Company commitments to reduce greenhouse gas emissions

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MSc Thesis in Urban Environmental Management

April 2019

Supervised by Prof. Dr Niklas Höhne

Course code: ESA-80436

Environmental Systems Analysis

WAGENINGEN
UNIVERSITY & RESEARCH

100years
1918 — 2018

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Preface and acknowledgement

Six months ago, I started this MSc thesis in contribution to the 'Wedging the Gap' approach. This approach focusses on bridging the gap between emission reductions of the Nationally Determined Contributions and the actual needed emission reductions. At the time that I was exploring possible thesis subjects the Intergovernmental Panel on Climate Change (IPCC) released a special report; 'Global Warming of 1.5°C'. The report showed that climate change should really be limited to 1.5 degrees, otherwise the consequences for mankind will be severe, and in the report the IPCC called for unprecedented measures. This report aroused my interest and has led to the choice to choose for a thesis subject that focusses on the mitigation of greenhouse gasses. Specifically, on the mitigation of greenhouse gasses by non-state actors, because initiatives of non-state actors need to bridge the emission gap. The subject of the thesis was further discussed with and under the supervision of Dr Niklas Höhne, Special Professor Mitigation of Greenhouse Gases at Wageningen University at the environmental systems analysis group. I would like to thank Dr Niklas Höhne for his supervision during the past six months. I have experienced his supervision as very pleasant. The discussions via Skype, the constructive feedback and his efforts to get the data were very much appreciated. Then, I would like to thank the Carbon Disclosure Project for the (indirect) provision of the 'company commitment' dataset that is used in this research. Furthermore, I would like to thank Swithin Lui and Takeshi Kuramochi of NewClimate Institute for their help and their efforts to explain the content of the dataset in detail and in a way that I could use the dataset in a proper and justified way.

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List of Acronyms and Abbreviations

BAU	Business as Usual
GHG	Greenhouse Gas
$GtCO_2e$	Gigatons of carbon dioxide equivalent
$MtCO_2e$	Megatons of carbon dioxide equivalent
IPCC	Intergovernmental Panel on Climate Change
NDC	Nationally Determined Contribution
NSA	Non-state actor
RQ	Research Question
tCO_2e	Tons of carbon dioxide equivalent
UNEP	United Nations Environment Programme

Summary

Countries signed the Paris Agreement in 2015 to hold the global mean temperature increase well below two degrees Celsius and to pursue efforts to limit the increase to 1.5 degrees. This requires to reduce worldwide emissions. However, the actually needed worldwide emission reductions are much larger than the promised emission reductions by the Nationally Determined Contributions (NDCs). This so-called 'emission gap' can be filled by important 'Non-state and sub-national actors (i.e. NSAs). 21 major NSA initiatives could bridge the gap. However, the initiatives' effects should be clearly and comprehensively formulated by scientists, policy makers and other stakeholders but limited data transparency and a lack of reporting that tracks implementation of NSA initiatives, prevent this.

My study aims to improve insights in company commitments to reduce greenhouse gas (GHG) emissions and their effect on worldwide emissions. My study meets the need for better monitoring and reporting of NSAs initiatives, and provides a clear and up-to-date representation of NSA companies' share on the near-future 'emissions gap'. I used (1) the current implementation performance and (2) the coherence of commitments and actions to indicate the companies' impact on worldwide GHG emissions. The implementation performance showed whether the primary or intermediate results were adequate to achieve the expected outcomes by assessing actual and desired emissions. The coherence of commitments and actions showed if distinct emission reduction activities were planned and if these activities were efficient and sufficient to achieve the expected outcomes by assessing company reports.

Third of 4,550 company' locations were on track to meet their targets or commitments and half of them were not on track. For one sixth of the companies whether they were on track or not was impossible to determine. Overall, these companies together reduced their emissions with 255 Megatons of Carbon Dioxide equivalent ($MtCO_2e$) more than their targets or in other words an additional reduction of 12% compared to their targets. Furthermore, 13 out of 30 companies are unlikely to meet their commitments based on the assessed coherence of commitments and actions. 17 companies are likely or very likely that they meet their commitments. An important shortcoming of the used data and approach is whether Scope-2 location-based emissions or Scope-2 market-based emissions are used to establish the trend that represents a trajectory to the desired emission reductions that result from the companies' targets or commitments. A downside of using policy documents is that they recollect a previous fiscal year to inform stakeholders and other interested parties. Such documents mostly contain highlights and figures of their environmental policies and performances instead of the necessary elaborated and detailed descriptions.

My study aimed to improve insights in company commitments to reduce GHG emissions and their global impact. In this way, my study meets the need for better monitoring and reporting of NSAs initiatives. The study provided a clearer and an up-to-date representation of the share of companies as NSA on the emission-gap in the short term and concluded that companies, as NSAs, not always implement their actions and not always realize their commitments but still managed to reduce emissions by an additional amount of 0.26 GtCO2e in 2017. In the long term, a decrease in additional emission reduction is predicted but this prediction is highly uncertain. Better implementation performance and greater coherence between commitments and actions could lead to higher additional emission reductions and therefore an improvement of companies' emission-reduction contribution to climate-change mitigation.

1 Introduction

1.1 Problem description

During the Paris Conference in 2015, countries signed the Paris Agreement and set the goal of holding global warming to well below 2 degrees Celsius, and of pursuing efforts to limit warming to 1.5 degrees Celsius. However, according to the latest report of the IPCC (2018), it is crucial that the world's maximum temperature increase must be limited to 1.5 degrees Celsius. When this will not be achieved, the consequences for mankind will be severe. Floods, droughts, extreme heat and other severe problems will occur (IPCC, 2018). The Emissions Gap Report of the United Nations Environment Programme (UNEP) (2017) stated that the NDCs alone will not be enough to meet the targets of the Paris Agreement. Moreover, NDCs cover only one third of the emissions reductions needed to keep the global warming well below 2 degrees Celsius (UNEP, 2017). There is a so called 'emission gap' between the emission reductions of the NDCs and the actual needed emission reduction. UNEP (2017) reported that the gap related to the 2 degrees goal, when NDCs are fully implemented, is 13.5 to 11 Gigatons of Carbon Dioxide equivalent ($GtCO_2e$), for unconditional and conditional pledges respectively and the gap related to the 1.5 degrees goal is 19 to 16 $GtCO_2e$ for unconditional and conditional pledges respectively.

Besides the fact that more ambitious NDCs are needed, NSAs[1] will play an important role to bridge this gap. Why? Because NSAs already make a considerable contribution to global greenhouse gas emissions and the emission reduction potential form NSAs is large (UNEP, 2018a). UNEP (2017) suggests that the impact on non-state initiatives is of the order of a few $GtCO_2e$ in 2030, above current NDCs. This means, potentially, a significant contribution to closing the gap. A follow up report of the UNEP goes even further. According to a pre-release of the latest Emissions Gap Report (UNEP, 2018a), the emission reduction potential of those NSAs is large. Moreover, when fully implemented, the 2030 emissions gap can almost be bridged. In the best-case scenario, the impact could be up to 15-23 $GtCO_2e$ per year by 2030 (UNEP, 2018a). This would be of great help in bridging the emissions gap. However, the report also shows that the additional emission reduction made by NSAs is still quite limited compared to national pledges. 0.2-0.7 $GtCO_2e$ per year by 2030 compared to full implementation of NDCs, and 1.5-2.2 $GtCO_2e$ per year compared to current policy (UNEP, 2018a). Besides the fact that NSAs can contribute to GHG emissions reduction, they play an important role in climate action. Building confidence in climate policy, pushing for more ambitious goals, creating space for experimentation and taking a leading role are other benefits of the NSAs involvement according to UNEP (2018a).

It is therefore undeniable that NSAs initiatives are needed to fill the 'emissions gap'. In that light Blok et al. proposed, already in 2012, a new approach; 'Wedging the gap'. The approach consists of 21 major initiatives, for example large companies, that could bridge the emission gap. Blok et al. (2012) suggest that those bottom-up initiatives driven by NSAs could give new momentum to action on climate change.

[1] Non-state actor: In the context of climate action, 'non-state actor' includes companies, cities, subnational regions and investors. More broadly, non-state actors have been defined as entities that participate or act in international relations. They are organizations with sufficient power to influence and cause a change even though they do not belong to any state institution (UNEP, 2017)

Since the world's 100 largest emitting companies account for almost a quarter of global greenhouse gas emissions (UNEP, 2017), companies have a big role to play. Therefore, Blok et al. (2012) also came up with bottom-up initiatives for companies' emissions.

An important bottom-up initiative for companies is the so called 'Top 1,000 companies' emission reductions', where Blok et al. (2012) pledge for a role for the World Business Council for Sustainable Development. In this role, the World Business Council for Sustainable Development should lead 30% of the top 1,000 companies towards a 10% energy related emissions reduction below business as usual (BAU) by 2020 and towards a 50% non-carbon dioxide greenhouse-gas emissions reduction. This proposed initiative then could lead to an expected impact of 0.7 $GtCO_2e$ reduction in 2020 (Blok et al. 2012). Over time the expected impact of this initiative is likely to be larger due to the longer time frame on which companies can reduce their carbon and non-carbon GHG emissions. However, there is a major issue that prevents scientists, policy makers and other stakeholders to formulate a clear and comprehensive impact figure of such initiatives: limited data transparency and a lack of reporting that tracks implementation of initiatives of NSAs (UNEP, 2018a). In the end, this issue prevents a full picture of the impact on wedging the gap. Due to this issue a question like; 'are NSAs really implementing their actions and are they realizing their commitments?', arises. To overcome this issue there is a need for enhanced monitoring and reporting of NSAs initiatives and resulting emissions reductions according to the UNEP (2018b).

In this light, a research conducted by Jaquot (2013) monitored and reported the possible impact of cities' (as an NSA) initiatives to the 'Wedging the gap' approach. Furthermore, De Boer (2014) studied the possible impact of NSAs initiatives to the 'Wedging the gap' approach by looking specifically at the 'Top 1,000 companies' initiative. Both Jaquot (2013) and De Boer (2014) used two different angles to monitor and report the initiatives; the coherence of the commitments and actions and the current implementation performance. Following their approach, my study will therefore also contribute to the 'Wedging the Gap' approach. My study focusses specifically on company commitments on reducing GHG emission. In the first part an up-to-date picture will be painted to see whether these companies are on track to meet their targets by looking at the implementation performance. The second part focuses on the coherence of the commitments and actions of companies to reduce emissions and to reach targets by analysing most recent sustainability reports, corporate sustainability reports, corporate responsibility reports, and annual reports or variants.

1.2 Purpose of study and research questions

This study aims to improve insights in company commitments to reduce GHG emissions and their impact on worldwide emissions. In this way, my study the need for better monitoring and reporting of NSAs initiatives. This will provide a clearer and an up-to-date representation of the share of companies as a NSA on the near-future 'emissions gap'.

To fulfil this purpose, the following main research question (RQ) will be answered:

- To what extent can companies' emissions-reduction initiatives contribute to climate-change mitigation by 2030?

To give a concrete answer to this question, the following minor RQs will be answered:

- RQ1: What is the current implementation performance of the companies that have GHG reduction targets?
- RQ2: What is the likelihood that the companies that have GHG reduction targets are meeting their commitments?

2 Methodology

In this chapter the methodology is described. Within this research indicators are used to determine the impact of companies on GHG emissions; (1) the current implementation performance and (2) the coherence of the commitments and actions. The first part is a general description of the methodology and after that, both indicators are described specifically.

