Green Controlling and Finance

Case Studies

Edited by

Cezary Kochalski

Helion

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Introduction

This publication is the outcome of research on controlling and finance in enterprises, that pursue measures to reach objectives resulting from the premises, underlying the concept of sustainable development. Well-recognized Polish and foreign enterprises were targeted within the research, with their economic performance ensuring value increase, and demonstrated success record in undertaking activities geared toward delivery of social and environmental objectives. Those are: Aesculap Chifa, Amica, Aquanet, LW Bogdanka, B. Braun, Hochtief, Kompania Piwowarska, Lotos, PBG, PKN Orlen, Rafako, Solaris Bus & Coach, ZGH Bolesław.

The research has been performed as an exemplification of practices used in enterprises, toward presenting solutions to problems identified in the monograph entitled 'Green Controlling and Finance. Theoretical Framework' - ed. C. Kochalski, Publishing House - C.H. Beck, Warsaw 2016. The dissertation adopts cognitive and methodical approach to identify the possibilities of employing controlling to reach the goals of sustainable development concept, in a way enabling the financial aspect of planned growth of company value to correlate with environmental and social activities.

The aim of this publication is finding an answer to the question: How do enterprises employ controlling to achieve the objectives of sustainable development concept, while assuming that social and environmental activities coordinated within the controlling scheme are to be considered in connection with the finance?

In order to answer this question, i.e. solve the research problem, the following issues were addressed:

- consideration of social and environmental aspects in the enterprises' strategic documents,
- employment of strategic analysis methods incorporating the requirements of sustainable development in enterprises,
- evaluation of sources and distribution of the created value added in enterprises from the perspective of identified stakeholder groups,

- addressing social and environmental aspects of activities undertaken at enterprises and their evaluation against key performance indicators (KPI's),
- the significance of financial planning in the context of enterprises' environmental investment decisions,
- revealing the significance of budgeting process in green controlling, based on experience of an international enterprise, including example of 'Latest Estimate' budgeting approach,
- methods of integration of measures and indices between the strategic and operational objectives of sustainable development,
- applied solutions for environmental reporting and integrated reporting,
- consideration of environmental and social aspects in cost management,
- employment of investment appraisal methods within the enterprises and evaluation of social and environmental impacts of investment projects,
- identification of various types of risk, risk management systems and methods employed in risk analysis as well as in determination of the cost of capital.

In order to solve the presented research problem and find answers to the detailed questions, qualitative and, in certain cases also, quantitative research methods have been applied. The authors attempted to explore specific solutions regarding green controlling and finance within considered enterprises, with emphasis on interpretation of the employed solutions and, wherever possible, numerical results were analysed and evaluated.

The data and information collected, arranged and analyzed under this project, come both directly from the enterprises in question, as well as, wherever possible and necessary, were supported by open sources. Particularly productive were visits paid to majority of the researched enterprises, where in the course of interviews, a lot of valuable information was shared, along with assistance in analysis and interpretation of the data gathered, thus allowing for a better understanding of the issues discussed.

This work comprises introduction, ten chapters, and conclusions. Each of the chapters covers a specific set of issues related to green controlling and finance within the considered enterprises.

Chapter 1 explores value creation at Aesculap Chifa, Amica, Aquanet, B. Braun Melsungen, Hochtief, PBG, PKN Orlen. In particular, it focuses on the practical aspects of value creation at enterprises that have opted for sustainable development.

Environmental and social aspects in the development of Aquanet's strategy have been presented in Chapter 2. Its purpose is to identify elements of sustainable development concept within the strategy of the considered enterprise.

Chapter 3 pertains to selected aspects of strategic analysis. Its objective is to demonstrate strategic analysis solutions at Amica, Aquanet, B. Braun, PKN Orlen and Solaris Bus & Coach, with indication of those related to sustainable development.

Chapter 4 refers to financial planning in profitability assessment of green investments, illustrated by an example of a wind farm. The example of a wind farm investment, draws attention to significance of financial planning in the context of investment decisions taken by enterprises focused on environmental and social objectives.

Budgeting in green controlling at B. Braun Melsungen is the subject of Chapter 5. It's particular focus is on the process of 'Latest Estimate' budgeting process, that forms ground for increased effectiveness, simplification and leanness.

The system of measures and indices employed in green controlling at Kompania Piwowarska is explored in Chapter 6. It presents solutions adopted for integration of measures and indices between strategic and operational objectives of sustainable development, with the use of appropriate IT tools to support processes of planning, control and reporting.

Chapter 7 takes a closer look at integrated reporting in accordance with the GRI standard, as illustrated by the case of LOTOS Group.

Chapter 8 explores cost management in terms of sustainable development at Aquanet enterprise. The purpose of this chapter is to show the effects of cost management at this company with a particular emphasis on environmental aspects.

The investment appraisal of projects with account of environmental and social aspects at Aquanet and Amica are pondered in Chapter 9, that presents practical aspects of employing various approaches to profitability appraisal of investment projects and diverse assessment methods in operation of the considered enterprises.

Chapter 10 is dedicated to risk and cost of capital at Aquanet, Amica, B. Braun Melsungen and PKN Orlen. It expounds the practical aspects of risk management and capital cost estimation within the subject companies, where businesses are conducted in a sustainable manner.

The conclusion summarizes the key findings from the conducted research. Based on conducted case studies, the findings that support usefulness of controlling and finance tools in achieving the objectives of sustainable development concept were highlighted.

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Cezary Kochalski

CHAPTER 1

Creating enterprise value and the requirements of sustainable development at Aesculap Chifa, Amica, Aquanet, B. Braun, Hochtief, PBG and PKN Orlen

1.1. Introductory remarks

The chapter on 'Value Creation Concept in Sustainable Business' in the book entitled 'Green Controlling and Finance. Theoretical Framework' [Mikołajewicz and Nowicki 2016b] presents concepts of value creation and the tasks placed before 'green' controlling within the context of the structure of possible enterprise goals. It also offers a comparison of the shareholder theory of value creation with the stakeholder theory, indicating arguments supporting each one and the possibilities of their coexistence. The discussed chapter also places the social and environmental aspects within the structure of key performance indicators of an enterprise in a model approach, and cites results of empirical research on the influence of environmental, social and corporate governance issues on the operational and financial efficiency and on the value of an enterprise.

In the present chapter, the primary focus is on practical aspects of value creation in enterprises that pursue the model of sustainable development, and the main problems regard:

- identification of declared objectives of an enterprise and accounting for social and environmental aspects within them,
- identification of key stakeholder groups,
- evaluation of sources and distribution of the created value added in the enterprise from the perspective of stakeholders,
- consideration of social and environmental aspects in key performance indicators (KPIs) of enterprises,
- identification of undertaken CSR initiatives and their related benefits.

The above problems have been presented as case studies in subsequent sub-chapters.

1.2. Declared objectives of enterprise at Amica, Solaris Bus & Coach, Aquanet, PBG, B. Braun and PKN Orlen

As regards the topic of this chapter, the focus should be on the objectives of enterprises as declared by the companies themselves.

The corporate group Amica declares its focus on the shareholder concept [Amica 2016]. This is reflected both in the company's mission, in the currently pursued strategy HIT 2023, and in the information for investors [Rutkowski 2015, p. 1: Amica 2015, pp. 18, 27-28; Amica 2014, p. 8]. The company does not employ a formalized system of value-based management, and in order to measure the effects of value creation, it uses indicators as formulated in the current strategy, such as revenues, EBITDA, net profits, dividend payout ratio, debt/EBITDA ratio or production effectiveness [Amica 2016, Amica 2014, pp. 9, 22, 28]. At the same time, the analysis of Amica's involvement in numerous initiatives demonstrating the policy of corporate social responsibility pursued by the company[1], commands the focus on objectives understood as increasing shareholder value in the categories of the so-called 'enlightened' value maximization[2]. Similar conclusions are brought by the analysis of company's mission, which mentions creating value for shareholders, employees and local communities and as such, even at this general level, it signals the company's will to consider social determinants of its operations [Amica 2014, s. 8].

Solaris Bus & Coach declares that 'the main objective of the company is its development, in which all stakeholders participate on equal rights' [Solaris 2015, s. 38]. This approach, then, is closer to the concept of balancing the interests of individual stakeholders, that is to the main concept competitive to the shareholder theory[3]. The company owner states openly that 'functioning of the enterprise is subordinate to the consistently pursued idea of sustainable development', which is manifested in that 'economic progress of the company must go hand in hand with care for the surrounding natural environment and the community bound to it' [Solaris 2015, s. 2]. It follows from these declarations that in the case of Solaris Bus & Coach, concern for environmental and social aspects is deeply ingrained in its business philosophy.

Aquanet, as a public utility enterprise, emphasizes that its 'main function is to provide uninterrupted cold water supply and waste water collection and treatment service to the residents, while maintaining profitability' [Aquanet 2015d, p. 14]. The nature of Aquanet's operations suggests that its business philosophy is closer to the stakeholder concept than to the shareholder concept, yet this does not mean that the growth of company value is not one of its goals: the letter from the President of the Supervisory Board contains an overt assurance that the increase of company's stock value is confirmation

[1] These will be explored further on in this chapter.

[2] This concept has been analyzed in: [Mikołajewicz and Nowicki 2016b].

[3] Shareholder theory and stakeholder theory as the main two concepts underlying objectives of an enterprise have been covered in: [Mikołajewicz and Nowicki 2016b].

of the company's capability to press ahead with an ambitious investment plan [Aquanet 2015d, p. 9]. In this case, accounting for the environmental and social determinants in the business operations is, in a way, directly dictated by its nature and stated in the strategy followed by the company [Ernst & Young 2015, p. 1].

PBG Group considers as its main strategic prerogative the steady and long-term increase of company value [PBG 2011, p. 2]. The adoption of such main objective places PBG Group in the ranks of entities that subscribe to the shareholder theory. Yet, its declared objective is well-rooted in the requirements of sustainable development. This is visible already at the level of the group's mission, which invokes improving the welfare of society [PBG 2011, p. 2]. Environmental and social aspects are also listed among the declared principles [PBG 2011, p. 2].

B. Braun declares that its main operational goal is to remain a family company that maintains and increases revenues and profits on the dynamic market of health care with the use of its own resources. The financial targets of the company are to achieve annual revenue growth of 5 to 7% and the EBITDA margin of 16-18% by the year 2020 [B. Braun 2015a, p. 5]. In the case of B. Braun, taking into consideration the environmental and social aspects is one of the pillars of company's philosophy, as it rests on three core values, that is innovation, efficiency and sustainability [B. Braun 2015b, p. 2]. Considering the area of activity of the entire group of companies, accounting for environmental and social aspects seems natural.

PKN Orlen 'is focused on the pursuit of the principle of company value growth with benefit to all the stakeholder groups (among others, employees, clients, stockholders, local communities and others) based on sustainable and responsible use of resources' [PKN Orlen 2015f]. PKN Orlen core values underlying both internal and external relations are: [PKN Orlen 2015g]:

- responsibility ('we respect our customers, shareholders, the natural environment and local communities'),
- development ('we explore new possibilities'),
- people ('we are characterised by our know-how, teamwork and integrity'),
- energy ('we are enthusiastic about what we do'),
- dependability ('you can rely on us').

The three declared pillars of PKN Orlen's strategy for the years 2014-2017 are value creation, financial strength and people. The third of these pillars revolves around responsibility for people, for the natural environment and for partners [PKN Orlen 2015a].

It must be noted that over the past few years, PKN Orlen's declarations regarding its objectives have evolved towards a stronger emphasis on the principles of sustainable development and corporate social responsibility. Up until the year 2012, the company's mission was as follows [PKN Orlen 2011, p. 16]:

'Aiming to become the regional leader, we ensure long-term value creation for our shareholders by offering our customers products and services of highest quality.

All our operations adhere to 'best practice' principles of corporate governance and social responsibility, with a focus on care for our employees and the natural environment.'

In 2012, the company's mission changed to [PKN Orlen 2013, p. 82]:

'We discover and process natural resources to fuel the future'.

The shift in the mission, mirrored in the declared values of the company and in its current strategy pillars, confirms the strengthening accentuation of the importance of accounting for environmental and social aspects in its business. Company's declarations regarding the current objectives of its operations may, then, be summed up as clearly geared towards sustainable development.

1.3. PKN Orlen stakeholder map

In order to create value in a sustainable way, PKN Orlen had to identify the key stakeholder groups and their expectations. This resulted in the development of the stakeholder map presented on figure 1.1, and its important extension being the relevance matrix[4], which shows the significance of individual social and environmental issues to specific interest groups against the background of the significance attributed to them by the company.

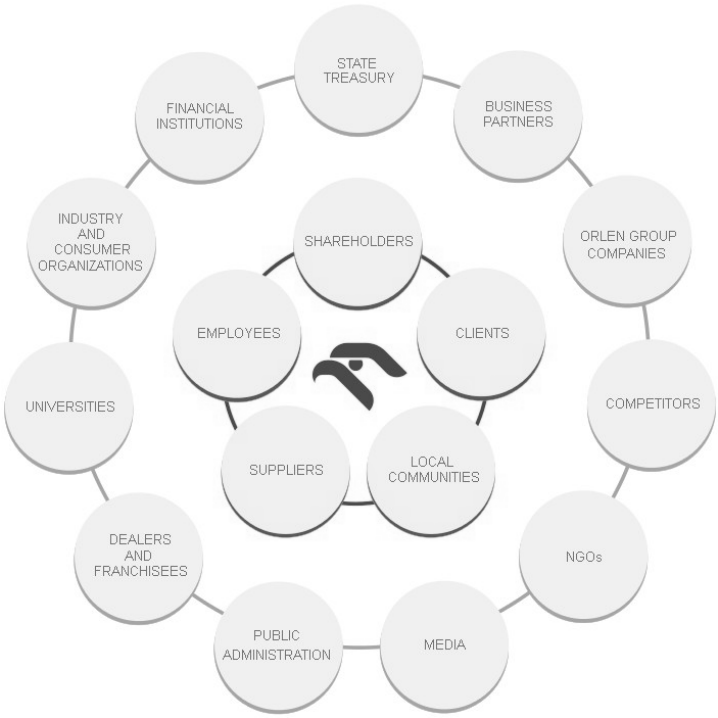

Fig. 1.1. PKN Orlen stakeholder map

Source: [PKN Orlen 2015c]

[4] The relevance matrix for PKN Orlen has been presented in sub-chapter 3.5.

PKN Orlen singles out two groups of stakeholders, that is key stakeholders (inner circle) and major stakeholders (outer circle). Importantly, these two groups are not always separable.

PKN Orlen has identified the following groups as its key stakeholders [PKN Orlen 2015c]:

- shareholders (of which the largest are: State Treasury, Nationale-Nederlanden Open Pension Fund and Aviva Open Pension Fund),
- employees, with whom the company ensures social dialogue based on independence of all parties, legal compliance, mutual trust, willingness to compromise, and observance of the rules. The company also provides them with support in the form of social benefits[5].
- clients, including both individual customers (such as drivers) and institutional clients representing virtually all industry sectors (among others, the chemical, automotive, aviation, power, construction, packaging, agricultural, and food production business)[6],
- suppliers, with whom the company strives to establish steady cooperation, and whose selection is of great importance to the company[7],
- local communities, i.e. residents of areas adjacent to company's production plants, storage facilities and locations where it carries out exploration and production activities, who, at the same time, are often employees or trading partners of the company.

As regards major stakeholders, PKN Orlen lists [PKN Orlen 2015c]:

- State Treasury,
- business partners, i.e. natural persons or legal entities who are parties to transactions with the company (this group includes both the company's suppliers and customers who purchase company's products or services), stable and partner relationship with them is what the company believes results in growth of value and trust in PKN Orlen,

[5] These benefits include, among others, co-financing of employee holidays or sanatorium, child care, holidays for small children and teenagers, school starter kits, recreation and sports activities, cultural and educational activities, non-repayable allowances, repayable housing loans, financial support for families with low incomes, and Christmas gifts for employees' children.

[6] The company sells its products to customers in 58 countries across 4 continents.

[7] In 2014, the concern cooperated with more than 17,000 offerors and 3,000 suppliers, and completed over 10,500 purchases and 1,700 electronic auctions.

- PKN Orlen Group companies, engaged in production, trade, services and exploration for and appraisal of hydrocarbon deposits, as well as power generation, transmission, distribution and trade,
- competitors (Grupa Lotos, Mitteldeutschland refinery at Leuna/Spergau, PCK refinery at Schwedt, Slavnaft refinery, Mozyr refinery),
- NGOs, whose strengthening, through transfer of knowledge and financial support, is in the public's and PKN ORLEN's best interest,
- media, that is the main channel used by the company to communicate with the stakeholders, to provide information on its achievements, plans and performance, and to address any business-related enquiries and doubts,
- public administration, which, given the scale and scope of the concern's operations, is a very broad and diversified group (among others, State Treasury, market regulators and public services, local government administration on investment sites),
- dealers and franchisees, who contribute to the steady strengthening of the company's leading position in retail fuel sales and who significantly contribute to customer perception of PKN ORLEN brand,
- universities (mainly technical ones, including the AGH University of Science and Technology and Warsaw University of Technology), on whose participation rests the continued modernization and building of company's competitive advantages[8],
- industry and consumer organizations,
- financial institutions, such as banks, insurance companies, and stock exchange institutions which determine the group's shape, dynamics and directions of growth.

A synthetic summary of the analysis of stakeholders and relations that PKN Orlen wishes to build with them can be found in the company's vision, which states [PKN Orlen 2015h, p. 8] that it wants to be perceived as a 'good and responsible employer that pursues principles of mutual trust, commitment and employee energy efficiency, while caring for their safety and supporting their life-work balance'. As regards the close surroundings, the emphasis is on 'development of social sensitivity' of company's business partners, that is clients, business partners, local communities, suppliers, shareholders and, as regards its further surroundings, the stress is on driving change, promoting innovativeness and setting 'highest industry standards within the scope of business ethics and protection of the natural environment.'

[8] The concern cooperates not only with Polish universities, but has also established educational centres abroad, including a modern R&D centre in Litvinov, the Czech Republic.

1.4. Value added creation at Hochtief Group

An increasing number of companies bases shareholder value creation on respect for the rights and needs of stakeholders, or directly declares its objective to be stakeholder value creation.

One possible manifestation of such approach is the analysis of value added creation within the company in the context of the sources of its origin and it distribution among stakeholder groups.

Hochtief is a fitting example, as it presents the sources and distribution of value added in 2015 (tables 1.1 and 1.2 respectively)[9].

Table 1.1. Sources of value added at Hochtief Group in 2015

	EUR million	%
Sales	21,096.6	98.9
Changes in inventories	18.5	0.1
Other operating income	217.5	1.0
Corporate performance	**21,332.6**	**100.0**
Materials	(15,484.3)	-72.6
Other operating expenses	(1,203.4)	-5.6
Other investment expenses	(51.2)	-0.2
Input costs	**(16,738.8)**	**-78.5**
Investment and interest income	92.8	0.4
Net income from participating interests	155.7	0.7
Gross value added	**4,842.3**	**22.7**
Depreciation and amortization	(413.8)	-1.9
Net value added	**4,428.5**	**20.8**

Source: [Hochtief 2015, p. 55]

As follows from the presented data, the main source of value added within the Hochtief group are revenues from its core operations, which generate ca. 98.9% of company's performance. The remaining part is made up by the change in inventories and other operating income. After accounting for cost of materials, goods and services, other operating expenses and other investment expenses (in total ca. 78.5% of corporate performance) as well as financial income and net income from participating interests (in total ca. 1.1%), the resultant gross value added stands for Hochtief at over EUR 4.84 billion, which represents 22.7% of the concern's overall performance. The net value added is lower than this amount by the costs of depreciation and amortization and amounts to nearly EUR 4.43 billion (20.8% of performance).

[9] The Value Added Statement as summed up in tables 1 and 2 (ger. Wertschöpfungsrechnung) constitutes a specific approach to profit and loss account, transformed so as to reveal the sources of value added and participation of individual stakeholder groups in the created value added in the entity. More on this topic in, among others: [Marcinkowska 2012].

Table 1.2. Distribution of value added at Hochtief Group in 2015

	EUR million	%
Employees	3,664.8	82.8
Lenders	240.2	5.4
Minority shareholders	124.9	2.8
Public authorities	190.2	4.3
HOCHTIEF and shareholders	208.3	4.7
Net value added	**4,428.5**	**100.0**

Source: [Hochtief 2015, p. 55]

As regards distribution of value added in the concern, it is allocated to the following groups of stakeholders: employees, lenders, minority shareholders, public authorities as well as Hochtief itself and its owners.

The largest share in the distribution of value added goes to employees, who participate in 82.8% of net value added through the costs of benefits and remuneration. Such a high share of these costs in the value added is, according to Hochtief [2015, p. 55], proof that this concern offers attractive employment on fair terms.

The second largest share group in this respect are the lenders, to whom 5.4% of the net value added is allocated in the form of interest for granted loans and credits. In the opinion of Hochtief [2015, p. 55], in face of turbulent market situation, low interest rates, this kind of distribution makes the concern a reliable borrower and an attractive investment opportunity.

The third place in terms of participation in created value added (4.7%) is occupied by Hochtief and its owners. They participate in the value added through the retained profits and dividends.

The fourth largest beneficiary are public authorities, with a share of ca. 4.3% in the net value added in the form of income tax.

The last group of stakeholders (2.8%) in terms of participation in the net value added are the minority shareholders, who gain benefits through participation in profits.

1.5. Key performance indicators (KPIs) at PKN Orlen

The growing significance of the social and environmental aspects in the operations of companies is reflected in how the enterprises are managed and in the process of value creation and distribution. Companies no longer limit themselves to analyzing the foregoing issues, but they also include them in the sphere of key success and competitiveness factors, consistently measuring and monitoring these areas.

One of the examples of such approach is including the social and environmental aspects in the Key Performance Indicators (KPIs). The issues monitored with the use of these indicators at PKN Orlen Group are listed in table 1.3.

Table 1.3. Key Performance Indicators (KPIs) at PKN Orlen

List	Key Performance Indicators (KPIs) at PKN Orlen
Manufactured Capital	■ processing of crude oil (by group companies) ■ processing capacity utilization (as above) ■ fuel yield (as above) ■ light distillate yield (as above) ■ middle distillate yield (as above) ■ sales volume (downstream sales, retail, production) ■ gross electricity production ■ number of Orlen Group service stations ■ Orlen Group hydrocarbon production ■ wells (drilled in Poland)
Financial capital	■ revenue from sales ■ LIFO-based EBITDA before impairment losses on non-current assets ■ LIFO-based EBITDA ■ LIFO effect ■ EBITDA ■ depreciation and amortization ■ LIFO-based EBIT ■ EBIT ■ net profit/loss ■ total assets ■ equity ■ net debt ■ net cash from operating activities ■ net cash from investment activities ■ free cash flows (FCF) ■ capital expenditure (CAPEX) ■ net financial leverage ■ net debt / EBITDA ■ net debt / LIFO-based EBITDA ■ dividend per share (DPS) ■ capitalisation at end of year
Intellectual capital	■ brand value ■ patents (by group companies)
Human capital	■ employment ■ men / women ■ training (number of training hours and number of participants in training and internship programmes) ■ safety (number of employees trained in OHS) ■ typical risk ratio (TRR)

Table 1.3. Key Performance Indicators (KPIs) at PKN Orlen - *continued*

List	Key Performance Indicators (KPIs) at PKN Orlen
Social and relationship capital	■ number of sponsorship projects - 'Orlen for Płock' ■ number of employees involved in the Employee Volunteering Programme ■ revenues to the Płock budget attributable to PKN Orlen's operations ■ charity projects for the Płock local community
Natural capital	■ water withdrawal by the Płock Production Plant the the Włocławek PTA Plant (water withdrawal from the Vistula river, from deep water wells, amount of returned water, demineralized water, industrial water, decarbonized water, sanitary and drinking water, water delivered by supplier) ■ amount of water abstracted by the Orlen Group from the environment ■ emissions (Płock Production Plant) (sulfur dioxide, NOx, carbon monoxide, total hydrocarbons, total dust, i.e. combustion dust, silica dust and metals in dust) ■ other substances (total emission of substances excluding carbon dioxide, total emission of all substances, Włocławek PTA plant - sulfur dioxide, NOx, carbon monoxide, total dust, carbon dioxide) ■ other substances (total emission of substances excluding carbon dioxide, total emission of all substances) ■ CO_2 (by companies, refineries) ■ waste (total generated waste, including: hazardous waste, waste transferred for recycling, waste transferred for disposal, stored waste) ■ waste management at the Włocławek PTA plant (as above) ■ wastewater (wastewater discharged to the Vistula River, wastewater discharger to the sewage system) ■ COD load in wastewater discharged to Anwil SA's sewage system (gross load) (5-day BOD load in wastewater, cobalt in wastewater) ■ volume of Orlen Group's effluents discharged to the environment (industrial wastewater, other wastewater) ■ charges (emission charges, water abstraction charges, wastewater discharge charges) ■ environmental protection expenditure at the Płock Production Plant

Source: own materials elaborated on the basis of [PKN Orlen 2015b]

As evidenced by the presented data, the issues analyzed at PKN Orlen as part of the Key Performance Indicators (KPIs) entail six important areas, namely: of manufactured, financial, intellectual, human, social and relationship and natural capital.

The first two types of capital may be qualified as part of classic interests of economic analysis, covering both technological and economic aspects (such as processing of crude oil, production, wells) and strictly financial ones (such as income, different types of financial results, capital structure, cash flows, capitalization, etc.).

The other four areas of KPIs are related to non-tangible company assets (such as intellectual capital in the form of brand and patents) and to its social responsibility, in the context of effects on employees (i.e. diversity, safety, training), on the local communities (sponsorship, employee volunteering projects, charitable activities) and on the natural environment (water abstraction, emissions, waste, wastewater, charges or environmental protection expenditures).

It is worth noting that in terms of the sheer number of various KPI issues (these are sometimes further divided into smaller, more detailed partial indicators), the natural capital sphere comes second (13 issues), right after the finance capital (25) and before manufactured capital (10). Human and social and relationship capital matters are much less numerous (5 and 4 issues respectively), as is the intellectual capital (2 issues).

1.6. CSR activities at Aesculap Chifa, Amica, Aquanet and Solaris Bus & Coach

Based on the analysis of CSR reports, environmental reports or information obtained directly from companies Aesculap Chifa, Amica, Aquanet and Solaris Bus & Coach, it may be concluded that these companies are involved in CSR initiatives in three key areas, that is the broadly understood social area (accounting for the perspectives of clients, suppliers and local communities), employee area and natural environment area.

As regards the social area, these activities relate mainly to:

- charity (charitable activities, foundations, employee volunteer programmes, support for the disadvantaged, for NGOs),
- educational and informational initiatives (Internet portals, debates, conferences, publications, educational programmes, scholarship programmes for school and university students, internships and apprenticeships, vocational training classes, safety promotion, open days at company's venues),
- supporting the healthy lifestyle (promotion of amateur and competitive sports, active leisure, sponsorship and organization of events),
- supporting handicapped persons (employment of disabled persons, financial support),
- ensuring high quality of products (their utility, safety, effectiveness),

- observance of corporate values and principles of conduct with business partners (application of the principles of corporate governance, monitoring the level of satisfaction with products, services, communication, cooperation with the company),
- supporting local communities (supporting local suppliers, employing inhabitants of a given city or region, cooperation with municipal authorities, carrying out investments and social projects),
- supporting projects related to culture and protection of national heritage.

As regards employee relations, these companies focus on:

- improvement of safety, work organization and conditions (including monitoring these elements and employee satisfaction),
- supporting employees and their families (co-financing of holidays, health care, child care, workplace nurseries and preschools, Christmas gifts for children, co-financing of school starter kits, non-repayable allowances, repayable housing loans, co-financing for sports activities),
- ensuring equal opportunities and remunerations, as well as appropriate motivational schemes,
- organization of training, workshops and opportunities for employees' professional development,
- initiatives geared toward pensioners (including the employee pension programme).

Concerning the natural environment, these initiatives typically include:

- meeting environmental standards,
- monitoring and minimizing resource use, emissions and waste (improved efficiency of use of energy and resources, both in production and auxiliary processes, and of the end-product use; waste segregation, recycling and disposal, product safety),
- fostering eco-friendly attitudes (social campaigns),
- investments in and expenditures for environmental protection.

Of course, the foregoing areas, as well as activities taken up as their part, are mutually overlapping, and the associated benefits may be noticed by many different stakeholders[10].

[10] The broad range of advantages brought about by accounting for social and environmental issues in the operation of business has been presented in: [Mikołajewicz and Nowicki 2016a, 2016b].

One fitting example are internship or workshop programmes, vocational training classes and cooperation with academic centres. On the one hand, these companies strengthen their brand (by becoming a desired and reliable employer), they secure the intake of specialized staff and new organizational and technological thought while, on the other hand, this gives rise to social advantages stemming from the availability of workplaces and the attendant sensation of security, as well as from the improved educational offer and scientific development (including also within the scope of environmental solutions). Such measures are taken up by, among others, Aesculap Chifa, Amica, Aquanet and Solaris Bus & Coach.

And so, for example Aesculap Chifa is involved in an on-going cooperation with the Stanisław Staszic Complex of Schools No. 2 in Nowy Tomyśl, with the John Paul II Complex of Secondary Schools in Radzyń Podlaski and with the Poznan University of Technology. Practical classes take place on plant premises, in school workshops and in production departments, thus allowing students to obtain theoretical and practical knowledge related to professions of a machine fitter with specialization in toolmaking and (since 2015) of mechanic technician, with the qualifications of a cutting tool operator. Each student is assigned an experienced employee who acts as their trainer, and throughout the training period, they have the status of 'adolescent employees'. After having completed their education and obtained the hands-on knowledge, students are guaranteed employment (in the case of mechanic technicians, three top graduates will be hired). The company sponsors to five best fitter students a month-long stay in Germany for extra training which, following a successfully passed examination, results in the obtainment of an IHK certificate that allows fitters to work in their profession across all of the European Union (in 2011, the Regional Examination Board in Poznań appointed an examination centre at Aesculap Chifa, and since 2014, workshops have been offered at the school in Radzyń Podlaski). As regards cooperation with the Poznan University of Technology, it entails organization of internships and apprenticeships, conferences and 'Lean Tours' with the Chair of Production Management and Engineering, whose aim is to exchange knowledge and experience in the scope of improvement of production processes. Amica and Wix-Filtron are also involved in the project.

Amica has also completed a programme entitled 'Science through the Kitchen Door', within which it conducted workshops and apprenticeships and students of vocational and technical schools in Wronki.

Aquanet, for its part, has established cooperation with universities in Poznań. Students of the Poznan University of Technology, of the Adam Mickiewicz University, of the Poznan University of Life Sciences, but also of the AGH University of Science and Technology in Krakow are completing internships at the company.

Since 2006, Solaris Bus & Coach has been the co-developer of a vocational training class at the Basic Vocational School in Murowana Goślina, which imparts education in the profession of a mechatronics technician, with 20 new students each year. The curriculum allows students to get to know the entire production process, and the knowledge they obtain enables them to complete as much as 75% of the tasks involved in the job of a full-time employee. The programme of Practical Professional Training at Solaris Bus & Coach, developed in cooperation with other vocational schools, also covers the plant in Środa Wielkopolska, where students are learning to become fitters.

Advantages generated by companies active in the CSR area are confirmed by image research conducted both among their customers and employees. What is more, pro-social and and pro-ecological measures enjoy broad social support.

And so, for example a poll conducted in Poznań and in its suburban communities, has proved the positive image of Aquanet among its customers [CBS 2015, pp. 26, 27, 37, 42]. They perceive this company as responsible, reliable and trustworthy, as well as a modern enterprise that cares for the high quality of services (over 75% of respondents have indicated this answer). Contacts with Aquanet's employees have garnered just as much positive feedback, regarding payment collectors, Customer Attention Centre employees and technical employees alike. Local residents also appreciate the company's social campaigns, expressing their high support (over 95%) of its investments accounting for ecological issues (only 1% of the respondents did not indicate their support for this type of measures and 4% did not have an opinion). As regards the work conditions at Aquanet [CBS 2014, pp. 10, 11, 17], they are assessed by company's employees as good. Nearly 2/3 of the respondents are of the opinion that their work conditions are either much or somewhat better than at competitive enterprises. Also contacts with other employees, work conditions and relations with superiors are evaluated as very positive. The great majority of surveyed Aquanet employees (58%) are not considering switching jobs in the foreseeable future (this option is pondered by on average one in eight employees, while there is a significant group of uncertain respondents - nearly 1/3 of them indicated the answer 'hard to tell').

1.7. Final remarks

The purpose of this chapter has been to identify the declared objectives of enterprises and whether these include social and environmental aspects, as well as to point out the key stakeholder groups. This goal has also covered an evaluation of the sources and distribution of created value added in the enterprise from the perspective of stakeholders, of accounting for social and environmental aspects in the key performance indicators (KPIs) and an identification of CSR measures and their attendant advantages.

This objective has been fulfilled. As follows from the conducted research, a part of the enterprises declared value creation for more than one stakeholder as the objective of their operations. From among the analyzed enterprises, the ones that indicate the goal of creation of shareholder value, at the same time declare a focus on environmental and social issues, which makes it justified to qualify them as subscribing to the 'enlightened' value maximization theory.

As regards identification of stakeholders, the chapter presents the map of stakeholders developed by PKN Orlen, which divides them into two groups: key stakeholders (shareholders, employees, clients, suppliers, local community) and major stakeholders (State Treasury, PKN Orlen Group companies, competitors, NGOs, media, public administration, dealers and franchisees, universities, industry and consumer organizations, financial institutions).

In evaluating the value created at an enterprise from the perspective of stakeholders, the chapter examined the sources of value added at Hochtief group, as well as its distribution among the following stakeholder groups: employees, lenders, minority stockholders, public authorities and the entity itself along with its owners.

The example of PKN Orlen illustrates that the natural environment occupies an important spot within KPIs, and that the main issues also entail the manufactured, financial, intellectual, human and social capital.

Concerning CSR measures in the examined companies (Aesculap Chifa, Amica, Aquanet, Solaris Bus & Coach), they are carried out in three main areas, namely: the broadly understood social area (accounting for the perspectives of clients, suppliers and local communities), employee area and natural environment area. The chapter also briefly addresses the attendant advantages as perceived by the companies.

CHAPTER 2

Environmental and social aspects in the corporate strategy of Aquanet

2.1. Introductory remarks

From the point of view of economic thought, there is no doubt nowadays that a water supply enterprise should be managed within a strategic framework. Considering environmental, social and economic determinants of functioning of water supply enterprises, it seems justified, or indeed necessary, for them to implement steps aiming at the inclusion of objectives and processes of sustainable development in the strategic plans of such companies.

The purpose of this chapter is to identify elements of sustainable development at the Aquanet SA waterworks in Poznań.

2.2. Strategic management process at a waterworks

As observed by S. Cyfert, the generic model of strategic management entails the accomplishment of four stages (see fig. 2.1). These are: strategic analysis, strategy formulation, strategy implementation and strategic control.

Although the primary focus of this chapter is on the formulated strategy of the discussed water supply company, it must be emphasized at this point that the shape of the strategy was strongly influenced by the results of strategic analysis of both external and internal company environment. Analytical works carried out in formulating the Aquanet SA. Strategy were performed by Ernst & Young in cooperation with the Aquanet SA Analytical and Strategic Team.

The obtained results of strategic analysis, in reference to the expectations of the company's external environment and to the internal potential of the enterprise, facilitated the formulation of Aquanet SA's mission (the core reason for its existence) and vision (the image of the enterprise in the future).

Fig. 2.1. Generic model of strategic management

Source: S. Cyfert, *Wymiar czynnościowy procesu zarządzania strategicznego w publicznych szkołach wyższych*, in a collective publication edited by C. Kochalski: *Model projektowania i wdrażania strategii rozwoju w publicznych szkołach wyższych*, Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań 2012, p. 156.

The mission of Aquanet SA is to provide water supply and sewerage services at a level of profitability ensuring access to its infrastructure throughout the entire region of company's operations. The current mission of Aquanet SA is as follows: 'To build our position through continued growth based on best practices. To ensure good customer relations and the development of our employees are important to us. To be efficient and innovative.'

The key values pursued by Aquanet SA are: quality of life, ethical practices, openness, efficiency, company value, sustainable development and social responsibility, innovativeness and creativity.

The general system of objectives of this enterprise in the form of mission and vision served as the point of departure for defining key success factors, which have been called key strategic directions in Aquanet SA's Strategy. These adopted key success factors are: long-term profitability of the enterprise, cost optimization, to provide infrastructure development, reliable water supply and sewage collection, high accessibility of water supply and sewerage services.

Thus formulated strategic directions of the company formed a basis for establishing the strategic goals of the water supply enterprise which, in turn, translated into strategic initiatives and activities. The strategic goals of Aquanet SA are: increasing efficiency and innovativeness of the operational model, customer care and natural environment protection, achievement of the target profitability levels and improved affordability of provided water supply and sewerage services.

Aquanet SA sets its strategies for five-year periods with the option of possible updates at half-term. The current strategy of Aquanet SA covers the period from 2016 to 2020. Readers may find out for themselves how great the changes in the strategic development of this company are by comparing the current strategy with the former one, implemented for the years 2012-2016.

2.3. Changes in the expectations of the external environment and in company capacities - comparison of strategic analyses results

Tables 2.1-2.4 present the results of strategic analyses relating to the strong and weak points of the company, as well as to the opportunities and threats in its environment.

Table 2.1. Strengths

Strategy 2012-2016	Strategy 2016-2020
Modernization of the strategic water treatment plants and wastewater treatment plants	Modernized, cutting-edge strategic water treatment stations and wastewater treatment plants
Implemented and gradually expanded IT systems	Growing customer satisfaction
The ability to manage failures and efficiency in removing their consequences	Skill of asset management
Professional, dynamic staff open to changes, with a great experience in organization and technology management	Professional staff with experience in technology management
High accounts receivable turnover ratio	High rated profitability indicators
Capacity to expand the volume of treated wastewater	

Table 2.2. Weaknesses

Strategy 2012-2016	Strategy 2016-2020
The sewage system is overloaded in some regions; there are problems with keeping the appropriate water pressure at end-points	Low levels of remuneration for specialists on staff
Problems with elimination of odorous	Low affordability of services
Insufficient metering of water supply and water sewage pipe network flows, and lack of well-developed systems of remote controlling of equipment in the networks	IT systems are not fully implemented
Difficulties with recruitment and retention of highly qualified staff	Parts of staff are not dynamic enough and not willingness to organizational changes
Low affordability of services	
High employment levels in the Company	

Table 2.3. Opportunities

Strategy 2012-2016	Strategy 2016-2020
Willingness of communes in transferring their water supply assets and collective waste water services to the Company	Increasing the level of outsourcing of non-core areas allowing for cost reduction and improvement of quality
Willingness of communes in the Company's takeover of management of commune's water supply enterprises	Decrease of investment costs as a result of degressive level of investments
Engagement of other Company activities to generate additional income	*Other opportunities as stated in the Strategy 2012-2016*

Table 2.4. Threats

Strategy 2012-2016	Strategy 2016-2020
Increasing energy prices which involved into increasing of operational costs	Increasing energy prices which involved into increasing of operational costs
No competition on the market of expert services	
Tendency to save water saving from the growing environmental awareness, coupled with a lack of possibility to increase prices for water supply and sewage collection to compensate for the decreasing in volumes	Tendency to save water saving from the growing environmental awareness, coupled with a lack of possibility to increase prices for water supply and sewage collection to compensate for the decreasing in volumes
Reduction or complete termination in financing water supply sector investments from EU funds	Reduction or complete termination in financing water supply sector investments from EU funds
Reduction in the number of inhabitants of the most densely populated regions, where providing of water supply is most cost-efficient	Reduction in the number of inhabitants of the most densely populated regions, where providing of water supply is most cost-efficient

Analysis of information provided in tables 2.1-2.4 allows for drawing the following conclusions. And so:

- The prices of provided services were not perceived as a weak point of the enterprise,
- Modernization of the water treatment plant and wastewater treatment plant are a strong point of the enterprise (expected by the stakeholders),
- A change has occurred in the perception of customers as a strategic element in the scope of satisfaction with level of services,
- Both documents give similar emphasis to the cost-related sphere of the enterprise's operations, including the area of energy,

- Attention has been given to the need to improve the managerial competences of the management, especially as regards the non-technical area,
- The situation in the social and business environment has undergone significant changes.

Changes in the expectations of enterprise's stakeholder and in its internal potential have keystone the need to update the strategy items relating to vision, strategic goals, initiatives and strategic enterprises.

2.4. Evolution of the vision of the company

The vision of Aquanet SA as formulated in the Strategy for the years 2012-2016 was as follows:

> 'We are one of the leading water supply and waste water company in Poland. We have accomplished our position through optimum employment of our resources and the development of our water supply and sewerage operations within the region of our activity. Our operations concentrate on the city of Poznań and its surrounding communes, while we actively seek investment opportunities in the public utility sector to increase the value of our company.'

The vision quoted earlier on (from the Aquanet SA's Strategy for the years 2016-2020) places emphasis on satisfying both the needs and expectations of customers and of employees, perceived as key stakeholders in driving competitive advantage.

2.5. Change of the strategic goals and initiatives of the company

The strategic goals of this company for the years 2012-2016 were:

- Year-to-year improvement of the ROCE indicator and EBITDA in the years 2012-2016,
- Steady, year-to-year reduction of manageable costs[1] in real terms in the years 2012-2016,
- Continuous maintaining of the required environmental protection standards,
- Continuous maintaining of the required level of services norms,
- Fulfillment of requirements regarding the sewage infrastructure development[2] as laid down in the NPMWWT[3] for the period ending on 31 December 2015.

[1] The manageable costs are those which, with account of determinants of functioning of water supply enterprises in Poland, may be directly influenced by the management (Chudziński, 2014).

Redistribution of strategic goals into strategic initiatives was aimed at undertaking activities with the objective of:

- Optimizing tariffs,
- Analysis and identification of areas with cost-reduction potential,
- Implementation of a system of monitoring and control of compliance with legal norms regarding environmental protection.

The results of the performed strategic analysis and the high level of accomplishment of strategic goals for the years 2012-2016 prompted the enterprise management to set new strategic goals for the years 2016-2020. These are:

- Development of an efficient and innovative operating model,
- Customer care and protection of the natural environment,
- Maintaining EBITDA in the years 2016-2020 at a level of at least 45%,
- Improvement of the affordability of water supply and sewerage services delivered by Aquanet.

Achievement of strategic goals takes place through the accomplishment of strategic initiatives. The most characteristic ones, from the perspective of changes in approach to the strategy, are:

- Optimization of business processes,
- Implementation of mechanisms to measure work efficiency and quality,
- Building an experienced team to achieve the strategic goals by way of measuring and development of function-specific skills,
- Optimization of communication and process of strategy communication,
- To maintain of high customer satisfaction levels,
- To provide infrastructure to inhabited areas,
- Analysis of price burden and of the tariff modification potential to increase the affordability of Company's services.

The analysis of divergences between the strategic goals as set in the years 2012 and 2016 shows that:

- The considered enterprise views its development more holistically, for example by grouping customers and natural environment together,
- It is visible the company striving to keep achieved financial performance,
- The examined enterprise strives to reduce the price burden of its services.

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[2] The essence of this goal was to accomplish a certain level of accessibility to waste water network throughout the entire region of Company's operations; for the Poznań agglomeration, the target was set at 98%.

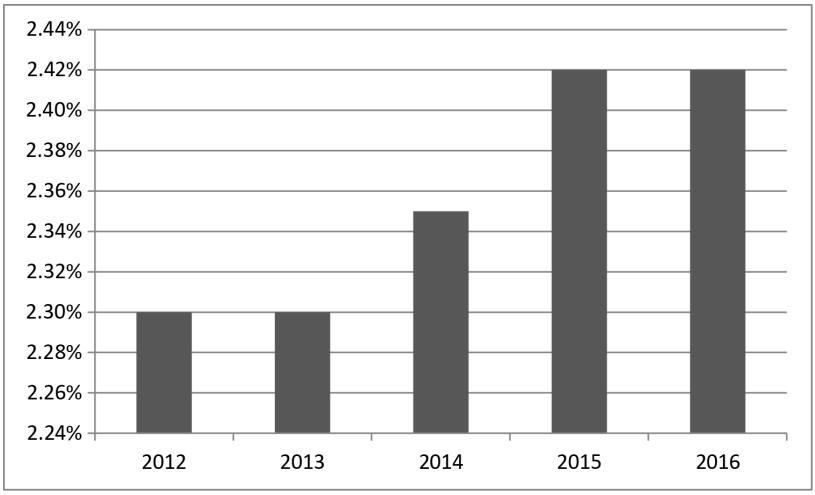
[3] NPMWWT - National Programme for Municipal Waste Water Treatment (KZGW, 2010).

A greater emphasis on the environmental and social issues is supported by the value of financial performance achieved by the enterprise in the years 2011-2015, which is presented in table 2.5.

Table 2.5. Financial performance and EBITDA of Aquanet in the years 2011-2015

	2011	2012	2013	2014	2015
Net profit (in PLN thousands)	12,941	12,184	49,478	59,104	73,938
EBITDA (%)	42.10	40.08	48.01	48.98	50.74

Graph 2.1 illustrates the price burden of services rendered by the discussed enterprise in the years 2012-2015.



Graph 2.1. Price burden of services delivered by Aquanet

Price burden is understood as the share of an average bill for water supply and sewage collection in the disposable income of a household[4]. The set objective is the decrease of price burden by the year 2020 in relation to 2016 by 0.15 percentage point, with the assumption that at this same time the value of the investment plan will not increase.

[4] Disposable income is understood as 'sum of current income of the household from various sources, reduced by advances towards personal income tax deducted by the employer on behalf of the tax payer (from paid work income and from certain benefits from social security and other benefits), by taxes paid on income from property, social security contributions, taxes paid by self-employed persons, including freelance professionals and persons using private farm in agriculture, and by social security and health insurance premiums. Disposable income includes monetary and non-monetary income, including natural consumption (goods and services taken for the needs of a household from the private farm or from the conducted business activity - agricultural and non-agricultural), as well as goods and services received free of charge. Disposable income is allocated to expenses and savings' - Central Statistical Office - Information Portal.

At the same time, the 2012-2016 strategy did not introduce a disintegration of the strategic goal related to the maintenance of environmental protection standards into individual strategic initiatives, but the current document split the achievement of this goal into the following measures:

1. Self-monitoring of own emissions means as the capability to automatically verify compliance of own measurements conducted on Company's objects with the norms and permits within the given period, as well as the capability to estimate the cost of environmental fees.
2. 'Carbon footprint[5]' of own emissions generated in the process of water treatment, wastewater treatment and their transmission.
3. Industry Card - recording pollutants discharged to the sewage system so as to enable monitoring compliance with the required environmental protection norms.

