“Incorporation of a Standardized Sustainability Reporting Structure for the Business Case Smurfit Kappa Solid Board the Netherlands”

Bachelor Thesis

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II. Abstract

Reporting is a significant critical success factor for a sustainable development, and in the packaging industry an overall willingness to report and disclose information is determinable. It facilitates awareness for sustainability relevance, provides environmental benchmarking and motivates towards change of value and behavior. It fulfills during sustainability management procedures a transversal task and guides through the stages on the road to long term sustainable success.

This paper describes the actual situation concerning environmental management and reporting at Smurfit Kappa Solid Board. For incorporation of sustainability reporting at Smurfit Kappa Solid Board, a higher and deeper organizational integrated "Environmental Management System (EMS)" is seen as a precondition.
Height is represented through strategic involvement of sustainability topics and sustainable long term goal definition, while an evolution into depth considers data sourcing and information gathering for reporting. Matter of integration is through in this change provided by an internal sustainability protocol, which consists of sustainable success indicators and predefined goals. To meet the requirements of reporting, information (by indicators) needs a certain relevance to internal goals and environmental activities.
To provide an internal report in a frequent manner 2 major questions are after conceptual visualization relevant for emphasis: What is "standardized" content for reporting with indicators? Building up on the content, which data gathering structure can be designed? Is it possible to automate indicator gathering in the information system?

Standardized reporting content for Smurfit Kappa Solid board features energy, water, waste and emissions to air. For a long term perspective and to receive a continuous information flow it is recommended to harmonize the production information system development stages of all the locations of Smurfit Kappa Solid Board to one stage. Furthermore to harmonization of the existing information systems, implementation of an "Environmental Information System" supports the compilation of data, monitoring of indicators and establishment of an internal environmental reporting protocol.
However to facilitate sustainability awareness in the organization and to gain short term wins, at least an interim solution is recommended. For the next business year of 2009 it is suggested to facilitate manual reporting, provided through integration of indicators from different sources through an excel grid. Reporting content, gathering structure and responsible persons for gathering are specified in the appendix of this thesis.

1 Introduction

During this first chapter the structure of the thesis will be described and visualized. This document functions as a bachelor thesis for the educational institution of Windesheim. It features a theoretical basis and a focus on the business case of "Smurfit Kappa Solid Board (SKSB)". The corporate internal project was carried out between February and June of 2008.

1.1 Relevance of the topic

"Sustainability Reporting is resounded through the land". Urgencies and pressure towards organizational activities supporting a sustainable development are recognizable, not singular through media. "One described the situation as a delicate balancing act between the need to spend money, on proving his company green pedigree, and the need to minimize additional cost".[1] According to this fact a sustainable change in the packaging industry should be both "Lean and Green".

The corporate environment is demanding to get an overview "picture" on economic, environmental and social impacts and performances of organizations in a balanced represented way. External Sustainability disclosures try to answer this through an extended supply of information across corporate boarders on positive and negative corporate impacts and activities. If right applied reporting content bears possibility for comparability and performance benchmark between companies.

In contrast to the external orientated sustainability movement, during this paper, focus is lead especially towards "internal" sustainability reporting possibilities and change requirements for SKSB. It has to be pointed out, that on the road towards establishment of external sustainability reporting and "triple-bottom line success"[2], a well developed internal sustainability reporting structure, higher and deeper corporate integrated "Environmental Management System (EMS)" is a precondition.

Reporting integration seems to be in practice more than often difficult, because standardized EMS features in companies, like in the case of SKSB, the function as a sub-system with no strategic management integration and concrete target definition. In order to facilitate the degree of environmental performance by figures, the environmental management cycle of ISO has to be linked with the CIP of operational efficiency management. For this purpose a sustainability management cycle for "Smurfit Kappa Solid Board (SKSB)" is drawn in the thesis.

[1] Packaging News, called 18. 02. 08; http://www.packagingnews.co.uk/RSS/News/782048/PwC-report-highlights-packaging-sustainability-concerns/

[2] In order to achieve success orientated on the 3 P's, its direction needs to be balanced between economic (Profit), ecologic (Planet) and social (People) goals."; Referring to: Elkington, John; Cannibals With Forks, 1998

Reporting on environmental and social activities is becoming increasingly important in the paper and pulp industry. It helps to see activities through the eyes of stakeholders and helps to evaluate achievements and challenges through external third party validation. SKSB recognizes increasing awareness from key customers, especially in the UK, and also from the immediate neighbourhood towards sustainability topics.

Sustainability reporting within "Smurfit Kappa Group (SKG)" is centralised and not defined, which means, that achievements are only reported at an ad-hoc basis with no frequency at mill level. Relevant sustainability aspects for reporting depend on the business field of a company and have to be identified, analyzed and selected collaboratively between mill and management.
In order to facilitate a periodic reporting it is necessary to evaluate the actual situation of SKSB. Next, think of instruments to identify reporting content and data gathering process.

1.2 Research question

The thesis questions are formulated as follows:

1. *What is in a functional perspective necessary for establishment of a managerial sustainability structure in between Smurfit Kappa Solid Board?*

2. *How could standardized reporting content look like? On a system orientated perspective: how may differently organized structures or new ICT solutions facilitate gathering of standardized reporting content"?*

The conceptual objective of this thesis is to make a drawing and describe the "Continuous Improvement Process (CIP)" of management and information interchange at SKSB. The second questions build up on the first question and focuses on definition of standardized reporting content and possibilities to gather this content through the ICT systems in place.

1.3 Structure of the thesis

The following thesis is build up in particular parts featuring relevance to the before raised questions. According to the structure, this thesis tries to build up awareness in a step – by – step order. The last part of the thesis features an appendix with relevant documents, which were established during the project. Moreover, during the thesis, *Exhibits* are formulated separately (in black boxes). Those represent notional and analytical sidesteps, which are for better overview separated.

The 1st Chapter gives an introduction into the thesis and its structure.

The 2nd Chapter illustrates Smurfit Kappa as an organization and introduces into the business case. In order to determine the outgoing situation of SKSB, this chapter can be comprehended as a reflection of the actual situation. It gives insight into current practice of the environmental management system at SKSB and describes the problem scenario as a requirement for answering the two research questions formulated above.

During the 3rd Chapter sustainability itself is presented and its relevant linkage to operational management is explained. The relevance of change management and employee awareness is mentioned. Furthermore, the concept of a sustainability reporting and management structure for SKSB is visualized. The "SKSB Sustainability Management Cycle" and its stages are described. Integrative role plays the concept of an internal sustainability protocol.

In the 4th and last Chapter, the second raised thesis question is highlighted. At the beginning a vision for sustainability is drawn. Next, the process for content identification is visualized. The necessity of strategic integration beside of environmental impact identification is highlighted. With respect to this process standardized content is "exemplary" defined and afterwards defended. Following on the content, determination, the ICT system of SKSB is short introduced and relevant focus for reporting automation detected. Moreover implementation steps towards incorporation of the SKSB sustainability reporting protocol are depicted.

2 Smurfit Kappa – Paper based packaging

Net Sales Smurfit Kappa Group	€ 7,3 Billion
Presence Smurfit Kappa Group	Active in > 31 countries
Employees Smurfit Kappa Group	~ 42.000
Employees Smurfit Kappa Solid Board	~ 550 (in the Netherlands)

Table 1 Smurfit Kappa Key Data Table

Smurfit Kappa is a producer of paper based packaging solutions with a leading position in Europe. During the year 2005 a merger between the "Jefferson Smurfit Group" and "Kappa Packaging" completed the "Smurfit Kappa Group (SKG)" as one entire organization. Through the merger, between 2005 and 2006, an increase in sales of 160% had been reached. The sales grew further from the year 2006 to 2007 by over 4% to € 7.3 billion (see Table 1 above). The private equity firm "Madison Dearborn Partners" bought a majority stake in Smurfit Kappa, according to the company going public into stock, during 2007. Following on the "PricewaterhouseCoopers Global Forest, Paper and Packaging Industry survey 2007" the SKG is at the 11th rank by sales worldwide in this industry.[3]

The SKG operations are executed over 23 European and 9 Latin American countries and the entire corporation employs 42.000 people. The headquarter of the entire group is located in Dublin (Ireland) and the corporate operations are organized within divisions – Paper Division Europe, Corrugated Division Europe, Specialties Division and by country Latin America. As a top producer of different paper grades, container board and corrugated boxes, the Smurfit Kappa is also a leading wastepaper recycler.

During the generation of the thesis the position of the graduate was located in the "Specialties Division". Furthermore in the Sub – Division of Smurfit Kappa Solid Board and at the board mill of Hoogkerk (Groningen).

[3] Pwc; Global Forest, Paper and Packaging Industry survey 2007; called 28. 02. 08; Http://www.pwc.com/Extweb/pwcpublications.nsf/docid/67CDFB24AC3357AD8525731E0080199E

2.1 Organizational Structure

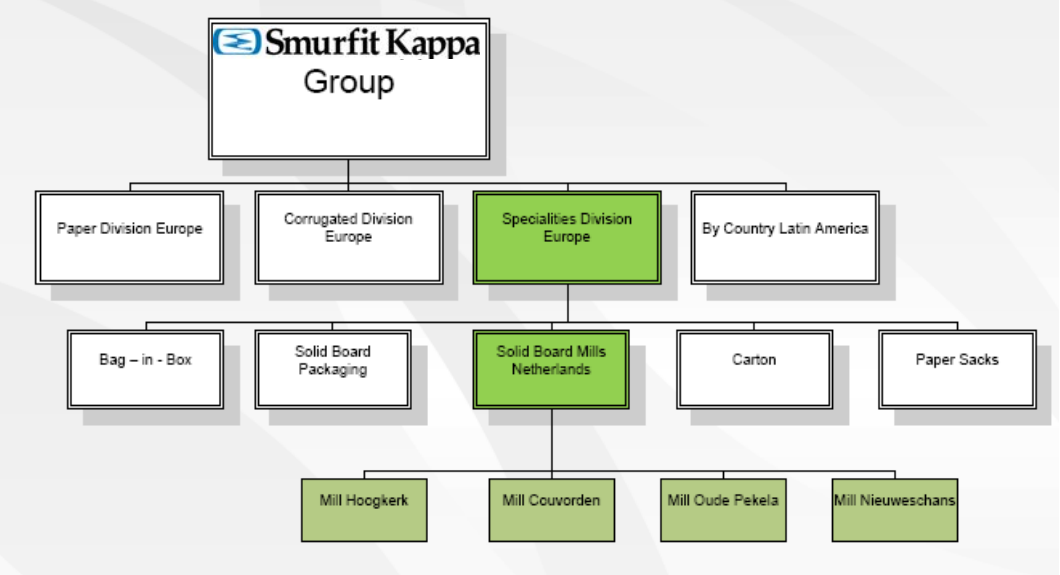


Figure 1 Organization Smurfit Kappa Group[4]

The "Smurfit Kappa Specialties Division (SKS)" is part of the "Smurfit Kappa Group (SKG)". The division focuses on operations, which are more dedicated to niche markets and products for high individualization. Organizational sub-entities include (see Figure 1) "Bag – in – Box", "Solid Board Packaging", "Solid Board Mills Netherlands (SKSB)", "Carton Board" and "Paper Sacks". In 2007, the financial performance of SKG's specialties business improved compared to 2006, with a 13% increase of EBITDA year-on-year, primarily reflecting SKG's strong focus on restoring acceptable end product pricing.[5]

The subdivision of SKSB, where this project was carried out, is an integrated company operating mainly across Europe. It is a leading supplier of solid board sheets to professional packaging and printing industries. As it is the rule, SKSB categorizes between 2 different sales channels: the sale of solid board for open markets as well as the sale of solid board to affiliated organizational entities of "Solid Board Packaging" for further conversion. "Solid Board Packaging" exclusively puts more value in graphic board products provided by the Solid Board Mills, and generates moreover packaging solutions, in order to serve customers bottling and filling lines efficiently and sustainable.

Solid board or graphic board may be used for book covers, customized paper files, food plates and luxury packaging applications. Solid board as a material is excellent for high sophisticated packaging applications. The mechanical properties can be customer individually finely adjusted to suit specific practical purposes. Generally it can be said,

[4] Ribitsch, Reinhard; Organizational Overview except of the SKSB mill Wrexen (Germany); own illustration
[5] SKG; Annual PLC Report; 2007; called 15. 04. 2008; http://www.smurfitkappa.com/NR/rdonlyres/3B7AA176-F8CF-400C-8D21-6F5EFDDE6278/0/SmurfitKappaAnnualReport2007.pdf; p. 19

that solid board performs particularly well in conditions with high moisture, on high-speed packaging machines or in high-quality graphic printing. For raw material supply solid board is 100% manufactured from recycled paper. In order to achieve the demanded qualities and graphic solid board, grey board is laminated with a variety of different finishes, making it ideal for the demanded occasion. Laminating paper will be glued on top or on both sides of grey board as a special surface. It may consist of virgin or recycled paper purchased externally or internally through the paper division. Grey board may be also equipped with special lamination finishes or coatings, which generate value-added opportunities for exclusive purposes or luxury packaging applications. Smurfit Kappa's dedicated "Specialty Board Lines" produced at the mill Oude Pekela serve markets such as packaging for perishables, meat and fish, food plates and luxury packaging for chocolates, cosmetics, whisky. For more information and illustration in the appendix is a "Smurfit Kappa variant parts visualisation"attached (Figure 15).

2.2 Management at Smurfit Kappa Solid Board

Administrative management of SKSB is located, following the executed merger in the year 2005, not anymore at each mill. According to "Figure 2" below, you see the organizational entity of SKSB. The internal executive and operational management system is visualized in blue colors and the "Environmental Management System (EMS)"visualized in green colors for separation:

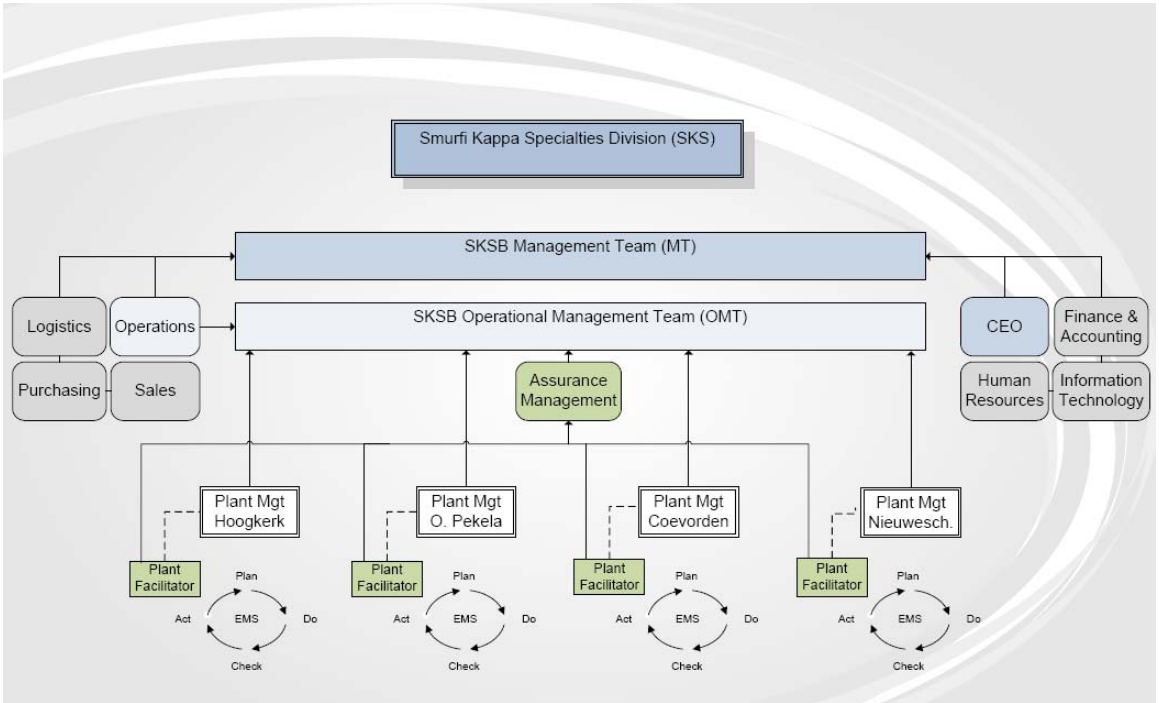


Figure 2 Executive, Operational and Environmental Management at Smurfit Kappa Solid Board[6]

[6] Ribitsch, Reinhard; Management at Smurfit Kappa Solid Board; own illustration

"Plant Management", in each of the four mills operates as a team, which consist of a "Plant Manager", "Plant Facilitator", "Process Coach", "Maintenance team leader" and a "Plant Process Engineer". This team is represented in this composition in all of the four locations and meets regularly. The "**Maintenance team leader"** has beside of maintenance also the objective of establishing energy relevant reports.[7] He is not responsible for the performance of the energy efficiency of the mills operations. The "Plant Manager" is responsible to deliver status and information towards the "Operational Manager". His status and contribution is discussed weekly at the "Operational Management Team (OMT)" Meeting.

The "**Assurance Team"** meets all 2 weeks at different locations and consists of an **"Assurance Manager**" and four **"Plant Facilitators"**. In between of SKSB, EMS administration and its managerial cycle is guided through the Plant Facilitator/mill and the Assurance Manager (green boxes). The "Assurance Manager" is responsible in delivering status of certification and environmental program to the "Management Team" and CEO.
Additionally the post of the "Plant Facilitator" performs the task as a conferrer of the "Plant Manager" considering assurance issues. In order to fulfill the function as an internal environmental, health and safety consultant, the "Plant Facilitator" communicates legal requirements, incidents, accidents, absentees and future possible requirements towards the "Plant Manager" and "Plant Management Team". It has to be noticed, that the actual responsibility for environmental, health and safety performance is directed to the "Plant Manager" of each mill and not to the "Plant Facilitator". According to this the "Plant facilitator" takes no actual responsibility for the concerning result of the environmental performance itself.
Besides assistance, the "Plant Facilitator" executes further an information exchange with local authorities and activities, in order to achieve compliance with regulations, healthy and safe working environments.

Beside of the management groups organizational departments of e.g. **Operations, Purchasing, Logistics, Information Technologies, Finance & Administration, Sales and Human Resources** are operating responsible for all the four production locations.

The **"Operational Management Team (OMT)"** meets weekly and consists of the Operations department, 4 Plant Managers and the "Assurance Manager". Furthermore during this meeting a set of "Key Performance Indicators (KPI)" is discussed on a weekly basis. Beside operational equipment efficiency, accidents, environmental incidents, illness and absentees are monitored and discussed. For the ecological dimension only on environmental incidents is focused singular. Energy usage, Emissions to air, Fiber sources and Water discharges are not a topic during OMT meetings. Annual policy deployment and goal definition is set through the "OMT".

[7] Annual reports for „License to Operate"; monthly reporting is at the mill Coevorden institutionalized

The **"Management Team"** consists of directors of each department and not mill representatives. Every "Management Team" member has his own kind of KPI list of indicators which will be weekly compiled and discussed collaboratively. Overview features a weekly aggregated management indicator review.

