

## Measuring sustainability of water supply: performance indicators and their application in a corporate responsibility report

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### ABSTRACT

For many water supply companies, the sustainable exploitation of water resources has always been an integral part of their business, voluntarily accepting tasks and responsibility which benefit society and the environment in general, e.g. in resource protection, environmental monitoring, and encouragement of sustainable farming practices. However, these voluntary activities are often not sufficiently recognised internally and externally due to a missing sustainability framework and a less developed communication strategy. Therefore, a comprehensive framework for the measurement and reporting of corporate responsibility (CR) in water supply was developed, comprising the environmental and sustainability issues of resource protection and water supply, social responsibility and long-term economical development. This framework was successfully applied in a Balanced Scorecard (BSC) approach and served as basis for a CR report of a German regional water and wastewater company. The CR Performance Indicator system was imbedded in the IWA framework of Performance Indicators (PI), and as such is universally applicable in water and wastewater systems.

**Key words** | balanced scorecard, corporate responsibility, performance indicator, reporting, sustainability, water supply

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### INTRODUCTION: MEASURING CORPORATE RESPONSIBILITY IN WATER SUPPLY

Social and regional responsibility, sustainable use of resources and of the environment, and long-term efficiency of infrastructure management on a company level are summarised in the corporate responsibility (CR) approach (Barth & Wolff 2009). The European Commission (2001) describes CR as “a concept with which companies integrate social and environmental concerns into their business operations and into their interaction with stakeholders on a voluntary basis”. For many water supply companies, the sustainable exploitation of water resources has always been an integral part of their business, voluntarily accepting tasks and responsibility which benefit society and the environment in general, e.g. in resource protection, environmental monitoring, and encouragement of sustainable farming

practices. However, the CR concept is more comprehensive in also including the behaviour of a company towards the regional stakeholders and economy, their staff and their clients.

One important element within this process was the Global Reporting Initiative (GRI). In a worldwide consultation process and in accordance with the environmental programme of the United Nations this initiative made it possible for guidelines to be agreed upon. These guidelines are mainly to help standardise companies' reports on transparency, governance and ecological achievements. The current GRI-Guideline comprises over 120 indicators which are applicable across all branches. For some branches specific guidelines already exist, but not for the water supply

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sector (Global Reporting Initiative 2006; KPMG 2008). The Triple Bottom Line (TBL) approach (Kenway, Howe and Maheepala 2007) is used in several countries (e.g. Australia: Group of 100 Incorporated 2003) but is not established in the German water sector. To adapt GRI and TBL approaches on the sustainability dimensions of drinking water supply in Germany, we developed a detailed CR-approach for water supply.

Firstly, the CR approach for German water suppliers would benefit from dedicated indicator systems, in order to define targets, to measure achievement and to direct efforts towards increasing sustainability. Secondly, CR efforts are rarely recognised by customers and stakeholders, due to the lack of valid reporting standards with a special focus on water supply. Therefore, a research project was set up to i) develop a set of quantitative and qualitative measures for sustainable and responsible company practice and ii) develop a reporting model for communication of CR achievements in water supply. Sustainability in water supply systems involves the aspects of providing a safe drinking water supply at high water quality for the people in the supply area, protection of water resources and finally to guarantee a continuous preservation of asset value and function over time and in the long run.

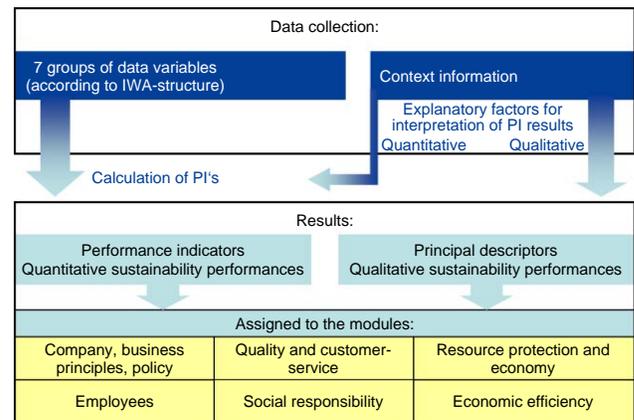
In water supply analysis, performance indicators (PIs) are increasingly applied, e.g. in internal or external benchmarking studies. For performance assessment of the whole service, the hierarchically structured IWA PI system (2nd edition) is recognised as a “standard system” in many companies (Alegre *et al.* 2006). This system was extended with regard to CR dimensions, as shown in Figure 1 and applied to three water supply systems in Germany.