2.6. Final remarks

The analysis of the Aquanet SA's 2016-2020 strategy indicates that this enterprise has changed its approach to perceiving its role and place within its environment. Less emphasis is placed on the increase of financial results, while greater attention is paid to such areas as customer relations and protection of the natural environment. This is significant given the fact that this water supply and sewerage company operates in conditions of a natural monopoly.

Issues in connection with environmental protection have been strongly highlighted in the company's strategy for the years 2016-2020, which is manifested in the strategic initiatives to be pursued, such as monitoring the condition of the natural environment and ensuring enterprise's ecological compliance with the relevant acts of law. The initiative regarding the 'carbon footprint' comes forth as a reflection of the enterprise's responsibility for climate change.

One strategic area which was not previously stressed too clearly relates to the enterprise's employees. The 2016-2020 strategy places much more emphasis on the development of function-specific skills of the employees and on improving of management's competences.

Considering the foregoing, the contents of the Aquanet SA's 2016-2020 strategy attest to a more pronounced shift of the enterprise toward following the principles of sustainable development.

[5] Carbon footprint – the total set of greenhouse gas emissions caused by the production process, services or other activity, expressed as CO_2.

CHAPTER 3

Selected ESG issues in strategic analysis at Amica, Aquanet, B. Braun, PKN Orlen and Solaris Bus & Coach

3.1. Introductory remarks

Strategic analysis is a significant element of strategic controlling. It employs many various methods, both regarding the analysis of enterprise's external conditions and of its internal issues, also those accounting for environmental and social determinants of enterprise's operations, which are in line with the requirements of sustainable development[1].

The purpose of this chapter is to demonstrate solutions related to strategic analysis at Amica, Aquanet, B. Braun, PKN Orlen and Solaris Bus & Coach enterprises, with an indication of those regarding sustainable development. The achievement of this goal dictated case studies as the research method of choice, as well determined the layout of the chapter. First, research was conducted to verify whether the selected enterprises declare interest in requirements of sustainable development at the strategic level. In order to achieve this, strategic documents of Amica, Aquanet and B. Braun were analyzed to assess the declared extent of concern for environmental and social aspects. Next, the main priorities have been presented, as well as the methods of strategic analysis employed at the Amica corporate group. Benchmarking applied at Aquanet is of interest in terms of the methodology of strategic analysis incorporating sustainable development. It is the subject of the next part of this chapter. One of the methods of strategic analysis incorporating environmental and social determinants is the analysis of stakeholder expectations. The use of this particular method at PKN Orlen is also covered in the following sub-chapter. The chapter concludes with a demonstration of how the company Solaris Bus & Coach accounts for environmental aspects in its analysis of product life cycle.

[1] Methods of strategic analysis of external and internal aspects of an enterprise, accounting for environmental and social determinants, have been discussed in: [Kochalski and Nowicki 2016].

3.2. Declared extent of concern for environmental and social aspects in the strategic documents of Amica, Aquanet and B. Braun

The HIT 2023 strategy, currently pursued by the Amica corporate group, outlines the company's strategic goals and plans up until the year 2023. None of the success factors, which are simultaneously the determinants of the strategy, do not relate directly to environmental or social aspects [Amica 2014, p. 7][2]. The company's strategy is firmly rooted in the business determinants, characteristic for the market on which it operates. However, the mission of Amica group features some ESG elements, as it indicates the various company stakeholders. The mission of Amica reads as follows:

'Our ability to quickly respond to customer needs makes us an important supplier for a wide range of household appliances in Europe. We focus on improving customer satisfaction; efficiently and effectively adapting business processes and structures to the challenges of the market, creating value for shareholders, employees and local communities' [Amica 2014, p. 8].

The social sphere stakeholders indicated in the mission are:

- customers, whose needs are in the centre of the company's business model, and the ability to respond to them quickly is emphasized as a key strategic ability;
- shareholders, employees and local communities, for whom the company creates value, through adapting business processes and structures to the challenges of the market.

Amica's vision gives centre stage to financial indicators, such as revenues, EBITDA and debt/EBITDA ratio, as well as to key markets and product portfolio [Amica 2014, p. 9]. Thus, the vision does not directly address ESG factors. It is noticeable that Amica's strategic concept is firmly based upon the market reality. However, the five components of the HIT 2023 strategy, along expansion onto new markets, strong regional brands, own product lines of home appliances and high kitchen production potential, also name a fifth element: excellence of internal processes and committed people in the group - and this relates directly to the social determinants of the company's operations [Amica 2014, p. 11]. It is precisely within the strategy component that a set of measures has been designed to build Amica's image as a reliable employer [Amica 2016].

At Aquanet, ESG factors are deeply embedded in the company's operational strategy for the years 2016-2020. They are present on various levels of the detailed strategy, appearing in the vision, among the strategic goals and strategic projects alike.

[2] Success factors included in Amica's strategy are listed further on in this chapter.

Aquanet's vision is [Ernst & Young 2015, p. 2]:

'To build our position through continued growth based on best practices. To ensure good customer relations and the development of our employees. To be efficient and innovative.'

Already the very vision of Aquanet incorporates social aspects of its operations, in the form of care for good customer relations and employee development. These declarations are further developed into strategic goals. Aquanet's operational strategy for the years 2016-2020 contains four strategic goals [Ernst & Young 2015, p. 2]:

- 'C1 - development of an efficient and innovative operating model,
- C2 - customer care and protection of the natural environment,
- C3 - maintaining EBITDA margin in the years 2016-2020 at a level of at least 40%,
- C4 - improvement of affordability of water supply and sewerage services rendered by Aquanet'.

The analysis of the foregoing declarations indicates that two of the four strategic goals directly refer to incorporation of environmental and social aspects in the company's operations - the second strategic goal expressly commands accounting for environmental determinants and satisfying customer needs, while the fourth strategic goals invokes a significant social aspect of company operations, that is affordability of services rendered.

The above is broken down into more detailed measures as expressed in the strategic projects which are to be pursued within the framework of each strategic goal. All strategic projects under the second goal relate to environmental and social aspects, as they focus on maintaining high customer satisfaction levels, observance of environmental protection norms and bringing infrastructure to inhabited areas [Ernst & Young 2015, p. 3]. Also the strategic project entailed by the fourth strategic goal concerns social aspects, as it focuses on the analysis of price burden and potential for tariff modification to increase affordability of services [Ernst & Young 2015, p. 4]. It must be noted, however, that also the two remaining strategic goals are to involve strategic projects of social and environmental relevance, such as connecting new customers to the existing water supply and sewage network (within the third strategic goal) and building an experienced workforce through the measurement and enhancement of function-specific competences (within the first strategic goal) [Ernst & Young 2015, pp. 3-4].

The high share of declared environmental and social aspects in the strategic documents of Aquanet seems a natural consequence of the characteristics of the enterprise's core activity, that is mainly water supply and sewerage services for inhabitants of the region, coupled with a paramount significance of environmental impact. The strong focus on ESG factors is also understandable given that this enterprise is a public utility company.

The B. Braun group 2015-2020 strategy rests on three values, that is innovation, efficiency and sustainability [B. Braun 2015a, p. 42]. The ultimate objective of the

company is to remain a family-owned enterprise and to finance its growth from its own resources, while the strategic goals take on a tangible, quantifiable form (annual revenue increase of 5 to 7% and EBITDA margin at a level of 16-18% all the way until 2020) [B. Braun 2015a, p. 5], but direct references to environmental and social aspects as one of the core values underpinning the company's philosophy are a clear declaration in this respect. This is understandable given not only the specific market on which the company operates (health care), but also the assumptions underlying the foundations of running a family business, such as B. Braun.

3.3. Strategic analysis at Amica group

Strategic analysis at Amica corporate group preceded the drafting of the currently implemented strategy of the company, HIT 2023. The methodological approach to company's strategic analysis entailed its macro- and micro-environment [Amica 2016].

This strategic analysis facilitated the singling out of both principal strategic dilemmas and priorities of the company [Amica 2016]. The strategic priorities include [Amica 2015, pp. 18-25]:

- expansion onto new markets, especially in Western Europe, through both acquisitions and organic growth (diversification);
- building its brand position on key markets;
- development of own product lines;
- high kitchen appliances production potential, to be achieved through investments in raising production capacities and through development of new production competences and optimization of production costs;
- excellence of internal processes and committed people in Amica group.

As regards the foregoing, the strategic analysis resulted in the indication of the following success factors in the Amica strategy [Amica 2014, p. 7]:

- 'strong position on chosen European markets and a good financial standing of Amica as a springboard for dynamic growth on both current and new markets;
- the need to scale up the business, to build strong brands, to diversify sales through growth on new markets and through new distribution channels, to offer a full portfolio of home appliances and to increase efficiency so as to avoid takeover by main competitors;
- fragmentation of the market and significant market share of local players in Western and Southern Europe pose and opportunity for Amica to develop its sales through their takeovers'.

Methods employed in the company's strategic analysis involve SWOT analysis, use of the BCG or ADL matrices, as well as benchmarking analysis [Amica 2016].

3.4. Employment of benchmarking in the strategic analysis at Aquanet

One of the methods employed in strategic analysis is benchmarking. Considering the specificity of Aquanet's operations, benchmarking has proved an efficient tool in the strategic diagnostics of the enterprise. The company participates in the 'European Benchmarking Co-operation' (EBC) project, whose 2014 research covered 43 water supply and wastewater companies from 17 countries [European Benchmarking Co-operation 2015a, p. 1]. Given that sale prices in the company's cannot be easily influenced, benchmarking serves not only as a tool of strategic analysis used to compare the performance of various enterprises representing the same industry; it is also a valuable method of indication of the most important Key Performance Indicators (KPIs), which are mainly cost indicators in this industry.

For example, Aquanet, as regards data for the year 2014, scored above the average in the following areas: [European Benchmarking Co-operation 2015a, pp. 1-66; European Benchmarking Co-operation 2015b, pp. 1-72]:

- energy consumption for wastewater treatment (kWh/population equivalent served) - throughout the years 2010-2014, it was below the industry average in Europe;
- distribution losses per mains length (m^3/km/day) - in the years 2010-2014, it was below the industry average in Europe;
- mains failures (number of failures/100 km of network) - in 2011, below the industry average in Europe, in the years 2010, 2012, 2013 and 2014 - above it;
- total cost per unit (euro/m^3) - in the years 2010-2014, it was below the industry average in Europe;
- average age of the sewer system - in 2014, it was below the industry average in Europe;
- average water supply network age - in 2014, it was below the industry average in Europe;
- customer service costs per connected property (euro/1000 m^3) - in the years 2012-2014, it was below the industry average in Europe.

The areas where Aquanet scored worse than its peers regarded the following indicators [European Benchmarking Co-operation 2015a, pp. 1-66; European Benchmarking Co-operation 2015b, pp. 1-72]:

- electricity use for water production and distribution (kWh//m^3) - in the years 2011-2014, it was above the industry average in Europe;
- sewerage network blockages (number of blockages/100 km of network) - in the years 2011-2014, it was above the industry average in Europe;

- personnel intensity in water supply (full-time employees/1000 properties) - in the years 2010-2014, it was above the industry average in Europe;
- personnel intensity in water production process (full-time employees/m^3 mln) - in the years 2010-2014, it was above the industry average in Europe;
- personnel intensity in customer services connected to water supply operations (full-time employees/1000 properties) - in the years 2010-2014, it was above the industry average in Europe;
- personnel intensity in wastewater operations (full-time employees/1000 properties) - in the years 2010-2014, it was above the industry average in Europe.

The extensive data provided by benchmarking allows for an analysis of dynamics in individual areas spread over subsequent years, for identification of reasons behind company's situation as compared to its industry peers from various countries, which may be applied in the process of designing measures in the strategic, tactical and operational dimension. One example within this context is the recurring higher than average number of blockages in the sewerage network, whose analysis gave rise to the implementation of an information campaign to reduce waste discharged into the network by its users [Aquanet 2016a]. Similarly, the poor performance regarding affordability of utility services as compared to other European enterprises [European Benchmarking Co-operation 2015a, p. 20; European Benchmarking Co-operation 2015b, p. 21] has resulted in the incorporation of this issue into the operational strategy of Aquanet SA for the years 2016-2020 as the fourth strategic goal [Ernst & Young 2015, p. 2].

3.5. Application of the analysis of stakeholders' expectations as a method of strategic analysis accounting for environmental and social aspects at PKN Orlen

The analysis of stakeholders' expectations (in German: *Analyse der Stakeholdererwartungen*) is a method of strategic analysis accounting for environmental and social aspects. One of the premises of this analysis is that long-term success of an enterprise hinges on striking a balance between the interests of various stakeholders [Steinke et al., 2014, pp. 54-55]. This analysis indicates not only the relevance of the individual issues to particular groups of interest; it also indicates their relevance to the business operations[3].

The relevance matrix presented by PKN Orlen and included in this chapter as figure 3.1 is an interesting example of the application of this analysis.

[3] The analysis of stakeholders' expectations has been discussed in, among others: [Kochalski and Nowicki 2016].

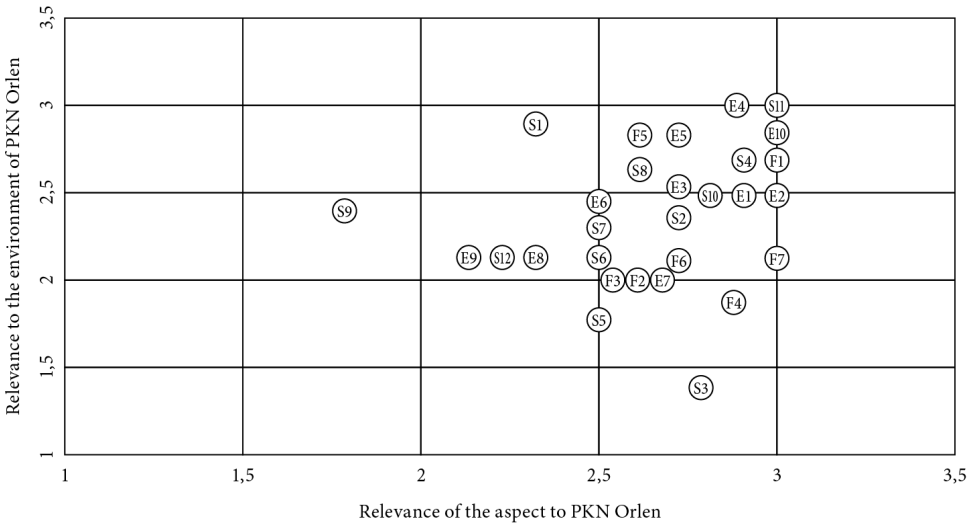


Fig. 3.1. Relevance matrix of PKN Orlen as an example of application of the analysis of stakeholders' expectations

1 - low relevance; 3.5 - high relevance; aspects marked as in table 3.1

Source: [PKN Orlen 2015d]

Table 3.1 indicates the main analyzed aspects, divided into financial, social and environmental issues.

The fundamental recommendations stemming from the analysis of stakeholders' expectations put particular emphasis on aspects of high relevance to both the enterprise and its stakeholders [Steinke et al., 2014, p. 56]. Based on the analysis of figure 3.1 and table 3.1, it may be concluded that in the case of PKN Orlen, this group entails such aspects as:

- customer health and safety,
- emissions of greenhouse gases,
- emergency preparedness,
- economic performance,
- occupational health and safety,
- energy,
- raw materials/materials,
- anti-corruption,
- effluents and waste,
- water,
- contribution to the economic development of Poland,
- respect for human rights.

Table 3.1. Financial, social and environmental aspects accounted for in the PKN Orlen relevance matrix

ASPECTS		
FINANCIAL (F)	**SOCIAL (S)**	**ENVIRONMENTAL (E)**
Economic performance - F1	Indirect economic impacts (impact on a company's business environment, e.g. resulting from its contribution to improving the quality of life of people or developing entrepreneurship) - S1	Raw materials/ materials (used [raw] materials) - E1
Procurement practices - F2	Employment - S2	Energy (energy consumption, energy intensity) - E2
Environmental protection expenditure - F3	Labour/management relations (information and communication policy, e.g. for giving notice of significant operational changes) - S3	Water (water consumption) - E3
Integrity of assets, process safety- F4	Occupational health and safety - S4	Emissions (direct and indirect greenhouse gas emissions, emissions intensity, emissions of other compounds - substances that deplete the ozone layer) - E4
Contribution to the economic development of Poland (investments, jobs) - F5	Education and training - S5	Effluents and waste - E5
Investments in research and development - F6	Diversity and equality of opportunities - S6	Products and services (Extent of impact mitigation of environmental impacts of products and services) - E6
	Equal remunerations to women and men - S7	Level of compliance with environmental regulations (compliance, penalties for non-compliance with laws and regulations) - E7
	Respect for human rights (investments) - S8	Environmental grievance mechanisms - E8
	Local community - S9	Grievance mechanisms for impacts on society- E9
	Anti-corruption - S10	Emergency preparedness - E10
	Customer health and safety - S11	
	Sponsorship of Polish sports - S12	

Source: [PKN Orlen 2015d]

Pursuant to the recommendations of the analysis of stakeholders' expectations, the areas of high relevance to stakeholders, but of lower relevance from the perspective of the enterprise, should be given more attention, especially as regards the area of communication [Steinke et al., 2014, p. 56]. Based on the analysis of figure 3.1 and table 3.1, it may be concluded that in the case of PKN Orlen, this group entails the local community.

3.6. Accounting for environmental aspects in the product life cycle at Solaris Bus & Coach

The living standards in urban areas (where over 50% of global population live) depend to a great extent on whether these areas pursue the policy of sustainable transportation, which meets the expectations of the society, which is economically viable and which minimizes the negative environmental impacts. With the foregoing in mind, Solaris Bus & Coach consistently follows a path of investing in technological innovations, improving their fleet in terms of quality and functionality, as well as in terms of the ecological impact of the vehicles and by tapping into the opportunities offered by alternative energy sources, for example by producing and advocating efficient electrical[4], hybrid or biogas-fuelled buses [Solaris 2015, p. 38].

Concerning the area of production and management, in 2005 Solaris Bus & Coach made the decision to implement an Environmental Management System compliant with the international ISO 14001 standard. The implementation of this system has facilitated the identification and assessment of environmental aspects in connection with company's functioning and the undertaking of measures to mitigate the negative impact of the enterprise on the environment.

Solaris Bus & Coach has identified the following environmental areas [Solaris 2015, p. 9]: consumption of natural resources, generation of waste, gas emissions, noise and vibrations, generation and discharge of wastewater and leakages.

The most important measures undertaken to mitigate the negative impact on the environment include [Solaris 2015, pp. 9, 10]:

- 'expanding the product range to include vehicles with a reduced negative impact on the natural environment (trams and hybrid buses, electric buses, diesel-engine buses meeting the most restrictive standards),
- conducting research on reducing vehicle mass (less fuel consumption, lower impact on the road surface), reduction of vibration and noise inside the vehicles and optimization of fuel consumption,

[4] The applied innovations, along with the cutting-edge charging systems, guarantee operational reliability of buses that matches the performance of vehicles with combustion engines, with the simultaneous significant reduction of costs of use. Another advantage is the enormous benefit to the natural environment as regards emission of pollutants (zero exhaust emissions) [Solaris 2015, p. 36].

- investments in the infrastructure, to reduce utility consumption in the process of production,
- investments in the infrastructure, to reduce the negative impact on the natural environment,
- trainings for employees, to heighten their ecological awareness,
- introduction of information bulletins for vehicle users,
- imparting training sessions for users regarding economic use of Solaris vehicles,
- introduction of electronic documents and recommendation of double-sided print of materials to reduce paper consumption,
- introduction of the 'material for material' programme (i.e. employees receive new equipment once they bring in the old one).'

The foregoing measures are consistently pursued, and the method of their implementation and following is constantly monitored by the management and through internal audits[5].

In its Integrated Management System and Technical Safety Policy, the company has undertaken to [Solaris 2015, p. 22]:

- 'minimize the amount of technical solutions which may negatively affect the environment,
- to carry out all activities in compliance with the provisions of law and with other requirements binding at Solaris,
- to reduce energy and natural resources consumption in the process of vehicle production, their use and in the overall operations of the company,
- to make all employees accountable not only for product quality, but also for the protection of the natural environment,
- to pursue rational management of waste and hazardous substances so as to reduce their negative impact on the environment,
- to enhance the ecological awareness of their employees, clients and subcontractors.'

As regards the use of company's products, Solaris Bus & Coach provides all its clients with a maintenance bulletin, covering detailed instructions on how to use and service the vehicles, and in particular including the summary of vehicle characteristics and data on how they match the most restrictive environmental norms, a detailed fire safety instruction for the drivers, recommendations on eco-driving, instructions on measures to be taken in case of leakages and a description of how to dispose of spent parts and operating fluids. This document has been drawn up to minimize the negative

[5] The Integrated Management System implemented at the company covers all locations and it meets the requirements of six different standards, i.e.: ISO 9001, ISO 14001, IRIS, on welding systems (EN ISO 3834-2 and DIN EN 15085-2) and regarding adhesive bonding (DIN 6701-2) [Solaris 2015, pp. 25, 26].

impact on the natural environment arising as a result of improper or non-optimum bus use and operation. Observance of these recommendations guarantees long operating cycle of the vehicle and constant care for natural environment [Solaris 2015, pp. 26, 27].

As regards the disposal and recycling of its products or their parts, Solaris Bus & Coach pays great attention to these issues, which is attested to by the existence of a complex recycling policy at the company (cf. fig. 3.2).

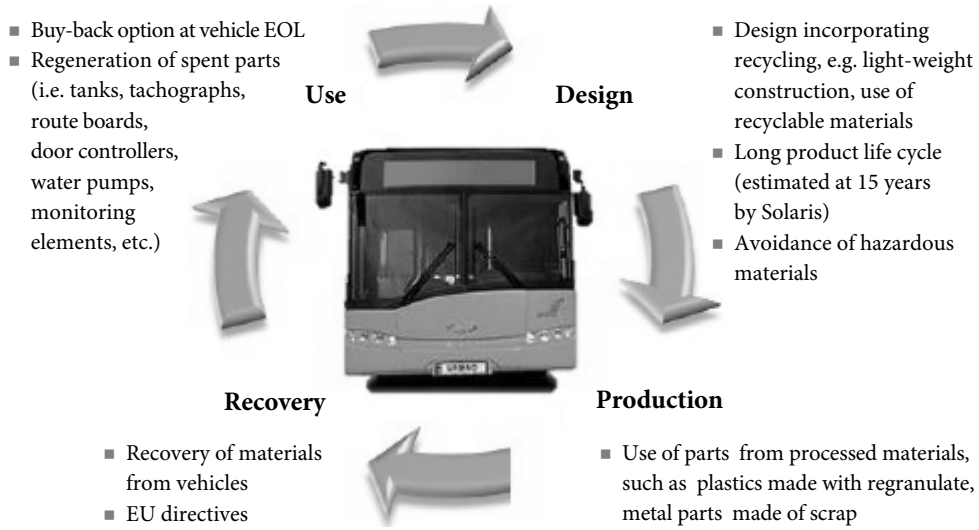


Fig. 3.2. Complex approach to recycling at Solaris Bus & Coach

Source: [Solaris 2015, p. 29]

This approach covers for all the aspects of recycling at each stage of product life cycle, i.e. from the phase of its design, through production and use, all the way to its final scrapping. This policy helps the company in using resources efficiently and in reducing the negative impact on the natural environment. As a consequence, many parts of a Solaris bus may be recovered for use in new vehicles. The company estimates that 85% of the material mass used in its vehicles is recycled [Solaris 2015, p. 30].

The following, for example, are subject to recycling [Solaris 2015, p. 32][6]:

[6] It should be noted that Annex V to the Directive 2005/64/EC of the European Parliament and of the Council of 26 October 2005 sets out which vehicle parts are not fit for reuse in the production of new vehicles. The following parts are not subject to recycling in Poland [Solaris 2015, p. 33]: automatic or non-automatic seat belt assemblies, including webbing, buckles, retractors, pyrotechnic actuators, seats (only in cases where safety belt anchorages and/or airbags are incorporated in the seat), steering lock assemblies acting on the steering column, immobilisers, including transponders and electronic control units, emission after-treatment systems (e.g. catalytic converters, particulate filters), exhaust silencers.

- aluminium (beams, rear engine covers, lower side panels, elements of the gear box, elements of the engine, radiators),
- steel (frame, wheel covers, external doors, elements of the engine, wheel centres, side flaps, axis components, drive shafts, elements of the exhaust and suction system, elements of the heating system, pneumatic pipes, railings, rims, seating anchorages, door elements, engine cushions, disabled ramps),
- copper (electric cables),
- oils and fluids (fuel oil, AdBlue fluid, coolant, windshield wiper fluid, brake fluid, oils in control augmentation system, hydraulic oil, engine oil, gear box oil, fan system drive oil, AC freon, battery acid),
- polymers (bumpers, window beams, fluid containers, pipe joints, electrical installation, reflector mounts and covers, elements of the driver's cabin, external covers, passenger seats, heating/AC channels, registration plate mounts, driver's seats, air intake grates, floor splats, linings),
- elastomers (gaskets, tyres, Sika waterstops, splash guards, suspension components, engine cushions, cable insulation),
- glass (external windshields, sunroofs, partition walls, door glazing),
- others (plywood, batteries, catalysts, dibond composites, electronic elements).

3.7. Final remarks

The purpose of this chapter was to present selected aspects of strategic analysis at Amica, Aquanet, B. Braun, PKN Orlen and Solaris Bus & Coach. It was examined which of the applied methods directly respond to the requirements of sustainable development.

This objective has been fulfilled. Declared extent of concern for environmental and social aspects in the strategic documents of Amica, Aquanet and B. Braun has been analyzed. Next, the main priorities and methods of strategic analysis employed at the Amica corporate group have been presented. The chapter also explores the strategic determinants of benchmarking application at Aquanet, a company whose operations are strictly connected to both environmental and social aspects. The next part of the chapter examines the application of the stakeholders' expectations analysis method at PKN Orlen. Accounting for environmental aspects in the product life cycle at Solaris Bus & Coach has also been indicated. Each of the sub-chapters offers a commentary on the practical solutions employed at the discussed enterprises.

CHAPTER 4

Financial planning in the assessment of profitability of green investments illustrated by the example of a wind farm

4.1. Introductory remarks

This chapter, based on the example of an investment in a wind farm, explores the importance of financial planning in the context of investment decisions of enterprises focused on green objectives. The chapter applies financial planning techniques presented from a theoretical standpoint in the book 'Green Controlling and Finance. Theoretical Framework.'

The present chapter indicates the significance and development of wind power industry. It further presents basic assumptions relating to a wind farm investment, placing most emphasis on estimation of investment expenditures. The subsequent two subchapters focus, respectively, on the presentation and justification of the adopted assumptions as regards income and costs of the discussed project. The following part of the chapter presents and discusses the main income statement items and cash flow statement of the enterprise. Next, the analysis shifts to characterize the guiding principles applied in determining the value of cash flows considered when evaluating effectiveness of this investment and estimating the discount rate (weighted average cost of capital). Application of these principles has facilitated calculation of basic measures of project profitability, such as NPV, IRR, MIRR or payback period. Analysis of NPV sensitivity to key project parameters is of paramount importance in the process of building a financial plan designed to assess investment profitability. This analysis enabled to determine the risk involved with investment in a wind farm.

4.2. Development of wind power industry as one of the forms of renewable energy

One of the assumptions underlying the 'Europe 2020' Strategy [European Commission 2010, p. 12] is reduction of emission of greenhouse gases by 20% as compared with the emission levels from 1990, as well as to increase the share of renewable energy up to 20% of overall energy consumption. Poland should therefore lower the share of energy generated from conventional sources in favour of renewable sources. Costs of green energy generation are higher than those of energy generated from carbon combustion, hence the need for the State's support of producers of e.g. wind energy. Such support is channelled through the so-called 'green certificate' market.

Wind power industry is a fast-growing energy sector. The technology of wind energy generation is constantly improved. Over the last 20 years, there has been an almost hundred-fold increase (from 25 kW to 2500 kW and more) in power output of a single turbine, while the costs of production of one unit of energy has shrunk to about one-fifth [Wiśniewski, Michałowska-Knap and Koć 2012, p. 12].

The development of the wind power industry (market introduction of turbines designed for terrains with low wind speeds) has made it economically feasible to produce energy in most areas of Poland, providing the turbines are appropriately selected for the location and the wind farm is duly optimized. The technical potential of wind energy is largely dependent on the spatial layout of open terrains. [Wiśniewski, Michałowska-Knap and Koć 2012, p. 14]. Two-thirds of Poland's territory present advantageous conditions for use of wind energy. The best locations in this respect are the Baltic Coast and the Suwałki Region, where the average annual wind speed exceeds 4.5 m/s [Gnatowska and Wąs 2015, p. 24].

4.3. Investment outlays and fundamental project assumptions

The integrated appraisal of the efficiency of energy generation from renewable sources does not hinge merely on economic assessment [Dzik 2005]. The process of profitability assessment of a green investment should start with a technical assessment study (in the case of wind farms to evaluate wind power efficiency), followed by economic, social and environmental assessment. In view of the nature of this work, the present chapter will focus on the financial evaluation of investment effectiveness, with particular emphasis on NPV sensitivity analysis. Technical aspects will not receive much coverage here, although they are certainly relevant to the final economic calculus. In the following appraisal of investment in a wind farm, the technical parameters related to determination of expenditures, income from the amount of generated power and operating costs have been determined based on publications of following authors: R. Gnatowska and A. Wąs [2015], M. Suska-Szczerbicka and E. Weiss [2013], R. Pesta [2009], J. Paska [2008].

The investment appraisal concerns erection and operation of a wind farm with a capacity of 40 MW. Its success is contingent upon many different factors, of which the chief ones are: investors' appropriate knowledge (of the rules governing renewable energy market within wind power installations and the relevant legislation), choice of a suitable location for the planned wind farm with particular emphasis on wind conditions, selection of appropriate units for the chosen terrain [Suska-Szczerbicka and Weiss 2013, p. 106].

For the needs of the investment appraisal, it has been assumed that capital outlay plan would be scheduled for two years[1]. After the lapse of this period, at the beginning of the third year, power production at the wind farm would commence. The structure of the project's initial expenses has been presented in table 4.1.

Table 4.1. Structure of investment outlays (capacity of 40 MW)

Type of outlays	Value
Road infrastructure	10,000,000
Design and preparatory works	12,000,000
Earthworks, surface hardening, foundations	13,000,000
Hook-up costs	20,000,000
Wind turbines (20 units)	165,750,000
TOTAL	220,750,000

In order to estimate the value of turbines (20 units), the price of a singel unit was assumed at 1.95 million Euro and the EUR/PLN exchange rate at PLN 4.25.

It has been assumed that depreciation would be calculated at the annual rate of 7%, with the use of the digressive method[2]. For the remaining outlays, the adopted depreciation rate is 4.5% (straight-line method).

The project analysis also entails the premise that investors (providing they win the auction) will be eligible for a 15-year guarantee to sell energy at the price offered at auction, pursuant to the Act on renewable energy sources [Act dated 20 February 2015][3]. For the abovementioned reason, a 15-year horizon for evaluation of project profitability has been set, assuming the investors would be looking to verify whether the outlays made pay back within the guaranteed price period. Owing to the long forecast period, it has been assumed that the financial plan would be constructed based on fixed prices.

[1] It has been assumed that the preliminary process connected to the selection of location and securing the necessary permits had been completed.

[2] The assumption regarding the digressive depreciation method has been made on the basis of the Individual Interpretation of the Director of Tax Chamber in Warsaw dated 10 April 2013 [interpertacje-podatkowe.org 2013].

[3] Pursuant to the Act on renewable sources of energy, the system of supporting RES in the form of green certificates will be gradually replaced with RES auctions.

It has been assumed that within the first year, 33% of outlays for fixed assets would be incurred and financed from equity, while in the second year, the remaining outlays would be made and financed with a loan. The investment, then, would be financed in 33% from equity and in 67% from external capital in the form of a bank loan[4]. The assumed loan interest rate is 6.53%[5], and the loan to be paid off within 15 years.

4.4. Sales revenues

A wind farm's income comes from the sale of energy. Power production depends on a number of variables: for example wind conditions, commercial terms as laid down in the connection and sale contracts and the prices of electric power. For the purpose of potential income estimation, the following technical assumptions have been adopted:

- wind farm capacity - 40 MW,
- maximum efficiency - 2400 MWh/MW.

In order to forecast income, it has been cautiously assumed that efficiency would reach 2200 MWh/MW, which would translate into 88 000 MWh of annual power output.

As already indicated before, it has been assumed that investors would be eligible for the 15-year guarantee to sell energy at the prices offered at auction. Pursuant to the Regulation of the Minister of Economy on the reference price of electric power from renewable sources of energy, in year 2016 [Regulation dated 13 November 2015], the maximum price for the sale of energy from new RES installations, launching energy production based on auctions, will stand at PLN 385/MWh for onshore wind power plants with a capacity exceeding 1 MW. Considering the industry expectations relating to the price levels acceptable to investors[6], for the purpose of this analysis, a price of PLN 380/MWh, being very close to the maximum price, has been assumed. Under the above assumptions about the amount and unit price of produced power, the total annual income would amount to PLN 33,440,000.

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[4] Such capital structure has been laid down in relation to the decision to adopt, for the analyzed project, the discount rate of weighted average cost of capital (WACC) as recommended by DiaCore (institution appointed by the European Parliament to support renewable energy policies within the EU). According to DiaCore's guidelines regarding WACC for enterprises pursuing investments in renewable sources of energy in Poland are the point of departure for the above-quoted shares of equity and debt.

[5] The credit interest rate has been adopted in accordance with the assumptions made in the evaluation of WACC by DiaCore for the year 2014, uprated by inflation factor (99.1 [Central Statistical Office]) in 2015.

[6] Ciepiela D., 2015, Czy nowy system wsparcia OZE będzie skuteczny?, *http://energetyka.wnp.pl/czy-nowy-system-wsparcia-oze-bedzie-skuteczny,257326_1_0_0.html*

4.5. Operating costs

Operating costs (throughout the wind farm's operating period) have been estimated based on operating and servicing costs of wind farms with a similar capacity of 40 MW. The most significant cost items are the real property tax and the costs of energy balancing. The price of energy balancing, based on market prices, has been set at PLN 16 per 1 MWh. Costs in connection with turbine maintenance have been averaged annually. A list of these costs for the first year of project operation has been presented in table 4.2.

Table 4.2. Annual operating costs

Type of costs		Value
Real property tax		1,900,000
Energy balancing	PLN 16 / 1 MWh	Total: 1,536,000
Insurance		300,000
Remuneration with overheads (operators)		200,000
Operation and maintenance		1,100,000

4.6. Net financial performance and project cash flows

With the adopted assumptions, the investment would generate a net financial performance and cash flows as presented in table 4.3.

Table 4.3. Net financial performance and cash flows in the adopted investment horizon in PLN thousands

Item/period	'0'	1	2	3	4	5	6	7
Net financial performance	0	-8706	-4421	-647	2690	5649	6857	6346
Cash flows from operations and investments	-220750	28532	28532	28532	28532	28532	28198	27044
Total cash flows	0	9014	9658	10302	10945	11589	11900	11389
Item/period	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Net financial performance	6867	7389	7910	8432	11972	20271	20792	21314
Cash flows from operations and investments	26921	26799	26677	26554	25724	23777	23655	23533
Total cash flows	11910	12432	12953	13475	13288	11985	12507	13028

Due to adopted digressive depreciation method, the project would generate accounting losse over the first three years. For the next nearly three years, the company would be relieved of income tax due to settlement of losses sustained in the previous years. Net profits would systematically increase owing to the decreasing depreciation write-downs and financial costs (loan interest).

In spite of the projected losses in the first three years, the project would, from its very commencement, drive positive operating cash flows. This would be a result of the abovementioned high depreciation write-downs. Total cash flows in each year are positive, which indicates lack of problems with paying off bank loans or maintenance of cash liquidity over the entire period covered by the investment profitability analysis.

4.7. Measurements of investment profitability

Free Operating Cash Flows (FOCF) have been determined for the needs of investment profitability analysis. In order to do so, for each of the years covered by the analysis, value of operating profit after taxation has been determined and increased by the amount of depreciation; initial project expenses have also been established. Moreover, the liquidation value has been added to the flows of the last year of the forecasting horizon; it has been determined based on the book value of fixed assets and liabilities. The project does not account for stocks, as their value is marginal and thus negligible in terms of project's profitability. The determined values have been presented in table 4.4.

Table 4.4. Cash flows for the needs of project profitability assessment in the assumed investment horizon, in PLN thousands

Item/period	**'0'**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Net operating profit after tax		771	3720	6256	8437	10313	11039	11039
Amortisation and depreciation		27580	23939	20808	18116	15800	14903	14903
Outlays in period '0' and liquidation value	-220750							
Free operating cash flows	-220750	28351	27659	27064	26553	26113	25942	25942
Item/period	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Net operating profit after tax	11039	11039	11039	11039	14058	21835	21835	21835
Amortisation and depreciation	14903	14903	14903	14903	11176	1575	1575	1575
Outlays in period '0' and liquidation value								18846
Free operating cash flows	25942	25942	25942	25942	25234	23410	23410	42256

As mentioned earlier, the adopted discount rate is the weighted average cost of capital (WACC), as recommended by DiaCore (institution appointed by the European Parliament to support renewable energy policies in the EU). According to DiaCore, WACC for Poland in 2014 varies between 8.7% and 10% [Diacore 2014].

The project estimates are based on the lower limit quoted by DiaCore owing to the gradual decrease of investment risk associated with investing in RES (being a result of, e.g. commitment by the states represented at the Paris climate conference to counteract global climate warming). With account for the inflation factor (99.1% - deflation), WACC set for 2015 stands at 7.72%. When calculating cost of capital an assumption was made on the fixed (ultimate) structure of capital for the enterprise realizing the project [Byrka-Kita 2008, p. 18].

The above assumptions have been used in the calculation of basic investment profitability measures.

Net present value (NPV) has been calculated according to the following formula:

$$NPV = \sum_{i=0}^{n} \frac{CF_i}{(1+k)^i} \tag{1}$$

where:

n – number of project functioning periods,
CF_i – cash flow generated by the project in the *i*-th period,
CF_0 – initial outlays,
k – cost of capital.

In order for an investment to prove profitable, the net present value must be positive.

Internal rate of return (IRR) and modified internal rate of return (MIRR) have been established based on the following formulas:

$$\sum_{i=0}^{n} \frac{CF_i}{(1+IRR)^i} = 0 \tag{2}$$

$$MIRR = \sqrt[n]{\frac{\sum_{i=0}^{n} CF_i^{(+)} (1+rei)^{n-i}}{\sum_{i=0}^{n} \frac{CF_i^{(-)}}{(1+k)^i}}} - 1 \tag{3}$$

where:

IRR – internal rate of return,
MIRR – modified internal rate of return; *rei* - reinvestment rate,
$CF_i^{(+)}$ – positive cash flow in the *i*-th period,
$CF_i^{(-)}$ – negative cash flow in the *i*-th period,
the remaining symbols are the same as in formula 1.

In order for an investment to be profitable, both rates (IRR and MIRR) must be higher than the discount rate, i.e. higher than the cost of capital of the entity realising the project.

Profitability index (PI) - is a measure which shows the relative effects of a project. It is calculated as follows:

$$PI = \frac{\sum_{i=0}^{n} \frac{CF_i^{(+)}}{(1+k)^i}}{\sum_{i=0}^{n} \frac{CF_i^{(-)}}{(1+k)^i}} \tag{4}$$

where:

PI – profitability index,

the remaining symbols are the same as in formulas (1-3).

In order for a project to be profitable, PI must be above 1.

Payback period is the lapse of time needed for the project's net cash flows to offset the outlays incurred. When calculating discounted payback period, it is tested what number of years it would take for a project's discounted net cash flows to break even with the value of discounted outlays. In the latter case, the fact that discount rate required by investors is deducted from the cash flows generated by the project is accounted for. In the discussed project, the length of the payback period calculated according to both nominal and discounted cash flows have been rounded to full years.

On the above assumptions, the discussed measures of investment profitability adopt the following values:

- NPV = PLN 7,344,456.28,
- IRR = 8.25%,
- MIRR = 7.95%,
- PI (profitability index) = 1.04,
- Payback period = 9 years,
- Discounted payback period = 14 years.

All the calculated measures show profitability of this investment. If the forecast were to come true, the enterprise value would increase by over PLN 7.3 million. Both the internal rate of return (IRR) and modified internal rate of return (MIRR) are higher than the cost of capital (7.72%). Profitability index (PI) is higher than 1, and payback period (calculated according to both nominal and discounted cash flows) does not exceed the assumed forecasting horizon. It must be noted, however, that the relative measures of profitability (IRR, MIRR, PI) suggest a slim safety margin within the project. The expected rate of return barely exceeds the cost of capital. The sum of

discounted benefits is only 4% higher than the value of discounted outlays. The project risk will be examined more closely based on the sensitivity analysis to be conducted in the following chapter.

It should also be emphasized that the project profitability could increase if social and environmental aspects were addressed by calculating the ecological effect of this investment. The ecological effect is understood as the benefits generated by replacement of carbon energy with energy from renewable sources. The ecological effects of using renewable energy are determined by deducting the external costs, burdening energy produced from a renewable source of energy, from external costs, burdening energy produced from carbon [Solińska and Soliński 2003]. Due to a lack of precise data, enabling estimation of these effects, this analysis will not be performed.

4.8. Project risk assessment

An important step in construction of a financial plan is sensitivity analysis. It has been conducted by determining critical values for a set of selected variables and calculating sensitivity coefficient.

Critical value of a parameter is one, for which NPV is nil, with the simultaneous assumption that values of other explanatory variables remain unchanged [Gryko et al. 2011]. Therefore, at critical value the project is on the verge of profitability. The critical values has been established for the following variables: value of the wind turbine, efficiency of turbines in MWh/MW, energy sale price (in PLN/MWh) resulting from the RES auctions, unit price of commercial energy balancing (PLN/MWh), tax on real property.

The critical values of the abovementioned parameters, along with their value percentage change causing NPV to fall to zero, has been presented in table 4.5.

Table 4.5. Critical value of parameters and their percentage change

Parameter	Base value	Critical value	Percentage change at which NPV = 0 in relation to base value
Value of 1 turbine	8,287,500	8,798,439	6%
Turbine efficiency in MWh	2,200	2,123	-4%
Auction price per 1 MWh	380	367.25	-3%
Price per 1 MWh of commercial balancing	16	28.75	80%
Property tax	1,900,000	3,021,666	59%
Discount rate	7.72%	8.25%	7%

The analysis of values presented in table 5 allows for a conclusion that profitability of the examined investment depends primarily on the price, the wind farm would be able to receive for 1 MWh of produced power. Considering that the maximum price accepted by the Ministry of Economy is PLN 385/MWh, investor representatives at auctions should not settle for prices significantly lower than the maximum rates. Project's NPV also hinges on turbine efficiency which, in turn, depends also on wind forces. Efficiency reduction by more than 4% equals drop in energy output rendering the project unprofitable. NPV displays high sensitivity to change of turbine price. Of course, regardless of whether the change is caused by change in manufacturer's price or a change in the EUR/PLN exchange rate, a 6% increase will bring the investment to the brink of profitability. The tax on real property or the fees for commercial energy balancing have much less profound effects on project profitability. Whereas comparison of IRR and WACC, shows that an increase in capital cost in excess of 7% will render the project unprofitable.

Also, sensitivity coefficient has been calculated for the foregoing variables. It determines how NPV (or another explanatory variable) will change when the input variable changes by 1% [Wiśniewski 2008, p. 172]. Its formula is as follows:

$$W_{wr} = \frac{\frac{NPV_1 - NPV_2}{NPV_2}}{\frac{Z_1 - Z_2}{Z_2} \times 100} \tag{5}$$

where:

NPV_1 – NPV value at input variable equal to Z_1,
NPV_2 – NPV value at input variable equal to Z_2,
Z_1 – value of the input variable after change,
Z_2 – base value of the input variable.

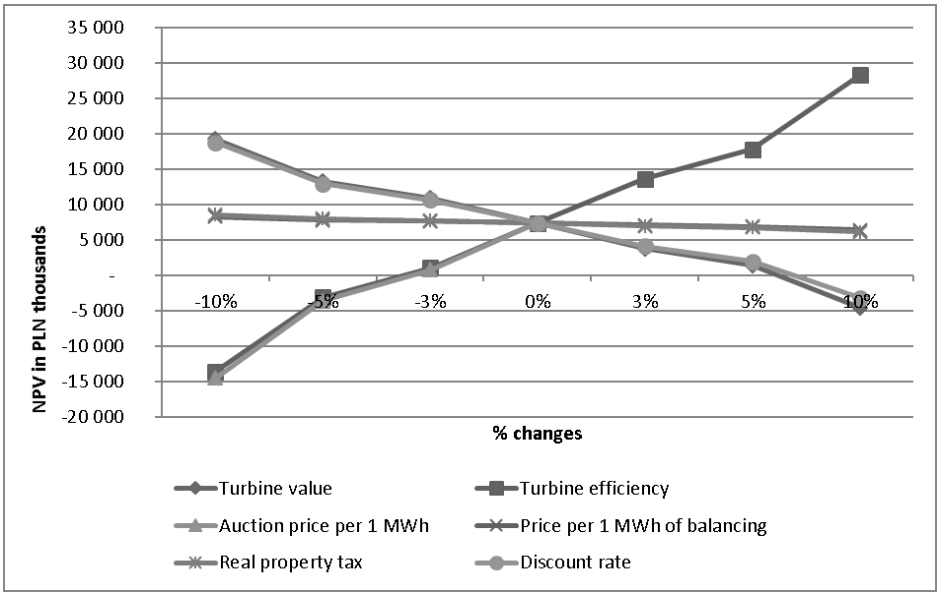
The values in table 4.6 confirm the conclusions drawn on the basis of critical values of individual parameters. Of the greatest significance for investment's success are the price of sold energy and the efficiency (production volume). Also the price of turbines and the cost of capital are very important. By applying sensitivity analysis, the investor acquires information on the type of variables that particularly require verification for correctness or should be watched with particular care, as changes in their values may impede accomplishment of desired objectives.