2.2.1 The "Environmental Management System"

It was pointed out during the introduction that for a well developed internal sustainability reporting structure, a higher and deeper corporate integrated "Environmental Management System (EMS)" is essential. In the following this management system and its management cycle will be explained for comprehension.

The "International Standardization Organization (ISO)" is known for development of standardized management systems. ISO also worked years ago on a standardized set of instruments for environmental management: called the ISO 14000 series. One of the standards proposed focuses on environmental management and is called ISO 14001. Since the first version of ISO 14001 was published a decade ago in 1996, called ISO 14001:1996, the standard has been used as a model for more than 111.000 companies in 138 countries worldwide, in different business and public sectors.[8] So, it can be said that the standard is quite common in industry.

Following on the popularity of the first release version a 2nd revised version called ISO 14001:2004 was released a few years ago and required in practice 2006.[9] This overworked content recommends now little more focus on the "Continuous Improvement Process (CIP)" and its harmonization with existent management systems like the ISO 9000 series.[10]
In between of both versions of this series, several standards and checklists are proposed for usage. Those provide professional guidance for organizations and responsible EMS managers in order to get environmental and safety incidents under control.[11] Adaptation and implementation of such an EMS is voluntary and requires annual audit assurance by an independent third party.
Moreover to specify benefits; beside external standardized guidance, adapted corporate internal processes, an implementation and certification may serve a higher degree of trust to local authorities, customers and other stakeholder groups.

Next to the ISO 14000 series it should be mentioned, that the "EU Eco-Management and Audit Scheme (EMAS)", which is developed and sponsored by the European Union bear

[8] www.iso.org
[9] 14th of May 2006
[10] Gastl, Rene; Original title: Die KVP – Forderung der ISO 14001; 2005
[11] Sayre, Don; Inside ISO 14000, The competitive advantage of environmental management; 1996; p. 25

useful tools to improve environmental and safety incidents. SKSB has decided, in contrast Smurfit Kappa divisions, to choose ISO 14001 as sole standardized EMS. There is no special reason for this decision. EMAS seems to be according to its country implementation distribution less common in the Netherlands and is higher diffused in Germany, Spain and Italy.[12]

Many firms have implemented formal EMS in parts of their organizations. An EMS is usually an instrument, which should facilitate the environmental performance of an organization. It should capture environmental affairs of a single facility (mill, plant) or entire corporate organization (e.g. SKSB).[13] If you compare implemented EMS, you can identify a different degree of influence, "diffusion"[14] or integration of the EMS within its company structures.
Considering the degree of influence of the EMS of SKSB, it can be noticed, that it is mainly distributed at mill level through a "Plan – Do – Check – Act cycle" of ISO 14001.

The organization and administration of the EMS at each mill is most of all executed through the "Plant Facilitators" and the Plant Management.
All mills except the mill Hoogkerk are ISO 14001 certified. For summer 2008 certification of all mills is planned. To provide an overview; SKSB Mills are certified by the following standards:

Mill/Certification	ISO 14001	ISO 9001	GMP[15]	OSHAS 18001[16]
Hoogkerk	- (summer 08)	X	-	(09)
Coevorden	X	X	X	X
Oude Pekela	X	X	X	- (summer 09)
Nieuweschans	X	X	X	X

Table 2 Certifications Smurfit Kappa Solid Board

[12] EMAS organizations and sites; 2008; called 23. 04. 08; http://ec.europa.eu/environment/emas/pdf/5_5articles_en.pdf
[13] Matthews, Deanna; Environmental management systems for internal environmental benchmarking; 2003; p. 95
[14] Area of influence and integration of the environmental management system into the overall organizational system Referring to the work of Gastl, Rene; Kontinuierliche Verbesserung von Umweltmanagementsystem und Umweltleistung – 14001; 2005; p. 38
[15] Good Manufacturing Practice Standard; information under: http://www.fda.gov/cdrh/devadvice/32.html#introduction
[16] OSHAS 18001 is a "British Standard" for Health and Safety controlling and accident improvement; information under: http://www.osha-bs8800-ohsas-18001-health-and-safety.com/ohsas-18001.htm

2.2.2 The Environmental Management Cycle at Smurfit Kappa Solid Board

To capture environmental incidents and affaires it is necessary to establish and maintain an environmental management cycle with core elements recommended by the ISO standard. According to this cycle, it has to be noticed and this was written in many research papers[17], that the ISO recommendations are broad and not detailed defined. On this account further application and modification should be advised in order to define environmental goals and performance activities.
According to the outgoing situation of environmental management; it will be discussed in a brief way:[18]

Plan - "an organization should formulate a plan to fulfill its environmental policy"

At the mills of SKSB "Plan" is primary executed at mill level. In order to identify content for "Plan" an environmental analysis is executed, which focuses on identification of environmental aspects. This analysis is executed through a "risk analysis" with a scoring of the most important ones (Environmental Aspect Register). It evaluates all internal process steps considering its risk to incidents and external complaints. It should be noticed, that the environmental performance by figures and parameters is not usually a matter of evaluation during planning. This evaluation is executed in each mill by the plant facilitator.

Annual activity planning is building up on the environmental aspect register and risk analysis. Definition and appropriate task identification is set during plant management meeting. There is one yearly "Actions and Decisions List (ADL)" available containing site and general assurance activities. Furthermore all activities are planned with a due date for achievement. This plan of activity is overworked and updated annually.

Do

"Do" represents the execution of planned activities at each mill or assurance management level.

Check

"Check" is executed within the Plant Management and reviewed on a regular basis. The "Plant Manager" even discusses environmental incidents and social accidents during OMT. Environmental incidents, absentees, illness, accidents are part of the weekly OMT - KPIs.

[17] Compare Rowland-Jones et al; page 212 - 213 and Deanna H. Mathews, p 96 - 97
[18] Information gathered through interviews and meetings with "Plant Facilitators"

Act

Review of the activity list happens only at each "Plant Management". During Plant Management meeting the activity progress is discussed. Focus on "what has to be done to succeed right in time".

The turnover of each environmental managerial cycle is annually. All the stages during the cycle are executed also at one organizational level in the overall organization. Only in case of emergencies or heavy incidents environmental issues become a topic during OMT. This means there is, beside of health and safety information no regular communication on environmental figures concerning improvements or development at the level of Smurfit Kappa Solid Board Operational Management (OMT) and Management (MT).

What could be a driver for this situation?

Major possibility is the fact, that operational environmental performance monitoring and reporting is not a requirement for audit of ISO 14001 on one side; and on the other side, costs for environmental incidents are not as high that it could come immediately relevant for operational meetings.[19] From the side of "Management Team" there have been till now no ambitions to define goals on environmental issues. There are so many more possibilities, beside the environmental ones, to reduce costs and safe money, that energy or other topics got not enough relevance. However environmental control is an instrument to decrease costs. Beside this fact it is more the future, customer orientation and strategic foresight, which raises now relevance for change.

2.2.3 Description of the actual situation concerning Smurfit Kappa Solid Board reporting

In the following paragraph the environmental management at SKSB will be examined considering corporate internal and external information transfer through questionnaires.

In the current situation, the progress of internal reporting in between "Smurfit Kappa Solid Board NL (SKSB)" is one predominantly focusing on data collection of questionnaires by the "Plant Facilitators" of each mill. Those questionnaires are organized and collected centrally by the "Smurfit Kappa Group (SKG)".

Reports established through the "Plant Facilitators" of SKSB are according to table 3 as follows (next page):[20]

[19] E.g. for EMAS I and II it is required to incorporate internal and external environmental reporting
[20] Information gathered through meetings with the "Plant Facilitators"

Report	Communication Receiver	Frequency	Forced by
Questionnaire for external Sustainability Report	SKG Environmental Affairs and Product Safety	Annual	Voluntary – Stakeholder demand
Questionnaire for Energy and Emission Report	SKG Environmental Affairs and Product Safety	Annual	Internal reporting
Questionnaire on site energy usage[21]	PPT Roermond	Annual	Corp. internal Energy Benchmark
Environmental Report – Milieujaarverslag	FO – Industries	Annual	Covenant for "License to operate (LTO)"
Made Plan Industry (M.P.I.)	Verification Bureau for Energy of the Government (VBE)	Annual	Legal Requirement (MJA – 2)
Emission Report – Verificatie Emissieverslag	Verificatie Bureau Benchmarking and Dutch Emission Authority (NeA)	Annual	National Allocation Plan (NAP)
Environmental incidents and safety accidents	OMT and MT	Weekly	Internal reporting

Table 3 Reports established at Smurfit Kappa Solid Board

An **"Emission and Energy Report"**, for internal and not external review, is issued annually by the central group. It should be mentioned, that reports for environmental issues and health & safety are issued centrally, and until now, they are not a matter of review or examination at a management level of SKSB. The reporting cycle begins with data collection through questionnaires (for each Mill of the SKG) in January/February annual. Compilation and analysis is executed through "Product Safety and Environmental Affairs (SKG)"usually around April. The **"Questionnaire on Energy Usage**" is new (March 2008) and collects site relevant energy data for a corporate internal benchmark.

Data integration for external **"Sustainability Report**" is even executed through SKG, which also represents a "Central Resource Management" for sustainability data. The external Sustainability Report has an own "Sustainability Questionnaire", which was filled out for the first time in January 2008 by all mills. During this summer the first external "Sustainability Report" will be disclosed.

The **"Environmental Report"** or in Dutch even called **"Milieujaarverslag"** is an annual report, externally required to receive a "License to Operate (LTO)" by the government. So it contains a check against the permit, legal requirements. The report is annually uploaded on the homepage of the FO-industry, the branch organization. This report is build up on

operational in and outputs with annual average values. The content of the "Environmental Report" features similarities to the internal "Energy and Emission Report SKG".

The **"Emission Report"** monitors figures of CO2 and Nox; its primary objective is to collect data on emissions to air. The content is especially verified through an external verification agency– the "Verificatie Bureau Benchmarking (VBA)". After external verification data is send to the "Dutch Emission Authority (NeA)".

"Made Plan Industry (M.P.I.) – PEMS (Process Energy Management System)" is a covenant and external report organized by the VNP (Koninklijke Vereniging van Nederlandse Papier- en kartonfabrieken), the association of the branch. It is even generated on an annual basis. Responsible for establishment of the report is the "Plant Facilitator", however in the actual situation the "Maintenance Team Leader" and the other internal supporters establish this report. The report is called "PEMS (Process Energy Management System – see Figure 3) and visualized below. It is in an excel sheet and represents a "Matter of flow" for energy.

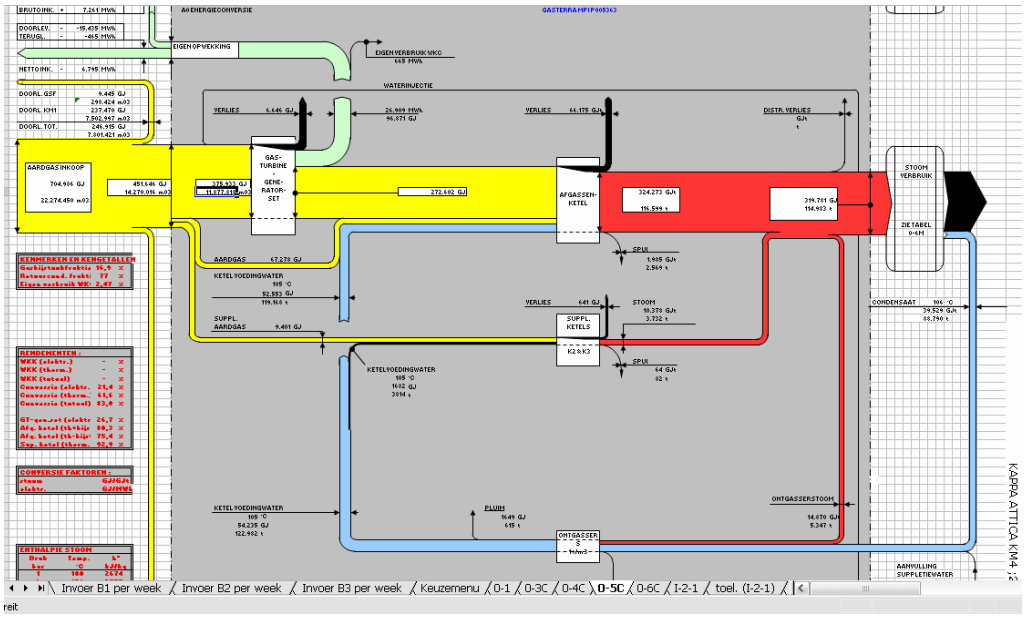


Figure 3 The PEMS (Process Energy Management System) file exposure

Through the above named reports it is recognizable, that no internal environmental reporting exists. The only internal periodic reviewed report is a weekly report on **"Environmental incidents and safety accidents"**. It contains a description of incidents, accidents, illnesses, absentees and environmental impacts. It is established regularly by one "Plant Facilitator" and transmitted to participants of OMT and MT. This report features the possibility for higher development with more figures. It is further observable that a monthly or periodic report is missing entirely.

2.2.4 Conclusion on the actual analysis

The cultural politic of SKSB regarding environmental development may be described as a "Politic of Avoidance", which is "passive" in its actions and not "pro-active" in identifying visions. According to this fact, no goals on environmental issues are defined during the stage of planning. It should be further amended, that after literature study, this problem is even well known in literature and common in practice. Following after *Rowland-Jones et al* , during the stages of "Planning" and "Assessment and Analysis on Sustainability Aspects" of EMS, there is actually in practice also often no focus lead on the actual environmental performance of the organization itself.[22]

It appears logical, that if no attention is paid on performance and operational environmental results (by reports), it might become difficult during "Planning" of environmental activities to focus on causes and define goals to improve the overall sustainable development. As there is only one weekly report on incidents and accidents established, reporting on selected standardized environmental figures, to determine and monitor environmental results, appears to have potential for future.

In summary the following checkpoints are recognizable for the actual situation, and valuable for future internal reporting and the next chapters:

- Absence of visible forces determinable, which could force internal environmental performance tracking and reporting. No organizational structures, which guide employees to focus on environmental performance goals. Singular functional EMS goals are in practice.
  Environmental performance is not a matter of audit and it seems to be that it will not be in near future. This circumstance drives the need to define internal goals for environmental protection and sustainability development. Goals create a kind of urgency to environmental topics and employee awareness.

- Communication and support for the external sustainability report is performed through questionnaires; static figure transfer. There is no linkage between activities and figures obvious for the central group.
  Goals and Activities need a relation. This relation is necessary for learning effects and internal reporting

- Administration and EMS processes are more or less left as a single task for the system manager in person of the "Plant Facilitator". According to this the identification of

[22] Rowland-Jones/Pryde/Cresser; An evaluation of current environmental management systems as indicators of environmental performance; In: Management of Environmental Quality Journal 16 No. 3; 2005; page 211

environmental aspects features no strategic integration and relevance for the policy of SKSB.
In this situation Plant Manager and Plant Facilitator should discuss collaboratively about goals and possibilities to improve goals. In the 3rd chapter an approach to identify content will be drawn. This could be a matter of discussion and review.
"Plant Facilitator" needs to give advices by figures for plant internal eco-controlling. Controlling needs figures and goals to be effective. Both of them are not an instrument of support in the actual situation.

- At no mill of SKSB "Employee Suggestion Systems" are implemented, which could facilitate employee and labor participation on environmental improvements and share ideas.
  Internally environmental suggestion boxes or "open collaborative discussions" at each mill could force labor and employees to raise the attention on environmental care.

- The internal report, called PEMS (Process Energy Management System - see 2.2.3.) bears possibilities for energy flow optimization, but has a shadowy existence. It is not a proactive used to identify activities.
  The possibility should be considered to think of new system possibilities and a new organizational group, which could work in a team on energy and water flow optimization. A new application or system could support identification and control of cycles.

- There is no centralized database, electronic location, folder for environmental operational figures – no comparison (by figures) to legal requirements available.
  This raises the issue that a new "Information System" with a database for environmental indicators at each mill could come into place. However for the first part an excel file posing all indicators is a first step.

- Furthermore it should be noticed, that all SKSB mills face different heterogeneous ICT-landscapes, which make an allocation and integration of environmental data tricky for frequent reporting.
  Integration of systems is the only solution to have one source of operational environmental indicators. This idea will be discussed in the last chapter of the thesis.

3 Organizational Sustainability

It seems to be that during the last years a paradigm change and a new comprehension and vision of corporate development has arisen. In comparison to other corporate development and change processes, the sustainability approach is different and enhanced orientated on improvements of the natural system condition and human situation. The entire sustainability approach is sponsored by multiple organizations and scientific contributions, which make a simplification and short overview in the frame of this project difficult. An explanation in own words, is following, with the particular question:

What is a simple meaning of sustainability and environmental protection?

In order to legitimate the move to natural values, which go beyond of a single financial orientation, an alternative interdisciplinary perspective of the world itself is required. The "natural system", described by natural science, has to be set in relation to the "artificial system" of our economy and business. The sustainability approach defines for those 2 system also values for differentiation: "Natural-" and "Artificial Capital"[23].

"Man-made", "artificial" or financial capital is therefore seen as a result of transformation of natural capital and therefore even dependent on natural resources. During the last century, through industrialization and single financial orientation artificial capital has been developed and western level of living provided (compare Figure 4). However natural capital itself has been influenced and devaluated through resource exploitation and environmental burden. Key consequence of this relation is that not only "artificial", financial capital should be protected and developed; even more, for a long "durable" run, focus should be lead, in equal parts, on the natural system and its serving capital values.

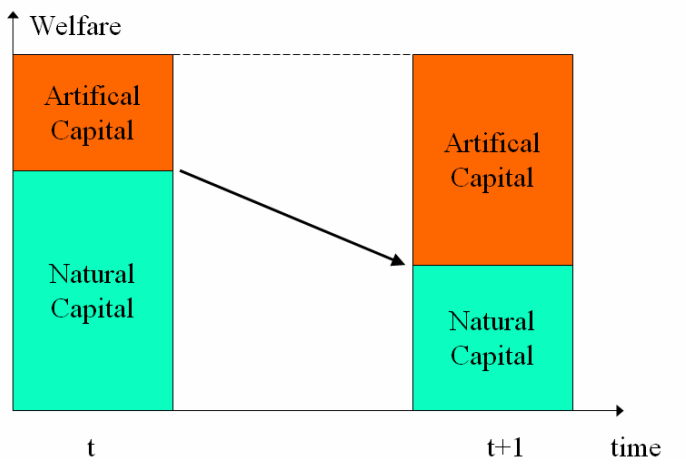


Figure 4 Substitution of natural through artificial capital

[23] Operationalizing sustainable development by investing in natural capital; In: Jansson *et al*; Investing in natural capital; 1993; page 22

To understand the relation between a company and its influence on the environment, a good example for simplification is the case of a flying airplane, comparable with a "company" and its internal system and on the other side "Laws of gravity and aerodynamics", representative for the natural system and its values. For the case of durable long term corporate success, only an airplane, which is orientated and adapted to physical laws will not fall and crash.[24]

We must not forget the relevance of social capital and values as an addition, which functions moreover as "intangible assets" (Recovery, Employee satisfaction). However, because of necessary focus and branch relevance, as a thesis constraint, recommendations for reporting will be singular led towards the ecological dimension of the 3 kinds of sustainable values.[25]

What are reasons for organizations to identify and start development in sustainability?

