THE IMPORTANCE OF CORPORATE AND SOCIAL INVOLVEMENT IN THE IMPLEMENTATION OF CLIMATE FRIENDLY PROJECTS

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ABSTRACT

Everyday people have been experiencing changes in weather and climate. The question is whether we are really on the top of a tendency or we just overstate the weather change because of our heuristic mentality? If the negative tendency of change is adopted we must involve climate friendly technologies in the strategic decision making process of enterprises. On the other hand, the important thing to keep in mind is that the main motor of the strategy is the profit. In case of the latest climate related strategies the problem is the hard quantification of the real profitability because it also depends on external effects. In spite of the classical investment analysis, the cost-benefit analysis is able to take into account negative and positive external effects. In case of strategic decision the new technologies or methods are also confronted with resistance. In the strategic decision making process we should calculate with these resistances as well. The aim of this study is to highlight those long-term calculation methods and business models which are able to consider the external effects of projects and examine the real profitability and break-even point in case of bad climate tendency scenarios. This paper presents a new method which includes the cost-benefit analysis and the change equation.

KEY WORDS

climate strategy, environmental project development, cost-benefit analysis, internalization (pricing of externalities), change management

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1 INTRODUCTION

In case of strategic decisions, the importance and the rate of economic and ecological aims is a key question on an individual, corporate and society level. The economic and the ecological aims have different importance in decision making. The question is how can we involve these aims in our calculations? The technology changes result in more environmentally friendly equipment in numerous fields of our life. Regarding profit calculations the conventional and the green technologies are equal. This equation is highly true in case of nowadays oil price reduction. In our opinion this price reduction is temporary but it makes question about the adaptation of environmental friendly or low-carbon methods. People with system-based thinking are not cheated with these temporary changes because they think in long-term projects with long-term effects.

During the last few years we have conducted numerous projects which examined low-carbon projects from the economic and ecological point of view. The cost-benefit analysis (CBA) was the main method for making proposals about climate-centered development opportunities for the transportation and agriculture sector. Based on our latest researches we would like to show the critical points of cost-benefit analysis and present a new method to calculate the external effects and the openness/closeness of changes together. In our method the human factor has an important role in the strategic decision. We would like to define a new mathematical model to examine the viability of the certain environmental initiatives. Our model is based on the CBA and the change equitation model. We attempt to mix these two methods into one model.

2 THEORETICAL FRAMEWORK

The success of environmental projects is a complex issue which may be approached from two different aspects. The first is the efforts of governmental decision-makers which can be assessed through the governmental regulations (Fogarassy et al., 2008). The other aspect is the so-called 'target audience' which includes attitude towards environmental targets of industrial/business stakeholders and society. The resistances to environmental initiatives have long been a known problem regarding environmental projects. The reason of these resistances is the main motivation factors of the business sector which are the followings: profit maximization, ensuring competiveness and market position. Climate policy measures have a strengthening role in the European Union and based on this trend a new phenomenon called 'Carbon Leakage' appeared among the member states. The term refers to the situation that may occur if, for reasons of costs related to climate policies, businesses were to transfer production to non-EU countries with laxer emission constraints. The adaptation of EU environmental norms and Best Available Technologies (BAT) would lead to excessive burden on the industry. In some cases, outsourcing the production out of the EU and then transporting the product back is cheaper and better achieved at company level (Horváth et al., 2015).

The social attitude shows a different view. It can be followed through the mechanism of The Environmental Kuznets Curve (EKC) which has been established in the early 1990s. The logic of the EKC assumes that the local environmental conditions depend on the change in GDP per capita. In the early stages of economic growth environmental degradation and pollution increase, but beyond some level of income per capita (which will vary for different indicators) the trend reverses. Therefore, at high-income levels, economic growth leads to environmental improvement. The EKC defines two impact indicators. One is the continued growth of technological standards which are able to operate on low environmental impact.

The other indicator is more important for our research aspects since it is the social attitude. The EKC stated that the people prefer a clean environment after a certain level of quality of life. The social attitude indicator leads to establish interest organisations (NGO's) and exercises pressure on government to make legalisations in order to preserve the environment. The hypothesis of the EKC is that the need for environmental preservation comes from the society which will be satisfied by decision makers (Stern, 2004).

