ENVIRONMENTAL PERFORMANCES OF COMPANIES LISTED ON THE STOCK MARKET: A QUANTITATIVE ANALYSIS

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Socially responsible investment (SRI) and the number of published environmental reports are growing each year. The inclusion of environmental issues into business and finance is therefore accepted but still far from being a commonplace. Among the many factors for their acceptance, the quality of evaluation methodologies is a crucial issue and current evaluations of social and environmental issues still have a way to go before achieving the richnessrelevance of financial valuation procedures. Recent changes in the SRI community prove that such limitations are taken seriously. Current practice is therefore evolving from the evaluation of companies and investments with qualitative indicators (e.g. checking the implementation of environmental management systems) towards more integrated frameworks, including quantitative assessments of environmental damages.

A quantitative evaluation of the environmental impacts of companies, whether public or not, require scientific knowledge to make the appropriate choices with respect to the identification of key issues per sector, assessing indicators' quality or developing relevant benchmarking schemes.

Life cycle thinking as scientific basis

Life cycle thinking has the theoretical as well as practical potential to answer these needs and provide the basis for assessing the environmental performance of companies. This holistic approach goes further than the traditional production-centred view and consider environmental impacts on the whole chain of production (resources extraction, transformation and transport), during product use and end of life. With this integrated approach which combining diverse perspectives and data sources, it is therefore possible to identify key impacts, life cycle phase and indicators. It proposes rationales for aggregation based on the similarity of impacts (resource use, climate change, human health and ecosystems quality) which allow for a reduction of surveyed indicators and a better legibility. Large inventory databases are, in addition, available and can be combined with engineering, technical or economic data.

Quality and use of environmental corporate data

The primary source for quantitative analysis should be corporate, e.g. environmental reports. Such reports usually cover a large range of environmental indicators, e.g. CO_2 emissions, energy or water consumption.

First studies at EPFL have however shown that data published in environmental reports are currently not adequate for proper benchmarking of environmental performances: unequal geographical and turnover coverage, a focus on the production stage only (not considering up- and down-stream emissions or out-sourcing, unclear units (CO2 or CO2equ.?), and unclear accounting of energy (final or primary energy?). The major criticism is however that indicators are generic and not specific to the activity considered. They answer economic concerns (better use of resources) or issues well known from the general public rather than purely environmental considerations. Some crucial emissions and impacts are therefore not considered.

While such published data cannot be used in a “narrow” SRI perspective which aims at the identification of best environmental performers, it can however be helpful in a larger SRI perspective. A monitoring of the quality of the reporting and a dialogue with companies can foster a larger environmental respect. This monitoring can be based on a few simple validation techniques for the control of both the internal coherence of the dataset provided by a company and its realism compared to other companies. Such tests are, for example, the ratio of CO2 emissions to primary energy, which is a known fact and depends on primary energy sources. Figure 1 shows this ratio for 2500 processes and economic activities[1]. This ratio should typically range from X to X g of CO2 per MJ of final energy. Some companies were easily identified as providing incoherent data, by showing a ratio of around 10’000.