Many organizations try to change the way they do business towards a sustainable way. Probably not in all of the cases, this endeavor causes in the protection of the natural values itself. An important significance plays the circumstance to reconcile activities with the part of economic sustainability and "Artificial Capital". In a general manner for categorization there are 4 causes determinable (Figure 5):

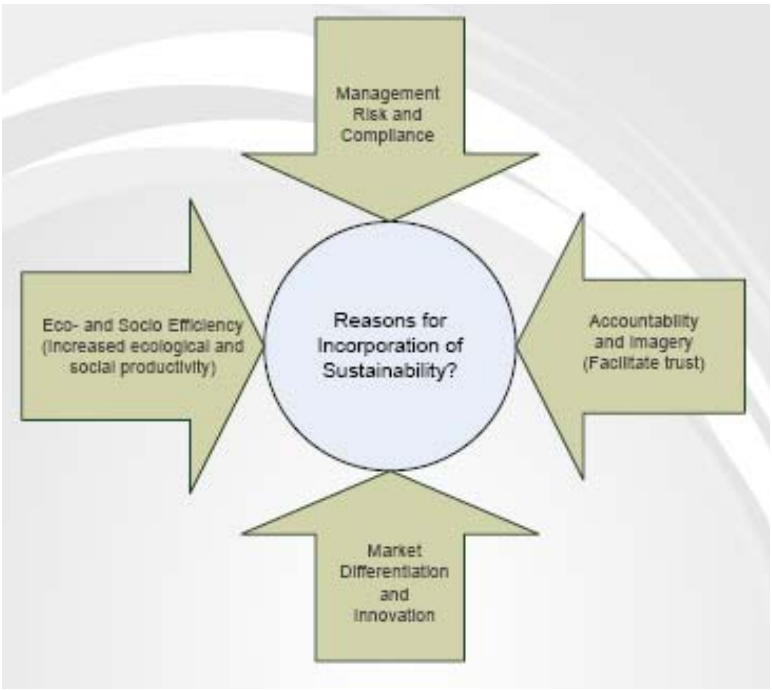


Figure 5 Reasons for incorporation of sustainability[26]

[24] Idea and comparison aligned from the movie "the corporation" – Interviews on Corporate Social Responsibility
[25] Profit (Financial capital) – Planet (Natural Capital) – People (Social Capital)
[26] Compare Tschandl, Martin, et al; Integriertes Umweltcontrolling; p. 4 - 6

For companies the most popular way to work on sustainability seems to be the focus on **"Eco- and Socio efficiency".** In the year 92 the "World Business Council for a Sustainable Development (WBCSD) raised and communicated the concept of eco-efficiency as a solution for corporate sustainability in a way businesses can contribute. Here the relevance and environmental benefits are easier to identify and measure. While eco-efficiency is focusing on its efficient use of its natural capital, socio-efficiency is concentrated on minimization of social impacts (working accidents, human rights, mobbing).[27]

"Management of Risk and Compliance" is in many companies more or less representative through the EMS requirements from the ISO 14000 or "EU-Environmental Management and Audit Scheme (EMAS)". This includes compliance with legal requirement levels, and activities in order to avoid risks throughout all stages of the life-cycle of a product.

"Accountability and Imagery" features more a strategy character. Here the linkage to "Reputation Management" and "Public Relations" is high. Companies try to communicate a green image for advertising and sales purposes.

"Market Differentiation and Innovation" as a cause for a sustainability examination contains not singular the sphere of production processes itself (Green Manufacturing); furthermore the products or services will be examined during its product development on possible negative impacts on sustainability (Environmental-friendly-design). This examination is the basis of new sustainable product innovations. A total "Life Cycle Assessment (LCA)" examination considering all stages is necessary in order to get an entire exposure.

What is "Smurfit Kappa (SK)" striving for? Referring to the annual "Smurfit Kappa Group Report 2007", which is a disclosure for external public audiences, SKG regards sustainability as being central to the business strategy. The mission is to be a customer oriented, market led company where the satisfaction of customers, the personal development of employees and respect for the environment are seen as being inseparable from the aim of creating value for the shareholders.[28]

[27] Dyllick, Thomas; Hockerts, Kai; Beyond the Business Case for Corporate Sustainability; 2002; p. 136
[28] SKG; Annual PLC Report; 2007; called 15. 04. 2008; http://www.smurfitkappa.com/NR/rdonlyres/3B7AA176-F8CF-400C-8D21-6F5EFDDE6278/0/SmurfitKappaAnnualReport2007.pdf; p. 31

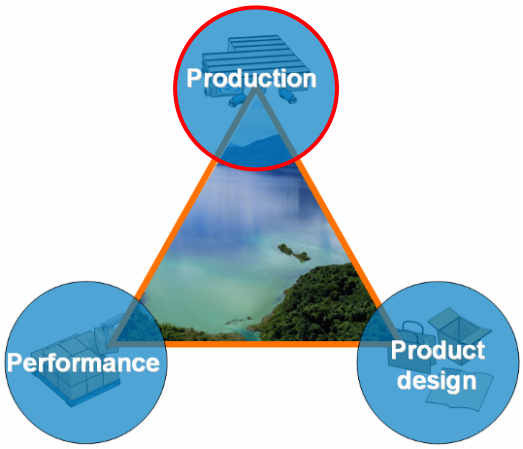


Figure 6 The Smurfit Kappa Triple P approach[29]

More detailed information provides the last sustainability information to customers, which amends to the environmental orientation also social responsible factors. According to this sheet, SKG strives forward to manage its business in a way, which recognises its responsibilities in all aspects of corporate social responsibility and the wider environment. Smurfit Kappa envisions with regard to sustainability and the 3 Ps[30] (Planet – People – Profit) an adapted approach focusing on "Production", "Performance" and "Product Design" (see Figure 6 above)[31]. All of the 3 SKG dimension can be examined as focusing on the ecologic perspective of reducing material intensity and input/output burden factors predominantly. With Respect to this SKG strategy, focus can be lead, for internal reporting at SKSB, on the operational environmental figures of the production locations Furthermore the following strategic sustainability components are relevant for SK and their facilities for future:

- Maintaining a code of business conduct that supports our core values of integrity, responsibility and respect
- Support local communities and our employees with dedicated social responsibility programs
- Ensuring to the maximum extent possible our suppliers of forest based products are credibly certified and legally compliant
- Achieving continuous improvement in reducing the environmental impact of our operations
- Fully harvesting efficient packaging solutions which contribute significantly to the sustainability of the total supply chain

During this project requirements for reporting are referred to eco-efficiency and socio-efficiency of operational management. Internal reporting of environmental issues answers

[29] SKG; Annual PLC Report; 2007; called 15. 04. 2008; http://www.smurfitkappa.com/NR/rdonlyres/3B7AA176-F8CF-400C-8D21-6F5EFDDE6278/0/SmurfitKappaAnnualReport2007.pdf; p. 31
[30] Referring to Elkington who founded as a first person this comprehension in the 90s
[31] Commitment towards sustainability; SpecDiv Sustainability Info Customers; received 07.05.2008

and functions as an element to support continuous improvement in reducing environmental impact of operations (the 4th raised point). Forest certification examination and incorporation of sustainable business conducts to the mill and production level are moreover identifiable as critical sustainable success factors for SKSB. In the next Chapter focus and questioning will be lead on the purpose of internal reporting itself and its relation to the external sustainability reporting.

3.1 The Trend of sustainability reporting

According to a comprehension of corporate sustainability, "reporting" can be defined "as an organizations account on its environmental, economic and social performance in relation to its operations, products and services".[32] Companies sustainability reports represent a channel[33] (corporate internal and external) to communicate sustainability impacts, performance and activities. Most important receivers of such information are internal and external stakeholders, which share interest into company's activities. In order to serve this information need, successful sustainability reports may demonstrate that environmental management systems are integrated into the overall management system, corporate policies developed and "Continuous Improvement Processes (CIP)" are internal evolving. Is such a development common and necessary for paper industries? It can be responded – yes.

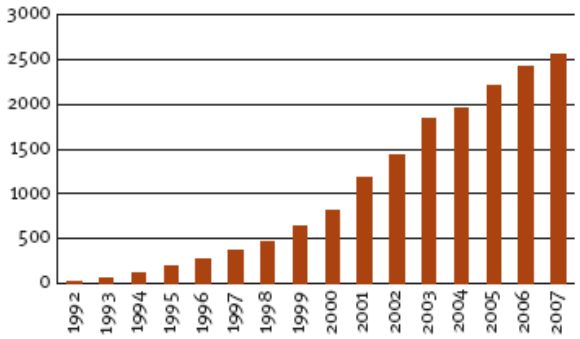


Figure 7 Global external reporting disclosures per Year (timeline)[34]

Through "Figure 1", from the institution "Global Reporting", it can be noticed, that corporate external disclosures and sustainability reports are growing by quantities each year. This trend started simultaneous with the evolution of EMS and the UN WCED (World Commission of Env. and Dev.) Rio Commission in the early 90s. The "United

[32] N.A.; GRI (Global Reporting Initiative); Introducing the 2002 Sustainability Reporting Guidlines, 2002; called 28. 02. 07; http://www.globalreporting.org/guidlines/2002/gri_companion_lite.pdf>
[33] Sustainability reports are mainly distributed over corporate homepages and in an annual manner updated. An internal environmental or sustainability management cycle has to be reconciled and orientated at the pretensions of external reporting
[34] Reference to www.globalreporting.com

Nations Environment Program Industry and Environment (UNEP)" designated in the 90s a special technical report, which describes five stages towards sustainability reporting.[35] The idea was to guide companies through the stages of corporate reporting; starting with "Green Glossies" and "one-off reports" towards a "frequent annual reporting linked with a companies EMS". The final stage of development features an internal and external "sustainability development reporting", which is linked to environmental, economic and social aspects. So during the years of reporting development the content in reporting was evolving towards a higher complex structure.
Nowadays 14 years later this vision is more or less translated into practice for the external disclosures, but there is still no universal accepted tool for companies to report on their impacts internally.

How is the reporting progress in the paper and packaging industry evolving?

In the Forest and Paper industry it is also recognizable that external disclosures are growing. 61 of the top 100 Forest, Paper and Packaging companies have disclosed an annual external sustainability report for the year 2006[36]. Most of the reports are published annually and provide corporate level details. Already 21% of the reporting paper and packaging companies provide information about activities and improvements of certain areas in each divisions, sites or business units.[37]

It can be said, that in the paper and packaging industry is a willingness to disclose and work on sustainability issues recognizable. For the case of Smurfit Kappa no external sustainability report has been published so far. The first planned date for issuing will be mid 2008.

3.2 Awareness and Change Management

"Tell me and I forget,
teach me and I remember,
involve me and I learn."
Benjamin Franklin

Following the fact that corporate external reporting is becoming more and more important and demanded, internal reporting needs to be incorporated. There are major multiple advantages by internal reporting identifiable beforehand: [38]

[35] N.A.; UNEP; Company Environmental Reporting, Technical Report N 24; 1994
[36] PwC; Sustainability Reporting in the Forest, Paper and Packaging Industry, Survey 2007; called 28. 02. 08; http://www.pwc.com/extweb/pwcpublications.nsf/docid/a0282de355ebfccb8525736e00553b4d - 42k, p. 31
[37] ebenda
[38] Compare also Ranganathan, Janet; Signs of Sustainability; In: Sustainable Measures; Benett & James, p. 489

- It forces internal awareness for sustainability relevance,
- Highlights problems before they occur (early warning effect)
- Communicates sustainability key areas for operational management attention across mill boarders
- Provides environmental benchmarking on key issues between the locations
- Motivates management action and allows to rank the mills internal
- Forces and supports organizational learning between the mills by continuous identification of SKSB best practice
- Provides a realistic basis for setting of future performance goals

During the recommendations for new organizational changes, beside of structures, also the awareness of the employees and its learning ability should be considered (see figure 8).
With reference to the advantages of reporting, learning effects in the area of environmental issues are necessary for internal improvements. Not all of the advantages raised before can be exploited with one strike. Such a process needs a lot of patience and long-term improvements; for example a successful start of stage 3, to find activities, requires the awareness that those activities are important. If this precondition, for a right order, is not fulfilled, environmental goal satisfaction will fizzle out.

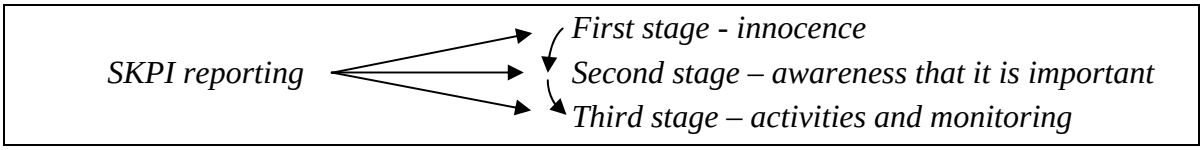


Figure 8 Sustainability awareness [39]

During the first stage, the *stage of innocence,* employees of a company are innocent towards environmental and sustainable relevance and their participation to improve its performance, continuous reporting and monitoring of figures. During this stage environmental issues are blocked; uncertainty or complacency is the cause. Recommendations for environmental improvements proverbial bang ones head against a brick wall.
But it is possible to think of different ways. Referring to *Kotter*[40] 8 steps are necessary to implement a change successfully: the first step for a change is to create a sense of urgency in an organization. Here the question will be posed, whether people feel that the outgoing situation is unacceptable. In many cases innocence can probably be traced back to a lack of information. But it will be assumed that filling the gap with information singular is not enough to support and reach awareness. It is assumed that people need to be pushed to focus on relevant action and people can be pulled to take action. Once can be said that both, push and pull, needs to be executed in a simultaneous or constructive manner. What is meant with push and pull?

[39] Ribitsch, Reinhard; own illustration
[40] Compare: Kotter, John; Leading Change; 2006

Push for example is representative for a new structure, with a new policy and new goals on environmental issues; these are symbols and frameworks, which may not influence values – the core of the identity of an organization or employee – however the behaviour. A power-coercive strategy is therefore forced by top-down; the presence of power and the threat of sanctions are necessary to raise urgency and assure the desired behaviour. Pull supports with soft facts and stimulation possibilities. Soft facts are provided by "Sustainability training programs", frequent feedback discussion rounds on sustainability issues, walk the talk, organizational "Best Practice" sustainability rewards, etc. The aim is to stimulate people to generate change themselves. This is more a bottom up approach based on rational insights and refers to the being of a person.
For long-term sustainability success, it should be considered, that only the caring employee, which actively pose sustainable values through personal reflection, can force and support corporate development towards a sustainable one. Reporting can play an important role in supporting this awareness in all of the sustainability development stages.

For the practical case of SKSB, it can be said value-free, that employees and relevant working staff are probably innocent for relevance of environmental topics and their influence to improve the performance. It is necessary to give people a reason for change and space for learning processes. For this reason, presence, reporting and monitoring of figures bears high relevance. Beside of sustainability awareness of figure 8, it can be even furthermore referred to the typical communication flow model below (figure 9).

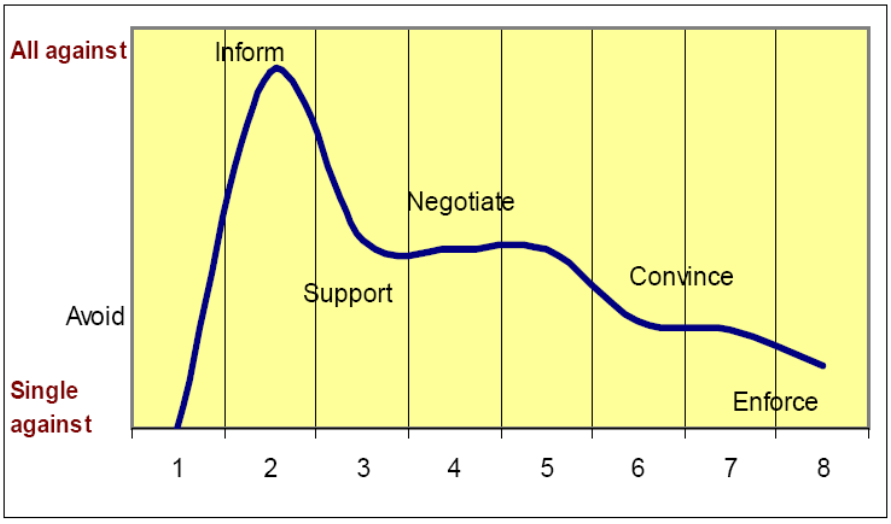


Figure 9 Communication flow model[41]

This graph shows more than concise, how relevant communication and reporting is, during the early stages of change processes. This is of course a standardized process ranking, but also relevant for the business case of SKSB.

[41] Hoven, Henk; Change Mangement at Smurfit Kappa Solid Board; 2007

The suggestion to support awareness of employees is simple; providing feedback to the employees by measures and indicators. I will give a short demonstration: In a housing project in the Netherlands, half the utility meters were installed in the basements like it is usual. At the other half of examined houses were in the meters in the front halls (where the residents could see them daily). In the houses, where the meters could be readily seen, 30% less energy was consumed.[42] This example shows more than significant how important presence of reporting and simple information in life, environmental management and development is.
Awareness to environmental topics enables as a next step responsibility and this facilitates the possibility of proactive action towards activities. The satisfaction of the activities can be moreover checked through reporting.

How should the structure look like to implement a frequent reporting? Reporting plays the role as a transversal task. This implicates a description and discussion of an ideal "Sustainability Management" cycle and not only one process spot. Beside of report generation itself environmental management structures need to be adapted. This new approach requires a common goal set and defined requirements for data collection. In the following chapter, those will be reflected in "helicopter view"; referring to the 1st raised thesis question: "what is in a conceptual perspective necessary for establishment of a managerial sustainability structure?"

3.3 The concept of a Sustainability Reporting Structure

Why is it not enough for SKSB to simply collect and transfer figures, through a standardized layout, in a periodic frequency?[43]

Because it can be noticed, that transfer of simple information, itself, cannot force "organizational learning". Representative for the case of SKSB is the fact that for example since 2005 annual reports on energy and emission are already established, by the central group, but they are not a matter for environmental planning at SKSB. As mentioned in the chapter before, internal communication about reporting should raise the awareness on environmental performance; that e.g. "we" have (or have not) reached certain learning stages on our road to e.g. sustainability. To meet the requirements and succeed in sustainability, information (by indicators) needs a certain relevance to well-considered aspects, values, activities and goals.

If those components are fulfilled in practice, organizational learning processes can be executed and recorded through one periodic internal report. This should be send after generation to internal SKSB contributors and furthermore to the central group of

[42] Willard, Bob; The Sustainable Advantage; 2002; p. 126
[43] Through questionnaires by external or internal authorities

environmental affairs. Integration of this frequently recorded information into the "external" SK Sustainability Report features a logical interchange. According to central group governance it is appreciated to receive such an internal protocol. However it is not recommended and allowed to directly send this information to external stakeholders. This is the purpose of the "external" sustainability report, and this contains usually a higher "complex" standardized set of figures for external benchmarking and comparison. The internal report contains confidential data, especially if operational goals are included.

