Siemens: Managing Sustainability Along the Value Chain to Benefit Our Customers

Ralf Pfitzner and Matthias Lutz

1 Introduction

1.1 About Siemens

Siemens is a globally operating technology company with core activities in the fields of energy, healthcare, industry, and infrastructure. For 166 years, Siemens has stood for innovative strength, a passion for technology, sustainability, responsibility, and an uncompromising commitment to quality and excellence. In fiscal year 2014, our approximately 343,000 employees generated a revenue of about 71.9 billion euros from continuing operations and income from continuing operations of about 5.4 billion euros. We have business activities in nearly all countries of the world and operate more than 290 major production and manufacturing plants worldwide.

Sustainability in its different aspects has at all times been part of the company, although it was not always termed "sustainability." For example, as early as 1873, Werner von Siemens developed a technology to eliminate ash from factory emissions which today would be considered as "environmental technology." The foundation of the Siemens Health Insurance Fund in 1908 is an example of addressing the social dimension of sustainability. Furthermore, already in 1971 Siemens set up a companywide Environmental Protection Office. Today, Sustainability is a

R. Pfitzner (✉)
Siemens AG, Corporate Development Strategy, Sustainability, Wittelsbacherplatz 2, 80333 Munich, Germany
e-mail: ralf.pfitzner@siemens.com

M. Lutz
Siemens AG, Plant Data Services, Werner-von-Siemens-Str. 65, 91052 Erlangen, Germany
e-mail: matthias.lutz@siemens.com

M. D'heur (ed.), *Sustainable Value Chain Management*, CSR, Sustainability, Ethics & Governance, DOI 10.1007/978-3-319-12142-0_8

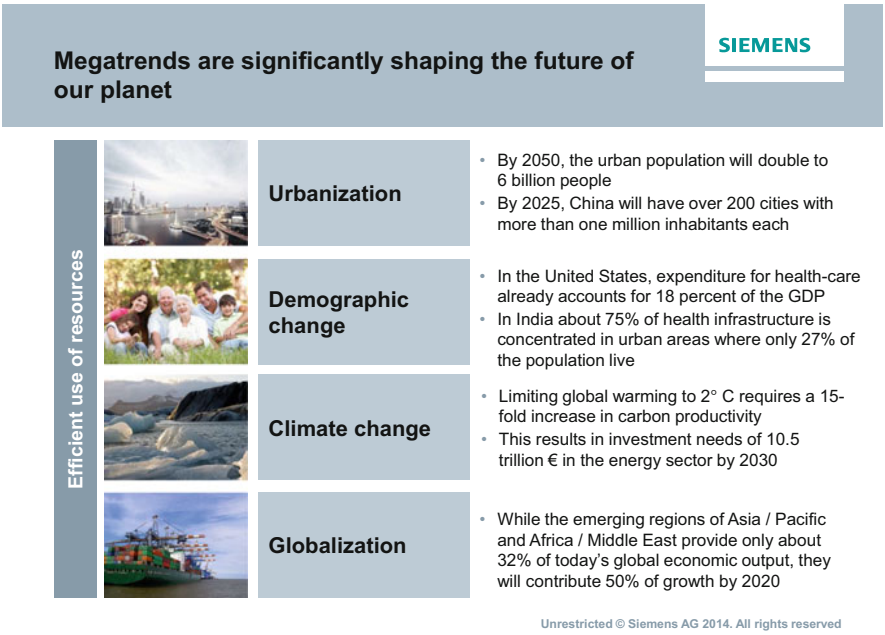

Fig. 1 Megatrends are shaping the future of our planet (Siemens 2014a)

responsibility of the Managing Board and a guiding principle within our company as it is of strategic importance for our businesses.

1.2 Megatrends

Our company, our customers, and our markets are subject to both long-term trends and short-term economic developments (Fig. 1).

Global megatrends are long-term developments that are expected to have an impact on all humans. Demographic change, urbanization, climate change, and globalization are megatrends that entail major challenges for policymakers, entrepreneurs, and scientists around the world. At the same time, however, they offer tremendous business opportunities.

Demographic change includes two major trends: the world's population continues to grow steadily – from 7.2 billion in 2013 to 9.6 billion in 2050 (UN 2013), and it continues to get older. Together, these two trends will challenge the ability of future healthcare systems to make healthcare available to everyone.

Urbanization refers to the growing number of densely-populated metropolitan centers around the world. This trend intensifies the existing demand for sustainable and energy-efficient infrastructures for buildings, transportation systems, energy, and water.

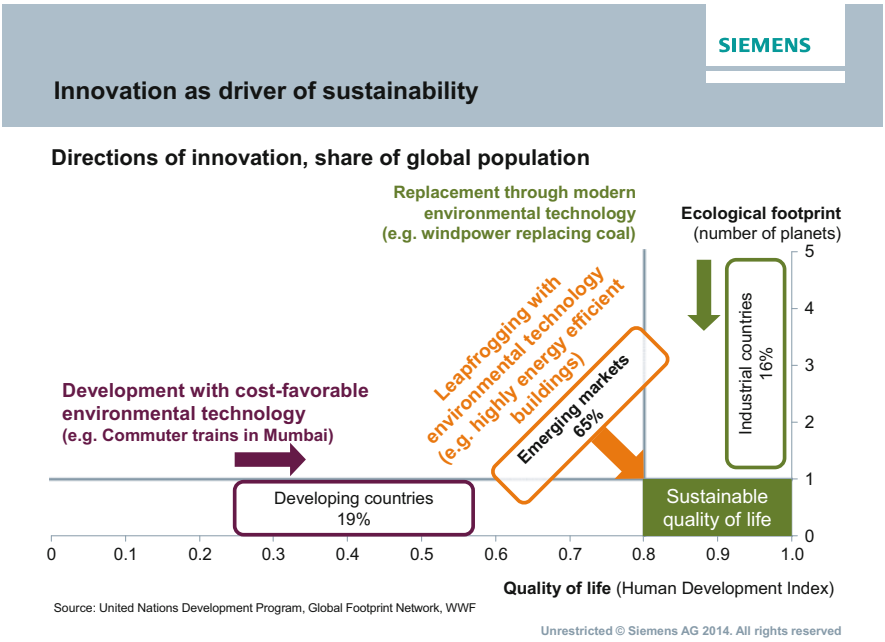

Fig. 2 Ecological footprint and human development index (Siemens 2014e citing UNDP 2014; Global Footprint Network)

We view **climate change** as a given fact and believe that reducing greenhouse gas emissions is vital to counteract the increasingly drastic effects on our ecosystem. There is serious need for innovative technologies to increase efficiency and reduce the emissions related to power generation and consumption.

