

econsense

Contributions to Ambitious Climate **Action** from German Industries

With a collection of practical examples
from econsense member companies



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Contributions to Ambitious Climate Action from German Industries

COP 25

Executive Summary

Climate change poses enormous challenges to society in terms of future living conditions, lifestyle adaptations and economic practices. A major transformation of the current system is necessary if the goal of the Paris Agreement to limit the global average temperature rise to well below 2°, preferably to 1.5°C on average, is to be achieved. On the one hand, companies are large emitters of greenhouse gas emissions, but are a crucial part of the solution on the other hand. With their products, technologies, services and continuous innovations they make an essential contribution to reducing greenhouse gas emissions to the necessary level and thus make an important contribution to climate protection. Many econsense members have set ambitious climate targets for themselves and are committed to the goal of long-term climate neutrality. On the way to climate neutrality, they often focus on two options – **1) measures for real physical reductions within their sphere of influence** (e.g. through increased energy efficiency and the use of renewable energies or reducing carbon intake and CCU) and **2) the compensation of emissions** within the framework of global climate protection projects and their inclusion in their own budgets based on international instruments. In Article 6, the Paris Agreement provides for the transfer of mitigation achievements between countries and hence creates the basis for international carbon markets. While COP24 has fi-

nalized nearly all parts of the Paris Rulebook to supplement the Paris Agreement, regulations for Article 6 have been postponed to COP25. Clear rules are needed to avoid e.g. double counting and establish transparent accounting rules. This should be based on positive and negative experiences with the so-called Clean Development Mechanisms (CDM) or Joint Implementation (JI) projects under the Kyoto Protocol, which allowed industrialized countries to meet parts of their reduction commitments abroad but avoid its shortcomings. The future role of existing credits under the Kyoto regime must be carefully addressed in order to avoid malfunctioning markets. These should avoid the existing difficulties with the CDM projects. As a consequence, this is one central subject of negotiation at the forthcoming COP25.

The purpose of this paper is to highlight the existing difficulties that now need to be addressed at the forthcoming COP negotiations about Article 6 on market mechanisms and to describe the developments from the Kyoto Protocol to the Paris Agreement. Secondly, the paper will present best practice examples of econsense members who committed to the goal of the Paris Agreement and set ambitious climate protection targets. Different measures for internal reductions of GHG emissions are presented as well as examples for GHG compensation and off-setting projects.

Boardroom Statements



"When it comes to the climate, words are not enough. Companies need to aim for carbon neutrality, here and now."

Dr. Volkmar Denner
Chairman of the Board of Management
Robert Bosch GmbH



"We continuously improve our own processes and support our customers in passenger and freight transport in further reducing their CO₂ footprint. I am firmly convinced that as the most environmentally friendly mode of transport, rail is key to better climate protection in Germany now and in the future."

Dr. Richard Lutz
Chairman of the Board
Deutsche Bahn AG



"Climate Performance is core for the sustainability of our businesses. This is why we committed to net GHG neutrality in 2050. This includes our products and services, which advance climate action of our customers."

Dr. Klaus Keysberg
Member of the Board
thyssenkrupp AG

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I Introduction

“The Parties to this Agreement, (...) Recognizing the need for an effective and progressive response to the urgent threat of climate change on the basis of the best available scientific knowledge, (...)”¹

There is a strong need for business and society at large to act swiftly, ambitiously and firmly on climate change. The average surface temperature of the earth has already increased by approx. 1°C compared to pre-industrial levels. The reason for this is the emission of greenhouse gases, above all CO₂ but also other Greenhouse Gas (GHG) emissions, which are caused by human activities such as the combustion of fossil fuels, industrial processes and agriculture. With unchanged emission trends (‘business as usual’), global warming is expected to be at around 4°C by the end of the century, causing massive damage and risks for society and the economy alike.² In October 2018, the Intergovernmental Panel on Climate Change (IPCC) presented a special report comparing the consequences of global warming to 2°C and 1.5°C respectively, and the measures required to achieve these targets. The report makes clear that the negative effects of climate change would be significantly less harmful at 1.5°C than they would be if the temperature were to rise by 2°C. While 0.5° seems to be negligible overall, specific local differences are tremendous. In both cases, a rapid transition to a greenhouse gas-neutral society is necessary, if possible by halving global greenhouse gas emissions in each of the next decades.³ Without increasing efforts and pressure, the earth could even be pushed into a hot period with average temperatures being 5-6°C higher and sea levels rising over longer time spans by 10-60 meters in the next centuries.⁴

The momentum for sustainability and climate protection has rarely been higher than in 2019. Since the summer of 2018 and the publication of the IPCC Special Report, the debate on climate protection and the implementation of the Paris Agreement has gained considerable momentum. Members of the Fridays for Future movement are protesting all

over the world. The UN Secretary General Summit on Climate in September 2019 united world leaders in an audible pledge for increased ambition and swifter action. In the EU, the 2019 elections made it clear that the issue of climate protection is gaining importance for the population. The new EU Commission President Ursula von der Leyen promises a Green Deal for Europe and wants to make Europe the first climate-neutral region in the world by the middle of the century. Europe should be a pioneer, exporting knowledge, technology and best practices. Similar trends dominated many elections worldwide. For econsense members, the current legislative drive in Germany aiming at net Greenhouse Gas neutrality by 2050 is particularly important.

In this context, companies play a decisive role as they enable climate protection by innovative modes of operation, products, technologies and services. Further, they help their clients with innovative and sustainable solutions. In this spirit, many of the econsense members have set themselves ambitious climate targets in order to contribute to the goal of the Paris Agreement to limit global warming to well below 2°C above pre-industrial levels, and are working towards these goals. As are others without publicly announced targets, but clear internal commitments. In order to achieve this goal, companies have two overall options today. First, companies can internally reduce GHG emissions through various measures such as increasing energy efficiency, switching to renewable energy, switching to efficient and green vehicle fleets, reducing their carbon input and using CCUS, etc.. Secondly, emissions that cannot be avoided today effectively or efficiently can be neutralized through offsetting and compensation measures within the framework of international climate protection projects. CO₂ reductions elsewhere can then be offset against a company’s own CO₂ budget. This requires adequate availability of such offsets, which will be reduced over the next decades with more and more countries having to meet their increasingly ambitious NDCs (nationally determined contributions [to mitigation]) on their

1 Paris Agreement (2015).

2 IPCC (2014).

3 IPCC (2018).

4 Steffen; Rockström & Richardson et al. (2018).

path towards national GHG neutrality. For the time being and globally most likely for the next four to five decades, the compensation of remaining and unavoidable emissions is an important tool in corporate climate protection in addition to the internal reduction of GHG emissions. It also has the additional benefits of technology transfer, capability building and speeding the transition process in all parts of the world.

The framework for compensation projects has so far been regulated by the Kyoto Protocol, which runs out in 2020, but the Paris Agreement foresees similar mechanisms and instruments in Article 6. As a consequence, the rules for market mechanisms must be redefined and must avoid the difficulties of its predecessor. Businesses are aware of the shortcomings of CDMs and need a credible, robust and reliable instrument that is accepted by all stakeholders. Even though this is urgently needed, businesses welcomed the decision to postpone the decision at COP24 rather than agreeing on an insufficient instrument that might possibly allow for double counting.

Brazil declined to accept rules that would require the application of corresponding adjustments for transferred credits, which is an essential requirement to avert the double counting of emission reductions. Without such adjustments, a country could claim emission reductions towards its own domestic targets, **and** sell those reductions to another entity, to be credited towards their target. In combination with the absence of any limits on the use of markets, this means countries could fulfil their climate commitments without reducing their emissions by a single ton.⁵

Article 6 defines **three main avenues of international cooperation** to transfer mitigation efforts between countries. Legally, the Paris Agreement requires each and every signatory state to achieve the goals of the agreement individually, especially net GHG neutrality in Article 4. Given

the distinct situations of different countries, a transfer mechanism is needed to allow global cooperation to ensure the most effective and efficient path to net GHG neutrality globally with the least impact on society at large. Article 6 provides for both **direct intergovernmental cooperation of two or more countries** individually with their own rules in the form of cooperative approaches under Article 6.2 and a global 'sustainable development' mechanism with global rules under Article 6.4. Articles 6.2 and 6.4, such as the Paris Agreement in general, address states, but the utilization of these articles, depending on their implementation, might involve companies. The clear and transparent definition of rules, provisions for transparency, the sharing of proceeds and interactions with previous instruments under the Kyoto Protocol are the central negotiating points at COP25 in Madrid in December 2019. For businesses, these two provisions in Article 6 are essential, because they constitute the basis for international and global carbon markets and access to compensation beyond national borders.

This paper aims to give an overview about the political frameworks and market mechanisms in a first step (chapter II) and then represent the implementation of climate protection measures in companies (chapter III) by internal GHG emission reduction and offsetting projects. It therefore contributes to the discussions and makes negotiations and instruments more accessible.

II International political frameworks for climate protection and market mechanisms

This section explains the development of mechanisms and instruments as a basis for carbon markets and mitigation transfers. It starts with a detailed discussion of the Kyoto mechanisms and its three flexible mechanisms (International emissions trading, Joint Implementation, Clean Development Mechanism) which are the basis for most international discussions. In the second part, it addresses current developments under the Paris Agreement (Direct bilateral cooperation, New sustainable development mechanism and non-market-based approaches). Current CDM projects in particular have been heavily criticized for their lack of environmental integrity, additionality, etc. These problems are presented in detail. The design of the new mechanisms under the Paris Agreement and how the problems of CDM projects can be prevented will have to be defined in the context of the forthcoming COP25 negotiations in December 2019.

This section concludes with the statement, that the creation of instruments is not sufficient, but that they must also result in actual markets and additional incentives by offering a price for Climate Action.

1. The Kyoto Protocol

The Kyoto Protocol is considered a milestone in international climate policy. It was adopted at the Third Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Kyoto in 1997 (COP3) and for the first time ever contained legally binding limitation and reduction commitments for industrialized countries for a first commitment period between 2008 and 2012. The Protocol was ratified by 191 countries, including all EU Member States and important emerging economies such as Brazil, China, India and South Africa. The US has not yet ratified the Kyoto Protocol. Canada withdrew in 2011.⁶ The second commitment period from 2013 to 2020 was once again not signed by all.

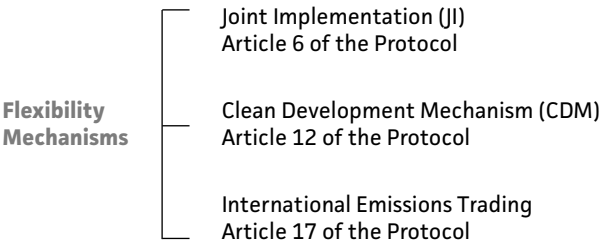
From Rio to Paris: CDM, Art. 6 Paris Agreement

1992	Decision on the Framework Convention on Climate Change in Rio de Janeiro
1997	COP3 in Kyoto Kyoto Protocol is adopted
2005	Kyoto Protocol enters into force & European ETS enters into force
2009	COP15 in Copenhagen 2°C target
2015	COP21 in Paris Paris Agreement
2018	COP24 in Katowice Adoption Rule Book
2019	COP25 in Madrid Negotiation on the modalities of Article 6
... 2050	

Figure 1: From Kyoto to Paris - Roadmap for Climate Neutrality

The Kyoto Protocol contains three mechanisms designed to help industrialized countries achieve the emission reduction targets they set. The so-called 'Kyoto mechanisms' or 'flexible mechanisms' allow industrialized countries to meet parts of their legally binding reduction commitments worldwide (e.g. in developing countries without emission reduction commitments).

