

The ADVANCE Guide to Sustainable Value Calculations

A practitioner handbook on the application of the Sustainable Value approach



Co-funded by the
EU LIFE Environment
Programme



The ADVANCE project is a joint project of the following institutions:



University of St Andrews & Sustainable Development Research Centre (SDRC), Forres, UK (www.sustainableresearch.com)

IZT – Institute for Futures Studies and Technology Assessment, Berlin, Germany (www.izt.de)

Avanzi SRI research, Milan, Italy (www.avanzi-sri.org)

GES Investment Services, Stockholm, Sweden (www.ges-invest.com)

Institute for Strategic Research (ISR), Budapest, Hungary (www.strategiakutato.hu)

scoris Sustainable Investment Research International, Hanover, Germany (www.scoris.de)

More information on the ADVANCE project can be found under www.advance-project.org

Authors

Frank Figge, Ralf Barkemeyer

University of St Andrews & Sustainable Development Research Centre (SDRC)

Tobias Hahn, Andrea Liesen

IZT – Institute for Futures Studies and Technology Assessment

Acknowledgements

The authors would like to thank Balázs Brunczel, Cristina Daverio, Martin Persson and Axel Wilhelm of the partnering eco-rating agencies as well as Timo Busch, Tell Münzing and Fiona Tilley who contributed to improve this handbook through their most helpful comments.

© The ADVANCE Project, 2006
Dissemination of this document is encouraged.

The project «Application and Dissemination of Value-Based Eco-Ratings in Financial Markets» (ADVANCE) has been co-financed by the EU LIFE Environment programme under grant number ENV/UK/000815.



Table of Contents

INTRODUCTION 4

SUSTAINABLE VALUE IN A NUTSHELL 6

HOW TO CALCULATE SUSTAINABLE VALUE 8

1 | Preparing for the assessment 8

- Choice of companies 8
- Choice of benchmark 8
- Definition of the resources to include 9
- Definition of the return figure 12
- Definition of the time span 13

2 | Data mining 13

- Collecting company data 13
- Collecting benchmark data 14
- Cross-checking data quality 14

3 | Calculating Sustainable Value 16

- How much return does the company create with its resources? 16
- How much return would the benchmark have created with each resource? 17
- What is the value contribution of each resource? 18
- How much Sustainable Value does the company create? 19

4 | Taking company size into account 20

5 | Interpreting and communicating the results 21

- Explanatory power of absolute Sustainable Value 21
- Explanatory power of the Return to Cost Ratio 23
- Potential users and uses of the results 23
- Transparency in communicating the results 24

CONCLUSION 26

MORE INFORMATION ON SUSTAINABLE VALUE 27

- About the project 27
- Publications 27
- Contacts 28

REFERENCES 29

Introduction

To operate companies not only need economic but also environmental and social resources. It is increasingly recognised that all three resources are in limited supply. The way we use these resources will determine the welfare and the sustainability of our society. Companies play a key role in this context. The welfare of our society can only be guaranteed if companies use economic, environmental and social resources wisely. It is therefore evermore acknowledged that performance measurement must not only cover the use of economic but also the use of environmental and social resources.

The need for and the rationale of integrated performance measurement and management is clearly articulated today. It is the practice that lags behind. This is due to the fact that economic resources and environmental and social resources are being treated differently. To assess the use of economic resources an opportunity cost approach is being used. From this perspective value is created if a resource is used more efficiently than through an alternative use of the same resource. A good example is performance assessment of financial investments. Value is created when an investment “beats its benchmark”. When it comes to the assessment of environmental and social resources existing approaches take a more complicated route. They stipulate that value is created when the costs related to the burden that the use of this resource inflicts on society are being covered. For this reason the burden, cost or harmfulness of a resource for society

must be determined. This largely fails in practice and so does integrated performance assessment for measuring corporate sustainability.

We have developed the Sustainable Value approach [1-4] to overcome these problems related to integrated performance assessment. Sustainable Value approaches the use of environmental and social resources in the same way in which we approach the use of economic resources today. A company creates Sustainable Value when it uses its set of economic, environmental and social resources more efficiently than the benchmark. There are two main advantages. Firstly, we are now assessing economic, environmental and social resources for the first time with the same approach. Secondly, by using opportunity cost thinking, Sustainable Value is based on data that is readily available. Both are necessary conditions for a successful integrated performance measurement of corporate sustainability.

As part of the EU-funded ADVANCE project we applied the Sustainable Value approach to measure the environmental performance of 65 European companies. The survey showed that the approach can easily be used in practice and provides inspiring results with the data that is publicly available today.

This handbook is the next step of the ADVANCE project. In this short handbook we give an overview on how Sustainable Value-assessments can be carried through. Sustainable Value is based on the economic, environmental and social information that is publicly available. There are a great number of issues that are

related to this information. Dealing with all these issues in detail would go beyond the scope of this handbook which deals primarily with the way Sustainable Value can be assessed on the basis of existing information. Therefore, this handbook will concentrate on providing a step by step guide to carry out Sustainable Value assessments. The handbook addresses some related key issues concerning corporate sustainability reporting but will not go into greater detail concerning reporting issues. There is considerable literature on sustainability reporting which addresses most of the relevant issues.

We hope that this handbook enables its readers to conduct Sustainable Value assessments and thus helps to facilitate the wide-spread use and adoption of Sustainable Value in corporate practice – and to translate economic, environmental and social information into an integrated measure of sustainable performance.

Sustainable Value in a nutshell

Sustainable Value measures corporate sustainable performance in monetary terms. For this purpose, it utilises the well-established logic of financial analysis.

Conventionally, investors and analysts concentrate on the return on capital to assess investment performance. Investors face an interesting problem in this context. To know if they have made a good investment, they must find out if their return on capital has covered the cost of capital. Unfortunately, capital is a resource without a price tag. Investors therefore compare the return of their investment to the return on alternative investments. These possible alternative investments are called benchmark. Only an investment that beats the benchmark creates value. This reasoning is built on a very fundamental rule. Value is created whenever the return of an investment exceeds its costs. The benchmark thus defines the cost of capital. And only an investment that covers the cost of capital creates value.

However, companies not only use economic capital but also environmental and social resources to create a return. In order to assess corporate sustainable performance we need to assess whether the use of the entire bundle of resources has created value. Sustainable Value therefore applies the logic of investment performance assessment to environmental and social resources. To create value the return on environmental and social resources must cover the costs of these resources. Sustainable Value compares the resource use of a company to a

benchmark and thus defines the cost of each resource via opportunity costs.