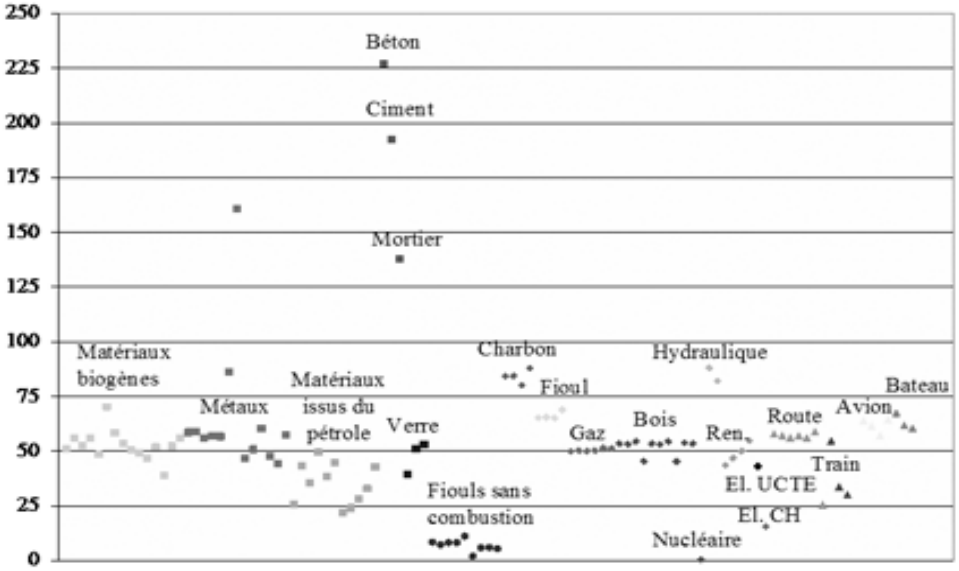

Figure 1. Emissions de CO2 par MJ d'énergie primaire non renouvelable

Another potential benchmark is the median of a sector or any other reference value. Such reference is however only usable after having identified the right basis for the comparison, which is sector specific. Some sectors show, for example, comparable data when divided by value-added, turnover, the number of employees or the offices surface. These techniques have proved to be superior to other attempts, e.g. looking at the evolution over time, which is flawed because of the lack of coordination when updating financial and environmental data and the inadequate reporting of structural changes (merger and acquisitions).

Benchmarking based on quantitative data

Benchmarking has therefore to be based on data external to the company. EPFL developed a methodology based on life cycle analysis which aims at measuring what companies do rather than what companies say. This three steps methodology combine bottom-up and top-down approaches and focus on key phases and key impacts. First, an industry chain profile is established, based on hybrid screening mixing process LCA and Input-Output analysis (a combination of National Accounting data and environmental emissions per sector) and the identification of reference processes, sectors and products. This profile provides an overview of all known impacts, a first assessment of the main characteristics of a sector as well as the identification of key measurable issues. During the second step relevant indicators, specific to each industry and the phase considered, are identified. The third step is the reconstruction of a company model, either by selection or aggregation of indicators. This last step is required since each company has a portfolio of activities, e.g. BMW turnover is at 80% in the automotive industry, 3% in the motorbike industry and 17% in the finance industry.

[1] The ratio is calculated based on Eco-invent ???, a Swiss database covering 2500 processes.

This approach is therefore sector specific and allow for a reduction of surveyed indicators. It is however complex due to the use of data sources with different scopes and different confidence levels. The analysis of the automotive industry showed, for example, large differences between the sources, making crucial a combined assessment and a cross-checking for ensuring validity. In addition, our focus is here on companies while data mainly concern processes, products or economic sectors.

Pharmaceuticals companies: key driving-forces of CO2 emissions

As announced earlier, due to the life cycle perspective, indicators can target key issues which are however usually ignored. Figure 2 illustrates the case of pharmaceuticals, where the main measurable impact is not related to the production per se but to the sales. Salesmen emitted more than 30% of CO2 in our case study. An appropriate indicator for this industry would therefore target, in priority the mobility of salesmen, e.g. the sales strategy and the type of car. The energy balance, CO2 emissions and costs of this company have here been assessed directly at the company level with the software Green-e, developed by the Life Cycle System Group - EPFL, for assessing environmental impacts based on economic and technical data provided by a company.

