GUIDELINE: BONUS/MALUS - CHANGING BEHAVIOUR WITH REWARDS AND PENALTIES

Abstract

A bonus/malus (reward/penalty) system can be used to improve the demand response energy behaviour of customers and it can help customers become more aware of their consumption habits. In a bonus/malus system, energy customers are usually billed according to how successful they are in responding to price and/or efficiency signals, but the bonus/malus system can also be applied in other ways. This guideline gives an introduction to researchers, project managers and product developers on how a bonus/malus system can be applied in energy tariffs and in gamification approaches.

What is it?

Changing habits does not come naturally to people. This is especially true for energy consumption habits since, in most cases, energy consumption is not at the top of people's mind because energy consumption is often a side effect of actions undertaken with a different goal in mind, e.g. watching TV, using hot water for showering. If the goal is to decrease peak load by shifting energy consumption to off-peak hours, a bonus/malus (Latin for good/bad) system can provide motivation for customers to change their behaviour and thereby their consumption patterns.

Generally speaking, a bonus/malus system aims at encouraging certain behaviours by applying rewards and penalties. Bonus/malus systems are applied in many areas. In several countries, for example, a bonus/malus system is applied in vehicle liability insurance systems. All customers registering a car for the first time pay the same insurance rate in the beginning. Depending on whether and how much they cause damage in a set observation period, the insurance rate increases (malus) if damage has been caused, or decreases (bonus) if the customer remains accident-free.

In the context of electricity, bonus/malus systems have most often been used for financial motivation in different tariffs with dynamic pricing. Customers can, for example, receive a financial bonus on their electricity bill if they manage to shift their consumption to periods when electricity demand is low and a malus if they consume electricity during peak load hours. However, tariffs with dynamic pricing are only one of many imaginable uses for a bonus/malus system in the energy context. Bonus/malus systems can also be applied in games, competitions, as a payback system, etc.

When to use?

- Are you looking for possible incentives for a tariff with dynamic pricing?
- Are you planning to test/simulate tariffs with dynamic pricing?
- Do you plan to set up an educational game or competition for your customers related to energy efficiency or energy saving?

As mentioned above, a bonus/malus system can be applied as financial motivation with the aim of shifting consumption from 'bad' times to 'good' times or incentivizing increased energy efficiency. Furthermore, it informs customers of the variations of energy production and energy prices through positive and negative signals. Here, prices don't have to correlate to actual market prices. Instead, greater price ranges can be chosen to increase the learning effect of the customers, especially during a test pilot.

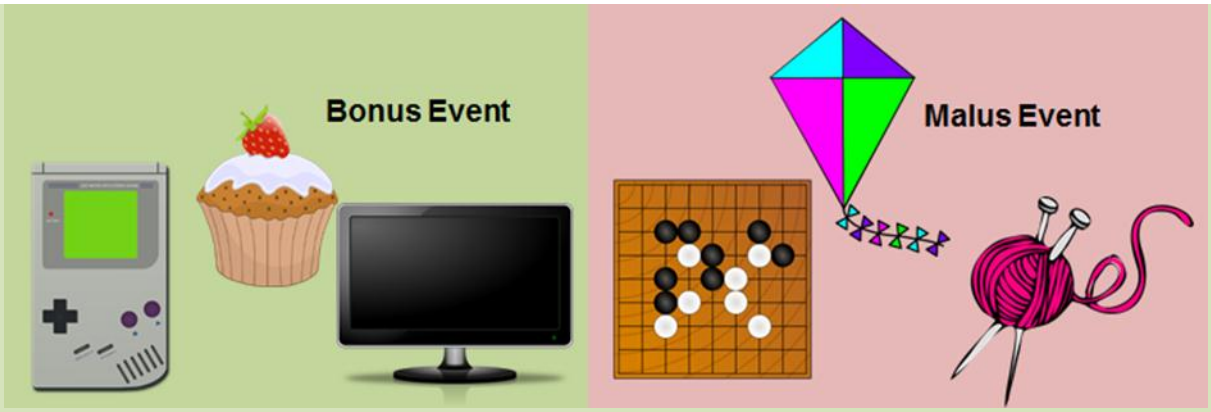
In the context of games and competitions, a bonus/malus system can be applied as a regular point-system. Customers receive rewards - 'bonus points' – and penalties - 'malus points' - for 'good' and 'bad' energy behaviour, respectively.