The underlying logic of the Sustainable Value approach can be explained using a simple example. In 2003, the Italian autoparts company Pirelli emitted 1.37 million tons of CO₂. At the same time, it created a Gross Value Added of 2.03 billion € and thus 1,478 € per ton of CO₂. In this example we use the performance of the EU15 economy as benchmark. In 2003, the EU15 created 2,701 € GDP per ton of CO₂ emitted. The benchmark thus outperforms Pirelli by 1,223 € per ton of CO₂. Used by Pirelli, 1.37 million tons of CO₂ create 2.03 billion €. If the same amount of CO₂ emissions had been used by the EU15 instead of Pirelli, a return of 3.7 billion € would have resulted. This represents the

	Return	-	Cost	=	Value
		Amount of CO ₂ -emissions used			
		1,370,613 t			
	Company		Benchmark EU15		
Efficiency	1,478 € / ton of CO ₂	-	2,701 € / ton of CO ₂	=	-1,223 € / ton of CO ₂
Absolute terms	2,026,000,000 €	-	3,702,623,890 €	=	-1,676,623,890 €

Figure 1. CO₂-value contribution of Pirelli in 2003 (Sources: own calculations based on [5])

opportunity cost of Pirelli's CO₂-emissions. We now compare the return that the company has created with the return the benchmark would have created with the company's resources (opportunity costs). In this case, the benchmark would have created a higher return than Pirelli. In 2003, Pirelli thus did not cover the (opportunity) costs of its CO₂-emissions and therefore did not use CO₂ in a value-creating way. The value contribution of Pirelli's CO₂-emissions in 2003 is € 2.03 billion - € 3.7 billion = € -1.67 billion.

Sustainable Value applies this line of thinking to all kinds of resources that companies use. It expresses the use of economic, environmental and social resources in monetary terms. As a result, Sustainable Value shows in monetary terms the value that a company creates or destroys by the use of a set of different resources. Sustainable Value extends the logic of financial markets beyond economic capital to environmental and social resources. Sustainable Value translates corporate sustainable performance into a language that is in line with managers' and investors' thinking.

How to calculate Sustainable Value

In the following, we provide a step by step guide to the assessment of corporate environmental and sustainable performance with the Sustainable Value approach. The process of using Sustainable Value can be best structured into the following five domains:

1. Preparing for the assessment
2. Data mining
3. Calculating Sustainable Value
4. Taking company size into account
5. Interpreting and communicating the results

Below, the assessment steps in these five areas are addressed and explained in detail.

1 | Preparing for the assessment

Before starting with the calculation of Sustainable Value, the scope of the analysis has to be defined. This comprises the five following steps:

- Choice of companies
- Choice of benchmark
- Definition of the resources to be included
- Definition of the return figure

- Definition of the time span

These steps are necessary to define the scope of an assessment of corporate environmental or sustainable performance with the Sustainable Value approach. Each of these steps is now described in further detail.

Choice of companies

The first step of defining the scope of Sustainable Value assessments is to choose the companies that should be analysed. One simple but essential precondition for a company to be assessed is that the respective data on the resources used is actually available. As will be pointed out below, there can be numerous pitfalls regarding the scope and quality of data.

A typical area of application would be a Sustainable Value assessment of companies within an industry sector. However, the ADVANCE survey has reinforced our view that both intra-sector and inter-sector assessments can produce meaningful results. While best-in-class assessments can identify sector leaders and provide insight into the room for improvement within a particular sector, a key strength of inter-sector assessments with the Sustainable Value approach is that they can uncover the potential of structural change for Sustainable Development.

Choice of benchmark

The choice of the benchmark is a crucial step in Sustainable Value assessments, as the benchmark defines the opportunity costs.

Similar to financial analysis the explanatory power of Sustainable Value assessment results depends largely on the benchmark chosen. Consequently, the benchmark should be chosen with great deliberation. In the ADVANCE survey we chose the EU15 economy as the benchmark. This means, that we compared the efficiency of the resource use in companies to the average efficiency in the EU15 countries. A positive (negative) Sustainable Value in the ADVANCE survey thus indicates that a company has used its environmental resources more (less) efficiently than the EU15 on average.

However, Sustainable Value analyses can be conducted with different benchmarks. For instance, national economies or a sector average can be used as benchmark for Sustainable Value assessments. We have shown the applicability of such benchmarks under real world conditions in several case studies [4, 6-8].

Methodologically speaking, the benchmark efficiency defines a hurdle that companies must pass in order to create Sustainable Value. The choice of benchmark thus defines how high this hurdle should be. When defining the benchmark one can for instance choose between different points in time. In the ADVANCE survey we have analysed two scenarios. In the past performance scenario we have chosen the past performance of the EU15 economy as the benchmark. This means that we compared company performance to the benchmark in the respective year. However, one could argue that it is not sufficient to be more efficient than the benchmark today. Therefore, to lift the hurdle, future efficiency targets could be used as benchmark in Sustainable Value

assessments. In the future performance scenario of the ADVANCE survey we therefore used a benchmark that considers the EU15 performance targets for the year 2010. In this scenario, companies thus only create a positive Sustainable Value if they use their environmental resources more efficiently than the EU15 target efficiencies already today.

In general, when choosing the benchmark one should keep in mind that the results of Sustainable Value analyses express the performance of a company relative to the benchmark that has been chosen. Therefore, it is important to carefully define and choose the benchmark.

Definition of the resources to include

Sustainable Value assessments can include different kinds of resources. In general, any resource that can be reasonably quantified can be included in the analysis of sustainable performance with the Sustainable Value approach. This holds true for the use of economic, environmental and social resources companies employ. Sustainable Value assessments can thus cover and integrate all three dimensions of the sustainability concept.

In the ADVANCE survey, we chose to assess the use of seven environmental resources. We showed in previous case studies that the set of resources considered can be enlarged to cover also economic and social resources. With these case studies we demonstrated that the Sustainable Value approach can be used under real world conditions to provide integrative and monetary

assessments of triple bottom line performance of companies [4, 6, 8]. The application of Sustainable Value is therefore not restricted to an assessment of the use of environmental resources.

In this context, it is important to keep in mind that the resources that are to be included must be measurable and quantifiable in a meaningful way. When choosing a resource one should define at the same time how, i.e. using which indicator, the resource use should be measured. In ADVANCE, we defined a data specification sheet for each resource to be included, in which we defined the indicators that were applied to measure the resource use. For instance, in the context of water use one has to define whether the use of cooling water should be included or not. Furthermore, when defining the resources that should be included it is important to avoid double counting. For example, one should include either energy use or energy related emissions. As these indicators are directly related, there would be an overlap and thus double counting if both were taken into account.

Below, some common economic, environmental and social resources that could be included in a Sustainable Value assessment are listed, highlighting some of the most important issues that need to be kept in mind when applying these indicators.

Analogously to financial analysis, the capital use of a company can be taken into account in Sustainable Value analyses to cover the use of economic resources. Capital use can, e.g. be measured in terms of fixed assets or total assets of a company.