For organizational changes SK group policies for each division will be defined and aligned soon, in near future. Those could include a conduct for sustainability and especially strategic goals, on which should be followed. During the last year a sustainability group director was designed to follow this new open approach of development.[44] A special "Project Team on Sustainability" is working since that time on establishment of an external sustainability report for the entire group. Each division CEO will apply the new policy values and show his commitment in goal setting and planning of sustainability.

Referring to the environmental management system, described during the actual analysis (see 2.2.2) and the conclusion, the environmental management system and its stages bear possibilities for adaptation. It is also recognizable from the side of literature, that it is quite common that EMS system standardized by the ISO 14001 are hardly developing after implementation, shown in many cases. However in order to communicate on sustainability improvements in a frequent periodic manner an evolution of the environmental management process of SKSB is required. Regarding to changing and evolving corporate environments and even higher demanded strategic flexibilities it will be assumed, that organizations do not need to follow a "passive" role during identification of their social and ecological focus and adaptation of their management systems. Companies can take the advantage to influence their business and societal environmental structures in order to contribute to a change in the way their management is approached.

Such a progress change or evolution is called in literature as a "diffusion" of the frame of an EMS into height and depth of an organization.[45]
EMS growth into depth represents a detailed focus on companies productive processes and employees abilities to force the sustainability performance. Here optimization of e.g. energy usage, by evaluation of company internal energy flow (cycle of matter, cycle of flow) is center of interest. Ways to facilitate employee knowledge for identification of activities and optimization potentials are also considerable for depth.
A growth into height has different more strategic approach to policy deployment and goal setting. This is necessary to give sustainability and environmental issues in an

[44] According to Smurfit Kappa Group Notice on Sustainability 18. Oct 2007 (Confidential internal notice – not external disclosure)
[45] Compare Gastl, Rene; Dissertation, Original title: Kontinuierlich Verbesserung von Umweltmanagementsystem und Umweltleistung; 2005;

organization enough relevance and urgency. Only through strategic integration it is possible to cascade operational environmental goals per mill at Smurfit Kappa Solid Board.

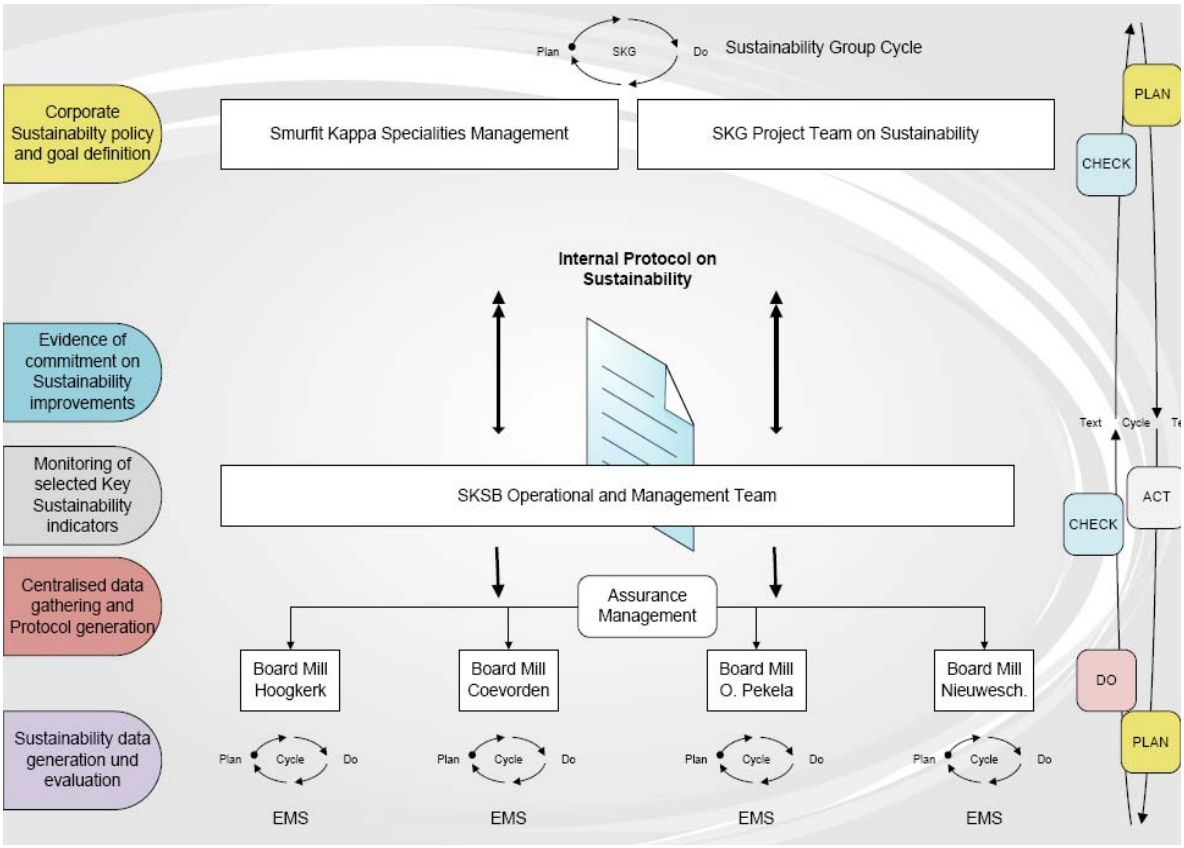


Figure 10 Managerial sustainability reporting cycle for Smurfit Kappa Solid Board[46]

The managerial cycle for sustainability management is described and visualized in Figure 10 above. Furthermore to simple "data transfer" through questionnaires, a documentation of CIP learning effects should come into place. Stages of PLAN, CHECK and ACT of the sustainability management cycle face further possibilities for extension (see cycle at right part of Figure 10). Through an enrichment of the frame, of the SKSB EMS cycle, more starting points, sustainability potentials with strategic relevance could be identified (See Figure 10 – check points left part). Sustainability goals and activities should be collaboratively analyzed, planned and checked on different levels of the SKSB organization. Central point of discussion plays the OMT meeting.

Referring to the figure above it can be summarized, that at mill level, each EMS continuously executes its EMS as conventional. However "Sustainability Data generation and evaluation" needs to come into place at each mill. At "Assurance Management" data will be collected and adapted with additional information for internal reporting (status of the improvement plans, Environmental Program Description of ISO, etc.). During OMT

[46] Ribitsch, Reinhard; the internal reporting protocol and its integration in the organization; own illustration

meetings a selected set of "Key Performance Indicators" with environmental focus are discussed. This activity emphasizes the stake CHECK and ACT of the management cycle. It will be necessary to provide overview over all locations and facilitate and objective performance benchmark. Furthermore to this activity "PLAN" and "CHECK" can be additionally be executed at the corporate level of "Smurfit Kappa Specialized Division (SKS)" or "Smurfit Kappa Group (SKG) for Environmental Affairs and Product Safety". PLAN represents therefore normative and strategic division goals and sustainability group business conducts. CHECK represents an overhead management review and integration into PLAN of the "Sustainability Management cycle of the Group" (see figure 9 – above part of the chart).

As a summary it can be stated, that an internal sustainability protocol could be a matter of integration during the sustainability management cycle (see center figure 10). It fulfills a transversal task in the organizational entity, sustainability management cycle and during the stages of sustainability awareness. It can document and record policy, goals, activities and progress of this stages in a short and compact manner.

3.4 The Sustainability Management Cycle for Smurfit Kappa Solid Board

Following moreover the stages of the SKSB sustainability management cycle will be discussed concrete. A proposed sustainability management cycle for SKSB contains 4 stages: Plan, Do, Check, Act, described in a visual process flow diagram in "Figure 11" on the following page:

PLAN

The sustainable managerial cycle starts with an annual policy deployment and budgeting of costs.

Building up on a **"Policy Deployment"** considering sustainability development an **"Identification of Relevant Aspects"** should provide overview towards necessary sustainability focus for SKSB.

Key focus should be referred on an aggregated list of all operational figures of an organization, its performance and compliance with external requirements and demands (Sustainability Impacts). During "Identification of Relevant Aspects" Operational Management and Assurance Management could identify and review a set of 5 – 10 **"Sustainability Performance Indicators"** periodically. Following, targets could be aligned by **"cascading"** for each mill, depended on a mills environmental performance and requirements for compliance.

Plant Management would discuss at mill level activities, which could influence the environmental performance and goals set collaboratively by the Assurance and Operational Management. Focus is lead towards the question what could be done, in terms of activities and process changes (in order to influence e.g. the operational emissions, waste, energy.), to reach the goal set.
One element that needs to be considered is the requirement for local data collection. As procedure to detailing this type of information about collection, frequency of collection, responsibility of collection needs to be defined at each location by persons. Such a definition was aligned with "Assurance Management" and documented in one EXCEL grid (see following the Appendix Table 4 Data gathering structure and responsibilities).

DO

During DO stage, different procedures and practices can be developed for operations and environmental impacts. As usual, Plant Management meets regularly and discusses, internal, beside of health and safety even environmental performance progress. While some facilities are higher developed, one step further in their environmental performance progress, benchmark results of the SKPIs play the role also for orientation. For example, if one facility is better in the area of pulper rejects it is probably an initial source for better practices. By means of organizational learning the internal report can a supportive instrument to learn from other mills how to improve environmental issues.

CHECK

In the stage CHECK activities, commitment and figures could be discussed, first of all, during meetings of the Plant Management.
Following **"Sustainability KPIs (5 – 20 SKPI)",** targets and favorably environmental program description could be compiled into one sheet – an **internal sustainability protocol (see Figure 10).** This sheet could be transferred to various internal audiences. Reporting of relevant information to the appropriate operational management and executive management is necessary to determine, which special focus, in between of the range of possibilities, has been chosen. Furthermore it is also a tool in communicating, gaining relevance and attention for the environmental performance goal, which should to be reached.

ACT

In the last stage of the cycle, an OMT revision and a discussion on progress could be executed. This would be necessary in order to discuss collaborative on appropriate solutions, higher necessary technological investments, costs and more complex process changes, to still reach the aim set.

The main difference between the above mentioned ideal situation (SOLL situation) and the actual situation (IST situation - described during Chapter 2.2.2.) is that a linkage between goals, aspects and activities, is in one cycle provided, through the amendment of the environmental input and output indicators, and the "internal protocol".

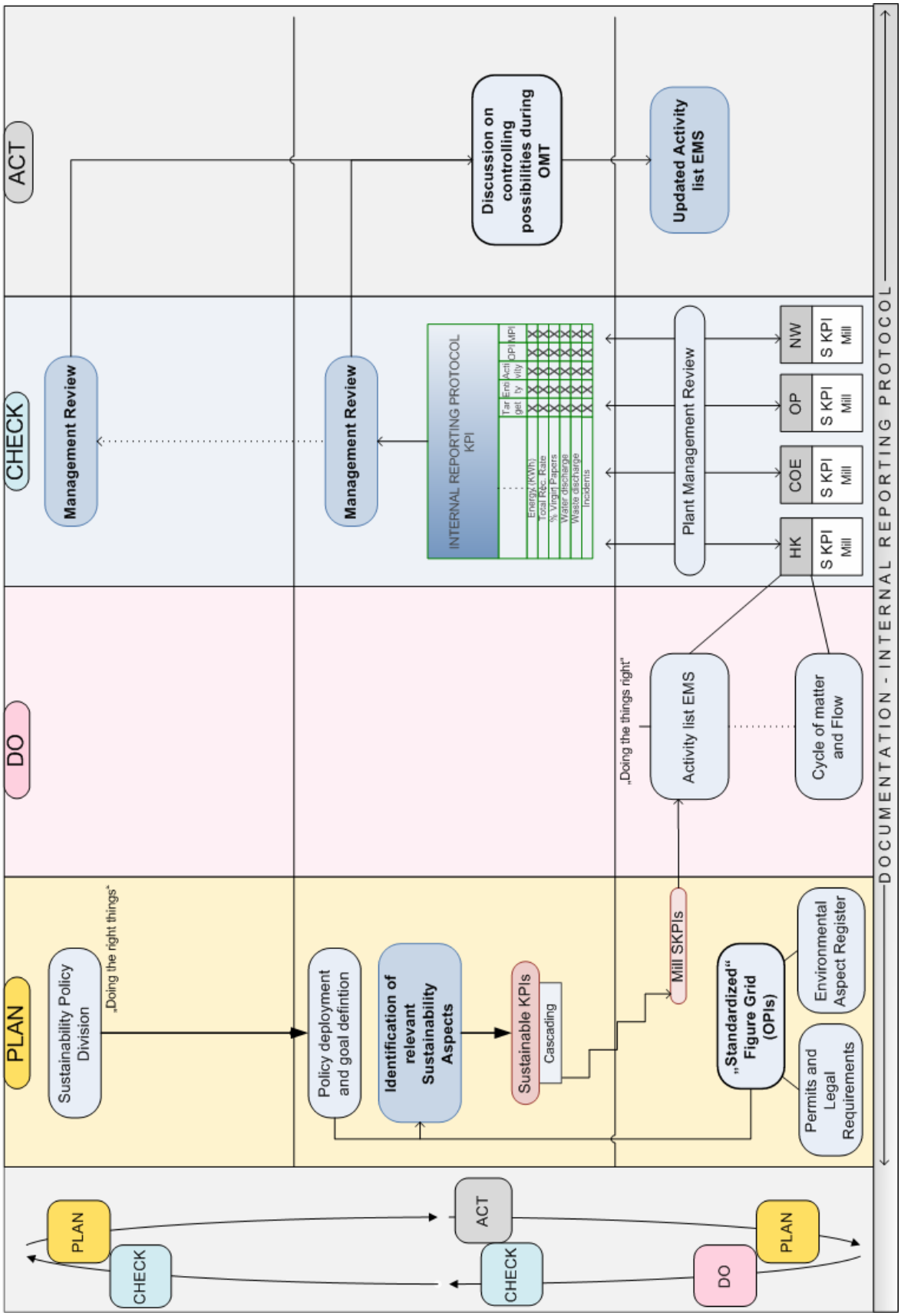


Figure 11 The sustainability management cycle and its stages[47]

[47] Ribitsch, Reinhard; Own illustration

4 Towards a standardized sustainability reporting protocol

How is it possible to identify reporting content? How to get the defined data out of the system?

As it was mentioned in the chapter before the actual EMS cycle needs adaption into height and depth of an organization. This is necessary for internal reporting; in the following will be emphasized, one part into height and one part into depth[48] In order to define reporting content it is necessary to go into high of an organization. In order to know how to get the data out of the system, you have to go into depth.

For simplification and lean reporting structures, it was planned during the project, to identify between 5 – 20 environmental indicators, which have certain relevance for periodic monitoring and OMT review. After definition of content it was examined how to automate and gather this information need.

On this account, in the following, practical and procedural ways for content identification will be discussed. These considerations refer directly to the stage PLAN (of Figure 11) discussed before. Those activities were executed to constrain focus in gathering of CHECK.
In order to get data out of the system the last part of this chapter can be seen as the implementation part, which raises future possibilities for a higher automated gathering of information for reporting (in order to provide a continuous CHECK in the sustainability management cycle of SKSB).

4.1 A Vision for Sustainable Packaging

What is necessary reporting content, what content is recommended and on what content is the branch focusing? Through substantial efforts over the last decades the packaging industry has reduced its impact on the environment in parts and continuously invests in methods and techniques to reduce its environmental and social impacts.

For a focus in sustainability packaging e.g. the institution “Sustainable Packaging Coalition”[49], the “WWF (World Wildlife Fund)”[50] and the “CEPI (Confederation of

[48] Compare Gastl, Rene; Original title: Kontinuierlich Verbesserung von Umweltmanagementsystem und Umweltleistung; 2005;
[49] The sustainable packaging coalition is a north-american working group; information under: http://www.sustainablepackaging.org/
[50] The World Wildlife Fund defines key relevant sustainability focus through a “Paper Scorecard”, which has a small relevant sustainability focus and can be adapted voluntary by paper organizations.
WWF; Special Guidance for the paper industry; information under: http://gftn.panda.org/practical_info/timber_buyer/paper.cfm

European Paper Industries)" define areas in which actively transformation, innovation and optimization could be necessary.[51] Furthermore near branch external sustainability reports of organizations like International Paper, Mondi, SCA, Sappi, DSSmith, Stora Enso refer as a matter of orientation to identify relevant key sustainability focus. After research, literature study and evaluation of the actual situation of SKSB most significant sustainability focus in the paper and recycled packaging industry can be defined in: [52]

- **Reduction of energy usage** – focus on alternative energy sources and energy reduction of all int. process stages (sourcing, manufacturing, transportation and recycling using renewable and less energy)
- **Reduction of material usage –** focus on alternative recycled fibre sources and certified virgin ones - Packaging is physically designed to use efficient materials
- **Reduction of water usage** – focus on closing and better isolation of all water cycles.
- **Reduction of emissions** – into air water and noise – furthermore reduction and replacement of chemicals in all production stages.
- **Increase of social situation and decrease of health and safety incidents** in all categories to zero - Health and Safety for individuals and community considering the whole product life-cycle
- **Achievement and satisfaction of market criteria** set by customer on performance and cost

Furthermore to this common focus it was deliberated how internally systems could support identification of relevant sustainability focus for reporting and operational management. The next following chapter explains one possible approach.

4.2 Practical content approach through scoring

For identification of reporting content on the following page visualization is drawn (see Figure 12). We see in the figure on the next page necessary steps involved to identify SKPI content for reporting.