2.1 General methodology

The indicators 'coherence of the commitments and actions' and 'implementation performance' are derived from a previous study of Jaquot (2013) on the performance of city networks and De Boer (2014) on the performance of companies. Jaquot (2013) gained inspiration from the work of Connell and Kubisch (1998) and their approach to design a method to evaluate comprehensive community initiatives. The following indicators and related questions are a result of the study of Jaquot (2013, p. 33-34):

1. Coherence of the commitments and actions:
    a. Have clear emission reduction activities been planned to reach the target?
    b. Are these activities efficient and sufficient enough to lead to the result expected?
2. Feasibility of actions:
    a. What are the incentives that motivate cities to act against climate change?
    b. Are all the-as mentioned in (Connell & Kubisch, 1998) 'contextual conditions' necessary to implement the mitigation actions in place? These factors include for instance population growth, economic fluctuations, political will, environmental variables, etc.
3. Implementation performance:
    a. Are the primary or intermediate results good enough to lead to the final expected outcomes?

The indicators 'coherence of the commitments and actions' and 'implementation performance' are used in this research. Both indicators are relevant to determine the impact of companies' climate policies on sustainable development. This is because the indicators help to provide an answer on how companies perform relative to their commitments because a commitment does not necessarily provide the actual GHG emissions reduction in the long run. Moreover, the commitment of companies to voluntary emission reduction targets do not guarantee full implementation of the committed reduction. Inconsistency between the commitments and 'the reality on the ground' may exist (Betsill & Bulkeley, 2007). In the end, the implementation performance indicator helps, in a quantitative way, to evaluate the likelihood for companies to achieve their targets. The other indicator, the coherence of commitments and actions, helps to fully understand the consistency or even the inconsistency between commitments and actions and the likelihood for companies to achieve their targets in a qualitative way.

The indicator 'feasibility of actions' is not considered as a separate indicator since it is beyond the scope of the thesis to find out all individual incentives of companies why they act against climate change by reducing their GHG emissions.

This also holds for contextual- or external conditions for companies in their environment. The exclusion of the 'feasibility of actions' indicator does however not mean that the relevance of this indicator is undermined. Moreover, an exploration of incentives and contextual conditions helps to place the results of this study in a new perspective. This is because the feasibility of initiatives depends on local interests (influences participation rate, extent of efforts and overall GHG mitigation), and the occurrence of obvious and pervasive contextual shifts according to Jaquot (2013). Only economic fluctuations as a contextual condition is partly embedded in the second indicator; 'the coherence of commitments and actions' (see Page 19).

2.2 Specific methodology: Implementation performance

The implementation performance is the first indicator used in this research. It answers the question if current results are good enough to lead to the final expected outcomes (companies' commitments and targets). The data collection method and the criteria for the sample of companies are described first. Then, the evaluation of the implementation performance of companies is explained for clarification. Last, the different methods and steps of the analyses are described.

2.2.1 Data collection and criteria

A dataset (Data Driven Yale et al. 2018) is used in this study to determine the implementation performance. The dataset contains information of hundreds of companies (with multiple locations, around 7,000) such as country of emissions, Global Reporting Initiative business activity, action type, base year emissions, target year emissions and emission trajectories. The dataset is organised per company location and therefore it is possible to determine the implementation performance per location. Since the data is location specific, my study will refer to 'locations' when talking about the results. In the discussion and conclusion my study refers again to 'companies' (sum of the locations) in general.

Based on the following criteria companies are selected from the dataset from Data Driven Yale et al. (2018):

1. Largest emitters (in $MtCO_2e$) in more than 1 $MtCO_2e$ emissions in base year;
2. Most ambitious (in annual reduction % of GHG emissions) in ≥ 1% reduction per year (% reduction/(target year – base year)); and
3. Least ambitious (in annual reduction % of GHG emissions) in < 1% reduction per year (% reduction/(target year – base year)).

Take note that within the second and third criteria a random sample is taken because all 7,000 locations fit either the most ambitious or least ambitious category. An overview of the random sample of companies can be found in Appendix A.

The base year and target year emissions as well as the emission trajectories are provided by the dataset (Data Driven Yale et al. 2018). The most recent and available emissions of the selected companies are retrieved manually by looking at the 'Climate Change 2018' responses from companies to the CDP (2019). In the 'Climate Change 2018' responses companies disclose their data on climate change such as their business strategy, targets and performances and detailed emissions data.

2.2.2 Evaluation

A given year of which most companies published their most recent emission data, is taken as a starting point. The most recent and available emission data is from 2017 and thus 2017 is taken as a starting point. The actual emissions of 2017 are then compared to emissions in the same year derived from a trend that represents the trajectory to the desired emissions resulting from the companies' commitments/ targets.

The evaluation will be performed with a trend that represents the trajectory to the desired emissions resulting from the companies' own set commitments and targets. The trajectory is obtained for each company by means of extrapolation between emissions in a base year and target emissions in the target year and is derived from the dataset provided by Data Driven Yale et al. (2018). Using the implementation performance as an indicator gives a first order indication of the status of GHG emission reductions. Because, when actual emissions are equal to or lower than the trend emissions in the trajectory the company is on track to meet their commitments and targets. On the other hand, when actual emissions are higher than the trend emissions in the trajectory the company is not on track to meet their commitments and targets. Assessing the implementation performance is only possible when companies have reduction commitments and have actual emission data and a desired emission trajectory projected in a trend. In the end, companies are labelled with different categories (Table 1).

Table ***2*** gives an overview of the different steps that result in the implementation performance as described above. Take note that step 1 to step 3 (

Table ***2***) are already performed in the dataset. Besides that, a predicted trend will be derived by taking current and past emissions of companies and this trend will be compared with the desired trend resulting from the companies' own set commitments and targets.

Table 1: Implementation performance – categories and conditions

Category	Implementation performance	Condition
1	On track	Actual emissions ≤ desired emissions according to the trajectory
2	Not on track	Actual emissions ≥ desired emissions according to the trajectory
3	Unclear	Actual emissions or desired emission are unclear
4	No target	No intensity or absolute emission target

Table 2: Calculation steps of the implementation performance

Example: Company A, location D
Target= 50% emission reduction in 2025 (target year) compared to 2015 emissions (base year= 31 tons of Carbon Dioxide equivalent (tCO_2e)). Scope-1 emissions 2017= 20 tCO_2e and Scope-2 emissions 2017= 9 tCO_2e

1. Reduction target/(target year – base year)= annual reduction
   = 50%/(2025 – 2015)= 5% annual reduction
2. Actual emission 2015 * (100 – annual reduction)/100= desired emission 2016
   = 31 * (100 – 5)/100= 29,45
3. Use MS Excel TREND function to calculate the desired emissions for the remaining years:

2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
31	29,45	27,9	26,35	24,8	23,25	21,7	20,15	18,6	17,05	15,5

4. Scope-1 emissions + Scope-2 levels= actual emission 2017

= 20 tCO_2e + 9 tCO_2e= 29 tCO_2e

5. Actual emissions ≥ desired emissions. This means that category 2 is not on track
= 29 tCO_2e ≥ 27,9= This means that category 2 is not on track

2.3 Specific methodology: Coherence of the commitments and actions

The coherence of commitments and actions is the second indicator used in this research and gives an answer on the if companies' activities and policies are efficient and sufficient enough to lead to the result expected. The data collection method and the criteria for the sample of companies are described first. Then, the evaluation of the coherence of commitments and actions is explained per component. Last, the different methods and steps of the analyses are described.

2.3.1 Data collection and criteria

The dataset from Data Driven Yale et al. (2018) is used in this study to take a random sample of 30 companies that are evaluated on their coherence of commitments and actions. An overview of the random sample of companies can be found in appendix A**.** Furthermore, the coherence of the commitments and actions is assessed from data obtained by internet and literature research. More specifically, most recent sustainability reports, corporate responsibility reports, corporate sustainability reports and annual reports or variants, depending on their existence and availability, are used to evaluate the coherence of the commitments and actions.

2.3.2 Evaluation

The question is, do companies say one thing and do another? To fully understand the consistency or even the inconsistency between commitments and actions, companies' emission reduction activities are inventoried, and their extensiveness evaluated. To evaluate the extensiveness of the companies' emission-reduction activities the Assessing of Low-Carbon Transition Framework of the Agence de l'Environment et de la Maîtrise de l'Énergie & the Carbon Disclosure Project (2017) is being used as a guideline for predetermining criteria (Table 3). Then, a first framework was developed (Appendix C). To see whether the framework worked and was applicable for each random company a test was held with 10 random companies. This test revealed that the framework needed some adjustments for the evaluation of the coherence of commitments and actions for a sample of companies. The test has led to a more detailed framework that is explained step by step next. The complete and detailed framework can be found in appendix D**.**

Table 3: Coherence of commitments and actions - components and criteria

Component	**Criteria**
Commitment	Low carbon (economy) future; high quality emission reduction targets
Need and plan for transition	Need for transition; transition plan
Present	Emission reduction measures; performance implemented measures
Legacy	Emission reduction targets in the past; performance emission reduction targets in the past
Consistency	Strategy consistency; undermining commitments

2.3.2.1 Commitment

According to Dahlmann et al. (2017) underlying intentions and commitments of companies in addressing environmental impacts is essential to examine the relationship between environmental management of those companies and its effects on environmental outcomes. Therefore, the

component 'commitment' is part of this framework and consists of 2 criteria: the commitment to a low-carbon future vision and related to that vision, the existence of good emission reduction targets. A short explanation will be given for each criterion. In the end, the conditions for the different scores within the criteria are determined.

The concept of low-carbon comes in many forms; low-carbon energy, low-carbon city, low-carbon society, low-carbon life, low-carbon community, low-carbon tourism and even a low-carbon world. All these concepts are linked to each other but there are also some differences. One of those concepts is a low-economy and Dahlmann et al. (2017) state that companies face moral responsibilities to mitigate their impact by reducing their GHG emissions as part of a transition to a low-carbon economy. Since this concept of a low-carbon economy is one of the most widely advocated one (Höhne et al., 2007) this research uses the concept of a low-carbon economy to determine what a low-carbon future for companies in that economy is. A common definition for low-carbon economy does not exist, but the main characteristics of a low-carbon economy are; low energy consumption, low pollution and low emission according to Hu Yuan et al. (2011). Furthermore, a low-carbon economy is the early phase of low-carbon development, during which reducing CO2 emissions in economic development is the main target (Hu Yuan et al. 2011). Besides that, decreasing the usage of traditional fossil energy, and increasing the use of renewable energy are also part in becoming a low-carbon economy and to achieve sustainable development. So, are companies embracing these aspects of a low-carbon (economy) future? Table 4 gives an overview of the conditions for this criterion.

Table 4: Low-carbon (economy future) - scores and conditions

Low-carbon (economy) future	- Reducing CO2e emissions - Reducing (fossil) energy consumption - Increasing renewable energy consumption
Score	**Condition**
1	The company is embracing 2 or 3 aspects of a low-carbon (economy) future
0.5	The company is embracing 1 aspect of a low-carbon (economy) future
0	The company is embracing 0 aspects of a low-carbon (economy) future

Detailed characteristics of a companies' target are important in examining the intentions of a company and therefore their likely impacts on the environment (Dahlmann et al. 2017). Therefore, 4 detailed characteristics are examined in determining whether an emission reduction target is of high quality; target type (absolute vs. relative emissions); target scope (broader vs. narrow scope); target ambitiousness (scale); and target time frame (period).