## DEVELOPMENT OF A PI-SYSTEM AND COMMUNICATION MODEL FOR SUSTAINABILITY

### Features

#### Linkage to the IWA PI system

The base for measuring and evaluating company performance was a comprehensive PI system, structured according to the IWA approach. The IWA PI system was used as a starting point, in order to increase acceptance and



**Figure 1** | Performance indicator system for measuring sustainability in water supply (source: own illustration).

practicability of the newly developed PI set on sustainability. Thus, the developed methodology of measuring and assessment of sustainability can be useful for international application. Moreover, the linkage to the IWA approach reduces the effort of data collection in companies taking part in other benchmarking activities.

### Modular design

The development of the PI system was based on the need to cover and to represent all important dimensions of sustainability. A further aim was to establish a flexible and problem-oriented PI system, that is suitable for different groups of users as well as for different communication strategies and forms.

The whole PI system was structured according to the relevant sustainability dimensions, namely ecological and environmental issues, workforce recruitment and development, customer orientation, and economy. The main extension of the current sustainability concepts was to include regional implications of the companies' activities, e.g. the regional economical impact, the beneficial impact of sustainability efforts in water supply in the region and the social responsibility of the local communities.

It was recognised, that CR reporting will differ widely in scope and focus from company to company, so that the PI system was arranged in the form of a tool box with several modules:

- Module A: Company, business principles, policy
- Module B: Quality and customer service

- Module C: Resource protection and economy
- Module D: Employees
- Module E: Social responsibility
- Module F: Economic efficiency

*Module A* provides key data on the water supply company and the individual boundary conditions of the company, e.g. profile, strategy and overall concept, sustainability aims and special challenges in the future.

*Module B* describes the quality and characteristics of the drinking water, delivery and service conditions, expectations and satisfaction of the consumer e.g., an implemented complaint management system.

*Module C* refers to relevant environmental aspects like data about raw water origin, resources, protection zones, environmental impacts of the company activities.

*Module D* provides information on human resource management, employment structure, benefits for employees (e.g. health, social benefits, incentive systems) and a specification of employees' qualifications as well as further training.

*Module E* addresses the social responsibility and the regional engagement of the company (e.g. sponsoring on sport, cultural or social activities, promotion of children and teenagers—education).

*Module F* covers aspects of the economic sustainability of the company, e.g. information about long-term economic protection of the company, maintenance of assets, efficiency of value performance and development of water prices.

These modules provide sufficient flexibility to integrate CR aspects in existing reporting frameworks such as single chapters in business or environmental reporting or at company websites including a comprehensive CR report covering the total scope.

### **Adaptation of the PI System to individual needs and interests**

The topic “sustainability” can be assessed differently in each water supply company. Thematic issues are defined individually and can change in the course of time depending upon actual developments or relevant discussions within the branch or the company. For this reason, the modular structure of the PI system was developed as one of the

central features enabling an individual adaptation and meaningful use of the developed methodology.

The modular structure of the developed PI system facilitates a flexible thematic structuring and processing of the collected data, suitable for the companies' strategy and to the target group.

### **Structure of the PI system**

The PI system consists of data variables, context information, performance indicators and principal descriptors (Figure 1).

#### **Data variables**

As a basis for calculation of PIs, data variables are defined. These are quantitative information, which are clearly defined to obtain resilient and comparable PI results.

#### **Context information**

Context information has to be collected, which can be of quantitative as well as of qualitative nature, and describes aspects like the structural data of the company, the supply system and the supply area (cf. IWA PI System). By definition, context information cannot be influenced by the utility—or only in the long run. Most of the context information is used to provide the necessary background information on the structure, the scope of the company and the companies' environment in a broad sense. They are very important for interpretation and communication of PI results.

#### **Performance indicators**

PIs are calculated from data variables and are quantitative *control values*, which can be influenced by the company in short or medium term. All available PIs are allocated to the different topic modules (A–F) of the PI system and illustrate the relevant *quantitative sustainability achievements* of the company. They can be used for strategic target setting and controlling issues e.g. in a balanced scorecard or internal or external reporting.