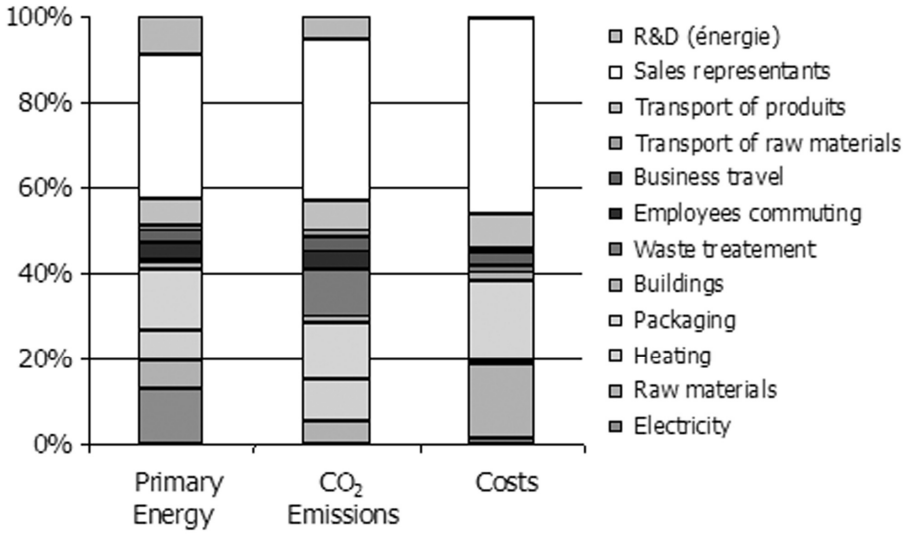

Figure 2. Primary energy, CO2 emissions and costs of a pharmaceutical company

The automotive industry: key phase & indicator

Within the automotive industry, corporate data is in line with the direct emissions given by the input-output analysis. It however completely underestimates the total impacts from this industry, because of the uncovering of the use phase, largely dominating.

Assessing the environmental impacts of the automotive industry is therefore better achieved by an indicator focusing on the use phase than by an indicator measuring the emissions during the production process or the water consumed in the factories. A potential indicator, developed by the Life Cycle System Group - EPFL is the “average emissions of a generic car per company”, in gCO2 per km. This indicator reflects both the technology efficiency and the marketing strategy of a company. A partial ranking, shown in figure 3, differentiate three groups of car makers. This ranking is different from the one based on the production phase (environmental reports) as well as from ranking based on other existing rationales, like the Energy label which impute scores within categories e.g. SUV and not across the whole range of cars.

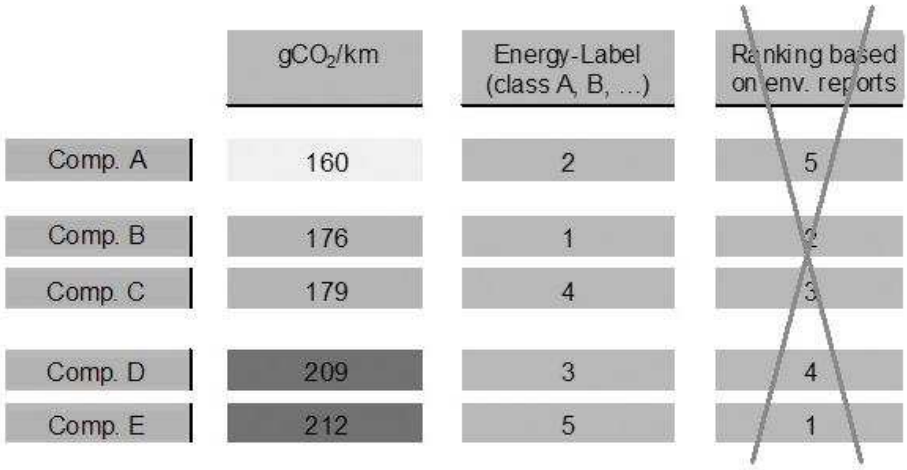

Figure 2. Partial ranking of automotive companies based on use phase data

Conclusion

While benchmarking environmental performances of companies based on quantitative data is a significant progress, further research is needed before its implementation on a large scale. Some sectors are clearly more difficult to assess than others and the proposed methodology needs refinement. Focusing on key issues up or downstream the production phase will, in addition ask questions about the distribution of responsibilities along the production and consumption chain. It is therefore currently advised to use quantitative assessments in parallel to qualitative ones until the former are further refined.