The first characteristic is the target type. Dahlmann et al. (2017) argue that intensity targets are relatively weaker, outward-looking, and potentially more symbolic expressions of firms mainly seeking to enhance corporate image. Moreover, absolute targets set an inward-looking hard goal more closely aligned with societal interests of climate change mitigation and whose achievement is prima facie antithetical to a company's overall performance (Pinkse & Kolk, 2009). Therefore, absolute emission reduction targets are associated with a better performance in reducing emissions. The second characteristic is the target scope. A distinction exists in direct (Scope-1 emissions) and indirect emissions (Scope-2 emissions). Direct emissions relate to activities directly linked to the company and indirect emissions relate to the use of electricity provide by the grid. Even a third

category exists (scope 3 emissions), relating to emissions from the supply chain, business travel, and from external distribution (WBSCD/WRI, 2011).

Dahlmann et al. (2017) argue that companies' emission reduction targets including at least two types of scope show substantive intentions to fully address climate change concerns. Therefore, a broader scope of emission reductions targets is associated with a better performance in reducing emissions. The determination of the ambitiousness of a target, the third characteristic, is subject to much debate because several contextual factors play a role (Dahlmann et al. 2017). However, companies that include a larger emission reduction percentage, are more likely to be effective (Ioannou et al. 2016) Therefore, quantitatively greater emission reduction targets are reflective of greater ambition, which is needed to provide a radical stimulus for innovation and organization change that could subsequently lead to better performance in reducing emissions. In this research, an emission reduction target is quantitatively great when an annual reduction of at least 1% per year is realised. Last, the target time frame over which targets apply is an important characteristic. Companies committing to long-term emissions reductions are presumable more realistic about the need for implementing significant long-term goals as advocated by climate science and international policy (Slawinski et al. 2017). Therefore, longer emission reduction target periods are associated with a better performance in reducing emissions. In this research, a reduction target period is long when the target is set beyond 2030. In the end, the research of Dahlmann et al. (2017) showed that targets characterized by a commitment to more ambitious emissions reductions, a longer time frame, and absolute reductions in emissions are associated with significant reductions in companies' emissions. Table 5 gives an overview of the conditions for this criterion.

Table 5: High quality emission reduction targets - scores and conditions

High quality emission reduction targets	- Target type; absolute - Target scope; broad (multiple scopes) - Target ambitiousness; high (annual reduction of at least 1%) - Target time frame; long (beyond 2030)
Score	**Condition**
1	The company incorporates 3 or 4 aspects of good emission reduction targets
0.5	The company incorporates 1 or 2 aspects of good emission reduction targets
0	The company incorporates 0 aspects of good emission reduction targets

2.3.2.2 Need and plan for transition

The component 'transition plan' consists of 2 criteria; the existence of a transition plan and to which degree the transition plan will drive the evolution of the company. A short explanation will be given for each criterion. In the end, the conditions for the different scores within the criteria are determined.

Companies need to change their business model to reduce emissions and this will therefore drive the evolution of the business. Table 6 gives an overview of the conditions for this criterion.

Table 6: Need for transition - scores and conditions

Need for transition	Change of the business model
Score	**Condition**
1	The company has to change the entire business model of the company in order to reduce emissions

0.5	The company has not to change the entire business model of the company in order to reduce emissions but parts of it

To achieve a low-carbon future companies must have a transition plan or a roadmap, a long view of where the company is going and how the company is getting there. An illustration of the major objectives and strategies for achieving a low-carbon future. Which steps, actions and measures are taken when and by whom? Are questions that need to be answered within the transition plan or roadmap. The company must have a clear picture of the different 'stepping stones' towards a low-carbon future or emission reduction target. Table 7 gives an overview of the conditions for this criterion.

Table 7: Transition plan - scores and conditions

Transition plan	- Where is the company now? - Where does the company want to go? - How does the company get there?
Score	**Condition**
1	The company has a detailed transition plan to achieve its low-carbon (economy) future
0.5	The company has a vague transition plan to achieve its low-carbon (economy) future
0	The company has not a transition plan to achieve its low-carbon (economy) future

2.3.2.3 Present

The component 'present' consists of 2 criteria; taken emission reduction measures and the performance of those implemented measures. A short explanation will be given for each criterion. In the end, the conditions for the different scores within the criteria are determined.

To achieve an absolute reduction in emissions from the industry sector will require a broad set of mitigation options going beyond current practices (IPCC, 2014). Mitigation options in the industry sector fall into the six categories. The following six categories for climate change mitigation in industry were proposed by the IPCC (2014) for the major emitting industrial sectors (Iron and steel; cement; chemicals; pulp and paper; non-ferrous; food processing; textiles and leather; mining) are used as a basis. Measures concerning; energy efficiency (technical energy efficiency improvement via new processes and technologies); emissions efficiency (CO_2 and non-CO_2 GHG emissions intensity reduction, fuel switching and Carbon Capture and Storage); material efficiency in production (recycling, reusing and reducing); material efficiency in product design (recycling, reusing and reducing); using products more intensively (recycling, reusing and reducing); and reducing overall demand for product services (IPCC, 2014). Assumed is that the categories also apply for other industrial sectors. Table 8 gives an overview of the conditions for this criterion.

Table 8: Emission reduction measures - scores and conditions

Emission reduction measures	- Energy efficiency - Emissions efficiency - Material efficiency in production - Material efficiency in product design - Using products more intensively - Reducing overall demand for product services
Score	**Condition**
1	The company has implemented significant measures that fits one category; or The company has implemented view measures that fits the majority (≥3) of the categories.

0.5	The company has implemented view measures that fits one category; or The company has implemented view measures that fits the minority (<3) of the categories
0	The company has implemented no measures at all

To determine the effectiveness of the measures taken by companies one simply compares the tCO_2e emissions in a given year to the previous year(s) (depending on when the measures were implemented). Contextual conditions (see methodology Page 10) are ignored. However, this specific criterion accounts for economic conditions by stating that a reduction in emissions may not be the result of certain obvious economic factors. Table 9 gives an overview of the conditions for this criterion.

Table 9: Performance implemented measures – scores and conditions

Performance implemented measures	Less amount/% of tCO_2e in a given year relative to the previous year(s). Not obviously due to other economic factors (economic crisis, bankruptcy etc.)
Score	**Condition**
1	The implementation of significant measures, as mentioned above, has led to an emission reduction
0	The implementation of significant measures, as mentioned above, has not led to an emission reduction
-	Unknown

2.3.2.4 Legacy

The component 'legacy' consists of 2 criteria; the existence of an emission reduction target in the past and the performance regarding this emission reduction target (reached or dropped). A short explanation will be given for each criterion. In the end, the conditions for the different scores within the criteria are determined.

The existence of historical emission reduction targets tells one of the legacies of a company. Cordano & Frieze (2000) found a positive relationship between a companies' amount of past source reduction activity and environmental managers' preference to implement source reduction activities in the future. In other words, environmental managers within a company that had emission reduction activities in the past are more likely to also implement emission reduction activities in the future. Table 10 gives an overview of the conditions for this criterion.

Table 10: Emission reduction targets in the past – scores and conditions

Emission reduction targets in the past	Reduced amount/% of $tC0_2e$
Score	**Condition**
1	The company had an emission reduction target in the past.
0	The company had not an emission reduction target in the past.
-	Unknown

Identifying historical performance is important because it may have an influence on the performance of companies' emission reduction targets in the future. Branzei et al. (2004) found that organizational goals adjust in response to performance signals. In other words, success in the past stimulates more difficult goals in the future, whereas failure triggers companies to adjust targets and efforts downwards. Table 11 gives an overview of the conditions for this criterion.

Table 11: Performance emission reduction targets in the past - scores and conditions

Performance emission reduction targets in the past	Reduced amount/% of tCO_2e
Score	**Condition**
1	The company has reached the emission reduction target in the past.
0	The company has dropped the emission reduction target in the past.
-	Unknown

2.3.2.5 Consistency

The component 'consistency' consists of 2 criteria; consistency between the companies' strategy and the emission reduction target(s), and whether there is talk of greenwashing. A short explanation will be given for each criterion. In the end, the conditions for the different scores within the criteria are determined.

A business strategy can be defined as "the means and processes by which firms organise their activities so as to fulfil their socio-economic purposes" (Foxon, 2011, p. 2262). A good environmental performance or low-carbon future these days can be seen as a socio-economic purpose of a company. Table 12 gives an overview of the conditions for this criterion.

Table 12: Strategy consistency - scores and conditions

Strategy consistency	- Means - Processes
Score	**Condition**
1	The company organises their activities by means and processes that only fulfil a low-carbon (economy) future and therefore have a positive effect on CO_2e reduction
0.5	The company organises their activities by means and processes that slightly fulfil a low-carbon (economy) future and therefore have a moderate effect on CO_2e reduction
0	The company organises their activities by means and processes that not fulfil a low-carbon (economy) future and therefore have a reverse effect on CO_2e reduction.

Sometimes companies adopt a more symbolic approach to managing their environmental impacts, while other companies are committed to their environmental commitments, 'greenwashing'. (Lyon & Montgomery, 2015) defined 'greenwash' as "any communication that misleads people into adopting overly positive beliefs about an organization's environmental performance, practices and products". In other words, it is the intersection of two company behaviours: poor environmental performance and positive communication about environmental performance according to Delmas & Burbano (2011). The scores of the former criteria are used to determine the environmental performance of a company (max. is 9). Besides that, the communication of companies regarding their environmental performance will be evaluated by the 10 signs of greenwash according to Gillespie (2008); fluffy language; green products of dirty company; suggestive pictures; irrelevant claims; best in class?; just not credible; gobbledygook; imaginary friends; no proof; outright lying. Table 13 gives an overview of the conditions for this criterion.

Table 13: Undermining commitments - scores and conditions

Undermining commitments	- Poor environmental performance - Positive communication
Score	**Condition**
0	The company has a poor environmental performance (≤ 3) and/or is guilty of using positive communication (multiple signs of greenwash)
0.5	The company has a moderate environmental performance (4-6) and/or is slightly guilty of using positive communication (view signs of greenwash)
1	The company has a good environmental performance (≥7) and/or is therefore not guilty of using positive communication (signs of greenwash)

2.3.2.6 Likelihood of reaching target

A company's action plan is graded based on the grading systems as explained before. The individual grades for the five different components are added up which results in a grade differing from 1 to 10 for each company's commitments and actions reports. How the grading relates to the likelihood of meeting the target is shown in Table 14. The conversion table is adopted from the research of Jaquot (2013).

Table 14: Coherence of commitments and actions - scoring system

Score criteria	0 - 2	3 – 4	5 – 6	7 – 8	9 – 10
Plan quality	None	Weak	Passable	Good	Excellent
Likelihood of reaching target	Unlikely		Likely	Very likely	

For a grade between 7 and 10 meeting the target is considered very likely. A grade above 4 but below or equal to 6 is considered a likely chance of meeting the target. A company graded equal to or below 4 will unlikely meet its target.

3 Results

In this section the results are described. The results section is structured according to the minor RQs as mentioned in Chapter 1 (see Page 8). This means that first the results regarding the indicator 'implementation performance' are described and then the results regarding the 'coherence of commitments and actions'. First, an introduction and the structure of each sub chapter of each indicator is given and then the results are shown.

3.1 Implementation performance

For the indicator 'implementation performance' the GHG emissions of a total amount of 645 unique companies and 4648 individual locations were analysed. The specific distribution is shown in Table 15 and a complete list of company names within each category and the amount of individual locations of these companies can be found in appendix A. Please take note that the companies belonging to the category of 'largest emitters' can also belong to either the 'most ambitious' or the 'least ambitious' categories and therefore the numbers in the general part (see Table 16) do not add up to the totals as shown in Table 16.