Globalization refers to the increasing integration of the world's economies, politics, culture, and other areas of life. Globalization leads to increased competitive pressure and demand for economical, timely-to-market, high-quality products and solutions (Siemens 2013a, p. 170).

The global challenges with regard to sustainability are often expressed in the global footprint and the Human Development Index (HDI) as Fig. 2 shows.

According to the Global Footprint Network, humanity today uses the equivalent of 1.5 planets every year. This means that today it takes the earth 1 year and 6 months to regenerate what we use in a year. The footprint concept is based on an "accounting system that tracks, on the demand side, how much land and water area a human population uses to provide all it takes from nature. This includes the areas for producing the resource it consumes, the space for accommodating its buildings and roads, and the ecosystems for absorbing its waste emissions such as carbon dioxide" (Global Footprint Network 2014).

Humans are dependent on nonrenewable resources, especially fossil fuels, and the resulting greenhouse gas emissions are having serious effects on climate. Many developing countries and some emerging countries still are below the HDI

(covering life expectancy, education, and income) of 0.8 which is considered as "high human development." To achieve a "sustainable quality of life," we believe that technology and innovation are major parts of the solution. Business can make a difference for example by increasing energy and resource efficiency in order to fulfill needs of people, to provide access to healthcare, energy in rural areas, and mobility in an effective and efficient manner, as well as limiting consumption to the equivalent of one earth to ensure a sustainable future for the Earth and for future generations.

2 Our Understanding and Organization of Sustainability

Siemens has defined sustainability as acting responsibly on behalf of future generations to achieve economic, environmental, and social progress.

We are aware of the associated high standards and the possibility of conflicting goals in balancing all three dimensions of sustainability. Nevertheless, the aim to create sustainable added value remains a key element of our corporate strategy. We are convinced that sustainability, in this sense, is also a business opportunity, and one that is worth seizing. For our value chain, this means for example that we do not compromise on sustainability standards or on compliance – neither for our suppliers nor in our own operations.

"One Siemens," our framework for sustainable value creation and capital-efficient growth, addresses this business opportunity with its three strategic directions (Siemens 2014b).

First, "focus on innovation-driven growth markets." The products and solutions in our Environmental Portfolio and the innovation power of Siemens play a central role in contributing to environmental and climate protection while also strengthening our standing in the innovation-driven growth markets that we focus on.

Second, "get closer to our customers." An intense customer focus and a competitive, globally balanced, and localized network of suppliers supports us in getting closer to our customers all over the world.

Third, "use the power of Siemens." Excellent employees are one of Siemens' vital strengths as they play a key role in our success and are the true power of Siemens. Leveraging the power of Siemens also means strictly adhering to clear principles of integrity – something we also expect of our partners and suppliers.

As these examples show, sustainability is not embellishment at Siemens – it's a central theme of our corporate strategy. In our Sustainability Program we focus on targets and activities in three areas: "Business opportunities," "Walk the talk," and "Stakeholder engagement." In the first area, we turn our approach to sustainability into concrete business opportunities. "Walk the talk" means we are committed to embedding sustainability throughout our organization and operations. In the third area, we focus on collaboration with all relevant stakeholders.

The latter is essential as many global challenges cannot be resolved by single businesses alone. Therefore Siemens partners with business organizations like the

World Business Council for Sustainable Development (WBCSD), e.g., in the area of energy efficiency in buildings, with C40, the Cities Climate Leadership Group in the area of sustainable urban development and in various other initiatives. Furthermore, Siemens has launched a global Siemens Integrity Initiative that supports organizations and projects fighting corruption and fraud through Collective Action, education, and training with over US$100 million. The initiative focuses on supporting projects that have a clear impact on the business environment, can demonstrate objective and measurable results, and have the potential to be scaled up and replicated. The Siemens Initiative is part of the comprehensive settlement between the World Bank Group and Siemens AG that was announced on July 2, 2009 (Siemens 2014e).

2.1 Organization of Sustainability

It has often been said but it remains true – a successful implementation of sustainability starts at the top of the organization. At Siemens, the central position within the company's organization, in our programs and measures we execute illustrates the importance of sustainability. Efficient sustainability management is a company-wide task that requires a clear organizational structure and a thorough anchoring of sustainability in our corporate culture. All our sustainability activities are steered by the Chief Sustainability Officer. Dr. Roland Busch, member of our Managing Board, currently holds this position. In order to coordinate and manage our sustainability activities proficiently, we established the Siemens Sustainability Board, the Sustainability Office, and the Siemens Sustainability Advisory Board.

The Siemens Sustainability Board, chaired by the Chief Sustainability Officer, is the central steering committee for sustainability at Siemens. In its regular meetings it directs our sustainability program as part of our sustainability strategy and adopts appropriate measures and initiatives. Our Chief Sustainability Officer also manages the Sustainability Office, which is responsible for enhancing sustainability even further at Siemens and for coordinating the sustainability program and other company-wide programs and measures. To help us maintain an objective perspective on our sustainability challenges and performance, we have also created the Siemens Sustainability Advisory Board, composed of eight eminent figures in science and industry from a range of disciplines and regions of the world. The Board meets at least twice a year, and through professional exchanges and practical initiatives has already contributed to the further development of our sustainability program. Furthermore, assigned Sustainability Managers in the Divisions and regional units ensure that sustainability measures are implemented throughout the Company.