Applying a bonus/malus system in an event tariff (eTelligence, DE)

eTelligence is one of several projects in the framework of E-Energy that tested an event tariff. "E-Energy – ICT-based energy system of the future" was a funding programme of the German Federal Ministry of Economics and Technology and the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety that concluded in 2013.

An event tariff is an extension of a time-of-use tariff. Due to external events, e.g. weather, the price per kWh was very high (malus) or low (bonus) for a pre-announced time interval (event). Bonus and malus events were announced at least one day in advance via online feedback devices (smartphone/tablet app; web portal). In the eTelligence project, customers reacted strongly to bonus as well as malus-events. During events with very high electricity prices, a decreased in consumption of up to 20% was observed for the period of the malus event. In a bonus event, during which electricity was free, an increase in electricity consumption of up to 30% within the period of the bonus event was measured.

In eTelligence, bonus events were strongly integrated into the project marketing, which proved to be very successful as participants developed a momentum of their own. Thus, neighbouring participants organised 'energy parties' at bonus/malus events to engage in activities with high/low energy consumption (e.g. baking party at a bonus event, knitting party at a malus event).



More information: http://etelligence.de/etelligence.html

Do's and don'ts

- **Look into legal aspects of changing a billing procedure.** Keep in mind that setting up a new tariff and accordingly changing the billing system requires a special allowance by the national regulator in most European countries. However, if a dynamic pricing regime is to be tested without permission of the regulator, there are also other ways to simulate it, which is explained in the S3C guideline Designing a dynamic tariff.
- **Create an attractive bonus/malus system.** Add the right incentives – monetary and non-monetary – taking into account different preferences of your customers. Don't forget to include social aspects, such as competitions. Find out more about this by reading the guideline Motivating consumers with social comparison and competition.
- **Make it easy**. Regardless whether you are implementing a new tariff structure or a bonus/malus system in games, complicated rules will discourage customers from participating.
- **Don't offer a too small reward.** The reward given to encourage the customers doesn't necessarily have to be only financial, but they do need to receive enough gratification to justify the effort involved in changing habits. To find out more about different incentive strategies, please have a look at the S3C Guideline Choosing and combining monetary and non-monetary incentives.

What do you need to do?

Customize for your target group

Be careful to choose the right tariff structure with your bonus/malus system and take your customers' preferences into account. In the bonus/malus billing system, customers are billed according to how successful they are in responding to price

and/or efficiency signals. Thus, the number of pricing levels (bonus levels and malus levels) and the price spread as well as the price update frequency must be determined. In part, this depends on the chosen tariff. You can find more information on different tariff structures in our guideline on Designing a dynamic tariff.

Bonus/malus system in a dynamic tariff (RegModHarz, DE)

In RegModHarz, another model region of E-Energy, a virtual regional electricity tariff for private customers with dynamic pricing via a bonus/malus system as financial incentive was implemented. A smart meter as well as an energy management system was installed in the homes of the customers testing this new tariff. The bonus/malus system was implemented through the grid operator. In the implemented dynamic tariff, prices changed in hourly intervals, but were communicated one day in advance. The tariff had a total of nine price levels:

Price level	Bonus/malus (ct/kWh) as calculated in the field trial	Interpretation example for a mean electricity price at 23 ct/kWh
9	16 ct/kWh Malus	39 ct/kWh
8	12ct/KWh Malus	35ct/kWh
7	8ct/KWh Malus	31ct/kWh
6	4ct/kWh Malus	27ct/kWh
5	0	23ct/kWh
4	4ct/kWh Bonus	19ct/kWh
3	8ct/kWh Bonus	15ct/kWh
2	12ct/kWh Bonus	11ct/kWh
1	16ct/kWh Bonus	7ct/kWh

Table 1: www.regmodharz.de

One of the central results from the trial was that most participants of the trial could imagine having a tariff with dynamic pricing and shifting their loads accordingly in the future, although it was also emphasized that such a tariff had to be accompanied by a well thought-through marketing strategy.

More information: http://www.regmodharz.de/

Inform your customers

First of all, the electricity consumption of individual customers must be monitored to ensure relevance and accuracy in rewards and penalties. Smart meters can be a means to bill your customers according to their actual consumption behaviour. For more information, have a look at the S3C guideline Optimizing meter installation and tool Training installers.

Furthermore, in order for customers to adapt their consumption to times when electricity demand is low and electricity is cheap (bonus), they must receive

adequate signals. The most common tools to communicate pricing signals are in-house displays or online portals with corresponding apps for smartphones and tablets. Such devices can also be used to provide other feedback and tips on how to adjust the energy use, which will support your customer in changing their consumption behaviour. For more information, have a look at our guideline about feedback information How to make energy visible through feedback.