Table 15: Specific distribution of company (locations) within each category

Category	Criteria	Unique companies	Company locations
Largest emitters	>1000000 tCO_2e	214	306
Most ambitious	≥ 1% annual reduction	278	2833
Least ambitious	< 1% annual reduction	153	1509
Total		645	4648

The results of the indicator 'implementation performance' consists of a general part with the overall results of the three different samples (largest emitters, most ambitious, least ambitious) regarding their implementation performance, whether the companies are on track or not and/or whether companies have already reached their target/commitments in the case that the target year is below or equal to 2017. Besides that, there is a detailed part with the sub results of the three different samples (largest emitters, most ambitious, least ambitious) regarding the share of the different categories, the individual and overall trendline towards 2030, and the overall trendline towards 2030 of this study against the overall trendline towards 2030 derived by Data Driven Yale et al. (2018).

3.1.1 General implementation performance

The actual emissions of 2017 for all the companies/locations of companies are compared with the emissions in the same year derived from the trend that represents the trajectory to the desired emissions resulting from the companies' commitments and targets (Data Driven Yale et al. 2018). Each location is rewarded a label 'on track', 'not on track', "unclear" or "no target" (see methodology Page 12). The score is given for each location and not per company because a company could have multiple locations of which some are on track and some are not on track. More than half of the locations are not on track or don't have a target at all. Furthermore, the implementation performance of another 725 locations is unclear, this is due to the fact that companies refused to share their emission data with the CDP (2019), or that companies had incomplete emission data, or the data was not provided by the CDP (2019) because of unknown reasons. 1527 out of 4554 locations, or 34%, are on track to meet the targets (Table 16).

For the largest emitting locations, 110 out of 306 locations are on track to meet their own targets. The other 196 locations are either not on track, the score is unclear due to several reasons or the company does not have a target at all. Table 16 gives an overview of the amount and percentages of different locations within the different categories. The label 'unclear' is given to 40 locations due to reasons as addressed above. Furthermore, the label 'no target' is given to 4 locations that did not have targets/commitments at all. The difference between largest emitters 'on track' and 'not on track' is a factor 1,4 and between both their emissions factor 3.

Table 16: Implementation performance – overall and largest emitters

Sample	Category	Implementation performance	Amount of locations	% of total locations	% of total emissions
Overall	1	On track	1527	34	26
	2	Not on track	2298	50	74
	3	Unclear	725	16	
	4	No target	4	1	
	Total		4554	100	
Largest emitters	**Category**	**Implementation performance**	**Amount of locations**	**% of total locations**	**% of total emissions**
	1	On track	110	36	25
	2	Not on track	152	50	75
	3	Unclear	40	13	
	4	No target	4	1	
	Total		306	100	100

For the most ambitious locations, 1588 out of 2833 locations are not on track to meet their own targets and another 389 is unclear whether they are on track or not due to reasons as addressed above. In other words, 56% is not on track and another 14% is unclear whether they are on track or not. The other 856 locations are on track since all locations do have a target, this means that 30% of the total amount of the most ambitious companies/locations of companies is on track.

An overview of the amount and percentages of different locations within the different categories is given in Table 17. The difference between most ambitious locations 'on track' and 'not on track' is a factor 1,9 and between both their emissions factor 3,8. For the least ambitious locations, 592 out of 1509 locations are on track to meet their targets/commitments. Furthermore, 615 locations are not on track and of another 302 locations the implementation performance is unclear. This means that a total of 61% of the least ambitious locations are either not on track or their implementation performance is unclear. An overview of the amount and percentages of different locations within the different categories is given in Table 17. The difference between largest emitters 'on track' and 'not on track' is a factor 1,1 and between both their emissions factor 2,2.

Table 17: Implementation performance - most ambitious and least ambitious

Sample	*Category*	*Implementation performance*	*Amount of locations*	*% of total locations*	*% of total emissions*
Most ambitious	1	On track	856	30	21
	2	Not on track	1588	56	79
	3	Unclear	389	14	
	4	No target	0	0	
	Total		2833	100	100
Least ambitious	**Category**	**Implementation performance**	**Amount of locations**	**% of total locations**	**% of total emissions**
	1	On track	592	39	31
	2	Not on track	615	41	69
	3	Unclear	302	20	
	4	No target	0	0	
	Total		1509	100	100

The trend that represents the trajectory to the desired emissions resulting from the companies' commitments and targets includes the assumption that companies' emissions do not stay constant after they reach their target/commitment emission. Locations with a target year before or equal to 2017 (last data reporting year) are therefore rewarded a label according to the different categories since emissions after the target year still can be compared with the trend due to the assumption. However, this also means that locations with a target year before or equal to 2017 already can be assessed whether they have reached their target/commitment or not.

Table 18 shows that out of 959 locations an amount of 300 succeeded in reaching the target/commitment and an amount of 394 failed in reaching the target/commitment. In total, an amount of 69% of the locations that had a target year before or equal to 2017 either failed reaching the target or the performance remained unclear. 43 out of 306 locations of the largest emitters had a target year before or equal to 2017. 17 locations have reached their target/commitment. 49% of the locations that had a target year before or equal to 2017 have failed to reach their target and another 12% is unclear due to issues as mentioned before. 565 out of 2833 company locations of the most ambitious locations had a target year before or equal to 2017. 156 locations have reached their target/commitment. 264 locations that had a target year before or equal to 2017 have failed to reach their target and another 145 is unclear due to issues as mentioned before. In total an amount of 73% has failed to reach the target/commitment or is unclear. 359 out of 306 company locations of the least ambitious locations had a target year before or equal to 2017. Table 18 shows that 134 locations have reached their target/commitment. 31% of the locations that had a target year before or equal to 2017 have failed to reach their target and another 32% is unclear due to issues as mentioned before.

Table 18: Implementation performance past target years – overall, largest emitters, most ambitious and least ambitious

Sample	Category	Implementation performance	Amount of locations	% of total locations
Overall	1	Succeeded	300	31
	2	Failed	394	41
	3	Unclear	265	28
	Total		959	100
Largest emitters	**Category**	**Implementation performance**	**Amount of locations**	**% of total locations**
	1	Succeeded	17	39
	2	Failed	21	49
	3	Unclear	5	12
	Total		43	100
Most ambitious	**Category**	**Implementation performance**	**Amount of locations**	**% of total locations**
	1	Succeeded	156	27
	2	Failed	264	47
	3	Unclear	145	26
	Total		565	100
Least ambitious	**Category**	**Implementation performance**	**Amount of locations**	**% of total locations**
	1	Succeeded	134	37
	2	Failed	110	31
	3	Unclear	115	32
	Total		359	100

A more in-depth figure is painted by looking at the different samples; largest emitters, most ambitious locations and least ambitious locations and by looking at the reasoning behind the scores of the implementation performance.

3.1.2 Largest emitters

The fact that a majority of the locations are not on track, have unclear data and/or do not have a target, does in this case not mean that the overall sample of 'largest emitters' are emitting more $MtCO_2e$ than is desired. Figure 1 shows that the actual emissions of the 'largest emitters' are below the target or desired emissions in 2017 according to the trend that represents the trajectory to the desired emissions resulting from the companies' commitments and targets. The sample of largest emitting locations emitted a total amount of 308 $MtCO_2e$ less than desired in 2017. There is no so-called 'emission-gap' (desired emissions > actual emissions) over 2017 for this sample of locations.

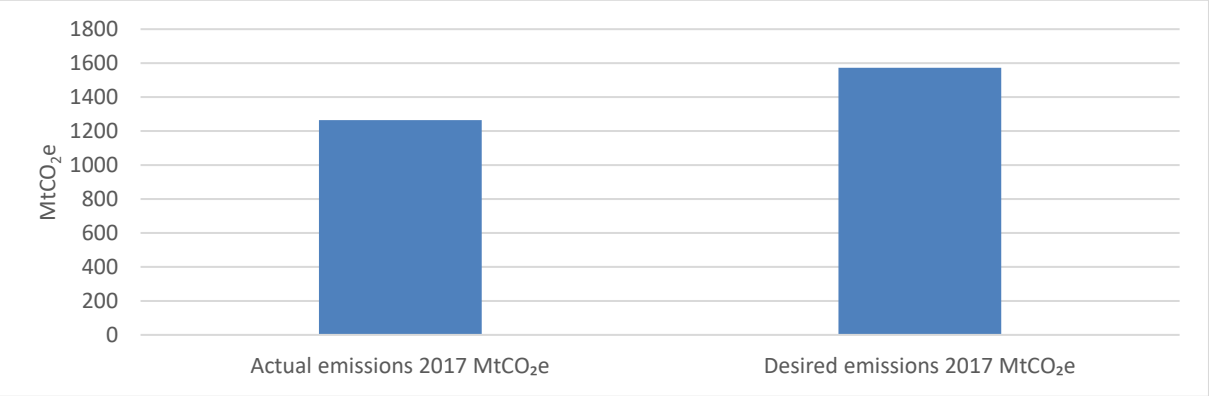

Figure 1: Actual versus desired emissions 2017 - largest emitters

Thereafter, a differentiation is made between the largest emitting locations that are 'on track' and the largest emitting locations that are 'not on track'. The locations that are on track emitted 528 $MtCO_2e$ less than was desired in 2017 (Figure 2) whereas the locations that are not on track emitted 220 $MtCO_2e$ more than was desired in 2017 (Figure 2). The locations that are on track managed to emit 62% less MtCO2e than was desired whereas the locations that are not on track managed to emit 30% more than was desired. 'On track' locations make up for the bad performance of the 'not on track' locations.

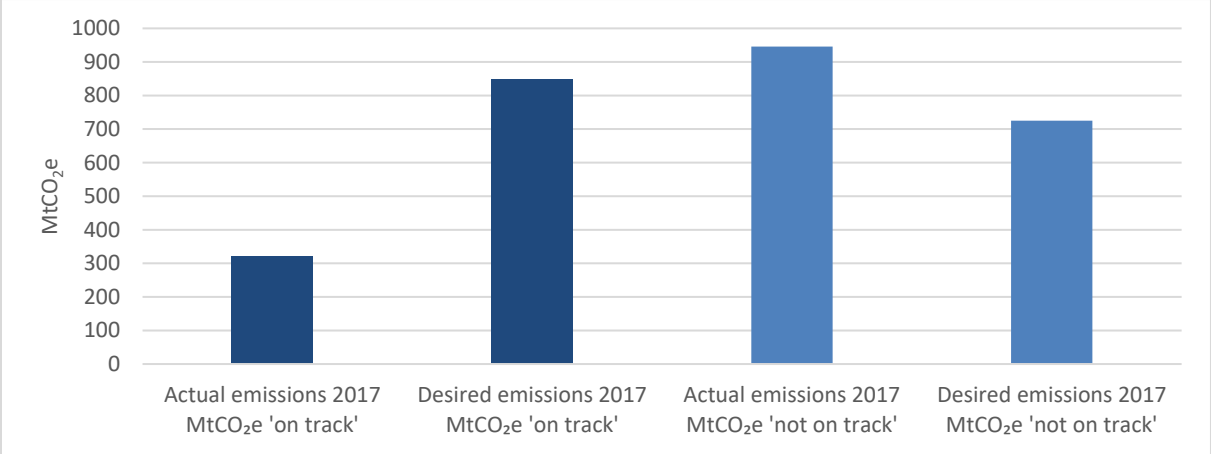

Figure 2: Actual versus desired emissions - largest emitters – 'on track' and 'not on track'

In the long run, a predicted trend is derived from the linear trend of companies' past emissions that represents the trajectory to the predicted actual emissions. Past emission trends are based on the emissions in the base year, year 2015, and the last data reporting year 2017. A predicted trend is derived for 'on track' locations and 'not on track' locations (Figure 3), and a combined predicted trend (Figure 4). Figure 3 shows the differentiation between 'on track' (category 1) and 'not on track' (category 2) locations predicted trends for 2018-2030. The predicted trend for 'not on track' locations shows an almost linear increase in GHG emissions towards 2030 whereas the predicted trend for 'on track' locations shows a decrease in GHG emissions towards 2030. The 'on track' predicted reduction trend is steeper from 2018 to 2022 and then levels off towards 2030.