There are various environmental resources that can be included in Sustainable Value assessments. In the following, we outline the environmental aspects that are most commonly reported by companies:

- Carbon dioxide (CO₂)
Methodologically, when including CO₂-emissions into the assessment, it has to be decided whether just direct emissions (emissions from combustion processes) of an entity or also indirect emissions (emissions taking place at the supplier of electricity, which is used by the company) are taken into account. Other issues to be resolved are whether to include transport-related CO₂-emissions or how to treat the CO₂-emissions of bio fuels (which could be considered CO₂-neutral).
- Methane (CH₄)
Methane is a major contributor to global warming. The same methodological issues as regarding CO₂ apply to methane emissions.
- Carbon dioxide equivalents (CO₂-eq)
Depending on data availability, another option to take greenhouse gases into account are CO₂-equivalents. In this case, all emissions that contribute to global warming are converted and summed up as carbon dioxide equivalents. Remember to avoid double counting: if CO₂-eq are assessed, no additional greenhouse gas emissions should be taken into account in the assessment. The same methodological issues

as in the case of CO₂ (direct vs. indirect emissions, transport-related emissions, bio fuels) apply to CO₂-eq emissions.

- Energy consumption
As an alternative to considering energy related emissions (such as CO₂, NO_x, etc.) the energy consumption of a company can be taken into account. In this context, it has to be kept in mind that the actual impact of a company's energy consumption is largely determined by the way in which this energy is produced. However, double counting of environmental impacts has to be avoided. If energy consumption is taken into account no energy related emissions should be considered.
- Emissions of Ozone Depleting Substances (t of CFC11-eq)
Emissions of ozone depleting substances are commonly reported in terms of tons of CFC11-equivalents. Under this indicator, all emissions that harm the stratospheric ozone layer are summed up according to their ozone depleting potential. Further guidance on how to calculate ODS can be found in Chapter III.E. of the UNCTAD Manual for the Preparers and Users of Eco-efficiency Indicators [9].
- Sulphur oxides emissions (SO_x)
Sulphur oxides emissions contribute to acidification and are mainly related to combustion processes. They are commonly reported on the basis of all emissions from stationary sources. In principle, transport-related SO_x-emissions could also be included but are rarely reported.

- Nitrogen oxides emissions (NO_x)
NO_x-emissions, another major source of acidification, are also mainly related to combustion processes. The reporting of emissions of nitrogen oxides mainly refers to emissions from stationary sources, even if emissions from transports could be taken into account.
- Waste generation
There coexist a multitude of differing definitions of waste on the corporate as well as on the national level. This makes comparisons of waste figures notoriously difficult. Issues to be aware of are whether or how to account for recycling, landfill waste, incineration, and by-products. Furthermore, waste can be reported on a wet or dry basis, leading to significant differences in weight and volume.
- Water use
One major issue regarding water use of companies is the question whether to include cooling water and how to account for closed-loop circles.
- Emissions of volatile organic compounds (VOC)
VOCs are mainly produced in combustion processes and through the use of solvents. They are significant contributors to smog as well as to the formation of ground level ozone. Commonly, VOC-emissions from stationary sources are reported.

Other possible indicators that could be applied to assess the use of environmental resources could be e.g. the emissions of particulates or the land use of corporate operations.

As illustrated in a number of case studies [4, 6-8], Sustainable Value assessments can cover the triple bottom line, i.e. economic, environmental and social aspects. Next to economic resources, like capital used, and different environmental indicators as discussed above, social indicators can be included. However, in order to be included in Sustainable Value analyses, social aspects have to be quantifiable and comparable data on the corporate as well as on the benchmark level has to be available. The following two social aspects are the most likely to meet these requirements.

- Number of Work accidents

The most important problem in the context of work accidents is the multitude of definitions regarding the term “work accident”. Issues to be addressed are the question whether to include commuting accidents or in which unit work accidents are measured (e.g. number of accidents, days of working time lost, etc.).

- Number of employees

Here, the question of how to account for seasonal workers has to be addressed. For instance, the average work force per year could be taken into account or the number of employees in fulltime employee equivalents as of a certain point in time.

In the following list we suggest other social indicators that could possibly be included. However, most of these indicators are not

reported by companies in a consistent and/or comprehensive and comparable way on a broader scale.

- Extra time
- Corporate giving
- Apprenticeships/Education expenditure
- Gender-related indicators
- Legal violations

Generally, the suitability of indicators will to a certain extent depend on the desired explanatory power of the results. If, e.g. you are interested in the contribution of a company to solving the climate change challenge then greenhouse gases are obvious indicators.

It is likely that there will remain gaps in the data collection. If data is e.g. extrapolated or estimated, it is essential to thoroughly document and disclose the calculation one has carried out to arrive at one’s data set.

Further guidance on the selection and definition of appropriate indicators can be obtained from the UNCTAD Manual for the Preparers and Users of Eco-efficiency Indicators [9].

Definition of the return figure

The next step of defining the scope of Sustainable Value assessments is the choice of the return figure. As pointed out above, Sustainable Value compares the resource efficiency of

companies to the efficiency of a benchmark. To calculate efficiencies we have to look at how much return a company creates per resource unit. In this context, different return figures could be used. This corresponds to different perspectives on the company. If one chooses e.g. profits as the return figure, the perspective of capital providers is adopted. In contrast, personnel expenses represent the return that companies create for employees. Finally, value added could be used to adopt a societal perspective as in the ADVANCE survey. Value added benefits the providers of capital, personnel and the government. Similar to the choice of resources above, it has to be defined how the return figure should be measured both for the company and the benchmark level. In this context, it is important to make sure that the return figures on the corporate and the benchmark level match. Therefore in ADVANCE, we have chosen EU15 Gross Domestic Product (GDP) as the return figure on the benchmark level as Gross Value Added – the return figure used on the company level – represents the contribution of a company to GDP.

Definition of the time span

Finally, the time span of the Sustainable Value assessment has to be defined. Generally, a larger time span can help identify mavericks and consequently improve the accuracy of the data set. Moreover, the assessment of a number of consecutive years can reveal performance trends. In addition, significant changes in the data over the years help to identify cases in which the company

structure has changed due to mergers, acquisitions or divestitures. One important issue to be kept in mind is that a company's fiscal year does not necessarily match with the calendar year. Therefore, if a company's fiscal year spans for example from April to March, a decision has to be taken how to relate this data to company data covering a calendar year.

Together these five steps of defining the scope of a Sustainable Value analysis largely determine the explanatory power and meaning of the results of the assessment. This should be kept in mind from the very beginning. At the same time it is important to reflect the scope when interpreting and communicating the results (see page 21 below).

2 | Data mining

Data mining represents the second area of Sustainable Value assessments. Based on the definition of the scope of the analysis as described in the preceding section, data has to be collected both for the company and the benchmark level. The experience of the ADVANCE survey shows that unfortunately the quality of environmental and social reporting of many companies is still rather poor. Therefore, it is important to cross-check data quality before using the data for Sustainable Value calculations.

Collecting company data

As the first part of data mining, company data has to be collected. This means that data on resources used and return created has to

be gathered. Data collection follows the specifications that have been laid down in the scope of the survey. For every company and every year under analysis data must be collected on the use of every resource that is included in the assessment. The collected data and the data sources must be well documented.