Flexible mechanisms of the Kyoto Protocol



Annex-I Parties would be able to achieve their emission reduction targets cost-effectively, by using these mechanisms.

Figure 2: Kyoto Mechanisms (Purohit, 2010).

6 BMU (2017).

II International political frameworks for climate protection and market mechanisms

International Emissions Trading (IET)

Today, emissions trading seems to be a well-established and widely accepted idea, being used in many jurisdictions on many levels. However, it was a very novel idea when it first was proposed in the Kyoto discussions. The market-based approach allows industrialized countries to trade emission rights among themselves. Each country is allocated a certain amount of emission rights under the Kyoto Protocol, the so-called AAU (assigned amount units). The quantity of emission rights per country is set in a way that ensures that a country exhausts its AAUs if it accurately meets its national emission reduction target set in the Kyoto Protocol. If a country has higher reductions than the Kyoto target requires, it can sell excess AAUs to other countries. A country that fails to meet its target can buy additional AAUs and credit them as its own emission reductions. AAUs are sold to the highest bidder internationally – the price is determined by the market.⁷

AAUs can only be traded between countries; they cannot be used by companies to meet their reduction targets.

Joint Implementation (JI)

Joint Implementation refers to projects carried out in partnership between two industrialized countries, both of which have committed themselves to an emission reduction target under the Kyoto Protocol. If an industrialized country implements or finances a climate protection project in another country, it can offset the resulting emission reductions against its reduction target in the form of emission reduction units. The host country, on the other hand, must reduce its own emission rights by the amount of the exported certificates. Joint Implementation projects can help to ensure that emission reductions are first made where they are cheapest.⁸

Clean Development Mechanism (CDM)

The Clean Development Mechanism works in a way similar to Joint Implementation, but does not necessarily involve countries. The most important difference, however, is that CDM projects are carried out in developing countries that do not have reduction commitments of their own. The emission savings achieved by a CDM project are certified under a UNFCCC mechanism and can then be used as 'Certified Emission Reductions' (CER) by industrialized countries to achieve their targets. Industrialized countries gain access to these certificates by either participating directly in a CDM project or by purchasing them, for example from companies having set up CDM projects. The aim of the CDM is not only –as with the two mechanisms mentioned above –to achieve emission reductions in a more cost-efficient way, but also to support developing countries in achieving sustainable development, for example through technology transfer.

The precise terms of the CDM were set out in the Marrakech Accord reached at the 7th COP in 2001. According to the agreement, all CDM projects must first be reviewed and approved by a committee ('CDM board') before they are eligible for credit. In Marrakech, the Parties also laid down rules on what types of projects are not eligible: Building nuclear power plants is discouraged, and so-called sink projects, for example afforestation measures, can only be counted to a limited extent. In order to be allowed to use the Kyoto mechanisms, states have to fulfill the following requirements:

- They have ratified the Kyoto Protocol.
- They have taken on emission reduction targets of their own, i.e. are Annex B states.
- They have calculated a national emissions budget and established a national data collection system for greenhouse gas inventories and emission rights transactions.

⁷ BMU (2017).

⁸ BMU (2017).

One point of contention during several climate-related negotiations was what percentage of emission reductions may be achieved by the Kyoto mechanisms, i.e. abroad. The Kyoto Protocol itself remains vague on this point: Kyoto mechanisms may be used 'in addition' to national reduction measures. This implies that no country may meet its reduction commitments by using only the Kyoto mechanisms. However, the Parties could not agree on a more precise regulation.

Criticism of the Kyoto Protocol

The linkage between countries which were governed by Kyoto targets and those which were not leads to double counting, which is a massive shortcoming. **While an industrialized country can deduct its CERs from its actual emissions, the emissions of the host country in which the CDM project happened are not reduced accordingly, in contrast to JI instruments.**

The reduction performance of a CDM project is always hypothetical, since the actual emissions of the project are compared with a reference scenario that shows how many emissions would have been emitted without the project. Thus, in CDM trading, hypothetical savings are traded against real emissions. Any CDM project that is overvalued or non-additional results in additional physical emissions. The notion of additionality⁹ generally focuses on the question if CDM projects create real emission reductions or if they are rather business as usual projects. Avoiding fictitious reductions is a main challenge to the CDM. Since no emission cap exists in host countries and thus everybody would benefit from an overestimation of reductions,¹⁰ a highly problematic possible effect is created. As a consequence, the topic of additionality attracted a lot of attention¹¹ and doubts about the additionality of many CDM projects could not be dispelled completely. A study by Cames et al. published in 2016 concluded that 85% of the projects examined had doubts about additionality.¹²

It is obvious that there have even been some cases of obvious fraud.

The CDM continues to be criticized for having provided perverse incentives, especially in the past. For example, industrial gas projects, which so far have generated almost 60% of certified emission reductions (CERs), are often accused of artificially increasing production in order to generate additional certificates by destroying the waste products that have been produced.¹³ The geographical distribution of CDM projects is dominated by China and India, where most of the CDM projects are carried out. More than two-thirds of the projects are implemented in either of these two emerging economies. The inequality regarding the certificates issued is even greater: 61% of the certificates issued so far were generated in China, 13% in India, a total of 75%. South Korea, Brazil and Mexico follow in 3rd, 4th and 5th position. By contrast, hardly any projects are implemented in the Least Developed Countries (LDCs) and the structurally weak regions of Africa. When dividing projects by sector, the CDM is dominated by renewable energy projects such as wind and hydropower. In terms of distributed certificates, industrial gas projects aimed at avoiding emissions of particularly climate-damaging hydrofluorocarbons (HFC23) and nitrogen oxides dominate. Other economic sectors, such as the transport sector, do not account for a significant share of CDM projects. With a share of almost 60% of all CDM projects, major projects dominate the CDM. The resulting neglect of small projects means that a significant reduction and development potential has hardly been tapped to date.¹⁴

Due to increased criticism, the EU factually closed its Emission Trading Scheme in 2012 to CERs, which resulted in a complete collapse of the market for CERs and hence stalled most CDM projects. This damaged the credibility of such instruments, but it also results in unused and even unissued CERs in the billions.

9 "Reductions in emissions that are additional to any that would occur in the absence of the certified project activity." (UNFCCC, 1997, Art. 12.5 c).

10 Butzengeiger et al. (2004).

11 Burian (2006).

12 Cames et al. (2016).

13 Schneider (2009).

14 UNFCCC (n.d.).

II International political frameworks for climate protection and market mechanism

In order to avoid the existing difficulties of CDM projects and in order to use the full potential of international cooperation, clear rules are needed when it comes to implementing the Paris Agreement and Article 6 in particular. The COP25 will focus on designing these rules, including taking into account the relationship to the former Kyoto mechanisms.

2. The Paris Agreement and Article 6 – Carbon mechanisms

The Paris Agreement marks the beginning of a new era in international climate policy. According to the Paris Agreement, all countries, including developing and newly industrializing countries, are obliged to submit climate protection goals (the so-called nationally determined contributions [NDCs]) and to implement them. This ended the previous static separation between industrialized countries with legally binding emission targets and developing countries without such obligations, which is actually enshrined in the original United Nations Framework Convention on Climate Change from 1992 and has as such not been removed. It builds on further developing the principle of common but differentiated responsibilities in the fight against climate change.¹⁵ The resulting differences of speed, ambitions and targets enable market mechanisms based on transferring mitigation efforts to create effective and efficient solutions for the transitional phase until global net GHG neutrality is reached. This is based on Article 6 of the Paris Agreement which governs the transfer of mitigation results and hence provides for the establishment of a new international market mechanism and possibilities for the use of national mechanisms.

Article 6 explicitly defines **three avenues of international cooperation**. On the carbon market, the new agreement provides for both direct intergovernmental cooperation of two or more countries individually with their own rules in the form of cooperative approaches under Article 6.2 and a global 'sustainable development' mechanism with global

rules under Article 6.4. Another form of cooperation under Article 6.8 is explicitly described as a non-market mechanism. With these three very different approaches, it has been possible to cover the concerns of all countries with regard to international cooperation possibilities.

The international carbon market, which was previously based on the flexible mechanisms of the Kyoto Protocol, has almost completely collapsed as mentioned above. This situation threatens ongoing CDM projects and prevents new projects from being implemented in the short term, even though there is ample potential for mitigation.¹⁶ There are efforts such as the German Federal Government's Nitric Acid Climate Action Group (NACAG) ('Lachgasinitiative') which tries to close the gap between the non-functioning CDM based markets and a new regime under the Paris Agreement in selected areas, in this case, nitrous oxides.

How and whether existing projects can be transferred is still largely unclear but will have a substantial effect on such markets given the billions of unused CERs still existing. For companies planning ahead or currently engaged in offsetting, clear rules are absolutely crucial in order to also mobilize private finance.

Direct bilateral cooperation Art. 6.2.

One instrument is direct intergovernmental cooperation under Article 6.2 of the Paris Agreement. This means that mitigation measures can be implemented in one country and the resulting emission reductions transferred to another, where they can be offset against the national climate protection target. The prerequisites for this are transparent procedures and correct accounting of the mitigation performance. Among other things, this should prevent emission reductions from being counted several times, for example in the climate balance of the country in which the climate protection measure takes place as well as in the country to which the reductions are transferred.

¹⁵ BMU (2017).

¹⁶ Hermwille & Kreibich (2017).

Article 6.2 could thus serve as a framework to link different national or regional instruments such as the European Emissions Trading Scheme with comparable schemes and thus create a common cross-border carbon market.

There will be no international supervision of this cooperation, but common guidelines for the use of Article 6.2 should be agreed upon. It should be emphasized that this form of cooperation must not undermine the environmental integrity of the overall system and, conversely, should even contribute to an increase in climate protection ambition. It has been disputed to what extent Article 6.6 should equally be applicable here despite its clear reference to Article 6.4 only, as explained below.

New sustainable development mechanism Art. 6.4

Another instrument is the newly created ‘mechanism to prevent greenhouse gas emissions and promote sustainable development’ (Article 6.4). In contrast to direct intergovernmental cooperation, this mechanism is supervised by an international body and open to all signatory states. When carrying out activities under Article 6.4, common rules and procedures must apply. This is intended to ensure that the design and implementation of climate protection measures and the review of the results are carried out in accordance with uniform guidelines. As in the case of intergovernmental cooperation under Article 6.2, the reductions achieved through this mechanism can be transferred from the country in which the emission reductions were achieved to another country and offset against the climate protection target there. A special feature of the mechanism is its objective of encouraging private sector actors to participate in climate protection activities. To this end, appropriate incentives are to be set on an international level.

