

# Sustainability assessment integrated into a single score using monetization: case study on a can deposit system in Belgium

**Benoît Liégey, Elisabeth van Overbeke, Simon Standaert, Mélanie Coppens, Bernard De Caevel**

*RDC Environment (Belgium)*

## 1. Context and scope

In 2011, RDC Environment carried out a sustainability assessment for Belgian Public Authorities, through a combined environmental, social and economic life cycle assessment, in which all dimensions have been monetized.

The purpose of this Cost-Benefit Analysis (CBA) was to analyze and balance environmental, social and economic impacts to determine whether a deposit system for beverage cans would be globally beneficial or not for Belgium.

Such a deposit system already exists in some European countries, a.o. Germany and the Netherlands.

The first step consisted in quantifying the different impacts over the life cycle, without any integration, focusing on the following impacts for the current scenario and the prospective scenario (with deposit):

- **Social impacts:**
  - Job intensity along the life cycle.
  - Cleanness associated to reduced can litter.
- **Environmental impacts:** a set of classical impacts categories are analysed:
  - Climate change
  - Non-renewable resource depletion
  - Eutrophication
  - Acidification
- **Economic costs:** cost data was collected or estimated. Besides infrastructures and logistics, the study also includes consumer time and space required at retail points.

The second step consisted in the integration of all those indicators, using monetization, which enables to quantify negative and positive externalities. As economic costs are

already in euros, only social and environmental impacts need to be monetized. For each type of impact, there is a specific way, among those 3: (1) modeling of the chain of effect and valuation of end-points; (2) observed political valuation and (3) surveys on willingness-to-pay or accept for a felt effect.

- For the investigated social impacts, we will describe the methodology used for monetization:
  - Job creation is monetized according to the preference revealed by Public Authorities through subsidies for job creation.
  - For the disamenity associated to can litter, RDC Environment performed a local contingent valuation to determine the willingness to pay of the population to avoid such disamenity. We will namely describe the data collection process.
- The environmental impacts are assessed using RDC's internal life cycle assessment tool (RangelCA) and its monetization method. This allows environmental effects to be associated to human welfare changes expressed in euro. This methodology is presented in details in a public study we made for the French Ministry of Ecology and Sustainable Development. This will not be detailed in this presentation as it is only related to environmental aspects.

Finally, we will discuss the importance of sustainability assessment in the decision-making process and the influence of this study on the stakeholders' position.

## 2. Main text

### **Methodology to assess social impacts : job creation and litter**

#### **Job creation**

Increase in employment rate is in many countries the main goal of economic policy. Evaluating this aspect is often compulsory for Public Authorities, in a sustainable development perspective.

To do so, the first step is to quantify the net job creation linked to the activity change, in Full-Time Equivalent (FTE). The term "net" means there is really an additional number of people working. Thus, job creation that merely shift activities or workers from a company to another, without increasing the labour market, are excluded.

In the can deposit case study, the analysis shows that all quantified jobs may be considered as net job creation. This job creation mainly arises at retail points and deposit sorting centres.

Creating a job is positive for the worker and for society. However, as policy making requires to weigh this aspect against other criteria, namely economic and

environmental impacts, it is relevant to evaluate in monetary terms the value for the society of a net job creation. The problem is complex, as taking into accounts all the costs and benefits for society implies the elaboration of a sophisticated model. Indeed, there is a large number of effects, including reduced expenses of social security, increased income for taxes, output of beneficiary work, better quality of life for the worker, better social cohesion...

To estimate the value of a net job creation from the perspective of the whole society, we use observed political valuation, making the following assumption:

*Public Authorities take into account the social benefit (worker) and the societal benefit (society) when defining the subsidies for job creation. Thus, the value of a job is equal to the maximum amount of subsidy given for the creation of a job during one year. The maximum value is considered as Public Authorities would not spend this amount if higher than the societal value. Using the average value would be meaningless as only the minimum amount is given to achieve the goal.*

However the reference subsidy should be selected with care for avoiding two possible biases in the valuation of societal benefits of job creation:

- **Deadweight:** there is a deadweight when the subsidy is used for a job that would have been created anyway. Consequently, the base value of a net job-year created is in fact higher than the amount of the subsidy allocated per person (ex: 2 jobs need to be subsidized for only 1 net job creation).
- **Feedback effect:** job creation generates an income for the State (income taxes, payroll taxes, avoided expenses for unemployment benefits...). For some subsidies, such an income may be taken into account when determining the budget. Consequently, the real value given by Public Authorities for job creation is in fact lower than the subsidy.