**Table 1** | Examples of Key Pis and Key Descriptors (in italic letters)

<b>Code</b>	<b>Key Pis and principal descriptors</b>	<b>Unit</b>
<i>Module A: Company, business principles, policy</i>		
KI-NH024	Fulfilment of additional duties (additional to core water supply tasks)	Qualitative description
KI-NH096	Management systems in the utility on quality, environment, safety,..	Qualitative description
<i>Module B: Quality and customer service</i>		
NH002	Average water tariffs for household consumers	€/m <sup>3</sup>
NH047	Interruptions per service connection	No./1,000 connections/year
NH050	Microbiological tests compliance	%
NH062	Service complaints per customer	No./customer/year
KI-NH015	Per capita water consumption	litre/inhabitant/day
KI-NH017	Forecasted population growth rate	%/year
KI-NH032	Customer survey and expectations	Qualitative description
KI-NH039	Share of water charges in the average household budget	%
KI-NH100	Management of customer complaints	Yes/No
<i>Module C: Resource protection and economy</i>		
NH010	Expenses for environmental protection measures	€
NH015	Protection areas with cooperation treaty	%
NH017	Energy efficiency: Energy consumption for water extraction	kWh/m <sup>3</sup>
NH019	Mains rehabilitation	%/year
NH020	Total water losses	%
KI-NH048	Environmental management programs	Qualitative description
KI-NH049	Management programs for protection zones	Qualitative description
<i>Module D: Employees</i>		
NH026	Employees per connection	No./1,000 connections
NH029	Women in leading positions	%
NH030	Expenses for education and training per employee	€/employee
KI-NH081	Age structure of staff	%
KI-NH084	Employment protection and health promotion)	Qualitative description
KI-NH087	Work time schedules	Qualitative description
<i>Module E: Social responsibility</i>		
KI-NH044	Locale engagement in terms of social activities, sponsorships etc.	Qualitative description
<i>Module F: Economic efficiency</i>		
NH007	Total cost coverage ratio	–
NH025	Ration of maintenance of assets	%/year
NH042	Average depreciation ratio	%
NH051	Unit investment	€/m <sup>3</sup>
KI-NH097	Ensurance of liquidity	Yes/No

## Principal descriptors

The need for more qualitative descriptions and information about relevant sustainable achievements led to the introduction of “principal descriptors”, also derived from contextual information. They describe the *qualitative sustainability achievements* of the company and can be used for controlling as well as PIs. They can usually be influenced by the company in the short or medium term. Examples for principal descriptors are given in Table 1.

## Key indicators and principal descriptors

The project experience and comprehensive discussions with water supply companies showed that not all available PIs and principal descriptors are equally relevant for the communication of sustainability performance for different companies. Each company identified different topics dominating their own communication strategy because of current development areas like customer service or resource protection. Thus, the usefulness of the majority of PIs/indicators depends on the actual context of the company. In addition, other information from the whole tool box could be identified as necessary for measurement, assessment and communication of sustainability achievements of each company. These PIs/indicators have a special relevance for sustainability communication and are therefore named as “key PIs” and “key descriptors”.

The effort of data collection and assessment within the PI system can be individually adjusted to the needs and interest of each company by two ways:

- the modular structure enables the utility to selectively focus on relevant topics to work on
- the hierarchical structure facilitates a flexible adjustment of the number and level of detail of collected and assessed data.

The recommended “basis data set” to describe the essential aspects of sustainability performance consists of 18 key PIs and 19 key descriptors. With this selection a manageable set of information is available which can be collected and assessed with a minimized effort. Every company can choose further information or modules for specific issues or purposes. Table 2 shows the total available PIs, data variables, context information as well as the recommended basis set of key PIs and key descriptors.

## STRUCTURE OF A “SUSTAINABILITY REPORT WATER SUPPLY”

After collecting and assessing the sustainability details of the water supplier, these information should be communicated to different interest groups and addressees. One available option is the publication of a sustainability report. This report can utilize the companies’ existing communication profile (annual report, internet presence etc.). The modular structure of a sustainability report was shown to be comprehensive and applicable for the communication of sustainability achievements in water supply (Figure 2). A manual including the whole PI system and instructions for using the PI system to prepare a sustainability report is available in German language (Schramm & Staben 2007).