In order to better illustrate the influence of individual parameters on NPV, a graph has been drawn, visualising how NPV would change in response to the change of individual input parameters by: –10%, –5%, –3%, 3%, 5% and 10%, respectively. The greater the inclination angle of the curve, the larger the influence of a given parameter on the NPV. The graph confirms that of the highest significance for project's success are the price and amount of produced energy, as well as of the price of wind turbines and discount rates.

Table 4.6. Sensitivity coefficient of selected project parameters

Parameter	Sensitivity coefficient of individual parameters
Value of 1 turbine	-19.6%
Turbine efficiency in MWh	22.4%
Auction price per 1 MWh	23.2%
Price per 1 MWh of commercial balancing	-1.3%
Property tax	-1.7%
Discount rate	-17.6%

In analyzing graph 4.1, it is worth pointing out that the line marked with triangles, illustrating the change of NPV in response to in energy sale prices is 'cut off' at the 0% level on the x-axis. The graph does not show the influence of price increase in relation to the base value of NPV as, pursuant to the regulation of the Minister of Economy, the maximum auction price of energy may not exceed PLN 385 per 1 MWh, which is only 1.3% above the base price of PLN 380 adopted in the forecast. It should also be noted that the maximum production capacity of the analyzed wind farm stands at 2400 MWh/MW, which is close to 10% above the adopted base efficiency of 2200 MWh/MW.



Graph 4.1. A graphic illustration of NPV sensitivity to changes of individual parameters

The risk analysis conducted with the above-described methods has a considerable significance in making decisions regarding endeavours, outcomes of which are difficult to assess. Green projects certainly qualify among them.

4.9. Final remarks

Financial planning makes it possible for interested entities to verify whether their goals may be achieved, and to determine the financial outcome of this process. What is particularly important, it facilitates assessment of risk associated with achievement of projected results from company's operation. The presented investment appraisal of wind energy production may sensitize some potential stakeholders in this type of projects (investors, public authorities supporting investments in renewable energy) to the necessity of employing appropriate procedures and techniques of financial assessment of investment profitability and, above all, turn their attention to significance of performing sensitivity analysis of potential investment results, to show their sensitivity to the change of significant parameters. It should be noted that the procedure of sensitivity analysis itself overlooks the likelihood of occurrence of parameter changes. Therefore, the factors determinative of NPV must be evaluated for their proneness to change and scale of such change. The conducted analysis has indicated a considerable influence of the sale prices of produced electric power on the project profitability. Pursuant to the regulation of the Minister of Economy, the maximum auction price of energy may not exceed PLN 385 per 1 MWh, which is only 1.3% above the base price of PLN 380 adopted in the forecast. This fact commands investors' caution at the stage of auction tenders. It may be surmised, however, that the industry is well aware that the maximum price as proposed by the Ministry, even if not ideal, is still acceptable to investors [Ciepiela 2015]. Moreover, it should be kept in mind that investors who plan to build new wind farms, besides the support in the form of subsidies to energy market prices, may also take advantage of available schemes to finance outlays on infrastructure necessary to generate energy from renewable sources.

The second most significant parameter determinative of NPV was turbine efficiency, which directly translates into the amount of energy produced. However, it seems the risk of production capacity reduction is small. The progress of science and technology in the scope of determining wind farm locations, as well as production of increasingly efficient installations, suggest low likelihood of decrease in rated turbine efficiency. Also the prices of wind turbines are steadily decreasing [Gazeta Prawna 2013], which means that the risk of a sudden spike in the prices is not likely to transpire and this, as shown by the sensitivity analysis, also determined the project value to a great extent. The risk of changes in discount rates may be considered moderate. Any possible increase in discount rates, caused by inflation processes, would be offset by the increase of energy prices at RES auctions, as the regulation of the Minister of Economy expressly states that the maximum energy price at auctions shall be adjusted by inflation coefficient. What cannot be excluded, of course, is an increase of capital cost, related to e.g. possible newunfavourable legislation, governing wind energy generation, coming into force.

CHAPTER 5

Budgeting in green controlling at B. Braun Melsungen

5.1. Introductory remarks

Budgeting and budget deviation analysis constitute the oldest and one of the best-known controlling tools. From the theoretical point of view [Szulczewska-Remi and Zerbst, 2016], the fundamental problems with budgeting in green controlling include: multidimensionality of a green budget, which accounts for economic, environmental and social aspects, and for reconciliation of the objectives of various stakeholder groups within the areas.

The principal objective of this chapter is to present the budgeting process as the fundamental tool of green controlling at the multinational concern B. Braun Melsungen AG. It explores primarily the innovative example of improved budgeting, i.e. *Latest Estimate* budgeting, that forms ground for increased efficiency, simplification and leanness.

As regards environmental aspects, on the other hand, the chapter provides examples of capital budgeting and, in the area of building social capital, it describes the CSR activity matrix and the budgeting process of one of the company's social projects, Children & Youth Weeks 'New Researchers Needed'.

5.2. Enterprise characteristics

B. Braun Melsungen AG is one of world's leading medical companies, manufacturing and distributing worldwide a wide range of products, from surgical instruments to innovative implants and medical equipment, available in the form of individual products or system solutions.

The history of the enterprise dates back to 1839, when one of the ancestors of the current owners purchased a pharmacy in the town of Melsungen, where over time a production plant was established. Throughout its 177-year history, the company has marketed a number of innovative products, such as infusion pumps.

Currently, the company has subsidiaries in 64 countries and is one of the leading providers of health care equipment and materials applied in such areas of medicine as surgery, neurosurgery, orthopaedics, nephrology, urology, cardiology or dentistry. The leading position of this company is attested to by numerous awards, certificates and honours, placing B. Braun within top 20 largest medical companies, according to the *Top 30 Global Medical Device Companies*.

The company's philosophy is founded upon the principle of sharing expertise, which is based on 'a promise from B. Braun to customers and colleagues to share medical knowledge and expertise for the benefit of health, to use this knowledge and build on it effectively and consistently, in dialogue with partners' (www.bbraun.com).

The B. Braun brand rests on three pillars, namely: supporting innovation, increasing efficiency and sustainable development. Innovation refers not only to products or services, but also to internal company processes, which are to improve its everyday functioning. Efficiency is expressed, among others, through the innovative customer services with the use of cutting-edge electronic, Internet-based and digital tools.

As a family-owned company, B. Braun assists its employees in all regions of its operation; it also delivers the goal of sustainable development through respect for the natural environment, and also by involvement in social life, through financing and organizing support for scientific, artistic and cultural projects.

5.3. Green controlling in the economic aspect

The concept of sustainable development of an enterprise also seeks balance between three perspectives in green controlling economy - profit, the environment and society. Thus, achievement of basic premises of the concept is combined with the implementation of company value growth, based on the financial results. This, in turn, is manifested in budgeting.

B. Braun Melsungen AG exhibits transparency in all areas of sustainable development, as evidenced by the B. Braun Group Sustainability Report 2015, which accounts for all basic guideline premises of the Global Compact GRI G4 programme. According to the guidelines, all reports should provide information regarding such economic indicators as income, operating costs, employee remuneration, donations and other benefits to the community, undistributed profits, payments to capital owners and state institutions, which are becoming fundamental elements of effective relationships with stakeholders and the grounds for investment decisions.

5.3.1. Increasing income through own resources

One of the main strategic objectives of B. Braun is to continue to conduct its business as a family-owned company, capable of resisting the intervention of external stakeholders (such as shareholders, investment funds, etc.). In order to respond to this challenge,

the entity has implemented a strategy of sustainable management of its finance and operation development, founded on 'growth through own resources'. It boils down to internal growth fuelled with own investments, which build the company's potential upon the basis of existing assets. As a result, it is possible for the enterprise to continue expanding in size, its market share and improve its financial potential, i.e. the company's market value, while maintaining full decision-making independence and avoiding exposure to fluctuations on financial markets.

The assumed conservative strategy of value creation gives preference to internal resources (mainly profits from previous years) for financing its operation, a lower share of liabilities, a high capital concentration in the hands of the family, a static ownership structure, that guarantees control over the enterprise [Gallo and Vilaseca, 1996].

This model results in slower, yet successive development, as compared to companies that raise capital through, e.g. stock issues. To B. Braun, however, it brings certainty, that the strategic objectives of the company (family ownership, independence of decision-making) will not be compromised.

5.3.2. Condition and financial results of the considered enterprise as an outcome of budge execution

The analysis of the basic financial indicators in the years 2010-2014 shows a tendency to increase resources at enterprise's disposal (this relates to both non-current assets, which dominate in the asset structure, and to current assets). At the same time, in the period of 2010-2014, both income and costs of the company increased, while the overall profit in the considered time frame averaged at 5.88% of sales income. The change in company's key financial indicators over the period of 2010-2014, based on its internal reports, is reflected in tables 5.1, 5.2 and 5.3.

The strategy of sustainable management in relation to finance and development of the discussed company, is pursued through:

- stable balance sheet structure,
- steady and stable increase in the value of non-current assets and equity,
- steady and stable decrease in the share of current assets,
- steady and stable increase in income.

On the other hand, employing internally generated funds and the pursuit of the 'increase through own resources' strategy, cause the enterprise to finance the asset value increase mainly from the achieved net profit (graph 5.1). In the years 2010-2014, the company invested over 3 billion euro, and by the year 2020 further expenditures, totalling over 4 billion euro, are planned for expansion and modernization of its plants, among others in Malaysia and Germany, and for takeover of dialysis centres in Russia, Columbia, Germany and the Netherlands.

Table 5.1. Simplified balance sheet and income statement of B. Braun 2010-2014 (in thousands of euro)

	2010	2011	2012	2013	2014
Fixed assets	2,733,589	3,060,679	3,365,625	3,971,514	4,436,864
Current assets	1,952,485	2,079,805	2,117,892	2,107,983	2,329,922
Total assets	**4.686,074**	**5,140,484**	**5,483,517**	**6,079,497**	**6,766,786**
Equity	1,984,027	2,101,244	2,259,176	2,444,985	2,564,017
Provisions and others	1,251,841	1,417,872	1,612,404	1,587,384	2,020,702
Long-term liabilities	793,020	699,935	886,808	1,006,977	1,290,758
Short-term liabilities	657,186	921,433	725,129	1,040,151	891,309
Total liabilities	**4,686,074**	**5,140,484**	**5,483,517**	**6,079,497**	**6,766,786**
Income:	4,422,813	4,609,439	5,047,846	5,169,545	5,429,574
Costs:	4,145,450	4,353,715	4,759,206	4,854,050	5,113,261
Profit	**277,363**	**255,724**	**288,640**	**315,495**	**316,313**
profit as %	**6.3%**	**5.5%**	**5.7%**	**6.1%**	**5.8%**

Source: own elaboration, based on B. Braun's Annual Reports 2010-2014

Table 5.2. Balance sheet structure at B. Braun 2010-2014 (in %)

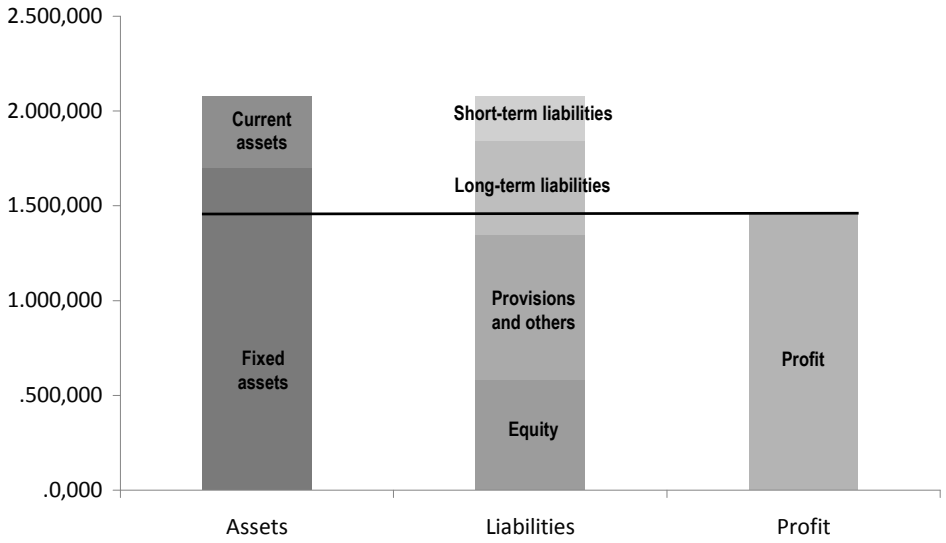
	2010	2011	2012	2013	2014
Fixed assets	58.3	59.5	61.4	65.3	65.6
Current assets	41.7	40.5	38.6	34.7	34.4
Total assets	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Equity	42.3	40.9	41.2	40.2	37.9
Provisions and others	26.7	27.6	29.4	26.1	29.9
Long-term liabilities	16.9	13.6	16.2	16.6	19.1
Short-term liabilities	14.0	17.9	13.2	17.1	13.2
Total liabilities	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: own elaboration, based on B. Braun's Annual Reports 2010-2014

Table 5.3. Dynamics of assets and liabilities at B. Braun 2010-2014 (in %)

	2011-2010	2012-2011	2013-2012	2014-2013	2014-2010
Fixed assets	+12.0	+10.0	+18.0	+11.7	+62.3
Current assets	+6.5	+1.8	-0.5	+10.5	+19.3
Total assets	**+9.7**	**+6.7**	**+0.9**	**+11.3**	**+44.4**
Equity	+5.9	+7.5	+8.2	+4.9	+29.2
Provisions and others	+13.3	+13.7	-1.7	+27.3	+61.4
Long-term liabilities	-11.7	+26.7	+13.6	+28.2	+62.8
Short-term liabilities	+40.2	-21.3	+43.4	-14.3	+35.6
Total liabilities	**+9.7**	**+6.7**	**+10.9**	**+11.3**	**+44.4**
Income:	+4.2	+9.5	+2.4	+5.0	+22.8
Costs:	+5.0	+9.3	+2.0	+5.3	+23.3
Profit	**-7.8**	**+12.9**	**+9.3**	**+0.3**	**+14.0**

Source: own elaboration, based on B. Braun's Annual Reports 2010-2014

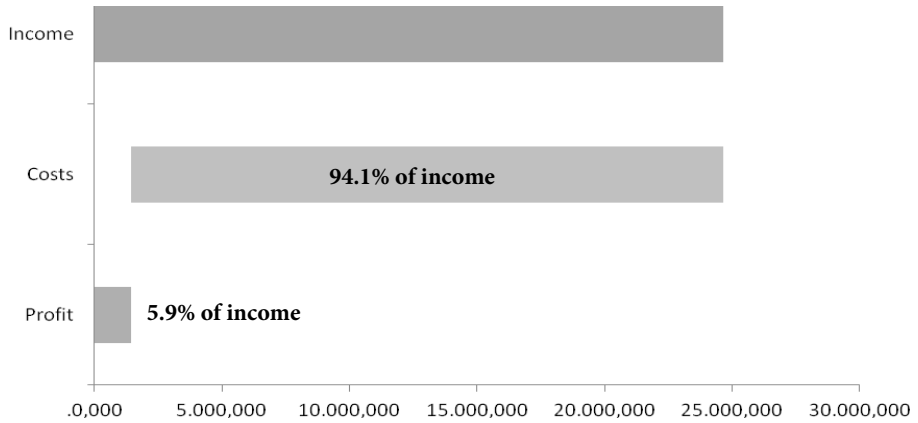


Graph 5.1. Increase in value of assets and liabilities versus net profit at B. Bran 2010-2014 (in thousands of Euro)

Source: own elaboration, based on B. Braun's Annual Reports 2010-2014

An analysis of the finance management strategy draws attention to the relatively low financial performance, which is characteristic of the medical industry (graph 5.2). The cumulative profits for the period of 2010-1014 constitute 5.9% of income generated throughout this period. Such level of profit margin suggests that even a seemingly minor cost overrun (or a failure to reach the target income) affects the profit.

In the year 2011, when cost increment was 0.8% higher (year to year) than increment of income, the generated profits fell by 7.8% in comparison to 2010 (from 277,363 thousand Euro to 255,724 thousand Euro).



Graph 5.2. Simplified income statement of B. Braun Melsungen AG for the years 2010-2014 (in thousands of Euro)

Source: own elaboration, based on B. Braun's Annual Reports 2010-2014

According to Gallo and other authors (2004), the distinctiveness of financing of family-owned companies is tied to the preferences of the decision makers, being the family members, as to the company growth ratio, risk and retaining control. Therefore, such an entity must have effective tools in place for financial planning and control.

5.3.3. Increased value of purchases in countries of manufacture

The pursuit of premises of green controlling in the economic aspect also covers decision-making support for the management on planning and control of materials and raw materials flow, as well as steering the process.

B. Braun handles this by applying the principle of purchasing materials locally, in the countries of manufacture. This strategy allows them to minimize costs throughout the entire supply chain, it ensures time-effective and accurate supply of products and services, and additionally supports the local economy.

According to entity's internal reports, over 93.1% of purchases are made locally in the United States, 77.1% in Germany, 72.3% in Malaysia and 53.8% in Switzerland. In the latter case, the lower value primarily stems from problems finding all suppliers locally within the region.

5.4. Budgeting process

Achievement of set targets as regards investment financing, financial results or contribution margins, as well as the plans developed for reaching them at B. Braun Melsungen AG, are translated into budgets. In course of this exercise, the entity employs financial planning and control tools, which enable it to analyze (and compare) on an on-going basis, the execution of set objectives in each area of operation (in geographic and assortment terms).

In 2003, the enterprise commenced the continuing reorganization and optimization of its financial processes, allowing for implementation of new solutions in budgeting. The course of the first stage of the conceptual and implementation phase of the new solution is shown in diagram 5.1.

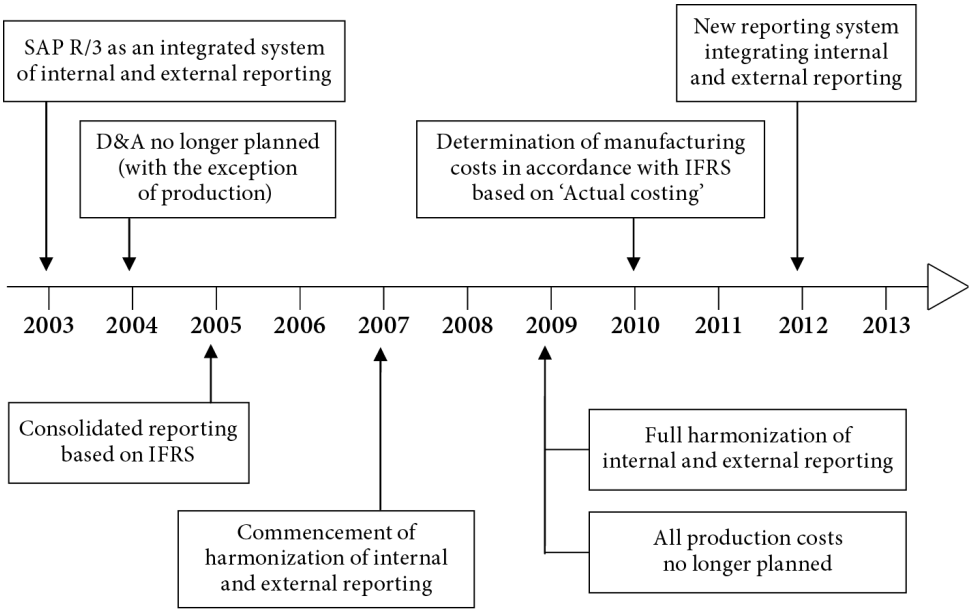


Diagram 5.1. Reorganization and optimization of financial processes at B. Braun Melsungen AG for the needs of implementation of new budgeting solutions

Source: B. Braun Melsungen AG, Latest Estimate Prozess

The above diagram illustrates the major changes that affect the budgeting process, through which the entity has:

- harmonized internal and external reporting processes in line with the International Financial Reporting Standards,
- implemented month-end account closing at the quality level of year-end closing.

The solutions prepared at company's headquarters were then gradually implemented (or are still in the process of implementation) at subsidiaries. Due to this exercise, the entity has standardized the form and significance of reported data. Implementation of month-end account closing has become a key stepping stone toward transition from the traditional model of budgeting (based on expansive plans) toward the forecasting model (based on actual data, adjusted by expected changes). The new budgeting solution has been dubbed *Latest Estimate*.

The *Latest Estimate* approach is a simplified form of budgeting, closer to financial estimation rather than planning. It is based on the premises of a rolling budget, i.e. in case of any significant changes in the internal or external environment of the concern (or its subsidiaries), the forecast values are subject to verification and update. Estimation time schedule based on the year 2015 is shown in diagram 5.2.

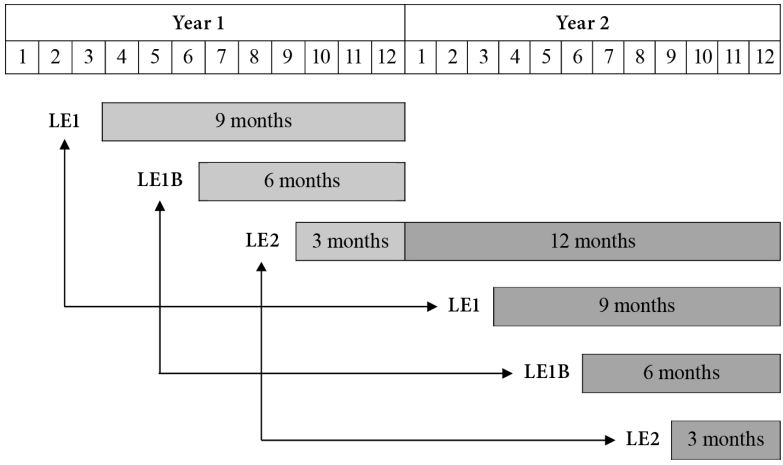


Diagram 5.2. Latest Estimate Time Schedule at B. Braun

Source: own elaboration, based on B. Braun Melsungen AG, Latest Estimate 2015/16 – Time Schedule

Within the *Latest Estimate* process, each of the company's entities draws up a forecasted income statement and balance sheet. They are then verified and accepted within sales areas and within subsidiaries. The Latest Estimate forecasts are drawn up three times a year:

- LE1 - is drawn up in April by all entities (or areas) and covers the period from April until the end of the current year,
- LE1b - is drawn up in July by entities (or areas) where risks that might prevent delivering the values forecasted in LE1 have been identified; in such event, adjustments are made to the forecast periods from July to December,
- LE2 - is drawn up in October by all entities (or areas) and it covers the period from October to December. LE2 also entails preliminary forecasts for the upcoming calendar year.

Diagram 5.3 presents an example of the *Latest Estimate* process time schedule based on LE1 2015.

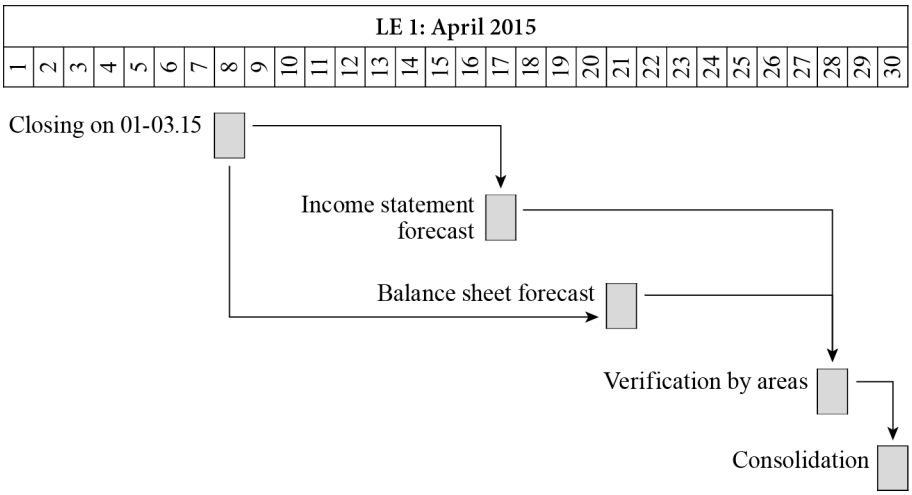


Diagram 5.3. 2015 LE1 Time Schedule at B. Braun

Source: own elaboration, based on B. Braun Melsungen AG, Latest Estimate 2015/16 – Time Schedule

Thanks to standardization of financial processes as implemented at B. Braun, as well as their optimization and automation, it is possible to close accounts on the 8th day of each month at the quality level of year-end account close. This also allows for a comparison of achieved results with the values forecast in LE2 in October of 2014. This step is the point of departure for drawing up LE1 forecast for the period from April to December 2015. The new forecast is drafted on the basis of current business information and the adjustments introduced to operational strategy.

Thus, B. Braun's budgeting process may be held up as a prime example of the concept of so-called 'improved budgeting' described in literature of the subject. The essence of this concept are phased changes in budgeting, which lead to increased effectiveness, simplification and leanness. The main features of improved budgeting are, on the other hand:

- Decentralization. Through simplification of the procedure of budgets preparation and approval, as well as decentralized planning, the budgeting process becomes shorter and more flexible.
- Focus and simplification. Focus on the key processes enables reduction of the number of indispensable budget items and swifter acquisition of information regarding the development of the situation (forecast).
- Relative targets. The recommended approach is to depart from fixing absolute values as targets. Relative targets are established based on the internal and external benchmarks.

- Strategy Orientation.
- Rolling forecasts. Means departure from annual planning, oriented on a given budgeting period, and replacing it, as at B. Braun, with three-, six-, nine- and twelve-month rolling forecasts.
- Support of planning processes. A wider employment of latest communication technologies and planning methods enable to accelerate budgeting and reduce expenditures required for its execution [Horvath, 2009].

5.5. Environmental aspects in budgeting

Green controlling in the environmental aspect is understood primarily as a tool for holistic and eco-friendly enterprise management, which entails regular recording and analysis of all physical and financial consequences related to the environment that result from the enterprise's operation [Sommer, 2013]. Within this context, B. Braun Melsungen AG employs this modern tool mainly in environmental management, which forms part of the overall management system.

The entity's concern for the environmental aspects of the its operation is primarily a consequence of need for consumption of materials, water and energy in production processes, coupled with emission of pollution, gas and dust into the air, discharge of wastewater or generation and disposal of waste. Therefore, separation of green controlling results from the ecological consciousness of the entity's stakeholders and it allows to dynamically respond to environmental changes, thus supporting the enterprise's pro-ecological activities [Balicka, 2015].

One of the manifestations of these activities was to incorporate, into the processes of capital budgeting, the standards of both eco-management and audit scheme (EMAS) and the energy management system (ISO) or the investment project connection with modernization of 34 dialysis centres of B. Braun Avitum in Czech Republic and in Slovakia, as well as erection of a modern logistics centre of B. Braun Austria in Maria Enzersdorf near Vienna. Introduction of recovery technologies has resulted in reduction water and energy consumption, as well as the amount of wastewater generated during a single dialysis from 1.8 to 1.2 kilograms, thus reducing by 1/3 the impact of haemodialysis on the environment. Optimization of energy efficiency, in turn, has increased the share of renewable energy, e.g. in Germany from 31% in 2012 up to 34% in 2014, simultaneously lowering the emission of harmful substances. Additionally, through adoption of renewable energy media obtained from natural sources, the cost of energy acquisition at the enterprise was reduced by 26%.

One of the world's first buildings in medical technology industry, that has been awarded a sustainable building LEED certificate (*Leadership in Energy and Environmental Design*) was erected at the company's Berin location, while in Melsungen, there is an operational biomass power plant with a rated capacity of 21 MW, where part of thus generated energy is used by B. Braun and the remaining part is transmitted to 10 thousand households in the region.

Therefore, incorporation of environmental issues into capital budgeting bares a significant influence on the enterprise's finances, it allows for selection of investment projects along with their financing while ensuring environmental care.

5.6. Social activities in budgeting

Green controlling in the social aspect has acquired special significance in both on-going and strategic operation of the enterprise, as running a business calls for increasingly wider consideration for and respect of social factors. A modern company operates within a society of ever better educated and ever more conscious of their rights citizens, clients, business partners, investors and employees [Dziawgo, 2009]. According to Dziawgo (2014), social capital has by now assumed the position of one of the key resources of a modern enterprise (alongside e.g. financial capital or human capital) and, as such, it is becoming a priority in increasing company market value.

5.6.1. Matrix of CSR activities

The global character of operations of B. Braun Melsungen AG requires coordination of undertaken pro-social activities so as to increase the effectiveness of resources earmarked for this purpose, but also to integrate social activities with the economic operation. For that reason, B. Braun has implemented budgeting social projects within the developed CSR matrix, which constitutes a fundamental tool for social projects management.

One of the arguments supporting development of the matrix was the conclusion that coordinating initiatives does not mean they should all address the same social or environmental challenge. It means they form a coherent portfolio in keeping with the firm's purpose and values [Rangan et al., 2015], which acquires strategic significance in the event of a company that employs over 55 thousand people across 64 countries. Development of the CSR activities matrix was, on the one hand, to enable performance of social projects in line with the objectives and values of the entity, while, on the other hand, to facilitate access to information on the scale and content of pursued projects.

With the above in mind, B. Braun Melsungen AG has developed and applied its original CSR activities matrix (table 5.4). The main purpose of this tool is to enable more effective fulfillment of the enterprise's CSR strategy, which has been condensed in the following points:

- stakeholder role at the centre of attention: special responsibility towards medical staff, doctor, patients, employees and local community;
- international strategy, support of local projects in B. Braun's areas of operation;
- key areas of CSR engagement are knowledge, regions and perspectives.

Table 5.4. Matrix of CSR activities at B. Braun Melsungen AG

		area of involvement		
		Knowledge	**Regions**	**Perspectives**
activity contents	**education**			
	generations			
	health			

Source: B. Braun Melsungen AG, The many faces of CSR- how to select, run and report CSR activities, 2015

Pursuant to the adopted CSR strategy, the enterprise carries out social projects in the regions where it operates. This aims to create value added both in the social and economic spheres. According to research, clients pay increasing attention to corporate social responsibility. A positive perception of an enterprise should translate into increases in economic performance, which, in turn, generates opportunities for subsequent social activities. Thanks to this, an enterprise has a chance to strengthen its position and to gain competitive advantage, but also to expand the scale of its social initiatives. A socially responsible entity, however, does not limit itself to projects carried out in the regions of its business. It also undertakes initiatives in places where it does not conduct business when it is called for circumstances such as saving lives, mitigating the consequences of natural disasters, etc.

In line with the aforementioned, the contents of activities pursued by B. Braun relate to three different aspects:

- health;
- generations;
- education.

The undertaken social projects focus primarily on issues pertinent to health, for which there are two main reasons:

- the company operates in the area of widely understood medicine;
- given its business domain, the entity has the largest experience, capabilities and effectiveness in this area.

The other initiatives undertaken by B. Braun are connected with the issue of generations (passing on experiences, support, maintaining bonds) and education. Consistent with the adopted strategy, B. Braun carries out local endeavours in international dimension. This means that the concern's headquarters leaves it up to each unit (country) to select a social project to be pursued. It stems from the assumption that representatives of each B. Braun subsidiary know best which project will be most beneficial. However, in selecting projects, each unit should evaluate them in accordance with the criteria presented in table 5.5.

Table 5.5. Evaluation criteria for a social project at B. Braun Melsungen AG

strategic fit	*corporate citizenship*	*stakeholders*	*regional focus and topic*	*balanced workforce*
benefit for society	effects	relevance	sustainable development	role model effect
benefit for B. Braun	internal effects	effects for stakeholders	reputation	
expenses	appropriateness	cost control		

Source: B. Braun Melsungen AG, The many faces of CSR- how to select, run and report CSR activities, 2015

With such multidimensional analysis of a project (or projects), it is possible to assess its potential effectiveness, and also to find an answer to the question of which project will bring most benefits to both the community and the concern. Striking a balance between the two aspects is of paramount importance in light of the already discussed value added.

Since both B. Braun Melsungen AG and its subsidiaries focus primarily on running their respective economic operation, the concern headquarters recommends that during selection and execution of a social project, they liaise (and also cooperate) with nonprofit organizations. This is due to the fact, that such entities have even greater knowledge about the needs of the local communities, as well as possess relevant experience for execution of such projects. Their involvement allows for creation of an even greater value added for the society. Diagram 5.4 illustrates the functional model behind social projects executed by B. Braun subsidiaries.

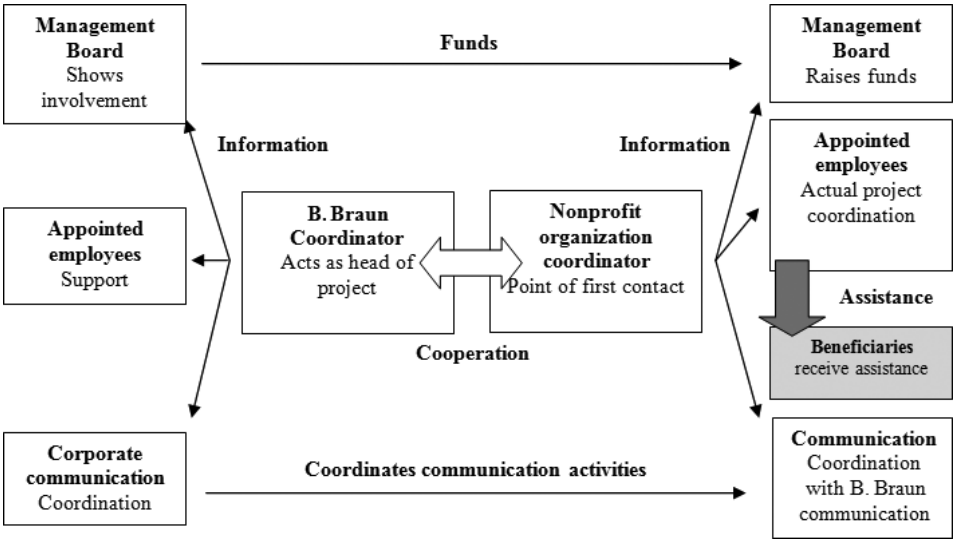


Diagram 5.4. Execution of social projects by B. Braun in cooperation with nonprofit organizations.

Source: B. Braun Melsungen AG, The many faces of CSR- how to select, run and report CSR activities, 2015

5.6.2. Social project Children & Youth Weeks 'New Researchers Needed'

The social project Children & Youth Weeks 'New Researchers Needed' is of a local character and it is mainly addressed to children and youth residing in the vicinity of the concern headquarters, i.e. Melsungen. This is an annual endeavour initiated in 2008, intended to stimulate youth's interest in the practical side of science and research. The enterprise has made the decision to implement this project owing to the following arguments:

- B. Braun is a corporate citizen with a strong social commitment,
- the events promote science and technology for kids and highlight training pathways for school students,
- the initiative is a means of driving forward and intensifying relationships with schools and kindergartens[1].

[1] Children and Youth Weeks 'New Researchers Needed'– B. Braun Melsungen AG.

Up until the present moment, 8 editions have been completed. Their form, as well as programme are modified from year to year, so as to make them more attractive:

- 2008: one-week program for kindergartens and elementary schools,
- 2009: Youth Week added to the Children's Week (14-day program for kindergartens and schools up to 12th grade),
- 2010: scope extended to include vocational schools
- 2011: development of the most successful topics from the previous year,
- 2012: 5th edition of the project (11 new topics included and Family Day added),
- 2013: most successful topics from the previous year plus four new modules (3.000 participants, 80 workshops, 140 workshop hours, 5.000 experiments),
- 2014: combined with B. Braun's 175th anniversary (9 new topics, over 4.000 participants)
- 2015: most successful topics from the previous year plus four new modules (3.500 participants, 162 workshop hours).

At the moment, the Children and Youth Weeks 'New Researchers Needed' project lists the following participants: 7 kindergartens, 3 elementary schools, one special school and 3 high and vocational schools (figure 5.1).

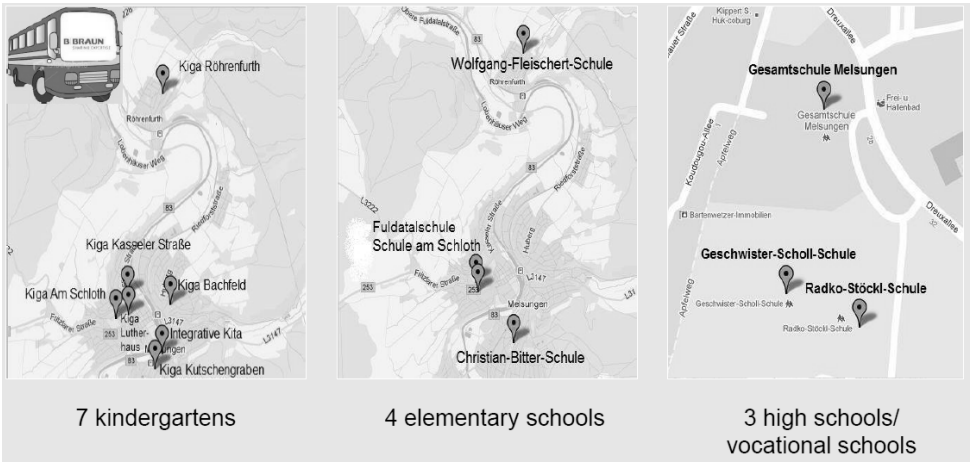


Fig. 5.1. Map of schools and kindergartens covered by the Children and Youth Weeks 'New Researchers Needed' programme

Source: elaboration by B. Braun Melsungen AG

Both the programme and the form of activities are verified and updated on an annual basis. At the design stage, the project is consulted with representatives of involved educational institutions. On the one hand, teachers propose subjects that would be useful in terms of the classes they impart, and, on the other hand, B. Braun communicates information regarding the latest accomplishments in the fields of industry and technology.

The final programme of the next project edition is constructed based both, on the most popular workshops, in conformity the needs declared by educational bodies as well as around recent scientific achievements. Individual workshops are grouped into panels concerning chemistry, biology or technology with examples of possible career paths in those fields (diagram 5.5).

Thus, teachers may plan their lessons ahead, for students to be able to take part in classes of interest to them and get a sensation of attending a real scientific conference. Workshops are imparted in the form or games and experiments, both inside production halls and at the green premises of the company. The entire project is adjusted to the age of children and youth, so as to ensure that - besides knowledge - they can also get fun out of it.

Chemistry			Biology		Technology	
Fuel cell	Medical technology in school	Changes in the world of materials	Academy for preschoolers	Blood system	Robots in everyday life	Solar energy
Chemistry inside the body	Pharmaceutical raw materials	Seven methods of identification of plastics	Dialyses	Human body/ a tour through the senses	Crocobot and robobird	Solar energy heat
Colours	Soap bubbles	Recycling	Genetic diagnostics	Marigold – medicine from the garden	From the life of a firefighter	Wind energy
What's inside the powder	Lord of the Rings: from iron to silver-plated ring	Air	Who am I?	Clay	Solar car	Firefighter training
Chemical explosions and bubbling	Mysterious water	Diving with scuba tanks			I'm an inventor!	Bright light for bright minds
Water and life					Magic light effects	

Diagram 5.5. An extract from a workshop programme offered as part of the Children and Youth Weeks 'New Researchers Needed'

Source: elaboration by B. Braun Melsungen AG

The preparation of this social project lasts 10 months and is divided into four stages:

1. conception (1st-5th month of preparations),
2. preparation of informational and promotional materials (6th-8th month of preparations),
3. detailed planning (9th month of preparations),
4. completion and control of preparations (10th month of preparations).

5.6.3. Budget of the Children and Youth Weeks 'New Researchers Needed' project

Budgeting of the Children and Youth Weeks 'New Researchers Needed' project employs primarily the resource-based cost accounting (table 5.6). The budget is structured to reflect cost data records viewed as individual company resources through the prism of the management hierarchy (organizational structure and responsibility) as well as by element (types of resources and costs by behaviour) [Zieliński, 2014].

Additionally, individual resources are aggregated into resource groups. Cost types are defined as either fixed or variable within the different resource groups, being: location, printed materials, technology and multimedia, layout, external experts, employees, photographer, catering, transport, work materials and others.

Table 5.6. Budget structure of the project Children and Youth Weeks 'New Researchers Needed'

Resource group	Type	execution	plan	difference
Location	Fixed			
Printed Materials	Fixed			
Technology and multimedia	Fixed			
Layout	Fixed			
External experts	Fixed			
Employees, internal resources	Fixed			
Photographer	Fixed			
Catering	Variable			
Transport	Variable			
Work materials	Variable			
Others	Variable			
Total				

Source: own elaboration, based on internal data of B. Braun Melsungen AG.

Incremental method is applied for budgeting in the project, i.e. the actual figures from the previous period become the starting point for budget preparation for the given period [Nowak, 2010]. The point of departure in this case is an analysis of the actual scale, structure and cost of project from the previous year. Next, adjustments are made to individual values, with the objective to adapt the budget to the planned new edition of the project. The result is a base budget, which provides the basis for project kick-off.

In the first stage of workshops preparations fixed costs value is established in liaison with business partners. Once these are known, the values planned on the basis of previous year's data are adjusted to account for the arrangements with business partners.

Thus, the value of fixed costs planned in the budget is modified to reflect the actual value of these items.

In the second stage of budget adjustment, new value of the variable costs is calculated in the budget. It is performed by subtracting the amount of fixed costs as established in the first stage from the overall budget value.

Next, the actual number of participants is introduced as calculated by enrolment applications received from kindergartens and schools covered by the project. Thus, unit variable cost is established, and it may be allocated to a given group of resources. This information is used to revaluate the different resources and in negotiations with business partners. The individual stages of budgeting in project Children and Youth Weeks 'New Researchers Needed' are presented in diagram 5.6.

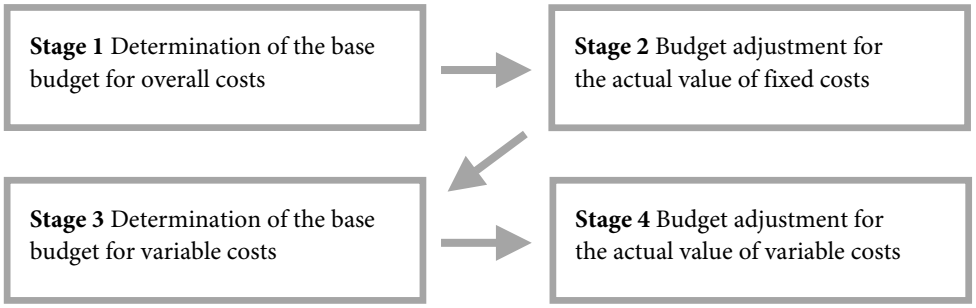


Diagram 5.6. Budget structure of the project Children and Youth Weeks 'New Researchers Needed'

Source: own elaboration, based on internal data of B. Braun Melsungen AG.

The actual value is understood as the value contracted with suppliers based on the established project scale. The final values of budget execution deviate slightly from those established in the fourth stage of budgeting and are insignificant.

This is a result of assessment of the project performance, which entails an analysis of amounts paid versus those established in stages 2 and 4, and of the opinions of project participants. Thanks to this approach, the base budget is adjusted at the stage of project preparations (based on the prices contracted with business partners) and the deviations in its performance are negligible (performance is very close to plan).

The main advantage of this budgeting approach is transparency of resource costs, which facilitates their control and efficient budgeting becomes the foundation for the entire project arrangement.

The Children and Youth Weeks 'New Researchers Needed' project is of a social character, and because of this, the enterprise is very much interested in meeting the expectations of the participants, as well as improving the project formula in subsequent years. For this purpose, participants fill out a survey to evaluate the individual items in accordance with the German grading scale, where the highest grade is 1 and the lowest is 6. An example of the project performance quality survey has been presented in tables 5.7 and 5.8.

Table 5.7. Opinions of participants of the Children and Youth Weeks 'New Researchers Needed' project regarding the quality of activities contents

	1	2	3	4	5	6	Average	Number of answers
Adjustment to the target group	25 (61%)	13 (32%)	3 (7%)	0 (0%)	0 (0%)	0 (0%)	1.46	41/44 (93%)
Ease of understanding	25 (61%)	14 (34%)	2 (5%)	0 (0%)	0 (0%)	0 (0%)	1.44	41/44 (93%)
Good start (or elaboration) of scientific issues covered by our curriculum	14 (34%)	24 (59%)	2 (5%)	1 (2%)	0 (0%)	0 (0%)	1.76	41/44 (93%)
Teaching and methodology	18 (44%)	19 (46%)	3 (7%)	1 (2%)	0 (0%)	0 (0%)	1.68	41/44 (93%)
Professionalism of activity completion	25 (61%)	13 (32%)	2 (5%)	1 (2%)	0 (0%)	0 (0%)	1.49	41/44 (93%)
Description in the programme brochure	20 (49%)	21 (51%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1.5	41/44 (93%)
							1.55	

Source: own elaboration, based on internal data of B. Braun Melsungen AG.

Table 5.8. Opinions of participants of the Children and Youth Weeks 'New Researchers Needed' project regarding organization of the project

	1	2	3	4	5	6	Average	Number of answers
Registration procedure	29 (71%)	7 (17%)	4 (10%)	0 (0%)	1 (2%)	0 (0%)	1.46	41/44 (93%)
Care on site	36 (88%)	4 (10%)	1 (2%)	0 (0%)	0 (0%)	0 (0%)	1.15	41/44 (93%)
Refreshments and food	33 (80%)	4 (10%)	2 (5%)	2 (5%)	0 (0%)	0 (0%)	1.34	41/44 (93%)
Duration of the event	26 (63%)	11 (27%)	3 (7%)	0 (0%)	1 (2%)	0 (0%)	1.51	41/44 (93%)
							1.35	

Source: own elaboration, based on B. Braun Melsungen AG.

5.7. Final remarks

Green controlling of B. Braun Melsungen AG stems from the particularly high social, ecological and economic awareness of the enterprise's stakeholders. Thanks to its modern approach to budgeting suited to the specificity of company's business operation, this entity is able to dynamically respond to changes in the natural environment and in the society, and to financially support pro-eco and pro-social initiatives.

The authors of this chapter have presented, in individual sub-chapters, examples of budgets executed in the economic and social aspects of the company and have indicated the environmental initiatives with largest effect on budgeting. In presenting the financial data, they have focused on the issue of value creation through financial results and on presenting the innovative improved budgeting approach of *Latest Estimate*, whose fundamental goals are increased effectiveness, simplification and leanness.

In consideration of building social capital, the authors have described the CSR activities matrix and one of the social projects of the concern, Children and Youth Weeks 'New Researchers Needed', placing particular emphasis on its budgeting and care for the stakeholders of the entire process, as well as on the analysis of deviations from the budget, combined with the analysis of quality aspects of the project. The example represents what the literature of the subject refers to as green budgeting, that is a modern approach to the process of budgeting.