Therefore, the value retained by RDC is based on the subsidy given by the Walloon region (Belgium) for a reintegration program by work in a company. This subsidy minimizes not only deadweight, but also feedback effect. Indeed, deadweight is supposed very low as the profile of the people benefiting from this subsidy have great difficulty in finding a job, and would likely not have found any without this subsidy. Moreover, the feedback effect is also supposed to be reduced, as there is no direct link between the entity which offers the subsidy (regional authority) and the entity which gets the taxes on revenue (federal authority).

As a result, a value of **11 k€ per job-year** is used for expressing the societal externality of net job creation. It is obtained by dividing the amount of the subsidy by the time of the subsidy complemented by the expected time the person remains effectively working afterwards.

This value provides an order of magnitude that can be transferred to other geographical areas. Indeed, RDC Environment carried out previously an analysis on

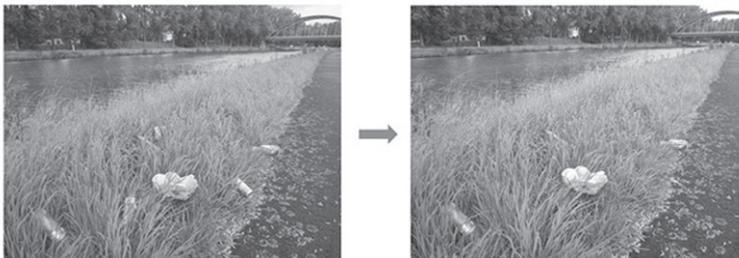
job creation valuation on the basis of subsidies in 16 European countries, USA and Canada. Accordingly, values of subsidies weighted by the GDP are quite constant among investigated countries.

### **Cleanness associated to reduced can litter**

To quantify the disamenity associated with the presence of can litter in Belgium, RDC Environment performed a local contingent valuation to determine the willingness to pay of the population to avoid such a disamenity.

It consists in directly asking a representative sample of the population how much they would be willing to pay to live in an area without litter (or less litter). This method has been developed by the economic theory to allocate a monetary value to non-market goods.

The survey, conducted online on a sample of 1 000 people, staged landscape change through photographs of public spaces “before and after”.



The questionnaire, developed by RDC, was entrusted to an external service provider for completion of the investigation. Statistical and econometric treatment of survey data was used to check the consistency of data and eliminate outliers, such as false zeros. The result is a range of values of “willingness-to-pay” (WTP) expressed in € / inhabitant / year, directly used in the cost-benefit analysis on the deposit on cans.

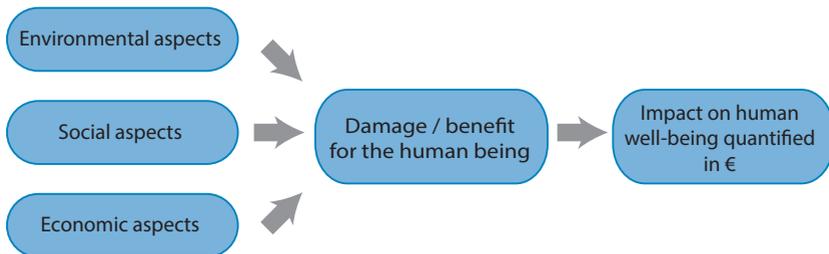
### **Integration into a single score and related benefits**

Balancing social impacts with other aspects is very challenging and decision-making often requires implicit arbitrary weighting between impacts.