The following chapters illustrate how we manage sustainability along the value chain based on our organizational setup: with our suppliers, in our own operations, and with our customers in order to mitigate risks and exploit opportunities.

3 Sustainable Supply Chain Management

3.1 Key Facts

The primary goal of all Supply Chain Management (SCM) activities is to ensure the availability and quality of the materials required to serve our customers. In order to achieve this goal, we require a globally balanced, locally anchored, and close network with our supplier base for optimal exploitation of the innovativeness of our suppliers.

The supply chain management parts of this chapter (Sects. 3.1–3.3) refer to the "source" process according to the SCOR model; EHS management and program (Sect. 4) refers to the "make" process of the model.

In fiscal year 2013, Siemens' purchasing volume amounted to approximately 38 billion euros. With direct responsibility for material costs, Supply Chain Management thus accounts for over half our value creation in sales. We procure from some 90,000 suppliers in over 150 countries and constantly increase the share of sourcing from emerging markets.

The challenges faced by SCM have grown considerably in recent years. Markets are more volatile, and not only from a financial point of view – the global economy is increasingly shifting away from the current industrialized countries to developing countries. In addition, the volume of global trade has more than doubled between 1990 and 2010 alone and the number of multinational companies (new global players from developing countries) is rising. The competition for innovations and scarce resources is consequently much tougher.

Sustainability in the supply chain has become a key requirement, mainly driven by customers and investors. In addition, we are facing a growing influence of sustainability-related legislations within the supply chain (e.g., rule on conflict minerals pursuant to Dodd–Frank-Act).

Although we were fortunately not confronted with significant issues in our supply chain in recent years, controversies around labor practice at the electronics supplier Foxconn in China or more recent issues in the textile industry's supply chain (The Economist 2013) show that it is essential to ensure sustainability standards in the supply chain and to mitigate respective risks. Sustainability requirements are therefore an integral part of all our relevant supplier management processes – such as supplier selection, supplier qualification and evaluation, and supplier development.

3.2 Risk-Based Approach

We expect all our suppliers to make a clear commitment to the principles of sustainability. Our requirements – such as respect for the basic rights of employees and environmental protection – are defined in the "Code of Conduct for Siemens

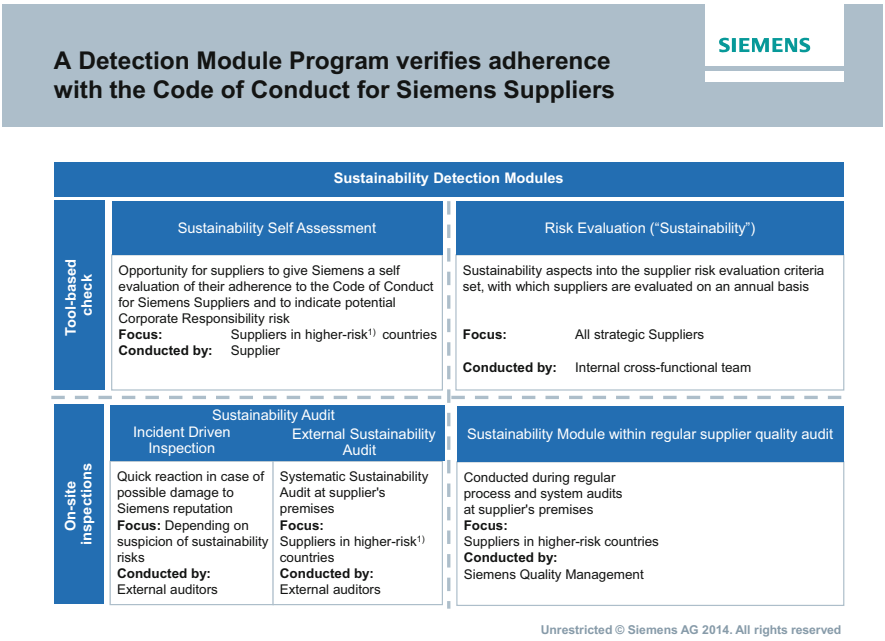

Fig. 3 System of sustainability detection modules in the supply chain (Siemens 2014c). Based on Organization for Economic Cooperation and Development and TI/CPI Transparency International/Corruption Perception Index

Suppliers," which is based on the ten principles of the UN Global Compact and reflects the content of our Siemens Business Conduct Guidelines.

Under the relevant provisions in our procurement contracts and our conditions of purchase, all Siemens suppliers must meet these requirements and also promote compliance with them in their own supply chain.

Because the supplier network is very large and widely spread, it is not possible for us to examine all suppliers to the same extent by auditing them on site. We have therefore established a risk-based system (Sustainability Detection Modules) of appropriate processes which enables us to systematically identify potential risks in our supply chain. It consists of sustainability self-assessments by suppliers, risk evaluation conducted by our purchasing department, sustainability questions within supplier quality audits, and sustainability audits by external auditors. Objectives, focus, and agents are shown in Fig. 3.

Within the last years, we rolled-out our supplier qualification process and continually increased the number of self-assessments. The suppliers in scope are mainly from non-OECD countries with a purchasing volume of more than 50,000 euros. We initially covered mainly our existing suppliers but more recently started to focus on new suppliers.