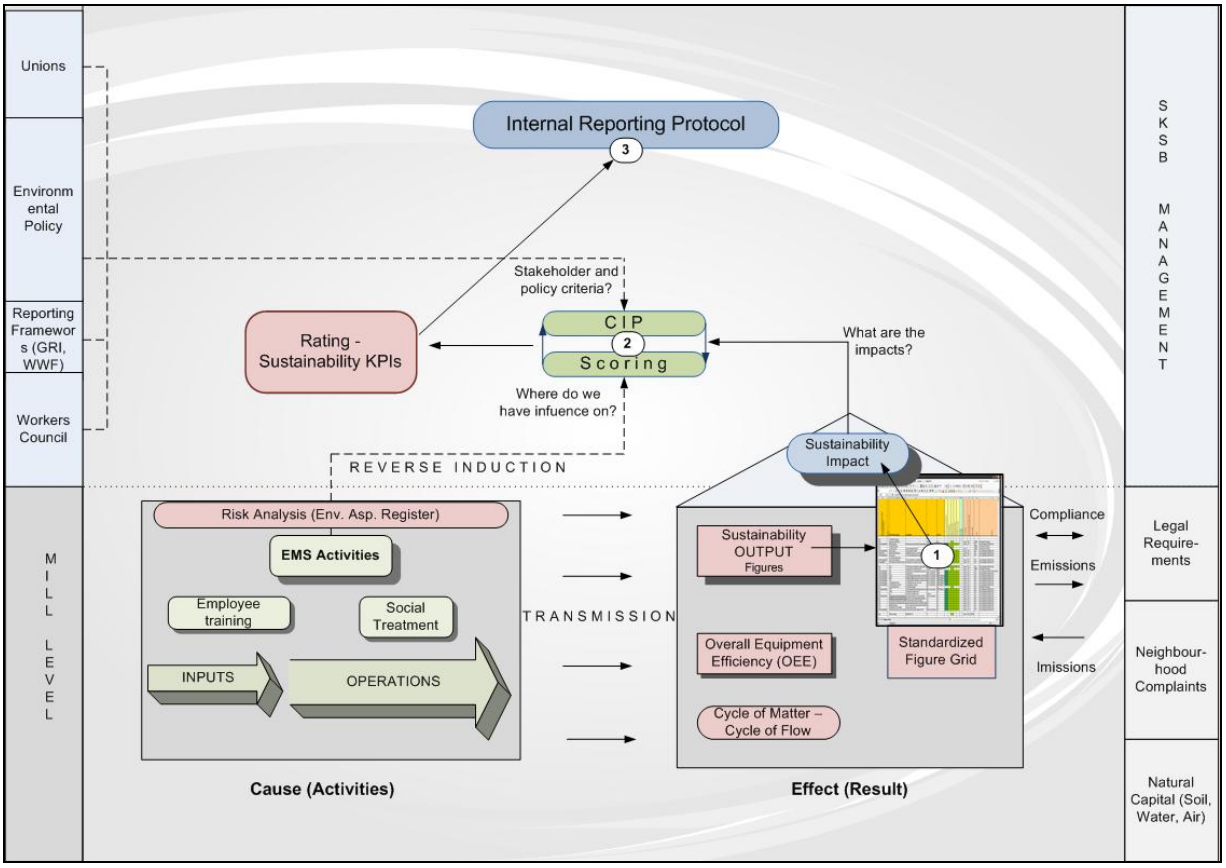
The graph is in 2 major parts divided, into mill and SKSB management level.
At the left and right bottom part of the picture corporate environmental influences for report content identification are added. At mill level these are legal requirements, local complaints and the natural and social system values for protection. For integration in a manner of strategic sustainability also a second environmental influence needs to be included during content identification. So on SKSB management level furthermore results

[51] Sustainability Packaging Coalition: information under http://www.sustainablepackaging.org/about_sustainable_packaging.asp
[52] Under consideration of the "Vision of Sustainable Packaging form the Sustainability Packaging Coalition", "WWF Guidlines for Pulp and Paper Packaging", the "WWF Paper Manual Scorecard" and other sources (see research list in the literature table)

of collaborations with unions, group sustainability policy goals[53], reporting guidelines as a reference need to be included during identification of reporting and management content. Such a process can be also defined as an "Environmental Analysis" in strategic management.

At the lower part of the picture, at the mill level, a split between SKSB "Causes" and "Effects" is drawn for separation (Internal Analysis). This split of causes and results refers directly to total quality management philosophies, which recommend such a separation. On the right side, "results, outcomes and deliverables" are representative for transformation or transmission of "activities, inputs and operations" into "sustainability success and performance by values". This is usually the environmental controlling cockpit with instruments for navigation.

To come to key performance indicators and provide selection, these results need to be translated back to its causes and strategic relevance.



1.	Integrative collection of all indicators in a list (Figure Grid – 100 PIs)
2.	Scoring of parameters considering 3 major criteria
3.	Evaluation of information compilation (SKPIs)

Figure 12 Identification of "SKPIs" considering the "Cause – and - Effect" relation[54]

[53] Will be defined in the first Group Sustainability Report
[54] Ribitsch, Reinhard; own illustration

To come to reporting content, it will be proposed to follow the process line from (1.) environmental impacts list to (2.) "Scoring Grid" (see exemplary appendix Table 8 Scoring Grid for SKPIs). Such indicators, which reflect relevance in such a scoring grid, are those indicators what are especially relevant for (3.) the internal reporting.

For SKPI reporting content and to identify impacts, indicators, which feature positive impact and those which feature negative, should be separated from each other for further treatment. It should be noticed that such a comparison is annually executed; however there is no sheet for comparison and tracking available.

Because of the inexistence of a grid with operative indicators, the collection of all available indicators by type was a meaningful activity during the project. A basis for the compilation has been all the reports and questionnaires, which were annual established in the last year, through the "Plant Facilitators" (see Thesis Structure 2.2.3.). This **(1) "Standardized Figure Grid"** features all operational indicator attributes generated in between SKSB so far and were amended by a few possible future ones.

Exhibit reporting grid

These indicators were classified with regard to its type (Energy, Material, Water, etc.). A big support for this compilation of indicators was the "Emission and Energy Report", which poses many relevant indicators. In between of this report "Best Available Technique (BAT)"[55] references are considered for external reference orientation. For the case of SKSB all of the required BAT values are fulfilled. Following recognition came that those values bear no actual impacts. An integration of legal requirements (higher restrictions), in this grid, was difficult, because all the frameworks (e.g. Province, Waterschap, and License to Operate) were written in Dutch language. For future it would be recommendable to track and include values and legal requirements in such a standardized grid for monitoring or environmental information database.
Simultaneous the "Plant Facilitators" started to establish (first at the mill Coevorden) one mill internal Grid for comparison with external requirements (local, government, license to operate). This grid is right at the moment not established but will be mid 2008.

To think of ICT automations and gathering structures, constrains were examined through the concept of a **(2) Scoring grid**. This analysis can be also compared to an "ABC analysis"[56] of environmental management, however amended with additional policy considerations. Strategic relevance is here compared with operational environmental impacts. It selects in this order: e.g. "group objectives, what are required from the side of a sustainable policy, but feature no incident with local legislation, are in this scoring system relevant for operational monitoring."

[55] Industry benchmark references published by the "International Pollution Prevention Commission (IPPC)" for the Pulp and Paper industry
[56] Categorize input output attributes considering its impact on the environment – classification into A, B and C

Exemplary one case was executed and exemplary attached in the appendix (see Scoring Grid for SKPIs - Table 8).

So it will be proposed, that "**Sustainability Key Performance Indicators (SKPIs)"** are indicators, which measure critical sustainability success, with relevance to the sustainability impacts, policy and the local stakeholders. The SKPI-focus in between of such a monitoring should especially represent the basis and content for an internal sustainability reporting protocol.

Exhibit SKPI selection

Following on this parameter classification, the scorecard set of indicators were discussed during "Assurance Meeting" with respect to its relevance for "Operational Management" and "Continuous Improvement Processes". The question *"do we have direct influence?"* was raised for each single indicator. With the basis of the **"Risk Analysis" (Environmental Aspect Register)** the proposed SKPI environmental indicators were examined.[57] A supportive instrument during scoring of most relevant SKPIs is a "**reverse induction"** through a **"Decision Tree for Boundary Setting"**[58] (see exemplary into the appendix Figure 16). This reverse orientation just questions operational figures on its direct influence on operations, by *"do we have influence on?* So the "Decision Tree" as an instrument can guide operational performance values with negative impact towards identification of its "Causes" and significance.

An **(3) "internal Protocol on continuous improvements"** is following a short document, which could contain 2 relevant types of measures in the content: [59]

- Indicators by category, or end – of – process measures (Inputs – Outputs), and
- Activity/effort levels/goals to present a balanced picture of environmental progress towards established goals.

This balanced picture can be seen as a reflection of the before discussed "cause- and – effect" relation of environmental management. It is proposed, that the ideal reporting frequency needs to be at least monthly at the beginning. Such a time interval is necessary to be continuously informed at plant and OMT management. The ideal report structure should contain (SKPIs) from operations, as well as in addition descriptions of operational managerial engagement to influence the figures. This engagement could be emphasized furthermore through an environmental program description of ISO 14001 by the "Assurance Manager" annually. So this sheet is reflecting the "State of the Art" of environmental progress of SKSB combined with its activities to improve this situation.

[57] The revised version of the ISO 14001:2004 recommends therefore an orientation and separation of a company's most important direct impacts and measures.
Sustainability Technical Library; ISO 14001:2004; Required Elements; called 12. 04. 08;
http://p2library.nfesc.navy.mil/ems/emsprimer/keytable.html
[58] www.globalreporting.com; See exemplary into the appendix
[59] N.A.; GEMI; Environmental Reporting in a Total Quality Management Framework; 1994; p. 8

Responsible for transfer of an internal protocol will be the "Assurance Team"[60].

4.3 The Sustainability Performance Indicators for Smurfit Kappa Solid Board

In the following, results of the Scoring grid are shown in table 6. According to the "SWOT Analysis for Europe's Paper and Board Industry of 2005" [61] as major paper and pulp industry threats can be mentioned: increasing energy and transportation costs, increased recovered paper costs and new increasing environmental legislation requirements. Following indicators and attribute groups has been chosen:

! Values for relative (Per ton produced) and absolute measurement!

Water	W1	Total Waste Water /per ton total net prod.
	W2	Bod emissions (Biological Oxygen Demand) /per ton total net prod.
	W3	TSS emissions (Total Suspended Solids) /per ton total net prod.
	W4	Nitrogen release /per ton total net prod.
	W5	Phosphor emissions /per ton total net prod.
	W6	Cod emissions (Chemical Oxygen Demand) /per ton total net prod.
Energy	E1	Direct Energy Inputs (Boiler, Gas Turbine) /per ton total net prod.
	E3	Indirect Electricity Input - Grid (Essent) /per ton total net prod.
	E4	Steam production /per ton total net prod.
	E5	Electricity Usage Mch /per ton total net prod.
	E6	CO2 Emission (Transport, Sourcing, Production) /per ton total net prod.
	E7	Nox Emission /per ton total net prod.
Material/ Waste	M 1	*Virgin Paper Rate (per ton)*[62]
	M 2	*FSC certified lamination paper bought/ total lamination paper bought*[63]
	M 3	Auxiliary hazardous material (e.g. Defoamer) /per ton total net prod.
	M 4	Tons of total hazardous waste /per ton total net prod.
	M 5	Waste from recovered paper rejects /per ton total net prod.
Health and Safety	H 1	Accident rate per 100 employees
	H 2	Illness Rate
	H 3	Lost Time Accidents (LTA)
	H 4	Recordable Accident without time losses
	H 5	Nr. Of days for LTA in total
Compliance	C 1	Nr. of cases with non-compliance to extern. Regulation
	C 2	Incidents: Spills, Leakage
	C 3	Complaints local neighbourhood

Table 5 Proposed Sustainability Key Performance Indicators

Water: For SKSB, 50 % of all environmental impacts are concerned to effluent water discharges (harmful components in the effluent water). Also for the Paper Scorecard of

[60] One "Plant Facilitator" takes charge of this task after discussions with him
[61] CEPI; Competitiveness and Europe s Pulp and Paper Industry; The state of play; called 02. 03. 08; http://www.cepi.org/Content/Default.asp?pageid=12
[62] Excluded for further evaluation, because frequent data gathering is not possible
[63] Excluded for further evaluation, because frequent data gathering is not possible

the WWF water discharges pose an important issue for sustainability in the paper industry.[64] Referring to the sustainability reports of near competitors of SKG (SCA, IP, Mondi) effluent water flows and discharges feature the first mentioned key sustainability aspect. According to industry benchmarks and relevance of occurring incidents the most relevant indicators for water are as follows: "**COD (Chemical Oxygen Demand)", "BOD (Biological Oxygen Demand)", "TSS (Total Suspended Solids)", Nitrogen, Phosphor** and **Wastewater flow.**

Exhibit Water:

The "Wastewater Treatment Plant (WWTP)" is the matter of influence for effluent waste water. For the question *"do we have influence?"* it has to be considered that the WWTP is an "End – of – Pipe"-solution, which has also an end-of-pipe measurement. The actual cause is in many cases not measureable, because of its uncertainty in appearance. Local requirements can be defined as high and regularly problems or incidents occur. In many incident cases, the cause for to high values is not referred direct to mistreatment through the WWTP. This measurement and process depend in parts on the quality of production processes and operational excellence itself. As a solution for reporting additionally effluent water, which comes into the WWTP, should be considered and measured moreover separately for wastewater control. The action and influence of the "Water Meister" depends on the water quality of the previous process stages. After discussion with Assurance no continuous measurement technology for WWTP inputs is with regards to its costs profitable. Daily sample tests for WWTP effluent water inputs are right at the moment not in practice at every mill of SKSB. More frequent measurement should be executed after "Policy Deployment" and goal setting to provide suitable WW input and output data for comparison. Each WWTP should facilitate an internal controlling and documentation.

Energy: Nr.1 of the top 10 competitiveness factors of the paper industry is energy – efficiency.[65] The pulp and paper industry is beside of material usage, also an energy intensive industry branch. Also for SKSB, near 20% of the total costs are for energy and as a result of that relevant for frequent monitoring.

[64] WWF; Paper Scorecard Manual; called 24. 04. 08; http://www.panda.org/about_wwf/what_we_do/forests/our_solutions/responsible_forestry/forest_conversion_agriculture/paper_scorecard/index.cfm

[65] CEPI; Competitiveness and Europe s Pulp and Paper Industry; The state of play; called 02. 03. 08

Exhibit Energy:

Energy features about 16% of total cost in the overall paper industry. Considering "SK Specialties" affiliated "paper division", near half of energy is there already transferred sustainable through biomass components.[66] Focus for SKSB on biomass components as primary energy source appears to be difficult, because of the absence of tree or other paper mill rejects, which can be applied for re-usage. But rather corporate internal operations processes bear lots of possibilities for energy reductions and improvements.

The Kyoto Protocol set limits for GHG emissions in between of Europe's industries. The National Allocation Plan (NAP-I and NAP-II) follows this goal on national level (Netherlands) by restricting a CO_2 capacity (certificates) for each SKSB mill. The PSR follows on this approach with NO_x emission restrictions. Both emissions feature right at the moment no risk for SKSB (legally).[67]

Focussing on the Kyoto protocol and its goals set, the Netherlands agreed to reduce its GHG emissions from 1990 to 2008-2012 to "-6%". The last available values refer to 2005 and show that the stage of reduction is at 1,16% of the 6% aimed.[68] *What is the contribution of the "Paper and Printing Industry"?* The "Paper and Printing Industry" has reduced its CO2 emissions since 1990 by 3%. So it can be said that the contribution of the paper industry is higher than the average contribution across all the other industries of the Netherlands. According to CEPI reports Energy Efficiency improvements were met in the whole industry through the usage of "Combined Heat and Power (CHP)" produced energy from primary sources in relation to single electricity usage by wire from external power plants. Growth in efficiency can be mentioned with 11,5 % between the year 1990 and 2006 through investments (whole industry). Also SKSB reduced its energy usage since the year 2005 continuously.

According to the EU Energy Policy of 2007 reduction in the area of energy should be met till the year 2020 (also with reference to the year 1990 – the same as Kyoto). The EU aims a reduction of 20% of GHG emissions, 20% increase in energy efficiency and 20% components of biomass primary energy inputs. A Directive is currently under preparation to split the targets among member states (burden sharing).

As right at the moment only annual monitoring of energy relevant data is executed for the case of SKSB; this field is especially relevant for OMT. By the central group and group internal organizational entity "Paper Production Technology (PPT)" an "Environmental Saving Program (ESP)" will be launched soon. For this case Group energy coordinators will be appointed. Those will interact with possible new energy responsible persons of each mill. In order to start improvements central higher frequent monitoring is necessary.

[66] SKG, Energy and Emission Report, Paper Industry, 2006 (internal paper – no disclosure)
[67] According to the "Assurance Team" and the "Risk Analyis (Environmental Aspect Register)"
[68] European Environment Agency; GHG emissions in CO2 equivalents and Kyoto Protocol targets; called 13. 03. 08; http://www.eea.europa.eu/

WWF and GRI recommend monitoring CO2 values in an entire perspective. SKG group goals for "Emissions to air will also follow in the next 2 years. Transport should be considered by its impact through logistics and employee transfer in this calculation. Furthermore also secondary purchased energy emissions should be included for monitoring. This is right at the moment not in place, one step to far for practical implementation, but considerable for future development of reporting. CO2 emission by transportation is furthermore difficult to automate for gathering in between of the information system of SKSB.

Material: Material is in the pulp and paper industry a serious topic with high relevance. Pulper rejects and waste feature high costs for external recycling. The performance of the Solid Board business is furthermore impacted by rising recovered paper purchasing costs due to higher fiber content than in containerboard. For the reporting content waste, rejects and chemical production additives like retention and defoamer are defined. Those indicator feature relevance according to the scoring grid and are available for gathering.

Exhibit Material:

For the monitoring of a "virgin paper rate" a change to 100% traceability and responsible sourcing seems to be not feasible.[69] This depends on one side on the cost requirements for FSC certified products and on the other side on fact that most of the SKSB suppliers do not deliver the percentage of their FSC Virgin Paper inputs. So traceability and goal definition for material is more or less not possible right at the moment even not through adaptation ICT systems. Though it will be mentioned concerning its relevance in-between of this SKPI list. Traceability of responsible fibre sources features along the paper industry a relevant and future task. However plans for certificated purchases are till now singular planned on pulp and not lamination products.

The figure "FSC certified lamination paper bought/ total lamination paper bought" is an important indicator, but according to the purchasing department not available. For most of the 26 suppliers of SKSB only the fact is known that they are having FSC-rated suppliers or not, but do not have information on the actual ratio of certificated purchase. There is even the risk involved that, through information delivery, purchasing costs could rise. It can be stated that this indicator is not suitable for frequent monitoring,

[69] According to the purchasing department

According to high costs and sustainability, monthly reporting of hazardous waste and rejects from the pulping process is meaningful addition. The inputs of "defoamer"[70] into the production process bear hazardous chemicals, which need to be tracked. These additives are also a matter of effluent waste water and production control for the "Maintenance Manager". A frequent monitoring of its values is recommended and for a sustainable development necessary.

Health and Safety: Health and Safety is right at the moment weekly monitored and should be even further monitored in a monthly reporting protocol with such a complexity. Right at the moment "Accidents with effect", "Accidents without effect", "Environmental incidents with effect," "Nr. Of days between incident and following meeting discussion on it" and "Nr. Of days since the last incident" are a matter of weekly reporting. In case of a high relevance impact every incident and accident becomes a discussion in between of OMT. This indicators are frequent updated and can be furthermore adapted for a monthly sustainability reporting.

Legal Compliance: Incidents and cases of non-compliance feature additional reporting content for OMT meetings and "Plant Management". According to the weekly report no themes and split into types of incidents is obvious. Such a split feature additionally relevant information for OMT and goal setting.

Summarized it can be said that those defined indicators feature the basis for evaluation of data gathering possibilities and reporting automation. However energy inputs/outputs, Emissions to air, waste and hazardous water inputs/emissions to water bear the most important relevance.

According to the first released external SKG sustainability reporting draft[71], which has been received mid may 08, indicators are more or less the same. This is an ideal circumstance and reflects right selection of indicators.

In the next chapter, it will be, according to this information and set of indicators, deliberated, how it could be possible to implement and organize a frequent monitoring at SKSB.