If monetized, social impacts can easily be compared to monetized environmental and economic impacts, as they are additive and can be integrated into a single score in euro units.

Even though there may exist limitations in the model (data, modeling assumptions, geographical and temporal context) and all social aspects are not taken into account, monetization has the big advantage to make value judgments and assumptions explicit and to be much less penalizing than arbitrary weighting.

Moreover, by providing orders of magnitude of impacts, monetization allows data collection and modelling to be refined specifically for key points. The discussion focusses then on the uncertainties attached to these hotspots, which enhances the robustness of conclusions.



## Results and discussion

### Type of results : “Range graphs” to take into account uncertainty

Results are obtained with RDC’s internal life cycle assessment tool (Range LCA). The basic concept is that results must represent the diversity of individual cases, instead of considering an average case and a few alternative scenarios. In practice, variable parameters are modelled by attributing a probability of occurrence to their various possible values. The range of values represent either the diversity of situations (e.g. manual return of cans or use of a machine) or the uncertainty on a parameter (e.g. the labelling cost).

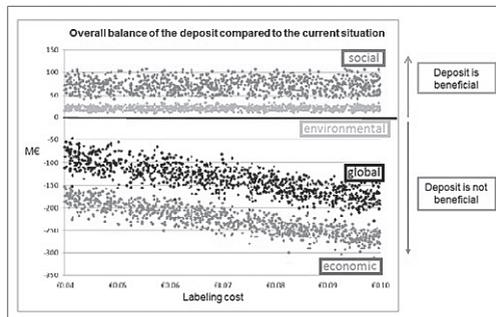
Results are presented in “Range graphs” as clouds of points. Each point represents one combination of variable parameters. The graph below shows the environmental, social and economic contributions to the global results. The benefit for the Belgian society (or welfare increase) of the introduction of a deposit system is plotted in function of an influencing parameter, the labelling cost per can. Positive values correspond to benefits (deposit is beneficial) while negative values refer to detrimental situations.

### Main conclusions

The introduction of a deposit system for cans results in significant environmental and social benefits.

Among studied social impacts, the benefits of avoiding can litter is much higher than the benefits of job creation.

However, the cost of implementing the can deposit system exceeds in all cases the associated environmental and social benefits. This deposit system has hence globally detrimental effects on the Belgian welfare.



The labeling cost is a sensitive parameter for economic impact but not for environmental and social impacts. However, the hierarchy remains the same for all value sets. This means conclusions are robust.

### Use of sustainability assessment to support decision-making at local level

This kind of integrated assessment is very useful to support policy makers in setting policies, both at national and local levels. The main advantages are the following: (1) it enables to take into account some social aspects over the life cycle in a holistic way; (2) it avoids to make arbitrary weighting between different types of impacts and (3) it enables to include local impacts in the quantitative evaluation process.

In this specific case, the loss of Human welfare due to economic cost outweighs the demonstrated social and environmental benefits. The Government decided not to implement such a can deposit. Such an approach can be applied for local projects like e.g. renovation of public buildings.

## References

French Ministry of the Environment, Monetization of environmental impacts related to recycling - Methodological Guide and Applications, study realized by RDC Environment (2007) <http://temis.documentation.developpement-durable.gouv.fr/documents/Temis/0062/Temis-0062814/18016.pdf>

RDC Environment, Value of job creation, internal report (2003)

Wallonia Waste Disposal Office, Sustainability assessment of the introduction of a can deposit system in Belgium, study realized by RDC Environment (2011) [http://environnement.wallonie.be/rapports/owd/pwd/rap\\_final\\_consigne.pdf](http://environnement.wallonie.be/rapports/owd/pwd/rap_final_consigne.pdf)

Wallonia Waste Disposal Office, Evaluation of environmental, economic and social benefits of different reuse scenarios by the social, study realized by RDC Environment (2008) [http://environnement.wallonie.be/rapports/owd/dechets\\_menagers/2008/rdc\\_juillet2008.pdf](http://environnement.wallonie.be/rapports/owd/dechets_menagers/2008/rdc_juillet2008.pdf)