In addition, sustainability-related questions are part of all regular quality audits. If sustainability risks are identified, we specifically audit the suppliers in question

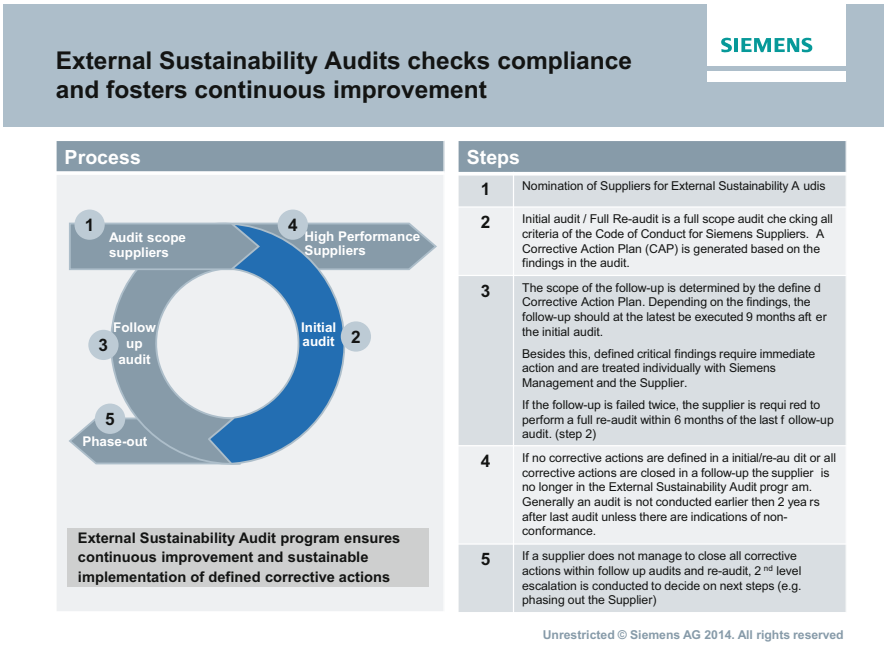

Fig. 4 System of external sustainability audits (Siemens 2014c)

on site. Figure 4 explains the respective process steps. We pay special attention to inspecting suppliers in emerging countries where we increasingly purchase products as part of our Global Value Sourcing program. If deviations from our requirements are identified, they have to be resolved by the suppliers within a reasonable period of time. In the event of serious deviations or unwillingness to implement measures for improvement, we exclude suppliers from any business with Siemens. In everything we do, we are guided by the principles of developing our suppliers in close partnership and building up their competencies for the long term. Furthermore, we conduct follow-up audits, which entail revisiting the sites to establish whether the agreed measures have actually been implemented. Deviations identified in the audits mainly relate to structural deficiencies in management systems and the lack of specific processes and guidelines at the supplier. This includes, for instance, measures to effectively prevent corruption and bribery and to rule out child labor.

3.3 Know-How Transfer and Competence Building

Our suppliers' commitment to complying with our sustainability principles is most effective when it is based on their own convictions. We are therefore increasingly committed to building up our suppliers' competence and intensifying knowledge

transfers related to sustainability. This is why we have developed an internet-based information and training platform, which is available free of charge to all suppliers (Siemens 2014d). On top of that, sustainability is an integral part of the company-wide training programs for buyers. All employees with purchasing responsibility are obligated to take part in intranet-based training on the subject of "Sustainability in the Supply Chain."

4 Managing Our Own Operations

4.1 EHS Management Approach and Program

Siemens has a comprehensive EHS (Environmental Protection, Health Management and Safety) management system. The process requirements of this management system help our operating units to comply with applicable laws, regulations, and customer requirements, to satisfy our corporate requirements properly, and to achieve our Siemens-wide environmental targets. The environmental protection management system requires that our environmentally relevant production sites and offices must implement an environmental management system which fulfills the requirements of the internationally recognized ISO 14001 standard and also our own internal standard, known as "Specifications on environmentally compatible product and system design." This internal standard defines requirements to reduce the environmental impact of our products and systems during production, use and disposal phase, and is subsequently an integral part of our business processes.

The management system includes a number of effective and complementary environmental programs as well as a set of Siemens-wide environmental targets. We conduct regular internal reviews of our environmental performance and progress, in order to create a cycle of continual improvement.

Our commitment to continual improvement caused two environmental protection programs to come into being in fiscal year 2012: "Serve the Environment" for industrial environmental protection and "Product Eco Excellence" for product-related environmental protection. They are designed to mitigate the environmental impact of Siemens business activities and our products, to fulfill growing international requirements with regard to environmental protection, to increase customer benefits, and to proactively strengthen our position as a sustainable company.

4.2 Energy and Resource Efficiency at Our Own Sites

Our industrial environmental protection efforts focus on optimizing energy and resource efficiency at our sites. With the "Serve the Environment" program we are committed to the following Siemens-wide main targets:

- To continue our systematic effort to improve energy efficiency, and thereby achieve corresponding improvement in our carbon dioxide efficiency;
- To improve the waste efficiency each year by 1 % until 2014;
- To reduce waste for disposal each year by 1 % until 2014.

Furthermore, Siemens continues to manage water-related risks. In locations where there are particular water risks (for example as a result of aridity, high waste-water loads, or poorly developed technical infrastructure), the local sites need to define targets matched to local conditions and, in meeting those targets, effectively reduce risks and negative impacts on the environment.

We measure progress towards achieving our "Serve the Environment" program targets by aggregating the results of measures implemented locally at our sites. We calculate environmental performance on a portfolio-adjusted basis. This approach enables us to survey and compare our environmental performance over time, regardless of acquisitions and disposals.

In order to use energy efficiently for our own operations and to increase our carbon efficiency from energy use, the "Siemens Energy Efficiency Program" (EEP) was developed already in 2007 in collaboration with two Siemens divisions. According to the process shown in Fig. 5, energy analyses within the EEP framework were conducted and measures implemented at more than 100 major manufacturing sites.

With innovative concepts like the Green Building Initiative and the Energy Efficiency Program, Siemens Real Estate (SRE), which manages our properties, optimizes resource allocation, and simultaneously makes buildings more energy efficient.