## EXAMPLE: CORPORATE-RESPONSIBILITY-REPORT OF WATER SUPPLY

The Kommunale Wasserwerke Leipzig GmbH (KWL) is a regional water and wastewater company, providing water supply and wastewater services to around 610,000

Table 2 | Statistics of the PI system according to hierarchy and modules

Kind of information	Total number	Number module A	Number module B	Number module C	Number module D	Number module E	Number module F
Data variables	129						
Performance indicators	69	–	23	16	13	–	17
Thereof: key performance indicators	18	–	4	6	3	–	5
Context information	105	16	25	32	15	7	10
Thereof: principal descriptors	19	4	5	2	6	1	1

Preamble, editorial	
1	Company, mission statement, strategy
1.1	Mission statement, strategy
1.2	Companies' profile
1.3	Challenges
2	Quality and service
2.1	Quality of drinking water
2.2	Services
2.3	Customers expectance and satisfaction
3	Resource protection and economy
3.1	Resource situation
3.2	Monitoring and management
3.3	Environmental impact of companies' activity
3.4	Engagement for the environment
4	Employees
4.1	Personnel policy and management
4.2	Employees
4.3	Benefit for employees
5	Social responsibility
5.1	Lokal engagement, special responsibility
5.2	Payed taxes and duties
5.3	Price level
6	Economic efficiency
6.1	Financial power and performance
6.2	Service efficiency and capacity utilisation
6.3	Asset management and demand of rehabilitation
Appendix	

**Figure 2** | Example structure of a sustainability report for water supply (source: Staben *et al.* 2008).

inhabitants of Leipzig and surroundings in an area of 600 km<sup>2</sup>. Services include provision of ca. 34 M m<sup>3</sup> drinking water via a 3,100 km water network, a 2,400 km wastewater network, and treatment in 21 treatment plants.

Corporate and social responsibility is an integral part of KWL's vision and mission. Sustainability indicators are used to monitor, control and improve sustainability achievements, and (among other issues) build one dimension in the companies' balanced scorecard (BSC) as developed in the project.

Furthermore, KWL has issued a CR report on the basis of the developed PI system which covered the topics as shown in Figure 3.

Within the section "Quality and Customer service" for example the strategy for rehabilitation of the distribution network and the positive effects on damage within the

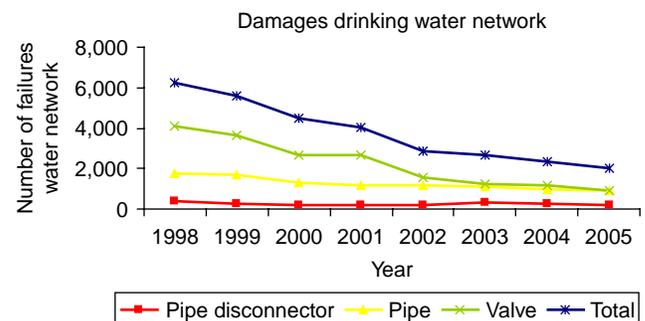
1) Company, Business principles, Policy	
2) Products (water and wastewater)	
Economic efficiency	3) Resource protection and economy
	4) Quality and customer-service
	5) Employees and processes
	6) Social responsibility and regional engagement

**Figure 3** | Example structure of the CR report for water supply (source: Staben *et al.* 2008).

network are described. Focusing on the number of failures in the drinking water networks, different views on sustainability aspects are possible: concerning the quality of supply, low failure rates can show large efforts in rehabilitation of pipes of certain materials, e.g. cast iron, asbestos cement or polyethylene//PVC as a measure to preserve asset value. It can also highlight existing needs for maintenance, taking into account the customer's interests concerning drinking water quality, number and duration of interruptions, pricing etc. Applying selected PIs from the sustainability PI framework, those statements could be made transparent in tables and Figures (e.g. Figure 4). Similarly, the positive development of employees' trainings could be identified and illustrated. For some PIs the collection of time series is especially recommended to show trends and illustrate achievements compared to other assessment methods like Benchmarking. The comparability with other CR reports will be achieved by a standardized definition of the performance indicators and principal descriptors.

The main targets of the CR-report were:

- to describe impacts of the companies' activities on the social and ecological environment,



**Figure 4** | Example of a visualisation of a selected PI in a time series—here: Number of damages in drinking water distribution 1998 to 2005 (source: Staben *et al.* 2008).

- to illustrate the assumed responsibility especially under new challenges,
- to demonstrate areas of voluntary engagement of the company and
- to improve reputation and image.

Target groups of the CR report were the regional shareholders, stakeholders from the municipalities and regional stakeholder groups, and the clients. The report was issued in November 2007 and distributed in print and via the companies' website (KWL CR report 2007).

## CONCLUSIONS AND OUTLOOK

A comprehensive framework for the measurement and reporting of corporate responsibility was developed, comprising of environmental and sustainability issues for resource protection and water supply, social responsibility and long-term economical development. The framework was applied in BSC approaches and served as basis for a CR report of a German regional water and wastewater company. The CR PI system was imbedded in the IWA framework of PIs and as such is universally applicable in water and wastewater systems.

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