A major debate also affecting the discussions on Art. 6.2. is the share of proceeds stemming from Article 6.6 as explained above. It states that ‘a share of proceeds from activities under the mechanisms

referred to in Art 6.4 is used to cover administrative expenses as well as to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation.’ While the intention to return a part of the revenues generated into Climate Finance for less developed countries is clear, there are still many unsolved issues such as how to raise and administer it, or how to convert credits and resulting certificates into revenues and money, when and how to utilize the proceeds under what governance, and not least what share would be a reasonable rate or percentage of proceeds.¹⁷

Non-market-based approaches Art. 6.8

As a third option, the use of non-market-based approaches is provided for under Article 6.8. As the name suggests, market-based climate change mechanisms are not considered. Just how these non-market-based approaches are to work will be determined in the future with the development of a ‘framework for non-market-based approaches’.¹⁸

3. Creating Instruments and creating markets to ensure an effective and efficient transition to global climate neutrality

When such robust and sustainable instruments exist, they need to be used to deliver their full potential. It will be essential that not only instruments are derived, but that actual markets emerge and are actively created. Especially economically strong countries and regions such as the EU and Germany can provide strong incentives for Climate Action towards the 90% of GHG emissions outside Europe if Climate Action becomes a marketable good which is priced and generates a monetary profit. Closing markets to Article 6 is counterproductive. In contrast to the old CDM, Article 6 always guarantees real physical reductions and under the long-term goal of the Paris Agreement of climate neutrality it is no substitute for action – but it can ensure globally efficient and effective transition paths.

¹⁷ Michaelowa et al. (2019).

¹⁸ BMU (2016).

III Company approaches to reducing GHG emissions

Climate change represents a major challenge for society at large and business as an important part thereof. The associated risks, transformational needs, new demands and new norms are reshaping the business environment for corporations worldwide.¹⁹ At the same time, corporate climate action is increasingly accepted as essential in driving the transition towards net GHG neutrality^{20, 21} as companies are continuously developing innovative responses under the premise of working profitably and responsibly in order to stay in business.²²

Nowadays, measures to tackle climate change are sitting at the heart of corporate strategies. Also, climate action has a high priority on the political agenda. The EU long-term climate strategy and the new EU Commission under Ursula von der Leyen have set ambitious goals in the field of climate policy. However, the goal of climate neutrality by the middle of the century is not only a political goal, but also a target for many companies nowadays. Many econsense member companies have set corporate climate targets, aligned their corporate strategies, and are working on innovative operations, products, technologies, services and processes that have the potential to enable a carbon-neutral economy by 2050.

On the way to climate neutrality, two approaches are of central importance for companies – **(1) the actual physical reduction of GHG emissions within their sphere of influence** (Scope 1-3) and **(2) the compensation of unavoidable remaining emissions**.

1. Actual physical reduction of GHG emissions within the sphere of influence – Climate strategies, targets and measures

There are various ways to reduce GHG emissions within a company. In the following, a selection of measures such as increasing energy efficiency and switching to renewable, alternative drives will be presented. Many econsense members have imple-

mented such and other measures at the heart of their corporate strategy.

These climate targets and strategies represent a central component of effective climate management. Often, the climate targets describe at what point a company aims to be climate neutral. The climate strategies are based on greenhouse gas inventories (e.g. according to the GHG Protocol), which record the most important emission sources of companies in Scope 1-3 and calculate a carbon footprint of processes and products. In order to realize the CO₂ reduction strategy, measures are defined in various areas. Examples are given in figure 3.

Realizing the CO₂ reduction strategy

Climate targets



CO₂ reduction strategy



Climate Protection Measures (examples)

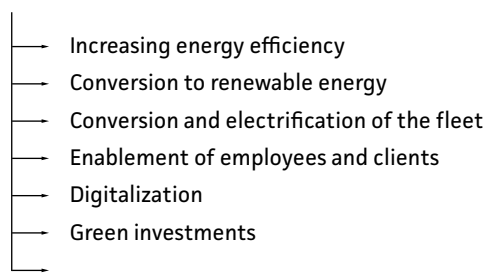


Figure 3: Corporate Climate Protection

Targets & CO₂ reduction strategies

Both climate negotiations and scientific literature focus primarily on global or country-specific mitigation measures. However, the ratification of climate agreements between countries has proven to be a complex and slow process. There is a growing rec-

19 Begg, Woerd & Levy (2005).

20 Persson & Rockström (2011).

21 Krabbe et al. (2015).

22 Begg, Woerd & Levy (2005).

ognition that a more active involvement of other actors (e.g. on a company level) in defining climate change measures can be crucial for tackling climate change effectively.²³ Thus, corporate climate action is increasingly considered important in driving the transition towards a net GHG neutral economy.²⁴ To this end, it is important that global targets are guiding reduction targets at company level.²⁵ Some consensus members have even had their climate targets checked externally for compatibility with the Paris Agreement, e.g. by the Science Based Targets Initiative²⁶.

The following examples for the internal reduction of GHG emissions are presented below:

- Increasing energy efficiency
- Conversion to renewable energies
- Electrification of the fleet
- Replacing carbon with hydrogen in chemical or metallurgical processes
- Use of CO₂ as a resource (circular economy)
- Digitalization
- Green investments

This is no exhaustive list and there are many other measures and instruments used by companies.

Climate Protection Measures:

(1) Increasing Energy efficiency

Reduction potentials and measures to achieve the climate targets can be identified on the basis of the identified emission sources and emission levels in the individual scopes. Reduction potentials result, for example, from energy efficiency measures. Possible measures that can be implemented in a com-

pany to increase energy efficiency are for instance the introduction of energy management systems, the procurement of energy-efficient products and machines, the avoidance or further use of waste heat and the introduction of a resource-saving circular economy approach.^{27, 28} Especially saving electricity is essential, because electrification is seen as the solution to many climate issues and increases the demand for electricity manifold, but availability of renewable electricity is still limited.

(2) Conversion to Renewable Energy

The industrial sector accounts for the biggest share of energy use of any end-use sector.²⁹ In addition to large amounts of electricity that is often based on fossil fuels, there is a strong demand for fuels for heating, transportation, etc. Phasing out of fossil fuels and using renewable energies (especially, but not exclusively green electricity procurement) is thus an important instrument for reducing GHG emissions.^{30, 31} Examples for possibilities in this context are guarantees of origin, Power Purchase Agreements, and own production.

Guarantees of origin prove the origin of renewable energy in a transparent way and provide the necessary reliability for electricity consumers, who need to be confident that the green electricity they pay for does in fact come from renewable sources.³²

Power Purchase Agreements (PPAs) are typically long-term contracts to purchase electricity and guarantees of origin from a particular project. If the relevant contracts are concluded in advance of project development, PPAs can contribute to the expansion of local infrastructure for the use of renewable

²³ Blok (2012) & UNEP (2015).

²⁴ Krabbe et al. (2015).

²⁵ Sullivan & Gouldson (2013).

²⁶ The Science Based Target initiative aims for emission reduction targets in line with the global goal of limiting global warming to less than 2°C compared to pre-industrial times.

²⁷ UBA (2009).

²⁸ BMU (2017).

²⁹ EIA (2019).

³⁰ BMU (2017).

³¹ The RE100 initiative estimates that a switch in the private sector to 100% renewable energies alone would save up to 15% of global CO₂ emissions.

³² UBA (2019).

III Company approaches to reducing GHG emissions

energies. For a comprehensive assessment, the various procurement options must be assessed in terms of local availability, emerging costs, complexity and individual preferences.

Own production (construction and operation of renewable energy plants) can be a useful option for green electricity procurement. If the appropriate environmental conditions are met, companies can invest in wind farms or PV plants on their premises to generate green electricity and guarantees of origin. Many products, technologies and services are offered by German companies not only on the home market, but globally.

There are great challenges concerning the **need for renewable energy outside electricity**. There are limits to using natural biomass sustainably. Artificial fuels based on converting natural energies from wind and solar into fuels (Power-to-X) will play an important role, especially in aviation. The key are hydrogen technologies, where German companies have a very strong technology offering.

There is a strong **geopolitical aspect** to this shift away from classic fossil energy carriers such as oil, gas and coal, because it impacts the whole world economy and trade balances of countries and regions. A sustainable transition to other sources of income will be essential for current exporters of fossil fuels in particular. Also, geopolitically difficult regions could potentially be stabilized if they become a source of alternative fuels or other sustainable energy carriers.

(3) Conversion and electrification of the fleet

By converting their fleets to alternative and more efficient technologies (e.g. hybrid or electric systems), companies can reduce their GHG emissions and thus enable lower-emission mobility and logistics. The transport sector is recognized as one of

the most important factors for facilitating climate change mitigation.³³ About 19% of global energy consumption and 23% of energy-related carbon dioxide emissions result from the transport sector.³⁴ The demand is still increasing at an average annual rate of 1.4% (EIA, 2016).³⁵ The shift to large-scale electric mobility can significantly reduce CO₂ emissions in the transport sector. Under the condition of the electricity being generated from renewable energy sources. However, mobility will not become entirely electric. For example, in cases of long-distance travel or heavy shipping, other modes of transport will have to be used. This results in a strong increase in alternative energy carriers such as hydrogen or alternative fuels based on renewable energies (Power-to-X).

(4) Replacing carbon with hydrogen in chemical or metallurgical processes

Carbon is not only used as an energy carrier: in many processes in industrial production it is used as a chemical agent, most notably perhaps in steel production, where it is an essential part of chemically converting iron ore into steel, unavoidably causing CO₂ emissions. An alternative are hydrogen based chemical reactions which are currently developed and introduced as CDA (carbon direct avoidance). This poses technological, infrastructural and especially economic challenges, but will be needed on the way to a net GHG neutral future.

(5) Storage (CCS) and using CO₂ as resource (CCU)

CO₂ capture and storage (CCS) was originally considered to be a decentralized decarbonization option for the electricity sector and energy-intensive industries. However, with renewable energy technologies spreading rapidly, other options for reducing emissions becoming available and social acceptance of the technology being low, this potential is now being downgraded. But CCS continues to be neces-

³³ Shaw et al. (2014).

³⁴ IEA (2012).

³⁵ EIA (2016).

sary, especially in energy-intensive industries and during the transition period for the production of CO₂-free hydrogen. In addition, CCS is necessary if CO₂ emissions from energy and industrial plants are to be captured and stored on a biomass basis in order to have an impact on negative emissions (BECCS – bio-energy and CCS), as proposed by the IPCC in its 1.5° report in 2018. Along with the land use sink, this compensate for the remaining greenhouse gas emissions in our economy.³⁶

An alternative to geological storage through CCS technologies is Carbon Capture and Utilization (CCU). It aims at using CO₂ as a carbon source for producing chemicals and generating value from existing feedstocks, as materials containing carbon will remain an indispensable part of our lives. The aim is to keep carbon in the loop, i.e. create closed carbon cycles.³⁷ In the transition phase, reusing carbon with a subsequent emission as CO₂ also greatly reduces emissions overall.