One of the key strengths of the Sustainable Value method is that it can be applied to readily available company information. The financial data is usually either obtained from the companies' annual reports and financial statements (e.g. profit or asset figures), or can be calculated on the basis of data gathered from these sources (e.g. gross value added as applied in the ADVANCE survey, see above). Additional data sources can be publicly available databases such as Hemscoff.

Corporate environmental and social performance data can be collected from the companies' environmental or sustainability reports, and their respective websites. Remember that particular attention has to be paid to the scope of the environmental and social data – the scope of the data on all resources has to be congruent in order to enable a meaningful Sustainable Value assessment.

Collecting benchmark data

In the next step, and following the specifications of the scope of the analysis, benchmark data has to be collected. Similar to the company level benchmark data must cover resources used and return created. Depending on which benchmark has been chosen,

readily available data from sources like national statistics or similar can be used. In other cases, the benchmark has to be constructed. For instance, sector data is often not publicly available and has to be calculated or estimated. In any case it is important to properly document all data and calculations including the sources that have been used.

In the ADVANCE survey, the EU15-level benchmark performance data was collected from various sources, including the European Environment Information and Observation Network (EIONET) Topic Centres of the European Environmental Agency (EEA) for water and waste data, the National Inventory Submissions to the Greenhouse Gas Inventories under the United Nations Framework Convention on Climate Change (UNFCCC) for data on air emissions, and EUROSTAT for economic performance data. Possible other sources, particularly for the collection of social performance data, include publications of national statistical offices, the International Labour Organization (ILO), the Organization for Economic Co-operation and Development (OECD), or the various UN institutions.

Cross-checking data quality

Before the collected data can be used to calculate Sustainable Value its quality has to be checked. Unfortunately, to date there are no reliable and binding standards in corporate environmental and sustainability reporting. Consequently, the data that has been collected has to be checked. There are three major issues in data

quality that should be addressed before calculating Sustainable Value.

Firstly, the consistency of the data has to be checked. This means that one has to make sure that the data on resource use follows the same definitions and measurement rules. If not, comparability between companies is not a given. For instance, some companies report their greenhouse gas emissions in terms of CO₂-equivalents. In such cases, different greenhouse gases are often aggregated into one indicator. Thus, there is no direct comparability to distinct figures on single greenhouse gases such as carbon dioxide or methane. Another prominent example is waste definitions, which tend to vary between countries, sectors and even companies. Another issue in the context of waste figures is the inclusion of recycled waste. Not all companies provide transparent and clear figures on their different waste fractions. Furthermore, it happens quite often that companies change their reporting rules over time, which can impede comparability.

Secondly, it is very important to ensure that the return figure and the data on resource use cover the same scope. This means that the economic and the environmental performance data must address the same area of activities. This holds for both the company and the benchmark level. This problem gets particularly virulent with corporate environmental and social performance data. While consolidated corporate financial data can easily be found in corporate annual and financial reports, environmental and social performance data is often not consolidated. This means that companies do not always report company-wide environmental

and social data. It happens that the reported data just covers part of the operations, e.g. only the core business and/or a specific region. However, some companies do not even give information of the scope of the environmental and social performance data they report. In the ADVANCE survey we experienced a number of cases in which the scope of environmental data was incomplete. For instance, a major car manufacturer excludes the emissions of power plants that it operates from its environmental data. Other companies could not be included in the survey due to the poor quality of environmental data. This was the case for some major European utility companies that only reported on a small fraction of their operations. Another possible source of changes in the scope of the data are mergers and acquisitions.

If the scope of the environmental figures does not match the scope of the return figure the data cannot be used for Sustainable Value assessments as this would lead to biased results. In cases where the scope of environmental data is incomplete one can extrapolate the environmental data based on information given by the company (e.g. percentage of production or sales covered by the data). Alternatively, the scope of the financial data can be reduced to match the scope of the environmental data. This is mainly applicable in cases in which the environmental data covers specific business segments of a company for which segment financial data is available in the financial report.

Finally, the accuracy of the collected data has to be checked. One of the most eye-opening experiences during data mining for the ADVANCE survey has been that it cannot be taken for granted that

the environmental and social data of corporate reports is correct. There were several cases in which it became obvious that the reported data was incorrect. For instance, we found that a major European engineering & machinery company overstated its SO_x and NO_x-emissions by a factor of 1,000 over more than five years. One way to check the plausibility of data is to compare the efficiencies of companies belonging to the same sector. In the example cited above the engineering & machinery company would have had a SO_x- and NO_x-efficiency in the range of an oil & gas company if the reported data had been correct.

__ 3 | Calculating Sustainable Value

The calculation of Sustainable Value is done in four steps. Each step addresses a specific assessment question:

- Step1
How much return does the company create with its resources?
- Step2
How much return would the benchmark have created with each resource?
- Step3
What is the value contribution of each resource?
- Step 4
How much Sustainable Value does the company create?

In the following, every step will be illustrated and explained by using the real world example of the Italian autoparts company Pirelli and its performance in 2003.

How much return does the company create with its resources?

Companies use a set of different resources to create a return. In the first step, the return that has been created by the company with its resources is determined for every year under analysis. Usually, this information can be directly obtained from the data collected on the corporate return figure. However, in some cases the return of the company has to be calculated. In the ADVANCE survey we have used Gross Value Added as the return figure on the company level. As most of the companies do not report Gross Value Added, we have approximated it via the sum of ordinary EBITDA (Earnings before Interest, Taxes and Depreciation) and personnel expenses [10, 11].

Pirelli is one of the 65 companies we have analysed in the ADVANCE survey. In 2003, Pirelli created a Gross Value Added of € 2,026,000,000 with its resources. With this information we can now also calculate the efficiency of the resource use by the company. For this purpose for each resource under analysis the return of the company is divided by the amount of resources used in one year. For example, Pirelli used 1,370,613 tons of CO₂ in 2003. Pirelli thus achieved € 1,478 of Gross Value Added per each ton of CO₂ emitted. Table 1 shows the amount of resources

used by Pirelli in 2003 and the resulting efficiencies for each resource.

		Amount of resources used in 2003	Efficiency of Pirelli in 2003
Table 1. Resource efficiencies of Pirelli in 2003 (Source: based on [5]).	CO ₂ -emissions	1,370,613 t	1,478 €/t
	NO _x -emissions	772 t	2,625,784 €/t
	SO _x -emissions	0 t	- €/t
	Waste generated	171,867 t	11,788 €/t
	Water used	29,960,663 m ³	68 €/m ³
	VOC-emissions	4,111 t	492,824 €/t
	CH ₄ -emissions	0 t	- €/t

How much return would the benchmark have created with each resource?

In the second step the opportunity costs of corporate resources are determined. For this purpose, it is calculated how much return would be created, if the resources were used not by the company but by the benchmark. As the resources are used by the company, the return the benchmark would create with these resources is foregone. This foregone return is called an opportunity cost.