The authors of this paper have different a point of view. Our earlier studies show that the society often realizes environmental problems without making efforts to solve or prevent them. The reason is very simple and similar to the companies': matching environmental needs goes together with an expensive life-style. The aim of this paper is to show a model which is able to handle the industrial and social attitude. We would like to define the resistance point and the solution for minimising this resistance. In order to achieve that, we are going to use cost-benefit analysis (CBA) and change equation model.

3 METHODOLOGY AND DATA

The CBA is the most well-known decision supporting method. The aim of the method is to calculate with the economic and social benefits and costs of the investment. In the case of decision making the calculation of the benefits and disadvantages (on corporate and social level as well) is the hardest part of the CBA. The question is how to price the benefits or the disadvantages during the calculation process. First of all we must clarify what does "benefit" mean in the CBA. The benefit is an advantage which comes from the project in monetary terms. The "cost" is a value which is lost in the project in monetary terms (Mishan, 1982). The social and economic CBA answers the following questions: (1) What is the amount of the social benefits of the project and how much subsidies are required from the government to reach these benefits? (2) How much is the social profitability of the project on regional level?

In our earlier economic calculation only the extra values against the conventional technology were calculated. Kovács and Székely (2006) called this model extra profit calculation. In order to use that model on a social level, the externalities must be identified and measured economically.

3.1 Pricing the externalities in the CBA

The CBA interprets the benefits and costs in monetary terms. It means that it generates a concrete value for the positive and negative effects of the investment. CBA has three different kinds of "benefits": (B_1) direct effects, (B_2) indirect effects, (B_3) spill-over effects. The costs are divided into the following groups: (C_1) preparation costs, (C_2) implementation costs, (C_3) public procurement costs, (C_4) negative social effects.

Concerning the strategic decision making period of the strategic management there are many methodologies to support decision makers in order to choose the most viable scenario for their company. Lately, a lot of new criteria emerged regarding this process which restrict the freedom of decision making. One of these new factors is the increasing importance of environmental values. In the CBA, the negative social effects include the value of environmental damages (Kovács et al., 2014). The environmental damages are the most common externalities. Externalities do not appear in sales and it is hard to define the value of them in monetary terms. The most common problem in case of environmental protection projects is that the externalities are not priced. This is the reason why these projects have incorrect clarity (Fogarassy and Bakosné Böröcz, 2014).

The most important effects of the low-carbon projects are the changes in the greenhouse gases balance (GGB). The CBA in case of climate policy has two key parts. The first part is the real changes in GGB indicated by the project on national or regional level. The changes of GGB may occur in reduction, or sometimes by increasing, because of inefficient implementation. The second part is the break-even point of the investment under the life-cycle of the projects. The break-even point is very important because the weak point of the low-carbon projects appears when the market is not able to react on the aims and equipment of these initiatives.

According to the requirements of the European Union the supported project must be viable in economic and ecological aspects as well. The financial efficiency is a significant factor in the recognition of the project during the subsidizing process. Fogarassy et al. (2015) completed a CBA model with the factors which are able to calculate with the quote prices of the EU Emission Trading System (1). They used the following modified CBA equation to examine the profitability of low-carbon projects:

$$AI_{pv} = -(\underbrace{IC - DI}_{\text{Decision on development}}) + (\underbrace{AS - AC}_{\text{Effects of operation}} \pm \underbrace{IE}_{\text{Indirect effects}} \pm GHG_i)_{pv}, \quad (1)$$

where AI_{pv} = the present value of additional income; IC = the additional investment cost of the equipment to be purchased (EUR); DI = possible support and discounts (EUR); AS = the additional sales revenue resulting from the additional yield or increase in quality attributed to using the given technology (EUR/year); AC = the balance of the given technology's additional costs and its possible savings (EUR/year); IE = the indirect economic impacts (environmental effects, effects on society) of using the given technology and the value of GHG reduction (EUR/year); GHG_i = the indirect effects on emissions of using the given technology, based on the value of the decrease in GHGs as per the EU ETS quota forecast (EUR/year); pv = present value.

The essential of the upper equation is the "Indirect effects". This factor includes the greenhouse gases (GHG) decreasing based on the prices on the quota trade. The present paper shows a scenario from an earlier research which illustrates a case study with the modified CBA equation. The scenario takes place in the transportation sector which means a modernization of city-transporting. The project evaluated in that research is a good example for the involvement of civil society in the climate friendly transportation system. Based on the price forecast of greenhouse gas quotes the scenario is viable in economic and environmental aspects as well (Fig. 1).