[70] There is an extremely diverse set of chemical formulations that can be effective either to prevent foam (anti-foam) or to destroy it once it has formed (defoamer).
[71] First Sustainability Reporting Draft internally distributed at 15th May, 2008

4.4 The ICT - system and implementation recommendations

This chapter focuses on CHECK of the SKSB sustainability management cycle. To enable frequent supply of information for an internal protocol, ICT integration possibilities should be considered.

However technique can not be the cause for change management and organizational development itself. In the following; it will be deliberated: what systems, where, with what benefit and when (short – long term time orientation) could be suitable for data gathering, information compilation and reporting at SKSB.

What kinds of systems are available to gather data for reporting?

To define and describe the existent systems, a definition and comprehension of data levels and system levels is necessary in advance. It can be said that "Information Systems (IS)" were initially responsible for data storing and had no interconnection with other IS in an organization. Each IS was in this comprehension an isolated system with a special function. However in order to make use of the success factor "Information", system integration between applications is inevitable.

As mentioned in the chapter before reporting bears a transversal task in an organization. Following on this, information sources are distributed over multiple locations of an entire IS and organizational hierarchy. Continuous information flow is only assured if all relevant IS are integrated and all hierarchical layers are mapped in between.[72]

To describe this integration an integration pyramid can be a matter of visualization (See Figure 13 following page); shows the location of potentials for internal automated reporting:

[72] compare Hildebrand, Knut; Information Management, 1995, page 23

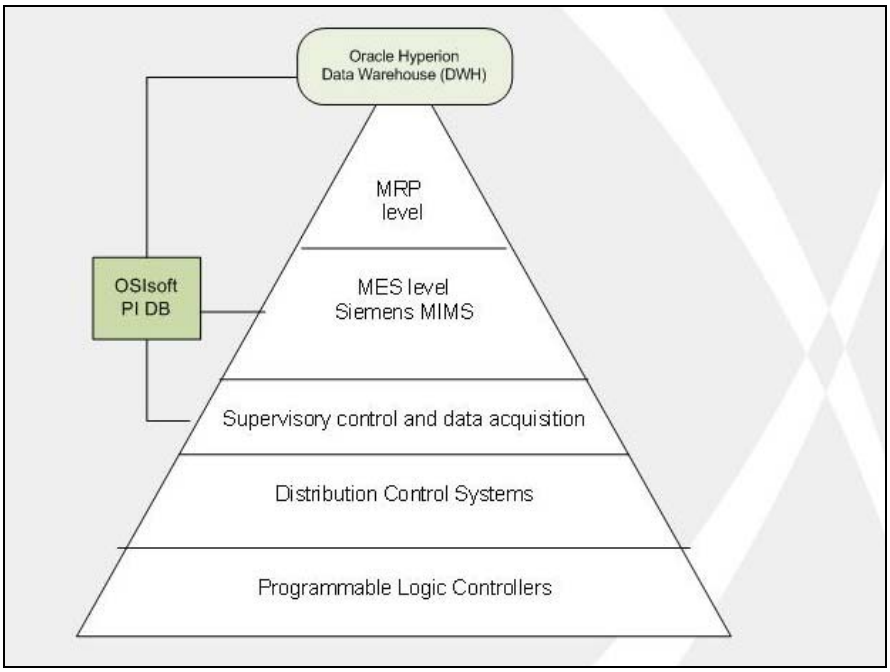


Figure 13 SKSB Information System Integration Pyramid[73]

With respect to the integration pyramid at the bottom layer of the ICT structure of SKSB "Programmable Logic Controllers (PLC)" are used for automation of industrial processes and production machinery (control of thickness of board, speed of board machine, moisture control in paper, etc). So they are used for rational transmission of mass data and simple procedures.

A "Distribution Control System (DCS)" can control and contain several PLC in one DCS system. In the mills of Coevorden and Oude Pekela an "Asea Brown Boveri (ABB)" system is in place. At the mill Hoogkerk is a different system implemented; it is called LSC Process Control system[74]. At the mill Nieuweschans a "Siemens Siematic System" is in usage. It can be said that all systems feature the same functions.
However for data gathering more special relevance features the next layer, which is only represented at the locations of Nieuweschans and Coevorden. "Supervisory Control and Data Acquisition (SCADA)" or general also called "Production Data Acquisition (PDA)" systems are moreover industrial control systems, which feature and contain "Remote Terminal Units (RTU)" along of the production process stages. Those RTUs measure state, activity or performance of machine elements. RTUs transmit information, which following will be stored in form of a "tag" in a database. This can be e.g. Process Steam Flow, Steam Pressure, Energy Usage Machinery, Water Usage, etc. In the case of the mill Coevorden and Nieuweschans a "Performance Indicator (PI)" system of the company OSIsoft (PI System and PI Process Book) is in place, which features all necessary tags together. Here it is possible to select PI tags for internal reporting.

[73] Ribitsch, Reinhard; Information gathered through personal interviews at SKSB; own illustration
[74] Information under: http://www.lsc-gmbh.com/

One layer above, the "Manufacturing Execution System" layer, business software for financial controlling, accounting, business process management or material resource planning is in place.
At the top a "Data Warehouse (DWH)" of Oracle Hyperion Essbase is implemented. This is an "OLAP (Online Analytical Processing)" tool, which provides possibility to integrate data from various sources of an organization for compilation and aggregation in one executive database. Right at the moment all production information, logistics, sales, finance can be reported over this system. Reporting of environmental or sustainability information bears useful extension on this data layer as well.

The following statement is relevant for reporting. If it is desired to implement an automated environmental reporting for SKSB, and this is desired, data origin needs to source in a PI system. However costs for implementation of a PI – systems at every location are high and not valuable for short term time orientation. What kind of data can be delivered continuously? And could that data be relevant for internal reporting? Not entirely. However energy usage, water usage, emissions to air, chemical additives and losses feature possibility for continuous tracking.

Other information related to **energy provided by grid, hazardous waste, rejects** cannot be gathered through such a process control system. Following on this insight interchange between systems or PI compilation in one environmental database (at each location) and furthermore into the DWH seems to be a meaningful approach. Recommended is a system, which is located separately to the MES system at this layer, uses selected continuous PIs and amends information of other business applications, used in between SKSB.
Such a system is called "Environmental Information System (EIS)" by literature and will be discussed in the following part for objective and relevance.

4.4.1 The "Integrated Environmental Information System" as one source for reporting

For environmental management control and optimization there are also software techniques possible as support. Environmental Information Systems (EIS; EMIS or ENVIS) are IS that use a variety of tools and technologies to store, process, transfer and facilitate an interpretation of environment-related information, for monitoring and environmental controlling.[75] In the case of SKSB an EIS is in place at the waste water treatment plants. It is called Eco master. This application bears possibility to collect manually environmental indicators and integrate legal requirement levels. Out of this system environmental reports can be generated.

[75] compare Rautenstrauch, Claus; Environmental Information Systems in Industry and Public Administration; 2001; p. 4 - 5

An "Integrated Information System (IEIS)" is moreover an EIS, which features the possibility to integrate data by different sources through database connection. Such a tool would play a supporter for environmental management and the "Assurance Management". Furthermore through such a system environmental reporting can be highly automated in addition.[76] In my case practical reference for implementation is the IEIS and flow management software Umberto©, which allows application integration with ERP systems and file imports from various source. [77] Such a system can be also used to provide one data source of environmental data.

What could be benefits and attributes of such an integrated environmental system?

- Gathering and collection of environmental operational data (PI database)
- Integration of legal requirements and cost
- Archival storage of data
- Establishment of indicators for measurement
- Tracking and monitoring of environmental performance in continuous or frequent intervals
- Integrated Cycle of flow and matter (e.g. water)
- Visualization and simulation for flow management
- Report generation for internal communication

As mentioned in chapters before the PEMS sheet (see 2.2.3), which visualizes a process energy flow through a "Sankey Diagram" is manual established and part of reporting to a local authority. It is complex and annual established. It appears that it has not the right acceptance as an instrument through the "Plant Facilitators" and file generating posts. Analysis and optimization is however necessary to identify activities and optimization sources for energy losses. It can be said that this sheet plays the role as a barrier or bottleneck for environmental improvements and control. The PEMS sheet collects manual data from several locations by reading of the gas meters or data queries on the information system. Beside of process control of the "Process Book" for the "Energy team leader" an eco-balancing software" and integration of data from various sources is necessary.

For future and long term orientation an IEIS like Umberto©, would be recommendable, because it functions as a source of environmental figures centrally. It is possible to connect this software to different other internal business software, The Eco – master (WWTP software) and PI-system integration should provide a suitable data basis for implementation of such an application. Furthermore it is possible to import manually data through standardized sheets via Excel.

[76] Referring to one report of the University of Magdeburg reporting can be easily automated through using EIS like Umberto.
Gomez, Jorge; Automated generation of reports with Umberto; 2004
[77] Information under: http://www.umberto.de/en/

Exhibit Umberto©,

Umberto©, is an exemplary IEIS for modelling, calculation, visualization and evaluation of material and energy flows and eco - balancing. This system can be adapted to meet specific needs. In the Case of SKSB Umberto©, can be an additional instrument for environmental management and performance tracking. It supports understanding the cause and effect and reaching of objectives set. Furthermore it can help to simplify the creation of an environmental report, because of its collection of relevant data. Considering the ICT – data layer it is situated at the same layer like applications for maintenance, logistics or finance.

4.4.2 Data Sources for reporting and change possibilities for future

For reporting and ICT-automation recommendations it will be distinguished between 2 time periods in the following: Short term (next 1 – 2yrs) and long term orientation (next 3 – 5 or more yrs). Before I want to go in detail I would like to provide an overview for implementation possibilities between those 2 time horizons:

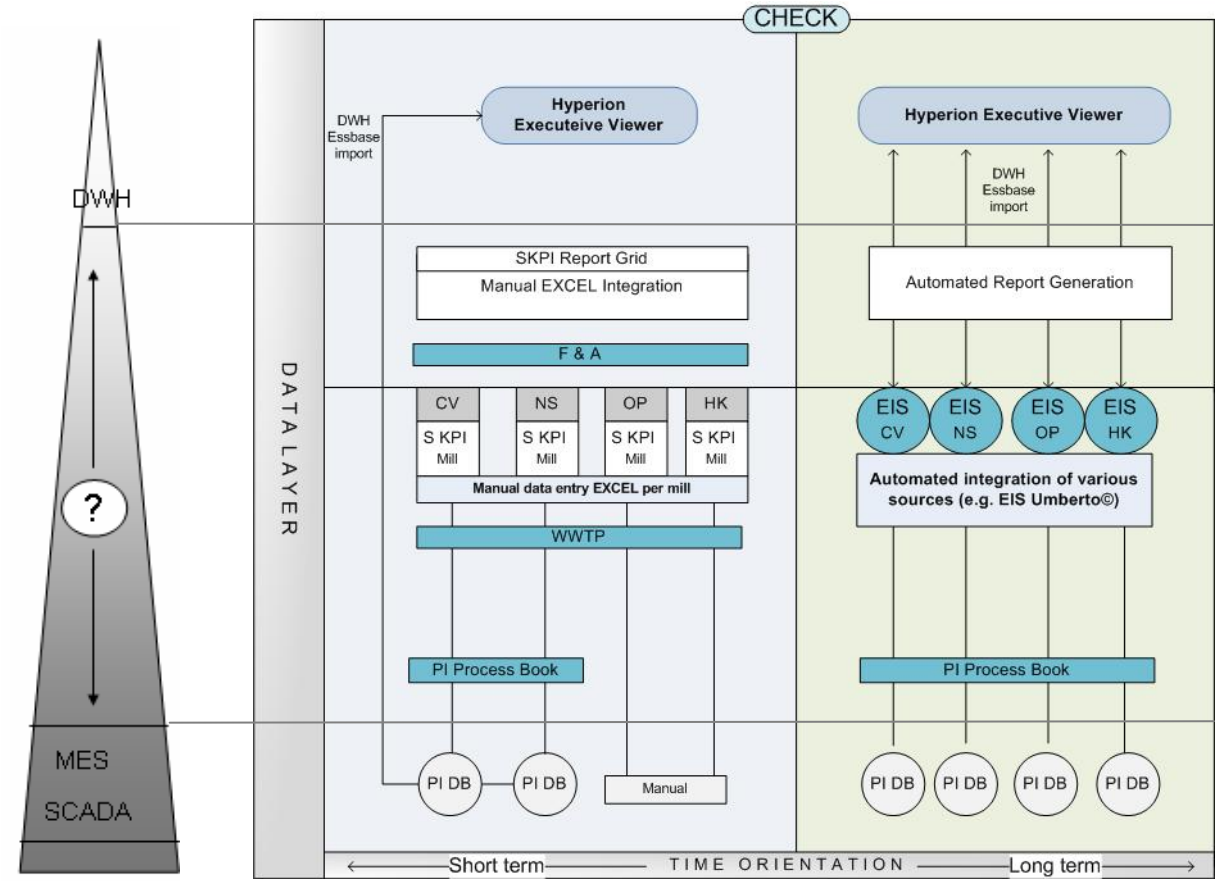


Figure 14 Short term and long term implementation view[78]

[78] Ribitsch, Reinhard; Own illustration

Figure 14 visualizes 2 implementation orientations. While for short term period an internal excel grid for integration of environmental is recommendable, for the long run focus on automated integration of values in one EIS or IEIS database is suggested:

2009/2010	2011 - 2015
1.Envision new approach to Management and Plant Management	1. Implement MIMS/PI systems at all locations of SKSB (e. g. Energy Manager of Siemens)[79]
2. Review standardized proposed reporting content at OMT and MT. Discuss matter of influence on SKPIs at OMT. Policy Deployment. If influence is approved – define goals per mill (cascading)	2. At OMT – Evaluate IEIS Implementation. Technical implementation and cost analysis.
3. Distribute changed data gathering responsibilities for reporting[80] Establish "Environmental Responsibility Matrix"[81]	3. Define monthly goals on SKPIs – Policy Deployment – Establish "Sustainability Responsibility Matrix"
4. Redefine responsibility of "Maintenance Team Leader" for energy issues	2. If approved - Implement IEIS to provide one data source for environmental information
5. Define local Energy Team and Energy Team leader - define environmental conducts at each location	4. Connect IEIS to other business applications (Finance, Logistic) - Generate automatically environmental reports through EIS or IEIS
6. Compilation of data indicators, goals and description into one Excel sheet (monthly updated)	5. Integrate EIS database with Oracle DWH for Management Review
7. Execute monthly reporting: benchmarking and goal tracking at mill and OMT	6. Distribute this report over the mills for benchmark – discussions on targets at MT, OMT and Mills

Table 6 Implementation Stages summary

For **short term orientation** it is necessary to generate short term wins, to facilitate sustainability awareness. It is necessary that management team gives his approval, shows commitment, to the plan proposed.

As a next step, after successful approval, standardized indicators need to be discussed at OMT for practical relevance and concrete influence. Risk here involved is that indicators feature less relevance in a few months. Those need to be reviewed again by the Assurance manager in a continuous manner.

After definition of this person, as a third step, responsibilities and data gathering responsible persons need to be defined for internal reporting. Through information compilation and involvement of different employees temporarily reporting can be facilitated. It needs to be checked for "standardized" reporting, whether all standardized

[79] Inclusive RTU for continuous emission and gas usage – this is right at the moment only at mill CV implemented
[80] See appendix: Data sources and responsibilities for gathering of environmental information
[81] Could be aligned from "Data Gathering Responsibilities" attached in the appendix (see Table 10)

indicators are monthly or more frequent available (see Data gathering structure table 9 in the appendix). Information compilation does not need to be executed centrally. All participators in this workgroup take individual action in typing in information. The Plant Facilitator types the goals set by the operational meeting in and follows together with the Plant Manager the status of improvement.
As a forth step the responsibility of the "Maintenance team leader" needs to be redefined to include beside of energy information gathering, also the responsibility, to provide energy – efficient production processes.
It is necessary to integrate the designated "Energy Coordinator" and "Plant Facilitator" and "Plant Process Engineer" regularly in a special established local "Energy Saving Team"[82]. They should meet together in a frequent order to discuss collaboratively on energy saving implementation possibilities to goals set.
Finally, as a last step, the reporting protocol of each mill will be compiled and aggregated into one single file (by one "Plant Facilitator). It can be transferred to internal audiences and the OMT for performance benchmark.

Exhibit Definition of standardized data gathering structure

According to the IST and SOLL situation changes need to happen. Table 9 in the Appendix visualizes the short term changes and tries to give an answer through a comparison. Necessary gathering changes in frequency of gathering for monthly reporting are visualized in green colours. In the Appendix is furthermore a "Data Gathering Structure" with responsibilities by person attached in table 10. Both refer to the short term view of implementation.

For **long term orientation,** manufacturing execution systems and energy management applications, like the "Energy Manager of Siemens", need to come into place. As manual gathering is not suitable for the long run IEIS could come into place. Here it is necessary to define an implementation plan and consideration on concrete actions for database interconnection.
After implementation of an IEIS monthly environmental reports can be generated. It is recommended, that the "Plant Facilitator" and "Applications technologist" at each mill takes care for the maintenance of the mills environmental database. One "Plant Facilitator" receives the responsibility to compile information and generate one aggregated benchmark report for OMT and MT for managerial review.
As a last step after implementation of IEIS at all mills of SKSB data warehouse integration of each mills environmental database features the logical last step. Here in the data warehouse, all SKSB indicators (Financial, Sales, Production; Logistics) come together for integrated evaluation. This makes it possible in future to establish one integrated SKSB report containing economic, social and financial data.

[82] According to the SKG Energy Saving Program (March 2008)

In the following each single indicator is considered in detail by his gathering and automation possibility:

Water:

Considering waste and effluent water discharges, the "Water Meister" takes care about a monthly excel sheet facing discharges. He takes water samples at a minimum of 3 times a weak or daily and fills it in an internal sheet.

For *Short term* orientation each Water Meister should think of internal monitoring and tracking of its values in order to identify trends and to provide a WWTP internal "Early Warning System" for outlier. For monthly reporting and the SKPIs the "Water Meisters" should fill monthly average and highest discharge values into the SKPI grid. He can make use of an EIS, the Ecomaster, to make plant internal reports on trends.

For *Long term* orientation implementation of continuous measurement techniques should be evaluated. Implementation of a measurement instrument for incoming waste water (into the WWTP) is necessary for optimal waste water quality control. This is expensive in its acquisition but on the long run necessary for optimal waste water control and sustainability. For implementation of a continuous measurement unit information on values could be furthermore monitored at the "Performance Indicator (PI) – Database" of the mill.

Energy:

For energy the situation is different. The defined post of an "Energy Coordinator" should maintain, provide and be responsible for energy efficient production processes.

For the *short term time* orientation, each location of SKSB should take care of monitoring energy indicators in the PEMS sheet. This is right at the moment generated annually and needs to be generated monthly in a manual manner. The gas meters are at all locations read and documented at a weekly basis, there should be data availability for manual monthly compilation.
Beside of ICT orientation, it is necessary to think of establishment of the post of an "Energy Coordinator", who is responsible for operational energy control and energy goal satisfaction. He should build for this case a local energy team together with "Plant Facilitator" and "Plant Process Engineer". They could deliberate and evaluate energy improvement possibilities.
The designated "Energy Coordinator" could have the responsibility for monthly PEMS establishment and generation of a weekly internal energy report (like established at the location of Coevorden).