To calculate the opportunity costs we look at the resource efficiency of the benchmark. The resource efficiency of the benchmark is calculated by dividing the return of the benchmark by the amount of each resource used by the benchmark, respectively. These efficiencies show how much return the benchmark creates per unit of a resource. In the ADVANCE survey

the EU15 economy served as the benchmark and we have looked at Gross Domestic Product (GDP) as the return figure. In this case, the efficiencies of the benchmark thus show how much GDP the EU15 creates per resource unit. For instance, in 2003 GDP in the EU15 amounted to € 9,312.8 billion. At the same time CO₂-emissions in the EU15 were 3,447,354,190 tons. The EU15 thus achieved € 2,701 GDP per ton of CO₂-emissions. Table 2 shows the efficiencies of the EU15-benchmark for the year 2003 for the seven environmental resources we have used in the ADVANCE survey.

Table 2. Resource efficiencies of the EU15 in 2003 (Source: based on [5])

	Efficiency of the EU15 in 2003
CO ₂ -emissions	2,701 €/t
NO _x -emissions	1,004,300 €/t
SO _x -emissions	1,779,304 €/t
Waste generated	6,270 €/t
Water used	41 €/m ³
VOC-emissions	970,676 €/t
CH ₄ -emissions	586,083 €/t

The efficiency of the benchmark can now be used to calculate the opportunity costs of the resources of the company. Remember that the opportunity cost is defined by the return that the benchmark would have created with the resources of the company. To calculate the opportunity costs we therefore multiply the efficiency of the benchmark with the amount of resources the company has used. Opportunity costs are calculated for every resource under consideration. Table 3 shows the opportunity costs of the use of seven environmental resources by Pirelli in 2003 as calculated in the ADVANCE survey.

	Efficiency of the EU15 in 2003		Amount used by Pirelli in 2003		Opportunity costs
CO ₂ -emissions	2,701 €/t	*	1,370,613 t	=	€ 3,702,623,890
NO _x -emissions	1,004,300 €/t	*	772 t	=	€ 774,896,587
SO _x -emissions	1,779,304 €/t	*	0 t	=	€ 0
Waste generated	6,270 €/t	*	171,867 t	=	€ 1,077,583,797
Water used	41 €/m ³	*	29,960,663 m ³	=	€ 1,242,562,830
VOC-emissions	970,676 €/t	*	4,111 t	=	€ 3,990,450,456
CH ₄ -emissions	586,083 €/t	*	0 t	=	€ 0

Table 3. Opportunity costs of the resource use by Pirelli in 2003 (Source: own calculations based on [5])

In our example, an interesting case arises with sulphur oxide and methane emissions. In 2003, Pirelli did not emit any SO_x and CH₄. However, with no SO_x- and CH₄-emissions the EU15 would have created no return as the EU15 economy depends on these emissions as reflected by the EU15's SO_x- and CH₄-efficiencies. This means that in the case of Pirelli the opportunity costs for SO_x- and CH₄-emissions are zero.

What is the value contribution of each resource?

To answer the question which resources are used by the company in a value-creating way, we compare the return the company creates with the opportunity costs. In other words, the return of the company is compared to the return the benchmark would have created with resources of the company. For this purpose we subtract the opportunity costs of each resource from the Gross

Value Added of the company. The result of this step is called value contribution. It shows how much more or less value a company creates with a resource compared to the benchmark. In the case of Pirelli in the year 2003 the value contribution of the CO₂-emissions is negative: Pirelli has created about € 1.68 billion less return than the benchmark would have created with this amount of CO₂-emissions. In other words, Pirelli has not covered the opportunity costs of the CO₂-emissions it has caused. Table 4 shows the value contributions of Pirelli in 2003 for all seven environmental resources included in the ADVANCE survey.

	Return of Pirelli in 2003	Opportunity costs	Value contribution
CO ₂ -emissions	€ 2,026,000,000	- € 3,702,623,890	= -€ 1,676,623,890
NO _x -emissions	€ 2,026,000,000	- € 774,896,587	= € 1,251,103,413
SO _x -emissions	€ 2,026,000,000	- € 0	= € 2,026,000,000
Waste generated	€ 2,026,000,000	- € 1,077,583,797	= € 948,416,203
Water used	€ 2,026,000,000	- € 1,242,562,830	= € 783,437,170
VOC-emissions	€ 2,026,000,000	- € 3,990,450,456	= -€ 1,964,450,456
CH ₄ -emissions	€ 2,026,000,000	- € 0	= € 2,026,000,000

Table 4. Value contributions of the resource use by Pirelli in 2003 (Source: own calculations based on [5]).

It can be seen that in 2003 Pirelli used five out of the seven environmental resources in a value-creating way. For SO_x- and CH₄-emissions the value contribution even equals the return, i.e. Gross Value Added of Pirelli. As Pirelli did not emit these gases opportunity costs are zero.

How much Sustainable Value does the company create?

In the fourth and last step Sustainable Value is calculated. So far, we have calculated how much value each individual resource creates. However, companies use more than one resource. We now determine how much value is created by the entire bundle of resources. Up to this point, we have assumed that each individual resource creates the entire value by itself. Simply summing up all value contributions would thus result in double counting.

Therefore, to calculate Sustainable Value we divide the sum of the value contributions by the number of resources considered. Through this aggregation the resources are weighted relative to their efficiency on the benchmark level. For instance, in 2003 the creation of the EU15 GDP required 5,233,964 tons of SO_x-emissions and 9,272,939 tons of NO_x-emissions. In other words, to create GDP in the EU15 each ton of SO_x-emissions is bundled with about 1.8 tons of NO_x-emissions. This means that SO_x-emissions have a weighting factor of 1.8 compared to NO_x-emissions.

Likewise, the opportunity costs of the complete resource bundle used by a company can be calculated through the average of the opportunity costs of all resources considered. The calculation of Sustainable Value thus boils down to subtracting total opportunity costs from the return of the company. Value is only created if the return exceeds the costs. This holds for both, single resources and the complete bundle of resources. Hence, Sustainable Value shows how much more or less return a company has created with its bundle of resources compared to a benchmark.

	Return of Pirelli in 2003	Opportunity costs	Value contribution
CO ₂ -emissions	€ 2,026,000,000	- € 3,702,623,890	= -€ 1,676,623,890
NO _x -emissions	€ 2,026,000,000	- € 774,896,587	= € 1,251,103,413
SO _x -emissions	€ 2,026,000,000	- € 0	= € 2,026,000,000
Waste generated	€ 2,026,000,000	- € 1,077,583,797	= € 948,416,203
Water used	€ 2,026,000,000	- € 1,242,562,830	= € 783,437,170
VOC-emissions	€ 2,026,000,000	- € 3,990,450,456	= -€ 1,964,450,456
CH ₄ -emissions	€ 2,026,000,000	- € 0	= € 2,026,000,000
	Return	- Cost	= Value
Sustainable Value	€ 2,026,000,000	- € 1,541,159,651	= € 484,840,349

Table 5. Sustainable Value of Pirelli in 2003 (Source: own calculations based on [5]).