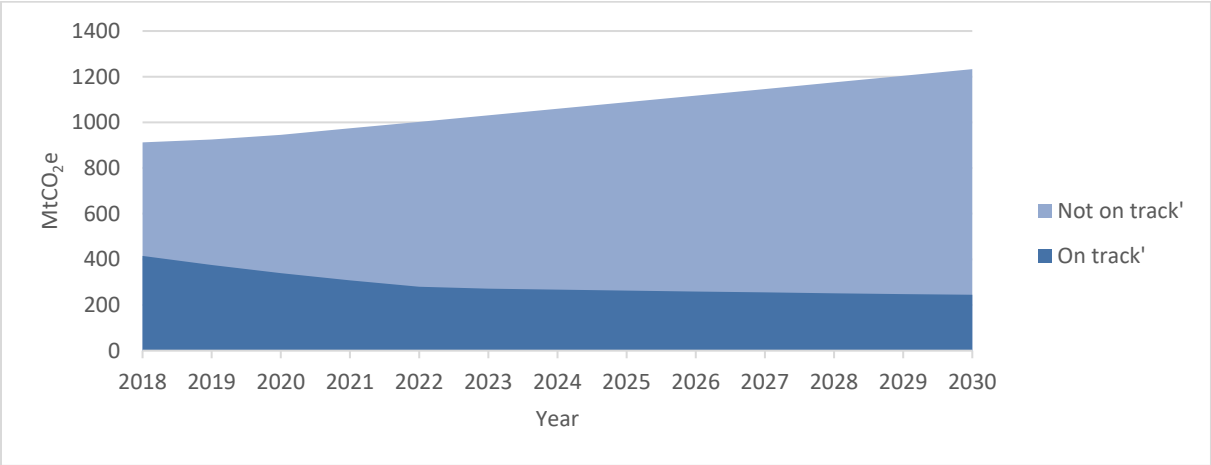

Figure 3: Predicted $MtCO_2e$ emission trend - largest emitters – 'on track' and 'not on track'

The combined predicted trend (Figure 4) shows that from 2018 onwards the emissions further decline till around 2020 and then levels off towards 2022. From 2022 onwards, the emissions of the largest emitting locations are expected to rise in an almost linear line. Figure 4 also compares the predicted actual $MtCO_2e$ emission trend of this study with the desired $MtCO_2e$ trend of the dataset (Driven Data Yale et al. 2018). The predicted trend of this study is based on past and current actual emission trends and the desired trend of the dataset assumes a gradually emission reduction that represents the trajectory to the desired emissions resulting from the companies' commitments and targets . The predicted $MtCO_2e$ emissions remain for the full period beneath the desired trend of the dataset (Data Driven Yale et al. 2018). This means that there is no 'emissions-gap' for the full period. Besides that, both lines show similarities for the period 2018-2020; a relatively quick decline in emissions. Whereas the predicted emission trend derived from this study flattens out till 2022 and then rises linearly, the desired emission trend derived by the dataset levels off till 2030. In the end, by 2030 both emission trends are approaching each other and will most probably cross each other on the long run and cause an 'emissions-gap'.

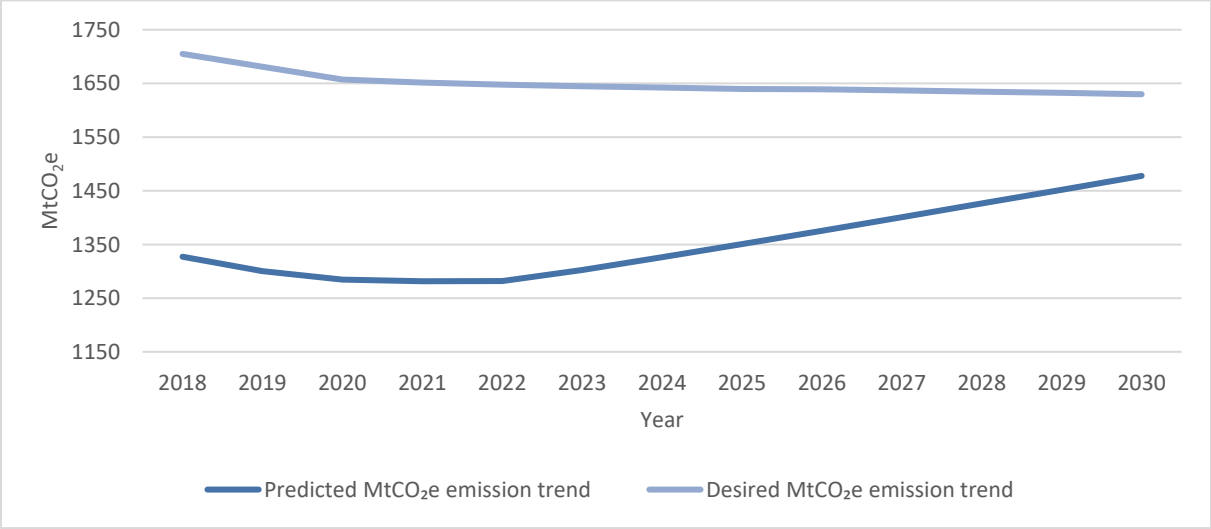

Figure 4: Predicted (study) vs. desired (dataset) $MtCO_2e$ emission trend - largest emitters

3.1.3 Most ambitious companies

The fact that a majority of the locations are not on track and/or have unclear data, does in this case mean that the overall sample of 'most ambitious companies' are emitting more $MtCO_2e$ than is desired. Figure 5 shows that the actual emissions of the 'most ambitious companies' are above the target or desired emissions in 2017 according to the trend that represents the trajectory to the desired emissions resulting from the companies' commitments and targets. The sample of most ambitious locations emitted a total amount of 41 $MtCO_2e$ more than desired in 2017. There is a so-called 'emission-gap' (desired emissions > actual emissions) over 2017 for this sample of locations.

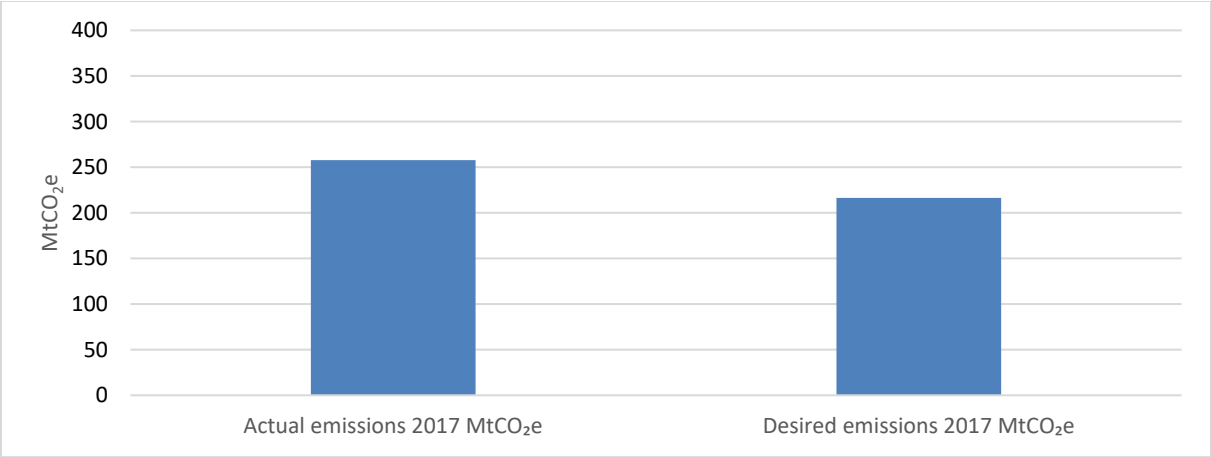

Figure 5: Actual versus desired emissions 2017 - most ambitious companies

Thereafter, a differentiation is made between the most ambitious locations that are 'on track' and the most ambitious locations that are 'not on track'. The locations that are on track emitted 16 $MtCO_2e$ less than was desired in 2017 (Figure 6) whereas the locations that are not on track emitted 57 $MtCO_2e$ more than was desired in 2017 (Figure 6). The locations that are on track managed to emit 22% less $MtCO_2e$ than was desired whereas the locations that are not on track managed to emit 39% more than was desired. 'On track' locations only make up a little bit for the bad performance of the 'not on track' locations.

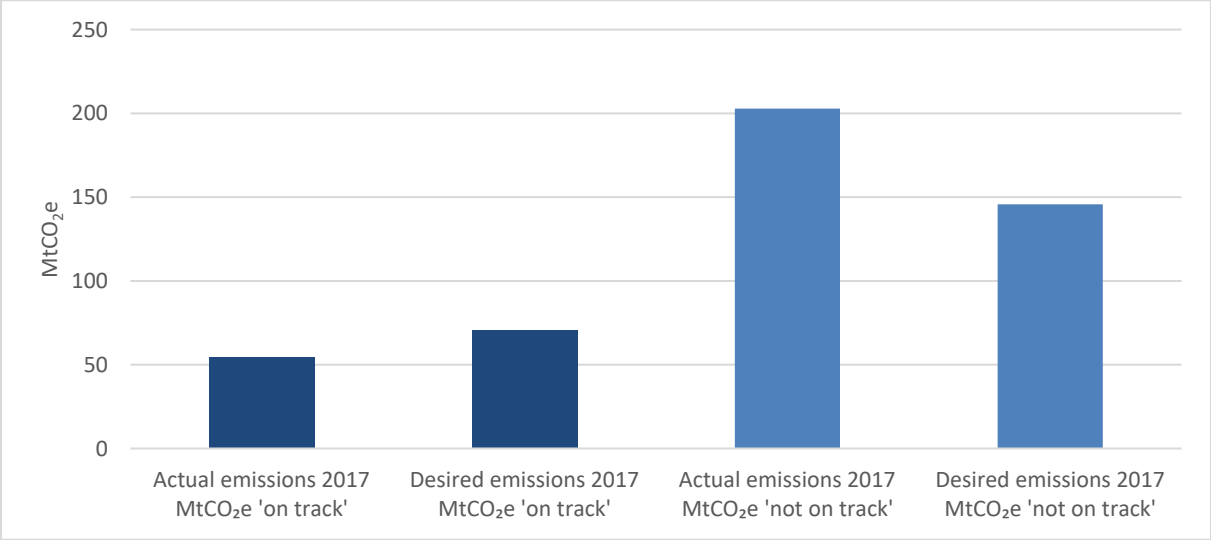

Figure 6: Actual versus desired emissions - most ambitious companies – 'on track' and 'not on track'

In the long run, a predicted trend is derived from the linear trend of companies' past emissions that represents the trajectory to the predicted actual emissions. Past emission trends are based on the emissions in the base year, year 2015, and the last data reporting year 2017. A predicted trend is derived for 'on track' locations and 'not on track' locations (Figure 7), and a combined predicted trend (Figure 8). Figure 7 shows the differentiation between 'on track' (category 1) and 'not on track' (category 2) locations predicted trends for 2018-2030. The predicted trend for 'on track' locations shows a decline in GHG emissions for the period 2018-2024 and then levels off towards 2030. Whereas the 'not on track' predicted emission trend shows a linear increase in GHG emissions for the period 2018-2030.