For *long term* orientation the ICT development stages need to be adapted. An adaptation of the locations of Hoogkerk, Oude Pekela and Nieuweschans to the level of production control of Coevorden is necessary and provides enhanced energy control. This ICT – structure at the location of Coevorden is developed for continuous energy and eco-efficiency control like no other location at SKSB. Organizational learning between the mills can be seen as a critical success factor during the stages of the implementation plan.

Material:

For *short term* orientation: Waste can be monthly added, into the excel register, by the Finance Department by one singular person.
This information sources from one external receipt by a third party (Van Gansewinkel) and this sheet is right at the moment only quarterly and not monthly available. In order to facilitate monthly reporting an inquiry for monthly receipts should be posed.
Responsible person to improve the performance of pulper rejects is the purchasing department and the "Plant Manager". The purchasing department can influence rejects by selection of grade level of post-consumer waste. Influence for hazardous waste is referred also to the "Plant Management".

For *long term* orientation more suitable would be an integration of the weight bridge for trucks at the mills of SKSB. Here trucks get weighted, which are supplying rejects and hazardous waste. Those measures are right at the moment not gathered, but should be in future. It is moreover necessary to facilitate a post calculation of the third party bills.[83]
In an ideal situation waste weight will be tracked automatically at the weight bridge and following transferred into the information system for further conversion and integration into the IEIS.

Defoamer is monitored continuously at the location of Coevorden and Nieuweschans through the PI-System[84]. The report tags are in the system available.[85] At the other locations, for *short term view* the "Maintenance Manager" has to take care for gathering of this information. Plant Management could assure through monthly reporting that the additive inputs are under control.

For the long term orientation the same as for energy is recommended, a PI-System with a „Process Book" should be implemented at the locations of Oude Pekela and Hoogkerk for monitoring of defoamer.

[83] Final costing on hazardous waste is not executed
[84] E.g PI-tags:. "K4-Anitsch-Machinekuip", "K4-Antisch-Pulperkuip"
[85] Only at the location Coevorden and Nieuweschans

Legal Requirements and Incidents:

Legal Requirements and incidents to complaints should be documented and monitored by each Plant Facilitator at each mill.

For *short term* time orientation, the "Plant Facilitators" can maintain one sheet with external requirement at each mill. The "Plant Facilitator" of Coevorden has initially started to do this task. Furthermore other locations will need to follow.

For *long term* orientation it could be a possibility to add legal requirements into the software based eco – balance. Through this integration legal requirements can be easily monitored. Such a comparison can be also made for the case of Umberto and for Ecomaster.

What is the reporting responsibility of the "The Plant Facilitator"? He is the eco – controller of the "Plant Manger". He does not need to establish the monthly protocol. He only needs to evaluate compilation of the areas involved and compare as a second instance target satisfaction of WWTP, Waste and Energy. Next the "Plant Facilitator" could have the responsibility to deliver status of improvements to the "Plant Manager", as he needs to be accountable for environmental goal reaching at monthly SKPI meeting (referring to concept of reporting structure chapter 3).

4.5 Conclusion

The first raised thesis question was requiring a conceptual approach for sustainability reporting. This approach has been visualized during the 3rd chapter through a sustainability management process, featuring internal reporting, relevant and supportive during all sustainability development stages.

As introduced at the beginning of the 4th chapter, establishment of an internal reporting protocol requires a diffusion of the sustainability management cycle. With regard to this chapter, one path for PLAN and CHECK was described.
This diffusion was translated into instruments, a "Scoring Grid" to provide PLAN (diffusion into height) and gathering/information systems considerations for CHECK (diffusion into depth). Both examples are representative as an answer for the 2nd raised thesis question: How is it possible to gather standardized data? And is it possible to automate?

Summarized it can be stated, that at Smurfit Kappa Solid Board, the road to internal sustainability reporting is a road posing a long term time horizon for proper implementation. In the last part, for implementation recommendations, it was tried to provide broad overview on gathering possibilities for the standardized reporting content. An implementation plan provides overview on the most relevant and necessary stages for implementation (see table 7 implementation stages summary).

To facilitate sustainability awareness and gain short term wins, at least an interim solution is recommended for the next business year of 2009: *focus on manual integration of indicators from different sources through an excel grid.* The recommended "Data gathering structure" of Table 8 in the appendix is one initializing step in this direction. Furthermore, to the data gathering structure and responsibilities, a template for OMT goal setting is attached.

5 Appendix

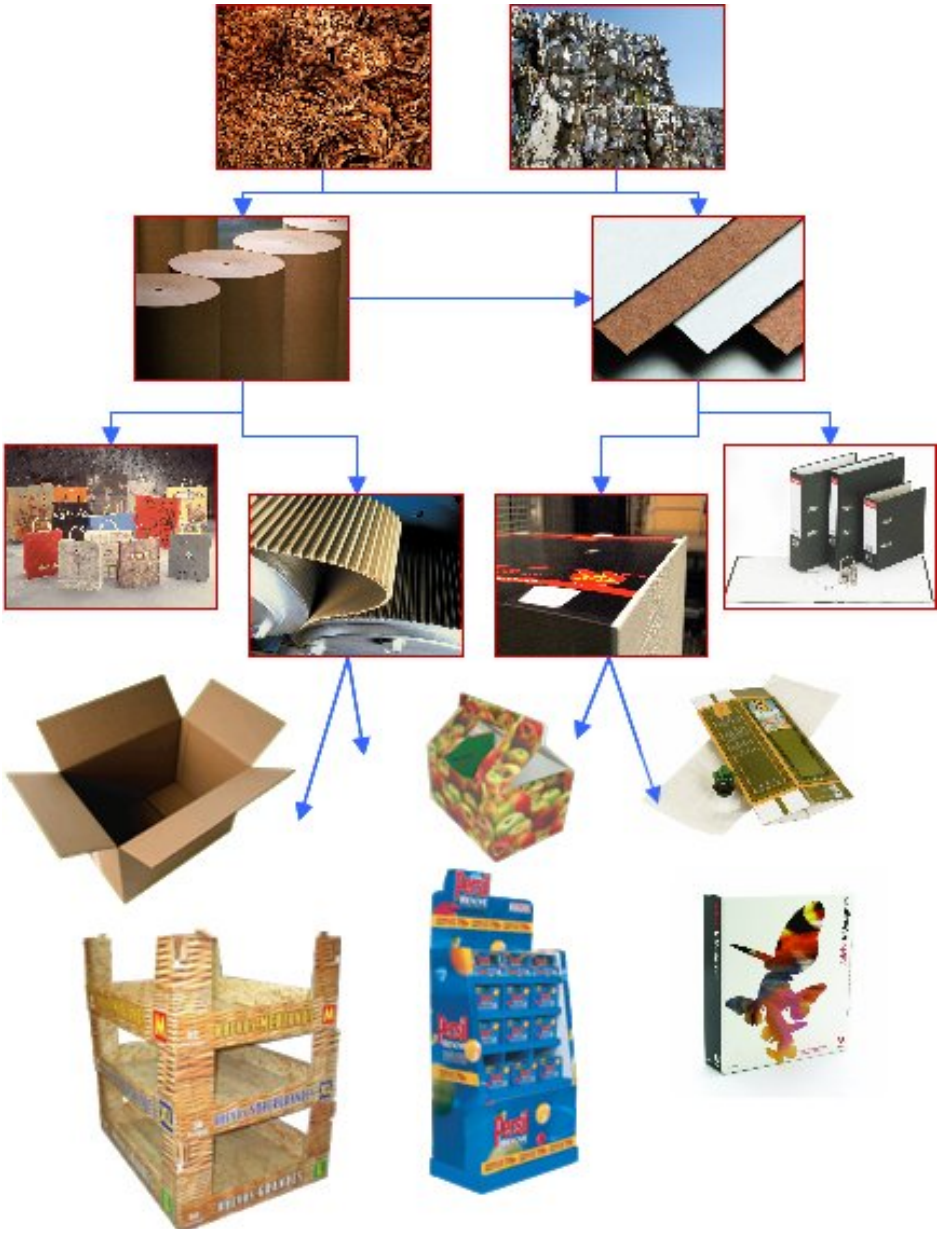
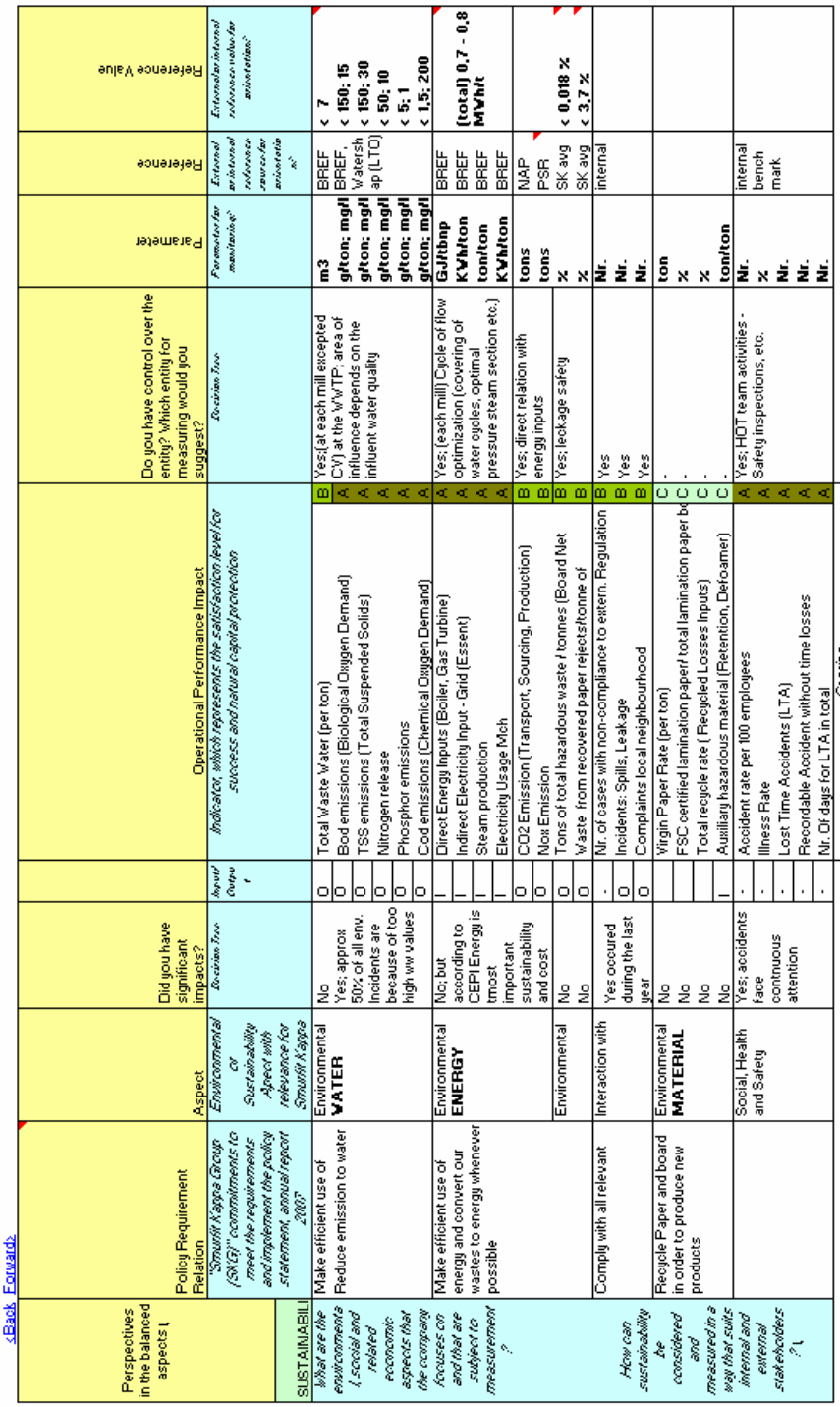


Figure 15 Smurfit Kappa variant parts visualisation



Perspectives in the balanced aspects	Policy Requirement Relation	Aspect	Did you have significant impacts?	Input/ Output	Operational Performance Impact		Do you have control over the entity? Which entity for measuring would you suggest?	Parameter	Reference	Reference Value
	"Smurfit Kappa Group (SKG)" commitments to meet the requirements and implement the policy statement, annual report 2007"	Environmental or Sustainability Aspect with relevance for Smurfit Kappa	Decision Tree		Indicator, which represents the satisfaction level/ for success and natural capital protection		Decision Tree	Parameter for monitoring*	External or internal reference source for orientation*	External or internal reference value for orientation*
SUSTAINABILI										
What are the environmental, social and related economic aspects that the company focuses on and that are subject to measurement ?	Make efficient use of Reduce emission to water	Environmental **WATER**	No Yes: approx. 50% of all env. Incidents are because of too high ww values	O O	Total Waste Water (per ton) Bod emissions (Biological Oxygen Demand) TSS emissions (Total Suspended Solids) Nitrogen release Phosphor emissions Cod emissions (Chemical Oxygen Demand)	B A A A A A	Yes;(at each mill excepted CY) at the WWTP; area of influence depends on the influent water quality	**m3** **g/ton; mg/l** **g/ton; mg/l** **g/ton; mg/l** **g/ton; mg/l** **g/ton; mg/l**	BREF BREF, Watersh ap (LTO)	**< 7** **< 150; 15** **< 150; 30** **< 50; 10** **< 5; 1** **< 1,5; 200**
	Make efficient use of energy and convert our wastes to energy whenever possible	Environmental **ENERGY**	No; but according to CEPI Energy is tmost important sustainability and cost	I I I O	Direct Energy Inputs (Boiler, Gas Turbine) Indirect Electricity Input - Grid (Essent) Steam production Electricity Usage Mch	A A A A	Yes; (each mill) Cycle of flow optimization (covering of water cycles, optimal pressure steam section etc.)	**GJ/tbnp** **KWh/ton** **ton/ton** **KWh/ton**	BREF BREF BREF BREF	**(total) 0,7 - 0,8 MWh/t**
		Environmental	No No	O O	CO2 Emission (Transport, Sourcing, Production) Nox Emission Tons of total hazardous waste t tonnes (Board Net Waste from recovered paper rejectstonne of	B B B B	Yes; direct relation with energy inputs Yes; leak-age safety	**tons** **tons** **%** **%**	NAP PSR SK avg SK avg	**< 0,018 %** **< 3,7 %**
How can sustainability be considered and measured in a way that suits internal and external stakeholders ?	Comply with all relevant	Interaction with	Yes occured during the last year	- O O	Nr. of cases with non-compliance to extern. Regulation Incidents: Spills, Leakage Complaints local neighbourhood	B B B	Yes Yes Yes	**Nr.** **Nr.** **Nr.**	internal	
	Recycle Paper and board in order to produce new products	Environmental **MATERIAL**	No No No No		Virgin Paper Rate (per ton) FSC certified lamination paper/ total lamination paper bo Total recycle rate (Recycled Losses Inputs) Auxiliary hazardous material (Retention, Defoamer)	C C C C	- - - -	**ton** **%** **%** **ton/ton**		
		Social, Health and Safety	Yes; accidents face contnuous attention	- - - -	Accident rate per 100 employees Illness Rate Lost Time Accidents (LTA) Recordable Accident without time losses Nr. Of days for LTA in total	A A A A A	Yes; HOT team activities - Safety inspections, etc.	**Nr.** **%** **Nr.** **Nr.** **Nr.**	internal bench mark	

tntp = total board net production

Scoring:
C No Impact / Relevance <<< RATE
B Medium Impact / Relevance <<< RATE
A High Impact / Relevance <<< RATF