The presented examples complement the existing research with hands-on case studies on budgeting in green controlling and, at the same time, attest to great potential of this tool in building competitive advantage and company's value of B. Braun Melsungen AG.

CHAPTER 6

System of measures and indicators employed in green controlling at Kompania Piwowarska

6.1. Introductory remarks

The shaping and coordination of the processes of planning, control and information supply, oriented at managing the enterprise with a view of sustainable development goals, which constitute the essence of green controlling, is possible thanks to application of an appropriate system of measures and indicators. The correct development of such a system requires solution of problems regarding selection, measurement and integration of measures and indicators of sustainable development. The problem of selection is related to the system of measurement of economic effects, already established in theory and practice, against a background of unstructured sets of measures and indicators of social and environmental activities. The problem of measurement stems from the divergences between units of measure of economic activity outcomes against those of social and environmental activities, as well as from the difficulties with quantifiable identification of the influence of CSR initiatives on the economic performance of the enterprise. The problem of integration primarily covers the dimension of goals (strategic and operational), as well as the dimension of sustainable development areas (economic, social and environmental). Another considerable challenge regarding the development of a correct system of measures and indicators of sustainable development is also the selection of appropriate IT tools to support controlling processes.

The purpose of this chapter is to present solutions regarding integration of measures and indicators between strategic and operational objectives of sustainable development, with the use of appropriate IT tools to support the processes of planning, control and information supply. Execution of the purpose has been based on the case study of Kompania Piwowarska SA.

6.2. Kompania Piwowarska - basic information

The objective of Kompania Piwowarska SA with its registered office in Poznań is the production and sale of beer. The Company operates three breweries with long-standing traditions: Tyskie Browary Książęce (established in 1629), Browar Dojlidy in Białystok (1768) and Lech Browary Wielkopolski in Poznań (1895). The most renowned brands of Kompania Piwowarska include *Żubr*, *Tyskie*, *Lech*, *Dębowe*, *Redd's*, *Książęce*. The Company's sales of beer hovers around 13.5 million of hectoliters annually, which is equivalent to 36% of market share, thus placing the Company first in beer industry of Poland. Sales revenue of the Company stood at around PLN 4,249 million in the last reporting period[1], while net income reached PLN 743 million. The assets value of the Company was equivalent to about PLN 2,996 million, while its equity amounted to PLN 1,083 million [EMIS 2016].

All of Kompania Piwowarska's shares are owned by the multinational corporate group SABMiller, whose portfolio consists of a number of beer industry companies. SABMiller plc[2] with its registered office in the United Kingdom, pursues its manufacturing and sales activities across 6 continents, in over 80 countries, offering in excess of 200 beer brands, including *Peroni*, *Miller*, *Pilsner Urquell*. In the last reporting year, the Group sold 324 million hectoliters of beer, as well as other alcoholic and non-alcoholic beverages, bringing up its revenue to over USD 26,288 million [SABMiller 2016].

6.3. Integration of measures and indicators

Integration of measures and indicators[3] of sustainable development is a necessary condition to properly shape green controlling. Lack of integration impedes incorporation of the undertaken social and environmental initiatives in the processes of planning, control and information supply, and thus may reduce the idea of sustainable development to a mere marketing tool.

The necessity of an integrated approach has been asserted in a communication of the European Commission [2011], in which it was emphasized that 'to fully meet their corporate social responsibility, enterprises should have a process to integrate social,

[1] SABMiller plc, along with its subsidiaries, have adopted as their reporting year the period from 1 April to 31 March. Thus, the last reporting year at Kompania Piwowarska, to which this chapter refers, runs from 1 April 2014 to 31 March 2015.

[2] As at the date of completion of this chapter, the company Anheuser-Busch InBev SA/NV of Belgium is in the process of concluding the purchase of SABMiller plc.

[3] The words 'measure' and 'indicator' are often use interchangeably, but their semantic scope is not identical. A measure is a denominate number, expressed as any unit, while an indicator is a denominate number compared with another denominate number, which serves as a basis of reference [Kochalski 2011]. Therefore, indicators may take on a denominate or non-denominate value.

environmental, ethical, human rights related and consumer concerns into their business operation and core strategy'. It is worthwhile emphasizing, at the same time, that socially responsible initiatives, which are not connected to the enterprise's strategy, are less beneficial to both its owners and other stakeholders [Ratajczak 2014].

The integration of measures and indicators of sustainable development should regard both individual areas of operation of an enterprise, as well as elements of its strategic goal system and operational goals[4], as illustrated in figure 6.1.

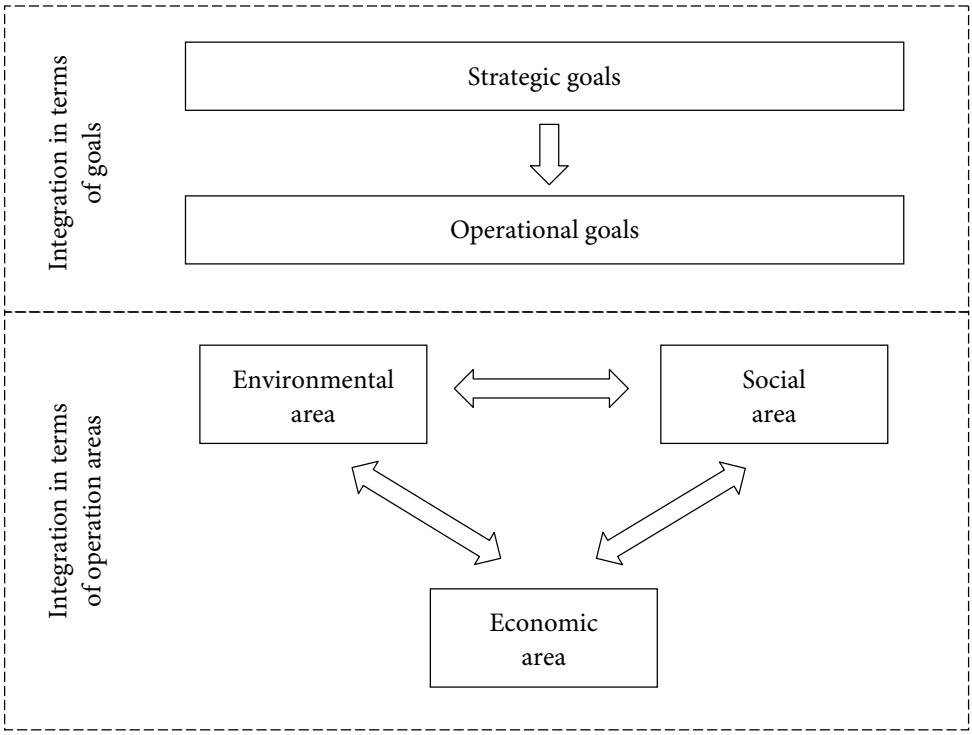


Fig. 6.1. Main dimensions of integration of sustainable development measures and indicators

Source: [Ratajczak 2016].

The integration of measures and indicators of sustainable development is a contributing factor to socially responsible initiatives, becoming the matter of interest to controlling authorities in cooperation with the employees of other units within organizational structure of the enterprise, especially with those accountable for social responsibility or relations with the external environment.

[4] The system of strategic goals of an enterprise comprises the following elements: mission statement, vision, main strategic goal (qualitative), derivative first grade strategic goals (qualitative goals in functional areas), derivative strategic second grade goals (qualitative strategic tasks), measures of objective achievement (quantitative strategic tasks) [Urbanowska-Sojkin, Banaszyk and Witczak 2004].

An integrated system of measures and indicators of sustainable development constitutes a tool of planning and control in all controlling processes, as presented in figure 6.2.

Main controlling processes	Measures and indicators		
	economic	social	environmental
Strategic planning	planning		control
Operational planning and budgeting	....		....
Forecasting	....		....
Cost accounting	....		....
Management reporting	....		....
Project and investment controlling	....		....
Risk management	....		....

Fig. 6.2. Measures and indicators of sustainable development in the system of controlling processes

Source: [Ratajczak 2016].

The thus developed system of measures and indicators of sustainable development, which conditions the proper shaping of green controlling, should be supported by an appropriate IT tool and fulfil a number of requirements [Schwarz, Beloff and Beaver 2002; Bossel 1999]: low costs of data collection, simplicity of calculation and interpretation of results, relevance for management decision-making, temporal and material comparability, comprehensibility to various groups of recipients, usefulness to enterprise's individual functional areas, informational capacity adjusted to the policy of non-disclosure of confidential information, cohesion with legal requirements.

6.4. Sustainability Assessment Matrix as a green controlling tool

Sustainability Assessment Matrix (SAM) is an IT tool supporting sustainable development controlling at SABMiller group. This software operates online, facilitating communication for internal stakeholders, their access to updated information and enabling them to work remotely. At a reduced functionality spectrum, SAM is also dedicated to external stakeholders[5]. The Sustainability Assessment Matrix tool was implemented at

[5] Access to some of the functionalities is made available at SABMiller's website - through the *SAM reporting tool* tab in the *Sustainability* section.

all companies of SABMiller corporate group in 2007[6]. In 2014, it was modified along with the implementation of a new sustainable development strategy. The major software functionalities are:

- entry of data and information regarding sustainable development,
- files storage with import and export functionality[7],
- calculation of measures and indicators, including key performance indicators[8],
- calculation of performance levels for five shared imperatives[9] of sustainable development[10],
- performance of analyses regarding accomplishment of strategic and operational goals,
- creating juxtapositions and comparisons between Group companies,
- communication between Group employees,
- generation of internal reports for the needs of national management and Group management,
- communication of achievements in the field of sustainable development to external stakeholders.

Although the Sustainability Assessment Matrix has been integrated for the entire group so as to ensure comparability of data and information between its various companies, it allows for adjustment of contents, form of presentation and method of analysis of sustainable development achievements to the profile of companies' business activities and external determinants in their respective countries.

Information relating to a given country, used in the software, is input primarily by employees responsible for sustainable development at the national level. The correctness of the entered data is, however, subject to multi-tier verification. If the software detects significant deviations of input data from the values recorded in the previous reporting period, it prompts the user to provide a written justification. In the case of data that cannot be easily verified at Group level, it is necessary to attach an appropriate verifying file.

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[6] The software developer is Blackwood Creative Ltd. with headquarters in Brighton, UK.

[7] Working with files is a particularly valuable functionality of this software when sustainable development data originates from various enterprise departments.

[8] Key performance indicators (KPIs) are the most important indicators used in company management. The role of KPIs is to describe the key success factors in numbers. It is a difficult task, yet it allows for goal quantification and, in a longer perspective, also the execution of the overall enterprise strategy [Niemiec 2015].

[9] 'Five shared imperatives' have been named 'five sources of growth' at Kompania Piwowarska.

[10] At SABMiller, progress in each of the five shared imperatives of sustainable development is measured with, among others, five levels of performance. Their detailed characteristics have been presented in subsequent sub-chapters.

Moreover, for each entry field, it is possible to exchange correspondence between employees responsible for monitoring of sustainable development at Group level and employees of subsidiary companies, for instant clarification of possible doubts as they arise. The final verification of data and information contained in SAM is based on electronic approval of employees responsible for sustainable development at Group level. Additionally, any internal reports generated by the system require, in accordance with internal procedures at Kompania Piwowarska, the signature of the President of the Management Board and the Vice President of the Management Board for Technical Affairs.

External stakeholders may use SAM to generate information in the form of graphs or tables, by selecting information of interest to them by regions, countries and periods. For example, figure 6.3 shows water consumption in hectoliters per one hectoliter of beer at all SABMiller companies, broken down into individual regions: Europe, Latin America, Africa, Asia and the Pacific and North America, referred to in the figure as *MillerCoors*[11].

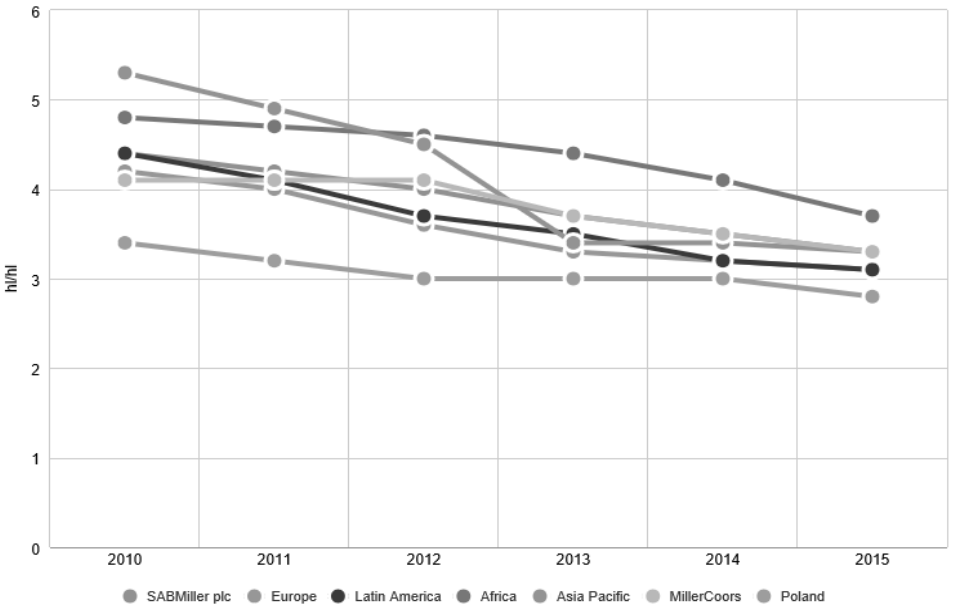

Fig. 6.3. Average water consumption for beer production by Group regions

Source: [SABMiller 2016].

[11] MillerCoors LLC is a joint venture between SABMiller and Molson Coors Brewing Company, established to compete in the North American market.

Information generated by SAM may be used for comparisons in time and in space, against other Group companies, thus expanding the number of control tools available to management and owners. For example, table 1 shows annual carbon dioxide emissions in kilograms per one hectoliter of beer in individual European countries were SABMiller subsidiaries operate.

Table 6.1. Annual carbon dioxide emissions for beer production in individual European countries

Country	Unit	2011	2012	2013	2014	2015
Canary Islands	(CO_2 kg/hl)	8.2	8.1	9.2	9.5	9.5
Czech Republic	(CO_2 kg/hl)	6.9	6.4	8.4	8.4	8.1
Hungary	(CO_2 kg/hl)	7.7	7.1	6.3	5.7	5.2
Italy	(CO_2 kg/hl)	7.3	6.8	6.4	5.5	5.5
The Netherlands	(CO_2 kg/hl)	6.9	7.5	6.0	5.5	5.3
Poland	(CO_2 kg/hl)	7.5	7.5	6.7	6.4	7.0
Romania	(CO_2 kg/hl)	9.2	8.0	6.1	5.9	6.3
Slovakia	(CO_2 kg/hl)	7.0	8.7	6.5	5.9	5.5

Source: own elaboration based on: [SABMiller 2016].

The presented information, available to external stakeholders, is just an example of many different reports that may be generated in the Sustainability Assessment Matrix at SABMiller's website and represent only a tiny sliver of functionalities accessible to internal stakeholders.

6.5. Planning sustainable development with the use of measures and indicators

Sustainable development planning at Kompania Piwowarska takes place at both strategic and operational levels. The effective performance of this strategy is made possible by the top management's commitment in socially responsible activities, which may be attested to by the comment made by Alan Clark, SABMiller CEO in connection with the plan for a new reporting year: 'if I were to choose the single most important thing on which our enterprise should focus, it would be the way we integrate with the local communities and the role we play in the society'[12].

[12] This quote is from 22 May 2014 and it refers to the reporting period from 1 April 2014 to 31 March 2015.

The sustainable development strategy of both Kompania Piwowarska and SABMiller group was modified in 2014 and currently it covers five areas, dubbed shared imperatives [Kompania Piwowarska 2016]:

- development of business and communities (thriving world) - 'we want a thriving world, where incomes and quality of life are growing. We will collaborate with farmers, distributors and retailers in our global value chains, by supporting their own development, the growth of their businesses, families and communities',
- responsible consumption (sociable world) - 'we want a sociable world where our beers are developed, marketed, sold, and consumed responsibly. We will endeavour to make beer a natural choice for moderate and responsible drinkers',
- saving water (resilient world) - 'we want a resilient world, where our businesses, communities and ecosystems share uninterrupted access to safe, clean water. We will continue to tackle water risk across all of our breweries',
- clean natural environment (clean world) - 'we want a clean world where nothing goes to waste and emissions are dramatically lower',
- productive and eco-friendly crops (productive world) - 'we want a productive world where land is used responsibly, food supply is secure, biodiversity is protected and brewing crops can be accessed at reasonable prices'.

The new strategy is a derivative of the previous one, developed on the basis of 10 priorities: discouragement of irresponsible drinking, making more beer using less water, reducing energy and carbon footprint of the company, packaging reuse and recycling, working towards zero-waste operations, encouraging enterprise development in value chains of the company, benefitting communities, respect for human rights, reducing consequences of HIV and AIDS, transparency and ethics.

In the new sustainable development strategy dubbed 'Prosper'[13], which entails 5 shared imperatives, 9 priorities from the previous strategy are reflected, as well as one new area i.e. 'productive and eco-friendly crops'. The priority of 'transparency with regards to sustainable development and ethics' has been recognised as the fundamental principle, underlying the enterprise strategy, and as such it is not considered a component of any of the sustainable development areas. The strategy modifications implemented in 2014 are presented in figure 6.4.

[13] Sustainable development strategy dubbed 'Postaw na piwo' (the verbatim translation is *Bet on Beer*) is the Polish version of 'Prosper' as named at SABMiller.

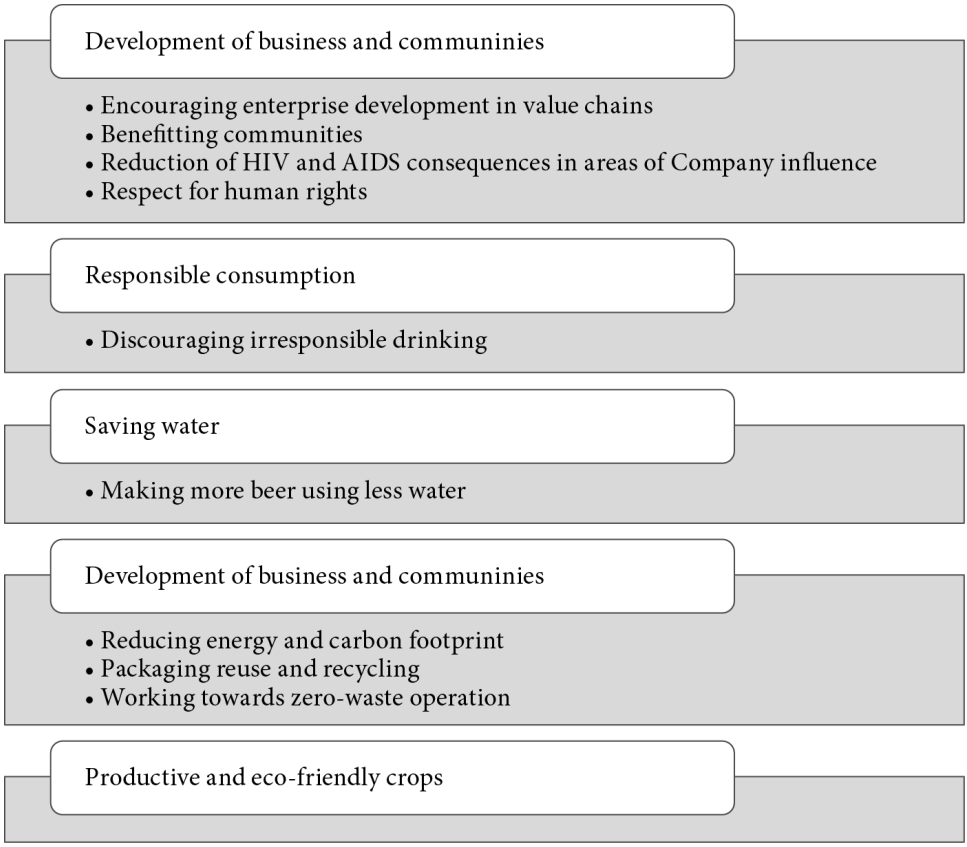

Fig. 6.4. Shared imperatives and priorities of sustainable development at Kompania Piwowarska

Source: own elaboration, based on internal Company documents.

The general sustainable development strategy of Kompania Piwowarska, 'Prosper', is pursued in line with the strategic commitments determined for each of the shared imperatives, which expand on the strategy. For example, the shared imperative 'development of business and communities' entails three strategic commitments, pursuant to which the Company plans to achieve the following objectives by the year 2020:

- directly support over 13.5 thousand small enterprises to enhance their business growth and family livelihoods,
- increase women's representation within SABMiller at the executive level,
- continue the existing social programmes.

The strategic commitments translate into strategic goals and these, in turn, further into operational goals. These goals are expressed in numerical form in two different ways as:

- key performance indicators (KPIs),
- performance levels for five shared imperatives.

Key performance indicators are expressed with measures and indicators, while performance levels are reflected on a scale of 0 to 5, providing both quantitative and qualitative information used in their calculation. The achievement of a given level requires fulfilling a number of different conditions determined for this level, as well as all the requirements set for the lower levels.

Goals in the form of key performance indicators are set for each of the subsidiaries, as a derivative of Group's overall goals, also on the basis of analysis of previous performance, macroeconomic determinants of a given country and company's declarations. The ultimate objective, however, is set by the Group Management Board. Goals in the form of performance levels are first determined by national management boards and then approved at Group level.

Goals expressed as key performance indicators and performance levels are set every six months for the next year and for the time horizon up to 2020, which is the time-frame for the strategy implemented in 2014. It merits a mention that some of the goals of crucial importance to Kompania Piwowarska have been broken down into more detailed schedules - for every year within the strategy time-frame. One example of the performance levels set by Kompania Piwowarska in 2015 is shown in figure 6.5[14].

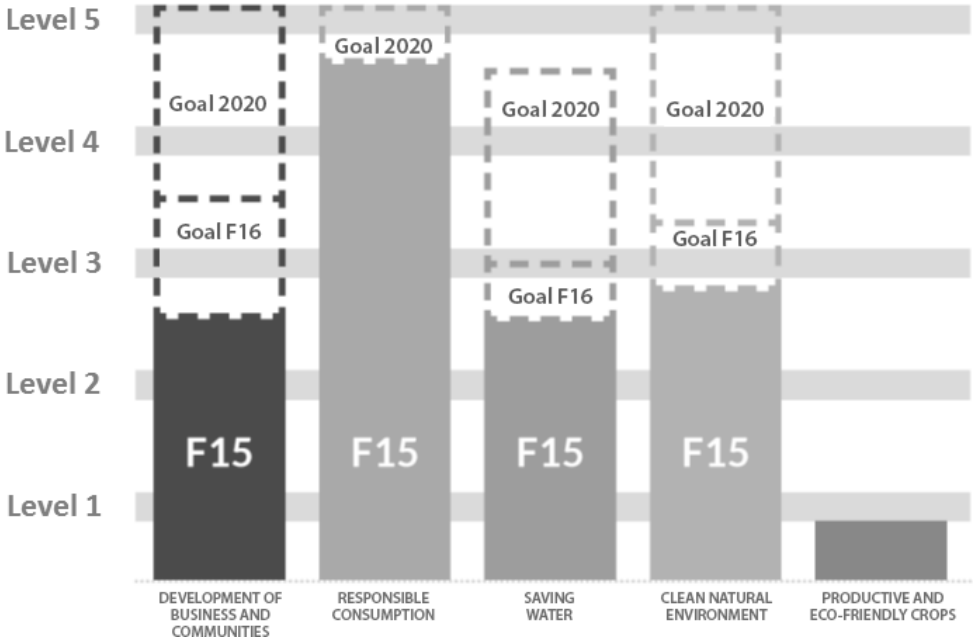

Fig. 6.5. Goals in the form of sustainable development performance levels

Source: [Report 2015].

[14] Years in this figure are represented by letter 'F' meaning a financial year which does not correspond to the calendar year.

The sustainable development strategy at Kompania Piwowarska rests on the same assumptions and covers the same priorities as those of the entire Group, but it differs in terms of number and weight of goals determined with the use of key performance indicators and performance levels. Moreover, it should be noted that although there are five shared imperatives at the Group level, some specific sub-imperatives, incorporated in the methodology of calculating performance levels, may be different, as illustrated by the sub-imperative of counteracting HIV, which has only been set for company Groups operating in certain countries. If the level of HIV morbidity in a given country is less than 1%, the sub-imperative 'reducing HIV' is not included in the calculation of performance levels within the 'development of business and communities' imperative[15].

6.6. Key performance indicators and performance levels for the five priorities

Measures and indicators of sustainable development have been calculated at Kompania Piwowarska both for the needs of strategic and operational planning since 2007. In 2014, 13 key performance indicators[16], relating to four shared imperatives[17], were selected, as illustrated by table 6.2.

The method of calculation, as well as the adopted unit for each of the measures and indicators provided in the Sustainability Assessment Matrix, including KPIs, is strictly determined, as presented for three sample KPIs in table 6.3.

Besides the method of calculation, SABMiller also determines additional guidelines regarding key performance indicators. For example, the indicator regarding water consumption for beer production is strictly defined as the number of hectoliters of water used at breweries in production of clear beer per one hectoliter of clear beer produced and placed in the warehouse. Also, sources of water are indicated (municipal water, surface water, underground water, rainwater) as well as methods of consumption measurement (meters, invoices) which may be applied in indicator calculation. A detailed measurement method is also set forth, according to which water intake should be measured at entrance to the brewery. Measurements are inclusive of losses due to silts or water treatment, and exclusive of water reuse in production. Clear beer is defined as all alcoholic beers (lagers and dark beer) and non-alcoholic beers, with the exception of African opaque beers made from maize and sorghum [SAM Principles 2015]. Such a detailed approach to defining KPIs is indispensable to ensure comparability of results between Group companies.

[15] Detailed information on the methodology behind performance levels has been provided in the subsequent sub-chapter.

[16] 16 key performance indicators have been identified within the entire Group.

[17] The presented KPIs do not account for the fifth shared imperative, that is 'productive and eco-friendly crops', which is an example of sustainable development strategy modification between various SABMiller subsidiaries.

Table 6.2. Key performance indicators at Kompania Piwowarska

Development of business and communities
■ number of small enterprises included in programmes to increase income and to enhance quality of life
■ women's representation at the executive level
Responsible consumption
■ number of brands involved in sustainable development
■ number of retailers involved in responsible alcohol sale
■ number of people engaged in road safety awareness programmes
■ number of people engaged in programmes discouraging alcohol consumption by minors
■ number of adults engaged in responsible consumption programmes
Saving water
■ share of water resources at risk
■ water consumption in beer production
Clean natural environment
■ CO_2 emissions in beer production
■ market share of freon-free refrigerators
■ share of recovered waste
■ CO_2 emissions for packaging

Source: own elaboration based on [Report 2015].

Table 6.3. Calculation of sample KPIs

KPI	**Unit**	**Calculation**
number of small enterprises included in programmes to increase income and to enhance quality of life	number	number of small farms + number of small suppliers covered by the programme + number of distributors covered by the programme + number of retailers covered by the programme + number of other enterprises covered by the programme
water consumption in beer production	indicator	water consumption in hectoliters / beer production in hectoliters
share of recovered waste	%	recovered or reused waste / total waste * 100

Source: own elaboration, based on internal Company documents.

Sustainable development performance levels have been applied by Kompania Piwowarska in the processes of sustainable development strategy planning and control since 2007 in reference to each of the 10 strategic priorities. Currently, alongside the key performance indicators, the 10 strategic priorities are employed in planning and control of performance on goals covered by the 5 shared imperatives (areas of sustainable development). Each of the imperatives may be achieved at one of the five performance levels, of which the first one stands for core standard, second one for progress, third one for developing leadership, fourth one for best practice and the fifth and highest level is tantamount to leading edge, or performance at the highest possible level achievable within the entire Group. It is worth noting that SAM activates or deactivates certain number and text fields depending on the performance level of a given company.

The determination of performance levels for individual imperatives requires that performance levels for each sub-area of these imperatives are calculated first. SABMiller has identified 22 sub-areas of imperatives, of which 14 are applied at Kompania Piwowarska. Performance level for a given imperative is a weighted average of performance levels in its sub-areas, e.g. the imperative of 'responsible consumption' is made up of three sub-areas: employee behaviour, commercial communication and responsible consumption, of which the first two sub-areas have been allocated the weight of 35% and the third sub-area 30%. Performance level in each sub-area is most frequently determined on the basis of a few measures or indicators. The achievement of a given level requires fulfilling the conditions determined for this level, as well as for lower levels. Besides the determined values of measures and indicators, also qualitative requirements, expressed in non-continuous values, must be accomplished e.g. success or failure in obtaining a certificate. A list of sub-areas of the five shared imperatives, along with the performance levels achieved in the current and preceding period is presented in figure 6.6[18].

Performance levels, just as KPIs, may also be employed as a benchmarking tool to compare different Group companies, as illustrated in figure 6.7.

It is worth noting, that accounting for at least a few measures and indicators in calculation of each sub-area of shared imperatives at a given level, as well as all lower levels, requires particular involvement of the Company in the processes of measurement of a variety of phenomena, and includes on-going survey research.

[18] At Kompania Piwowarska, the five shared imperatives are dubbed 'Development of business and communities', 'Responsible consumption', 'Saving water', 'Clean natural environment' and 'Productive and eco-friendly crops', but at the Group level, the following corresponding names are also functioning: 'Accelerate growth', 'Beer the natural choice', 'Secure shared water', 'Reducing waste and carbon', 'Sustainable use of land', as presented in figure 6.6.

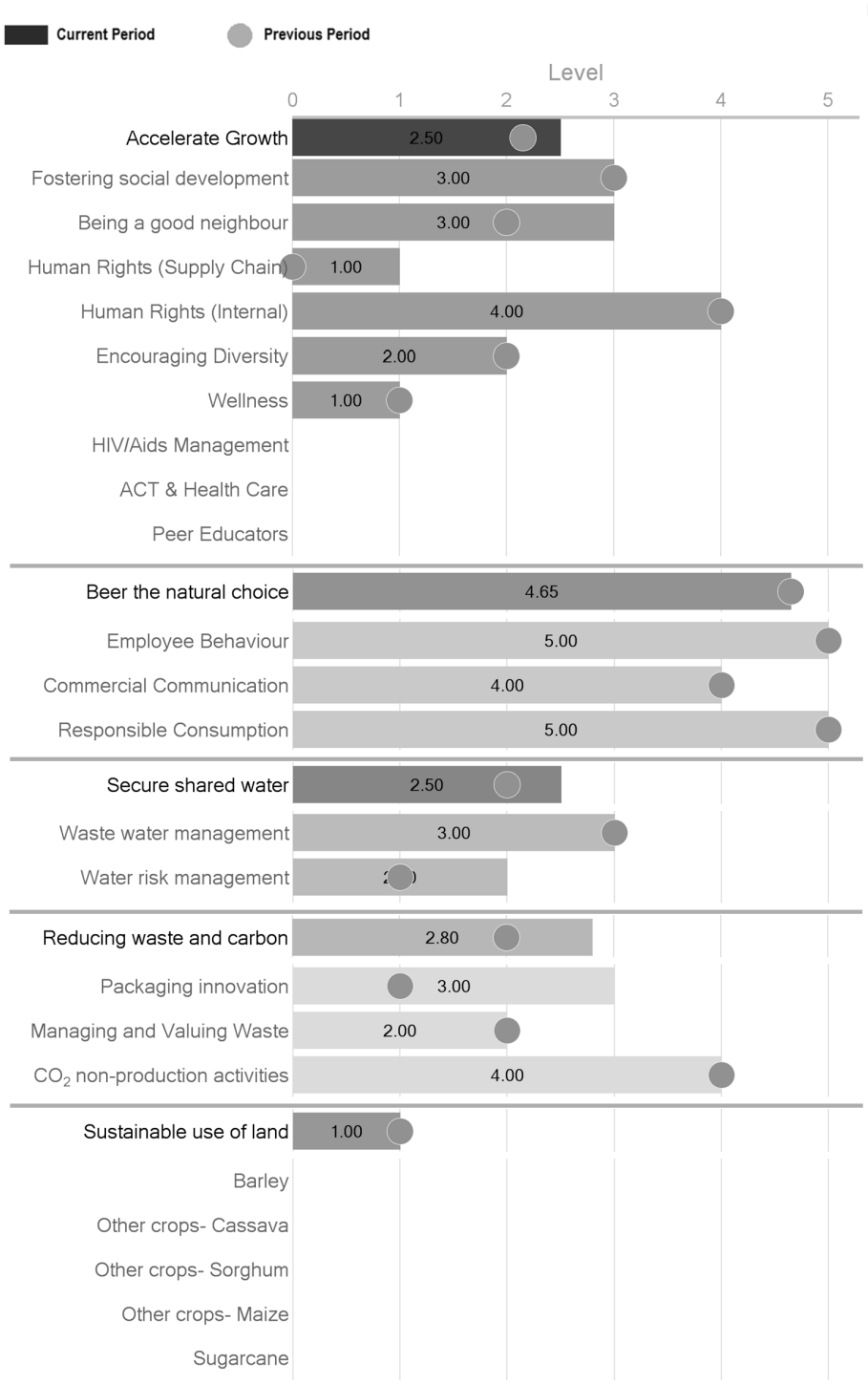

Fig. 6.6. Sub-areas of shared imperatives at Kompania Piwowarska in 2015

Source: Company's internal documents.

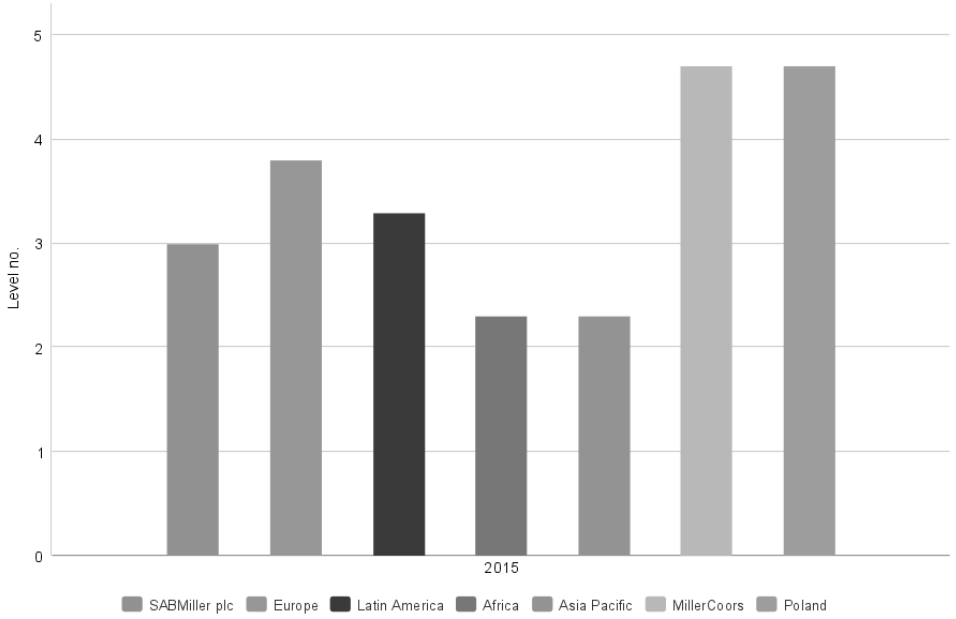

Fig. 6.7. Performance levels for the shared imperative 'responsible consumption' in Poland and in individual Group regions

Source: [SABMiller 2016].

6.7. Communication and control of sustainable development activities

The processes of communication and control of performance on sustainable development goals, related to both internal and external stakeholders, are performed at the Company primarily through reports, meetings with stakeholders and activities taken by the sustainable development authorities.

Kompania Piwowarska drafts two basic types of reports containing measures and indicators of sustainable development, adjusted to the informational needs of individual addressees:

- annual reports addressed primarily to external stakeholders,
- semi-annual reports addressed to executives.

The largest portion of the Company's annual report on sustainable development consists of description of activities and accomplishments connected to the individual shared imperatives, providing both qualitative and quantitative information. The report provides mainly information concerning:

- the history and brief outline of Company's operation,
- sustainable development strategy along with the related undertaken commitments,
- socially responsible projects and initiatives, as well as the motives behind them,
- methods of delivery on strategic commitments, including pursued investments,
- main accomplishments in sustainable development in the last reporting period,
- foundations with which the Company cooperates in the course of execution of selected socially responsible projects and initiatives,
- basic information regarding the reporting methodology.

Quantitative information provided in an annual report comprises mainly key performance indicators and performance levels for each of the shared imperative. Apart from those, also other measures and indicators of significance to external stakeholders are presented in reports. Some of them relate to projects performed within the given reporting period, while others are of relatively recurring nature, allowing for their values to be monitored over time. Measures and indicators of significance to stakeholders of Kompania Piwowarska in 2015, of recurring nature but not constituting key performance indicators, have been presented in reference to individual shared imperatives in table 6.4.

The annual report also contains measures and indicators pertaining to projects conducted in a given reporting period, e.g. the weight of waste collected in the 'Eco Zone' at Woodstock Festival, the number of people registered as potential bone marrow donors under the project 'Non-trivial Valentine's Day', the number of rear-windshield stickers handed out to drivers within the 'I Never Drink and Drive' campaign, the count of downloads of the 'Check Your Blood Alcohol Content' application, number of trees planted and number of participants of the 'Go for Bike' action.

It is also worthwhile to take a look at the detailed measures and indicators pertaining to the performance of strategic commitments through investments pursued. In its annual report, the Company disseminates information about expected ecological effects of, e.g. modernization of the water treatment station for the ammonia compressor, which is expected to save 0.07 hectoliter of water per one hectoliter of beer. Another example is the modernization of the open system of condensate tanks installed in the production halls, consisting of addition of a water seal, which will enable the operation of tanks in a closed system under working pressure of 0.2 bar leading to elimination of condensate loss through evaporation and will prevent the associated heat energy loss at a level of 22,996 CO_2 kg annually [Report 2015].

Table 6.4. Measures and indicators of recurring nature not constituting key performance indicators in the annual report of Kompania Piwowarska

Development of business and communities
■ number of jobs created thanks to the Company's operations, divided into employees, suppliers, employees of food establishments, employees of retailers
■ number of employees per type of employment
■ total amount of taxes paid to State Treasury in connection with Company's operation
■ production volume, number of employees, value of raw materials purchases, value of packaging and service purchases, number of jobs in related sectors (per regions of operation[19])
■ number of volunteers, number of volunteer projects, number of volunteer hours, value of donations (in total and per regions of operation)
■ number of suppliers divided into entities supplying: raw materials for beer production, energy and production support processes, packaging, other services
■ number of direct buyers, divided into 'Cash & Carry', discount chains, wholesalers organised in voluntary chains, hypermarkets, supermarkets and gas stations, wholesalers
■ number of indirect buyers, divided into pubs, retail outlets and sub-wholesalers, food establishments
Responsible consumption
■ number of visits on the Internet website, number of Facebook followers
■ number of trainings on responsible alcohol sale, number of participants in the responsible alcohol sale training
Saving water
■ total water consumption, water consumption divided into own underground sources and municipal water
■ volume of wastewater produced (per regions of operation), total wastewater volume and parameters (chemical oxygen demand, suspended solids)
Clean natural environment
■ energy consumption (total electric power consumption, electric power consumption per production unit, total consumption of heat energy from non-renewable sources, consumption of heat from renewable sources, total consumption of heat in MJ per production unit)
■ emission of pollutants to the atmosphere by type: NOX, SOX, CO, CO_2
■ fuel consumption by transport vehicles, by trucks, cars and delivery lorries (divided into ON, PB95, LPG and in MJ), number of kilometres, fuel consumption per 1 km
■ size of truck fleet with a hybrid LPG-ON installation, number of participants in eco-driving training sessions
■ biogas use indicator in combustion processes
■ bottle mass, can mass, share of returnable bottles in total sales
■ total weight of waste by type (side products, other waste, hazardous waste),
■ weight of used materials, recycled and recovered, in total and by type (aluminium, tin, wooden pallets, paper and cardboard, glass, plastics)
Sustainable use of land
■ total purchase volume of malt, total purchase value of hops, share of malt from Polish suppliers, share of hops from Polish suppliers

Source: own elaboration based on [Report 2015].

[19] The Company has three major regions of operation, covering Upper Silesia (Tyskie Browary Książęce), Wielkopolska (Lech Browary Wielkopolski) and Podlasie (Dojlidy Browar Białystok).

The semi-annual report, unlike the annual report, is intended for internal use and is addressed exclusively to Company employees, in particular its executives, both at the Company level and at the SABMiller group level. The report is generated with the use of the Sustainability Assessment Matrix and it provides the most significant measures and indicators pertaining to the achievement of enterprise goals in strategic and operational dimensions. Information contained in the semi-annual report of Kompania Piwowarska is structured according to five elements:

- approval of data for the report,
- overview of sustainable development achievements,
- key performance indicators by shared imperatives,
- performance levels for sub-areas of shared imperatives,
- occupational health and safety.

Approval of data used for the report generation, which is the first step in drafting of this report, is connected with the procedure of verification of information originating from the Sustainability Assessment Matrix. The second part of the report - overview of sustainable development achievements - focuses on information regarding accomplishments in the area of sustainability from the perspective of the managing director and managers of various departments. The subsequent parts refer to the five shared imperatives in relation to key performance indicators and the performance levels for individual sub-areas of shared imperatives. The part concerning occupational health and safety presents measures and indicators related to four aspects: number of major injuries, number of fatalities, injury rate per 200,000 hours, number of road vehicle accidents. Information presented in the five report parts is as condensed as possible, taking up less than 10 pages. Additionally, an annex to the report contains a run-down of all the key performance indicators of the Company. A summary of the most important sustainability results of Kompania Piwowarska provided in the internal report for the second half of the reporting year 2015 is presented in figure 6.8.

A graphic summary of the most important results, as appearing in the internal report, is a synthesis of key performance indicators (upper part of the figure) and sustainability performance levels (lower part of the figure), for each of the five shared imperatives. KPI values are expressed with the use of suitable measures or indicators. A further part of the report presents the year-to-year change of KPI values, expressed in relevant units (in the case of measures) or in percentages (in the case of indicators). The achieved performance levels are shown in relation to values planned for the years 2016 and 2020.

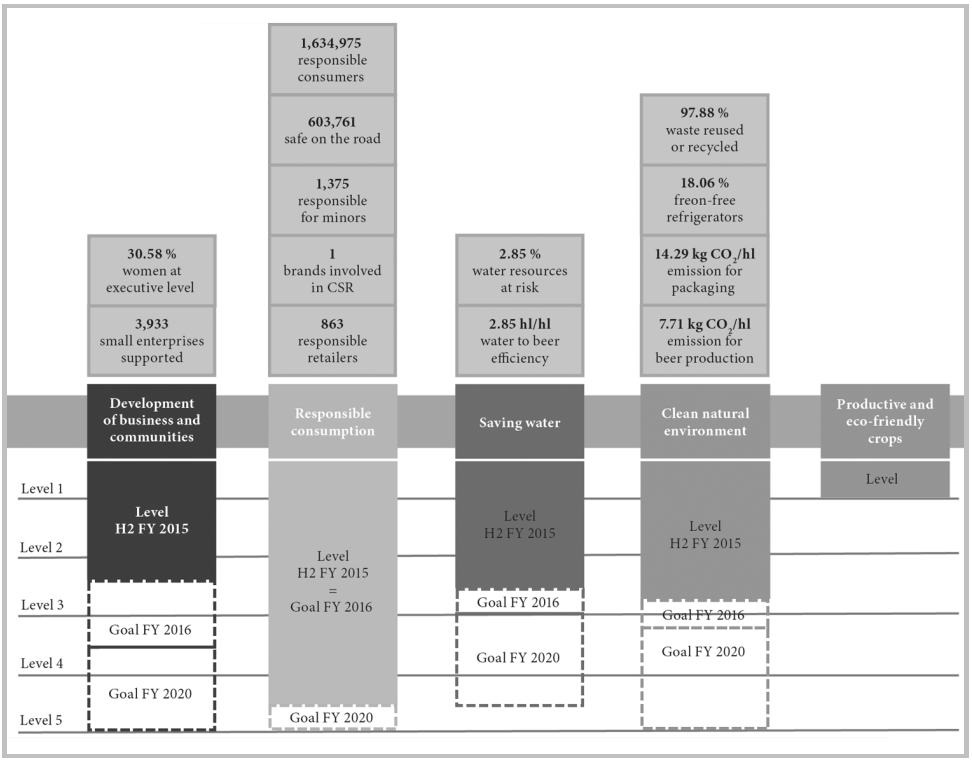

Fig. 6.8. Summary of the most important results in the internal report of Kompania Piwowarska

Source: own elaboration, based on internal Company documents.

The undertaken sustainability activities are subject to the oversight by the appropriate authorities, including the Corporate Accountability and Risk Assurance Committee – CARAC. This Committee oversees both performance of the SABMiller plc Management Board and of each of the regional companies[20] of the Group. Sessions of regional Committees are held twice a year, to discuss on-going issues, as well as for the overview of performance levels of sustainable development objectives, with the use of measures and indicators provided by the Sustainability Assessment Matrix. Committee works are headed by the regional managing director, accompanied by, in particular, the regional corporate affairs director along with representatives of SABMiller plc[21], including the corporate affairs director, sustainable development director, general counsel and the Policy, Public and Industry Affairs Director. Committee activities enable not only the oversight over the levels of performance on goals, but also exchange of experiences between Group companies as regards the solutions to individual problems and enhancement of effectiveness of undertaken activities. The presence of high-ranking

[20] These regions usually match the territory of individual countries.

[21] SABMiller plc is the holding company of the SABMiller corporate group.

executives with broad competences and decision-making powers lends special significance to the Committee in terms of control of Company initiatives in the field of sustainable development of the entire SABMiller group.

Besides the Corporate Accountability and Risk Assurance Committee, which operates at all of Group's companies, Kompania Piwowarska have also appointed an Ethics Committee, which functions as a permanent body. The Committee focuses primarily on all ethics-related issues, including active promotion of ethical standards and serving employees with its consultancy and advisory capacities. In 2012, a former CEO of Kompania Piwowarska was appointed president of the Committee, which goes to prove that the Company strategically perceives its socially responsible endeavours.