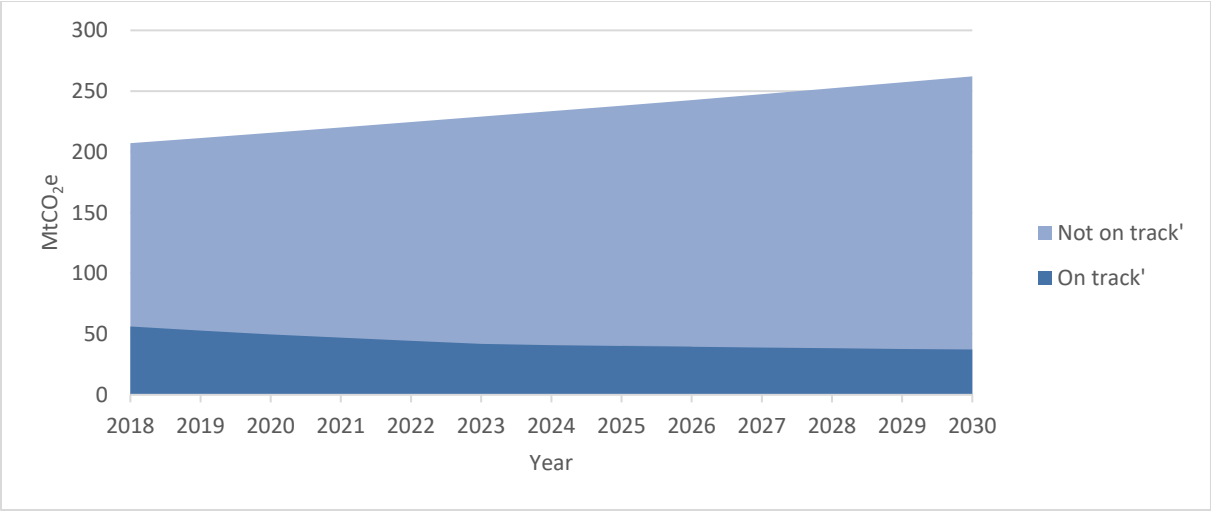

Figure 7: Predicted $MtCO_2e$ emission trend - most ambitious companies – 'on track' and 'not on track'

The combined predicted trend (Figure 8) shows that from 2018 onwards the emissions increase relatively slowly till around 2023. From 2023 onwards, the emissions of the largest emitting locations are expected to increase even further in a steeper linear line. Figure 8 also compares the predicted actual $MtCO_2e$ emission trend of this study with the desired $MtCO_2e$ trend of the dataset (Driven Data Yale et al. 2018). The predicted trend of this study is based on past and current actual emission trends and the desired trend of the dataset assumes a gradually emission reduction that represents the trajectory to the desired emissions resulting from the companies' commitments and targets. The predicted tCO_2e emissions remain for the full period above the desired trend of the dataset (Data Driven Yale et al. 2018). This means that an 'emission-gap' exists for the full period and that this 'emission-gap' grows over time. Besides that, whereas the predicted emissions trend derived from this study increases already from the beginning, the desired emission trend derived by the dataset decreases rapidly for the period 2018-2020 and then decreases at slower speed till 2025. Furthermore, the predicted emission trend derived by this study becomes steeper after 2023 which shows a more rapid growth in $MtCO_2e$ emissions. The emission trend derived by the dataset also becomes steeper, but with some delay, after 2025 which shows a growth in the $MtCO_2e$ emissions.

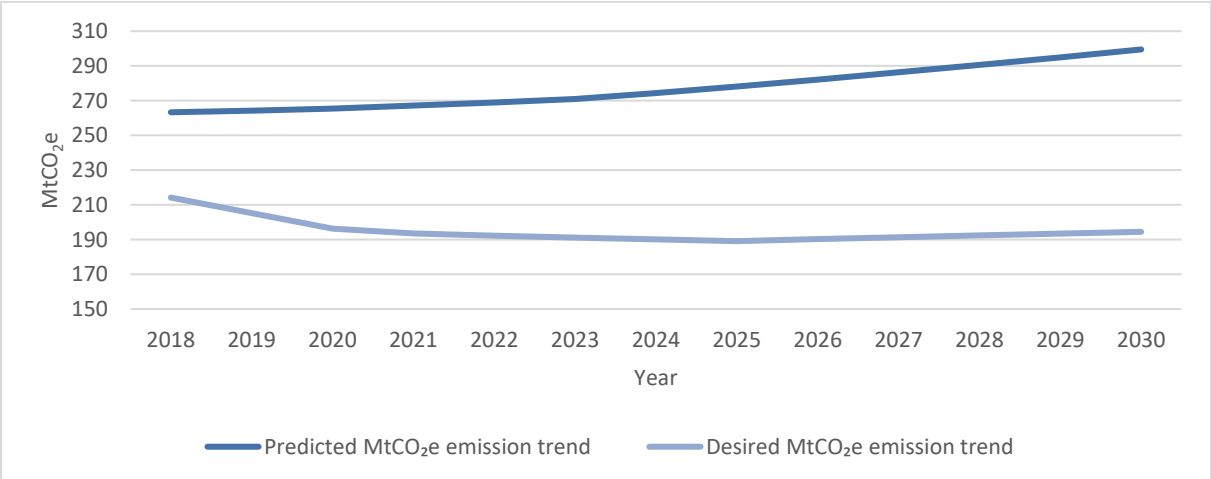

Figure 8: Predicted (study) vs. desired (dataset) $MtCO_2e$ emission trend - most ambitious companies

3.1.4 Least ambitious companies

The fact that a majority the locations are not on track and/or have unclear data, does in this case mean that the overall sample of 'least ambitious companies' are emitting more MtCO2e than is desired. Figure 9 shows that the actual emissions of the 'least ambitious companies' are above the target or desired emissions in 2017 according to the trend that represents the trajectory to the desired emissions resulting from the companies' commitments and targets. The sample of least ambitious locations emitted a total amount of 12 $MtCO_2e$ more than desired in 2017. There is a so-called 'emission-gap' (desired emissions > actual emissions) over 2017 for this sample of locations.

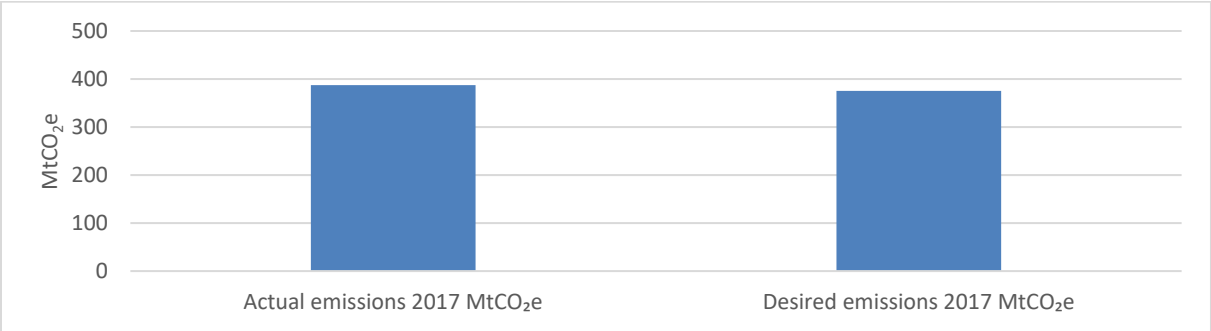

Figure 9: Actual versus desired emissions 2017 - least ambitious companies

Thereafter, a differentiation is made between the least ambitious locations that are 'on track' and the least ambitious locations that are 'not on track'. The locations that are on track emitted 14 $MtCO_2e$ less than was desired in 2017 (Figure 10) whereas the locations that are not on track emitted 26 $MtCO_2e$ more than was desired in 2017 (Figure 10). So, the locations that are on track managed to emit 11% less $MtCO_2e$ than was desired whereas the locations that are not on track managed to emit 11% more than was desired. 'On track' locations only make up a little bit for the bad performance of the 'not on track' locations.

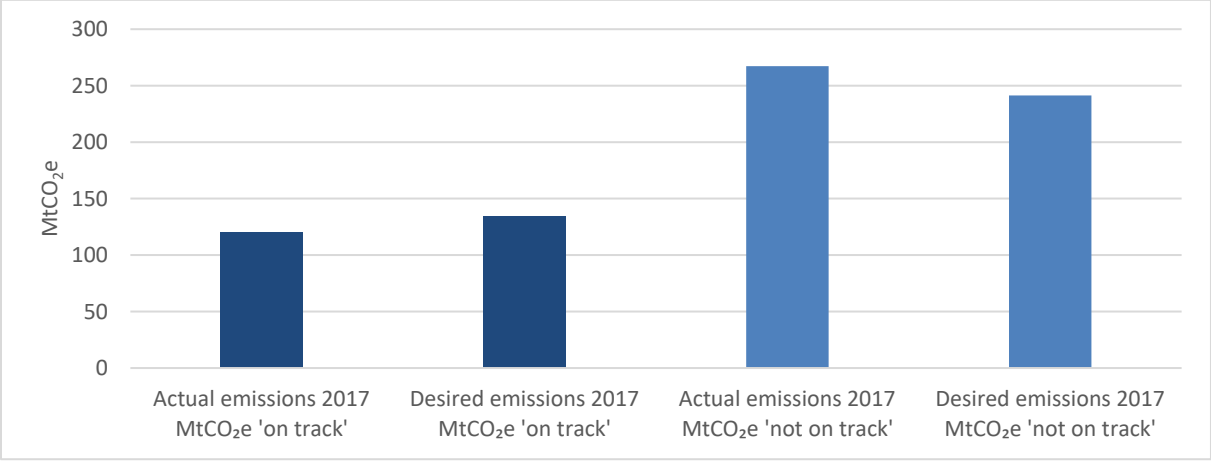

Figure 10: Actual versus desired emissions 2017 - least ambitious – 'on track' and 'not on track'

In the long run, a predicted trend is derived from the linear trend of companies' past emissions that represents the trajectory to the predicted actual emissions. Past emission trends are based on the emissions in the base year, year 2015, and the last data reporting year 2017. A predicted trend is derived for 'on track' locations and 'not on track' locations (Figure 11), and a combined predicted trend (Figure 12).

Figure 11 shows the differentiation between 'on track' and 'not on track' locations' predicted trends for 2018-2030. The predicted trend for 'on track' locations shows a slow decline in emissions for the full period 2018-2030. Whereas the 'not on track' predicted emission trend shows a linear increase in GHG emissions for the full period 2018-2030.