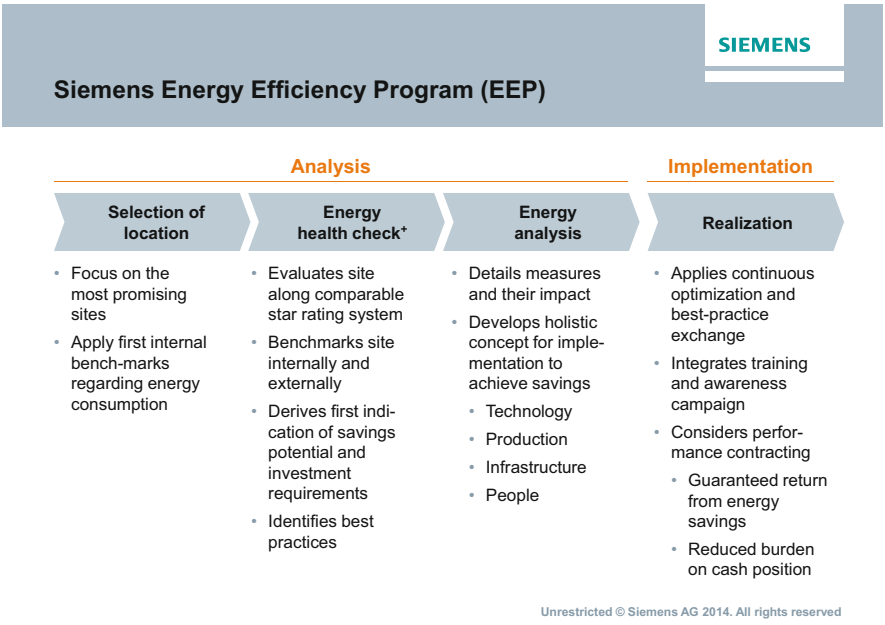

Fig. 5 Siemens energy efficiency program

Savings	
Energy cost:	€/a 3,700,000
Savings:	€/a 674,400
Investment:	€ 4 Mill.
Amortization:	4 years
IRR:	19.3%
CO_2 Emission:	t/a 2,300

Technical solution
Building Management System
Gas-combined heat power
Optimization of hydraulic systems
Ventilation system with 165,000 m³/h with heat recovery system
Installation of a radiant warmer

Fig. 6 Financial savings and energy saving measures implemented at Siemens Krefeld Railway Engineering plant

New buildings as well as important existing constructions have to meet systematic sustainability criteria and are certified according to the international Green Building Standard LEED (Leadership in Energy and Environmental Design). Through energy-focused renovations of the building services technology and structural measures at more than 15 production locations, annual energy cost, for example, was reduced by over 4.4 million euros. Most measures were implemented under an energy performance contracting model with Siemens' Building Technologies Division and resulted in a sustainable reduction of annual CO_2 emissions by more than 16,000 tonnes (SRE 2014).

One example of successful implementation of energy saving measures is the Siemens Krefeld Railway Engineering plant, one of Siemens' most important centers in the railway industry. Each year more than 450 railcars leave the factory. In Krefeld-Uerdingen, Siemens Mobility employs around 2,200 people who develop and manufacture these rail vehicles and electrical components. Regional trains such as the Desiro and high-speed trains such as the Velaro are marked "Made in Krefeld."

A detailed analysis for the Krefeld site within the Energy Efficiency Program resulted in a package of seven efficiency measures that were implemented, leading to annual savings of approximately 675,000 euros, equalling a payback of the investment within 4 years (see Fig. 6).

Heating System

1. The most important efficiency measure consisted in building a gas-fired cogeneration plant for heat and power generation. Thusly, the power plant was implemented in parallel to the existing four boilers.
2. In addition, the hydraulics of the heat distribution were optimized. Network pumps are now controlled by a new building management system which allows for a demand-driven operation through frequency inverters.

(continued)

3. Another efficiency measure consisted in the installation of ceiling heating elements. Due to the good accessibility of the ceilings in the involved buildings and no overhead cranes, the installation of this type of heater was logical. The infrared radiant heat is, in no time, ascertained by the employees as pleasant and is expended with minimum heat energy. These dark heaters are supplied with natural gas. The direct firing with gas as the primary energy carrier also reduces the heat losses in the heating network.

Ventilation System

4. Optimization of the ventilation system involved the renewal of the complete ventilation control center (100,000 m^3/h) and retrofitting the air-handling unit in the assembly hall with a heat recovery system in form of a rotating air-to-air heat exchanger and modern control technique. As a result, the air supply temperature is now at a constant 18 °C.

Building Management System

5. This efficiency measure consisted in the creation and expansion of the building management system. For this purpose, the measures described, as well as the existing automation stations were linked to a new, joint management system.
6. The installation of an energy monitoring system provides an insight into the plant's energy consumption and allows for an optimal adjustment to the installation. The measure also included the installation of energy meters and circuit-entering of the building management system.
7. In addition, a new monitoring platform was set up. The new Energy Monitoring and Control system (EMC) ensures, through continuous recording and analysis of energy consumption, not only further energy savings but also performance control of the efficiency measures. In order to make these achievements transparent, understandable for everyone and specific to the customer requirements, Siemens developed the Green Building Monitor™. The Green Building Monitor™ is a communications means, which allows staff and guests at the entrance area of a building to get information on the energy and media consumption in this building and to motivate them with specific advice to actively contribute to an increase in energy efficiency. The implementation of these EEP measures in the Krefeld facility led to cost savings of 15 % and a reduction of CO_2 emissions by 20 % (SRE 2012).

4.3 Product-Related Environmental Protection

Siemens' products, solutions, and services are the "bridge" between our operations and our customers. The major focus on product-related environmental protection therefore is to improve the overall environmental performance of our products and solutions. We define mandatory requirements in our internal environmental standard to reduce the environmental impact of our products and systems during the product development, production, use, and disposal phases.