Both approaches, CCS and CCU, are limited and cannot replace a drastic reduction of the use of fossil fuel. The use of a limited amount of CO₂ as a raw material for chemical synthesis or for direct use as a gas or liquid can complement its storage in geological rock formations.^{38,39}

(6) Digitalization

Digitalization is reshaping our society in many ways and offers a huge chance to catalyze the fundamental transformation towards a sustainable future. Digital solutions can positively increase transparency and collaboration, enable more efficient processes and resource management, improve measurement and strategic capabilities, and increase access to products and services.⁴⁰

(7) Green Investments

In order to achieve a sustainable society and economy, sufficient capital must be invested to finance the (possible) long-term transition of the real economy. It not only focuses on a limited number of sectors (i.e. renewable energies, eco-innovations, bio-products, etc.), but also creates the basis for a sustainable financial system to finance and promote this transition.⁴¹ The European Environment Agency estimates that the amount of financial investment needed to achieve a low carbon economy is between US\$300 and 400 billion per year by 2020.⁴² Especially the speed of transformation is determined by the amount of capital available and by the willingness to finance and cover financial risks related to new products or technologies. Given these needs and their role as intermediaries in the economy, banks have a unique position in relation to environmental objectives, as they could attract or drive the economy through sustainable lending.^{43,44}

Further examples of climate protection measures taken by econsense members can be found in the econsense publication on COP22 – “Business Contributions to Tackling Climate Change”. This can be downloaded from the econsense home page at:



https://econsense.de/app/uploads/2018/06/econsense_COP22_Zukunftsf%C3%A4hig-wirtschaften_Beitrag-von-Unternehmen-zur-Bew%C3%A4ltigung-des-Klimawandels_2016.pdf

³⁶ EU Commission (2018).

³⁷ ICC (2016).

³⁸ Peters et al. (2011).

³⁹ Markewitz et al. (2012).

⁴⁰ econsense (2018).

⁴¹ Falcone et al. (2018).

⁴² European Environment Agency (2014).

⁴³ Barbieri et al. (2016).

⁴⁴ Falcone (2018 a).

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2. Compensating and Offsetting GHG emissions

Climate protection can work well on an international scale because it is irrelevant where a ton of greenhouse gas is saved as long as it is physically saved. Therefore, effective market mechanisms are of particular importance as they reduce emissions effectively and economically. Expanding and linking carbon markets on an international scale can help to further reduce the costs of meeting emission reduction targets and stimulate the necessary investment for transitioning to climate neutrality. By introducing Article 6 into the Paris Agreement, countries have paved the way for a new form of international interaction in carbon markets.⁴⁵ Article 6 introduces two voluntary market-based paths for international cooperation on carbon markets,⁴⁶ which opens up new opportunities for voluntary climate protection commitment and expressly supports corresponding initiatives by industrial companies.⁴⁷ However, to ensure that environmental and sustainable development gains are realized and to avoid the problems of CDM projects, carbon markets under Article 6 need strict rules.

Offsetting is in some cases an important instrument in the climate protection construction kit at a corporate level, as it is not possible today to avoid all GHG emissions thanks to internal reduction measures (e.g. some process emissions cannot be prevented) in an effective and efficient way. It is sometimes more economic, more beneficial to society at large and without disadvantages to climate protection to reduce emissions elsewhere. By offsetting remaining emissions through reduction projects, e.g. through direct investments in certified climate protection projects worldwide as foreseen in Article 6 of the Paris Agreement, it is possible to achieve climate goals.

The limiting factor is the availability of such credits or offsetting projects. Under the CDM regime they could be generated as positive deviations from a business as usual scenario and were often based on very generous assumptions of this baseline. With increasing pressure from ever more ambitious NDCs, the scope for generating additional mitigation efforts, i.e. on top of what the NDCs already call for, will decrease. In the intended final state of global climate neutrality in the second half of this century, offset credits can only be generated by actually removing GHGs from the atmosphere, i.e. real negative emissions. But until then, in the transition period, they play an essential role as they reduce costs and accelerate climate action through technology transfer, capability building, etc.

Under the CDM process, the emissions saved within the scope of a compensation project are confirmed by independent testing institutes. For each ton of CO₂ saved, projects that have been recognized as such can issue an emission reduction certificate, which can then be purchased by companies and used to offset their CO₂ emissions. This creates economic incentives for project developers to initiate additional emission reduction projects that would otherwise not be feasible. Further advantages are that these voluntary projects also contribute to local development aid (e.g. through technical and financial cooperation, access to energy and water, new jobs, and better health).^{48,49}

A similar approach is expected for instruments under Article 6 of the Paris Agreement. In any case, business efforts to protect the climate will only be fully effective if they are integrated into a fair regulatory framework on a global scale that includes all emitters and supports the international competitiveness of the most climate-friendly solutions. If companies are to play their role in the necessary transformation, they require e.g. planning security and clear accounting rules.

⁴⁵ IEA (2019).

⁴⁶ IEA (2019).

⁴⁷ Hermwille & Kreibich (2017).

⁴⁸ Dutschke & Michaelowa (2006).

⁴⁹ Goldstandard Org. (2019).

3. Further Climate Action tools beyond Article 6 – how to make German Climate Action available to the world through the UNFCCC technology mechanism

The Technology Mechanism under the UNFCCC and how to tap into the wealth of UNFCCC information

Dr. Hans-Jörn Weddige Official BINGO (business and industry NGOS) observer at the UNFCCC Technology Executive Committee workstream

The German industry and business landscape has much to offer in terms of Climate Action that can also be applied in other countries. The UNFCCC and the Paris Agreement with its Article 6 provide a very powerful tool for financing the transfer of technologies. However, the UNFCCC and the Paris Agreement offer much more in terms of global cooperation rather than global carbon markets and direct financing instruments as covered by Article 9.

Climate Action means Climate Technologies active on the ground. Article 10 of the Paris Agreement covers the issue of technology and agrees that 'Parties share a long-term vision on the importance of fully realizing technology development and transfer in order to improve resilience to climate change and to reduce greenhouse gas emissions'. Such a clear acknowledgement of the role of technology was strongly debated, but eventually agreed upon. There is a strong focus on support for developing countries and technology transfer. The Paris Agreement does not start from scratch, as the previous Technology Mechanism established under the UNFCCC shall also serve the Paris Agreement – a well-established but often overlooked mechanism with powerful instruments.

In essence, the Technology Mechanism consists of two interlinked and supporting parts – the Technology Executive Committee at the UNFCCC as the political and governing part, and the Climate Technology Center and Network (CTCN) providing technical assistance to developing countries.

Both are served by a network of National Designated Entities (NDE) established in theory in every member state of the convention. They serve as focal points and issue or receive requests for technology or technical assistance.

The German NDE under the authority of the German Ministry for Economic Affairs provides detailed information on available German technologies as well as for companies interested in technology transfer; i.e. selling their technology on dedicated target markets outside Germany, including general information on other countries. In principle, this could be a one-stop shop solution as it also includes other activities of the German Government. [www.nde-germany.de]

The CTCN is in general not actually providing technical knowledge based on their own expertise, but serves as a broker and issues tenders for providing the requested expertise. Offering their expertise as a paid service may also be an option for German companies. [www.ctc-n.org]

The Technology Executive Committee (TEC) focuses on identifying policies that can accelerate the development and transfer of low-emission and climate resilient technologies. While this seems far from a direct business interest, its findings and information can be very useful for strategy decisions and market intelligence. [unfccc.int/ttclear]

One of its key mandates is to support Technology Needs Assessments (TNAs) and provide an overview about a country's need for technology, including assessing policies and potential barriers to implementation. This results in Technology Action Plans (TAPs) which are not far from actual bankable projects. All this information is publicly available on the website. [unfccc.int/ttclear/tna/reports.html] Projects are available and stakeholders are invited to participate, which can certainly also generate business opportunities.



TT:Clear



CLIMATE TECHNOLOGY CENTRE & NETWORK



BASF's Carbon Management: Ensure CO₂ neutral growth midterm, enable low emission production with breakthrough technologies longterm

In recent decades, BASF has already achieved a considerable reduction in CO₂ emissions by optimizing energy generation and production processes as well as systematically reducing emissions of nitrous oxide. Since 1990, GHG emissions have been cut by half – while production has more than doubled.

Further reduction of greenhouse gas emissions will be increasingly difficult due to the high degree of efficiency that has been reached. However, BASF does not want to grow at the cost of the climate and has therefore in 2018 set the target of CO₂-neutral growth until 2030, which means growth without an overall increase in GHG emissions. In order to reach this, efforts to increase process and energy efficiency as well as further reduction of nitrous oxide reduction will continue. Also, BASF will gradually replace fossil fuels with renewable energy sources in electricity purchasing.

In order to cut greenhouse gas emissions dramatically, BASF researchers are intensively working on fundamentally new low- CO₂ emitting production processes. The Carbon Management R&D program focuses on base chemicals: These are responsible for 70% of the GHG emissions of the chemical industry but are an indispensable starting point for the value chain. By electrification and new processes, base chemicals could be produced almost GHG emission free. Key projects are:

- Production of emission-free hydrogen based on (initially) fossil methane.
- The world's first electric heating concept for the steam crackers.

- A CO₂-free synthesis pathway for olefins, the largest intermediate in the chemical industry in terms of volume, on the basis of innovative catalyst systems.

The first pilot plants are to be built over the next years, and implementation at large scale could possibly take place from 2030 onwards, provided that the framework conditions are favorable: Especially the availability of renewable electricity at competitive prices is a key factor for the competitiveness of such new technologies.



Starke Schiene: DB on course for CO₂-free transport by 2050

Climate change is tangible for us as Deutsche Bahn. Hotter summers, stronger storms or flood-like rain-falls are becoming an almost daily challenge. We must all act.

Deutsche Bahn is facing up to its responsibility for the environment and our society: We are strengthening the railways in Germany – for the climate, for the people, for the economy and for Europe.

With our umbrella strategy 'Starke Schiene', we are creating the conditions for this. Because without a massive shift of traffic towards the green railways, neither the domestic German nor the European climate targets can be achieved. No other form of transport is as climate-friendly as rail.

Deutsche Bahn is consistently expanding this environmental advantage: By 2050 we will be CO₂-free. In order to achieve this goal, we have set ourselves demanding intermediate stages: By 2030, we want to more than halve our CO₂ emissions compared with 2006 and increase the share of renewable energies in the German traction current mix to 80%. By 2038, we will have completely converted German traction power to 100% green power. Efforts and investments are contributing to this, particularly in the following four areas:

Expansion of the share of eco-electricity

In order to completely convert traction power to 100% green electricity by 2038, DB is relying on a broad mix of renewable energies. In addition to the full greening of long-distance traffic and S-Bahn traffic in Berlin and Hamburg, DB operates its 15 largest stations in Germany with 100% green electricity, for example in Berlin, Munich and Cologne.

Increasing energy efficiency

In addition, DB relies on the efficient use of energy, e.g. by introducing systems for regenerating brake energy in the overhead line and by using energy-saving operating methods that achieve electricity savings of up to 10%.