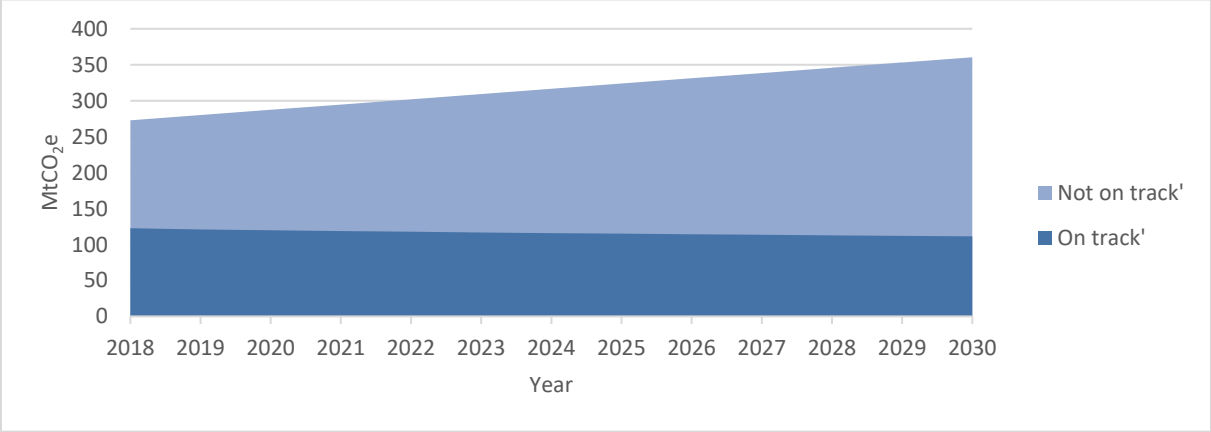

Figure 11: Predicted $MtCO_2e$ emission trend - least ambitious companies – 'on track' and 'not on track'

The combined predicted trend (Figure 12) shows that from 2018 onwards the emissions increase relatively rapidly in a linear line till 2030. Figure 12 also compares the predicted actual $MtCO_2e$ emission trend of this study with the desired $MtCO_2e$ trend of the dataset (Driven Data Yale et al. 2018). The predicted trend of this study is based on past and current actual emission trends and the desired trend of the dataset assumes a gradually emission reduction that represents the trajectory to the desired emissions resulting from the companies' commitments and targets. The predicted $MtCO_2e$ emission trend remains, except for the period 2018-2019, above the desired trend of the dataset (Data Driven Yale et al. 2018). This means that a 'emission-gap' exists for the period 2020-2030 and that this 'emission-gap' grows over time. Besides that, whereas the predicted emissions trend derived by this study increases already from the beginning, the emission trend derived by the dataset increases slowly from 2022 onwards till 2027 and then becomes stable again. The emission trend derived by the dataset fluctuates between 400 and 410 $MtCO_2e$ whereas the emission trend derived by this study increases from a little bit more than 390 to about 470 $MtCO_2e$.

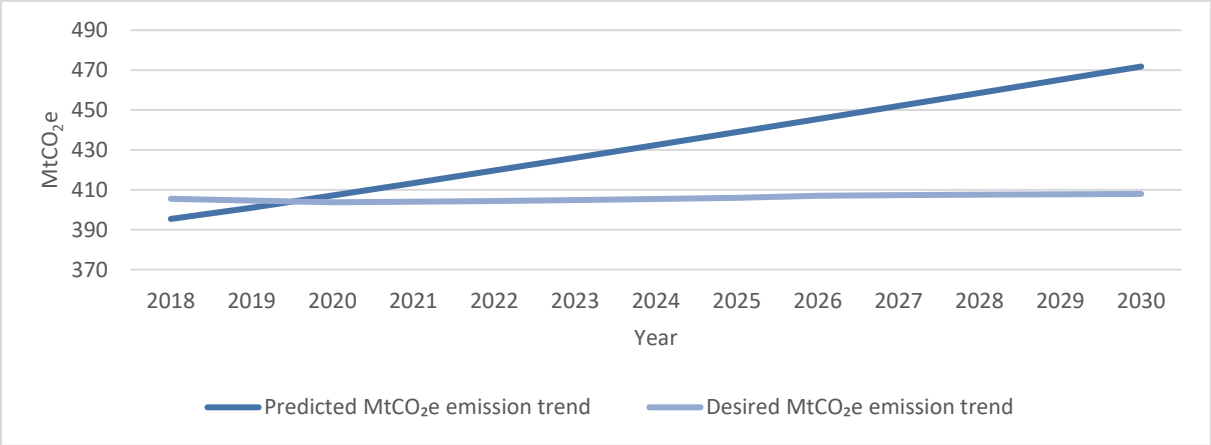

Figure 12: Predicted (study) vs. desired (dataset) $MtCO_2e$ emission trend - least ambitious companies

3.2 Coherence of commitments and actions

For the indicator 'coherence of commitments and actions' policy documents of a total amount of 30 unique companies were analysed. A complete list of company names can be found in appendix A. The results of the indicator 'coherence of commitments and actions' consists of a general part with the overall results of the analysed companies regarding their commitments and actions, whether it is likely that the companies are going to reach their targets/commitments or not. Besides that, there is a detailed part with the sub results of the five different components and corresponding criteria; 'commitment' (low-carbon future, high quality emission reduction targets), 'need and plan for transition' (need for transition, transition plan), 'present' (emission reduction measures, performance implemented measures), 'legacy' (emission reductions targets in the past, performance emission reduction targets in the past), and 'consistency' (strategy consistency, undermining commitments).

3.2.1 General coherence of commitments and actions

The coherence of commitments and actions of all companies are evaluated. Each company is rewarded a label 'unlikely', 'likely' or 'very likely' regarding the likelihood of reaching targets (see methodology Page 21). It is unlikely that 13 out of 30 companies are going to reach their (future) targets (Table 19) and for 17 out of 30 companies (more than half) it is either likely or very likely that they are going to reach their (future) targets. Companies got an average a 5,5 grade and therefore have a passable plan quality with a likely chance of reaching (future) targets (Table 19). The specific distribution of the companies regarding their grade, plan quality and likelihood of reaching targets, can be found in Table 19.

Table 19: Coherence of commitments and actions – all companies

Grade	**Plan quality**	**Likelihood of reaching target**	**Amount of companies**	**% of companies**
0 – 2,5	None	Unlikely	1	3,3
3 – 4,5	Weak	Unlikely	12	40
5 – 6,5	Passable	Likely	8	26,7
7 – 8,5	Good	Very likely	8	26,7
9 – 10	Excellent	Very likely	1	3,3
Total			30	100
Average	**Plan quality**	**Likelihood of reaching target**	**Amount of companies**	**% of companies**
5,5	Passable	Likely	30	100

3.2.2 Components and criteria

Table 20 shows the sub results, and averages of the components and criteria, and the distribution of the companies within a criterium regarding the conditions '1', '0,5', '0' or '-' (see methodology Page 14 – 21). Generally, companies have committed to a low-carbon (economy) future and have set emission reduction targets of (high) quality to fulfil that commitment (Table 20).

97% of the companies have to change only parts of the business model and 1 company has to change the entire business model, but almost none of the companies has a detailed plan how to change the business model in order to fulfil their commitments and to reach their targets (Table 20). A score of 0,60 out of 1 is given for the current emission reduction measures and a 0,43 out of 1 for the performance of these measures according to Table 20.

73% of the companies had reduction targets in the past of which 53% of the companies has reached those targets. 50% of the companies organize their activities by means and processes that slightly fulfil a low-carbon future and therefore have a moderate effect on CO2e emission reduction and 60% of the companies have a moderate performance, according to this framework, and use positive communication (Table 20).

Table 20: Average scores and distribution of companies per criteria and components

Component	**Criteria**	**Score - condition**	**Amount of companies**	**% of companies**	**Average criteria (0-1)**	**Average component (0-2)**
Commitment	Low-carbon (economy)future	1	24	80	0,88	1,58
		0,5	5	17		
		0	1	3		
	High quality emission reduction targets	1	17	57	0,70	
		0,5	8	27		
		0	5	17		
Need and plan for transition	Need for transition	1	1	3	0,52	0,60
		0,5	29	97		
	Transition plan	1	1	3	0,08	
		0,5	3	10		
		0	26	87		
Present	Emission reduction measures	1	9	30	0,60	1,03
		0,5	18	60		
		0	3	10		
	Performance implemented measures	1	13	43	0,43	
		0	17	57		
		-	0	0		
Legacy	Emission reduction targets in the past	1	22	73	0,76	1,38
		0	7	23		
		-	1	3		
	Performance reduction targets in the past	1	16	53	0,62	
		0	10	33		
		-	4	13		
Consistency	Strategy consistency	1	8	27	0,52	1,02
		0,5	15	50		
		0	7	23		
	Undermining commitments	1	6	20	0,50	
		0,5	18	60		
		0	6	20		

4 Discussion

The results that are, presented in Chapter 3 of this research, are discussed in this chapter. The weaknesses of the used approaches/methods and the consequent uncertainties in the results are described. The structure of this section is the same as the previous parts of the report; first the weaknesses, uncertainties and results regarding the 'implementation performance' indicator are discussed and then the of the 'coherence of commitments and actions' indicator. In the end, a comparison with different studies is made.

4.1 Uncertainties in results

Weaknesses and the consequent uncertainties of the used data and the used method have to be explained before interpreting the results on the implementation performance. First, one has to look at the data that is used in this study because some weaknesses exist regarding parts of the data and therefore there are uncertainties in the results and consequently in some of the conclusions.

A weakness exists regarding the approach of comparing actual emissions with desired emissions. The actual emissions of 2017 for all the companies/locations of companies are compared with the emissions in the same year derived from a trend that represents the trajectory to the desired emissions resulting from the companies' targets. The derived trend assumes a gradually reduction of emissions in line with an end target and after the target year this gradually reduction is assumed to continue as a BAU pathway. However, this gradually reduction of emissions by companies is unlikely to happen. The moment of implementation of reduction measures differs and depends on external factors like economic circumstances and development of technologies. Furthermore, when a company implements emission reduction measures the overall reduction does not reduce gradually but rather quickly. Besides that, companies that are not on track compared to the desired emissions and still have a certain amount of years to go when the target should be reached, have time to make up for the past years and reach their target. Therefore, the further one looks into the future the higher the uncertainty regarding the implementation performance because anything could be done in the meantime. By assuming a gradually reduction of emissions my study over- and underestimates the reality of the implementation performance because of economic developments and development of new technologies that could take place in the meantime. The consequent uncertainty for the results is that these 'on track' and 'not on track' labels are uncertain predictions whether the company will meet their targets and commitments. The results are intermediate (snapshot) and tell only a part of the complete story. However, conclusions can still be drawn at this point because this study gives a good indication of the current implementation performance of the companies' targets and commitments. Therefore, this has no further consequences on the conclusions. Although the study gives a clear representation of the current implementation performance and future emissions, repetition of this study in coming years would enhance precision of the analysis.

Furthermore, weaknesses regarding the targets within the dataset exist. Company targets may already be outdated, replaced for new or additional company targets and/or even be dropped by companies due to different factors. The three options, mentioned before, could have different impacts on the used method and the results.

This means that, with the last data reporting year 2015 (dataset) and 2017 (study), companies with target year 2016 or 2017 could not be assessed on their current implementation performance (on track, not on track or unclear) and could only be assessed on the fact whether they have reached the target or not. Monitoring and reporting the implementation performance in that case stops after the target year and nothing could be said about the current and future performance. In order to include these companies and to give an indication of the current implementation performance and the future performance, the assumption is made that companies follow a BAU pathway after the target year. This means, the assumption is made that emissions do not stay constant after they reach their target emissions levels. By doing this, actual emissions can be compared with emissions, in the same year and coming years, derived from a trend that represents the trajectory to the desired emissions resulting from the companies' targets. Replaced targets mean that, when companies have replaced their targets for either more or less ambitious targets, the derived implementation performance are incorrect for these companies. The consequent uncertainty for the results is that in cases of a more ambitious target replacement the implementation performance could be too positive or in cases of a less ambitious target replacement the implementation performance could be too negative. To account for this uncertainty the assumption is made that the existing targets in the dataset are correct and up to date and have not be replaced by the companies. This also holds for additional and dropped targets. A company has possibly additional or multiple absolute- or intensity targets with different base years and/or target years. No differentiation is made between different targets of the same company, both targets are assessed with the assumption that both targets are correct and up to date. Surely, a company could have intermediate targets along the road to another target and therefore assessing the implementation performance of the company on both targets is relevant. And, whether the company has dropped the target or not, the assumption allows to still assess the current implementation performance of that target. This problem is relatively small and the impact on the results is minimal due to the fact that this condition holds for a limited amount of companies/locations. Therefore, the conclusion remains the same.