The "Product Eco Excellence" program supports our businesses to fulfil these requirements. Additionally, the program aims to better prepare the operating units for future regulatory and customer requirements, to strengthen environmental communication, and to broaden environmental awareness amongst our employees. The main elements of the program are:

- Being committed to continuously improve transparency regarding declarable substances, particularly in purchased parts and components. To gain transparency, we provide a list of declarable substances (LoDS), comprising substances that are restricted in use due to regional or application-specific regulations or due to potential health and environmental risks posed by these substances themselves and in the manufacture, use, and disposal of products containing them. We strive for an improved basis for assessing the environmental impact of our products and ensuring that our customers' requirements in the respective target markets are met. This also supports closing material cycles (cradle to cradle) which is becoming an increasingly important topic as global market demands.
- To develop a methodology for better assessing risks such as environmental, toxicological, and future availability risks associated with substances and materials used. The results are the basis for substitution decisions within product development. We have developed the methodology and will roll it out as part of the environmental program. We intend to verify the potential of the methodology using pilot projects.
- To establish a harmonized procedure for determining the "ecological footprint" of our products whose coverage we want to further increase. In order to determine and evaluate the "ecological footprint" of our products and systems, we have adopted the requirements of international life-cycle assessment (LCA) standards ISO 14040 and ISO 14044. The assessment results are the basis of our environmental product declarations (EPD) which are part of an internal harmonized process.

Though widespread demand by our customers does not yet exist, we see an increase of requests for sustainability-related information on products as well as for our overall sustainability performance. The main drivers are our customer's sustainability requirements in tendering processes as they intend to reduce their own carbon footprint and improve their energy and resource efficiency. In this context, life-cycle assessments and environmental product declarations are tools we increasingly use for evaluating products along the life cycle and to communicate this information to our customers and interested stakeholders.

5 Contributing to Our Customer's Success: The Siemens Environmental Portfolio

Siemens develops and manufactures mostly investment goods which last many decades. Hence, the main lever regarding overall energy and resource efficiency for many of our products and solutions is efficiency in the use phase. Though today there is hardly any premium to be achieved because a product is "green," it becomes a business opportunity once we support our customers in reducing their operational as well as total cost of ownership with energy and resource efficient products, solutions, and services.

Apart from the individual product level where EPDs are available, we address these demands with the Siemens Environmental Portfolio. Here we bundle all those products, solutions, and services that make particular contributions to environmental and climate protection. Our aim is to achieve a threefold benefit: First for our customers who improve their competitiveness as a result of lower energy costs and higher productivity, second for future generations, and third for Siemens itself, by developing attractive markets and growing profitably.

Quantifiable benefits for our customers can be illustrated with many examples. For example at the "Taipeh 101," which is 508 m high and therefore one of the tallest buildings on earth, a Siemens building automation system lead to energy savings of 18 %. Besides this, the driverless metro in Nuremberg enables a 50 % capacity increase with 15 % energy savings and thus highlights customer benefits in the area of mobility. Also in industry, the usage of optimized drive technologies can cut energy consumption by up to 70 %, leading to significant energy cost savings and short amortization periods. This is also illustrated by Fig. 7.

5.1 Clear Criteria for the Siemens Environmental Portfolio

Key features of a product in the environmental portfolio are energy efficiency, renewables, and environmental technologies. As no global standards exist for the definition of "green/sustainable products" and being credible is very important to us, Siemens defined an internal standard already several years ago. Inclusions to the Environmental Portfolio are made in accordance with strict processes on the basis of the following criteria:

Energy Efficiency This applies to products, solutions, and services that offer significantly better energy efficiency than a comparable solution. The condition is an increase in energy efficiency of at least 20 % or a reduction of at least 100,000 metric tons of CO_2 in the use phase in a given year of all installed products, solutions, and services combined.

Renewables This criterion covers technologies such as wind turbines and solutions for hydropower as well as smart grid applications like smart meters or smart control mechanisms for energy distribution networks.

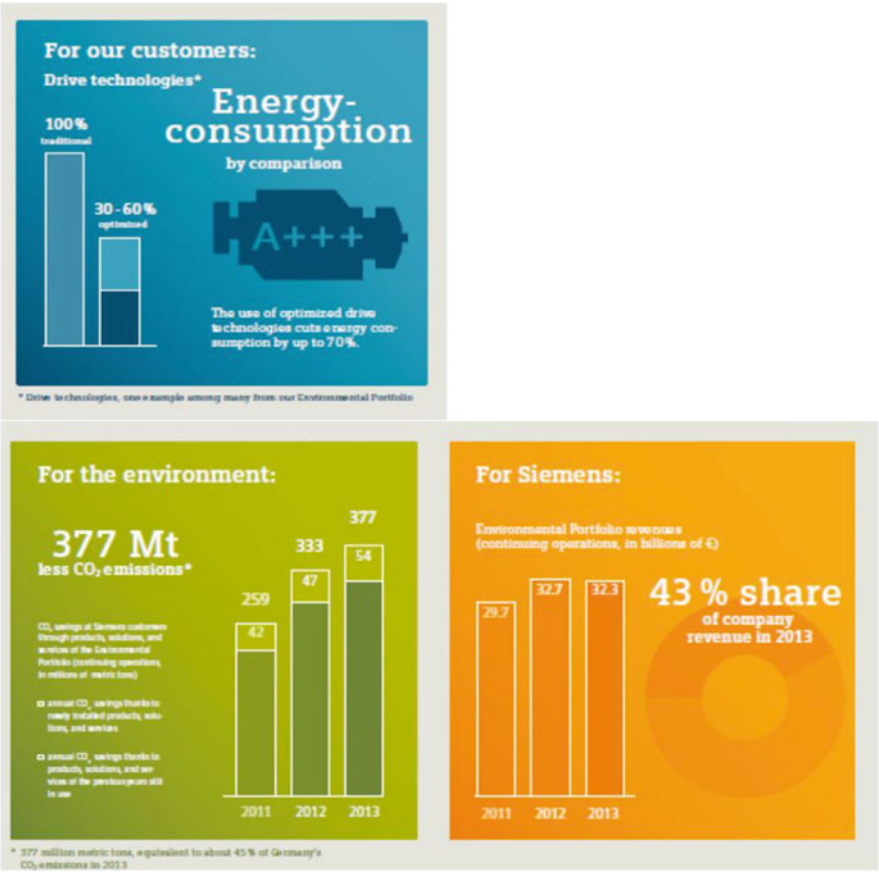

Fig. 7 Threefold benefit with the Environmental Portfolio – energy savings for customers, CO_2 reduction for the environment and growth opportunities for Siemens (Siemens 2014f)

Environmental Technologies The focus is on technologies for pollution control, water, and waste water treatment or recycling. Solutions from the healthcare sector can also qualify if major effects for the patient (noise, X-ray radiation) are reduced by at least 25 %.