Phasing out of fossil fuels

On the way to CO₂-free Deutsche Bahn, the use of fossil fuels will be dispensed with. Since not all lines can be electrified despite all efforts, DB is pursuing an open-technology approach with alternative drives. With the use of hybrid vehicles in freight and passenger transport, DB is taking a first step towards low-emission alternatives to conventional drives. In the next step, diesel-powered vehicles will be replaced by battery or hydrogen-powered ones and the necessary tank and charging infrastructure will be developed.

Introduction of new mobility services

DB is introducing new intermodal mobility services in order to make transport beyond the railways climate-friendly from the first to the last mile. These include autonomous and climate-friendly on-demand services and the sharing of e-vehicles and bicycles.

‘Das ist grün.’ shows how and where DB is committed to environmental protection

Only with a strong rail system will Germany and Europe achieve their climate targets. That's what 'Das ist grün.' is about - the environmental strategy and more than 150 underlying measures in climate, nature and resource protection as well as noise protection.

In addition to efforts to protect the climate, environmental protection also means maintaining a healthy ecosystem for us. That is why we use resources sparingly. We have set ourselves the goal of recycling more than 95% of the raw materials we use by 2020.

However, we go one step further towards a healthy ecosystem by creating habitats for endangered animals and plants and by promoting biodiversity. This is why we have already implemented more than 25,000 individual nature conservation and species protection activities since 2010.

For us, more passengers and goods for a green rail also mean thinking about the people who live on the railways: This is why we are continuously making our trains quieter, investing further in noise protection and developing innovative measures for quieter railways. With the clear goal of halving rail traffic noise by 2020.

As Deutsche Bahn, we are living up to our responsibility for a successful mobility turnaround in Germany and Europe. And in doing so, we are turning our customers into environmentalists.

More information about Das ist grün., the environmental strategy and all measures behind it at:
[deutschebahn.com/gruen](https://www.deutschebahn.com/gruen)



Climate protection is a priority for Deutsche Bank

Climate protection is an important part of Deutsche Bank's corporate responsibility. This is why the bank has been making its own business climate-neutral since 2012. It works continuously to improve energy efficiency, uses renewable energies and offsets its remaining greenhouse gas emissions. In concrete terms, this means that between 2011 and 2018, Deutsche Bank was able to reduce CO₂ emissions from its own operations by more than 60%; in 2018, it obtained around 80% of its electricity from renewable sources; and it invests around EUR 400,000 annually in projects that promote climate protection and sustainable development in Africa, Latin America and Asia. However, the bank does not want to leave it at that: Over the next three years, it intends to reduce its energy consumption by a further 3%.

In 2019, the European Union decided to reduce greenhouse gas emissions to net zero by 2050. This goal can only be achieved if the economy undergoes fundamental change, and companies in CO₂-intensive sectors in particular still face major challenges. As a globally active financial institution, Deutsche Bank sees its greatest contribution to climate protection as accompanying its clients' transformation processes – through the way it grants loans, through its products, and through its guidelines and principles.

As a long-standing member of the United Nations Environment Program, Deutsche Bank is one of the first signatories to the Principles for Responsible Banking. These principles form the framework for a sustainable banking system of the future and are intended to help achieve the sustainability goals of the United Nations and the Paris Climate Agree-

ment. With its signature, the bank underscores its extensive experience and long-standing commitment to climate protection.

Deutsche Bank has been active in the field of renewable energies since mid-2000. In 2018 alone, Deutsche Bank arranged financing for corresponding projects amounting to around EUR 1.2 billion and an output of over 2,000 megawatts.

In 2014, Deutsche Bank helped to develop the market for green bonds by helping to develop the Green Bond Principles. Last year alone, the bank issued over EUR 8 billion worth of green bonds for its clients.

Deutsche Post DHL Group: On the way to zero-emission logistics

March 8, 2017 was a special date for Deutsche Post DHL Group. On this day, CEO Dr. Frank Appel presented our new climate protection target in Bonn: We want to reduce all logistics-related emissions to zero by 2050 – and are a pioneer in sustainable logistics with this goal. The shift towards clean transport and delivery solutions will make zero-emission logistics possible, among other things.

Our long-term goal is accompanied by four sub goals, which we want to achieve by 2025: We want to improve our CO₂ efficiency by 50% compared with the base year 2007 and handle at least 70% of our own delivery and collection with clean solutions such as electric vehicles or freight bikes. More than 50% of our sales are to come from green logistics solutions. In addition, we want to certify at least 80% of our employees as GoGreen experts and plant one million trees a year together with partners.

Electromobility: From logistics provider to car manufacturer

In order to achieve our goal of zero-emission logistics, we will make transport and delivery more sustainable. Electric vehicles play a central role in this because they are already an emission-free and quiet alternative to conventional drives. However, some special requirements must be taken into account in the delivery process: the vehicles must be able to withstand the particular stresses of continuous start-stop traffic and at the same time offer sufficient payload and range. In addition, the needs of our colleagues in delivery, e.g. ergonomics and comfort, must also be considered.

Because we could not get a vehicle that was convincing in all areas at the desired time, we became

active ourselves. In a joint project with StreetScooter GmbH and the Technical University of Aachen, we therefore developed the first prototype of the StreetScooter in 2012, an electric vehicle specially tailored to the requirements of delivery operations. The first pre-series models were tested in operation in 2014, and the vehicle has been in series production since 2016. We are active as a manufacturer ourselves, because StreetScooter GmbH has been a wholly-owned subsidiary of Deutsche Post DHL Group since the end of 2014.

More than 10,000 vehicles are now being delivered in Germany alone. The StreetScooter has a range tailored to the delivery of parcels and letters and is charged overnight at the delivery base - with 100% green electricity, of course. With the Work L model, we have also been producing a larger version of the vehicle since 2015, which at eight cubic meters has almost twice the loading volume of our basic Work model. And as the largest vehicle in our model range, we have designed and commissioned the Work XL model in cooperation with Ford, which has a loading capacity of 20 cubic meters – equivalent to more than 200 packages.

Quick and clean on two, three or four wheels: Our bike fleet

In addition to the StreetScooter, our delivery by bike is an important element in cities. The eco-balance of the bicycle is unbeaten: It is environmentally friendly, quiet and usually the fastest and most flexible means of transport in the city center. Our fleet in Germany consists of around 11,000 e-bikes and three-wheel e-trikes as well as 14,400 conventional post bikes.

In addition to delivering letters, we are also working on solutions that make it possible to deliver small packages and small parcels by bicycle. For example,

DHL Express Netherlands has developed the Parcycle, a bicycle that delivers documents and smaller parcels by express delivery. It has a lockable transport box with a capacity of 140 liters. The Parcycle was extensively tested in the Netherlands as part of the pilot test and is now being used successfully in Germany, France, Great Britain and Italy, among other countries.

The Cubicycle is another bicycle delivery innovation from the Netherlands. The four-wheeled cargo bicycle is equipped with a removable and securely lockable container that offers a loading volume of one cubic meter. A container can hold up to 125 kilograms of consignments. The container principle is the highlight of the Cubicycle: The cargo wheel is used in combination with the City Hub, a trailer on which up to four containers can be transported to the delivery district. There, the trailer acts as a micro-lift for the Cubicycle deliverer, by quickly and easily loading and unloading full containers. Despite its loading volume, the recumbent bike is easy to drive, and the drivers are supported by an electric auxiliary drive.

Conclusion: Green logistics is good for the environment – and good for business

The StreetScooter and our freight bikes are just two examples of how we are using technical innovations to make logistics greener. In particular, these measures play a major role in achieving our goal of making delivery cleaner and thus improving air quality in cities.

At the same time, our investments in green technology are having a positive economic impact: Through efficiency gains, but also in the form of competitive advantages, by serving the growing demand from customers for sustainable logistics services. In addition, with our measures and our target for 2050,

we are setting important impulses for the logistics and transport industry and thus contributing to a greener future.

You can find out more about our climate protection target, the StreetScooter and our sustainability fleet at www.dpdhl.com/verantwortung.

Deutsche Post DHL Group: Climate protection in Lesotho

Since December 2010, Deutsche Post DHL Group has been coordinating and financing its own climate protection project in the South African state of Lesotho. The project achieves annual savings of around 20,000 tons of CO₂ and is geared to the long term. With our project, we ensure that the people in Lesotho receive a fair and appropriate share of the sales proceeds from the CO₂ credits and that the project contributes to cushioning the negative consequences of climate change locally. An established minimum price enables long-term financing of the project costs, while an additional premium payment is paid directly to the village communities, which can be invested in local climate adaptation measures.

The Lesotho climate protection project uses the so-called 'Save80' cooker, which reduces CO₂ emissions by up to 80% compared to the conventional cooking method. In Lesotho, cooking is traditionally done in pots over an open fire. The 'Save80' cooker enables people to preserve their traditions but requires only a minimum of firewood and has a long thermal output. The low demand for firewood reduces deforestation and soil erosion and improves people's health and quality of life. The project will be implemented together with the local partner Solar Lights (sales) and atmosfair gGmbH, one of the world's leading providers of climate protection projects.

Deutsche Telekom's integrated climate strategy

Deutsche Telekom (DTAG) has set new, ambitious climate targets. As in the past, these are an elementary component of an integrated climate strategy based on four pillars.

1. CO₂ emissions from the entire value chain are considered

In addition to reducing direct emissions, Deutsche Telekom has also committed to reducing indirect emissions from the supply chain and the use phase of its products. The future climate target, which extends to 2030 and is based on 2017 as the base year, represents all global activities and is therefore a Group-wide target.

Deutsche Telekom aims to reduce direct CO₂ emissions by 90% and indirect CO₂ emissions by 25% per customer by 2030. The new targets were accepted and published by the Science Based Target Initiative.

The main clusters for managing the reductions in direct emissions are the fixed and mobile networks, data centers, buildings and the fleet. For indirect emissions, Deutsche Telekom considers purchased goods and services as well as capital goods in the supply chain and products sold and leased in the usage phase. These four categories represent approximately 83% of all emissions from the upstream and downstream value chain. The main suppliers are included in the optimization strategy to achieve the targets, e.g. through joint workshops and measures derived from them.

2. Use of renewable energy

Deutsche Telekom plans to draw 100% of its electricity from renewable energy by 2021. More and

more national companies are already purchasing 100% of their electricity from renewable sources. This is now being extended to the entire Group. In principle, various instruments are used for this purpose: guarantees of origin, Power-Purchase Agreements (PPAs), Green Tariffs, own production. In the initial phase, the acquisition of so-called guarantees of origin is used the most due to the lack of technical and economic alternatives in Europe. Although around 300 photovoltaic systems are operating in Germany nowadays, for example at Deutsche Telekom, the Group's own production still accounts for a very small proportion. However, this is expected to change over the next years, and in-house production and PPAs will cover a significantly larger proportion of electricity requirements overall. Deutsche Telekom assumes that PPAs and in-house production will become significantly more competitive over the next years as a result of technical and market developments. In the United States, the situation regarding PPAs is different. PPAs are already used in the US, and electricity requirements are to be covered entirely by them from 2021 on.