Table 5 illustrates that in 2003 Pirelli created a positive Sustainable Value of almost € 485 million. With its return of € 2.03 billion Gross Value Added Pirelli covered the total opportunity costs of its environmental resources which amounted to € 1.54 billion. This means that overall, Pirelli used its environmental resources in a value creating way compared to the EU15 on average.

4 | Taking company size into account

When comparing companies, a size effect gets in the way. Usually, large companies are expected to have larger profit, sales or cash flow figures. The same applies to Sustainable Value figures. We therefore take company size into account when comparing different companies. For this purpose, we use the so-called Return to Cost Ratio (RCR). The Return to Cost Ratio compares the return of a company to the return the benchmark would have created with the resources of the company (opportunity costs). Thus, it is a typical benefit-to-cost-ratio. A Return to Cost Ratio larger (smaller) than 1 indicates that the company yields more (less) return per unit of resource, i.e. the company uses its bundle of resources more (less) efficiently than the benchmark.

The easiest way to calculate the Return to Cost Ratio is to fall back on the very fundamental insight that value is only created when the return exceeds the costs of an activity. Recall that Sustainable Value is only created if a company’s return exceeds the opportunity costs of the resources it uses. Thus, the following holds:

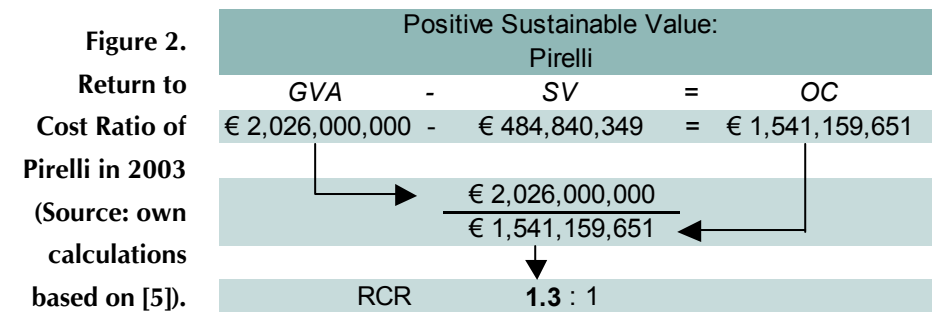
$$\text{Sustainable Value} = \text{Return} - \text{Opportunity Costs}$$

As explained above, the Return to Cost Ratio represents the ratio between the return of the company and the opportunity costs. To calculate the opportunity costs we only need to rearrange the above formula slightly. The following holds:

$$\text{Opportunity costs} = \text{Return} - \text{Sustainable Value}$$

In the ADVANCE survey, the return is measured in terms of Gross Value Added while the opportunity costs are measured in terms of the GDP the EU15 would have created with the set of resources of the company. These opportunity costs can thus easily be calculated by subtracting the Sustainable Value of a company from its Gross Value Added. The opportunity costs of Pirelli’s set of resources in 2003 thus amounts to € 1,541,159,651 (Gross Value Added of € 2,026,000,000 – Sustainable Value of € 484,840,349).

To calculate the Return to Cost Ratio we can now distinguish between two cases. In the first case, the company has a positive Sustainable Value, i.e. it uses its resources more efficiently than the benchmark. In this case the return to cost ratio is calculated by dividing the return of the company by the opportunity costs. This applies to the example of Pirelli for the year 2003. Dividing Pirelli’s Gross Value Added by the total opportunity costs of its resources yields a factor of 1.3. This means that the Return to Cost Ratio of Pirelli for 2003 is 1.3 : 1 and shows that Pirelli was 1.3 more eco-efficient than the EU15 on average. Figure 2 illustrates the case of Pirelli’s Return to Cost Ratio.



In the second case, the Sustainable Value of the company is negative. This means that the company uses its resources less efficiently than the benchmark. In this case, to calculate the Return to Cost Ratio we divide the opportunity costs by the Gross Value Added of the company. The performance of the Dutch chemicals company Royal DSM is a good example in this context. In 2003, DSM created a Gross Value Added of € 1,938,000,000 but had a negative Sustainable Value of -€ 2,362,906,433. The total opportunity costs of Royal DSM thus amounted to € 4,300,906,433. Dividing the opportunity costs by the Gross Value Added of DSM yields a factor of about 2.2. The Return to Cost Ratio of DSM in 2003 is thus 1 : 2.2, i.e. overall DSM used its environmental resources 2.2 times less efficiently than the EU15 benchmark.

Figure 3. Return to Cost Ratio of Royal DSM in 2003 (Source: own calculations based on [5]).

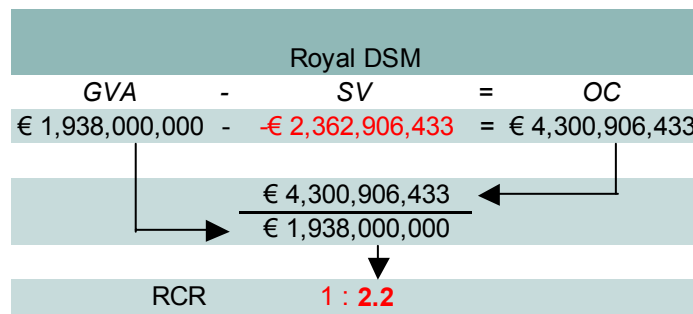


Figure 3 shows how the Return to Cost Ratio is calculated in the case of a negative Sustainable Value using the example of Royal DSM.

5 | Interpreting and communicating the results

In this section, we discuss the explanatory power as well as potential uses and user groups of the results. In addition, we highlight some of the most important issues and aspects when communicating the results of Sustainable Value assessments.

Explanatory power of absolute Sustainable Value

Sustainable Value translates the sustainable performance of companies into monetary terms. The absolute Sustainable Value thus shows how much value a company has created or destroyed with the use of its economic, environmental and social resources. More precisely, the absolute Sustainable Value tells us how much more or less return a company has achieved with its set of resources compared to the benchmark. It thus represents the excess return on resources a company has achieved compared to the benchmark that has been chosen. As a consequence, the absolute Sustainable Value reflects the value that is created or destroyed due to the fact that a specific company instead has used a given set of resources. The absolute Sustainable Value thus answers the following question: What is the value that has been created or destroyed because a company has used some resources as opposed to these resources being used by other companies? In other words, a positive (negative) Sustainable Value shows if a company has covered the opportunity cost of its economic, environmental and social resources.

At the same time, Sustainable Value translates the efficiency with which a company uses its economic, environmental and social resources into monetary terms. It thus represents a monetary measure of the sustainability efficiency of a company. However, Sustainable Value also takes into account effectiveness, i.e. the absolute amount of resources companies are using. This is particularly relevant from the viewpoint of environmental protection and sustainable development. Sustainable Value shows the value that has been created or destroyed through the use of a specific amount of resources by a company. It also shows the value that could be gained if resources were shifted from companies with a low Sustainable Value to companies with a higher Sustainable Value. The overall amount of resources used remains constant. If reduction targets are used as the benchmark, Sustainable Value can also take into account the need to reduce the use of environmental and social resources.