3.1.1 Details of examined scenarios

It is necessary to define the environmental effects and the probability of resources invested in case of the assessed projects. Besides the carbon-orientation matrix which summarizes environmental effects (Fig. 1) there are some more characteristics, that need to be examined. The CBA model is to carry out two cases. In the first case the hypothesis was that the conditions are compatible with the present policy and financial scheme towards 2030 which is the end of the next program period of the EU. It is relevant to evaluate the effects of the latest climate policy until 2030. According to other scientific research this case is called 'Business as usual' (BAU) in the scenario analysis. Regarding the second case our CBA model calculates with a project which indicates greenhouse gas emission reduction. We used two various groups of indicators to evaluate the projects from an environmental and financial point of view. These two indicator groups are the 'carbon-efficiency' and the 'financial return' measures. The transportation model presented in this paper is a pilot project stating the following characteristics: increase the use of mopeds in city transportation instead of cars, government provides the financial support for buying mopeds.

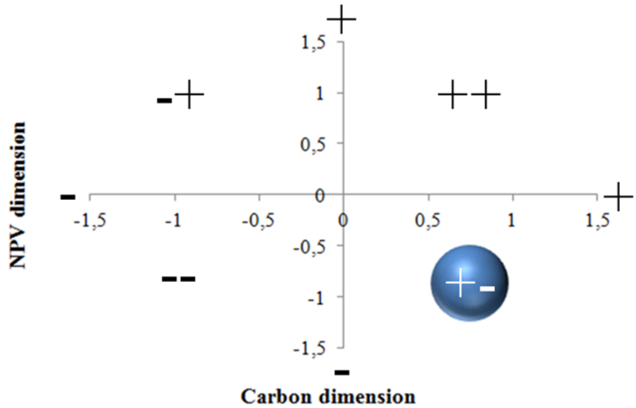

Fig. 1: Carbon-orientation matrix of the projects with corporate and social involvement (Fogarassy et al., 2015)
Notes:
−+: A project is implemented that increases emissions and the investment does not provide a return within the lifecycle.
++: A project where the invested costs show a tendency of providing a return, but the activity itself was not suitable for decreasing GHG emissions.
−−: Emissions can only be decreased with high costs on which there will be no return.
+−: Acceptable scenarios that enable CO_{2e}[1] decreases to be attained while also providing a return on investments over a longer period of time. (Investments that are recoverable even after their lifecycles, with externalities that can change in line with political preferences.)

Carbon-efficiency indicators of transportation project

Fig. 2 illustrates the CO_2 emission change of the project which is the most important indicator in the carbon-efficiency research. It shows the change of CO_2 balance compared to BAU in transportation sector. The adaptation of this transportation project generated decrease in the GHG emissions.

We can see in Fig. 3 the structure of changes which makes us able to measure the efficiency. We need this examination because the future scenarios predict increase in total kilometers travelled but the project must influence the level of GHG emissions even in these circumstances. Fig. 3 shows that the emission per kilometer is also decreased due to the use of mopeds in city transportation, so the total GHG balance can be lowered despite the growth in travelling distances.

Fig. 4 demonstrates the low-carbon technology contributions in the environmental effects. In this case there is no major change in the transportation project. This indicator is useful in cases with renewable energy involvement.

Financial indicators of transportation project

First of all the net present value (NPV) of the transportation project is shown in Fig. 5. This NPV is corrected with the difference of the BAU and the moped project according to the CBA model. In addition the externalities are also calculated in this indicator. Important externality of the moped project is the reduction in car transportation indicating longer life time of cars which results in further savings.

The possibility of return of income in the lifecycle of transportation project is illustrated in Fig. 6. The internal return rate (IRR) is 25% which is a very good value meaning that the project is investable. Other options regarding this indicator are the following: the project is considered for implementation between 0% and −10% with it's acceptable social losses, the

[1]CO_{2e} is the basic level of greenhouse gas emission measurement which expresses the relative global warming potential (GWP) of these gases interpreted in CO_2. CO_2 has a GWP of 1, while methane (CH_4) has a warming potential value of approximately 25 (on a 100 year time horizon). This equation means that every tonne of CH_4 emitted is equivalent of 25 tonnes of CO_2 emissions.