3. Improving energy efficiency

Deutsche Telekom monitors two efficiency KPIs: energy intensity and carbon intensity. The KPIs relate energy consumption and CO₂ emissions to the volume of data transported over the network. Due to the switch to 100% electricity from renewable energies, the carbon intensity KPI will play a less important role in the future. The Energy Intensity KPI, on the other hand, will gain in importance against the background of increased efforts to increase energy efficiency. Group-wide efficiency projects will ultimately be covered by this KPI. As a result of increasing data traffic and the resulting further expansion of the network, e.g. 5G, great efforts are being made here to demonstrate a positive development in efficiency.

4. Enabling Society

Through its products and services, Deutsche Telekom is making a significant and increasing contribution to reducing its customers' emissions. For example, travel can be replaced by video conferencing. Parking search traffic in urban areas can be reduced by using an app. Networks with sensors can generally optimize the flow of traffic. Cloud computing enables customers to outsource existing infrastructures to efficient data centers. These are just a few selected examples of how CO₂ emissions can be reduced during use. Deutsche Telekom records these realized emission reductions with an 'Enablement Factor' KPI for the Group in Germany. Behind this KPI is a factor that expresses how much more CO₂ emissions have been saved due to the use of Deutsche Telekom's products and services than emissions were caused by the company's operation. The ratio development has been satisfying. In Germany, it was 1.85 in 2018 compared to 1.71 in 2017, i.e. saving were greater than emissions caused by 85%. We want to further increase this value and thus make it clear that Deutsche Telekom is not only part of the problem, but above all part of the solution for a more climate-friendly society.

E.ON SE: Energy for tomorrow – E.ON is dedicated to climate protection

E.ON is committed to a sustainable energy future. By making energy cleaner and its consumption more intelligent and by making sustainable energy available to all. E.ON reinvented itself and systematically focuses on delivering the solutions for the decarbonization of the energy world.

With our focus on smart grids and customer solutions, we will drive the energy transition in Europe forward together with our customers. We see our customers as partners when it comes to climate protection and work together to create the new energy world. We will promote Europe's green and digital agenda in the interest of its citizens and businesses, thereby making an important contribution to achieving Europe's ambitious climate targets.

A platform for the energy transition

The energy world is transforming, it's becoming more decentralized with network connection points multiplying and energy feed-in fragmenting further. In this context, the energy network infrastructure becomes the platform where the energy transition actually happens, and it is required to take a more active role. Thus, E.ON is committed to this transition to a low-carbon energy system that takes maximum advantage of renewable sources. Our platform connects consumers with a steadily growing number of distributed renewable energy producers and provides the backbone for sustainable, low-carbon e-mobility.

To manage these complex energy flows while ensuring a reliable electricity supply, we're making our networks smarter. Connecting customers and renewable energy sources in an affordable way requires the use of innovations and intelligent tech-

nologies. Smart grid elements help us increase the capacity of our existing grid in order to integrate renewables, at the fraction of the cost of new lines and bigger transformers. Smart Grid investments will ensure that our grid is flexible enough to meet tomorrow's challenges.

We help to realize the energy transition so that **sustainable** energy is available to everyone.

Helping our customers become more sustainable

The easiest way to emit less carbon is to use less energy. Energy efficiency and recovery have enormous climate-protection potential. So do distributed, renewable energy and e-mobility. Not surprisingly, our customers – from homeowners and small businesses to industrial enterprises, real estate developers, and entire cities – increasingly want smart solutions that enable them to use energy more efficiently, save money, and emit less carbon.

Digitalization helps. It creates new opportunities – like digital energy management and smart-home technology – to make energy use transparent and more sustainable.

Our Climate strategy

We strive to become carbon neutral by 2050. We reduce the carbon emissions of our own business operations by 30% and those of our customers – their carbon emissions per kWh of power we sell them – by 50%, both relative to a 2016 baseline. Furthermore, we strive to make our buildings carbon-neutral by 2030 and electrify our fleet by 2030.

HeidelbergCement: First cement company with SBTi-approved targets

HeidelbergCement is one of the world's largest integrated manufacturers of building materials with leading market positions in cement, aggregates, and ready-mixed concrete. Climate protection is at the heart of the Group's sustainability strategy. In its Sustainability Commitments 2030 published in 2017, HeidelbergCement already set ambitious targets for 2030: By 2030, the company aims to reduce its specific net CO₂ emissions by 30% compared with 1990 levels.

Together with the Science Based Targets initiative (SBTi), HeidelbergCement explored the possibility of obtaining recognition of its climate targets as conforming to the Paris Agreement – to limit global warming to well below 2°C above pre-industrial levels. The SBTi independently assesses and validates corporate emission reduction targets against the latest climate science. HeidelbergCement pursued a bottom-up approach: The process was based on HeidelbergCement's '30% by 2030' target, while other companies usually start out by committing themselves to the development of science-based targets and develop these targets from zero in a next step.

HeidelbergCement's CO₂ reduction strategy relies on concrete bottom-up measures at plant and product level. It is the result of a comprehensive, Group-wide examination of what is technically and economically feasible: After collecting existing data, extensive testing of the performance and possible technical measures ensued at all HeidelbergCement plants worldwide. Results and improvement proposals were then evaluated and translated into individual CO₂ reduction plans for each plant. All plans focus on opportunities to improve energy efficiency and a steadily increasing use of alternative raw materials and fuels.

Following thorough discussions and a careful validation process, HeidelbergCement's initial reduction goal for 2030 was slightly adapted to include both a scope 1 and a scope 2 target and adjusted to a 2016 base year. It was officially recognized by the SBTi in March 2019. HeidelbergCement's SBTi-approved target is to reduce scope 1 GHG emissions by 15% per ton of cementitious materials by 2030 compared with 2016 levels. HeidelbergCement also commits to reduce scope 2 GHG emissions by 65% per ton of cementitious materials within the same time frame. This makes HeidelbergCement the first company in the cement industry and one of currently only around 200 companies worldwide whose targets have been recognized as science-based.

By 2018, HeidelbergCement already managed to achieve a reduction of 20% on the original 30% target and is in a leading position when it comes to the development of new technologies for CO₂ sequestration and use. Concrete has the potential to become the most sustainable building material – and HeidelbergCement's goal is to realize the vision of CO₂-neutral concrete by 2050 at the latest.

What role does sustainability play for HSBC?

Two years ago, HSBC placed sustainability at the heart of its global banking strategy and set itself ambitious targets. Since then, 4,000 relationship managers have been trained to enter into a strategic dialogue with our corporate clients on CO₂ reduction and to explore alternative solutions. In all major countries and territories where HSBC is large, there have since been Climate Business Councils chaired by the CEO in which the bank's key representatives are represented.

More than 80 Sustainability Risk Managers worldwide have a say in lending to particularly exposed sectors. This ranges from agricultural commodities to energy and mining. We have defined thresholds for environmental impacts that companies must not exceed if they wish to obtain loans from us.

From HSBC's point of view, reducing global CO₂ emissions is the most important challenge facing society.

Together with our customers, we develop strategies and point out possibilities to promote the change to an economy low in CO₂. In addition, for more than ten years, we have had a team of specialists at the HSBC Centre of Excellence, which aims to provide the best analysis of climate change and its impact on the economy, industries and sectors. In the Thomson Reuters Eintel Survey in the Sustainability Research category, HSBC has been ranked first for years. In addition, HSBC established the Centre of Sustainable Finance as a global think tank in 2017 to further enhance our visibility as an opinion leader among the global public.

Operations

In order to keep the environmental impact of our

own business operations as low as possible, the Bank relies on processes that reduce environmental pollution. We also see our environmental protection measures as a role model for our employees, customers and other stakeholders. We pursue reduction targets in waste management, energy consumption, CO₂ emissions and building management. We also have concrete targets for environmentally friendly mobility: For business trips, we prefer to use the train to reduce CO₂ emissions and particulate matter. Company tickets for employees also support green mobility.

Climate protection measures often go hand in hand with financial savings. The HSBC REDUCE program, which aims to reduce annual CO₂ emissions per employee from 3.5 tons in 2011 to 2.0 tons in 2020, has been at the heart of HSBC's commitment to the environment since 2012. The program defines ambitious targets for ten areas. Since 2011, for example, global paper procurement has been reduced by over 60%, electricity consumption by 26% and waste production by 75%. For example, the introduction of a thermo cup for employees has led to a reduction of around 90% in the consumption of disposable cups at the Düsseldorf site. Since October 2019, the Düsseldorf location has no longer offered the distribution of beverages in disposable cups. In addition, we rely on renewable energies for our electricity supply and purchase 100% green electricity in our main building.

• Sustainability in the organizational structure

HSBC operates in 65 countries and territories around the world. HSBC coordinates and implements operational climate protection measures globally. This requires uniform specifications and guidelines. Compliance with these requirements and guidelines is managed globally by Group Sustainability.

Since mid-2017, HSBC has appointed a Global Head of Sustainable Finance, who is also responsible for global strategy. Almost every HSBC country unit has a Sustainability Team dedicated to the following three main areas:

- **Sustainable Financing**

As one of the world's largest financial institutions, HSBC strives to be a leading global partner in the transition to a low carbon future. We are committed to providing \$100 billion in sustainable finance and investment by 2025. We are also committed to improving the efficiency of our own operations. By 2030, we will be purchasing 100% of our electricity from renewable sources. We have a particular credibility with Green Loans because we have also been involved in developing the framework, the Green Loan Principles. HSBC already has a track record for structuring green loans. HSBC also played a key role in establishing the Green Bond Principles.

According to the 2019YTD rankings, HSBC takes first place in the League Tables for Green Bonds. Overall, HSBC participated in 312 Green/Social/Sustainability Bond Deals and was the Structuring Advisor in 96 cases.

- **Sustainable networks and entrepreneurship**

Sustainable growth requires consistent and responsible international trade networks. We work with our business partners and nonprofit organizations to promote business practices that protect the environment and human rights. We support new companies in their establishment and growth plans.

- **Future Skills Requirements**

A rapidly changing world also requires special skills for the labor market and knowledge of financial is-

sues. We provide our clients and partners with the necessary knowledge and financial expertise to succeed in the globalized economy. We empower our employees for the challenges of this professional world.

- **What tips can you give others?**

'You can't manage what you can't measure' – The success of the HSBC REDUCE program is decisively linked to the measurability of the defined objectives. Especially in globally active organizations, these goals and transnational coordination within the framework of a global strategy are a decisive factor for measurable, thus controllable and ultimately effective climate protection measures. In addition, raising awareness with employees is of great importance. HSBC therefore offers its employees a training program at HSBC University dedicated to climate change and sustainable development.

- **What is the feedback from employees and customers on your commitment?**

The feedback from our employees is consistently positive. At the latest since the introduction of the HSBC thermo cup, ecological awareness has been strengthened for a large number of employees, so that many colleagues also take initiative themselves. Last summer, for example, a 22-member HSBC team pedaled in the 'City Cycling' campaign for climate protection in Düsseldorf. Since 2009, more than 2,000 employees around the world have also been trained on their own initiative to become so-called 'climate champions' in order to establish environmental awareness and operational measures across the board.