Finally, one core feature of Sustainable Value is that it integrates the use of economic, environmental and social resources – and thus all three pillars of the notion of sustainability. At the same time, Sustainable Value is based on the well established notion of opportunity cost thinking and value-based management from financial economics and management. Sustainable Value thus goes beyond standard tools for corporate valuation and performance measurement that solely take into account the return on capital. By integrating environmental and social aspects and opportunity cost thinking, Sustainable Value achieves a major progress in two respects: On the one hand, it broadens the narrow view of

standard financial performance assessment to also include environmental and social resources. On the other hand, Sustainable Value translates environmental and social issues into the well established logic of value-based management and performance assessment that is used in companies and on financial markets every day. The explanatory power of absolute Sustainable Value is thus comparable to Economic Value Added figures – but not only with respect to economic capital but also to environmental and social resources companies are using.

Sustainable Value provides an aggregated figure on the use of economic, environmental and social resources by companies. However, the results can also be used to conduct a more in-depth analysis. For this purpose, one can consider the value contributions. Remember that the value contributions show for each resource under analysis whether this resource has been used in a value-creating or a value-destroying way. Resources with a positive (negative) value contribution are used more (less) efficiently compared to the benchmark. Comparing value contributions thus provides a two-fold insight. On the one hand, the value contributions disaggregate the Sustainable Value figure and show how the aggregate Sustainable Value figure materialises. On the other hand, value contributions help to identify strengths and weaknesses of corporate sustainable performance. This shows which resources constitute a source of value creation and which resources' use should be improved. Value contributions thus represent an interesting starting point for managing and improving corporate sustainable performance.

Explanatory power of the Return to Cost Ratio

The Return to Cost Ratio (RCR) is an indicator of the efficiency with which a company uses its economic, environmental and social resources – in brief: it measures the sustainability efficiency of companies. As this indicator takes into account company size, it is very useful to compare the performance of companies of different sizes. The message behind RCR is simple: It shows how much more or less return a company creates with its resources compared to the benchmark. A RCR of 2 : 1 thus shows that the company generates twice as much return out of the resources it uses compared to a situation in which these resources were used by the benchmark. This also tells us that the sustainability efficiency of the company is twice as high as the benchmark. Accordingly, a company with a RCR of 1 : 2 uses its economic, environmental and social resources only half as efficiently compared to the benchmark.

The RCR can also be used to compare the performance of two companies. For instance, a company with a Return to Cost Ratio of 2 : 1 uses its resources six times more efficiently than a company with a RCR of 1 : 3. This reasoning can e.g. be used to determine the performance spread within a sector by comparing the RCR of the sector leader to the performance of the sector laggard. The RCR thus provides a simple but meaningful indicator to compare the sustainable performance of companies.

Another interesting analysis is to look at the development of the RCR of a company over time. This shows whether and by how

much the company has increased the efficiency of its use of economic, environmental and social resources. For instance, a company whose RCR decreases from 3 : 1 to 2 : 1 loses 33% in sustainability efficiency. Conversely, a company that improves its RCR from 1.3 : 1 to 2 : 1 over time, gains more than 50% in sustainability efficiency.

Overall, RCR has proven to be a very strong indicator of corporate sustainable performance. It allows to compare companies of different sizes and expresses sustainability efficiency as a benefit-to-cost-ratio.

Potential users and uses of the results

The results of a Sustainable Value assessment can be used by a range of different stakeholders.

- Corporate managers can use the Sustainable Value approach and the assessment results to monitor and communicate their environmental or sustainable performance. In the context of performance monitoring, the identification of value drivers, strengths and weaknesses with the Sustainable Value analysis is particularly relevant. If performance targets are used as the benchmark, the results can be used as early warning signals for particularly relevant environmental or social problems in the future as well as to identify the vulnerability of the company to tighter regulations or future societal or market demands.

- Socially responsible investors and analysts may be one of the most relevant user groups of the results. First of all, they can use the Sustainable Value methodology to identify out- and under-performers. For socially responsible investors and analysts it is highly beneficial that the assessment results follow a value-based logic, because this makes them compatible with standard financial analysis. Moreover, SRI-investors can use the results of the in-depth analysis to identify strengths and weaknesses of corporate sustainable performance as well as performance trends. If performance targets are used as the benchmark, the results reveal the exposure of different companies to market demands and tighter regulation in the future. This is particularly interesting in the context of risk analysis: SRI-investors can determine which companies or sectors are most vulnerable to tightened regulation in different regulatory areas and which are best prepared to meet future challenges.
- Last but not least, the results of Sustainable Value assessments are also relevant for policy makers. They can use the results to identify those sectors and companies that are most critical for implementing economic, environmental and social policies.

Transparency in communicating the results

As pointed out throughout this handbook, the quality of the Sustainable Value results will strongly depend on the quality of the assessment itself. The choice of the benchmark as well as the

choice and definition of indicators are highly sensitive issues that need to be handled with great deliberation. Similar to financial analysis, the explanatory power of the Sustainable Value assessment largely depends on the benchmark that has been chosen. Accordingly, the choice of indicators will influence the overall rating: as explained above, sector affiliation partly determines performance, and some sectors are more prone to certain indicators than others.

Given these properties of Sustainable Value assessments, it is essential to be as transparent as possible in all steps of the assessment. The data sources and all calculations should be well-documented, and therefore enable the reader to understand the underlying assumptions the assessment is grounded in. This also applies to cases in which data has been extrapolated, estimated or calculated. Furthermore, all communication of the results of Sustainable Value assessments should explicitly mention the indicators that have been chosen as well as the benchmark that has been used in the Sustainable Value assessment. As Sustainable Value measures corporate sustainable performance relative to a benchmark it is essential to give the reader sufficient information on the rationale and the explanatory power of the choice of benchmark. Likewise, the scope of Sustainable Value assessments in terms of which indicators and resources are covered should be addressed. In general, the more indicators are covered by Sustainable Value assessments the more accurate the picture the results provide on the sustainable performance of the companies that are analysed. When communicating the results to stakeholders

it should thus be clearly stated which economic, environmental and/or social indicators and aspects are covered by a Sustainable Value assessment.

Overall, it can be expected that the more transparent and comprehensible the results of Sustainable Value assessments are communicated the higher the acceptance of these results with different stakeholder groups. It is thus highly advisable to communicate not only the results of Sustainable Value assessments but also report on data sources, the choice of benchmark and indicators and the procedures used to obtain the results.

Conclusion

Companies that contribute to a Sustainable Development of our society cover the cost of the economic, environmental and social resources they use. It was the difficulty to determine the cost of environmental and social resources that has prevented a wide application of this very simple rule.

Sustainable Value defines the cost of environmental and social resources via opportunity costs – similar to the way the cost of economic capital is determined today. As a result Sustainable Value allows one to express sustainable performance in monetary terms.