Oversight and communication within the sustainable development at Kompania Piwowarska is also undertaken in liaison with external stakeholders. At least once a year, meetings with key Company's stakeholders are held. Among the stakeholders are representatives of local authorities, NGOs, media, business partners and employees. The purpose of these meetings is to discuss the completed socially responsible activities, as well as to determine the initiatives and projects, important and needed from viewpoint of external stakeholders, to be pursued in the future..

Oversight and communication of socially responsible activities at Kompania Piwowarska leads to systematic improvement on performance with regards to goals set in the sustainable development strategy, as evidenced by, for example, the increase of the average performance level within the Group from 1.7 in 2007 to 3.4 in 2014. During the same period of time, the number of subsidiaries which were classified on the first performance level, as regards any of the ten sustainable development priorities, fell - from 71 companies in 2007 to only 2 companies in 2014[22].

6.8. Final remarks

The application of an appropriate system of measures and indicators in green controlling is one of the conditions of correct shaping and coordination of the processes of planning, control and information supply, oriented at managing the entire enterprise with a view of sustainable development goals. The effectiveness of this system is determined by, among others, the employed solutions as regards integration of measures and indicators between the strategic and operational goals of sustainable development, as well as by application of appropriate IT tools. This chapter presented the so-called 'good practices' applied at Kompania Piwowarska, particularly those related to the Sustainability Assessment Matrix software, application of key performance indicators and performance levels in strategic and operational planning, as well as tools used in communication and oversight of the degree of goals achievement.

[22] Up until the year 2014, the sustainable development strategy had been based on 10 priorities.

CHAPTER 7

Reporting in green controlling at selected companies

7.1. Introductory remarks

The functioning of enterprises in the modern economy is connected with exerting an impact on the natural environment. The scale of this impact varies, depending on the types of processes pursued by business entities. The national legislation and EU directives oblige enterprises to monitor levels of pollution and to carry out environmental reporting. The reporting path, types of reports and the obligatory solutions within this scope have been presented in the first, theoretical part of book.[1] The present chapter transposes theoretical issues relating to environmental reporting onto the field of economic practice.

Given the vast scope of the subject, the chapter covers only some selected reporting methods and types of reports presented to companies' stakeholders. They correspond with the provisions of the EU Directive dated 22 October 2014. The Directive aims to harmonize the structure and scope of non-financial information to be disclosed by enterprises.[2]

Results of empirical research pertain to four case studies. The first two were conducted at companies operating in extractive industry. The next two present reporting by example of two types of reports: integrated report (LOTOS Group) and Eco-Management and Audit Scheme (EMAS) report.

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[1] Cf: *Green Controlling and Finance. Theoretical Framework*, [ed. C. Kochalski], Wydawnictwo C.H. Beck, Warsaw 2016, p. 251 et seq.

[2] Directive 2014/95/UE of the European Parliament and Council amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups. Official Journal of the European Union 15.11.2014 L330/1.

The impact of extractive industry on the natural environment is relatively intense, primarily due to discharge of mine water to rivers, generation of large amounts of waste, deformation of earth surface or emission of various types of dust and gases to the atmosphere, both directly, i.e. in the course of the processes performed, and indirectly, through high energy consumption. Given the above, the following extractive companies were selected for the research: coal mine LW Bogdanka and the mining and metallurgy enterprise ZGH Bolesław SA. LW Bogdanka is a public joint-stock company listed on the regulated market at Warsaw Stock Exchange (WSE). Environmental reporting, being the focus of the research, constitutes a part of the company's integrated report. The company has been awarded a 'Golden Laurel' journalists' award for the scope and quality of its report. The scope of data obtained from LW Bogdanka and contained in the present chapter stems from the legal obligations binding companies listed on stock exchange.

ZGH Bolesław SA is not stock listed. It is the holding company of the Corporate Group ZGH Bolesław SA. The Group does not draw up consolidated reports in the area of environmental impacts. Each of the companies in the Group reports separately to the Voivodeship Inspectorates for Environmental Protection (VIEPs), to Voivodeship Marshals who grant environmental permits and to the Central Statistical Office, as well as to other central-level offices responsible for the monitoring of pollution levels of the natural environment in the country.

The third case study is that of LOTOS Group. The group runs extractive, refinery and trade activities. Its impact on the broadly understood natural environment is therefore irrefutable. The report issued by the LOTOS Group is an integrated report. The Group has been publishing its report in this form since 2009. It has received a number of awards and distinctions for its pro-environmental and pro-social initiatives, such as the 'Crystal Laurel of Skills and Competence' for combining business activities with social responsibility and for its contribution to development of Polish economy in 2014. It has also received accolades for its integrated report (3rd award in 2014) in the 'Best Annual Report' contest. This report is addressed to stockholders and all other interested parties. As a result, the scope of disclosed information covers the entire spectrum of company's operations within a given year.

The final example is RAFAKO SA with its environmental report drafted according to the Eco-Management and Audit Scheme (EMAS), compliant with the ISO 14000 standard. This report focuses mainly on environmental aspects, yet it may also be a standard for the harmonized structure and scope of non-financial information as stipulated in the above-mentioned directive.

The purpose of this chapter is to present the best practices in green reporting.

7.2. Environmental reporting system at GK LW Bogdanka SA

7.2.1. Brief description of the company

The core activity of the corporate group GK LW Bogdanka SA is the extraction of hard coal used for production of electrical and heat power and cement. It also has a number of applications in the chemical industry. The coal recipients are industrial plants operating in the electric power industry, located primarily in Eastern and North-Eastern Poland.

LW Bogdanka SA corporate group entails:

- mine LW 'Bogdanka' SA,
- EcoKLINKIER construction ceramics enterprise,
- Łęczyńska Energetyka Sp. z o.o.,
- repair enterprise RG Bogdanka Sp z o.o.,
- transportation enterprise Ecotrans Bogdanka.

The CSR strategy of GK LW Bogdanka SA assumes remaining the leader of efficiency in the mining industry and maintaining a strong leadership in the field of innovative technological solutions dubbed 'Smart Mine'. The Group expects to double its resources and to maintain the company's operations until ca. 2050. The planned activities are co-dependent with measures in the field of social responsibility, which represents a significant element of the business development strategy. The priorities of social responsibility adopted in this strategy for the years 2014-2017 reflect the key areas of social and environmental impacts. The strategy is based on continued adherence to four priorities, for which measures and quantifiable goals have been defined. Specific, main activity directions have been determined for the goals.

The priorities for the years 2014-2017 are:[3]

- Goal 1 - To strive to increase the safety of workforce,
- Goal 2 - To guarantee the safety of local natural environment,
- Goal 3 - To ensure safety and support development of local community,
- Goal 4 - Transparent and responsible management practices.

The listed goals focus on the social and environmental dimension.

[3] Corporate Social Responsibility Report of GK LW Bogdanka for the years 2012-2013, p. 55, *www.lw.com.pl* (downloaded on 8.01.2016)

7.2.2. Monitoring the natural environment condition

In order to mitigate the impact of its extractive operations on the environment, the company has undertaken a number of initiatives. It has implemented the integrated System of Quality, Environment and OHS Management. The key processes have been outlined in the Integrated Management System Book, which governs environmental management. They are:

- Identification and assessment of environmental aspects,
- Monitoring of the key characteristics of environmental aspects,
- Identification of legal and other requirements and compliance assessment,
- Development of environmental programmes.

The environmental aspects are also accounted for as key issues on the corporate risk map. The integrated system of corporate risk management involves an entire group of environmental risks, dividing them into the following categories:

- risk associated with recultivation and mining damages,
- risk associated with the increasingly stringent standards and legal regulations as regards environmental protection legislation and the obligation to obtain permits to use the natural environment,
- risk associated with management of waste generated following the expansion of the mining site,
- investment risk associated with the protected areas.

Activities pursued for a number of years have by now brought the risk exposure down to an acceptable level.

The Corporate Group LW Bogdanka SA systematically monitors its impact on the natural environment. The long-standing monitoring has enabled in depth knowledge and understanding of the majority of impact mechanisms of mine's operations on the condition of the natural environment in the vicinities of the mining site, especially mechanisms of water circulation, migration of contaminants, etc. The company has a particular responsibility, as areas of unique aquatic and mire value, protected by the law, are located in its direct surroundings. Table 7.1 presents the legal grounds for monitoring the level of Group's environmental impact, the frequency of measurements and the organizational units where measurement documentation is kept.

Table 7.1. Monitoring of legal compliance at GK LW Bogdanka SA

No.	Measured parameter	Frequency of measurement	Performed by	Location
1. The basis for measurement - Decision no. ŚiR.III.6811/91/07 of the Lublin Voivode dated 31.12.2007 - water permit				
1.1.	Volume of mine water pumped out	1 x day	Shaft Division	Record kept by Energy Settlement Section
1.2.	Physico-chemical analyses of water discharged to mine water reservoir	6 x year	Laboratory of Łęczyńska Energetyka based on contract	Record kept by Environmental Protection Dep. of LW 'Bogdanka' SA
1.3.	Physico-chemical analyses of water discharged from mine water reservoir	6 x year	Laboratory of Łęczyńska Energetyka based on contract	Record kept by Environmental Protection Dep. of LW 'Bogdanka' SA 1 copy - submitted to VIEP and to Marshal of Lublin Voivodeship
1.4.	Physico-chemical analysis of water in Świnka River 100 m before wastewater discharge point	2 x year	External company	Record kept by Environmental Protection Dep. of LW 'Bogdanka' SA
1.5.	Physico-chemical analyses of waters in discharge ditch before discharge to Świnka River	2 x year	External company	Record kept by Environmental Protection Dep. of LW 'Bogdanka' SA
1.6.	Physico-chemical analyses of water in Świnka River 100 m below discharge point of mine water	2 x year	External company	Record kept by Environmental Protection Dep. of LW 'Bogdanka' SA
2. Decision no. BAO 6223/39/2007 of the Staroste of Łęczna dated 09.01.2008 - water permit				
	Physico-chemical analyses of water discharged to Świnka River	2 x year	External company	Record kept by Environmental Protection Dep. of LW 'Bogdanka' SA

Table 7.1. Monitoring of legal compliance at GK LW Bogdanka SA - *continued*

No.	Measured parameter	Frequency of measurement	Performed by	Location
3. Basis of measurement - Decision no. RŚ - V.7240.113.2011.EW dated 26.01.2012 of the Marshal of Lublin Voivodeship, approving the extractive waste management programme				
	Extractive waste records	1 x month	MCPP, Environmental Protection Department	Records kept by the Environmental Protection Department, GM Department MCPP of LW 'Bogdanka' SA - 1 copy submitted to VIEP
	Physico-chemical properties of waste	1 x year	External company	
	Volume of leachate water	1 x month	ŁE Laboratory	
	Leachate water reservoir	4 x year	External company	
	Monitoring of surface and underground water	4 x year	External company	
	Slopes stability	1 x year	External company	
	Precipitation	1 x month	Institute of Meteorology and Water Management in Krakow	
	Landfill settlement	1 x year	GM Department	
4. Basis of measurement - Water Act of 18 July 2001 (Journal of Laws no. 115, item 1229 as amended)				
4.1.	Volume of mine water used for own needs - surface	1 x month	Mechanical Coal Processing Plant and Łęczyńska Energetyka	Records kept by Mechanical Coal Processing Plant (MCPP), Łęczyńska Energetyka and Environmental Protection Dep. of LW 'Bogdanka' SA
4.2.	Volume of mine water used for own needs - underground	1 x year	Mechanical depts. of the mine in cooperation with a geologist	Record kept by Environmental Protection Dep. of LW 'Bogdanka' SA
5. Basis of measurement - Contract no. 31/W/01/KWK – 531/G/55/01 of 2.07.2001 for water supply and wastewater collection				
	Volume of potable water supplied for the mine and of wastewater discharged	1 x month	Łęczyńska Energetyka Limited Liability Company (Sp. z o.o.)	Energy Settlement Section of the mine

Table 7.1. Monitoring of legal compliance at GK LW Bogdanka SA - *continued*

No.	Measured parameter	Frequency of measurement	Performed by	Location
6. Basis of measurement - Act on waste of 14.12.2012. (Dz.U. z 2013r. item.21) + executive provisions - Decision no. RŚ-V.7243.20.2014.LG of 06.08.2014 concerning waste generation issued by Marshal of Lublin Voivodeship				
	Amount and type of generated waste	1 x quarter	All areas of operations	Consolidated record kept by Environmental Protection Dep. of LW 'Bogdanka' SA Consolidated annual report submitted to Marshal of the Voivodeship
7. Basis of measurement - Act on extractive waste of 10.07.2008. (Journal of Laws no. 138, item 865 of 2008)				
	Amountof generated extractive waste recovered and neutralized	On-going	MCPP and Environmental Protection Department	Record kept by MCPP, Environmental Protection Dep. of LW 'Bogdanka' SA
8. Basis of measurement - Act on environmental protection of 27.04.2001 (Journal of Laws no. 62, item 627 as amended)				
	Influence of mine water reservoir on first aquifier - Physico-chemical analyses of underground water + evaluation	1 x year	External company	Record kept by Environmental Protection Dep. of LW 'Bogdanka' SA
9. Basis of measurement - Act on geological and mining law of 09.06.2011 (Journal of Laws no. 163, item 981 of 2011)				
	Measurements of earth surface deformation	1 x year	GM Department	Records kept at the GM Dept. and Environmental Protection Dept.
10. Basis of measurement - Act of 20 April 2004 on substances depleting the ozone layer (Journal of Laws no. 121, item 1263), Act of 17 July 2009 on the system of management of emissions of greenhouses gases and other substances (Journal of Laws no. 130, item 1070 of 2009)				
	Amount of substances depleting the ozone layer	1x month	Administrative and Commercial Department and PM/MN-2 (Head Mechanic/ Underground Mining Machinery Chief Foreman)	Record kept by the PM/MN-2 and Administrative and Commercial Depts. Record form kept by the Environmental Protection Dept. 1 copy is submitted to the Office of Ozone Layer Protection Annual report on emissions of greenhouse gases and other substances is submitted to NCEBM

Source: own data of LW 'Bogdanka' SA

Table 7.2. Monitoring of characteristics of stored waste (SW)

No.	Basis for measurement	Measured parameter	Frequency of measurement	Performed by	Location
1.	Extractive waste records	Amount of generated, managed and stored extractive waste	On-going	MCPP and Environmental Protection Dept.	Record kept at MCPP and at the Environmental Protection Dept.
2.	Waste records	Amount of waste managed through sales	Based on needs determined by Warehouse Manager	Internal Logistics Department, Environmental Protection Department	Records kept at Internal Logistics Department and at the Environmental Protection Department
3.	Waste records	Amount of waste for neutralization and use	1 x quarter	Electric Department, Internal Logistics Department, Ventilation Department, Environmental Protection Department	Record kept by Environmental Protection Department
4.	Waste records	Amount of postindustrial waste for management	Based on needs	Internal Logistics Department, Purchasing Department, Environmental Protection Department	Records kept at Internal Logistics Department, Purchasing Dept. and Environmental Protection Dept.
5.	Measurements of stored coal	Determination of stored coal weight (volume x specific weight)	1 x year	Inventory Department	Record kept by Inventory Department
6.	Technical inspections of fire equipment	Functional check of fire equipment: ■ hand equipment ■ internal hydrants ■ external hydrants	1 x quarter 1 x year 1 x year	On-site Rescue Team (ORT) Ł. Energetyka Ł. Energetyka	Record kept by ORT Record kept by ŁE

Table 7.2. Monitoring of characteristics of stored waste (SW) - *continued*

No.	Basis for measurement	Measured parameter	Frequency of measurement	Performed by	Location
7.	Technical inspections of AC equipment	Functional check, maintenance	2 x year	External company (standing contract) and authorized employees of the mine	Records kept at Administrative and Commercial Department and by PM/MN-2
8.	Records of mine water	Volume of water pumped out	1 x day	Shaft Division	Records kept by Shaft Division and Energy Settlement Section
9.	Records of mine water	Volume of mine water used for own needs -surface	1x month	Mechanical Coal Processing Plant and Łęczyńska Energetyka	Records kept at MCPP, ŁE and Environmental Protection Dep. of LW 'Bogdanka' SA
10.	Records of mine water	Volume of mine water used for own needs - underground	1 x year	Mechanical Divisions of the mine in cooperation with a geologist	Record kept by Environmental Protection Dept. of LW 'Bogdanka' SA
11.	Records of potable water consumption and sanitary sewage	Volume of potable water supplied to mine and of sewage discharged	1x month	Łęczyńska Energetyka Spółka z o.o.	Energy Settlement Section of the mine
12.	Energy consumption records	Amount of energy input	1x month	Electrical Division	Record kept by Energy Settlement Section
13.	Fuel consumption records	Amount of fuel input	1 x day	Internal Logistics Department	Records kept at Internal Logistics Department and at Environmental Protection Department

Source: Own data of LW Bogdanka SA courtesy of the Environmental Protection Department

Monitoring of compliance of Group's operation with the provisions of law regarding environmental protection serves as the basis for reporting the impact of Group's activities on individual elements of the environment.

7.2.3. Reporting procedure and contents of environmental reports

Environmental reports are drafted at LW Bogdanka SA by its Environmental Protection Department. This department is responsible for drafting consolidated reports based on interim reports provided by subsidiary companies. Each subsidiary has their own Department of Environmental Management, whose purpose is to measure the level of company's impact on the natural environment on a regular basis and to report it to the Group.

Up until 2014, LW Bogdanka SA published its own reports. In October 2015, L.W. Bogdanka SA was taken over by the energy group Enea. The group has its Ecological Controlling Department, whose scope of tasks, besides the monitoring of impacts on the natural environment, recording costs and outlays on green endeavours, also includes reporting on sustainable development issues. Bogdanka's reports will be included in the consolidated report of Enea Group for the year 2015.

Environmental reports at LW Bogdanka SA are drawn up on a regular basis, each quarter and at year's end. However, as need may be, the Management Board receives occasional reports, which are employed in the processes of making on-going environmental decisions, in connection with, e.g. complaints from local residents concerning cracks in buildings or other real estate damages caused by the extractive industry. Occasional reports are also used by the Management Board to solve various other problems of the company as they arise.

The Management Board of Corporate Group LW Bogdanka SA has not as of yet issued an instruction which would determine the types and scope of environmental reports. Regular reports are drafted in compliance with the provisions of law regarding environmental reporting and with administrative decisions of Voivodeship authorities concerning the use of natural resources by the company. Legal bases relating to measurements and drafting reports have been specified in the foregoing sub-chapter. Occasional reports are drawn up based on one-off orders or instructions of the President of the Management Board and are employed for the internal needs of the company connected with drafting of key documents for the Management Board.

Corporate Group LW Bogdanka SA also prepares interim internal reports on the company's impact on individual elements of the natural environment in connection with the use and treatment of water, emissions to the atmosphere or volume of generated waste. Indicated employees of the Environmental Protection Department are responsible for the interim reports. Annual reports, besides information on the emissions volume, also cover the level of environmental charges, costs of environmental protection as well as material and financial extent of ecological endeavours. The latter forms part of the Investment Outlays Plan of Corporate Group LW Bogdanka SA. Interim reports are later used in the drafting of consolidated annual reports. They are transferred to the team responsible for the preparation and publication on integrated reports. The entire Environmental Protection Department is accountable for accurate

drafting of the consolidated report. Each department employee handles their own reporting area (waste, gas emissions, water), and the final, consolidated version of the report is verified by the head of Department. This collective responsibility for correctness and timeliness of report drafting is reflected in remuneration scheme. Employees of the Environmental Protection Department, besides base salary, receive also discretionary bonuses, established on a monthly basis. This ensures smooth cooperation within the Department.

Environmental reports of GK LW Bogdanka SA, which are part of the sustainable development report, are published on the Group's website and provided to the Warsaw Stock Exchange. They are accessible to various groups of stakeholders: employees interested in the impact of extractive operations on the natural environment who reside in the area, investors who put their capital in company's stock, suppliers, clients, local communities, administrative authorities and other groups interested in the operations and financial performance of the company.

External environmental reports are sent to:

- Marshal of Lublin Voivodeship,
- Voivodeship Inspectorate for Environmental Protection,
- Industrial Development Agency,
- Voivodeship Branches of the Central Statistical Office,
- Ministry of Environmental Protection,
- National Centre for Emissions Balancing and Management (NCEBM).

The following tables 7.3-7.7 present the scope of environmental reporting as covered by the integrated reports of the Corporate Group LW Bogdanka SA.

From the data presented in table 7.3, it follows that LW Bogdanka SA recovers and uses for commercial purposes an increasing volume of mine water. In 2014, 21.5% more water was recovered as compared to the year 2012. The volume of wastewater in reference to 2012 fell by nearly 5%. The mine places great emphasis on the commercial use of water from rock mass dewatering, and, in justified cases, also on the limitation of drainage of Jurassic aquifers. The discharged mine water exceeds the parameters established for water quality class 2 only in terms of chlorides (on average, 943.61 mg/ dm3).[4] Łęczyńska Energetyka is currently constructing a Water Treatment Station (WTS) at Bogdanka. It will be used for treatment of mine water originating from mine dewatering.

Table 7.4 shows the level of greenhouse gas emissions emitted by LW Bogdanka SA and by Łęczyńska Energetyka in the years 2012-2014, associated with the use of fuel oil, natural gas and electric power consumption.

[4] Integrated report 2014 *www.lw.com.pl* (downloaded on 10.01.2016)

Table 7.3. Water demand and volume of discharged wastewater

List	2012	2013	2014
LW 'Bogdanka' SA			
Consumption of potable water from surface water intakes (1000 m^3)	274.6	282.5	283.4
Mine water recovered and used for commercial purposes (1000 m^3)	451	565	548
Łęczyńska Energetyka Sp. z o.o.			
Water abstraction from underground intakes (1000 m^3)	309.0	315.1	301.6
Potable water sales (1000 m^3)	283	289	282.8
Consumption of potable water from surface intakes (re-invoiced by LW Bogdanka SA) (1000m^3)	0.158	0.149	0.486
Mine water recovered and used for commercial purposes (1000 m^3)	13.0	10.1	5.7
Wastewater (mine water) discharged by LW Bogdanka (mechanical wastewater treatment plant - mine water tank) (1000m^3)	5,736.0	5,628.8	5,485.9
Municipal wastewater discharged by Łęczyńska Energetyka Sp. z o.o. (mechanical-biological wastewater treatment, 1000m^3)	174.1	182.0	203.6
Precipitation water discharged by Łęczyńska Energetyka Sp. z o.o. (1000m^3)	373.9	373.9	373.9

Source: company data obtained from the Environmental Protection Department and CSR Report 2012-2013, Corporate Group Lubelski Węgiel *www.lw.com.pl*, Integrated Report 2014, Corporate Group Lubelski Węgiel *www.lw.com.pl* (downloaded on 7.01.2016)

The values presented in the table do not account for the emissions of EcoKLINKIER Construction Ceramics Enterprise, whose tunnel kiln, used for firing ceramics operated on gas fuel, thus being the largest direct source of gas emission to the atmosphere. Production ceased at this plant in 2014, and so both use of high-methane and emissions from gas combustion have been eliminated. This has reduced the direct CO_2 emissions. It should also be added that data for 2012-2013 have been adjusted for comparability purposes and do not account for the levels of emissions of that kiln. Consequently, the key performance indicator for emission efficiency, being the relation of CO_2 emmision to production output measured in extraction and revenue, is stable. In 2014, it stood at, respectively, 21.7 CO_2 kg per extracted tonne of coal and at 122.2 CO_2 kg per PLN 1 thousand in revenues.

Table 7.4. Greenhouse gases emissions and operational efficiency of GK LW Bogdanka

List	2012	2013	2013	Comment
LW 'Bogdanka' SA				
Fuel oil (tonnes)	7,386	7,949	8,527	Estimated based on 'GHG Stationary combustion tool Version 4 (GHG Protocol)'
Natural gas (EcoKLINKIER, Tonnes)	6,922	2,756	No data	Actual data from reports
Consumed electrical energy (tonnes)	162,167	173,326	190,749	Estimated based on 'GHG emissions from purchased electricity (Version 4-2)'
Total (tonnes)	176,475	184,031	199,275	
Łęczyńska Energetyka Sp. z o.o.				
Heat production (tonnes)	50,597	48,583	44,094	Actual data from reports
Consumed electrical energy (tonnes)	2968	2833	2683	Estimated based on 'GHG emissions from purchased electricity (Version 4-2)' (GHG Protocol)
Total ŁE (tonnes)	53,565	51,416	46,777	
Group total	230,040	235,447	246,053	
Direct and indirect CO_2 emissions related to production processes expressed in tonnes of coal (LW Bogdanka, with the exclusion of construction ceramics production (CO_2 tonnes/coal tonnes)	0.0220	0.02172	0.02168	
Total indirect emission and direct CO_2 in relation to revenues (CO_2 tonnes/PLN thousands)	0.1250	0.1239	0.1222	

Source: company data obtained from the CSR Report 2012-2013, Corporate Group Lubelski Węgiel *www.lw.com.pl*, Integrated Report 2014, Corporate Group Lubelski Węgiel *www.lw.com.pl* (downloaded on 7.01.2016)

Table 7.5 presents the level of emissions of NO_x and SO_2 for two core companies in the Corporate Group LW Bogdanka SA.

Table 7.5. NO_x, SO_2 emissions

List	2012	2013	2014
LW 'Bogdanka' SA			
NO_x (kg)	2,511.70	3,117.46	No data
SO_2 (kg)	37,636.36	38,455.88	No data
Łęczyńska Energetyka Sp.z.o.o			
NO_x (kg)	105,247.03	73,882.94	66,930.48
SO_2 (kg)	55,742.74	42,956.72	37,753.28

Source: company data obtained from the CSR Report 2012-2013, Corporate Group Lubelski Węgiel *www.lw.com.pl*, Integrated Report 2014, Corporate Group Lubelski Węgiel *www.lw.com.pl* (downloaded on 7.01.2016)

LW Bogdanka SA has not reduced its levels of emissions of nitrogen oxides and of sulphur dioxide. Łęczyńska Energetyka, on the other hand, has had some considerable achievements in this respect.

The data presented in table 7.6 indicate an improvement in the waste management figures. Over 45% of non-hazardous waste, mainly gangue, was recovered in the last year. The company has also succeeded in the management of nearly 97% of hazardous waste, which also represents a year-on-year improvement. Only 3.7% of it was neutralized. The recovery ratio for non-hazardous waste reached 99.7% at Łęczyńska Energetyka. As regards hazardous waste generated at Łęczyńska Energetyka, 100% of it was neutralized.

In 2014, machines, devices and installations of the waste neutralization plant were commissioned for use. Also in 2014, LW Bogdanka acquired a plot of land of ca. 9 hectares, adjacent to the extractive waste neutralization site. Since the plot is a woodlot, logging will be necessary. The majority of the outlays planned for 2015 will be allocated to purchase of land for subsequent stages of development of the waste neutralization site. The ultimate plans for future use of slag heap provide for its heightening up to 80 m and turning it into a sports and recreation area.

Table 7.6. Waste management (tonnes) at GK LW Bogdanka

List	2012	2013	2014	Dynamics 2012 = 100%
LW 'Bogdanka' SA				
Waste other than hazardous				
Generation (tonnes)	4,762,334.00	5,082,034.88	5,637,385.08	118.4
Recovery (tonnes)	2,574,344.00	1,882,105.71	2,555,627.09	99.3
Recovery, %	54.1	37.0	45.3	83.7
Neutralization	2,187,980.00	3,199,920.00	3,081,757.99	140.8
Neutralization, %	45.9	63.0	54.7	119.2
Hazardous waste				
Generation (tonnes)	78.99	79.61	100.39	127.1
Recovery (tonnes)	75.60	77.20	97.15	128.5
Recovery, %	95.7	97.0	96.8	100.5
Neutralization (tonnes)	3.39	2.41	3.24	95.6
Neutralization, %	4.3	3.0	3.2	74.4
Łęczyńska Energetyka Sp. z o.o.				
Waste other than hazardous				
Generation (tonnes)	6,359.00	6,065.00	5,897.80	92.7
Recovery (tonnes)	6,203.00	6,051.00	5,879.62	94.8
Recovery, %	97.5	99.8	99.7	102.2
Neutralization (tonnes)	156.00	14.86	18.18	11.6
Neutralization, %	2.5	0.2	0.3	12.0
Hazardous waste				
Generation (tonnes)	0.44	0.33	0.53	120.4
Recovery (tonnes)	0.0	0.31	-	0.0
Recovery, %	0.0	92.4	0.0	0.0
Neutralization (tonnes)	0.44	0.03	0.53	120.4
Neutralization, %	100.0	7.6	100.0	100.0

Source: company data obtained from the CSR Report 2012-2013, Corporate Group Lubelski Węgiel *www.lw.com.pl*, Integrated Report 2014, Corporate Group Lubelski Węgiel *www.lw.com.pl* (downloaded on 7.01.2016)

Table 7.7 presents the level of expenses in connection with environmental protection.

Table 7.7. Expenses associated with environmental protection at GK LW Bogdanka SA (PLN thousands)

List	2012	2013	2014	Dynamics 2012 = 100%
LW 'Bogdanka' SA				
Environmental protection costs (recultivation, monitoring)	803.39	609.24	1,138.73	141.7
Costs of management of post-mining waste and of post-industrial disposal	40,459.02	26,892.90	32,948.93	82.4
Costs of surveys, opinions, documentation, designs, etc.	200.05	21.50	69.23	34.6
Environmental charges	408.08	456.26	403.89	99.0
Total	**41,870.54**	**27,979.90**	**34,560.78**	**82.5**
Łęczyńska Energetyka Sp. z o.o.				
Fees for emission of pollutions from the boiler house at Bogdanka	128.89	108.42	93.1	72.2
Fees for emission of pollutions from the boiler house at Zawadów	1.34	1.77	1.79	133.6
Fees for abstraction of underground water and discharge of wastewater at Bogdanka, Nadrybie and Stefanów	61.74	85.79	75.62	122.5
Total	**191.97**	**195.98**	**170.50**	**88.8**

Source:company data obtained from the Environmental Protection Department and CSR Report 2012-2013, Corporate Group Lubelski Węgiel *www.lw.com.pl*, Integrated Report 2014, Corporate GroupLubelski Węgiel *www.lw.com.pl* (downloaded on 7.01.2016)

Expenses incurred for protection of the environment have fallen in 2014 at LW Bogdanka by 18% as compared to 2012. The largest share of expenses, amounting to 95%, represents the costs of waste management. These costs have decreased from PLN 40.5 million in 2012 to just under PLN 33 million in 2014. The costs of environmental protection at LW Bogdanka represented 2.1% of product sales costs in 2014. The costs of environmental protection at Łęczyńska Energetyka are mainly emissions fees and costs of water abstraction. These costs have decreased from PLN 190 thousand in 2012 to PLN 170 thousand in 2014.

7.3. Environmental reporting system at Corporate Group ZGH Bolesław in Bukowno

7.3.1. Brief description of the company and its processes

ZGH Bolesław SA is the holding company in the Corporate Group ZGH Bolesław. The Group produces 154 thousand Mg of zinc annually, accounting for 6% of the overall European output. The Corporate Group is made up of the following subsidiaries:

- Zinc Metallurgy Plant MIASTECZKO ŚLĄSKIE SA with its registered office in Miasteczko Śląskie,
- BOLESŁAW RECYCLING Sp. z o.o. with its registered office in Bukowno,
- BOLTECH Sp. z o.o. with its registered office in Bukowno,
- Physical and Property Protection Agency KARO Sp. z o.o. with its registered office in Bukowno,
- GRADIR MONTENEGRO Sp. z o.o. with its registered office in Czarnogóra.

ZGH Bolesław Group companies have implemented the ISO 9001 system and meet all of its requirements; they also pursue the mission of being an eco-friendly company on many various planes.

Research on environmental reporting has been conducted at the holding company, ZGH Bolesław SA. This company extracts and processes zinc and lead ores. The SHG Zinc manufactured by the company is listed in the London Metal Exchange. As regards mining production and production of electrolytic zinc, the company is the single largest national producer. The annual ore extraction stands at about 2.4 mln tonnes with an average 3.0% content of Zn and about 1% content of lead. The company produces 80 thousand tonnes of electrolytic zinc, of which 36 thousand is galvanizing zinc alloys. Moreover, the enterprise also manufactures sulphuric acid, dolomite and zinc-lead concentrate with an increased content of silver, which is a product of floating slag from zinc metallurgy. The purpose of producing concentrate is to recover useful metals, mainly silver, zinc and lead. Another commercial side-effect is lead sulphate which, besides lead, contains considerable amounts of silver. Extraction of Zn-Pb ores, and their further processing at all production stages is inseparably connected to environmental impacts.

7.3.2. Impact of ZGH BOLESŁAW SA on the natural environment

Mining and metallurgy of zinc and lead ores entails processes which pollute the natural environment. ZGH Bolesław continuously pursues a programme aiming to reduce emissions to the environment within the entire chain of its process.

Based on the conducted interviews, according to executives, the current impact level is the lowest achievable, given the existing state of technological advancement and the economic conditions. The currently employed environmental protection technologies

are in line with international standards. This state of affairs is confirmed by the fact that the company has received integrated permits for the smelting process line and for tailings ponds. Intense efforts of ZGH Bolesław SA in the field of improvement of functioning of waste, water and wastewater management have enabled the company to obtain all possible decisions and permits in this scope. The tables below present all the pollution volumes and levels over three years.

Emissions to the atmosphere

As evidenced by data in table 7.8, the emission levels of dust, metals, sulphur dioxide and sulphuric acid are systematically decreasing. The emission levels of metals fell in 2014 by nearly 40% in relation to 2012, by 11% in the case of sulphur dioxide and by 9.5% in the case of sulphuric acid.

Table 7.8. Volumes of dust and gas emissions at ZGH Bolesław SA in the years 2012-2014

Pollution [Mg/y]	**2012**	**2013**	**2014**
Dust, including:	2.31	1.71	1.77
Metals	1.81	1.19	1.12
Sulphur dioxide	418	367.8	370.7
Sulphuric acid	30.6	28	27.7

Source: own elaboration, based on Company data

The total emissions of H_2SO_4 fog, SO_2, CO_2, NO_x and of other significant compounds emitted by ZGH Bolesław SA into the atmosphere by type of compound and volume in the years 2012-2014 are presented in table 7.9.

Table 7.9. Level of emission of dust and gas pollutions

Emission of dust and gas pollutions [tonnes/year]	**2012**	**2013**	**2014**
H_2SO_4 fogs	30.6	28.0	27.7
SO_2	418.0	367.8	370.7
CO_2	240.5	219.3	185.7
NO_x	0.4	0.4	0.3
Dusts, including:	2.31	1.71	1.77
Zn	1.8	1.2	1.1
Pb	0.004	0.004	0.003
Cd	0.0004	0.0004	0.0003

Source: own elaboration, based on Company data

Water originating from the dewatering of the mine is pumped out onto the surface and than abstracted by the Company, which uses a part of it for own technological and sanitary needs. Some of this water, selectively chosen, is used by PWiK Sp. z o.o. in Olkusz for production of drinking water.

Pursuant to the water permits held, the Company discharges the excess of unused water through the Southern Channel, Dąbrówka Channel and Western Channel into Biała Przemsza River. Waters discharged into the Channels are contaminated with various compounds, as illustrated by the data in table 7.10. It must be noted, however, that the introduction of mine and technological water into Biała Przemsza does not induce substantial physical, chemical or biological changes which would disrupt the proper functioning of its aquatic ecosystems.

Table 7.10. Level of contamination of discharged water and wastewater

Dąbrówka Channel							
Year	**Volume of water [m3/min]**	**Suspended solids [mg/dm3]**	**Zn [mg/dm3]**	**Pb [mg/dm3]**	**Cd [mg/dm3]**	**Sulphates [mg/dm3]**	**Chlorides [mg/dm3]**
2012	188.71	24.52	1.342	0.257	0.0190	307	24.52
2013	184.88	20.90	1.671	0.287	0.0744	312	25.33
2014	174.32	26.20	1.450	0.303	0.0279	256	23.83
Southern Channel							
Year	**Volume of water [m3/min]**	**Suspended solids [mg/dm3]**	**Zn [mg/dm3]**	**Pb [mg/dm3]**	**Cd [mg/dm3]**	**Sulphates [mg/dm3]**	**Chlorides [mg/dm3]**
2012	54.57	23.2	1.068	0.178	0.0059	121	18.43
2013	62.66	20.9	1.178	0.172	0.0130	157	21.35
2014	61.61	23.3	1.306	0.293	0.0077	119	20.36
Western Channel							
Year	**Volume of water [m3/min]**	**Suspended solids [mg/dm3]**	**Zn [mg/dm3]**	**Pb [mg/dm3]**	**Cd [mg/dm3]**	**Sulphates [mg/dm3]**	**Chlorides [mg/dm3]**
2012	4.12	17.39	1.047	0.074	0.0306	1267	818.8
2013	3.50	19.70	1.030	0.085	0.0550	1595	797.6
2014	3.53	15.20	1.165	0.249	0.0547	1484	1208.2

Source: own elaboration, based on Company data

Over the researched period, the volume of discharged water and wastewater has fallen significantly (table 7.11). In the year 2014, the volume of water originating from mine dewatering has fallen by 4.3%. This is a result of the fact that deposits are running out and lower ore extraction in consequence.

Table 7.11. Volume of water originating from mine dewatering and its management

Type of water	Unit of measure	2012	2013	2014
Water from mine dewatering	[m^3 thousand/year]	140,371	142,361	136,242
Water used for Company needs	[m^3 thousand/year]	8,745	8,709	8,655
Water used by Water and Sewerage Company (PWiK) in Olkusz	[m^3 thousand/year]	4,742	4,498	4,609

Source: own elaboration, based on Company data

Waste

ZGH Bolesław exerts an environmental impact through generation and storage of waste. The volume and type of industrial waste generated is determined by the type of used technology of Zn-Pb ores enrichment. At Olkusz-Pomorzany mine, where Zn-PB ore is extracted, nearly 60% of waste is the so-called post-floating waste, that is water with crushed rock. It is the main stream of waste generated by the mining and processing operations (1.4-1.5 million tonnes annually), which is placed in tailings ponds, that is the site for neutralization of extractive waste. The majority of waste from the metallurgy operations are slags from zinc hydrometallurgy and sediments from the plant of acid and industrial wastewater treatment plant (a total of ca. 60-70 thousand Mg per year). Industrial waste generated by the metallurgy operations is managed virtually in full within the Corporate Group:[5]

Table 7.12. Volumes of technological waste at ZGH BOLESŁAW SA in the years 2012-2014

Total weight of technological waste per type and methods of management	Unit of measure	2012	2013	2014
Total waste weight, including:	thousands Mg/y	1,544.6	1,505.3	1,546.7
hazardous waste	thousands Mg/y	48.2	56.9	57.4
waste other than hazardous	thousands Mg/y	1,496.4	1,448.4	1,489.3
Total weight of waste by method of management, including:	thousands Mg/y	1,544.6	1,505.3	1,546.7
recovery	thousands Mg/y	1,458.3	1,462.0	1,502.0
stored on the extractive waste neutralization site	thousands Mg/y	86.3	43.3	44.7

Source: own elaboration, based on Company data

[5] Internal Company materials

In 2014, the analyzed company managed 97.1% of waste, and only 2.9% of waste was stored. In comparison, in 2012, 5.6% of waste was stored, which represents a significant improvement in this area.

Environmental Fees

Use of the environment entails environmental fees and fines for exceeding the contamination level allowed by limits and permits. ZGH Bolesław SA do not pay any environmental fines. ZGH Bolesław SA pay current due environmental fees for the introduction of substances to the atmosphere and water, as well as for waste storage, at individually established unit rates, pursuant to the executive provisions to the Environmental Protection Law, Water Law and Act on waste. The amounts of these fees in the years 2012-2014 are illustrated by data in table 7.13.

Table 7.13. Structure of fees paid by ZGH Bolesław SA for the use of the environment in the year 2012-2014.

Type of fee	2012	2013	2014
		[PLN]	
Wastewater discharge	264.510	237.839	428.426
Emissions to the atmosphere	251.954	229.408	240.133
Waste storage	0	0	0
Total [PLN]	516.464	467.247	668.559
Production of electrolytic zinc [Mg/y]	67.189	76.183	80.010
Environmental fee per 1 Mg of Zn [PLN/t]	7.68	6.13	8.35

Source: own elaboration, based on Company data

The amounts of environmental fees are contingent upon the level of environmental contamination, as rates are established on the basis of emission units. Fees for discharge of wastewater increased from 264 thousand in the year 2012 to 428 thousand in 2014.

7.3.3. Monitoring the natural environment condition and reporting contamination levels

Monitoring and reporting in the area of the natural environment, pursuant to the requirements set forth in the sectoral decisions, integrated permits and water permits, is handled by the Environmental Protection and Land Management Department. This processes, in line with the enterprise's specificity, may be divided into two parts: mining and processing, and metallurgy.

Mining and processing part of ZGH Bolesław SA[6]

The scope of monitoring and reporting is determined by:

- permit for dewatering, abstraction and discharge into Baba River of water from dewatering of the mine site,
- permit for dewatering, abstraction and discharge of water from dewatering of the mine site, post-floating water from tailings ponds and treated sanitary sewage,
- instruction on the use of tailings ponds of ZGH Bolesław SA issued by the Małopolska Voivodeship Office in Krakow,
- permit for the processing of waste in the process of recovery at the extractive waste neutralization site and in tailings ponds of ZGH 'Bolesław' SA,
- integrated permit - for the installations of waste recovery with a processing capacity of over 10 t of hazardous waste per day - installation for floating enrichment and filtration of waste from zinc hydrometallurgy at the Mechanical Processing Division 'Olkusz-Pomorzany' of ZGH 'Bolesław' SA,
- decision on waste generation for the Minining and Processing part of ZGH 'Bolesław' SA,
- permit for the processing of waste in the process of recovery at the Mechanical Processing Division 'Olkusz-Pomorzany' of ZGH 'Bolesław' SA,
- permit for the processing of waste in the process of recovery consisting in the use of waste coded 10 05 80 to fill negatively transformed terrain degraded by the mining operations of Open-pit 'Bolesław'.

Monitoring of water and wastewater[7]

Testing the condition and composition of water from mine dewatering, discharged into Baba River, is conducted by the Environmental Protection and Land Management Department of ZGH Bolesław SA. Sampling of water and its delivery to the testing place occurs within the same day. Wastewater quality testing is performed at the Testing Laboratory of ZGH Bolesław SA and at the Testing Laboratory - Centre for Environmental Testing and Control in Katowice.

ZGH Bolesław SA tests the quality of discharged waters from samples collected from wastewater channels at a fixed measurement spot - the representative site for sampling is the initial section of the open part of the Channel.

[6] Elaborated on the basis of Company's internal materials

[7] Elaborated on the basis of Company's internal materials

Analysis samples collected from the channels concern:

- waters from the dewatering of the mine site (shafts: Mieszko and Dąbrówka),
- sludge supernatant discharged through the Post-floatation Channel,
- treated sanitary sewage from the enterprise's treatment plant (SSTP), and
- treated sewage from the City of Olkusz Treatment Plant,
- sewage from the Water Treatment Station of PWiK Olkusz Sp. z o.o.,
- treated sewage from the Laski Treatment Plant.

The testing scope covers:

- pH, suspended solids, sum of chlorides and sulphates, Zn, Pb and Cd at monthly intervals, from mean daily samples; total suspended solids, zinc, lead, cadmium, sulphates, chlorides once every two months,
- Hg, Cu, Ni, Cr, As, V, Ag, Tl, $ChZT_{Cr}$, BZT_5, Tl, Fe, and volatile phenols (phenol index).

Results of quality tests of discharged wastewater and sewage are submitted to the VIEP Krakow and to the Marshal of Małopolska Voivodeship, within 30 days after the end of each quarter.

Noise monitoring

Noise level measurements are conducted at the border of acoustic protection zone, located adjacent to ZGH Bolesław SA. These measurements are conducted at least once every two years. The measurements are conducted pursuant to reference methodology, by an appropriately accredited external company.

Monitoring of generated, recovered and neutralized waste

Qualitative and quantitative records of waste is conducted with the use waste record cards and waste transfer cards as well as forms designed for drafting and submission of consolidated records of waste data, pursuant to the relevant waste regulations. These records are maintained by the Environmental Protection and Land Use Department.

The amount of waste transferred to ponds is controlled on the basis of monthly mass balance sheet of ores, concentrate and waste. This balance sheet is drawn up by MPD 'Olkusz-Pomorzany' of ZGH Bolesław SA.

Monitoring of precipitation

Measurement of precipitation volumes – is conducted at the waste neutralization site, once a day. Measurement results are recorded in a so-called report book. At the end of each month, the average monthly precipitation is calculated and compared against mean monthly precipitation recorded at the meteorological station representative for the location of the extractive waste neutralization site. Measurements are carried out by tailings ponds employees.

Monitoring of sludge supernatant and excess water

The measurement of sludge supernatant and excess water discharged through the Post-floatation Channel is conducted with the use of rectangular spillway mounted in the channel. Measurement and recording of the water column above the bottom part of the spillway is conducted once every shift by an employee of the Mechanical Processing Division 'Olkusz-Pomorzany'.

Qquality testing of the waters discharged from the plant and from the tailings ponds is carried out by the Environmental Protection and Land Management Department in Dąbrówka Channel and in Post-floatation Channel:

- once a month to test: pH, specific conductance of electrolytes, Zn, Pb, Cd, SO_4, Cl, ChZT, BZT_5 - in Dąbrówka Channel and in Post-floatation Channel,
- one a quarter to test: Hg, Cu, As, Cr, Ni, V, Ag, phenols, BZT_5 – in the Post-floatation Channel.

Monitoring of indicative substances and parameters in underground waters

Testing of indicative substances and parameters in underground waters entails analysis of composition and level of the waters. Monitoring of underground waters is conducted by the Geological Measurements Department and by the Environmental Protection and Land Management Department.

Frequency and scope of measurements:

- underground water table – measured once a quarter,
- quality of underground water in observation wells - tested once a quarter for: pH, specific conductance of electrolytes, SO4, Cl, Zn, Pb, Cd, Fe, Mn, Ca, Mg, Na, K, Sr,
- quality of underground water discharged through shafts - tested once a quarter for: suspended solids, pH, Zn, Pb, Cd, SO4 and Cl.

Monitoring of the settling of waste neutralization site surface

The testing of the waste neutralization site surface settling is carried out by the Geological Measurements Division of ZGH Bolesław SA. Once a year.

Monitoring of tailings ponds embankments

The height of tailings ponds embankments is measured against three reference points located on the southern side of the ponds and against the benchmark located on the northern side of the ponds. Measurements are carried out periodically, depending on the needs, as the embankments are heightened, by the Geological Measurements Division of ZGH Bolesław SA.