Table 7 Scoring Grid for SKPIs

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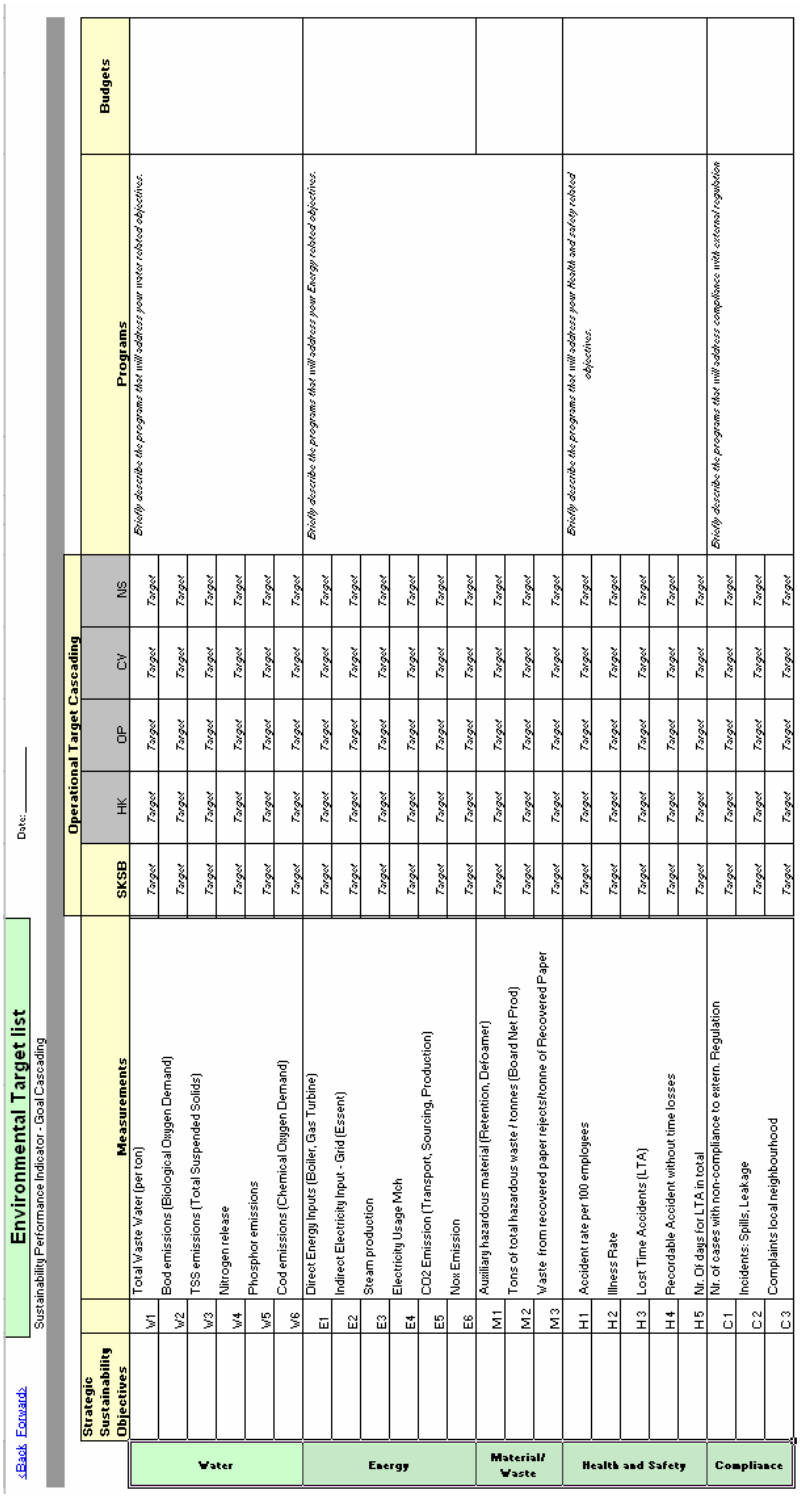
Measurement Summary					Update Frequency SOLL				Update Frequency IST				Degree of support			
Summarize the attributes associated with each measurement in the Balanced Scorecard			Mesurement Level	Responsibility Location	HK	OP	CV	NS	HK	OP	CV	NS	HK	OP	CV	NS
Water	W1	Total Waste Water (per ton)	Mill	Assurance	Monthly	Monthly	Continuous	Continuou	Annual	Annual	Continuous	Annual	manual	manual	MIMS	MIMS
	W2	Bod emissions (Biological Oxygen Demand)	Mill	WWTP	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	manual	manual	manual	manual
	W3	TSS emissions (Total Suspended Solids)	Mill	WWTP	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	manual	manual	manual	manual
	W4	Nitrogen release	Mill	WWTP	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	manual	manual	manual	manual
	W5	Phosphor emissions	Mill	WWTP	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	manual	manual	manual	manual
	W6	Cod emissions (Chemical Oxygen Demand)	Mill	WWTP	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	3 days/wk	manual	manual	manual	manual
Energy	E1	Direct Energy Inputs (Boiler, Gas Turbine)	Mill	Energy Coord	Monthly	Monthly	Continuous	Monthly	Annual	Annual	Continuous	Annual	manual	manual	MIMS	manual
	E3	Indirect Electricity Input - Grid (Essent)	Mill	Energy Coord	Monthly	Monthly	Monthly	Monthly	Annual	Annual	Monthly	Monthly	Finance	Finance	Finance	Finance
	E4	Steam production	Mill	Energy Coord	Monthly	Monthly	Continuous	Continuou	Annual	Annual	Continuous	Annual	manual	manual	MIMS	MIMS
	E5	Electricity Usage Mch	Mill	Energy Coord	Monthly	Monthly	Continuous	Continuou	Annual	Annual	Continuous	Annual	manual	manual	MIMS	MIMS
	E6	CO2 Emission (Transport, Sourcing, Production)	Mill	Assurance	Monthly	Monthly	Monthly	Monthly	Annual	Annual	Annual	Annual	manual	manual	manual	manual
	E7	Nox Emission	Mill	Assurance	Monthly	Monthly	Continuous	Monthly	Annual	Annual	Continuous	Annual	manual	manual	MIMS	manual
Material/ Waste	M 1	Virgin Paper Rate (per ton)	Overhead	Purchasing	NM	NM	NM	NM	NM	NM	NM	NM	-	-	-	-
	M 2	FSC certified lamination paper bought/ total lamination paper bought	Overhead	Purchasing	NM	NM	NM	NM	NM	NM	NM	NM	-	-	-	-
	M 3	Auxiliary hazardous material (Retention, Defoamer)	Overhead	Energy Coord	Monthly	Monthly	Continuous	Continuou	Annual	Annual	Continuous	Annual	manual	manual	MIMS	MIMS
	M 4	Total recycle rate (Recycled Losses Inputs)	Overhead	Energy Coord	NM	NM	NM	NM	NM	NM	NM	NM	-	-	-	-
	M 5	Tons of total hazardous waste / tonnes (Board Net Pro	Overhead	F & A	Monthly	Monthly	Monthly	Monthly	Quaterly	Quaterly	Quaterly	Quaterly	Finance	Finance	Finance	Finance
	M 6	Waste from recovered paper rejects/tonne of Recover	Overhead	F & A	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Finance	Finance	Finance	Finance
Health and Safety	H 1	Accident rate per 100 employees	Mill	Assurance	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	manual	manual	manual	manual
	H 2	Illness Rate	Mill	Assurance	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	manual	manual	manual	manual
	H 3	Lost Time Accidents (LTA)	Mill	Assurance	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	manual	manual	manual	manual
	H 4	Recordable Accident without time losses	Mill	Assurance	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	manual	manual	manual	manual
	H 5	Nr. Of days for LTA in total	Mill	Assurance	Weekly	Weekly	Weekly	Weekly	NM	NM	NM	NM	manual	manual	manual	manual
Compliance	C 1	Nr. of cases with non-compliance to extern.	Mill	Assurance	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	manual	manual	manual	manual
	C 2	Incidents: Spills, Leakage	Mill	Assurance	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	manual	manual	manual	manual
	C 3	Complaints local neighbourhood	Mill	Assurance	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	manual	manual	manual	manual

NM: No Measurement

Table 8 Data Sources for gathering and reporting (Shortterm)

Data Gathering Structure Responsibilities			Hoogkerk		Oude Pekela		Coevorden		Nieuweschans	
			Data Responsibility	Information Source	Data Responsibility	Information Source	Data Responsibility	Information Source	Data Responsibility	Information Source
Water	W1	Total Waste Water (per ton)	Edwin Stulp	Internal Sheet	Johan Niemeijer	Internal Sheet	van Gennep	Monthly Energy Report	H van der Molen	Internal Sheet
	W2	Bod emissions (Biological Oxygen Demand)	Edwin Stulp	Eco Master	Johan Niemeijer	Eco Master	van Gennep	Eco Master	H van der Molen	Eco Master
	W3	TSS emissions (Total Suspended Solids)	Edwin Stulp	Eco Master	Johan Niemeijer	Eco Master	van Gennep	Eco Master	H van der Molen	Eco Master
	W4	Nitrogen release	Edwin Stulp	Eco Master	Johan Niemeijer	Eco Master	van Gennep	Eco Master	H van der Molen	Eco Master
	W5	Phosphor emissions	Edwin Stulp	Eco Master	Johan Niemeijer	Eco Master	van Gennep	Eco Master	H van der Molen	Eco Master
	W6	Cod emissions (Chemical Oxygen Demand)	Edwin Stulp	Eco Master	Johan Niemeijer	Eco Master	van Gennep	Eco Master	H van der Molen	Eco Master
Energy	E1	Direct Energy Inputs (Boiler, Gas Turbine)	Nico Jager	PEMS	Tammo Roggema	PEMS	Henk Potgieter	Report Generator	H Riemeijer	PEMS
	E2	Indirect Electricity Input - Grid (Essent)	Fin- Wernecker	F & A	Fin- Wernecker	F & A	Fin- Wernecker	F & A	Fin- Wernecker	F & A
	E3	Steam production	Nico Jager	PEMS	Tammo Roggema	PEMS	Henk Potgieter	Report Generator, PEMS	H. Riemeijer	PEMS
	E4	Electricity Usage Moh	Nico Jager	PEMS	Tammo Roggema	PEMS	Henk Potgieter	Report Generator, PEMS	H. Riemeijer	PEMS
	E5	CO2 Emission (Transport, Sourcing, Production)	Peter Hielema	Internal Sheet	Berend d. Boer	Internal Sheet	Jan Deuring	Internal Sheet	Berend d. Boer	Internal Sheet
	E6	Nox Emission	Peter Hielema	Internal Sheet	Berend d. Boer	Internal Sheet	Jan Deuring	Internal Sheet	Berend d. Boer	Internal Sheet
Material/ Waste	M1	Virgin Paper Rate (per ton)	-	-	-	-	-	-	-	-
	M2	FSC certified lam. paper bought/ total lam. paper bought	-	-	-	-	-	-	-	-
	M3	Auxiliary hazardous material (Retention, Defoamer)	Nico Jager	Internal doc	Tammo Roggema	Internal doc	Henk Potgieter	Report Generator	H. Riemeijer	Internal Doc
	M4	Total recycle rate (Recycled Losses Inputs)	-	-	-	-	-	-	-	-
	M5	Waste from recovered paper rejects/tonne of Recovered	Fin- Wernecker	Van Gansewinkel	Fin- Wernecker	Van Gansewinkel	Fin- Wernecker	Van Gansewinkel	Fin- Wernecker	Van Gansewinkel
Health and Safety	H1	Accident rate per 100 employees	Fin- Wernecker	F & A	Fin- Wernecker	F & A	Fin- Wernecker	F & A	Fin- Wernecker	F & A
	H2	Illness Rate	Peter Hielema	Internal Sheet	Berend d. Boer	Internal Sheet	Jan Deuring	Internal Sheet	Berend d. Boer	Internal Sheet
	H3	Lost Time Accidents (LTA)	Peter Hielema	Internal Sheet	Berend d. Boer	Internal Sheet	Jan Deuring	Internal Sheet	Berend d. Boer	Internal Sheet
	H4	Recordable Accident without time losses	Peter Hielema	Internal Sheet	Berend d. Boer	Internal Sheet	Jan Deuring	Internal Sheet	Berend d. Boer	Internal Sheet
	H5	Nr. Of days for LTA in total	Peter Hielema	Internal Sheet	Berend d. Boer	Internal Sheet	Jan Deuring	Internal Sheet	Berend d. Boer	Internal Sheet
Compliance	C1	Nr. of cases with non-compliance to extern. Regulation	Peter Hielema	Internal Sheet	Berend d. Boer	Internal Sheet	Jan Deuring	Internal Sheet	Berend d. Boer	Internal Sheet
	C2	Incidents: Spills, Leakage	Peter Hielema	Internal Sheet	Berend d. Boer	Internal Sheet	Jan Deuring	Internal Sheet	Berend d. Boer	Internal Sheet
	C3	Complaints local neighbourhood	Peter Hielema	Internal Sheet	Berend d. Boer	Internal Sheet	Jan Deuring	Internal Sheet	Berend d. Boer	Internal Sheet
Total 14 Empl.		Total Nr. of employees	4		3		3		3	
		Total Nr. of employees	1							

Table 9 Data gathering structure and responsibilities (Shortterm)



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Environmental Target list

Sustainability Performance Indicator - Goal Cascading

Date: _____

Strategic Sustainability Objectives		Measurements	Operational Target Cascading					Programs	Budgets
			SKSB	HK	OP	CV	NS		
Water	W1	Total Waste Water (per ton)	Target	Target	Target	Target	Target	*Briefly describe the programs that will address your water related objectives.*	
	W2	Bod emissions (Biological Oxygen Demand)	Target	Target	Target	Target	Target		
	W3	TSS emissions (Total Suspended Solids)	Target	Target	Target	Target	Target		
	W4	Nitrogen release	Target	Target	Target	Target	Target		
	W5	Phosphor emissions	Target	Target	Target	Target	Target		
	W6	Cod emissions (Chemical Oxygen Demand)	Target	Target	Target	Target	Target		
Energy	E1	Direct Energy Inputs (Boiler, Gas Turbine)	Target	Target	Target	Target	Target	*Briefly describe the programs that will address your Energy related objectives.*	
	E2	Indirect Electricity Input - Grid (Essent)	Target	Target	Target	Target	Target		
	E3	Steam production	Target	Target	Target	Target	Target		
	E4	Electricity Usage Mch	Target	Target	Target	Target	Target		
	E5	CO2 Emission (Transport, Sourcing, Production)	Target	Target	Target	Target	Target		
	E6	Nox Emission	Target	Target	Target	Target	Target		
Material/ Waste	M1	Auxiliary hazardous material (Retention, Defoamer)	Target	Target	Target	Target	Target		
	M2	Tons of total hazardous waste / tonnes (Board Net Prod)	Target	Target	Target	Target	Target		
	M3	Waste from recovered paper rejects/tonne oil Recovered Paper	Target	Target	Target	Target	Target		
Health and Safety	H1	Accident rate per 100 employees	Target	Target	Target	Target	Target	*Briefly describe the programs that will address your Health and safety related objectives.*	
	H2	Illness Rate	Target	Target	Target	Target	Target		
	H3	Lost Time Accidents (LTA)	Target	Target	Target	Target	Target		
	H4	Recordable Accident without time losses	Target	Target	Target	Target	Target		
	H5	Nr. Of days for LTA in total	Target	Target	Target	Target	Target		
Compliance	C1	Nr. of cases with non-compliance to extern. Regulation	Target	Target	Target	Target	Target	*Briefly describe the programs that will address compliance with external regulation*	
	C2	Incidents: Spills, Leakage	Target	Target	Target	Target	Target		
	C3	Complaints local neighbourhood	Target	Target	Target	Target	Target		

Table 10 Environmental Target List (Template)

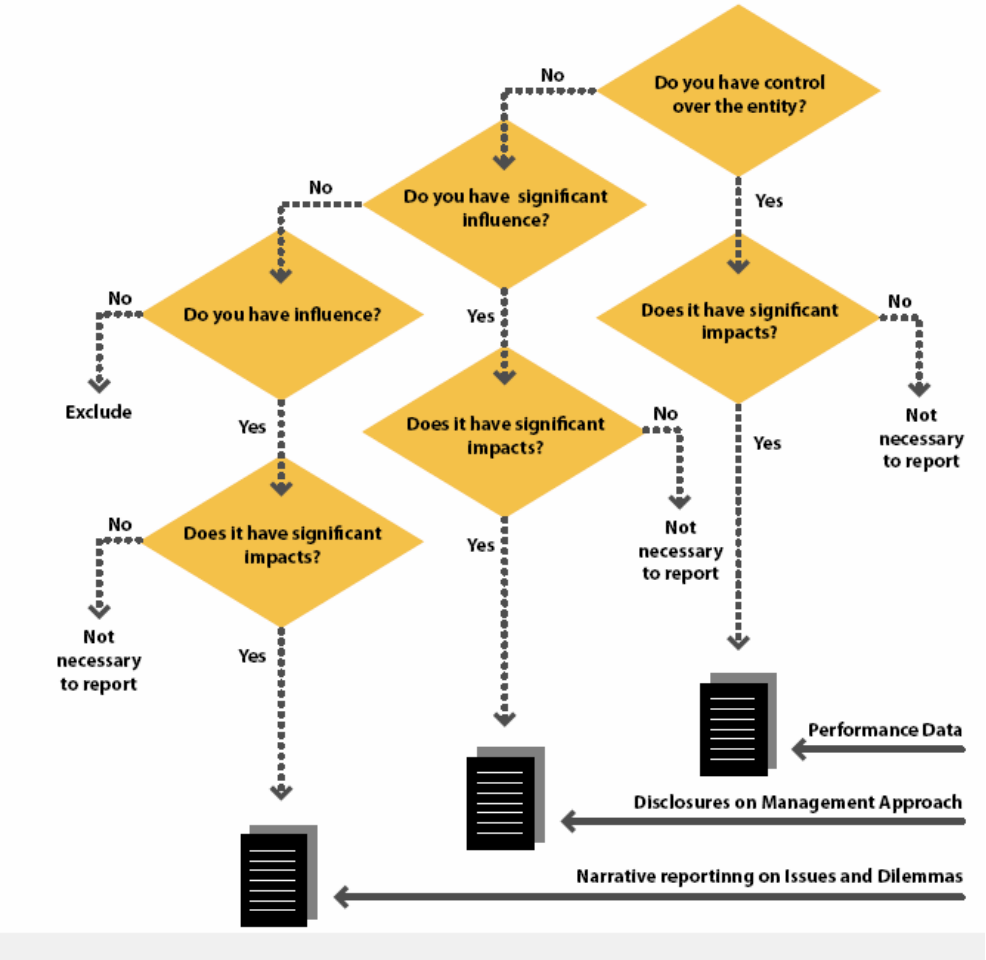

Figure 16 Decision Tree for Boundary Setting and identification of reporting focus[86]

[86] Global reporting, GRI guidelines; www.globalreporting.com

III. Table of Figures

IV. List of Tables

V. List of Abbreviations

ABB	Asea Brown Boveri
ADL	Actions and Decisions List
APIS	Automatic Process Information System
BOD	Biological Oxygen Demand
CEPI	Confederation of European Paper Industries
CHP	Combined Heat and Power
CIP	Continuous Improvement Process
COD	Chemical Oxygen Demand
CS	Corporate Sustainability
GRI	Global Reporting Initiative
DCS	Distribution Control System
DJSI	Dow Jones Sustainability Index
EBITDA	Earnings before interest, taxes, depreciation and amortization
EIS	Environmental Information System
EMAS	Env. Management and Audit Scheme
EMS	Environmental Management System
EPE	Environmental Performance Evaluation
GHG	Greenhouse Gases
GMP	Good Manufacturing Practice
IEIS	Integrated Environmental Information System
ISO	International Standardization Organization
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
LTA	Lost Time Accidents
LTO	License to Operate
MES	Manufacturing Executing System
MIMS	Mill wide Information Management System
MPI	Made Plan Industry
MT	Management Team Solid Board
NEA	De Nederlandse Emissieautoriteit
NGO	Non Governmental Organization
PDA	Production Data Acquisition
PLC	Programmable Logic Controller
OPI	Operational Performance Indicator
OMT	Operational Management Team Solid Board
PEMS	Process Energy Management Sheet
PI	Performance Indicators
PPT	Paper Production Technology
RTU	Remote Terminal Unit
SCADA	Supervisory control and data acquisition
SK	Smurfit Kappa
SKG	Smurfit Kappa Group
SKS	Smurfit Kappa Specialized (Division)
SKSB	Smurfit Kappa Solid Board (Sub – Division)
TSS	Total Suspended Solids
UNEP	United Nations Env. Programme Ind. And Env.
VBE	Verification Bureau for Energy of the Government
VNP	Koninklijke Vereniging van Nederlandse Papier- en kartonfabrieken
WCED	World Commission on Env. and Development
WWF	World Wildlife Fund

VI. List of Definitions

Corporate Sustainability	Long term orientation of a company with regards to the protection and development of natural values, social equity and financial steadiness.
Internal Reporting	"Reporting" can be defined "as an organizations account on its environmental, economic and social performance in relation to its operations, products and services"
Environmental Management Systems (EMS)	In between of both standardization series ISO 1400 and EMAS I and II, several standards and checklists are proposed for usage. Those provide professional guidance for organizations and responsible EMS managers in order to get environmental and safety incidents under control.[87] Adaptation and implementation of such an EMS is voluntary and requires annual audit assurance by an independent third party.
PI Database (OSIsoft)	A Pi database, like provided by OSIsoft is one single Database featuring a set of operational process information and system tags, which bear possibilities for further conversion. The PI system keeps business relevant data always online and available in a specialized time series. [88]
Environmental Information System (EIS)	Environmental Information Systems (EIS; EMIS or ENVIS) are IS that use a variety of tools and technologies to store, process, transfer and facilitate an interpretation of environment-related information, for monitoring and environmental controlling.[89]

[87] Sayre, Don; Inside ISO 14000, The competitive advantage of environmental management; 1996; p. 25
[88] Information under http://www.osisoft.com/products/PI%20System
[89] See Rautenstrauch, Claus; Environmental Information Systems in Industry and Public Administration; 2001; p. 4 - 5

VII. Literature table

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