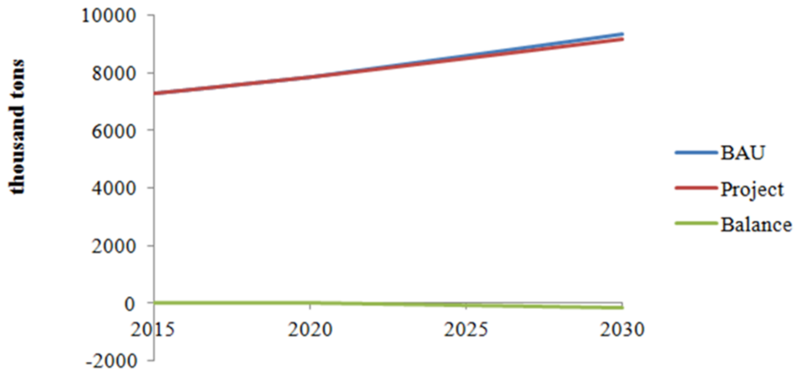

Fig. 2: Assumed changes of CO_2 emission in Hungarian transportation sector till 2030
Source: Fogarassy et al. (2015)

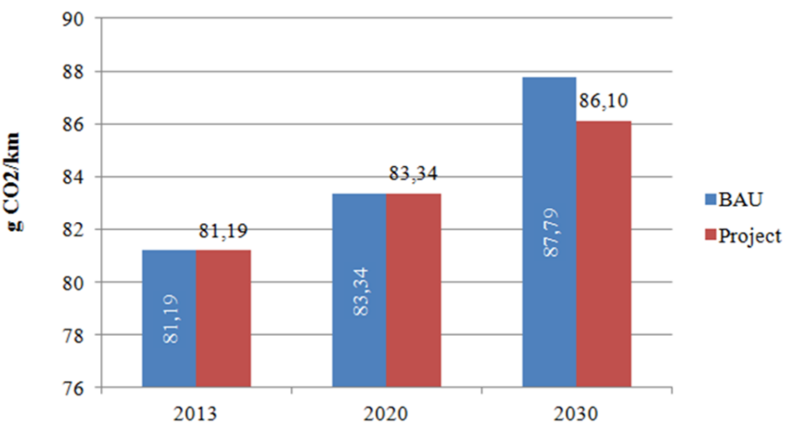

Fig. 3: Assumed changes of CO_2 emission per kilometer in Hungarian transportation sector till 2030
Source: Fogarassy et al. (2015)

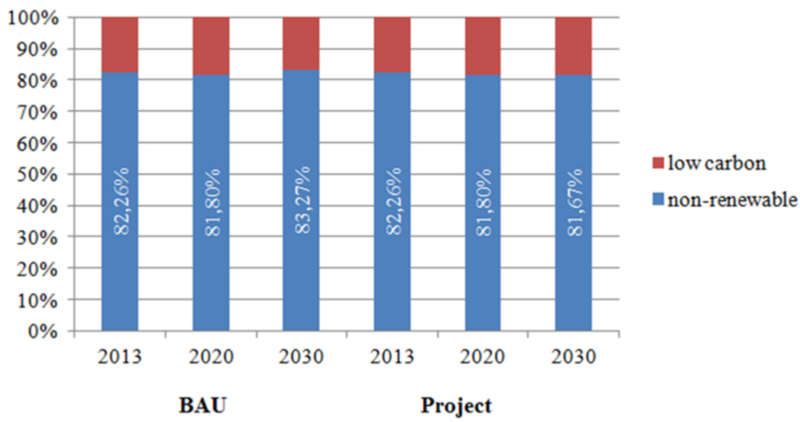

Fig. 4: Changes of rate of low-carbon technology in transportation sector till 2030
Source: Fogarassy et al. (2015)

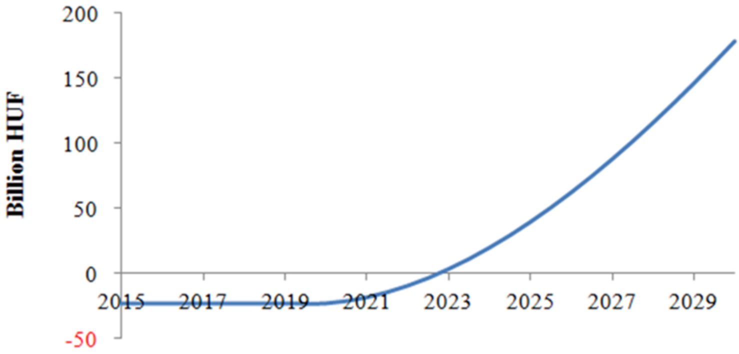

Fig. 5: Present value of extra income in cost-benefit analysis of the transportation project till 2030
Source: Fogarassy et al. (2015)