Monitoring of air quality

Dust deposition measurements are conducted by the Environmental Protection and Land Use Departments at three measurement sites located in the vicinity of tailings ponds.

The measurements are carried out once a month, and the testing scope covers: organic matter, non-organic matter, Zn, Pb, Cd, Mn, SO_4, pH.

Monitoring of technological processes

It is conducted in line with the dedicated technological instructions. It is carried out by the Production and Auxiliary Divisions of the Mining and Processing Technological Line of ZGH Bolesław SA.

The above measurement results are recorded and kept by the Environmental Protection and Land Management Department at ZGH Bolesław SA. This data is applied in drafting the reports required by the law, as well as made available to oversight authorities.

Metallurgy part of ZGH Bolesław SA[8]

The scope of monitoring and reporting is determined by:

- the integrated permit - for the installation of electrolytic zinc production issued by the Małopolska Voivode; the integrated permit - for the installation of deep dechlorination, defluorization and leaching of raw zinc oxide, issued by the Marshal of Małopolska Voivodeship,
- permit for dewatering, abstraction and discharge of treated wastewater to Biała Przemsza River through the Western Channel and Warwas watercourse.

Monitoring of emissions into the atmosphere

Measurements of emissions introduced into the atmosphere as a result of technological processes is conducted at:

- Sulphuric Acid Plant: sulphuric acid and sulphur dioxide – once a quarter,
- Zinc Electrolysis Division: dust from induction furnaces – twice a year,
- Leaching Plant: sulphuric acid – twice a year.

Measurements of dust and gas emissions are conducted at ZGH 'Bolesław' SA by company Eko-Norm Sp. z o.o Katowice. Chemical analysis of dusts is carried out by the Śląskie Centrum Ochrony Pracy Sp. z o.o. (Silesian Center of Work Protection) in Katowice. Results of the dust and gas emissions measurements are submitted within 30 days from the end of each quarter to the VIEP Krakow and to the Marshal of Małopolska Voivodeship.

[8] Elaborated on the basis of Company's internal materials

Monitoring of the amount of abstracted water

Abstraction of water from the dewatering of the mine site through a deep water intake located in the shaft pipe of the decommissioned shaft Mieczysław (Bukowno commune) for technological needs of the smelting production line – on-going measurements and recording of the amount of water pumped out through this intake is conducted on he basis of the exsiting system of flow meters mounted in dewatering and distribution pipelines. Data is recorded by the enterprise's energy and mechanical employees.

Monitoring of wastewater

The monitoring of condition and composition of wastewater is conducted by the Environmental Protection and Land Management Department of ZGH Bolesław SA. Samples of wastewater are collected for analysis from the outlet channel of the enterprise's industrial wastewater treatment plant. The quality of wastewater is tested at the Testing Laboratory of ZGH Bolesław SA and at the Center for Environmental Testing and Control Sp. z o.o. in Katowice.

ZGH Bolesław SA is obliged to meet the quality parameters of discharged wastewater regarding the following indicators: pH, suspended solids, SO4 and Cl, Zn, Pb, Cd, F, $ChZT_{Cr}$, BZT_5, Hg, Cu, Ni, Cr, As, V, Ag, Tl, volatile phenols.

Results of quality tests of discharged wastewater and sewage are submitted within 30 days after the end of each quarter to the VIEP Krakow and to the Marshal of Małopolska Voivodeship.

Noise monitoring

Noise level measurements are conducted at the border of acoustic protection zone, located just adjacent to ZGH Bolesław SA. These measurements are conducted at least once every two years. Measurements are conducted according to the reference methodology by an appropriately accredited external company.

Monitoring of generated, recovered and neutralized waste

Qualitative and quantitative records of waste is conducted with the use waste record cards and waste transfer cards as well as forms designed for drafting and submission of consolidated records of waste data, pursuant to the relevant waste regulations. Conducted by the Environmental Protection and Land Management Department.

Monitoring of technological processes

Monitoring of technological processes is conducted in line with the dedicated technological instructions. It is carried out by the Production and Auxiliary Divisions of the Mining and Processing Technological Line of ZGH Bolesław SA.

The above measurement results are recorded and kept by the Environmental Protection and Land Management Department at ZGH Bolesław SA. The data is applied in drafting the reports required by the law, as well as made available to oversight units.

Table 7.14. Environmental protection reporting

No.	Report symbol	Type of report	Deadline and frequency of reporting	Report addressee
1	OS-1	Report on emission of contaminants to the atmosphere and on the condition of filtering devices	By the end of January of the following year	Central Statistical Office, Warsaw
2	KOBIZE	Report to the national database on emissions of greenhouse gases and other substances	By the end of February of the following year	National Centre for Emissions Balancing and Management (KOBiZE) - Warsaw
3		Report on the atmospheric emissions measurements	30 days after end of each quarter	VIEP; Marshal of the Małopolskie Voivodeship
4		Report providing information on volumes and types of gases or dusts introduced into the atmosphere, data based on which the volumes are determined and information on the amount of fees due	By the end of March of the following year	VIEP; Marshal of the Małopolska Voivodeship
5	PRTR (*Pollutant Release and Transfer Register)*	Report on the European Pollutant Release and Transfer Register	By the end of March of the following year	CIEP, Warsaw
6	OS-3	Report on water and wastewater management and on pollutant loads	By the end of January of the following year	Central Statistical Office, Warsaw
7		Report on quality measurements of discharged water and wastewater (Channels: Southern, Dąbrówka and Western)	30 days after the end of each quarter	VIEP; Marshal of the Małopolska Voivodeship
8		Report on the measurements of quality of discharged water and wastewater (Southern and Dąbrówka Channels)	For 6 month of the current year	Polish Angling Association in Katowice
9		Fees for water and wastewater discharge to surface water reservoirs	By the end of March of the following year	VIEP; Marshal of the Małopolska Voivodeship
10	OS-6	Report on waste (with the exception of municipal waste)	By the end of January of the following year	Central Statistical Office, Warsaw
11	OS-3	Report on the weight of packaging exported abroad	By the end of March of the following year	Marshal of the Małopolska Voivodeship

Table 7.14. Environmental protection reporting - *continued*

No.	Report symbol	Type of report	Deadline and frequency of reporting	Report addressee
12	OS-1	Data for recovery organization which recovers packaging waste on behalf of ZGH Bolesław SA	By 20.01 of the following year	TOM Organizacja Odzysku Opakowań SA - Szczecin
13	Table 8.3	Mining waste management at mining enterprises subject to the control of the District Mining Office in Krakow	By the end of January of the following year	OUG Kraków
14		Consolidated waste report (generation, recovery, neutralization)	By the end of March of the following year	VIEP; Marshal of the Małopolska Voivodeship
15		Report on the operation of the extractive waste neutralization site - post-floatation waste tailings pond	By the end of March of the following year	VIEP; Marshal of the Małopolska Voivodeship
16		Report containing information on waste placed in the waste landfill and the amount of fees due	By the end of March of the following year	VIEP; Marshal of Małopolska Voivodeship; Gmina Bolesław
17	OS-29/K	Questionnaire on current costs incurred on environmental protection	In case the company is randomly selected for the report	Central Statistical Office, Warsaw
18		Report containing a consolidated set of information regarding use of the environment and the amount of fees due	By the end of March of the following year	VIEP; Marshal of the Małopolskie Voivodeship;
19		Measurement of noise emitted to the environment	Once every two years	VIEP; Marshal of the Małopolskie Voivodeship
20		Information on products containing asbestos	By the end of January of the following year	Marshal of the Małopolskie Voivodeship
21		Management Board Report on Company operation for the given calendar year (one of the chapters - Environmental Protection at the Company)	By the end of 1st quarter of the following year	Supervisory Board of ZGH Bolesław SA
22		The Management Board's consolidated report on the operation of Corporate Group ZGH Bolesław SA for the given calendar year (one of the chapters - Environmental protection)	By the end of 1st quarter of the following year	Supervisory Board of ZGH Bolesław SA

Source: own elaboration, based on information received from the Company

As follows from the data in tables 7.14, companies draw up and provide, according to the instructions, a number of reports to the Voivodeship Inspectorate of Environmental Protection, Central Inspectorate of Environmental Protection in Warsaw, Marshal of Lublin Voivodeship, communal authorities competent for the territory the of company's operation and to other institutions interested in the level of company's impact on the natural environment.

7.4. Integrated reporting pursuant to the GRI standard illustrated by the example of LOTOS Group

7.4.1. Brief description of the corporate group

LOTOS Group is an oil enterprise, whose main areas of operations are the extraction and processing of crude oil, as well as wholesale and retail sales of petroleum products. In total, the concern extracts ca. 28 thousand equivalent barrels of crude oil daily. LOTOS Group handles exploration for and production of crude oil through its subsidiary companies, that is coporate group LOTOS Petrobaltic SA, LOTOS Exploration and Production Norge AS (North and Norwegian Seas) and LOTOS Geonafta (Lithuania). The group's refinery processes 10.5 million tonnes of crude oil annually. LOTOS is the producer and supplier (to LOTOS petrol stations) of, among others, unleaded gasoline, diesel oil, fuel oil for heating purposes, aviation fuel. The company also specializes in the production and sale of lubricant oils and bitumens, products for the rail industry and car cosmetics and car chemistry, or other products, such as liquid sulphur[9]

The development directions of corporate group up until 2020 entail the following objectives:

- to further optimize the management model to achieve top efficiency,
- by 2020, to have access to extractable and confirmed resources of hydrocarbons at a level of ca. 330 million oil-equivalent barrels (BOE),
- to increase extraction up to ca. 100 thousand BOE/day (equivalent to 5 million tonnes of crude oil annually),
- to maintain at least 30% share in domestic fuel market,
- to maintain sales at a level exceeding the refinery's fuel production capacity by 15%,
- to secure at least 10% share in the domestic retail market,
- to further improve the economic efficiency of processing raw materials to ensure optimum utilisation of assets,
- to strive for the optimization of refinery's energy economy by expanding links to other energy systems.

[9] *http://www.lotos.pl/* (accessed on 16.03.2016)

The key operational objectives of LOTOS Group - in the economic, environmental and social areas - are as follows:

- management of human resources,
- protection of health and occupational safety,
- protection of the natural environment and sustainable management of organization's resources,
- security of the energy sector,
- quality of production and products,
- market relations,
- ethics and corporate misconduct prevention,
- corporate governance,
- social relations,
- communication with stakeholders.

The LOTOS Group sees the integration of social, environmental and economic objectives of the group as an opportunity to maximize the creation of shared value for shareholders, other stakeholders and the society as a whole. Activities of this type are determined also by the specificity of the industry and allow for identification, prevention and mitigation of the possible negative effects of company's core operations.

7.4.2. Impact of LOTOS Group on the natural environment

The operations of LOTOS Group impact the natural environment in a host of obvious ways. Part of its operations (mainly extractive and refining) require permits and licenses (e.g. corporate group LOTOS Petrobaltic holds 2 exploration licenses and 4 licenses for the exploration and identification of mineral deposits in the Baltic Sea, and LOTOS Norge - 23 licenses for the exploration and extraction of crude oil in the North Sea and Norwegian Sea. LOTOS Group considers emission of pollutants to the atmosphere, generation of waste, use of water and discharge of wastewater as the areas of highest significance.

The most critical chemical compound is carbon dioxide (CO_2). Table 7.15 illustrates CO_2 emissions at LOTOS Group according to the type of emission.

Table 7.15. Type of CO_2 emission at LOTOS Group - emission [thousands of tonnes/year]

Type of emission	2012	2013	2014
Direct	1,979	1,689	1,820
Indirect	400	373	411
Total	2,379	2,062	2,231

Source: LOTOS Group integrated report

The volume of emissions reported by LOTOS Group (refining operations) for the year 2014 is considerably higher than in 2013. The reason behind it is the month-long repair shutdown during the first half of 2013. For the years 2013-2020, the corporate group obtained annual allowance limits entailing average annual emissions at a level of 1.435 thousand tonnes. This means that the LOTOS Group will purchase CO_2 allowance limits from other entities, under the EU Emissions Trading System (EU ETS). It is, therefore, considered a key and sensitive element in the appraisal of company's environmental performance. CO_2 emissions are also a key item in the group's environmental budget.

The most significant sources of CO_2 are:

Direct emission	Indirect emission
■ burning fuel oil and other fuels in the energy systems, steam boilers and crane engines in the operation of rigs of the LOTOS Group Petrobaltic (extractive section) ■ refining operations of the LOTOS Group	■ purchase and consumption of electrical energy

As regards the operations of the LOTOS Petrobaltic group - natural gas originating from under the Baltic Sea does not contain any chemical compounds or substances that could cause emission of greenhouse gases during combustion, other than CO_2. Methane, which is a component of the fuel gas, is burnt up and thus not emitted into the atmosphere. Other products of gas separation do not contain greenhouse gases, and their use by end-users does not lead to emission of gases other than CO_2. Emission volumes are determined based on the measurement of used fuels, feedstock, as well as hydrocarbons sent to flare stacks, in reference to the relevant emission indicators, calculated on the basis of conducted laboratory analyses or reference figures. Emissions of gases produced in the course of exploration and extraction activities are not regulated by either Polish or international law, and therefore are not subject to mandatory monitoring.

The direct environmental effects disclosed by the group concern:

- types of CO_2 emissions in total and broken down into main units,
- emission volumes of other pollutants, such as SO2, Nox, VOC (volatile organic compounds), dust, also with account for their origins,
- direct energy consumption by primary energy source, by place of origin,
- amount of discharge - amount of flare gas,
- raw materials and consumables by weight and volume,
- total volume of wastewater by origin, with particular emphasis on formation water and water generated in the production process,

- total abstraction of freshwater by sources and processes consuming large quantities of water,
- total recycled water and total volume of treated water and wastewater by their quality and destination
- quantity of generated waste and methods of waste management.

Besides the direct effects, the group, pursuant to GRI guidelines, reports also the indirect environmental impacts. They concern, among others:

- transportation services performed by and for the group,
- offered products.

The activities taken up by the LOTOS Group aimed to reduce the impact of road transportation of fuel products on the environment, irrespective of the legal requirements, include:

- developing safety requirements for delivery sites,
- defining safe loading, unloading and transport procedures for fuels and performing regular inspections to ensure they are complied with,
- setting emergency response rules,
- supervision of third-party vehicles for compliance with technical requirements,
- supervision over selection and training of staff responsible for transport of products.

In respect of products, both gasolines and diesel oils manufactured by the refinery in Gdańsk, feature sulphur content substantially below the legal threshold. The average annual sulphur content in motor gasolines and diesel oils is 3.3 ppm and 6.2 ppm, respectively, both considerably below the required maximum of 10 ppm. This results in substantially lower sulphur dioxide emissions into the atmosphere. Another long used method of mitigating the environmental impact of fuels is the use of biocomponents, which can be considered a renewable energy source, and therefore limit the impact of fuel combustion on the environment.

Initiatives focused on reducing the group's indirect effect on the natural environment also entail bitumens, oils and other groups of products. The LOTOS Group is undertaking a host of initiatives regarding the natural environment. Among others, it develops sets of best practices and regularly tests its safety procedures.

Environmental protection expenditures

The Corporate Group reports costs and expenditures related to environmental protection. The sum of these costs represents just a small fraction of overall group's costs, yet in total, it is a considerable amount. Environmental protection expenditures have been increasing at the Group over the years.

Table 7.16. Costs and expenditures related to environmental management

Item	Costs and expenditures [PLN thousands]		
	2012	2013	2014
LOTOS Group (refinery)			
Costs			
Costs related to environmental management	3,143	2,137	2,852
Expenditures on environmental protection	23,555	22,336	22,569
Financing of pro-environmental efforts of third-party institutions	525	509	544
Outlays			
Pro-environmental investments	67,606	63,012	16,040
Investments on property, plant and equipment	141,913	202,314	134,572
LOTOS Group			
Costs			
Costs related to environmental management	4,729	4,695	4,442
Expenditures on environmental protection	26,716	28,336	33,254
Financing of pro-environmental efforts of third-party institutions	547	509	544
Environmental insurance*	105	194	0
Outlays			
Pro-environmental investments	75,515	66,348	17,665
Investments on property, plant and equipment	814,264	1,130,446	980,174

* Environmental insurance premiums are paid at the LOTOS Group level. The structure of the insurance contract in force in 2014 does not allow to explicitly determine the part of the insurance premium paid for the environmental protection cover. Therefore, costs related to environmental insurance are not reported for 2014.

Source: Integrated report of the LOTOS Group

Table 7.17. Environmental expenditures by pollution

Item	Spending [PLN thousands]		
	2012	**2013**	**2014**
LOTOS Group (refinery)			
Emissions to the atmosphere	2,980	1,256	1,265
Water abstraction	140	162	150
Wastewater discharge	298	316	333
Waste storage	0	0	0
Total	**3,418**	**1,734**	**1,748**
LOTOS Group			
Emissions to the atmosphere	3,218	1,651	1,622
Water abstraction	173	240	220
Wastewater discharge	388	511	537
Waste storage	0	0	0
Total	**3,779**	**2,402**	**2,379**

Source: Integrated report of the LOTOS Group

Environmental expenditures concern mainly emissions of pollutants into the air. Much lower figures concern water abstraction and discharged wastewater. The listed elements are of key importance in reporting.

7.4.3. Reporting at LOTOS Group

The Corporate Croup views corporate social responsibility as an element of the main management stream and of perfecting the organization. LOTOS Group has been externally reporting its activities within this scope, and since 2008, it has pursued its strategic goals with social responsibility in mind. The present analysis covers the 'LOTOS Group Corporate Social Responsibility Strategy for the years 2012-2015'. Its overriding objective was to support the organization in the achievement of goals stemming from the business strategy by optimum use of resources and competences of the organization to create economic and social value with benefits for the company and its surroundings. The purpose of the adoption of an integrated form of presenting group performance has been to enable stakeholders to conduct a complex assessment of the group's involvement in sustainable development issues within a given year.

The annual report complies with:

- the IFRS (International Financial Reporting Standards), as regards financial reporting,
- and as regards non-financial reporting, with:
  - Global Reporting Initiative (version G3.1. of GRI along with the Oil and Gas Sector Supplement, Level A+1)
  - United Nations Global Compact,
  - recommendations of the Directive 2014/95/UE of the European Parliament and Council, dated 22 October 2014, as regards disclosure of non-financial and diversity information by certain large undertakings and groups,
  - guidelines of the International Integrated Reporting Committee (IIRC).

In analyzing the structure and scope of LOTOS Group report, it is easy to notice that it indeed has the form of an integrated report.[10] The basic form of the report's presentation is an Internet website, thanks to which the report may be kept as concise as posible. Moreover, the website is interactive. The subsequent subpages are linked, which makes it much easier to navigate through such complex collection of data. In general, it may be stated that the on-line format satisfies the five principles of drafting an integrated report[11]:

- strategic direction,
- access to information,
- orientation on the future,
- accounting for the opinion of stakeholders,
- conciseness, reliability and relevance of information.

The 2014 Annual Report accounts for 87 performance indicators of GRI G3.1, along with the oil and gas sector supplement. Their list, as well as descriptions of their position in the report and a list of entities in the LOTOS Group which report performance in this scope, are presented in table 7.18.

[10] Cf: Walińska E., Bek-Gaik B., Gad J., Rymkiewicz B., Sprawozdawczość przedsiębiorstwa jako narzędzie komunikacji z otoczeniem. Wymiar finansowy i niefinansowy, Wyd. UŁ, Łódź 2015, p. 24.

[11] Cf: The International IR Framework, p. 7.

Table 7.18. GRI performance indicators reported by companies in the LOTOS Group

GRI aspects	Reported GRI indicators in 2014	Position in report	Subsidiaries
Products and services	■ Initiatives to reduce the impact of products and services on the environment, and the scope of reduction of this impact	■ Results and prospects	L. Asfalt, L. Kolej, L. Oil, L. Paliwa, L. Petrobaltic
	■ Percentage of materials and packaging reclaimed from products sold by category	■ GRI and UN Global Compact Content Index	L. Asfalt, L. Oil, L. Paliwa
Transport	■ Significant impact on the natural environment exerted by the transportation of products and other goods and materials used by the organization in its operation, and transportation of employees	■ Results and prospects	L. Asfalt, L. Kolej, L. Oil, L. Paliwa, L. Petrobaltic (corporate group)
Customer health and safety	■ Life cycle stages in which health and safety impacts of products and services are assessed for improvement, and percentage of significant products and services categories subject to such procedures	■ Results and prospects	L. Asfalt, L. Kolej, L. Oil, L. Paliwa
Process safety	■ Number of threats to process safety, by business activity	■ Risks and opportunities	L. Asfalt, L. Kolej, L. Oil, L. Paliwa, L. Petrobaltic
Labelling of products and services	■ Type of information about products and services required pursuant to procedures and percentage of significant products and services subject to such information requirements	■ 2013 Integrated Annual Report/ Value growth strategy/ Relationship capital / Value chain	L. Asfalt, L. Kolej, L. Oil, L. Paliwa
	■ Practices related to customer satisfaction, including results of surveys measuring customer satisfaction	■ Results and prospects	
Marketing communication	■ Programs for adherence to laws, standards, and voluntary codes related to marketing communications, including advertising, promotion, and sponsorship	■ Results and prospects	L. Oil, L. Paliwa
	■ Total number of incidents of non-compliance with regulations and voluntary codes concerning marketing communications, including advertising, promotion, and sponsorship by type of outcomes	■ GRI and UN Global Compact Content Index	L. Asfalt, L. Kolej, L. Oil, L. Paliwa
Customer privacy	■ Total number of substantiated complaints regarding breaches of customer privacy and losses of customer data	■ GRI and UN Global Compact Content Index	L. Asfalt, L. Kolej, L. Oil, L. Paliwa,

Table 7.18. GRI performance indicators reported by companies in the LOTOS Group - *continued*

GRI aspects	Reported GRI indicators in 2014	Position in report	Subsidiaries
Compliance	■ Total number of incidents of non-compliance with regulations and voluntary codes concerning health and safety impacts of products and services during their life cycle, by type of outcomes	■ GRI and UN Global Compact Content Index	L. Asfalt, L. Oil, L. Paliwa, L. Kolej
	■ Total number of incidents of non-compliance with regulations and voluntary codes concerning product and service information and labelling, by type of outcomes	■ GRI and UN Global Compact Content Index	
	■ Monetary value of significant fines for noncompliance with laws and regulations concerning the provision and use of products and services	■ GRI and UN Global Compact Content Index	
Biodiversity	■ Location and size of land owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	■ Results and prospects	L. Asfalt, L. Oil, L. Paliwa, L. Petrobaltic
	■ Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas	■ Results and prospects	
	■ Habitats protected or restored	■ Results and prospects	
	■ Strategies, current actions, and future plans for managing impacts on biodiversity	■ Results and prospects	
	■ Number and percentage of significant operating sites in which biodiversity risk has been assessed and monitored	■ GRI and UN Global Compact Content Index	
Emissions, wastewater, waste	■ Total direct and indirect greenhouse gas emissions by weight	■ Results and prospects	L. Petrobaltic (corporate group)
	■ Other significant indirect greenhouse gas emissions by weight	■ Results and prospects	
	■ Initiatives to reduce greenhouse gas emissions and reductions achieved	■ Results and prospects	
	■ Emissions of ozone-depleting substances by weight	■ Results and prospects	
	■ NOx, SOx, and other significant air emissions by type and weight	■ Results and prospects	
	■ Total wastewater discharge by quality and destination	■ Results and prospects	

Table 7.18. GRI performance indicators reported by companies in the LOTOS Group - *continued*

GRI aspects	Reported GRI indicators in 2014	Position in report	Subsidiaries
Emissions, wastewater, waste - *continued*	■ Total weight of waste by type and disposal method	■ Results and prospects	L. Petrobaltic (corporate group)
	■ Total number and volume of significant spills	■ Results and prospects	
	■ Volume and disposal method of formation water and water generated in production processes	■ Results and prospects	
	■ Amount of drilling waste (drill mud and cuttings) and strategies for treatment and disposal	■ Results and prospects	
Indirect economic impacts	■ Identification and description of significant indirect economic impacts, including the extent of impacts	■ Results and prospects	L. Asfalt, L. Kolej, L. Oil, L. Paliwa, L. Petrobaltic, L. Geonafta
Local community	■ Number of sites that have been decommissioned and sites that are in the process of being decommissioned	■ GRI and UN Global Compact Content Index	L. Petrobaltic (corporate group)
Resources	■ Volume and type of estimated proved reserves and production	■ Results and prospects	L. Petrobaltic (corporate group)
Raw materials and consumables	■ Used raw materials/consumables by weight and volume	■ Results and prospects	L. Petrobaltic (corporate group)
Energy	■ Direct energy consumption by primary source	■ Results and prospects	L. Petrobaltic (corporate group)
	■ Indirect energy consumption by primary source	■ Results and prospects	
Water	■ Total water abstraction by source	■ Results and prospects	L. Petrobaltic (corporate group)
	■ Water sources significantly affected by withdrawal of water	■ Results and prospects	
Market position	■ Range of ratios of standard entry level wage by gender compared to local minimum wage at significant locations of operation	■ Results and prospects	L. Asfalt, L. Kolej, L. Oil, L. Paliwa, L. Petrobaltic (corporate group)
	■ Policy, practices, and proportion of spending on locally-based suppliers at significant locations of operation.	■ Results and prospects	
	■ Procedures for local hiring and proportion of senior management hired from the local community at significant locations of operation	■ Results and prospects	

Table 7.18. GRI performance indicators reported by companies in the LOTOS Group - *continued*

GRI aspects	Reported GRI indicators in 2014	Position in report	Subsidiaries
Employment	■ Total workforce by employment type, employment contract, and region, broken down by gender	■ Business strategy and model	L. Asfalt, L. Kolej, L. Oil, L. Petrobaltic (grupa kapitałowa), LOTOS-Air BP Polska
	■ Total number of employees who quit and employee turnover by age group, gender, and region	■ Results and prospects	
	■ Education, training, counselling, prevention, and risk-control programs in place to assist workforce members, their families, or community members regarding serious diseases	■ Results and prospects	
	■ Composition of governance bodies and breakdown of employees per employee category according to gender, age group, minority group membership, and other indicators of diversity	■ Ethics and corporate governance	
	■ Ratio of basic salary and remuneration of women to men by employee category	■ Results and prospects	
	■ Total workforce by employment type, employment contract, and region, broken down by gender	■ Business strategy and model	L. Paliwa
	■ Total number of employees who quit and and employee turnover by age group, gender, and region	■ Results and prospects	
	■ Education, training, counselling, prevention, and risk-control programs in place to assist workforce members, their families, or community members regarding serious diseases	■ Results and prospects	
Human rights	■ Percentage and total number of significant investment agreements and contracts that include clauses incorporating human rights concerns, or that have undergone human rights screening	■ Results and prospects	L. Asfalt, L. Kolej, L. Oil, L. Paliwa, L. Petrobaltic (corporate group)
	■ Percentage of significant suppliers, contractors, and other business partners that have undergone human rights screening, and actions taken	■ Results and prospects	

Source: own elaboration, based on the 2014 Integrated Annual Report of Grupa LOTOS SA

The report structure is broken down into the following chapters:

- Key data 2014,
- Ethics and corporate governance,
- Risks and opportunities,
- Results and prospects,
- Financial information,
- Useful information.

Key data 2014 is a general chapter, presenting basic financial and non-financial data concerning the financial year in question (ex post). Non-financial data disclosed by the enterprise concerns:

- the natural environment: size of pro-environmental investments, total water abstraction and CO_2 emissions,
- community: value of donations for social purposes,
- workforce: number, turnover and LTIF injury index per 1 million hours worked,
- market position: share in the market of fuels, crude oil and natural gas extraction.

This chapter also contains a Letter from the Preisent of the Supervisory Board and Letter from the President of the Management Board summarising the financial year and setting the activities to be taken up for the upcoming years, description of the group's organizational structure. Some of the most important elements of the environmental and social area involve the description of integrated reporting in the LOTOS Group, the report on the independent limited-scope external assurance (PwC) as well as awards and distinctions received for CSR initiatives (among others, the Crystal Laurel of Skills and Competence, 3rd place in the Best Annual Report competition).

Ethics and corporate governance is the second chapter, devoted to values guiding the corporate group. It contains a description of the approach to management, ethics, Corporate Supervision and the roles of the Supervisory Board and Management Board. In this area of social and environmental elements, the group discloses the consolidated list of management system audits, including of the implemented systems ISO 14001, ISO 50001, PN 18001.

Risks and opportunities is the third part, entirely focusing on the approach to corporate risk management and basic risk factors in the management, exploration and extraction, operational, financial and trade segments. The group also identifies a number of risk groups associated with environmental activities (Table 7.19).

Table 7.19. Risk groups associated with environmental activities

Activity	operational segment of the group	Context	Activities
environmental	exploration and production	Risk related to the use of infrastructure	Measures preventing the occurrence of such situations and mitigating their potential consequences
	operational (refinery)	Risk associated with legislative changes	Drafting of application for permit to use EDC Cooperation with the lobby Installation modernizations
	operational and financial (refinery)	Risk associated with CO_2 emission allowance caps	LOTOS Group is at risk of higher costs
	operational (refinery)	Risks associated with the necessity to obtain new permits or revision of conditions of the already held permits	Drafting documentation ahead of time Monitoring the provisions of national and EU laws
	Operational (refinery)	Risks associated with adjustment to new provisions regarding implementation of the the best available techniques (so-called BAT)	Launch of investment process to adjust to the new requirements

Source: own elaboration, based on the 2014 Integrated Annual Report of Grupa LOTOS SA

The listed risk factors associated with the enterprise's activities in the social and environmental area indicate the relevance of this field, on the one hand, while on the other hand, they may translate directly into future costs or, ultimately, on the decision whether to continue operations.

Business strategy and model is a chapter of significance from the perspective of the integrated report and objectives also in the environmental, ecological and economic spheres. It presents a model of the value chain and detailed strategic objectives along with critical success factors. The LOTOS Group's CSR strategy until 2015 has defined the key objectives to be achieved in individual areas of activity:

- In the area of investment in human resources the objective is to ensure availability of highly qualified staff required to successfully implement the business strategy and enhance the corporate culture based on adopted values,
- As regards health and safety improvement, the priority is to increase the awareness and involvement in work safety improvement among the management staff, employees and contractors,
- As regards integration with the local community, the principal goal is to undertake initiatives that help to ensure lasting solutions to social and environmental issues vital to the local communities,
- In the area of management of natural resources in the production process, the group seeks to reduce environmental risk and continually minimize the environmental impact of the group's operations,
- In terms of ethics and the prevention of misconduct, the group seeks to improve management by ensuring ethical conduct and transparency of business processes, as well as by protecting the organization against misconduct,
- The Group's strategic goal with respect to partnership relations with the market environment is to build lasting customer relationships by focusing on understanding customers' needs and ensuring expected product quality and safety,
- As regards energy sector security, the Group's objective is to support initiatives designed to enhance energy sector security in a socially and environmentally responsible manner,
- As regards communication, the Group aims to ensure that communication with employees is timely and appropriate to their various needs. The Group also seeks to build organizational culture based on multi-directional, open communication, including through the development of a system of public consultations within the LOTOS Group.

Employees and the natural environment are regarded as particularly significant areas from the perspective of the business model of the LOTOS Group. The reporting area regarding employees is the total workforce by employment type, employment contract and region and gender. The enterprise also reports key initiatives aiming to ensure the availability of highly qualified staff required to successfully implement the business strategy.

In the area of natural environment, the Group strives for continuous minimization of its environmental footprint. The detailed activities entail:

- modernization of the last, fourth boiler in the CHP plant in order to adapt it to combust natural gas (reduction of emissions),
- the switchover to natural gas as a source of energy and a feedstock in the production of hydrogen has enabled the Group to considerably reduce emissions from the production units and CHP plant,
- further enhancement of the energy management system, in line with ISO 50001,
- appointment of the Energy Efficiency Team, whose responsibilities include implementation of two closely related environmental objectives: improvement of energy efficiency of the interplant pipeline steam heating system (to be achieved in 2015) and reduction of primary energy consumption at the LOTOS Group's refinery,
- continued promotion of awareness of best environmental practices and standards among all LOTOS Group employees as well as local communities.
- imparting a cycle of lectures and seminars, as well as field trips, with a special focus on students and youth,
- meeting standards, including the newly implemented requirements pertaining to the protection of soil and underground water, imposed on the operators of IPPC installations by the Industrial Emissions Directive.

The majority of presented initiatives concern reduction of emissions. This is a critical element. The Group presents here the CO_2 emissions by LOTOS Group in the years 2005-2014, as well as the emissions of main pollutants from LOTOS Group's CHP plant to the air relative to permitted values.

Results and prospects is a key chapter presenting the group's impact on economic, social and environmental factors. Economic elements, for example, entail market share, use of production capacities, regional profit margins, fuels market data, performance of individual segments. Social and environmental elements have been described in the part on sustainable development. It is the largest part presenting the LOTOS Group's performance. It contains nearly all GRI performance indicators reported by companies in the LOTOS Group. This part also covers the Group's environmental footprint (see chapter 7.4.2)

Financial information is the next chapter in the report. The form and scope are typical of financial reports of stock exchange listed companies.

The chapter devoted to useful information is also of interest. It contains the GRI and UN Global Compact Content Index. The index lists all the elements required by the GRI 3.1 standard, along with the oil and gas segment supplement. The table is in fact a guide to the report, helpful in locating significant environmental and social content. It also has links to specific articles presenting more detailed data.

The table also presents some very important data and indicators, such as the monetary value of significant fines for noncompliance with laws and regulations concerning the provision and use of products and services, the total number of incidents of noncompliance with regulations and voluntary codes concerning health and safety impacts of products and services during their life cycle, by type of outcomes, or the percentage of materials and packagings reclaimed from products sold by category.

7.4.4. Conclusions

In summary, the LOTOS Group exerts a significant impact on the natural environment and highly values the social and environmental elements of its operation. The report, in line with the integrated report standard, is a derivative of the business model built upon the mentioned elements.

This Group was one of the first ones to attempt to draw up an integrated report in accordance with best global practices. The report has received numerous awards and it is a model to be followed by others, both as regards theory and practice of integrated reports. It has a strategic direction, thanks to the description of business strategy and model, which are a critical point of the report. Access to information is very broad, as the data provided is detailed and, through its connection with the system of objectives, it refers to both the past and future activities. The presented data is reliable, relevant, and it accounts for the stakeholders' opinions. One outstandingly convenient solution is the GRI and UN Global Compact Content Index, which orders the report content in terms of provided data. It may be concluded that in its current form, the report is an example of a good practice in the sphere of reporting economic, social and environmental effects.

7.5. EMAS environmental reporting compliant with ISO 14001 illustrated with the example of RAFAKO SA

RAFAKO SA is a company established in 1993[12] as a result of privatisation of Fabryka Urządzeń Technicznych (Technical Devices Factory)[13]. It has operated continuously since 1949. Since 1994, it has been listed on the Warsaw Stock Exchange. Currently, since 2011, a subsidiary of PBG Group.

The enterprise is the unquestionable leader in the market of energy boilers and environmental protection devices for the energy sector in Poland and in Europe, as well as an important player worldwide (as the leading global producer of boiler components). Since 2008, it has been an independent producer of complete power generation units

[12] Uniform Statute of RAFAKO Spółka Akcyjna in Racibórz, Chapter V, § 33.

[13] Fabryka Kotłów Rafako ma 60 lat, Nasz Racibórz, 29.09.2010

(for example for Jaworzno III Power Plant - 910 MW[14]). Over the last several years, it has gained the position of Poland's leader in the field of installations for flue gas desulphurization with the wet lime method and semi-dry method. The company is headquartered in Racibórz, where all the design and technological offices are located, along with five production plants and company management. Over the last few years, the company base has expanded to include design offices in Gliwice, Częstochowa and Belgrade. The Electrostatic Precipitators Enterprise has been operating in Pszczyna since 2009 and in the nearby locality of Wyry, production of electrostatic precipitator components has been launched.[15]

The company offer is supplemented by a number of various maintenance services, from diagnostics, through repairs, renovations and supply of replacement parts, to complex modernizations of boilers and boiler paraphernalia. As regards environmental protection, the company designs, performs and completes turn-key installations for flue gas desulphurization, reduction of NOx emissions and dust removal equipment.[16]

7.5.1. Brief description of the company

Rafako SA keenly undertakes social and environmental initiatives. For many years now it has viewed human beings as the most significant element of both the enterprise and the entire ecosystem. In line with this approach, human beings must be oriented on taking responsibility for other people and for the world in which they live and create heritage for future generations.[17] The enterprise's current mission is to actively participate in the modernization and improvement of safety and comfort of everyday life through the development of eco-friendly energy sources.[18]

The sphere of social activities entails sponsorship of sports initiatives. This is in line with the enterprise's value system and the general focus on energy in all forms. The company sponsors the cross country skier, Justyna Kowalczyk, the triathlonist Ewa Bugdoł and it supports and sponsors initiatives such as 'Run to the Olympics' (a series of contests for children and youth) or 'Hussars Poland (WSB University team). Some other local sports initiatives supported by the company include the sponsorship of AZS RAFAKO Racibórz, KS RAFAKO soccer team, mountain biking club RAFAKO MTB Team and individual athletes and teams representing the company at sports events.

As regards activities in connection with pro-ecological measures, RAFAKO SA has held, since 1998, a certificate of environmental management in accordance with ISO 14001. In 2002, the Environmental Management System in accordance with the PN-ISO 14001

[14] A. Roguski, Rafako gotowe do skoku, Parkiet, 26.02.2016

[15] *http://encyklopedia.pwn.pl/haslo/3913853/ideologia.html* (accessed on 09.03.2016)

[16] *http://encyklopedia.pwn.pl/haslo/3913853/ideologia.html* (accessed on 09.03.2016)

[17] Company Profile RAFAKO SA, Wydawnictwo ART, 2001, p. 2.

[18] *http://encyklopedia.pwn.pl/haslo/3913853/ideologia.html* (accessed on 09.03.2016)

standard was integrated with the Quality Management System in accordance with the requirements of PN-EN 9001 standard. [19] True to its outstanding concern for the natural environment, in 2006 the company implemented the requirements of the then binding regulation 761/2001/EC (EMAS) and, in early 2007, it was entered in the National EMAS Register.

7.5.2. EMAS environmental declaration reporting scope[20]

The report submitted by the enterprise within EMAS is in the form of the so-called environmental declaration. Both EMAS and ISO 14001 are based on the same premises. The fundamental difference between EMAS and ISO 14001 is limited to the obligation to publish the environmental declaration and to the approach to legal compliance, as well as a few other minor elements listed in Annex 2 to the regulation, 'Environmental management system requirements and additional issues to be addressed by organizations implementing EMAS'[21]. The purpose of the environmental declaration is to provide the society and other interested parties with environmental information concerning impact on the natural environment and effects of its environmental performance, as well as on continuous enhancements of the organization's environmental performance. It is submitted at first registration, and subsequently every three years.

Information in the environmental declaration covers: [22]

a) a clear and unambiguous description of the organization registering under EMAS and a summary of its activities, products and services and its relationship to any parent organizations as appropriate,
b) the environmental policy and a brief description of the environmental management system of the organization,
c) a description of all the significant direct and indirect environmental aspects which result in significant environmental impacts of the organization and an explanation of the nature of the impacts as related to these aspects (Annex I.2),
d) a description of the environmental objectives and targets in relation to the significant environmental aspects and impacts,

[19] *http://encyklopedia.pwn.pl/haslo/3913853/ideologia.html* (accessed on 09.03.2016)

[20] Developed on the basis of the EMAS RAFAKO SA environmental declaration.

[21] Regulation (EC) No. 1221/2009 of the European Parliament and Council of 25 Novemeber 2009 on the voluntary participation by organizations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC, EU Official Journal L 342/23.

[22] Regulation (EC) No. 1221/2009 of the European Parliament and Council of 25 Novemeber 2009 on the voluntary participation by organizations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC, EU Official Journal L 342/23.

e) a summary of the data available on the performance of the organization against its environmental objectives and targets with respect to its significant environmental impacts. Reporting is to be on the core indicators and on other relevant existing environmental performance indicators as set out in Section C,
f) other factors regarding environmental performance including performance against legal provisions with respect to their significant environmental impacts,
g) a reference to the applicable legal requirements relating to the environment,
h) the name and accreditation or licence number of the environmental verifier and the date of validation.

In the environmental declaration of RAFAKO SA for the year 2015, the description of basic information about the enterprise and of its profile of activities is contained in chapters 1-3. Besides the basic information regarding the company and its products and services, the enterprise has also provided information concerning product and process innovations of ecological character.

The description of the environmental policy and a brief description of the eco-management system is represented by chapters 4-6. The framework of the environmental policy at the company is set by the earlier mentioned Environmental Management System, whose purpose is to continuously minimize the negative influence of operations of RAFAKO SA by way of:

- reducing waste emissions and waste segregation,
- reducing emissions of pollutants into the atmosphere,
- improvement of the quality of wastewater discharged to surface water,
- designing products with account of environmental aspects.

The description of environmental aspects of the enterprise's economic activities is provided by Chapter 7 of RAFAKO's environmental declaration. In order to define the environmental aspects which have or may have a significant influence on the environment, an organization should establish and maintain procedures for the identification of environmental aspects related to its activities, products or services, which it may supervise and influence. The organization should ensure that the significant environmental aspects are taken into account in establishing its environmental objectives.[23] The discussed report is structured so as to identify both direct and indirect impacts of the company's economic operation on the natural environment.

[23] Regulation (EC) No. 1221/2009 of the European Parliament and Council of 25 November 2009 on the voluntary participation by organizations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC, Annex I - A.3.1 and Annex VI, EU Official Journal L 342/23.

Environmental aspects are divided into direct and indirect ones. The direct environmental aspects are related to the operation, products and services of the organization, over which it has direct managerial control. The identified direct environmental aspects include: emission of pollutants into the atmosphere, waste management, discharge of wastewater to surface water and consumption of electrical energy, natural gas and technical gases.

The scope of the disclosed information covers the operation with the mentioned environmental aspect, the type of substances influencing the environment and technical solutions applied by the enterprise in order to reduce this influence over the past years. For example, one of the chief environmental aspects is the emission of pollutants into the atmosphere.

At RAFAKO SA, it is primarily an effect of the boiler house, as well as of certain production aspects, such as shot-blasting, gas and plasma cutting, forming and thermal processing, etc. Emission of pollutants into the atmosphere at RAFAKO SA takes place in both organized and non-organized manners. Organized emission takes place through 24 emitters, of which each has a determined emission cap as determined by the relevant decision. Non-organized emission originates mostly from welding processes. The greatest share in organized emission is represented by emissions from the boiler house. The pollutants emitted into the atmosphere are mostly dust, sulphur dioxide and nitrogen oxides. The boiler house is fitted with five WLM 2.5 boilers and two WLM 1.25 boilers, modernized within the projects carried out in the years 2000-2007.

All the listed direct environmental aspects of the enterprise have been described in a similar way.

Indirect environmental aspects may stem from the organization's relations with third parties, over which the organization applying for registration in EMAS may have a degree of influence. Indirect environmental aspects at RAFAKO SA account for environmental impacts exerted by the offered products and services and in relation to the chosen suppliers. The company's environmental influence through its products and services is reduced by the fact that the offered products have better environmental parameters (lower emissions of SO_2, NOx, dusts).[24] The company designs and implements new technologies within this scope. RAFAKO SA also evaluates its suppliers in terms of the influence of their operations on the environment (legal requirements, contractual provisions, employee trainings).

The evaluation of environmental aspects, both direct and indirect, takes place every year. The individual aspects are ranked on a scale of 1 to 5, where 1 stands for negligible influence and 5 stands for very negative influence. The company regards those which obtained a grade of 3.5 or more, in the process of environmental influence evaluation, to be significant. The company publishes detailed indexes of aspects, along with their relation to tasks and targets.

[24] RAFAKO SA environmental declaration 2015, pp. 12-13.

Chapters 8 to 10 provide a synthesis of environmental objectives of the enterprise. They are broken down into years and relate to direct and indirect environmental aspects. They contain the targets, tasks and achieved or expected outcomes. An example of a target set in relation to direct environmental effects has been presented in Table 7.20.

Table 7.20. Targets and tasks for 2014

No.	Target	Tasks	Achieved outcome
1.	Reduction of emissions of volatile organic compounds into the atmosphere by 20% in the year 2016	Construction by 30.06.2015 of a new paint house equipped with installations reducing volatile organic compounds (VOC) - **significant aspect**	Completion of stage 1 (construction part), contracting of part 2 by the Purchasing Department (technological part)
2.	Reduction of emissions of dust pollutants from the plant boiler house down to 200 mg/m3 To enter into force by 01.01.2016	Modernization of the boiler house dedusting system by 31.12.2015 to ensure the emission of dust pollutants within allowed limits – **significant aspect**	On 23.12.2014, devices and components of the dedusting installation were delivered to RAFAKO SA. The devices are to be installed in the 2nd quarter of 2015
3.	Removal, by 2015, of hazardous materials and removal of the asbestos emissions risk	Replacement of roofings containing asbestos (360 m2) in 2 venues (gas reduction station, gas cylinder warehouse) at RAFAKO SA in Racibórz - **significant aspect**	Performance of this task has been suspended in 2013 pursuant to Order Z/N/01-064 of 02.04.2013. Implementation of savings. Performance postponed until 2015
4.	Reduction of heat losses in production halls by 15%	Modernization of the renovation hall: reconstruction of the roof skylights - replacement of the roofing cover, replacement of glass with polycarbonates in the eastern wall	Roofing cover modernization completed over the Electrical Workshops. Completion of the rest in 2015
5	Improvement of illuminance and reduction of the cost of electric energy needed to illuminate the premises	Modernization of external illumination	In progress. Completion scheduled for 1st quarter of 2015

Source: RAFAKO SA environmental declaration 2015, p. 14

Chapters 10 and 11 contain a description of the environmental performance effects along with environmental performance indicators. It is the largest and most detailed part of the environmental declaration.

