ecosystem enables new products & services. The project studied the perceived increased value and the increment of engagement of the end users by using an energy management system (EDP's HEMS - re:dy), tested by 16 customers in Oporto and Lisbon.

### **Key learnings from HEMS:**

- ❖ **Heavy Users** tend to be tech-savvy, have a medium or even a high knowledge of the Re:dy Service and tend to be involved with the service;
- ❖ However, a majority of customers only take advantage of the extracted information in a reactive way. These are the "Observers".
- ❖ Heavy users want more functionalities, **Basic Users** want guidance to take greater advantage of their HEM service and the Observers want reports with actionable insights that they can act on.

The success of a smart grid deployment depends not only on the grid technology but mainly on end-users acceptance that may be fostered through proper end-user engagement schemes. S3C project contributes to a new paradigm of electric system players through the development of an innovative toolkit that will put *Smart Consumer, Smart Customer, Smart Citizen* in the centre of the utilities strategy. This new context will call out for new and collaborative approaches between DSO, suppliers, regulators and Customers towards a more "humanized" smart grid.

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- [3] Huotari, K., & Hamari, J. (2012). ["Defining Gamification - A Service Marketing Perspective"](#) *Proceedings of the 16th International Academic MindTrek Conference 2012, Tampere, Finland, October 3-5.*