Climate action: Bosch to be carbon neutral world-wide by 2020

Stuttgart and Renningen, Germany – Bosch is to be fully climate-neutral as early as next year. Its over 400 locations worldwide, and their engineering, manufacturing, and administrative facilities, will no longer leave a carbon footprint. This will make Bosch the first major industrial enterprise to achieve this ambitious goal in a little over a year. “We see climate action as our responsibility, and believe we have to act now,” says Dr. Volkmar Denner, chairman of the board of management of Robert Bosch GmbH. In a bid to swiftly achieve carbon neutrality, Bosch will buy more green electricity in the near term and compensate for unavoidable CO₂ emissions with carbon offsets. In the years to 2030, the company will gradually increase the share of renewable energy in the power that it generates and buys, and will invest a billion euros to boost its locations’ energy efficiency.

Once Bosch achieves climate neutrality, it will no longer adversely affect carbon dioxide concentration in the atmosphere. The company is thus making an important contribution to the Paris Agreement ratified in 2015, which calls for global warming to be kept well below two degrees Celsius above pre-industrial levels. “Everyone has to contribute to climate action,” Denner says.

Swift action to achieve early carbon neutrality

Industrial enterprises such as Bosch can make a significant contribution to the drive for global climate neutrality. According to the International Energy Agency, manufacturing accounts for around 32% of global carbon dioxide emissions. As it stands, Bosch emits around 3.3 million metric tons of carbon per year. The company has already reduced carbon emissions relative to its value creation by nearly 35% since 2007. “We are not starting from scratch. We

have consistently exceeded our targets for the relative reduction of carbon emissions. Now the time has come for absolute targets. Let the final countdown begin,” Denner says.

Focusing on sustainable, renewable power supply

Starting in 2020, Bosch will compensate for any residual and unavoidable carbon emissions primarily by buying green power from legacy plants and taking part in carbon offset programs. The company is investing in environmental projects, certified to rigorous standards, aimed at supporting social and ecological development. Carbon offsets are to be gradually scaled back by 2030, and Bosch is stepping up investments in renewable energies to this end. It also intends to enlarge company-owned photovoltaic systems such as those in place at the Nashik and Bidadi locations in India. The company expects to achieve a tenfold increase in installed energy capacity with this move. Bosch will also sign long-term, exclusive supplier contracts with new wind and solar farms around the world, which can then operate profitably even without government subsidies.

A billion euros – and connected solutions – for greater energy efficiency

Enhanced energy efficiency is a powerful tool for achieving carbon neutrality. Bosch will invest a billion euros in the energy efficiency of its plants and buildings over the next ten years. “We want to reduce energy consumption and carbon di-oxide emissions in absolute terms, and not just relative to value creation,” Denner says. By 2030, the company plans to save additional energy amounting to some 1.7 terawatt hours per year. This is more than one-fifth of its current annual consumption, and comparable to the amount of electricity consumed by private households in Cologne. Bosch has been vigorously pursuing environmental management practices for years. In 2018 alone, the company carried out

some 500 energy-efficiency projects, reducing power consumption by close to 1.5%. Connected manufacturing has also become a key efficiency driver. Bosch has already deployed its proprietary energy platform, a part of the company's portfolio of Industry 4.0 solutions, to more than 30 factories around the world. This platform is a cloud-based software solution that can track and control every single machine's power consumption.

Climate action pays social and economic dividends

In the years up to 2030, the company will incur one billion euros in added costs by buying green electricity, engaging in carbon offset programs, and sourcing power from renewables. In that same period, Bosch will invest one billion euros to boost in-house energy efficiency. This increase in energy efficiency will save Bosch around one billion euros, thereby bringing the company's expenditure on carbon neutrality down from around two billion to one billion euros by 2030. 'Carbon neutrality is doable and, if pursued with the necessary determination, can be achieved quickly. Our investments benefit not only us at Bosch, but humankind in general as well,' Denner says.

A selection of exemplary Bosch projects

The Feuerbach plant – energy efficient thanks to people and machinery

Feuerbach, Germany, is home to Bosch's oldest location worldwide. Established in 1909, Bosch has steadily and systematically modernized its facilities to contribute to the company's overall energy efficiency. With training sessions in its 'Energieerlebniswelt' (energy experience world), the local team focuses on energy monitoring and increasing awareness among the workforce. The plant has pursued heat recovery, room automation, machine power shut-off management, and shop renovation projects with great success. Its energy requirements

are down more than 50% compared with 2007; its carbon emissions – relative to value creation – are down 47%.

Crunching data to conserve energy in Homburg

The Bosch location in Homburg, in the German state of Saarland, is edging ever closer to the vision of an energy efficient, self-learning plant. It has spared the world around 5,000 metric tons of carbon dioxide in the past two years and more than 23,000 tons since 2007. This approach pairs maximum transparency with technical innovation. An energy management platform developed by Bosch uses data from the machinery collected at some 10,000 measuring points. Associates can track, control, and optimize each individual machine's power consumption. Technical solutions include ventilation of manufacturing shops on an as-required basis, utilization of waste heat from various machining processes, and smart consumption management for machinery.

Sustainable heating in Rodez

Reduce the site's carbon footprint – that was what the team in Rodez in France set out to do when it started making plans as far back as 2009. The location now has a biomass heating plant, up and running since 2013. It burns wood chips obtained from certified sustainable local forestry resources. Rodez uses its power to heat water and generate process heat. On average, the wood chip-fired plant covers 90% of the location's heating requirements. It consumes some 6,600 metric tons of wood chips a year. Burning this biomass releases no more carbon than the trees had taken from the atmosphere. The factory has reduced its yearly emissions by around 600 tons.

RWE: Carbon neutral by 2040

Carbon neutral by 2040, one of the world's leading renewable energy companies, a responsible producer of power from all energy sources – this is the formula behind the new RWE. Based on a three-stage CO₂ reduction plan, the company has set ambitious goals for its strategic realignment. RWE intends to become a carbon neutral company within the next 20 years.

RWE decreased its carbon dioxide emissions by a third from 2012 to 2018, representing a decline of 60 million metric tons. An additional reduction of approximately 70% is envisaged by 2030. RWE will decommission its last coal-fired power station in the United Kingdom to this end. In Germany, more of the Group's coal power plants will gradually be taken offline, following the recommendations by the Commission for Structural Change. The Dutch government wants its country's coal-based electricity generation to end by 2030. RWE is in the process of converting the plants in Eemshaven and Amer to fire biomass. The objective is to transform electricity generation from fossil fuel in order to achieve carbon neutral production. In addition to a large international portfolio including wind turbines and photovoltaic units which the company intends to expand continuously, RWE will then place its chips on storage, biomass and gas-fired power stations primarily fired by 'green' gas, which will be indispensable to achieving security of supply. This presents RWE with a huge task. But there is a clear idea how to achieve this goal. On the one hand, phasing out of fossil energy sources both consistently and responsibly. On the other hand, making huge investments in wind and solar power as well as in high-capacity storage technologies. This is how the new RWE is and will remain one of the major players in the electricity generation business.

Growing renewable energy is the clear focus of the new RWE. The renewable energy portfolios of E.ON and innogy, combined to form RWE Renewables, will turn the company into a 'global player made in Germany' with an installed capacity of more than 9 gigawatts. Added to this are further assets with a combined capacity of 2.6 gigawatts under construction that will be completed in the near future. The world's No. 2 in offshore wind and Europe's No. 3 in renewable energy – these are the starting positions that the company intends to consolidate and strengthen. RWE will provide an annual 1.5 billion EUR in net capital expenditure for both offshore and onshore wind turbines as well as photovoltaics and storage. Project partnerships have the potential to increase total investments to between 2 and 3 billion EUR per annum.



SAP: Using technology to transform businesses and reduce carbon outputs

SAP is addressing climate change and helping the world run better by digitalizing business processes and applying data to drive decisions about resource usage of customers. The IT company is also striving to lead by example in internal operations.

Steps taken to improve SAP's Environmental Performance

- Supporting customers to run more sustainably and strengthening the Green Cloud
- Significant cuts of CO₂ emissions and commitment to be carbon-neutral by 2025
- SAP-owned facilities and data centers powered by 100% renewable energy (since 2014)
- Driving internal initiatives, implementing an Environmental Management System

Enabler

The majority of SAP's overall emissions result from the use of its software, which means that the company's key lever for climate action is its product portfolio. One of the most efficient ways to help customers reduce their energy usage and emissions is by managing their SAP systems through cloud services provided by SAP's carbon-neutral green cloud offerings. In addition, the solutions in SAP's portfolio enable its customers to manage their resources in an efficient manner. By combining the worlds of analytic and transactional data into one real-time, in-memory platform, it helps to create leaner operations, further simplifying the system landscape and reducing energy consumption. Furthermore, the IT provider has integrated value chain sustainability management and carbon footprint management to support its customers on their path to increased transparency and combine non-financial and finan-

cial data into reporting and steering. Consequently, digital solutions that drive efficiency and resource productivity are already helping to achieve SAP's aspiration of a world with zero waste and the UN Sustainable Development Goals (e.g. Goal 12 'Responsible Production and Consumption' and Goal 13 'Climate Action').

Example

SAP is a member of the Science-Based Targets initiative and was the first German company to release a science-based climate target in 2017. At SAP, this 1.5°C target corresponds to an 85% reduction in the 2016 emissions level by 2050. As more business moves to the cloud, data centers have become the primary focus of SAP's carbon reduction efforts, so the company introduced initiatives to drive efficiency and innovation around buildings, data center operations and infrastructure. Additionally, SAP is committed to 100% renewable electricity. While SAP produces a small amount of renewable electricity through solar panels, it relies primarily on the purchase of renewable energy certificates. To become fully carbon-neutral in its own operations by 2025, SAP is following a three-pillar approach: avoid, reduce, compensate. When emissions cannot be avoided or reduced, SAP has extended compensation models for travel and is investing in high-quality CO₂ offsets. Due to this three-fold approach, SAP outperformed its annual target of reducing its emissions in 2018 to less than 333 kt of CO₂ by 23 kt. This cut has contributed to a cumulative cost avoidance of EUR 272.8 million in the past three years, compared to a business-as-usual scenario based on 2007.

Another important factor in SAP's environmental performance is the Environmental Management System (EMS) based on ISO 14001, that has been rolled out for 70% of SAP's employees in more than 55 locations in 30 countries. Additionally, the even

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more demanding ISO 50001 energy management system has been implemented in St. Leon-Rot and Walldorf. A further key initiative is the commitment to phase out single-use plastics in all SAP locations worldwide by the end of 2020.

SAP's achievements in environmental sustainability has been recognized once again by the Dow Jones Sustainability Indices 2019, in which SAP scored 80% in the Environmental Policies and Management Systems category (+65 pp compared to industry average) within the environmental dimension.

Siemens is leading the way: carbon neutral operations by 2030

With our commitment to turn our operations carbon neutral by 2030, Siemens set a clear signal even before the adoption of the Paris Agreement. By setting this goal, we express our firm belief that companies play a pioneering role in the fight against climate change. Our goal is clear: All Siemens production facilities and buildings worldwide are to achieve a net zero-carbon footprint by 2030. This program not only benefits humanity and the environment, but also comes with sustainable economic advantages for our company.

What have we achieved so far?

CO₂ savings realized up to now: 33% - since launching the program, we have managed to reduce our CO₂ emission by ~ 33%.