Table 7.21. Key environmental performance indicators at RAFAKO SA

Key indicator	Unit	A - annual influence in the area					B - annual performance (t)					R = A / B				
		2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
Energy efficiency																
▪ total direct consumption of coal energy	GJ	92,008	70,161	80,401	78,618	53,583	12,222	11,104	10,536	8,326	9,440	7.5	6.3	7.6	9.4	5.7
▪ total direct consumption of electrical energy	MWh	14,706	13,889	12,167	11,201	12,000	12,222	11,104	10,536	8,326	9,440	1.2	1.3	1.2	1.3	1.3
Effective use of materials																
▪ consumption of materials for production	t	11,336	14,480	9,687	10,396	8,008	12,222	11,104	10,536	8,326	9,440	0.9	1.3	0.9	1.2	0.8
▪ consumption of welding materials	t	189	300	202	135	181	12,222	11,104	10,536	8,326	9,440	0.015	0.027	0.019	0.016	0.019
▪ consumption of paints	t	117	158	134	98	124	12,222	11,104	10,536	8,326	9,440	0.010	0.014	0.013	0.012	0.013
▪ consumption of natural gas	Nm^3	666,187	577,030	514,049	384,711	453,877	12,222	11,104	10,536	8,326	9,440	54.5	52.0	48.8	46.2	48.1
▪ consumption of oxygen	Kg	474,300	464,100	425,268	424,620	504,300	12,222	11,104	10,536	8,326	9,440	38.8	41.8	40.4	51.0	53.4
▪ consumption of argon	Kg	409,620	460,220	442,670	346,280	426,420	12,222	11,104	10,536	8,326	9,440	33.5	41.4	42.0	41.6	45.2
▪ consumption of CO_2	Kg	7,840	11,300	11,760	13,640	9,820	12,222	11,104	10,536	8,326	9,440	0.6	1.0	1.1	1.6	1.0
Water																
▪ consumption of water	m^3	47,190	54,421	47,451	34,528	42,870	12,222	11,104	10,536	8,326	9,440	3.9	4.9	4.5	4.1	4.5
Waste																
▪ amount of generated waste	kg	3,564,113	3,027,724	4,034,982	3,132,988	2,634,101	12,222	11,104	10,536	8,326	9,440	291.6	272.7	383.0	376.3	279.0
▪ amount of generated hazardous waste	kg	26,358	25,643	40,600	44,373	36,346	12,222	11,104	10,536	8,326	9,440	2.2	2.3	3.9	5.3	3.9
▪ amount of generated waste other than hazardous	kg	3,537,755	3,002,081	3,994,382	3,088,615	2,597,755	12,222	11,104	10,536	8,326	9,440	289.5	270.4	379.1	371.0	275.2
Biodiversity																
▪ land use (developed plots)	m^2	180,015	180,015	180,015	180,015	180,015	12,222	11,104	10,536	8,326	9,440	14.7	16.2	17.1	21.6	19.1
Emissions																
▪ CO_2	Kg	14,307,000	11,093,000	13,205,000	11,872,000	8,467,000	12,222	11,104	10,536	8,326	9,440	1,170.6	999.0	1,253.3	1,425.9	896.9
▪ SO_2	Kg	89,000	68,000	78,000	76,000	52,000	12,222	11,104	10,536	8,326	9,440	7.3	6.1	7.4	9.1	5.5
▪ Nox	Kg	26,000	20,000	23,000	22,000	15,000	12,222	11,104	10,536	8,326	9,440	2.1	1.8	2.2	2.6	1.6
▪ solid particlesPM	Kg	12,000	10,000	10,000	10,000	8,000	12,222	11,104	10,536	8,326	9,440	0.98	0.90	0.95	1.20	0.85

Source: RAFAKO SA environmental declaration 2015, p. 14

Key performance indicators are the most significant elements. The indicators should present a thorough evaluation of the environmental performance effects in an organization in a clear and unambiguous way. They should also allow for comparisons of operations effects in time and space, with sectoral, national or regional points of reference or relevant legal requirements. Table 7.24 presents the key environmental indicators.

Key environmental indicators are shared for all types of organizations. They focus on the chief environmental areas.

Column A presents the overall annual influence of the enterprise on the natural environment. Value B is the annual performance. It is the number of tonnes of the final product from the Racibórz plant. As an effect, column C represents the influence that the company exerts on the natural environment to produce a tonne of final product. The key performance indicators in this table do not account for the indicator of renewable energy use, since RAFAKO SA has not consumed any such energy.

The list is complemented with a description of the performance achieved. Fluctuations in the consumption of materials stem mainly from the nature of company's operation, i.e. long production cycles, dependence on atmospheric conditions or new investments.

The declaration also addresses other factors regarding environmental performance. These concern primarily the area and values of emissions allowed by decisions. The mentioned decisions (issued by the Starost) are a reference to the applicable legal requirements relating to the environment. They present a detailed picture of all the elements of operations identified in the direct environmental aspects. The form of presentation of environmental influence is graphs and tables (Table 7.22).

Table 7.22. Example index of hazardous waste

Hazardous waste	Values as per decision from 2007. t	2010	Values as per decision from 2011. t	2011	2012	2013	2014
		t		t	t	t	t
Mineral engine, transmission and lubrication oils	20	6.120	20	7.120	6.900	6.906	3.460
Textiles for wiping, protective clothing	10	5.950	10	5.500	9.836	5.674	7.221
Batteries	5	2.720	8	4.100	5.713	1.820	3.600
Others	-	11.568	-	8.923	18.151	29.973	22.065
Hazardous waste total		**26.358**	**-**	**25.643**	**40.600**	**44.373**	**36.346**

Source: RAFAKO SA environmental declaration 2015, p. 33

Waste management is also the object of presentation of other performance indicators. The total amount of hazardous waste is the key indicator. RAFAKO additionally publishes a detailed list of hazardous waste by type and origin, along with normative amounts (Table 7.22).

The other elements of the presentation are discharge of wastewater to surface water and utility management (coal, electrical energy, natural gas, oxygen, argon, CO_2).

The last part of the declaration is the statement by the environmental verifier concerning verification and validation activities performed. It contains the name and accreditation or licence number of the environmental verifier and the date of validation.

7.5.3. Place of the EMAS environmental declaration within the system of external reporting

Environmental declaration is separate from annual, semi-annual, quarterly or current reports. Data published in the declaration in the case of RAFAKO do not have any equivalents in financial reporting. As regards the scope of disclosure, however, it is one of the reports named by the EU Directive on the harmonization of structure and scope of non-financial information published by enterprises.

As pointed out by J. Nycz - Wróbel, the form of presentation and the scopes of environmental performance indicators naturally differ between entities depending on the type of their operations. However, even in the case of organizations running similar operations, the form of presenting this information may differ in terms of, e.g. number of pages devoted in the declaration for presentation of this information, form of presentation (one table, a number of tables, graphs), measurement units used to present the indicator values (number A and B), time spans, for which the indicators are given. These various differences render the analysis of information regarding environmental performance indicators a very difficult and time-consuming exercise. [25]

7.6. Final remarks

To summarise the consideration on environmental reporting, it must be emphasized that reports are some of the most crucial documents applied in environmental management. The basis of environmental reporting are measurements of the degree to which enterprises' operations influence the various individual elements of the natural environment. Research regarding this degree is conducted either by in-house laboratories and environmental protection departments of by appropriately accredited external companies. Measurement records are kept at the departments which conduct the measurements and at the Environmental Protection Department. Enterprises draw up internal reports which serve as a basis for managerial decisions as well as external reports pursuant to requirements of legal provisions. External reports are drawn up on a regular basis: each month, each quarter or annually. Internal reports are primarily of occasional nature and are drafted in response to the needs of the Management Board.

[25] J. Nycz-Wróbel, Różnice w sposobie prezentowania informacji dotyczących wskaźników efektywności środowiskowej, Humanities and Social Sciences, vol. XIX, no. 21 (3/2014), pp. 173-184.

It should be emphasized that both internal and external reports are interim reports and focus on specific elements of the natural environment. Water contamination level, level of emission of dusts and gases to the atmosphere, level of waste and the degree of its management or the influence of operation on earth surface are all reported separately. Reports are sent to the Voivodeship Inspectorate of Environmental Protection, to the Central Inspectorate of Environmental Protection, to the Voivodeship Marshal, to the Central Statistical Office, to the National Centre for Emissions Balancing and Management and to other institutions interested in the influence exerted by economic entities on the natural environment. Pursuant to the permits, compliance with environmental standards and unit costs connected with emissions, the amounts of environmental fees are established. Those may amount to a considerable part of fixed costs of enterprises' operations.

CHAPTER 8

Cost management with account of sustainable development at Aquanet

8.1. Introductory remarks

Aquanet SA is a water supply and wastewater company serving the Poznań agglomeration, with a population of ca. 800 thousand inhabitants. The tariff regulators as regards water supply and wastewater collection, and at the same time the owners of the enterprise, are local councils competent for the territory of the company's operation.

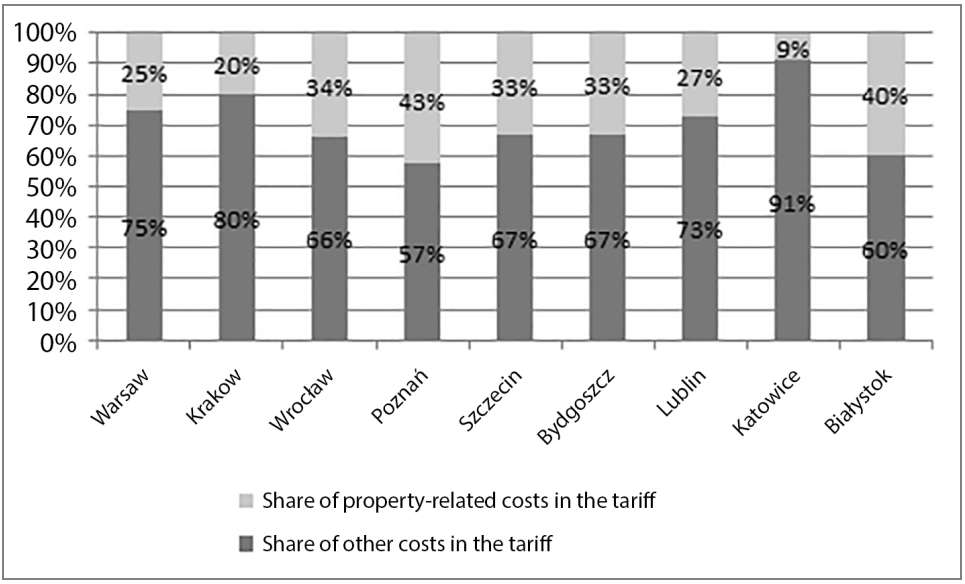
The analyzed enterprise manages its costs strategically, and benchmarking is the main tool used in the shaping of amount and structure of costs in the long run, as regards value creation with account of environmental and social aspects.

The opportunities and determinants for increasing enterprise eco-efficiency in the operational sphere have been presented in the collective work entitled 'Green Controlling and Finance. Theoretical Framework', while the purpose of this chapter is to present the effects of cost management in sustainable development with particular emphasis on environmental aspects at Aquanet.

8.2. Cost management at Aquanet SA

Water supply and wastewater companies are characterized by a high share of fixed costs understood as property-related costs[1]. The share of property-related costs in the water and wastewater tariffs in selected cities of Poland have been presented in graph 8.1.

[1] 'Property-related costs' are understood as costs incurred by an enterprise in association with the manufacture or acquisition of new assets. In the case of water supply and wastewater companies, these 'property-related costs' entail: depreciation costs, real property taxes, fees for installation of infrastructure within road reserves and financial costs related to financing asset acquisition. (Chudziński, 2014)



Graph 8.1. The share of property-related costs in the water and sewerage tariffs in selected cities of Poland in 2014

Source: (E&Y, 2014)

As follows from graph 8.1, the median share of 'property-related costs' in the tariff of the discussed enterprises was 33%. Since 'property-related costs' cannot be influenced directly by the enterprise, increasing efficiency at water and wastewater companies is focused on operational costs, which may at the same time be considered manageable (controllable)[2]. In terms of cost classification, they are the cost elements of: remuneration, social security premiums and other employee benefits, consumption of materials and energy, external services and other costs.

8.3. Effects of operational costs management with account of environmental aspects

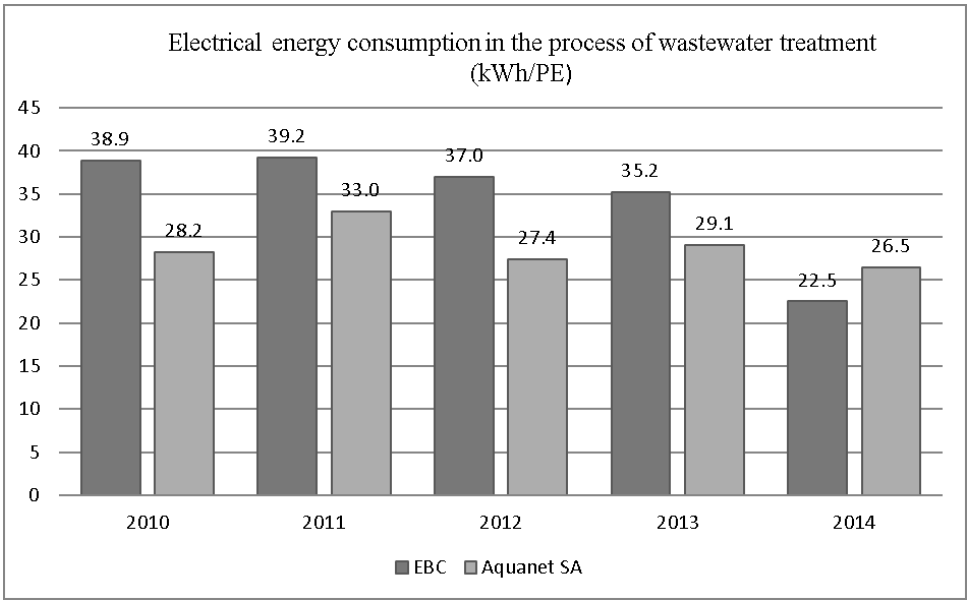
Aquanet, based on the results of benchmarking analyses, has focused on reduction of its costs of electrical energy and costs related to failures removal. Both types of costs are directly related to the environmental aspects of enterprise's operations. And so, costs related to electrical energy consumption are associated with the reduction of greenhouse gas emissions in the process of energy production, while costs of removing mains failures are associated with the costs of lost water[3], consumption of materials necessary to restore the damaged mains network elements, as well as with costs of

[2] Manageable costs are the equivalent of controllable costs within the meaning of accounting.

[3] Costs related to lost water are represented by the distribution loss rate.

electrical energy and fuel necessary to transport materials to failure site. Costs of electrical energy in the process of wastewater treatment are one of the most significant items in this process.

The achieved results as regards energy cost management in the process of sewage treatment are presented in graph 8.2.



Graph 8.2. Electrical energy consumption in the process of wastewater treatment indicator (kWh/pe[4])

Data in graph 8.2 indicate that the indicator of electrical energy consumption in the process of wastewater treatment at Aquanet in the years 2010-2014 was below the average for water and wastewater companies participating in the[5] EBC[6] benchmarking project. It should be added, however, that the performance of enterprises which score best in terms of consumption of electrical energy in the process of wastewater treatment, based on data provided by the EBC project (EBC, 2014), is still significantly better than

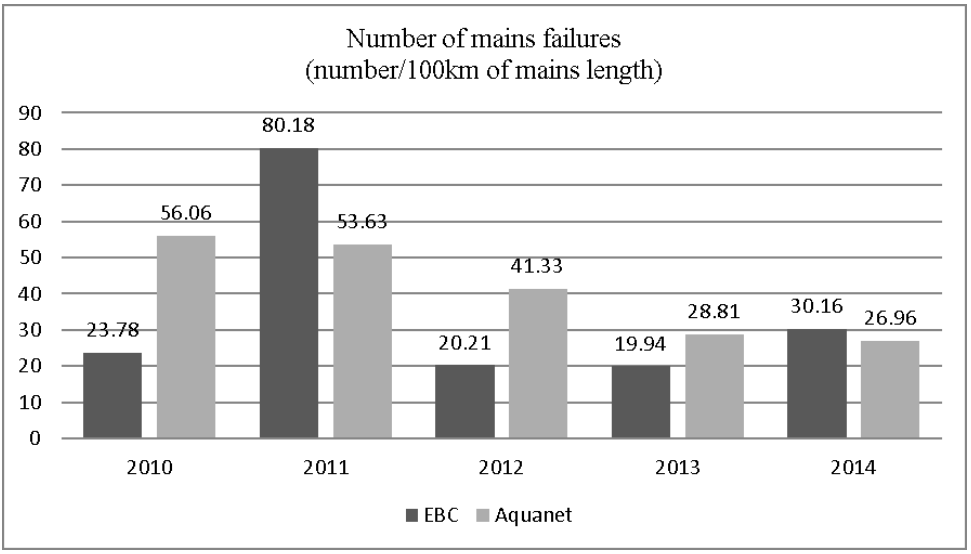
[4] pe - Population Equivalent - is the number expressing the ratio of the sum of the pollution load in wastewater produced during 24 hours by industrial facilities and services to the individual pollution load in household sewage produced by one person in the same time.

[5] A benchmarking project is understood as an organized joint activity of two or more enterprises for the purposes of conducting benchmarking between these enterprises.

[6] EBC – European Benchmarking Cooperation – a non-profit organization established to carry out a benchmarking project for water and wastewater companies. In 2014, 43 water and wastewater enterprises from 17 countries participated in the project, most of them from within the European Union.

that of Aquanet. At the same time, it should be noted that these results do not necessarily reflect only cost management quality, but may rather also stem from the applied technologies.

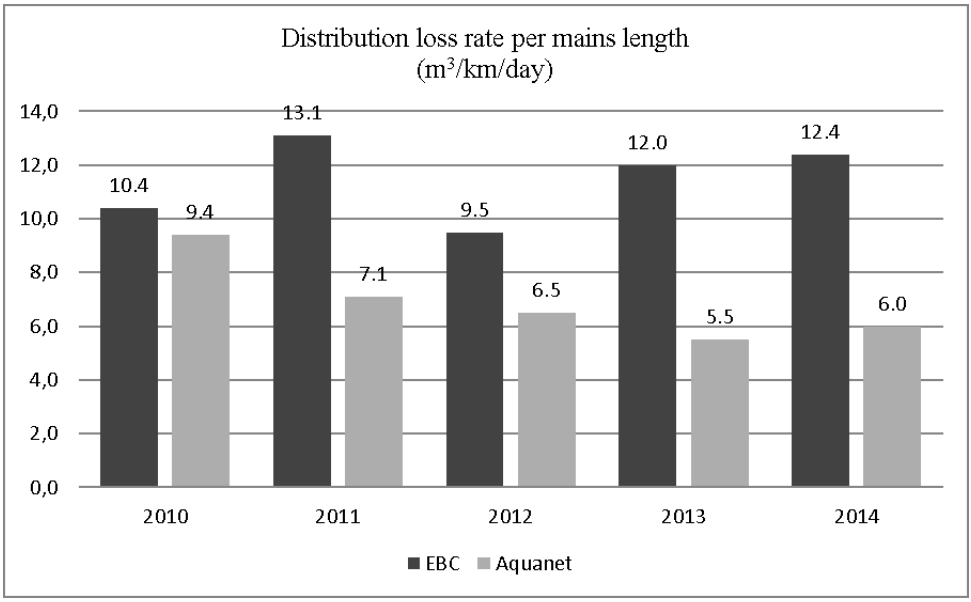
The second cost management area which provides a picture of Aquanet's efficiency with account of environmental aspects is the water network management. The achieved results are reflected by the number of mains failures and by the distribution loss rate in the network. The former of the two figures is presented in graph 8.3.



Graph 8.3. Number of mains failures

In relation to the measure presented in graph 8.3 above, in order to present a reference regarding the increase of eco-efficiency, it is justified to show the distribution loss rate. This figure is shown in graph 8.4.

The analysis of shaping and value of distribution loss rates allows for drawing conclusions regarding the increase of efficiency at the discussed enterprise in the area of water. The first of the effects is related to reduction of water demand. In the researched period, i.e. in the years 2010-2014, the length of the mains network increased from 1778 km to 1945 km. Therefore, given the extension of the mains network and the reduction of the distribution loss rate per mains length from 9.4 m^3/km/day in 2010 to 6.0 m^3/km in 2014, it may be inferred that in 2014 the company saved over 2.4 mln m^3 of water. Directly proportionally to the reduction of distribution losses, also the consumption of electrical energy, required in the process of catchment, production and distribution of water has decreased. Graphs 8.3 and 8.4 indicate similar change dynamics.



Graph 8.4. Distribution loss rate per mains length

The analyzed enterprise has not performed measurements of consumption changes as regards other consumables and raw materials, such as fuel for the vehicles necessary to remove failures, crushed rock, pipes and other fittings or materials related to the restoration of road surface. It may be surmised, however, that their consumption trends align with the trend illustrated in graphs 8.3 and 8.4.

The main reason for the reduction of distribution loss rate in the mains was its regulation and associated zone-specific reduction of mains pressure. The simultaneous decrease of per capita water consumption rate from 103.8 l/resident/day in 2010 down to 100.3 l/resident/day in 2014 further reduced the burden on the natural environment. It must be noted that per capita water consumption rate throughout the area serviced by Aquanet is on average 20% lower than the average individual water consumption at enterprises participating in the EBC project. Such a level of water consumption is determined by the high price burden[7] of the services and by the growing environmental awareness of the society.

Water and wastewater companies in Poland are characterized by a very high share of activated costs, which translates into higher tariffs, and, at the same time, these companies (data based on 3 Polish enterprises participating in the EBC project) perform their services in areas that are less urbanized than the areas of operation of other enterprises participating in the EBC project. This is reflected by the connection density indicator, expressed as the number of connected properties per one kilometre of mains length.

[7] Price burden is understood as the share of bill for water supply and sewage collection in the disposable income of households.

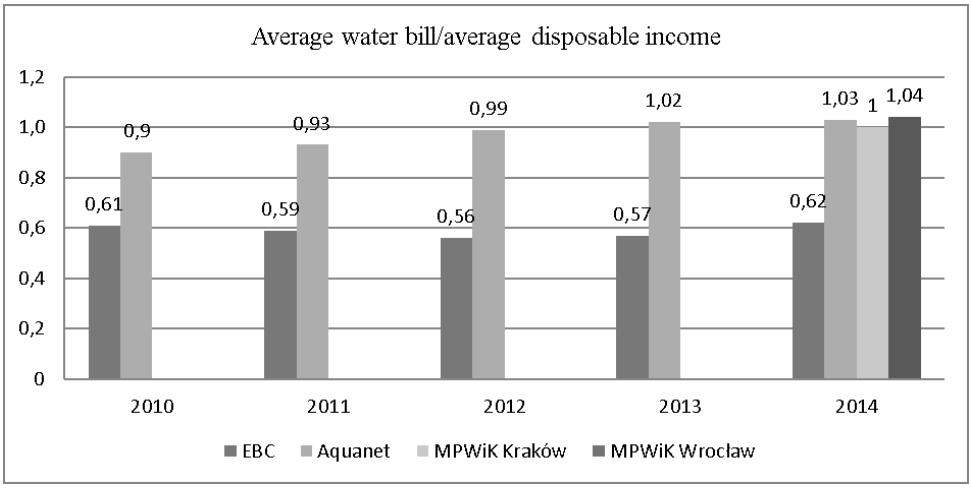
While the average connection density indicator in the EBC project stands at 49 connections/ 1 km of mains length, in the case of Polish enterprises this indicator ranges from 28 to 32 connections/ 1 km of mains length. This fact additionally aggravates the negative tendencies as regards affordability of services.

Another problem in the area of sustainability is the problem of olfactory nuisance in connection with the process of transportation and treatment of wastewater. So far, no universally binding standards have been implemented in this area. Therefore, it is particularly difficult to measure achievements and to draw comparisons between enterprises. For this reason, the number of complaints claiming olfactory nuisance has been adopted as a gauge of progress in this respect. Aquanet, in the course of its odorous substances elimination programme, has implemented a methodology of measuring these substances, but in this case, the number of complaints claiming odour is still used as an element of evaluation. In 2011, the number of complaints per 1000 residents stood at 0.15, in 2012 - at 0.21, to reach 0.04 in 2014. The average value for EBC participants was 0.17 complaints per 1000 residents annually. It is worth mentioning that the performance of the odorous substances elimination programme was connected with the necessity to incur investment outlays of over EUR 10 million, and the problem itself was a result of permitting residential housing development in the direct vicinity of a water treatment plant. The entire amount of investment outlays was incurred by the enterprise, which was reflected in the tariffs for wastewater collection. Despite the reduction of the complaint indicator related to olfactory nuisance, it should not be overlooked that there is not enough data for comparisons between Aquanet and other enterprises to render such exercise representative.

8.4. Tariff burden

Tariff burden is understood as the share of an average bill for provided services in the disposable income of a household. Although the tariffs for water supply are relatively low in Poland in comparison to other EBC project participants, their burden remains the highest. The situation has been illustrated in graph 8.5.

The affordability of water and wastewater services in Polish utility enterprises is varied, but determinants of their functioning currently leave them no choice but to establish charges around the upper limits of tariff burden as set by OECD (4%) or by the US Environmental Protection Agency (US EPA, 2.5%). The burden of a total water and wastewater bill hovers around 2.1% in Poland. This value falls very close to the maximum reference value in the USA.



Graph 8.5. Tariff burden of Polish water and wastewater enterprises in the years 2010-2014

8.5. Final remarks

Strategic cost management at Aquanet SA, primarily with the use of benchmarking, is rendering positive results not only in the economic dimension, but also in the environmental and social ones. Reduced demand for electrical energy and materials is an evident example of accounting for sustainability aspects in the analyzed enterprise.

As shown in this chapter, tariff burden is an important and ongoing problem of Polish water and wastewater enterprises, which, despite positive results in the area of cost management, remains high. Nowadays, it is the shaping of tariffs - and thus an element of the social dimension of sustainable development - that seems like the greatest challenge ahead of water and wastewater enterprises in Poland.

CHAPTER 9

Investment project appraisal with account of environmental and social aspects at Aquanet and Amica

9.1. Introductory remarks

In economic practice, there are many different methods of investment project appraisal that may be employed. This appraisal may be approached from a number of angles. The classic methodology of investment appraisal adopts the shareholder's point of view. Accounting for environmental and social determinants in the analysis of investment opportunities shifts the appraisal perspective to align it with that of the entire society[1].

The purpose of this chapter is to present the practical aspects of employment of various approaches to investment profitability appraisal and various assessment methods in the operations of enterprises such as Aquanet and Amica. The achievement of this goal dictated case studies as the research method of choice, as well as determined the layout of the chapter. First, Aquanet's approach to investment project assessment is characterized. Next, methodological solutions applied at the company in reference to business projects are presented. They are dominated by the employment of financial methods of investment appraisal. What follows is an example of evaluation of social impacts of an investment project carried out by Aquanet. This topic is then elaborated with a description of a possible approach to valuation of social impacts as part of cost-benefit analysis, illustrated with the example of traffic congestion in Poznań. Lastly, the chapter provides a characterization of methodological solutions applied in assessment of investment projects at Amica.

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[1] Different perspectives applied in investment project appraisal, as well as methods employed in the various approaches have been discussed in: [Nowicki 2016]. The classic methods used in the capital budgeting process, adopting the shareholder perspective, such as NPV or IRR, are referred to therein as financial methods of investment appraisal, while the assessment performed from the perspective of the entire society and accounting for various environmental and social aspects is performed with non-financial methods of investment appraisal.

9.2. Approach to investment project appraisal at Aquanet

Aquanet is very active in the process of analysis and performance of investment projects, which is attested to by the fact that in the years 2013-2014, it allocated PLN 473 mln as investment outlays on tasks such as: modernization of the water treatment station in Mosina, hermetization of the Central Wastewater Treatment Plant tanks, construction of a sanitary sewer in Kamionki, protection of the acquifier zone Marlewo, modernization of the wastewater treatment plant in Mosina or the construction of a trunk sewer under Al. Niepodległości in Poznań [Aquanet Investments 2016]. The company has no intention of stopping at the above investments, as it is in the process of completing the largest investment programme in the history of the enterprise [Aquanet 2015d, p. 10] and, moreover, continuous investments are in a way at the core of company's mission - the list of design documentation in progress covers 74 items [Aquanet Investments 2016].

The approach of Aquanet to the appraisal of investment projects carried out by the enterprise could be referred to as rational and deeply rooted in business reality. This is due to the fact that the decision on whether to perform an investment project appraisal and, if the answer is yes, to what extent, is driven by rational premises provided by the analysis of company's operations. From the perspective of the considerations in this chapter, investment projects pursued by the company may be divided into three groups [Aquanet 2016c]:

- investment projects related to the expansion of the water network,
- investment projects related to operations above and beyond the regular operations of this entity, but not related to the expansion of the water network (business projects),
- investment projects with a significant impact on the natural and social environment.

This division is significant owing to the scope of performed investment appraisal analyses, as, in the case of investments related to the expansion of the water network appraisals are not carried out at all; in the case of investment projects above and beyond the regular operations of the entity, such formal profitability analyses are performed for internal needs; whereas in the case of investment projects with a significant impact on the natural and social environment, analysis of this impact is considered.

The reason that the company does not perform any analyses of profitability of investment projects related to the expansion of its network is that expansion is undertaken based on premises other than their feasibility to the company. As regards this type of projects, neither the net present value nor the internal rate of return are known, since no formal profitability analysis is performed. One fitting example of this type of project is connection of a new housing estate to the water network.

As regards other investment projects above and beyond the regular activities of the entity, formal profitability appraisals, focusing on the assessment of financial feasibility[2], are prepared for internal needs. The relevant decision on performance or rejection of an investment project is made based on the outcome of this analysis and the resultant recommendation. For example, investment projects of this type considered in 2015, entailed [Aquanet 2015g]:

- Left-bank Wastewater Treatment Plant (LWTP), bioreactors - replacement of current compressors and blowers with more energy-efficient equipment,
- Water Treatment Station (WTS) Wiśniowa - electrical and heat energy supply (heat pumps, power generation unit, replacement of piping),
- decommissioning of the wastewater treatment plant in Chludowo,
- WTS Mosina - carbon filters washings recirculation,
- construction of a secondary disinfection point on the eastern main in Czapury,
- the option to supply water to Zielątkowo, Golęczewo, Chludowo and Rokietnica from the Poznań Water Network System (PWNS),
- LWTP - replacement of positive displacement pumps with rotary pumps in the sludge recirculation system,
- construction of an installation to transfer post-filtration sludge from WTS Mosina to the Central Wastewater Treatment Plant (CWTP),
- electrical energy supply for the Water Intake Promienko,
- LWTP - construction of a CNG fuelling station.

As regards investment projects with a significant impact on the social and natural environment, the company considers performance of a social and environmental impact analysis, which would represent a case of application of non-financial methods of investment appraisal. In such a situation, analysis results are taken into account in the decision-making process. One example of such a project is the construction of the right-bank trunk sewer II in Poznań.

However, even in the case of investment projects for which a formal analysis of social or environmental impacts is not performed, Aquanet naturally, owing to the profile of its operations, puts great emphasis on environmental and social issues. Moreover, the financing of a considerable share of investment outlays incurred by the company from the EU Cohesion Fund under the Infrastructure and Environment Programme [Aquanet and EU 2016] forces the company to achieve the so-called environmental effect [Aquanet 2015d, p. 49]. Therefore, environmental and social aspects are significant determinants in Aquanet's making of investment decisions

[2] The division of investment profitability appraisal methods into financial and non-financial methods is discussed in [Nowicki 2016].

[Lasocka-Gomuła 2008, pp. 8-11]. What follows are examples of investment projects with a significant impact on the social and natural environment [Aquanet 2015d, pp. 37-49]:

- modernization of the Wastewater Treatment Plant in Mosina (pro-social and pro-environmental project),
- modernization of the Water Treatment Station in Mosina (pro-social and pro-environmental project),
- construction of a combined trunk sewer with storm overflow beneath Al. Niepodległości in Poznań (project of significant social impact - an important communication route in downtown Poznań, under custody of the Municipal Office of Heritage Preservation, archeological works),
- modernization of the sanitary sewer in the Sołacz residential estate in Poznań (pro-environmental project),
- new building of the 100-years-old 'Garbary' Wastewater Pumping Plant (strict custody of the Municipal Office of Heritage Preservation),
- construction of the Junikowo trunk sewer (pro-social project with a plan of compensation planting),
- construction of the Umultowo-Suchy Las trunk sewer (pro-social project),
- works on sludge management and generation of energy from biogas (pro-environmental project),
- introduction of co-digestion to company's plants (pro-environmental project),
- odour reduction programme at Aquanet SA (among others, hermetization of sedimentation tanks at wastewater treatment plants - pro-environmental and pro-social project).

9.3. Business investment project appraisal at Aquanet

Financial appraisal of profitability is performed for investment projects that go beyond and above the regular operations of the entity, other than expansion of the water network. The financial methods of investment appraisal employed at the company include [Aquanet 2015a, 2015b, 2015c, 2015e, 2015f]:

- net present value (NPV),
- internal rate of return (IRR),
- net present value ratio (NPVR),
- payback period (PP),
- discounted payback period (DPP).

The modified internal rate of return, or MIRR, is not calculated in the analyses, and neither is the modified net present value, MNPV.

Moreover, the appraisal based on the net present value is performed according to two methodological approaches:

- in reference to the detailed forecast period only,
- in reference to the detailed forecast period with account of the investment value after the lapse of this period (residual value).

Investment appraisal reports at Aquanet typically involve the following elements [Aquanet 2015a, 2015b, 2015c, 2015e, 2015f]:

- definition of the purpose and object of analysis,
- discussion of analyzed variants,
- indication of data sources,
- description of the main technological and financial assumptions,
- description of the material scope and of investment outlays,
- presentation of a time schedule,
- discussion of changes in revenues and costs (savings, additional operating costs),
- presentation of analysis results,
- summary, which is finalized with a recommendation as to the advisability of the analyzed investment endeavour.

Although this is not expressly stated in Aquanet's investment appraisal reports, the analysis of financial models of individual investment endeavours shows that the detailed method of formulating discounted cash flows is the free cash flow to equity, or FCFE method[3], although in the case of investment projects for the analytical needs of which the company assumed financing from equity, without the use of debt, these cash flows are identical to those under FCFF method.

The analysis of Aquanet's investment appraisal reports indicates that the main decision-making criteria are the net present value and the discounted payback period. This, and especially the focus on NPV in the decision-making process, is in line with the most universal recommendations on making investment decisions to be found in the literature of the subject.

[3] This is one of the two most frequent methods of defining cash flows subject to discounting, besides the free cash flow to firm (FCFF) method. More on this subject: [Nowicki 2016].

9.4. Example of evaluation of social impacts of an investment project at Aquanet

The project of construction of the right-bank trunk sewer II in Poznań, executed in 2010-2012, may be used as a fitting example of an investment project with a significant impact on the social environment. At the pre-investment stage, Aquanet, fully aware of the significant repercussions of this project for the social environment, decided to perform an analysis of its social impacts. This task was commissioned to an external company, and the final outcome was the report drafted in June 2008 [Grontmij 2008].

This endeavour was to consist in the construction of a 4 km-long sanitary trunk sewer with a diameter of 1.8-2.4 m, in the section from Główna Street to the intersection of Milczańska and Bolesława Krzywoustego Streets in Poznań, as well as of a 1 km-long storm water trunk sewer with a diameter of 1.2 m beneath Berdychowo Street. The purpose of this project was to relieve the sewer system in the right-bank part of Poznań. It was planned that, upon completion, the right-bank trunk sewer II would deliver wastewater to the Central Wastewater Treatment Plant, among others from the areas of Łacina, Szczepankowo, Starołęka, Żegrze and Swarzędz, while the storm water trunk sewer was to act as an outlet for precipitation from the non-connected part of Łacina and regions of Rataje [Right-bank trunk sewer II 2016]. Owing to the considerable size of the trunk sewer and its planned location, the endeavour was to cause road nuisances to the residents, even though a part of works was to take place by way of microtunneling, it was not possible to avoid the open-excavation method as well [Right-bank trunk sewer II 2016].

Considering the above, the aim of the analysis was to determine the lower limit of social costs [Grontmij 2008, p. 4]. The objective associated with this and resulting from the analysis, was to find justification for signing a time incentive contract with the contractor, which would contain a financial incentive for the quickest possible completion of works, thus leading to reduction of the social costs [Grontmij 2008, pp. 17, 19].

The performed social costs analysis was based on the methodology of cost-benefit analysis (CBA). The analysis used the notion of willingness to pay (WTP) and methods of monetization of unquantified external effects such as [Grontmij 2008, s. 4-5][4]:

- travel cost method,
- benefit transfer method,
- productivity analysis method.

[4] The fundamentals of cost-benefit analysis have been discussed, among others, in: [Nowicki 2016]. The work also provides a brief characterization of the key methods of monetization of unquantified external effects in the economic appraisal of investment projects [Nowicki 2016].

The analysis provides an explanation on why the following methods were not applied [Grontmij 2008, p. 5]:

- hedonic pricing,
- contingent valuation method.

In the course of the performed analysis, it was possible to quantify the following social costs [Grontmij 2008, pp. 10-14]:

- increased costs of vehicle operation,
- cost of the increased commute time in passenger and freight car transportation,
- costs of the increased emission of exhaust fume components,
- cost of the decreased recreational attractiveness of the Malta Lake and its surroundings,
- potential cost of losing the chance to host the World Rowing Cup.

Besides, the analysis lists social costs which could not be successfully expressed as a monetary value, such as [Grontmij 2008, p. 14]:

- cost of the increased time of tram commutes,
- delay or suspension of other investment projects located close to the construction site of the right-bank trunk sewer II,
- temporary loss of value of real estate in the vicinity of the trunk sewer construction,
- costs of accidents,
- difficulties with traffic coordination/telematics systems of the City of Poznań,
- slowdown of car traffic on streets in the vicinity of the trunk sewer construction,
- decrease in numbers of customers of the nearby Galeria Malta shopping mall in the investment period.

From the methodological perspective, it should be noted that the authors of the analysis have limited themselves to the valuation of social costs of the considered investment project in search for a justification of proposing a time incentive contract to the investment contractor. The analysis points out possible social benefits of the investment, but no attempts were made to quantify them [Grontmij 2008, pp. 17-18]. As a result, it was not possible to perform a global assessment of the social costs and benefits generated by the investment endeavour in question. What must be considered a shortcoming of the performed valuation is the fact that the social costs account was provided in nominal values for the expected period of works estimated at 24 months, and so the time value of money was not accounted for. The analysis did not employ any of the non-financial methods of investment appraisal, which are the crowing of the economic analysis conducted under the CBA, such as:

- economic net present value (ENPV),
- economic rate of return (ERR),
- benefit-cost ratio (B/C ratio)[5].

This is, in a way, understandable, given the clearly stated objective of the report [Grontmij 2008, p. 19], as well as the absence of profitability appraisal in the financial analysis, which should normally be the basis for the economic analysis, accounting for social benefits and costs. Without a financial model of the investment project, without quantification of social benefits and without the application of the discount account, the calculation of ENPV, ERR or of the B/C ratio was not possible.

9.5. Costs of traffic congestion in Poznań as an example of valuation of certain social impacts under cost-benefit analysis

The cost-benefit analysis (CBA) accounts for various social and environmental aspects of investments that are not incorporated into the traditional financial profitability analysis[6]. External effects of investments include, among others, increase/decrease of noise, of pollution emissions, of waste, deterioration/improvement of health or of the living conditions of the local community, etc. Since these are non-tangible effects, it is difficult to measure them.

One of the examples of measuring social aspects and their evaluation is the opportunity cost analysis, which is the method presented below on the basis of traffic congestion analysis in Poznań, as provided in the 'Report on Traffic Congestion in 7 Largest Cities of Poland. Warsaw, Wrocław, Kraków, Poznań, Gdańsk, Łódź, Katowice' by Deloitte and Targeo.pl [2016]. This is due to the fact that time spent in traffic jams is not used productively, and it could be devoted to work or rest depending on individual preferences.

Table 9.1. presents information on monthly delays caused by rush-hour traffic congestion in Poznań in the years 2011-2015 [hours:mins]

Table 9.1. Monthly delays caused by rush-hour traffic congestion in Poznań in the years 2011-2015 [hours:mins]

List	2015	2014	2013	2012	2011
Morning rush-hour	03:41	03:11	03:29	03:19	04:03
Afternoon rush-hour	04:28	03:43	03:54	04:17	04:09
Total	**08:09**	**06:54**	**07:23**	**07:36**	**08:12**

Source: [Deloitte and Targeo.pl 2016, p. 19]

[5] Non-financial methods of investment appraisal have been described in: [Nowicki 2016].

[6] More on the topic of cost-benefit analysis in: [Nowicki 2016].

As indicated by the data in the table, the average monthly delay caused by traffic congestion[7] in Poznań in 2011-2015 amounted to over 7.5 hours, with the highest values in the extreme years of the analysis (over 8 hours), and the lowest in the year 2014 (below 7 hours). The delay is distributed fairly equally between the morning and afternoon rush hours. The latter was responsible for, on average, 54% of the total delay in the analyzed period.

Delay data, in turn, was used to determine the costs of traffic congestion in Poznań, based on the following assumptions [Deloitte and Targeo.pl 2016, pp. 52, 53]:

- the opportunity cost for the time lost in traffic congestion is work for remuneration, whose value has been set at the amount of average monthly gross remuneration in the entrepreneurial sector in Poznań (commuters from the suburban areas were not taken into account),
- only working persons were accounted for; the number of workers commuting daily to/from work (individual transportation) was estimated on the basis of information from Municipal Transit Authorities on the use of public transportation in the city,
- the drivers use a statistical vehicle, that is Fiat Panda with a 1.1 l gasoline engine,
- the price of gasoline applied in the model is the annual average for the entire country.

The costs of traffic congestion in Poznań are presented in table 9.2.

Table 9.2. Costs of traffic congestion in Poznań[8]

Year	Annual cost of traffic congestion per driver (in PLN)	Annual cost of traffic congestion per driver as a percentage of average monthly gross remuneration in the city	Annual cost of traffic congestion in Poznań for the economy (in PLN million)
2015	3,350	74%	456
2014	2,848	64%	367
2013	3,055	71%	390
2011	3,050	74%	383
2010	3,236	80%	398
Average:	**3,108**	**73%**	**399**

Source: own elaboration on the basis of [Deloitte and Targeo.pl 2016, pp. 53, 55, 56]

[7] Delay caused by traffic congestion is calculated against free flow without any difficulties, outside of the rush hours [Deloitte and Targeo.pl 2016, p. 5].

[8] Calculations for 2012 were not available.

As follows from the data presented in the table, the average annual cost of traffic congestion per driver in Poznań amounts to ca. PLN 3,108, which represents nearly 73% of the average monthly gross remuneration in this city. The highest costs were observed in the extreme years of the analysis, especially in 2010, when they reached PLN 3,236, i.e. 80% of the average gross monthly remuneration at that time. The lowest values were observed in 2014, amounting to PLN 2,848 and 64% respectively.

The presented calculation also accounts for the annual cost of traffic congestion in Poznań for the Polish economy, which is the difference between costs to drivers (fuel and opportunity cost) and revenues to the state budget (from VAT and fuel excise tax) [Deloitte and Targeo.pl 2016, p. 56]. The average cost on account of this in the analyzed period amounted to nearly PLN 400 million, and it turned out to be the highest in 2015 (PLN 456 million).

According to the authors of this research [Deloitte and Targeo.pl 2016, p. 53], 'data and assumptions adopted in our calculations seem conservative, it is therefore highly probable that the economic assessment of opportunity costs of traffic congestion in cities is underestimated'.

This happens for a number of reasons. Firstly, the costs of traffic congestion in this model only adopt conservative premises, such as those regarding the statistical vehicle driven by working persons or the price of gasoline, which has been established at the annual average for the entire country (while in cities these prices can be higher), and, secondly, the model does not incorporate environmental and health costs (such as exhaust fumes, noise, etc.).

9.6. Investment project appraisal at Amica group

Owing to the group's dynamic development, it pursues a number of investment projects in various areas of activity. The performed investment projects may be divided into the following categories [Amica 2016]:

- investments to increase production capacities and to further the development of new technologies,
- investments oriented on product development,
- IT projects,
- other investments.

The company has a formalized system for investment project appraisal, which is a part of the project management system [Amica 2016]. Each year, the corporate group drafts a development plan which defines the expected investment outlays. Annual development plans must be in line with the longterm investment plan drawn up in the course of setting the company strategy. At that stage, the proposed investment projects

were scored according to criteria such as project profitability, level of strategy support, risk level [Amica 2016]. Prior to the performance of a project, it is thoroughly assessed in terms of profitability. A report from this appraisal is performed for the internal decision-making needs of the company. Investment appraisal at Amica focuses on the financial issues, and the primary methods applied by the company are net present value (NPV) and the internal rate of return (IRR) [Amica 2016]. Non-financial methods of investment appraisal are not employed at the company [Amica 2016].

The cohesion and consistency of Amica, reflected in the compliance between declared objectives of company's operations and the applied methods of investment appraisal, are noteworthy. Since the declared objective of the company is to create value for shareholders [Rutkowski 2015, p. 1; Amica 2015, p. 18, 27-28; Amica 2014, p. 8], the most fitting method of investment appraisal is the one based on net present value, a measure fully aligned with thus formulated objective of operations.

The fact that Amica considers the financial methods of investment appraisal to be decisive, does not mean that it does not account for environmental and social aspects in its investment operations. These are incorporated on many different planes. For example, in the case of investment projects aiming to increase production capacities and to further the development of new technologies, the company places great emphasis on ensuring that the implemented technology will reduce energy intensity of production [Amica 2016]. Moreover, investment projects oriented on product development focus also on endeavours meant to increase their energy class [Amica 2016]. Also under projects not related to the core operations of the company, Amica takes the mentioned aspects into consideration, as was the case with, for example, the construction of a workplace kindergarten [Amica 2016].

9.7. Final remarks

The purpose of this chapter was to present the practical aspects of employment of various approaches to investment profitability appraisal as well as various appraisal methods. The objective was fulfilled by the case study analysis of solutions applied at Aquanet and Amica.

The objective of the chapter has been reached. It characterizes the approach of Aquanet to investment project appraisal, indicating the rationale behind performing investment appraisal only for those projects, which the company will decide to pursue or reject based on the outcome of the analysis. The chapter also shed light on methodological solutions applied at Aquanet in relation to business projects, where the investment decisions are made based on the outcome of financial methods of investment appraisal. As regards environmental and social aspects accounted for in investment appraisal, the chapter presented an example of Aquanet's social impacts evaluation of

an investment consisting in the construction of the right-bank trunk sewer II in Poznań. This topic was then elaborated with a description of a possible approach to valuation of social impacts as part of cost-benefit analysis, illustrated with the example of traffic congestion in Poznań. Lastly, the chapter provided a characterization of methodological solutions applied in the appraisal of investment projects at Amica. Each of the subchapters offered a commentary on the practical solutions employed at the discussed enterprises.