Primarily the use phase is being considered – which means that the positive effects must be noticed by the customer. Every year the entire Siemens portfolio is reviewed for possible classification in the Environmental Portfolio on the criteria outlined above. The elements undergo a multiphase check in the appropriate Siemens Division and in the Corporate Sustainability Office before being admitted.

As Fig. 8 shows, in fiscal year 2013, nearly three quarters of the solutions in our Environmental Portfolio related to energy efficiency and underline Siemens' continued strategic focus on technologies in this field. Energy efficiency is not only relevant in the consumption of energy, where for example Siemens industrial motors used in conjunction with variable speed drive technology can reduce energy

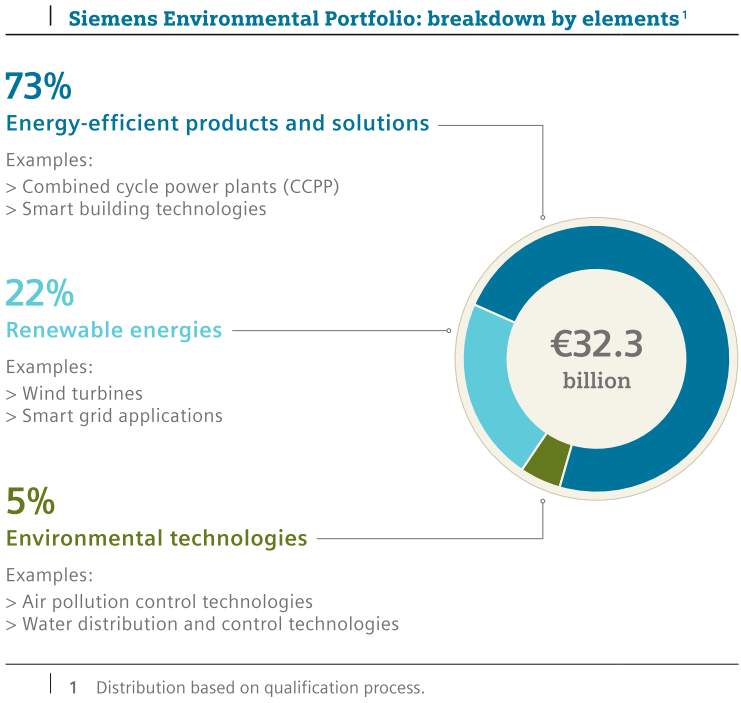

Fig. 8 Breakdown of Environmental Portfolio by elements (Siemens 2013b, p. 19)

consumption of up to 70 %. The Environmental Portfolio also offers solutions which enable efficient generation of energy, for example through our combined cycle power plants. Renewable energies account for almost a quarter of revenue generated by the Environmental Portfolio. Siemens is a leading company in this field, with technological innovations such as gearless 6 MW turbines for the generation of wind power. Environmental technologies comprise a broad range of services and solutions related to water and air pollution control, as well as products of the healthcare sector where an environmental impact reduction is achieved by reducing noise, radiation, or weight.

5.2 Technology Fields, Impact and Growth

The Siemens Environmental Portfolio includes ten technology areas along the entire value chain of electrification: renewable energies, fossil power generation, power transmission and distribution, smart grids, energy storage, mobility, industry solutions, building technologies, healthcare, and water. Figure 9 illustrates some innovative products, solutions, and services along the value chain of electrification.

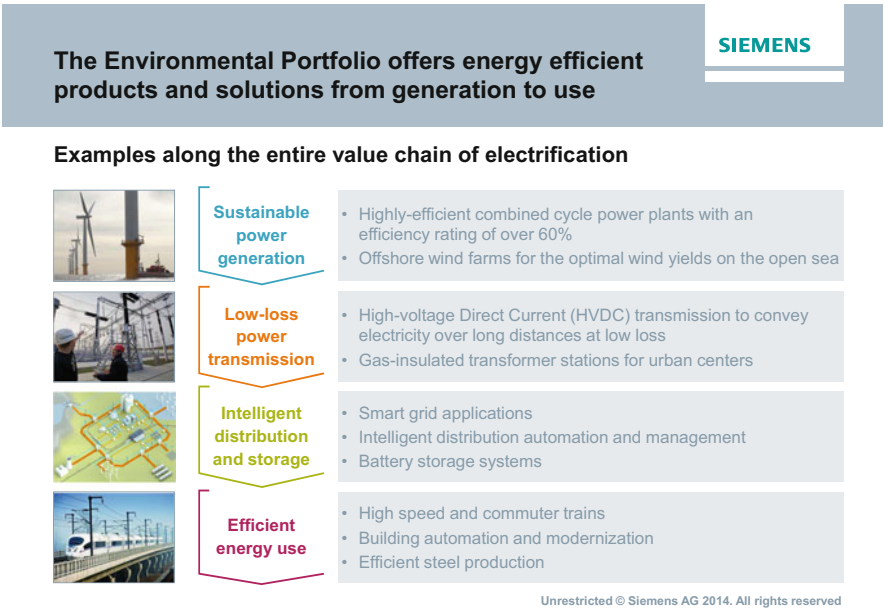

Fig. 9 Innovative technologies along the value chain of electrification in the Environmental Portfolio (Siemens 2014g)

Innovation in these technology areas continuously improves energy and resource efficiency across the entire energy conversion chain: from power generation (e.g., combined cycle gas fired power plants with efficiency >60 % or the aforementioned 6 MW gearless wind power turbines to increase competitiveness of renewable energy technologies), transmission (e.g., high voltage direct current power transmission with low losses) to smart-grid technologies and energy-efficient consumption. Increasing the energy efficiency of the demand side still has a lot of potential. Given the fact that just under 2/3 of industrial power requirements are allocated to electrical drives, 40 % of potential savings in the drive train are to be found in system optimization by means of speed control and energy recovery with inverters and energy saving motors. Other examples refer to building technologies or for example intelligent and resource efficient transport systems.