Siemens Energy Efficiency Program: 15% - our investments in energy efficiency projects have led to 15 % reduced energy costs.

Green power for Siemens: 90% - in Germany, 90% of the electricity consumption of our sites is covered by renewables.

As an interim step, Siemens will reduce its CO₂ emissions by 50% by 2020, compared to 2014. Measures and goals by 2020 are:

- We plan to invest EUR 100 million in energy efficiency projects. This will annually result in > EUR 20 million savings.
- We plan to invest around EUR 45 million in distributed energy systems.
- We will gradually expand the infrastructure of today's 200 charging points for electric vehicles at German sites.

- 75% of our global power consumption will be covered by power from renewable energy sources.

As part of Siemens' commitment to become carbon neutral by 2030, Siemens has launched two internal carbon pricing pilot projects in the UK and Brazil.

UK Carbon Investment Fund

Siemens UK has launched a carbon reduction Investment Fund in order to support Siemens' global commitment of being carbon neutral by 2030. During the financial year 2019, the fund of £240k was created by charging UK businesses an internal carbon price of £13 per ton of carbon emissions from gas and electricity. This specific price was set in order to raise enough seed funding for five to ten projects as part of the pilot project phase. More than 60 innovative ideas were submitted by employees over six weeks to rapidly reduce carbon emissions in the Siemens UK operations. These range from innovation solutions, such as using a digital twin for gas turbines, to energy efficiency measures like funding new air curtains for factories. The six most compelling ideas have been rewarded with funding in the fiscal year 2019.

Carbon pricing in Brazil

Following a similar approach as the UK, Siemens Brazil will launch a carbon reduction Investment Fund as part of the pilot project in October 2019. To determine the internal carbon price for future investments, Siemens Brazil adopted the recommended level of the High-Level Commission on Carbon Pricing and set the price at US\$40 per ton of carbon emissions. This value reflects the ambition to reduce the carbon footprint and set the country on a corrective course in fulfilling the Paris Agreement. 80% of the funds collected will be used for

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carbon reduction projects defined by the community of Siemens experts (e.g. Siemens Energy Managers). The remaining 20% will be allocated to projects nominated by all Siemens employees. Every year, different carbon reduction actions will be supported via such a funding mechanism.

Siemens' Environmental Portfolio – our decarbonization driver

With its Environmental Portfolio, Siemens tackles major challenges, such as climate change, environmental pollution and resource scarcity. The Environmental Portfolio comprises products, systems, solutions and services that meet one of our criteria, namely energy efficiency or the use of renewable energies. Offerings from the Environmental Portfolio help to alleviate the negative impact on the environment and to reduce emissions of carbon dioxide and other greenhouse gases contributing to global warming.

What characterizes a product in the Environmental Portfolio? Renewable energy systems and components qualify for our Environmental Portfolio as well as products and systems, that are far more energy-efficient in the use phase at our customers than comparable solutions, i.e. yield an increase in energy efficiency of at least 20% or a greenhouse gas reduction of at least 100,000 metric tons of CO₂ equivalents in the reporting year.

Our Environmental Portfolio in facts and figures

- Our customers saved 609 Mt CO₂ in the fiscal year 2018 with the help of innovative solutions from the Siemens Environmental Portfolio. This is the equivalent of more than 75% of Germany's annual CO₂ emissions.
 - In the fiscal year 2018, the Environmental Portfolio represented nearly half of Siemens' total revenue.
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- In the fiscal year 2018, the revenue from the Siemens Environmental Portfolio amounts to ~ EUR 39 billion.

thyssenkrupp sets itself clear targets: climate neutrality by 2050 including our impact through products and technologies

Targets and Ambition

thyssenkrupp aims to be climate neutral from 2050 onwards. The targets cover thyssenkrupp's own production operations (scope 1), the energy it purchases (scope 2) and its products in their use phase (scope 3). As a 2030 midpoint target the Group intends to cut emissions from production and sourced energy by around 30 percent. Emissions from the use of thyssenkrupp products are to fall by 16 percent by 2030. thyssenkrupp's climate strategy is fully in line with the Paris Climate Agreement of 2015 and was accepted by the SBTi; making thyssenkrupp the first diversified multinational to be certified in this way.

Climate Action at and by thyssenkrupp

Implementing ambitious climate goals requires bold action. At thyssenkrupp this is achieved through the coordinated Group program CAPS (Climate Action Programm for Sustainable Solutions), with the clusters #IMPLEMENT, #ENABLE and #ENGAGE aligning activities and generating synergies.

#IMPLEMENT: ambitious climate action through mitigation of own emissions

Reducing own emissions at thyssenkrupp concentrates on our steel production and energy use as the main contributors, but spans all emissions (scope 1 and 2).

- Energy efficiency is a group-wide priority. Since 2013, we have been implementing our GEEP program (Group-wide Energy Efficiency

Program) including concrete measurable targets, which are related to the board compensation.

- The conscious use of renewable and climate-neutral energies is an important lever. Energy efficiency efforts alone cannot reduce energy use to zero. And upcoming climate action might actually increase energy demand, which would then be met with energy from renewable sources.
- In the steel production, we follow two approaches to reduce CO₂ emissions. On the one hand we develop Carbon2Chem (C2C), where we expect a large-scale implementation even before 2030. Carbon2Chem produces valuable chemicals using waste gases from the steel production and delivers a sustainable carbon source for essential basic elements of chemistry such as alternative fuels, fertilizers or plastics.
- On the other hand, we aim at avoiding CO₂ (CDA – carbon direct avoidance) by using “green” hydrogen instead of coal as a reduction agent. Thus, no carbon dioxide will be produced at all. We also provide a ready-to-use bridge technology by directly injecting hydrogen into the blast furnaces. This feature is unique to our approach. In the long-term, novel plants for pure hydrogen metallurgy will be used, that rely on an efficient hydrogen infrastructure and cost-efficient “green” hydrogen – contributing to carbon neutrality in 2050.

#ENABLE: thyssenkrupp enables climate solutions for our customers

The indirect climate effects of our supply chain (scope 3) exceed direct emissions by far. Especially in the use phase of our products by our customers, there is high potential to avoid greenhouse gas emissions. We want to exploit this potential by offering intelligent solutions. Examples include:

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- Greenhouse gas neutrality will not become reality without green hydrogen. Therefore, we have developed our alkaline water electrolysis (AWE), a proven and cost-efficient concept. This technology now also enables flexible demand side management of renewable electricity.
- The path to greenhouse gas neutral cement plants is based on our Oxyfuel technology. CO₂ cannot be fully avoided in cement making as it is contained in the limestone used as a raw material. Our solution is to enrich and capture the CO₂ and use it in a Carbon2Chem plant or deliver it to other future CO₂ infrastructures.
- Fertilizer production is critical to ensure the nutrition of a growing world population. EnviNOx mitigates most N₂O emissions, which are 300 times more harmful than CO₂, and additionally nearly all NOx emissions.
- In the area of alternative fuels thyssenkrupp is working with European partners to produce alternative fuels also from biomass as well as from CO₂. These fuels reduce CO₂ emissions by up to 90 percent compared with conventional fuels. Other key activities include the e-mobility sector, where thyssenkrupp supplies battery production lines and special steels for electric motors. Solutions for sustainable cities and novel mobility concepts include MULTI and ACCESS.
- Climate protection only works globally and requires an adequate regulatory framework on all policy levels to ensure transparency of climate protection and achieve global competitiveness. thyssenkrupp is engaged in the socio-political discussions on all levels. We are a regular at the UN climate conferences (COP), but also in many UNFCCC activities such as the Technology Needs Assessment (TNA) process.
- We share our positions also through federations and trade associations and are active in key bodies such as BIAC (Business and Industry Advisory Committee to the OECD) or the International Chamber of Commerce (ICC), but also throughout the world in local organizations such as econsense in Germany.
- Integrating climate action into the supply chain and bringing it to our customers is core of our business.
- Involving science and research is a constant part of our daily work. We are in permanent exchange with a large number of political Think-Tanks and Research Organizations. We are a member of advisory boards and committees on all levels, e. g. the framework project "Dialogue Climate Economy" of the German Ministry for Research and Education, and play a leading role at "IN4Climate.NRW" at regional state government level.

#ENGAGE: thyssenkrupp plays active role in socio-political dialogue

We are convinced that only a broad socio-political consensus can tackle the challenge of true climate protection. This requires common solutions and joint implementation from companies, politics and civil society alike. thyssenkrupp plays an active role on all levels as a constructive, competent, but also critical partner to advance Climate Action:

We are convinced that technologies for climate protection should be implemented where they can contribute the most. Therefore, we need suitable national and global financial funds and a supportive regulatory framework. The transformation can be accelerated by a monetarization of the additional climate value, a global creditability of mitigation efforts (article 6 of the Paris Agreement) and suitable financial tools for financing climate protection projects.

V Conclusion and outlook

Climate change poses major challenges to the global community. Society is facing a major transformation in which business as usual will no longer be possible if the rise in the global average temperature is to be kept below 2°C, or better 1.5°C, as agreed in the Paris Agreement. Companies are one of the largest emitters of GHG emissions due to the energy-intensive manufacture of products and services; and indirectly through the use of such products and services. At the same time, they are a central part of the solution for achieving the goal of climate neutrality by the middle of the century. Research and development, innovation and international cooperation play an important role in achieving the Paris goals. In order to effectively implement climate protection in the company and to become climate neutral, companies have two main options – real physical reduction within their own sphere of influence and compensation of remaining emissions. Both approaches, internal reduction and offsetting, were presented and illustrated with best practices by econsense members. Over the next decades, both will be needed to achieve the indispensable transformation towards global climate neutrality effectively and efficiently with the least negative impact on society-at-large.

For effective climate protection, however, companies need the necessary framework conditions (e.g. for planning and legal certainty, for a level playing field, fair competitive conditions, economic efficiency and cost efficiency). For their own activities this is often nationally determined. But for a sustainable and robust compensation approach, at least during the transitionary period of the next decades, appropriate international and global market mechanisms and regulations for carbon markets are necessary, which is the central point of the COP25 negotiations. Global cooperation on effective and competitive climate protection will only be possible if the teething troubles of the Kyoto Protocol, such as a lack of environmental integrity, a lack of additionality and rules to avoid double counting, can be avoided in the upcoming specification of Article 6 of the Paris Agreement and the finalization of the Paris Rulebook.

When such robust and sustainable instruments exist, they need to be used to deliver their full potential. It will be essential that not only instruments are derived, but that actual markets emerge and are actively created. Especially economically strong countries and regions such as the EU and Germany can provide strong incentives for Climate Action towards the 90% of GHG emissions outside Europe if Climate Action becomes a marketable good which is priced and generates a monetary profit. Closing markets to Article 6 is counterproductive. In contrast to the old CDM, Article 6 always guarantees real physical reductions and under the long-term goal of the Paris Agreement of climate neutrality it is no substitute for action – but it can ensure globally efficient and effective transition paths.

econsense and its members are committed to contributing to the required discussions, but even more so to using the resulting instruments actively and intensively to speed up Climate Action and reaching the goals of the Paris Agreement.

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