This handbook

- explains the underlying logic of Sustainable Value,
- defines the steps we need to undertake to prepare for and carry through Sustainable Value calculations and
- highlights some of the user groups and how Sustainable Value can be interpreted.

This handbook should enable readers to perform simple Sustainable Value calculations. The underlying concept is new but – with its reference to financial investment valuation – builds on a long tradition. That using a resource more efficiently is preferred to using the same resource less efficiently will meet a rather broad consensus.

The real challenge that we face is that the amount and quality of corporate environmental and social data is somewhat restricted. This is not specific to Sustainable Value calculations but constitutes an obstacle to all assessments of corporate sustainability performance.

We strongly believe that together with an improved sustainability reporting system Sustainable Value has a great potential to translate corporate sustainable performance into managerial terms – and to further advance corporate sustainability.

More information on Sustainable Value

About the project

The project is funded by the EU and the participating organisations with a total budget of about € 688,000. ADVANCE produces three main outputs.

1. The ADVANCE survey has assessed the environmental performance of 65 European companies using the Sustainable Value approach.
2. This handbook gives an overview on how Sustainable Value can be calculated.
3. The handbook will also help us to conduct training workshops which will take place in fall and winter 2006.

More information about the ADVANCE-project can be found on the project website www.advance-project.org or by visiting the thematic website www.sustainablevalue.com.

Publications

The ADVANCE-Project (2006): Sustainable Value of European Industry. A Value-Based Analysis of the Environmental Performance of European manufacturing Companies. Forres and Berlin: SDRC and IZT.

Figge, F. & Hahn, T. (2006): "Looking for Sustainable Value", *Environmental Finance*, 7(8), 34-35.

Figge, F. Hahn, T. (2005): "The Cost of Sustainability Capital and the Creation of Sustainable Value by Companies", *Journal of Industrial Ecology*, 9(4), 47-58.

Figge, F. & Hahn, T. (2005): "Sustainable Value - Ein wertorientierter Ansatz zur Ermittlung der Nachhaltigkeitseffizienz und der nachhaltigen Wertschöpfung von Unternehmen", in: Busch, T. & Liedke, C. (Hrsg.): *Materialeffizienz: Potenziale bewerten, Innovationen fördern, Beschäftigung sichern*. München: ökom, 203-216.

Figge, F. & Hahn, T. (2005): "Créer de la valeur durable. Un nouvel impératif pour les entreprises françaises : les cas de Danone SA.", *Ressources Humaines pour Décideurs*, (Décembre 2005), 3-4.

Figge, F. & Hahn, T. (2004): "Value-oriented impact assessment: the economics of a new approach to impact assessment", *Journal of Environmental Planning and Management*, 47(6), 921-941.

Figge, F. & Hahn, T. (2004): "Nachhaltige Wertschöpfung. Wie kann eine wertorientierte Logik in den Kapitaleinsatz von Unternehmen einfließen?" *Zukünfte*, 13(47), 48-49.

Figge, F. & Hahn, T. (2004): "Euro statt Öko-Punkte. Bewertung der Nachhaltigkeit von Unternehmen", *Politische Ökologie*, 90, 78-79.

Figge, F. & Hahn, T. (2004): *The Cost of Sustainable Capital. An Assessment of Sustainable Value Creation of Companies*. Leeds

and Berlin: University of Leeds and Institute for Futures Studies and Technology Assessment.

Figge, F. & Hahn, T. (2004): "Sustainable Value Added. Measuring Corporate Contributions to Sustainability Beyond Eco-Efficiency", *Ecological Economics*, 48(2), 173-187.

Figge, F. & Hahn, T. (2004): "Sustainable Value Added - ein neues Maß des Nachhaltigkeitsbeitrags von Unternehmen am Beispiel der Henkel KGaA", *Quarterly Journal of Economic Research*, 73(1), 126-141.

Figge, F. (2001): "Environmental Value Added - Ein neues Maß zur Messung der Öko-Effizienz", *Zeitschrift für Angewandte Umweltforschung*, 14(1-4), 184-197.

Contacts

Professor Frank Figge
University of St Andrews & Sustainable Development Research
Centre (SDRC)
The Enterprise Park
Forres, Moray
IV36 2AB
United Kingdom
Tel: +44 (0) 1309 678113
Fax: +44 (0) 1309 678114
Figge@sustainablevalue.com

Dr Tobias Hahn
IZT – Institute for Futures Studies and Technology Assessment
Schopenhauerstr. 26
D-14129 Berlin
Germany
Tel. +49-30-803088-24
Fax. +49-30-803088-88
t.hahn@izt.de

References

1. Figge, F., *Environmental Value Added - Ein neues Maß zur Messung der Öko-Effizienz*. Zeitschrift für angewandte Umweltforschung, 2001. **14**(1-4): p. 184-197.
2. Figge, F. and T. Hahn, *Sustainable Value Added - Measuring Corporate Contributions to Sustainability beyond Eco-Efficiency*. Ecological Economics, 2004. **48**(2): p. 173-187.
3. Figge, F. and T. Hahn, *Sustainable Value Added - Ein neues Maß des Nachhaltigkeitsbeitrags von Unternehmen am Beispiel der Henkel KGaA*. Vierteljahreshefte zur Wirtschaftsforschung, 2004. **73**(1): p. 126-141.
4. Figge, F. and T. Hahn, *The Cost of Sustainability Capital and the Creation of Sustainable Value by Companies*. Journal of Industrial Ecology, 2005. **9**(4): p. 47-58.
5. The ADVANCE-Project, *Sustainable Value of European Industry. A Value-Based Analysis of the Environmental Performance of European manufacturing Companies*. 2006, Forres and Berlin: SDRC and IZT.
6. Figge, F. and T. Hahn, *Sustainable Value - Ein wertorientierter Ansatz zur Ermittlung der Nachhaltigkeitseffizienz und der nachhaltigen Wertschöpfung von Unternehmen, in Materialeffizienz: Potenziale bewerten, Innovationen fördern, Beschäftigung sichern*, C. Liedtke and T. Busch, Editors. 2005, oekom Verlag: München.
7. Figge, F. and T. Hahn, *Unternehmerische Nachhaltigkeit messen*. *Umweltperspektiven*, 2005(Okttober 2005): p. 19-21.
8. Figge, F. and T. Hahn, *Créer de la valeur durable. Un nouvel impératif pour les entreprises françaises : les cas de Danone SA*. *Ressources Humaines pour Décideurs*, 2005 (Décembre 2005): p. 3-4.
9. United Nations Conference on Trade and Development, *A Manual for the Preparers and Users of Eco-efficiency Indicators*. 2003, Geneva: UNCTAD-ISAR.
10. Riahi-Belkaoui, A., *Productivity, Profitability, and Firm Value*. *Journal of International Financial Management and Accounting*, 1999. **10**(3): p. 188-201.
11. Haller, A. and H. Stolowy, *Value Added in Financial Accounting. A Comparative Study Between Germany and France*. *Advances in International Accounting*, 1998. **11**(1): p. 23-51.

www.advance-project.org

www.sustainablevalue.com