The impact of energy efficiency is primary energy and fuel cost savings for our customers. Besides this, it is a positive contribution to the environment and society – many technologies needed to stay on a 2 °C global warming track are already available.

Taking together all elements of the Environmental Portfolio which were installed at customer locations since the beginning of fiscal year 2002 and remain in use today, we have reduced customer carbon dioxide emissions by 377 million metric tons in fiscal year 2013 (Fig. 7), which is the equivalent of the combined annual emissions of the following 12 cities: Berlin, Cape Town, London, Los Angeles, Melbourne, Mexico City, Moscow, New York City, São Paulo, Seoul, Singapore and Tokyo – or roughly 40 % of Germany's annual carbon emissions.

The carbon dioxide savings demonstrate that we not only enable our customers in becoming more energy efficient but also turning the challenges of the megatrend climate change into an opportunity. Furthermore, it is an opportunity to grow profitably – revenue from products and solutions of the Environmental Portfolio reached 32.3 billion euros or 43 % of Siemens total revenue in fiscal year 2013 (Fig. 7).

6 Conclusion and Outlook

Managing sustainability along the entire value chain is a necessity today in order to mitigate risks, fulfill customer demands and act as a responsible business. It is therefore increasingly an integral part of our business rather than a separate activity.

External rankings, ratings and awards prove that we are on the right track with embedding sustainability into our strategy and operations. For example, Siemens has been part of the widely respected Dow Jones Sustainability Index for 15 consecutive years. Within this index, we were ranked as "Industry Leader in 2014 for Industrial Conglomerates for the seventh time in a row, and as Industry Group Leader for Capital Goods" for the third time. We also earned high ratings on a number of other indexes and rankings, including those created by the prestigious CDP. Siemens had one of the best scores in the world for the seventh time in a row.

We expect sustainability-related customer demands to increase in the future – in terms of product performance (driven by the need for increased energy and resource efficiency), increased transparency along the entire supply chain (e.g., information on substances and carbon footprint of products) as well as related to our sustainability management approach and fulfillment of essential standards (compliance, environmental protection, occupational health and safety).

This article focused on sustainability of our supply chain and the benefits this brings with it for our customers. Sustainability, though, goes way beyond these aspects. It has become an important feature for recruiting and for employee engagement; today's leaders care about career development but also about the "purpose" they are working for.

Sustainability is an ongoing journey where Siemens as well as people involved continuously learn and grow. Key drivers are the stakeholders: customers, shareholders and employees. The implementation into all business processes requires time and effort and it is an ongoing task to balance the "three P's – people, profit, planet" in daily decision making. Being aware of possible conflicts, staying credible and let communication follow content are possible recommendations we would make to other organizations that start their journey.

One should always bear in mind that sustainable value creation for a company requires long-term thinking. As already Werner von Siemens, the founder of the company said (Werner von Siemens 1884): "I won't sell the future for momentary profit."

Bibliography

Global Footprint Network. (2014). *World Footprint*. http://www.footprintnetwork.org/en/index.php/GFN/page/world_footprint/. Accessed 2 May 2014.

Werner von Siemens. (1884). *Letter of Werner von Siemens to his brother Bruder Carl*, 29.12.1884.

Siemens. (2013a). *Siemens annual report 2013*. www.siemens.com/annual/13/en/download/

Siemens. (2013b). *Additional sustainability information to the siemens annual report 2013*. www.siemens.com/annual/13/en/download/

Siemens. (2014a). *Company presentation – "Sustainability at Siemens"*.

Siemens. (2014b). *One Siemens*. www.siemens.com/one-siemens. Accessed 2 May 2014.

Siemens. (2014c). *Sustainability in the supply chain*. https://w9.siemens.com/cms/supply-chain-management/en/sustainability/detection/Pages/detection.aspx. Accessed 2 May 2014.

Siemens (2014d). *Web-based Training* https://w9.siemens.com/cms/supply-chain-management/en/sustainability/supplier-development/web-based/Pages/trainings.aspx. Accessed 2 May 2014.

Siemens. (2014e). *Siemens integrity initiative*. www.siemens.com/integrity-initiative. Accessed 2 May 2014.

Siemens. (2014f). *Leading you to energy efficiency – Siemens environmental portfolio*. https://www.siemens.com/sustainability/pool/umweltportfolio/siemens_environmental_portfolio.pdf. Accessed 2 May 2014.

Siemens. (2014g). *Measuring impact – A portfolio approach*. Presentation at the PE International Symposium 2014, Ralf Pfitzner, Stuttgart 2014.

SRE. (2012). *The EEP Book: A showcase of building-related energy efficiency projects in manufacturing facilities – a collaboration of Siemens Real Estate and Building Technologies*.

SRE (2014) *Siemens real estate*. http://www.siemens.com/about/en/businesses/siemens_real_estate.htm. Accessed 2 May 2014.

The Economist. (2013). *Bangladesh's clothing industry: Bursting at the seams*. http://www.economist.com/news/business/21588393-workers-continue-die-unsafe-factories-industry-keeps-booming-bursting-seams. Accessed 2 May 2014.

UNDP (2014) *Human Development Index (HDI)*. http://hdr.undp.org/en/statistics/hdi. Accessed 02. May 2014.

UN. (2013). United Nations, Department of Economic and Social Affairs, Population Division, 2013.

WWF. (2012). *Living planet report 2012*. http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/2012_lpr/. Accessed 2 May 2014.