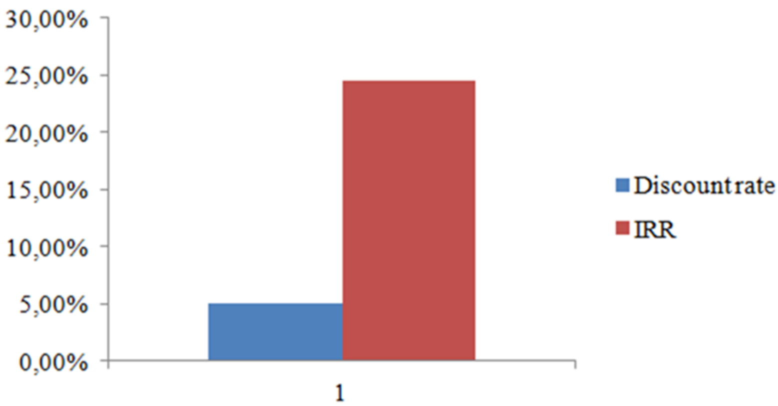

Fig. 6: Internal return rate of transportation project
Source: Fogarassy et al. (2015)

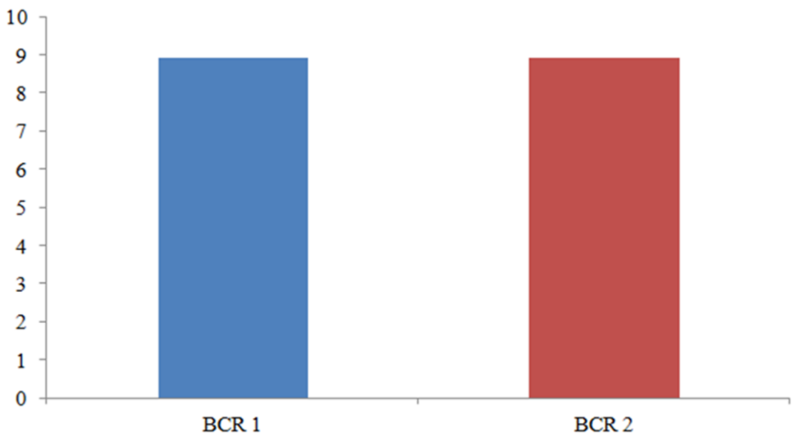

Fig. 7: BCR indicators of transportation project
Source: Fogarassy et al. (2015)

project cannot be conducted below −10% in any cases.

BCR_1 (Fig. 7) shows the total income compared to the investment cost in ratio. In case of a value above 1 a project is financially viable, between the value of 1 and 0.5 it is up to further consideration and under 0.5 the investment is not feasible. BCR_2 demonstrates that how many times the investment will show a return until 2030. According to Fig. 7 the transportation project is investable.

The high value of financial indicators came from the pilot type of the presented transportation project. It means that with low investment we can reach high income. We can see that the environmental value of the project is not significant but it is worth to be extended to the whole sector. This case indicated an example for the assessment of the financial and environmental aspects of a project. In the next chapter we elaborate on how to merge the business and the social attitudes into the described CBA model.

3.2 Methods for overcoming the resistance to change

The modified CBA equation (1) estimated only the economic factors. In vain the model shows that the project is viable if the person who will operate has resistance to change (Illés et al., 2012). The forms of resistance may be variable: fear of losing status quo or power; distrust, misunderstanding, hard learning, different circumstances, self-doubt, negative feelings about changes, uncertainty, pursuit of risk etc. Overcoming the resistance on strategic level is the key factor of success regarding long-term decisions. In the strategic decision we must calculate with those elements which play an important role in the success of change during the implementation. We may use various models to estimate the success of change. In this paper we attempt to modify the change equation model (2) by Cameron and Green (2012) and Beckhard and Harris (1987) with the CBA model. The change equation is based on the following context:

$$\text{Dissatisfaction} \times \text{Desirability} \times \\ \times \text{Practicality} > \text{Resistance to Change}$$

Change equation model:

$$C = (A + B + D) > X, \qquad (2)$$

where C = chance to success of change; A = level of dissatisfaction with the status quo; B = desirability of the proposed change or end state; D = practicality of the change (minimal risk and disruption); X = cost of changing.