CHAPTER 10

Risk and cost of capital accounting for social and environmental issues at Aquanet, Amica, B. Braun and PKN Orlen

10.1. Introductory remarks

The chapter 'Risk Analysis and Cost of Capital Estimation in Sustainable Business' in the book entitled 'Green Controlling and Finance. Theoretical Framework' [Mikołajewicz and Nowicki 2016a], defines various types of risk associated with running a business. It presents possible approaches of accounting for risk in the enterprise analysis or in the investment appraisal, as well as discusses the basic methods of risk analysis. It also addresses the chief methods of estimating the cost of capital and the factors that influence this cost, thus building a model approach to this issue on the basis of prevailing theories. In a synthetic manner, it presents the results of empirical research on the influence of corporate governance, social and environmental issues (ESG) on the cost of capital in an enterprise.

In the present chapter, the primary focus is on the practical aspects of risk management and estimation of the cost of capital at enterprises that follow the model of sustainable development, and the main problems regard:

- identification of key global risks and trends,
- presentation of the risk management system employed at enterprises,
- presentation of approaches and methods applied at enterprises with regard to risk analysis and estimation of the cost of capital.

The above problems are explored as case studies in subsequent sub-chapters.

10.2. Key global risks and trends

Risk management and its mitigation are acquiring growing significance owing to the increasingly volatile market conditions coupled with the scale and reach of enterprises' operations. Effective risk management requires identification of its sources and on-going monitoring.

The Global Risk Report [WEF 2016], drafted by the World Economic Forum (WEF), may prove helpful in identification of the threats.

A global risk is defined as 'an uncertain event or condition that, if it occurs, can cause significant negative impact for several countries or industries within the next 10 years.' [WEF 2016, p. 85.

WEF groups global threats into five major categories, that is economic, environmental, geopolitical, social and technological risks.

In the economic area, the following types of risks have been identified [WEF 2016, p. 85]:

- asset bubble in a major economy,
- deflation in a major economy,
- failure of a major financial mechanism or institution,
- failure/shortfall of critical infrastructure,
- fiscal crises in key economies,
- high structural unemployment or underemployment,
- illicit trade (e.g. illicit financial flow, tax evasion, human trafficking, organized crime, etc.),
- severe energy price shock (increase or decrease),
- unmanageable inflation.

As regards environmental threats, they include such risks as [WEF 2016, p. 85]:

- extreme weather events (e.g. floods, storms, etc.)
- failure of climate-change mitigation and adaptation,
- major biodiversity loss and ecosystem collapse (land or ocean),
- major natural catastrophes (e.g. earthquake, tsunami, volcanic eruption, geomagnetic storms),
- man-made environmental catastrophes (e.g. oil spill, radioactive contamination, etc.).

In the geopolitical aspect, the following risks have been identified [WEF 2016, p. 86]:

- failure of national governance (e.g. failure of rule of law, corruption, political deadlock, etc.),
- interstate conflict with regional consequences,

- large-scale terrorist attacks,
- state collapse or crisis (e.g. civil conflict, military coup, failed states, etc.),
- weapons of mass destruction.

In the social area, the following risks have been identified [WEF 2016, p. 86]:

- failure of urban planning,
- food crises,
- large-scale involuntary migration,
- profound social instability,
- rapid and massive spread of infectious diseases,
- water crises.

In the area of technological threats, notice should be taken of the following risks [WEF 2016, p. 86]:

- adverse consequences of technological advances,
- breakdown of critical information infrastructure and networks,
- large-scale cyberattacks,
- massive incident of data fraud/theft.

An analysis of the 2016 report conclusions [WEF 2016, p. 6] indicates that the significance in the environmental and social categories is on the rise. Risk associated with climate change has been identified as the most important threat in terms of impact, and over the last three years, it has permanently been within the top five. The second place is occupied by the threat of weapons of mass destruction and the third by water crises. The next two positions are taken by the risk of involuntary migration and risk of energy price shocks, respectively.

Most of these types of risks are also pointed out in terms of likelihood of occurrence. And so, the most likely risk according to the report is the risk of involuntary migration, followed by the risk of extreme weather events and climate change, with the risk of interstate conflict and natural catastrophes closing the top five.

Besides the global risks listed above, WEF identifies also key global trends. A trend is defined as 'a long-term pattern that is currently taking place and that could contribute to amplifying global risks and/or altering the relationship between them.' [WEF 2016, p. 87].

WEF lists the following key trends [WEF 2016, p. 87]:

- ageing population,
- changing landscape of international governance,
- climate change,

- environmental degradation,
- growing middle class in emerging economies,
- increasing national sentiment,
- increasing polarization of societies,
- rise of chronic diseases,
- rise of cyber dependency,
- rising geographic mobility,
- rising income and wealth disparity,
- shifts in power (in the state, economy, society),
- urbanization.

Importantly, both the various types of risks and trends, as well as the two groups, overlap and co-exist.

10.3. Integrated enterprise risk management system at PKN Orlen

An increasing number of companies implement solutions for active risk management, through on-going risk monitoring and assessment and through undertaking steps to mitigate its influence on the entity's business.

One example of such approach is the Integrated Enterprise Risk Management System implemented at PKN Orlen. It is one of the key elements supporting achievement of strategic and operational goals of the concern.

The Integrated Enterprise Risk Management System (IERMS) at PKN Orlen consists of [PKN Orlen 2015e]**:**

- Supervisory Board (Audit Committee), which performs an annual assessment of the effectiveness of IERMS, monitors the level of risks affecting achievement of business objectives, provides the General Meeting with an evaluation of the internal control system and of IERMS,
- The Management Board, which oversees the process of enterprise risk management, approves the objectives and principles of risk management and provides the Supervisory Board with comprehensive information about business risks and how they are managed,
- Audit and Enterprise Risk Management Office, which coordinates and supervises the process of enterprise risk management at all levels of organization (it develops policies and procedures for risk management at the corporate level, periodically reports risk assessment results to the Management Board and the Supervisory Board's Audit Committee),

- Management Team, responsible for monitoring, identification, assessment and analysis of risks and implementation of recommendations on the management of each risk under the adopted policies,
- Financial Risk Committee, which manages market risk, credit and liquidity risk and operational risk as well as is responsible for the management policy regarding these risks through development of internal organizational documents and procedures.

The stages of the integrated enterprise risk management at PKN Orlen are presented in figure 10.1.

As follows from figure 10.1, integrated enterprise risk management is an on-going process at PKN Orlen. It entails the identification of individual types of risk, their assessment (gross risk), assessments of controls which leads to risk reassessment (net risk) and the target risk assessment. The completion of these steps in this model is finalized with the development and implementation of remedial action plans and with risk monitoring and reporting.

Fig. 10.1. Stages of integrated enterprise risk management system at PKN Orlen

Source: [PKN Orlen 2015e]

The company has identified the following key risk types [PKN Orlen 2015e]:

- market risk (commodity risk, currency risk and risk associated with changes in interest rates),
- liquidity and credit risk,
- sector risks (fuel consumption, crude processing/feedstock supplies),
- regulatory risks (costs of meeting the obligation to achieve the National Indicative Target[1], CO_2 emission allowances, industrial emissions, 'colour' certificates, mandatory stocks, shale gas, gas market liberalization, new business areas, operational and incidental losses, court and regulatory proceedings, tax, customs and excise duty inspections, risks related to changes in laws and regulations, risks related to the stability and security of IT systems and data).

10.4. Risk analysis and cost of capital at Aquanet, Amica and B. Braun

Investment appraisal analyses drafted by Aquanet for the internal decision-making needs regarding investment projects above and beyond the regular operations of the entity, other than projects to expand the water network, apply certain risk analysis methods.

It should be noted that risk in the analysis is expressed as risk-adjusted discount rate [Aquanet 2015a, 2015b, 2015c, 2015e, 2015f]. This is in line with the universal practice within this scope, which stems from certain difficulties with the application of the certainty equivalent method[2].

In its investment appraisal analyses, Aquanet uses two basic risk analysis methods[3]: scenario analysis and qualitative risk analysis. Scenario analysis entails preparation of a number of alternative models, varied in terms of the detailed forecast period length, various technological solutions or different operating times of analyzed devices [Aquanet 2015a, 2015b, 2015c, 2015e, 2015f].

Figure 10.2 presents an example of considerations of various alternatives under the scenario analysis method.

[1] National Indicative Target (NIT) specifies the minimum share of biocomponents and other renewable fuels, calculated according to their calorific value, in the total amount of fuels and liquid biofuels consumed during a calendar year in the transport sector.

[2] Among risk apprehension methods in the analysis, the certainty equivalent (CE) method or the risk-adjusted discount rate (RADR) method can be employed. A description of these methods may be found in: [Mikołajewicz and Nowicki 2016a].

[3] The basic risk analysis methods include sensitivity analysis, threshold value analysis, scenario analysis and Monte Carlo simulation analysis [Mikołajewicz and Nowicki 2016a].

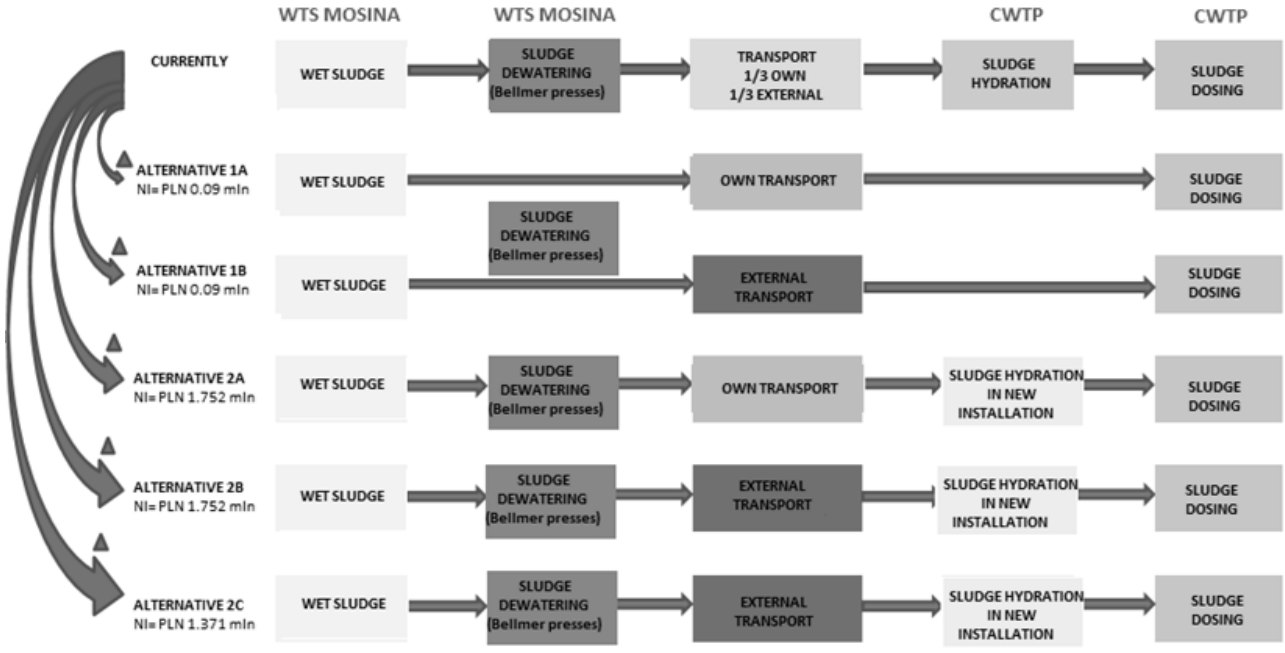

Fig. 10.2. Example of presentation of assumptions in the scenario method at Aquanet

Source: [Aquanet 2015a, p. 3].

The application of discount rate in the analyses merits some attention. The selection of risk-adjusted discount rate would suggest the application of the cost of capital as the discount rate in the analyses. At Aquanet, however, the adopted discount rate for calculations is equal to treasury bond yield [Aquanet 2015a, 2015b, 2015c, 2015e, 2015f]. It is illustrated by the table below.

Table 10.1. Example discount rates in investment appraisals at Aquanet

Project	Date of analysis	Discount rate	Annual inflation rate	Grounds
LWTP - CNG fuelling station.	2015-02-04	3.51%	2.50%	average treasury bond yield in 2013
Construction of an installation to transfer post-filtration sludge from WTS Mosina to the CWTP	2015-02-11	3.51%	2.50%	average treasury bond yield in 2013
Construction of a secondary disinfection point on the eastern main in Czapury;	2015-03-09	3.51%	2.50%	average treasury bond yield in 2013
Replacement of positive displacement pumps with rotary pumps - LWTP	2015-04-20	3.51%	2.50%	average treasury bond yield in 2013
WTS Mosina - carbon filters washings recirculation	2015-07-02	3.31%	1-2%	no data

Source: own elaboration on the basis of [Aquanet 2015a, 2015b, 2015c, 2015e, 2015f].

In its investment appraisals, Aquanet applies a discount rate determined on the basis of analysis of the yields on treasury bonds with various maturities and inflation forecasts, updated annually. The weighted average cost of capital for the company is not calculated [Aquanet 2016b]. Importantly, adoption of the discount rate at the level of treasury bond yield, often assumed to be a risk-free rate in the calculations of the costs of capital, also means the assumption of zero risk premium. In this case, there is a noticeable incoherence between the method of defining cash flows subject to discounting and the method of determination of the discount rate, according to which the free cash flows to firm (FCFF) should be discounted with the use of weighted average cost of capital (WACC), while free cash flows to equity (FCFE) should be discounted with the use of cost of equity. The company usually defines its cash flows as FCFE, and so it should be assumed that the cost of equity is calculated at the level of risk-free rate, thus implying a zero risk premium. This means that, given the applied decision-making criteria (financial methods of profitability appraisal), of which the chief criterion is net

present value, Aquanet considers satisfactory a rate of return on investments exceeding risk-free rate of return.

In relation to the example of social cost analysis in the investment project consisting in the construction of the right-bank trunk sewer II in Poznań, it must be stated that the analysis drafted by an external company was based on nominal values for the expected investment time of 24 months, and so it failed to account for the time value of money [Grontmij 2008]. As a result, the social costs more remote in time were not discounted to the present value at zero moment of analysis (this moment, incidentally, was not determined at all in the document); and so the social discount rate was not determined or used in the analysis. Despite the fact that the discount rate was not used to incorporate risk into the analysis, the document does employ some basics of risk analysis in the form of the scenario method, as two alternative models were analyzed: an optimistic and a pessimistic one [Grontmij 2008, p. 19].

Risk analysis in the process of project management at Aquanet is based on good project management practices as recommended by the Project Management Institute (PMI) with the use of the Earn Value method [Kaziród and Beszterda 2013, p. 30]. Based on this methodology, risk analysis for each project is performed on a monthly basis by the contractor, contract engineer and by the commissioning party, that is Aquanet in this case [Kaziród and Beszterda 2013, p. 34]. The pursued approach also assumes that at the initial stage of the project, work breakdown structure (WBS) should be defined, as it places emphasis on planning and allows for risk reduction [Kaziród i Beszterda 2013, pp. 35-38]. Employment of WBS facilitates appropriate communication with the contractor, guarantees influence over contract performance and, thanks to division into sections and tasks, control over time and scope, allocation of outlays to specific tasks and focus on key performance indicators (KPIs) increases the likelihood of timely performance [Kaziród and Beszterda 2013, pp. 36-38].

At Aquanet, one of the applied risk analysis tools is benchmarking. It enables strategic diagnosis of the enterprise and identification of possible types of risks occurring in the analyzed areas. One of these areas analyzed under a benchmarking project in which the company participates is sustainability [European Benchmarking Co-operation 2015a, p. 20; European Benchmarking Co-operation 2015b, p. 21].

Moreover, the company performs risk analysis with account of environmental and social risks in the course of the conducted investments. One significant example in this scope is the analysis of climate risk and vulnerability assessment (CRVA) prepared for the company's investment programme for the years 2012-2016, financed from the ISPA Fund, from the Cohesion Fund (three stages) and from equity and loans, including from the European Investment Bank [Grontmij 2014a]. The purpose of climate risk and vulnerability assessment was to establish whether the investment programme in its existing form was solid and resilient to climate-related risks. The risk analysis also employed such methods as:

- sensitivity analysis which, in combination with the exposure assessments, results in the foundations of analysis of vulnerability to change,
- risk analysis through quantification of probability and potential impact of each risk,
- identification of adjusted alternatives or the evaluation of adaptive capability [Grontmij 2014b, p. 2].

The voluminous report contains, among other, environmental risk analysis for the entire investment programme.

At Amica Group, the cost of capital is determined for the needs of investment appraisals and it is calculated as the weighted average cost of capital (WACC) with the use of expert methods [Grontmij 2014b, p. 2]. The company, when probed for information regarding the impact of ESG initiatives on the cost of capital, stated that such influence has not been observed, neither on cost of debt nor on cost of equity [Amica 2016].

Moreover, Amica applies various risk analysis methods in its day-to-day management, both at the strategic and operational levels, as well as within the investment project management system. The main approach to risk analysis as applied at the company focuses on the qualitative risk analysis method [Amica 2016].

From the strategic angle, the risk analysis has identified the following key risks to the achievement of HIT 2023 strategy objectives [Amica 2014, p. 10]:

- 'ineffective entry on new markets,
- political, economic and financial risks,
- ineffective takeovers and integration of new companies/brands,
- ineffective cooperation with suppliers in the scope of development of own product lines,
- aggressive competition and aggressive pricing policies of competitors.'

Steps aiming to mitigate these types of risks were defined in Amica's Enterprise Risk Management System [Amica 2014, p. 10].

As regards risk analysis methods, it should be pointed out that minimization of currency risk through effective hedging is identified as one of the objectives in relation to financial management and controlling, included under one of the five components of HIT 2023 strategy (excellent processes).

At B. Braun Group, one of the primary tasks of controlling is risk analysis and management, which are to allow for the identification, documentation, evaluation, monitoring and control of risk [B. Braun 2015a, p. 58]. Risks arising from operating activities are quickly identified and evaluated under the controlling system. The company also identifies and controls risks that do not stem directly from group's operations [B. Braun 2015a, p. 58]. The following types of risk are analyzed [B. Braun 2015a, pp. 58-60]:

- macroeconomic risk,
- sector risk,

- supply risk (risk of procurement),
- product risk,
- human resources risk,
- IT risk,
- financial risk.

ESG factors are accounted for in many of the above-mentioned risk areas. For example, the company strives to minimize the sector risk related to the policy of favouring the offer of domestic producers whenever their products are comparable, which is emerging on certain markets (e.g. in Russia), by strengthening its relations with local producers and its regional presence [B. Braun 2015a, p. 59]. In an attempt to manage the human resources risk associated with possible regional shortage of appropriately qualified workforce, B. Braun tries to build its image as an attractive employer, by implementing various professional development programmes, continuing education, initiatives to improve employees' work-life balance, performance-based remuneration or flexible work models [B. Braun 2015a, p. 60].

10.5. Final remarks

The purpose of this chapter has been to identify key global types of risks and trends, to present risk management systems applied at the enterprises and to describe the methods used by enterprises in risk analysis and estimation of the cost of capital.

This objective has been fulfilled. As follows from the conducted research, global threats may be grouped into five major categories, that is economic, environmental, geopolitical, social and technological risks, with the noticeable rising significance of environmental and social threats. Climate change risk has been identified as the risk of largest impact, followed directly by the risk associated with weapons of mass destruction and water crises. The next two positions are taken by the risk of involuntary migration and risk of energy price shocks, respectively.

The performed research has confirmed that the discussed enterprises have risk management systems in place, an example of this being the Integrated Enterprise Risk Management System at PKN Orlen or the risk management system at Amica.

Risk analysis employs, among others, approaches such as qualitative methods, scenario analysis, sensitivity analysis, social cost analysis, Earned Value method, benchmarking or climate risk and vulnerability assessment (CRVA). Estimation of the cost of capital in enterprises is based on estimation of weighted average cost of capital (WACC) or, in the simplified approach, on the application of risk-free rate as the discount rate.

Conclusions

This monograph presents results of research on the application of controlling for the achievement of sustainable development concepts, with the assumption that activities coordinated under controlling should be regarded in connection with finance. The performed research indicates that:

- strategic documents of the explored enterprises account for social and environmental aspects,
- the analyzed enterprises that adhere to the purpose of value creation for shareholders may be classified as pursuing 'enlightened' value maximization,
- the considered enterprises employ numerous methods of strategic analysis, especially: benchmarking, methods of stakeholder expectation analysis, product life cycle,
- financial planning enables the interested entities to verify the feasibility of goal achievement, along with the determination of the financial outcomes of this process, as well as allows the enterprises to assess the risk associated with the accomplishment of enterprise's business objectives,
- owing to modern budgeting concepts tailored to the specificity of company's operations, the discussed entities have been able to dynamically respond to changes in the natural and social environment and to financially support initiatives in these areas,
- the application of an appropriate system of measures and indicators in green controlling is one of the conditions of correct shaping and coordination of the processes of planning, control and reporting at the analyzed enterprises,
- reports are one of the chief types of documents applied in environmental management,
- taking into account of environmental and social aspects in cost management may improve economic performance of an enterprise,
- environmental and social aspects may be noticed in investment project appraisals in the explored companies,

- the discussed enterprises have risk management systems in place; social and environmental risks are acquiring a growing significance, and risk analysis employs approaches such as: scenario analysis, sensitivity analysis, social costs analysis, earned value method, benchmarking or climate risk and vulnerability assessment (CRVA),
- estimation of the cost of capital at analyzed enterprises is based on determination of weighted average cost of capital or, in the simplified approach, on the application of risk-free rate as the discount rate.

The conducted research allows for drawing the general conclusion, albeit still a tentative one, that the application of green controlling in connection with finance contributes to enterprise value creation in the long run. Further, more profound research, is necessary to confirm this conclusion with a greater degree of certainty.

Bibliography

Act on renewable energy sources dated 20 February 2015, Journal of Laws No. 2015, item 478, vol. 1.

Amica, (2014), *Wyniki skonsolidowane grupy Amica 2013*, *prezentacja dla relacji inwestorskich*, *http://www.pandl.pl/tl_files/raporty i prezentacje/HIT2023_prezentacjaIR_v8.pdf* (accessed on 01.03.2016).

Amica, (2015), *Strategia HIT 2023. Prezentacja dla inwestorów*, *17.03.2015*, *https://www.amica.pl/files/strategia_hit_2023.pdf* (accessed on 01.03.2016).

Amica, (2016), *Materiały przygotowane przez kierownictwo i pracowników spółki Amica na potrzeby niniejszego badania z 22.03.2016 roku*, internal materials of the company.

Aquanet and UE, (2016), *Aquanet i UE. Wspólne inwestycje – opis projektów współfinansowanych z Funduszu Spójności UE*, *http://inwestycjeunijne.aquanet.pl/o-projekcie* (accessed on 01.03.2016).

Aquanet, (2011), *Strategia AQUANET SA na lata 2012-2016*, Poznań.

Aquanet, (2015a), *Aktualizacja strategii operacyjnej Aquanet SA na lata 2016-2020*, Poznań.

Aquanet, (2015b), *Budowa instalacji do przejęcia osadów pofiltracyjnych z SUW Mosina na COŚ* (*Nr zadania w aktualnym PI-10*: *4-05-12-035-0*). *Wyniki analizy opłacalności*, *raport wewnętrzny spółki Aquanet z 11.02.2015 wraz z analizą opłacalności sporządzoną w arkuszu kalkulacyjnym Excel*, internal materials of the company.

Aquanet, (2015c), *Budowa punktu wtórnej dezynfekcji wody na magistrali wschodniej w Czapurach. Analiza porównawcza typów elektrolizera* (*Nr zadania w aktualnym PI-10*: *3-05-03-304-1*). *Wyniki analizy opłacalności*, *raport wewnętrzny spółki Aquanet z 09.03.2015 wraz z analizą opłacalności sporządzoną w arkuszu kalkulacyjnym Excel*, internal materials of the company.

Aquanet, (2015d), *LOŚ – stacja paliw CNG* (*Nr zadania w aktualnym PI-10*: *6-05-14-072-1*). *Wyniki analizy opłacalności*, *raport wewnętrzny spółki Aquanet z 04.02.2015 wraz z analizą opłacalności sporządzoną w arkuszu kalkulacyjnym Excel*, internal materials of the company.

Aquanet, (2015e), *Raport roczny 2014*, Aquanet SA i Agencja reklamowa ADV, Poznań.

Aquanet, (2015f), *SUW Mosina – wody popłuczne po filtrach węglowych. Wyniki analizy opłacalności*, *raport wewnętrzny spółki Aquanet z 02.07.2015 wraz z analizą opłacalności sporządzoną w arkuszu kalkulacyjnym Excel*, internal materials of the company.

Aquanet, (2015g), *Wymiana pomp wyporowych na wirowe – LOŚ OB.27* (*4-05-15-078-0*). *Wyniki analizy opłacalności*, *raport wewnętrzny spółki Aquanet z 20.04.2015 wraz z analizą opłacalności sporządzoną w arkuszu kalkulacyjnym Excel*, internal materials of the company.

Aquanet, (2015h), *Subjects of feasibility studies conducted in 2015*, internal materials of the company.

Aquanet, (2016a), *Kampania „Nie śmieć w sieć"*, opis kampanii oraz filmy edukacyjne, *http://www.aquanet.pl/nie-smiec-w-siec,506* (accessed on 01.03.2016).

Aquanet, (2016b), *Wyjaśnienia spółki Aquanet na temat kosztu kapitału z 11.03.2016 roku*, internal materials of the company.

Aquanet, (2016c), Wywiad pogłębiony z kierownictwem spółki Aquanet przeprowadzony w dniu 12.02.2016 roku w siedzibie spółki.

Aquanet Investments, (2016), *Podsumowanie inwestycji realizowanych przez Aquanet*, *http://www.aquanet.pl/inwestycje,5* (accessed on 02.03.2016).

Balicka A., (2015), *Controlling ekologiczny w przedsiębiorstwie*, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, vol. 399, pp. 13-21.

Bossel H., (1999), *Indicators for Sustainable Development*: *Theory*, *Method*, *Applications*, A Report to the Balaton Group, International Institute For Sustainable Development, Winnipeg.

B. Braun, (2015a), *Sharing Expertise. Annual Report 2014*, B. Braun Melsungen AG, *http://www.bbraun.com/ documents/2014_Annual_Report_digital.pdf* (accessed on 01.03.2016).

B. Braun, (2015b), *Taking responsibility*. B. Braun Group Sustainability Report 2015, internal materials of the company.

Byrka-Kita K., (2008), *Metody szacowania kosztu kapitału własnego. Teoria a praktyka*, Wydawnictwo Uniwersytetu Szczecińskiego, Szczecin.

CBS, (2014), *Raport z badania*: *Pracownicy spółki Aquanet*. *Diagnoza funkcjonowania firmy*, Centrum Badań Stosowanych Ultex Ankieter sp. z o.o., October, internal materials of the company.

CBS, (2015), *Raport z badania*: *Badanie wizerunku spółki Aquanet SA wśród klientów z aglomeracji poznańskiej*, Centrum Badań Stosowanych Ultex Ankieter sp. z o.o., November, internal materials of the company.

Chudziński P., (2014), *Wykorzystanie benchmarkingu w zarządzaniu kosztami w przedsiębiorstwie wodociągowym*, Ph.D. dissertation, Poznan University of Economics and Business, Poznań

Ciepiela D., (2015), *Czy nowy system wsparcia OZE będzie skuteczny?*, *http://energetyka.wnp.pl/czy-nowy-system-wsparcia-oze-bedzie-skuteczny,257326_1_0_0.html* (accessed on 01.03.2016).

Deloitte, Targeo.pl, (2016), *Raport o korkach w 7 największych miastach Polski. Warszawa*, *Wrocław*, *Kraków*, *Poznań*, *Gdańsk*, *Łódź*, *Katowice*, March, *http://www2.deloitte.com/ content/dam/Deloitte/pl/Documents/Reports/pl_Raport_korki_2016.pdf* (accessed on 03.03.2016).

DiaCore, (2014), *http://diacore.eu/component/content/article?id=11* (accessed on 01.03.2016).

Directive 2014/95/UE of the European Parliament and Council amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups. Official Journal of the European Union 15.11.2014 L330/1.

Dziawgo D., Dziawgo L., (2014), *Społeczna rewolucja rynku finansowego. CSR i IR – wybrane aspekty*. Nauki o finansach, vol. 1(18), pp. 29-39.

Dziawgo L. (2009), *Bank jako „instytucja BRAKU zaufania publicznego"*, in: Szambelańczyk J. (ed.), Globalny kryzys finansowy i jego konsekwencje w opiniach ekonomistów polskich, ZBP, Warsaw.

Dzik R., (2005), *Zintegrowana ocena efektywności pozyskiwania energii elektrycznej ze źródeł odnawialnych*, Rynek Energii 2005, no. 2.

EMAS, (2016), *http://emas.gdos.gov.pl/lista-rejestru-emas* (accessed on 01.02.2016).

EMIS, (2016), *https://www.emis.com* (accessed on 01.03.2016).

Ernst & Young, (2015), *Aktualizacja Strategii Operacyjnej Aquanet SA na lata 2016-2020*, 10.06.2015, internal materials of the company.

European Benchmarking Co-operation, (2015a), *International Benchmark 2014. Water supply*, *Final company report Aquanet SA advanced*, 02.12.2015, internal materials of the company.

European Benchmarking Co-operation, (2015b), *International Benchmark 2014. Wastewater*, *Final company report Aquanet SA advanced*, 02.12.2015, internal materials of the company.

European Commission, (2010), *A Strategy for Smart, Sustainable and Inclusive Growth Fostering Social Cohesion*, p. 12, *http://eur-lex.europa.eu/LexUriServ/ LexUriServ.do?uri=COM:2010:2020: FIN:PL:PDF,* (as at 20.02.2016).

European Commission, (2010), *A Renewed EU Strategy 2011-2014 for Corporate Social Responsibility*, COM (2011) 681, Brussels.

Gallo M.A., Tapies J., Cappuyns K., (2004), *Comparison of Family Business and Nonfamily Business*: *Financial Logic and Personal Preferences*, Family Business Review, vol. 17, pp. 303-318.

Gallo M.A., Vilaseca A., (1996), *Finance in family business*, Family Business Review, vol. 9(4), pp. 387-401.

Gazeta Prawna.pl. Biznes Energetyka, 28.05.2013, *http://serwisy.gazetaprawna.pl/energetyka/artykuly/707416* (accessed on 28.02.2016).

Gnatowska R., Wąs A., (2015), *Analiza opłacalności inwestycji w produkcję energii ze źródeł odnawialnych na przykładzie farmy wiatrowej*, *przy założeniu wsparcia rządu dla „zielonej energii"*, Inżynieria i Ochrona Środowiska 2015, vol. 18, no. 1.

Grontmij, (2008), *Analiza kosztów społecznych budowy kolektora prawobrzeżnego II od ulicy Głównej do Katowickiej*, Grontmij Polska Sp. z o.o., Poznań, June 2008, Aquanet's internal materials of the company.

Grontmij, (2014a), *Ocena ryzyka wynikającego ze zmian klimatycznych i podatności na nie* (*w skrócie ang. CRVA*) *programu AQUANET WATER AND WASTEWATER*, raport przygotowany przez Grontmij Polska Sp. z o.o., Poznań, 31.01.2014, Aquanet's internal materials of the company.

Grontmij, (2014b), *Streszczenie – Ocena ryzyka wynikającego ze zmian klimatycznych i podatności na nie* (*w skrócie ang. CRVA*) *programu AQUANET WATER AND WASTEWATER*, Streszczenie raportu przygotowanego przez Grontmij Polska Sp. z o.o., Poznań, December 2014, Aquanet's internal materials of the company.

Gryko J., Kluzek M., Kubiak J., Nowaczyk T., (2011), *Planowanie finansowe w przedsiębiorstwie*, Wyd. Uniwersytetu Ekonomicznego w Poznaniu, Poznań.

Hochtief, (2015), *Group Report 2015. Combined Annual Report and Sustainability Report*, *http://reports. hochtief.com/reports/mmdbdownload?id=153935&format=4* (accessed on 01.03.2016).

Horvath P., (2009), *Controlling*, Vahlen, Munich, p. 219.

GK LW Bogdanka, (2001, 2007-2016), Internal company materials of GK LW Bogdanka.

Individual Interpretation of the Director of Tax Chamber in Warsaw of 10 April 2013, *https://interpretacje-podatkowe.org/stawka-amortyzacyjna/ippb3-423-66-13-2-ms* (accessed on 02.03.2016).

Kaziród A., Beszterda K., (2013), *FS w Aquanet SA*, presentation of 11.06.2013, *http://pois.nfosigw.gov.pl/* (dostęp 02.03.2016).

Kochalski C. (ed.), (2011), *Model projektowania i wdrażania strategii rozwoju w publicznych szkołach wyższych w Polsce*, Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań.

Kochalski C. (ed.), (2016), *Zielony controlling i finanse. Podstawy teoretyczne*, Wydawnictwo C.H. Beck, Warsaw.

Kochalski C., Nowicki J., (2016), *Analiza strategiczna jako narzędzie projektowania strategii ekorozwoju*, in: Kochalski C. (ed.), *Zielony Controlling i Finanse. Podstawy teoretyczne*, Wydawnictwo C.H. Beck, Warsaw.

Kolektor prawobrzeżny II, (2016), *opis inwestycji Kolektor Prawobrzeżny II*, *http://inwestycjeunijne.aquanet.pl/ inwestycje/3/9* (accessed on 02.03.2016).

Kompania Piwowarska, (2015), *Raport zrównoważonego rozwoju Kompanii Piwowarskiej 2015*, *http://www.kp.pl/files/social_reports/pol/kp_raport_2015.pdf* (accessed on 01.03.2016).

Kompania Piwowarska, (2016), *http://www.kp.pl/* (accessed on 01.03.2016).

KZGW, (2010), *Aktualizacja Krajowego Programu Oczyszczania Ścieków Komunalnych*, Krajowy Zarząd Gospodarki Wodnej.

Lasocka-Gomuła I., (2008), *Firma Aquanet jako dostawca wody dla miasta Poznania oraz jego działalność w zgodzie ze środowiskiem*, paper delivered at a conference in Seville in 2008.

Lotos, (2015), *Integrated Report 2014, http://www.lotos.pl/* (accessed on 01.02.2016).

Lotos, (2016), *http://www.lotos.pl/* (accessed on 01.02.2016).

Marcinkowska, M., (2012), *Sprawozdanie z wartości dodanej – przykład oceny wyników przedsiębiorstwa z perspektywy interesariuszy*, Zeszyty Naukowe Uniwersytetu Szczecińskiego. Finanse, rynki finansowe, ubezpieczenia, no. 51/690, *www.wneiz.pl/nauka_wneiz/frfu/51-2012/FRFU-51-335.pdf* (accessed on 01.03.2016).

Mikołajewicz G., Nowicki J., (2016a), *Risk Analysis and Cost of Capital Estimation in Sustainable Business*, in: Kochalski C. (ed.), *Green Controlling and Finance. Theoretical Framework*, Wydawnictwo C.H. Beck, Warsaw 2016.

Mikołajewicz G., Nowicki J., (2016b), *Value Creation Concept in Sustainable Business*, in: Kochalski C. (ed.), *Green Controlling and Finance. Theoretical Framework*, Wydawnictwo C.H. Beck, Warsaw 2016.

Ministry of Development, (2016), *https://www.mr.gov.pl/strony/zadania/bezpieczenstwo-gospodarcze/bezpieczenstwo-produktow-i-uslug/system-reach/* (accessed on 01.02.2016).

Ministry of the Environment, (2016), *https://ippc.mos.gov.pl/ippc* (accessed on 01.02.2016).

MPWiK Leszno, (2016), *mpwik-leszno.pl. http://www.mpwik-leszno.pl/ index.php?option=com_content&view= article&id=56&Itemid=113* (accessed on 01.03.2016).

MPWiK Warsaw, (2016), *mpwik.com.pl. http://www.mpwik.com.pl/o-firmie/dane-spolki/strategia* (accessed on 01.03.2016).

Niemiec, A., (2015), *Możliwość zastosowania analizy istotności osiągnięć w identyfikacji i ewaluacji zestawu kluczowych mierników dokonań* (*KPIs*), Zeszyty Naukowe Uniwersytetu Szczecińskiego, no. 873.

Nowak E., Nita B., (2010), *Budżetowanie w przedsiębiorstwie. Organizacja*, *procedury*, *zastosowanie*, Oficyna Wolters Kluwer Polska Sp. z o.o., Warsaw.

Nowicki J., (2016), *Evaluation of Investment Projects with Environmental and Social Insight*, in: Kochalski C. (ed.), *Green Controlling and Finance. Theoretical Framework*, Wydawnictwo C.H. Beck, Warsaw.

Nycz-Wróbel J., (2014), *Różnice w sposobie prezentowania informacji dotyczących wskaźników efektywności środowiskowej*, Humanities and Social Sciences, vol. XIX, no. 21 (3/2014), pp. 173-184.

OFWAT, (2016), *www.ofwat.gov.uk., http://www.ofwat.gov.uk/regulated-companies/price-review* (accessed on 01.03.2016).

Paska J., (2008), *Reliability Issues in Electric Power Systems with Distributed Generation*, Rynek Energii 2008 no. 5.

PBG (2011), *CSR w Grupie Kapitałowej PBG*, Biuletyn Korporacyjny Ogniwo, special edition XII 2011.

Pesta R., (2009), *Analiza opłacalności budowy farmy wiatrowej o mocy 40 MW*, Rynek Energii 2009 no. 1.

PKN Orlen, (2011), *Raport roczny 2010*, *http://www.orlen.pl/PL/RelacjeInwestorskie/Raportyroczne/Strony/ default.aspx* (accessed on 01.03.2016).

PKN Orlen, (2013), *Raport roczny 2012*, *http://www.orlen.pl/PL/RelacjeInwestorskie/Raportyroczne/Strony/ default.aspx* (accessed on 01.03.2016).

PKN Orlen, (2015a), *Integrated Report 2014. Pillars of PKN Orlen's strategy*, *http://integratedreport.orlen.pl/en/our-strategy/orlen-group-strategy-2014-2017/pillars-pkn-orlens-strategy* (accessed on 01.03.2016).

PKN Orlen, (2015b), *Integrated Report 2014. Interactive KPI*, *http://integratedreport.orlen.pl/en/tools/interactive-kpi*, (accessed on 01.03.2016).

PKN Orlen, (2015b), *Integrated Report 2014. Stakeholder Map*, *http://integratedreport.orlen.pl/en/tools/stakeholder-map* (accessed on 01.03.2016).

PKN Orlen, (2015d), *Integrated Report 2014. Relevance Matrix*, *http://integratedreport.orlen.pl/en/tools/relevance-matrix* (accessed on 01.03.2016).

PKN Orlen, (2015e), *Integrated Report 2014. Risks*, *http://integratedreport.orlen.pl/en/node/475/market-risks* (accessed on 01.03.2016).

PKN Orlen, (2015f), *Integrated Report 2014. CSR strategy*, *http://integratedreport.orlen.pl/en/our-strategy/csr-strategy* (accessed on 01.03.2016).

PKN Orlen, (2015g), *Integrated Report 2014. Core Values and Standards of Conduct*, *http://integratedreport.orlen.pl/en/our-company/who-we-are/core-values-and-standards-conduct* (accessed on 01.03.2016).

PKN Orlen, (2015h), *Strategia CSR dla PKN ORLEN*, *http://www.orlen.pl/PL/Odpowiedzialny_Biznes/Documents/Strategia_CSR_dla_PKN_ORLEN_prezentacja_15.07.2015.pdf* (accessed on 01.03.2016).

Rafako SA, (2001), *Company Profile RAFAKO SA*, Wydawnictwo ART, p. 2.

Rafako SA, (2010), *Fabryka Kotłów Rafako ma 60 lat*, Nasz Racibórz, 29.09.2010.

Rafako SA, (2013-2016), Internal company materials of RAFAKO SA.

Rafako SA, (2015), *Deklaracja środowiskowa RAFAKO SA*, pp. 12-13.

Rafako, (2016), *http://www.rafako.com.pl/* (accessed on 01.02.2016).

Rafako SA, *Jednolity Tekst Statut RAFAKO Spółka Akcyjna w Raciborzu*, Chapter V, § 33.

Rangan V.K., Chase L.A., Karim S., (2015), *The truth about CSR*, Harvard Business Review, vol. 1.

Ratajczak, P., (2014), *Powiązanie działalności społecznie odpowiedzialnej ze strategią przedsiębiorstwa a wartość dla jego właścicieli oraz pozostałych interesariuszy*, in: Urbanowska-Sojkin, E. (ed.), Studia Oeconomica Posnaniensia, vol. 2, no. 11 (272), pp. 122-137.

Ratajczak, P., (2016), *Mierniki i wskaźniki w controllingu ekologicznym*, in: Kochalski, C. (ed.), (2016), *Zielony controlling i finanse. Podstawy teoretyczne*, Wydawnictwo C.H. Beck, Warsaw, pp. 203-226.

Regulation of the Minister of Economy on the reference price of electric power from renewable sources of energy in 2016 dated 13 November 2015, Journal of Laws of 2015, item 2063),

Regulation (EC) No. 1221/2009 of the European Parliament and Council of 25 November 2009 on the voluntary participation by organizations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC, EU Official Journal L 342/23.

Roguski A., (2016), *Rafako gotowe do skoku*, Parkiet, 26.02.2016.

Rutkowski J., (2015), List Prezesa Zarządu AMICA SA (do Akcjonariuszy), dołączony do Raportu rocznego za rok obrotowy 2014 (stan prawny na dzień 28 kwietnia 2015), *https://www.amica.pl/files/calendar/skonsolidowane_sprawozdanie22.pdf* (dostęp 03.03.2016).

SABMiller, (2016), *http://www.sabmiller.com/* (accessed on 01.03.2016).

SAM Principles, (2015), *SABMiller plc Sustainable Development Reporting Principles and Methodology for Assured Indicators in The Year Ended 31 March 2015*, *http://www.sabmiller.com/docs/default-source/sustainability-documents/sustainable-development-reporting-principles-june-2015.pdf?sfvrsn=4* (accessed on 01.03.2016).

Schwarz, J., Beloff, B., Beaver, E., (2002), *Use Sustainability Metrics to Guide Decision-Making*, Chemical Engineering Progress, July, pp. 58-63.

Solaris, (2015), *Raport środowiskowy Solaris Bus & Coach SA 2014*, Annual Report, Solaris Bus & Coach – internal materials of the company.

Solaris, (2016), *Rekordowe przychody Solarisa w roku 2015. Spółka trzynasty rok z rzędu liderem w segmencie autobusów miejskich*, Press Release, Solaris Bus & Coach, Bolechowo/Warsaw, 16.02.2016.

Solińska M, Soliński L., (2003), *Efektywność ekonomiczna proekologicznych inwestycji*, Uczelniane Wydawnictwa Naukowo-Dydaktyczne AGH, Krakow.

Sommer P., (2013), *Instrumenty wspomagające zarządzanie środowiskiem*, in: Kryński A., Kramer M. (eds.) *Zintegrowane zarządzanie środowiskiem*: *systemowe zależności między polityką*, *prawem i techniką*, Caekelbergh A.F., Oficyna Wolters Kluwer business, Warsaw.

Steinke K-H., Schulze M., Berlin S., Stehle A., Georg J. (eds.), (2014), *Green Controlling*, *Leitfaden für die erfolgreiche Integration ökologischer Zielsetzungen in Unternehmensplanung und – steuerung*, *Internationaler Controller Verein*, Haufe Gruppe, Freiburg – Munich.

Suska-Szczerbicka M., Weiss E., (2013), *Ocena opłacalności przedsięwzięcia inwestycyjnego produkcji energii elektrycznej farmy wiatrowej*, Rynek Energii 2013, vol. 1.

Szulczewska-Remi A., Zerbst S., (2016), *Budżetowanie i analiza odchyleń w controllingu ekologicznym*, in: Kochalski C. (ed.) *Zielony Controlling i Finanse. Podstawy teoretyczne*, Wydawnictwo C.H. Beck, Warsaw, pp. 166-185.

The International IR Framework, *http://integratedreporting.org/*, p. 7.

TUV-NORD, (2016), *http://www.tuv-nord.com/* (accessed on 01.02.2016).

Urbanowska-Sojkin E., Banaszyk P., Witczak H., (2004), *Zarządzanie strategiczne przedsiębiorstwem*, PWE, Warsaw.

Walińska E., Bek-Gaik B., Gad J., Rymkiewicz B., Sprawozdawczość przedsiębiorstwa jako narzędzie komunikacji z otoczeniem. Wymiar finansowy i niefinansowy, Wyd. UŁ, Łódź 2015, p. 24.

WEF, (2016), *The Global Risk Report 2016*, 11th Edition, World Economic Forum, *http://www3.weforum.org/ docs/GRR/WEF_GRR16.pdf* (accessed on 03.03.2016).

Wiśniewski G., Michałowska-Knap K., Koć S., (2012), *Energetyka wiatrowa – stan aktualny i perspektywy rozwoju w Polsce*, Raport Instytutu Energetyki Odnawialnej, Warsaw.

Wiśniewski, T., (2008), *Ocena efektywności inwestycji rzeczowych ze szczególnym uwzględnieniem ryzyka*, Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, Szczecin.

Zieliński T.M., (2014), *Zasobowo-procesowy rachunek kosztów w przedsiębiorstwie*, Ph.D. dissertation. Poznan University of Economics ande Business in Poznań.

ZGH Bolesław, (2012-2016), Internal company materials of ZGH Bolesław in Bukowno.

ZGH Bolesław, (2016), *http://zghboleslaw.org/pl/* (accessed on 01.02.2016).

Zmysłowska A., Nowakowski T., (2003), *Pozwolenia zintegrowane IPPC. Folder informacyjny dla przemysłu i administracji publicznej*, Ministry of the Environment, Warsaw.

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This book exemplifies activities undertaken by selected enterprises towards resolving significant problems related to green controlling and finance. It presents how the analysed enterprises employ (or may employ) green controlling for coordination of initiatives in environmental and social dimensions. The authors focused primarily on the financial angle of the solutions regarding environmental and social aspects within the scope of corporate strategy, value creation, financial planning, budgeting, indicator analysis, reporting, cost management, investment appraisal, risk analysis and estimation of capital cost. The analyses performed enabled the researchers to prove that elements of green controlling connected with finance are present in the discussed enterprises and may serve as examples of good practices for other business entities striving to increase enterprise value in the long run.

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