Add additional motivation

Apart from applying a bonus/malus system as a financial incentive, it might be beneficial to motivate customers in other ways, too, especially because the financial gain from the bonus/malus system is usually rather modest. Customers might additionally be incentivised by gifts, awards, games, etc. For more information see the S3C guideline Choosing and combining monetary and non-monetary incentives, as well as its sub-guidelines Choosing from different types of monetary incentives and Choosing from different types of non-monetary incentives.

Decide on the billing frequency

The accumulated reward or penalty can be added to the electricity bill on a monthly basis or, in a project setting, at the end of the field trial. It has been proven that prompt feedback is more likely to have an effect on behaviour. On the other hand, the more frequent billing, the smaller the reward or penalty, which may in turn discourage customers from putting the effort into achieving the rewards/avoiding the penalties.

Add a community dimension

Bonus/malus systems have shown the possibility to bring customers together by supporting community building efforts, especially if the bonus events are promoted in the marketing strategy. In the eTelligence project (see example above), neighbouring participants organised so-called ‘energy parties’ for upcoming bonus events. Furthermore, customers can be prompted through the established communication channels to exploit upcoming bonus events, e.g. posting on social media: “*Bonus event today from 15:00h to 16:00h! How are you planning to use it*?”

Bonus/malus systems in games and competitions

Bonus/malus systems have been used in games and social competitions in an energy context. Customers received ‘bonus points’ and ‘malus points’ for ‘good’ and ‘bad’ behaviour, respectively. For example, if used in a competition a specific set of bonus and malus points can be defined and communicated to the participants. Easy to implement and clear point definitions are best, e.g.

- *The computer is switched off during the night* (Bonus point)
- *The computer is on sleep mode during the night* (Malus point).

Winning points as such works as an incentive. Still, it might be beneficial to introduce additional incentives such as prizes or awards. For more information on gamification, see Gamification – making energy fun and Motivating consumers with social comparison and competition.

Do you leave the light on when you leave a room? (EcoOffices, FR)

The EcoOffices energy challenge aimed to sensitise office employees to their energy consumption and consumption habits. Office buildings were equipped with metering devices and feedback channels for the employees, which enabled a competition, based on real-time energy usage data of the employees within the offices. In a pilot, 400 metering devices have been installed in a building of the Scientific and Technical Centre for Building. The employees got access to their consumption histograms, but also received energy saving tips. Grouped into three teams, They aimed to reduce their consumption in a friendly competition by striving for bonus points (e.g. always switching of the light before leaving a room) and avoiding malus points (e.g. leaving the air conditioning on while being away). The team gaining the highest score was rewarded with a prize, e.g. a joint sailing trip for the winning team.

Further reading

- Agsten, M., Bauknecht, D., Becker, A., Brinker, W., Conrads, R., Diebels, V., Erge, T., Feuerhahn, S., Heinemann, C., Hermsmeier, J., Hollinger, R., Klose, T., Koch, M., Mayer, C., Pistoor, G., Rosinger, C., Rüttinger, H., Schmedes, T., Stadler, M. (2014). *eTelligence final report – New energy sources require a new approach.* Oldenburg, EWE AG. URL (20140701): http://www.etelligence.de/feldtest/file/EWE%20102189%20EVE%20eTelligence%20Abschlussbericht%20Inhalt%20GB%20Internet_sc.pdf
- Karg, L., Kleine-Hegermann, K., Wedler, M., Jahn, C., (2014). *E-Energy Abschlussbericht – Ergebnisse und Erkenntnisse aus der Evaluation der sechs Leuchtturmprojekte.* München / Berlin: B.A.U.M. Consult GmbH. www.e-energy.de
- Speckmann, M., Schlögl, F., Hochloff, P., Lesch, K., Stetz, T., Braun, M. (2011). The RegModHarz- Architecture – Facing the Challenges Caused by the Transformation to a Distributed Energy System. International Journal of Distributed energy Resources 7(4):329-344. http://www.energiesystemtechnik.iwes.fraunhofer.de/de/presse-infothek/publikationen/uebersicht/2011/regmodharz-architecture.html

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 end user 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, end users can take on different positions with respective responsibilities and opportunities. In order to promote cooperation between end users and the energy utility of the future, S3C addresses the end user 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 (2012-2015) performed an extensive literature review and in-depth case study research on end user engagement in smart grids, resulting in the identification of best practices, success factors and pitfalls 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.