4 RESULTS

We attempt to define a model which is able to aggregate the modified CBA model (1) and the change equation model (2) in one equation. Our model is able to calculate with the economic and ecological factors of the project and the human aspect of the decision making process together (3).

Modified change equation model by CBA:

$$C = \big(\pm A_1 \pm A_2 \pm \mathrm{IE} \pm \mathrm{GHG_i} + \\ + (\mathrm{AS} - \mathrm{AC})\big)_{\mathrm{pv}} > (\mathrm{IC} - \mathrm{DI})_{\mathrm{pv}}, \qquad (3)$$

where C = chance to success of change; A_1 = social deadweight loss; A_2 = lost caused by short-term corporate/individual vision; IC = the additional investment cost of the equipment to be purchased (EUR); DI = possible support and discounts (EUR); AS = the additional sales revenue resulting from the additional yield or increase in quality attributed to using the given technology (EUR/year); AC = the balance of the given technology's additional costs and its possible savings (EUR/year); IE = the indirect economic impacts (environmental effects, effects on society) of using the given technology and the value of GHG reduction (EUR/year); $\mathrm{GHG_i}$ = the indirect effects on emissions of using the given technology, based on the value of the decrease in GHGs as per the EU ETS quota forecast (EUR/year); pv = present value.

The first result of this paper is the combination of the CBA model and the change equation. The other result is that we separated factor "A" (level of dissatisfaction with the status quo) to factor "A_1" meaning social level and factor "A_2" meaning project level which both make the long-term resistance to the current situation. In factor "A_2" we figure a case when a producer exploits the resources in spirit of short-term benefits. These decisions of the producer result in degradation of the environment and as a consequence the producer will lose yield in long-term (Loum and Fogarassy, 2015).

The combination of the two equations makes a good example for examination models of the environmentally friendly or low-carbon projects. It shows that environmental initiatives will always contain "soft-factors" which reflect the social and/or corporate way of thinking.

5 DISCUSSION AND CONCLUSION

From and external point of view the environmental protection may look like some civil organisations putting pressure on the decision makers who make legislation for industrial producers. Nowadays this picture is a lot more blurred because preserving the environment requires efforts from the side of society as well as it does from business stakeholders. Moreover, the climate policy of the EU includes more and more sectors, for example transport and buildings. In case of these sectors it is obvious that the involvement of society is quite significant in order to reach the future goals. Concerning the results of this paper it is very well expressed that despite the endeavours, not all the important indicators of environmental projects can be monetarized or quantified. There are always going to be measures like social and corporate behaviour to influence the expected outcome without showing exact values.

That is the reason why the offered equation aims to operate with the amount of losses generated by these behavioural aspects. The applicability though faces two major obstacles. One comes from the theoretical nature of the equation which requires future analyses to earn practical credibility. The second segment is the attitude of the examined stakeholders which vary in different countries. The difference in their environmental consciousness can be observed as the product of wage-level disparities in the case of the several nations. While in Western European countries raising social awareness of an environmental or social problem could be enough to change the way how people think and act towards that matter, in case of Central and Eastern Europe policy makers need to build a radical legislation framework in order to gain the same results.

The present study is based on the personal perception of the authors that the discipline of environmental sustainability cannot be distributed among market and social stakeholders without regards to economic benefits. The firms and the society will not show serious participation in environmental protection actions until their personal advantages will be proven. The distribution of Smart Metering systems is a good example for this. The essence of these devices is to track the energy consumption of households. Due to this system the residents could pay their bills according to their actual monthly consumption – like in the case of phone bills – instead of the common flat-rate scheme. The advantage of this metering system is the correct measurement which helps the costumers to plan their consumption more accurately. After a successful nation-wide Smart Metering project in Italy, the attitude of customers apparently changed. People from society used their household appliances less, started to operate with alternative solutions and changed the time of use. The reason for this phenomenon was that they were finally able to see the exact cost of their energy waste.

The success of the projects goes together with appropriate business and social attitude. However, it is necessary to make demonstration/pilot projects to evolve this attitude. So the final question is: where to start this process? Which comes first, the egg or the chicken? The answer – based on the Italian example – is that top-down solutions are necessary to start this circulation. Later on the society and the business sector will show their need for clean environment and make own efforts if they are able to see the financial advantages of it.

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