Furthermore, weaknesses regarding the companies/locations of companies within the dataset exist. Company names and company locations may differ over time. Both a change in company name and/or the amount of corresponding locations (branches) could have different impacts on the used method and the eventual results. When a company name/brand changes because the company takes over other businesses in the same industry or gets rid of subsidiaries it could mean that the amount of emissions increases or decreases under the new name/brand. As a result, the proportion between emissions in the previous years and the coming years therefore may not the comparable and thus the emissions cannot be compared with the desired trend. The consequent uncertainty for the results is that the current implementation performance is either too positive or too negative and a wrong representation will be given whether the company is on track or not. Since this limitation only holds for a limited amount of companies, the conclusions still hold.

Therefore, the assumption is made that the proportion between emissions in the previous years and the coming years are comparable in cases the name/brand has changed and that CDP automatically corrects the name/brand in their responses (CDP, 2019). This problem is relatively small and the impact on the results is minimal due to the fact that this condition holds for a limited amount of companies/locations. Therefore, the conclusions remain the same. Also, not all branches of a company are always included in the dataset. Therefore, only the branches included in the dataset are assessed on their implementation performance.

As a result, it is therefore not possible to interpret the combined implementation performance of the branches of a company as a reflection of that entire company, it is possible that multiple branches are left out of the analyses. This has no further consequences on the conclusions.

A more important weakness exists regarding the Scope-2 emissions within the dataset. An important downside of the used data and therefore the used method is the fact that it is unknown whether Scope-2 location-based emissions or Scope-2 market-based emissions are used in determining the trend that represents the trajectory to the desired emissions resulting from the companies' commitments and targets in the dataset. A company can provide Scope-2 emission data both by the location-based method (reflects the average emissions intensity of grids on which energy consumption occurs) and by the market-based method (reflects emissions from the electricity that companies have chosen in the market or their lack of choice). These methods differ in respect to the choice of emissions factor used for the allocation. Consequently, the values of both methods can differ a lot and that means that Scope-1 plus either Scope-2 location-based emissions or Scope-2 market-based emissions could be the difference between a 'on track' label or a 'not on track' label in cases that both Scope-2 methods are provided by a company in their response to CDP (2019). To account for this blind spot, the assumption is made that in cases that both methods are provided by a company, and therefore two different values of Scope-2 emissions are available, the actual emission (Scope-1 + Scope-2) that comes in closest range of the desired emission (Scope-1 + Scope-2) is the one that is used for this research. When the difference between Scope-2 location-based and Scope-2 market-based is small the used method could be either in favour or not in favour of the company (too optimistic or too pessimistic). But when the difference between Scope-2 location-based and Scope-2 market-based is large the used method accounts for a too optimistic and therefore unrealistic picture of the current implementation performance. The consequent uncertainty for the results is that it is possible that companies, unjustly, received an 'on track' label or a 'not on track' label and therefore the $MtCO_2e$ emission gap between actual and desired emission could be larger or smaller and future trends could show another trajectory. However, this chosen approach is better than the two alternatives to pick either the highest or the lowest Scope-2 emission since differences between both methods could be so large that the implementation performance is soon to optimistic or too pessimistic. By choosing the highest Scope-2 emissions my study would underestimate the implementation performance of companies and by choosing the lowest Scope-2 emissions vice versa. The chosen method therefore accounts for extremes. By doing this the results are more reliable, because of the elimination of extremes, given the weaknesses described earlier. Although the limited dataset specified the implementation performance, giving information on which Scope-2 emission method is used would enhance precision.

Finally, a weakness regarding the amount of data reporting years exists. To develop a trend that represent the trajectory to expected emissions up to 2030 a method is used that has a weakness and therefore a consequent uncertainty for the results. The future trend that represents the trajectory of expected emissions results from a linear trend of emissions in the base year, last data reporting year of the dataset; 2015, and the last data reporting year of this study; 2017. The assumption is made that this linear trend continues after 2017 till 2030. Furthermore, the assumption is made that from the moment future emissions turn negative the emissions are zero. It is unlikely that the trend behaves linear all the way along and becomes zero within this timeframe due to technological-, economical- and other external developments. However, given this dataset and the gathered data this is the best option to give an indication of future emissions.

Although this limited dataset specified a clear trend, collecting more emission would enhance precision. For instance, data on the years between the base year and 2015 and data on the year 2016 would give a more precise linear trend that could be used to determine the future trend. Because at this point the predicted trend is very uncertain because it is based on limited emission data. The additional emission reduction by 2030 is an underestimation of what is likely that will happen. This additional emission reduction prediction includes the assumption that over time no (extra) locations will commit to their targets and/or (extra) locations will increase their emission-reduction speed, and thus the further one looks ahead the higher the uncertainty of the prediction.

Weaknesses and the consequent uncertainties of the used data and the used method have to be explained before interpreting the results regarding the coherence of commitments and actions.

An important downside of the grading system (see methodology Page 21), linked to the quality of companies' plans and the likelihood of reaching targets, is that it relies on personal judgement and therefore subjectivity. The consequent uncertainty for the results is that a repetition of the analyses of the coherence of commitments and actions by a different person may result in a different outcome. A different outcome could mean that the overall conclusions of the coherence of commitments and actions could be more positive or negative which means that the likelihood of companies to reach their targets could either be more unlikely or very likely. To minimize subjectivity in this part of the research, the grades were compared with corresponding 'Climate Change' responses from companies to the CDP (2019) and the score companies received for their responses. In the 'Climate Change' responses companies disclose their data on climate change such as their business strategy, targets and performances and detailed emissions data. When the score deviated that much from the score of the CDP a second analyses was done in order to find out if the difference was justified or not. Subjectivity was also minimized by the developed framework with different components and criteria based on existing literature. The detailed conditions for certain criteria declined the 'space' for personal judgement. Therefore, the conclusions remained the same and are still valid.

Furthermore, the coherence of commitments and actions was assessed by evaluating different sorts of policy documents. This study looked at the latest annual-, sustainability-, corporate responsibility-, corporate sustainability and social responsibility-, sustainable development-, citizen- and integrated reports that were available for downloading on companies' websites. The downside of using these policy documents is that they look back at a previous fiscal year to inform stakeholders and other interested parties. Besides that, the documents mostly contain highlights and figures of their environmental policies and performances instead of elaborated and detailed descriptions of those same environmental policies and performances. In case a more detailed and elaborated method was chosen the grades and the likelihood of reaching targets would be higher. However, to compare and judge each company in the same way this was not possible because not all companies provide the same amount of information via their information channels. Although my research indicates a good first likelihood if companies are going to reach their targets, collecting and evaluating reports from previous years, information on the websites and news articles would enhance precision.

4.2 Comparison with different studies

De Boer (2014) assessed 100 companies and showed that 33% was on track to reach their targets, 26% had higher emissions, 25% had no target at all and another 17% remained unclear.

My study showed that out 4,554 companies one third was on track, half had higher emissions, a few had no target at all and one sixth remained unclear. Differences in approaches between this study and the study of De Boer (2014), such as the smaller sample size and the last data reporting year of 2012, cannot be ignored and therefore differences in the results are hard to compare. However, one difference in the results is remarkable. 25 out of 100 companies had no target (De Boer, 2014) but in this study only 4 out of 4,554 companies had no target. Companies have committed themselves to emission reduction targets over the years, but the impact of this difference remains unclear. The share of companies that were on track remains in both studies one third, and the share of companies that were not on track is 26% for De Boer (2014) and 50% for this study. If one assumes that both samples are comparable then an increase in companies that have emission reduction targets does not automatically mean an increase in companies that are on track. Concluding, one can assume that more companies have committed themselves to emission reduction targets.

A comparison with the proposed 'Top 1,000 companies' emission reduction initiative, with an expected impact of 0.7 GtCO2e by 2020 (Blok et al. 2012), with my research is not possible. The baseline is not the same, Blok et al. (2012) assume that the mentioned impact could be the result of an overall 10% reduction of energy-related emissions and an overall 50% reduction of non-carbon GHG emissions by 2020 realised by 30% of the 'Top 1,000 companies'. My study uses company commitments of different magnitudes covering both energy-related as non-carbon GHG emissions and it is unknown whether all the companies belong to the 'Top 1,000 companies' initiative. However, the realised additional emission reduction impact of 0.26 GtCO2e can still be placed in context of the research of Blok et al. (2012) and Data Driven Yale et al. (2018). The impact of 0.26 GtCO2e (already in 2017) emphasizes the fact that the potential of business initiatives is huge and that a part of the companies ('on track') live up to this potential. Worse still, if all companies would live up to this potential the impact would be much larger. Data Driven Yale et al. (2018) argues that global GHG emissions could be between 0.2 and 0.7 GtCO2e/year lower in 2030 as a result of individual commitments by regions, cities and businesses. Therefore, given my results, the realised impact of 2017 by 'on track' companies can be called a success and is promising for future implementation of pledged targets by those companies. However, it is unrealistic to assume that pledged targets will be fully implemented by companies since, given the results, not all companies ('not on track') live up to the potential as stated by Data Driven Yale et al. (2018).

For the coherence of commitments and actions, De Boer (2014) showed that out of 25 companies 48% had a likely or very likely chance of reaching the target and another 52% had an unlikely chance of reaching the target. This study showed that out of 30 companies almost 43% had an unlikely change of reaching the target and another 57% had a likely or very likely chance of reaching the target. Although the difference in results are relatively small, the approach for assessing the coherence of commitments and actions in this study is more justified. De Boer (2014) used the 'Climate Change' responses from companies to the CDP, however these responses do not contain a detailed planning of the implementation of measures over the coming years. Using policy documents directly from companies' websites gives more information and more input to determine the likelihood. Besides that, De Boer (2014) only looked at few activities, the cover of activities and investment methods without justifying that choice by using existing literature. Therefore, the grading system used in my research gives a more science-based conclusion compared to De Boer (2014).

5 Conclusions

In this research the emission reduction potential of companies, consistent with the 'wedging the gap' approach, is evaluated and estimated. In this light, the research focused on two indicators that could give an estimation of the emission reduction potential of companies: the implementation performance and the coherence of commitments and actions.

Answering RQ1, about a third of 4,554 locations are on track to meet their targets/commitments. Furthermore, a staggering 50% or half of the locations are not on track to meet their targets/commitments. For another 16% it is unclear to determine whether the locations are on track or not. Overall, the total sample of locations emitted a total of 255 $MtCO_2e$ less than was desired in 2017 according to their targets/commitments. However, when looking at the share of emissions in each category the 'on track' locations only account for 26% of the emissions. The 'not on track' locations account for 74%. Thus, when looking forward it is possible that in the coming years this positive result will be undone by locations that are 'not on track'. A look at the three different samples will provide more insight of the current and future implementation performance.

The overachievement of the targets by 255 $MtCO_2e$ as a result of the implementation performance over 2017 is caused by the sample of the largest emitters, because they showed a positive emission-gap (predicted < desired) of 308 $MtCO_2e$ in 2017. Especially largest emitters that are 'on track' are performing extraordinarily great, in view of the fact that desired emissions for the 'on track' largest emitters are higher than the desired emissions for the 'not on track' largest emitters. This group of 'on track' locations are 36% of the total locations and are responsible for 25% of the emissions. A group of leading locations is thus causing this effect and on the other hand a larger group of stragglers will most likely undo the positive results of the leading locations in the future. The achievement of the leading locations should be therefore a spur to the stragglers, otherwise there will be no progress in the future and the emissions-gap will be larger. That is what is predicted by this research; the effect of the good performing 'on track' locations is coming to an end from 2022 onwards. This means that a lot of these locations probably have targets before or in this year and/or have reached zero emissions according to the linear trend, and then the 'not on track' locations take over and the emissions will increase rapidly. Whereas the positive emissions-gap (predicted < desired) in 2018 will likely be 370 $MtCO_2e$, the positive emissions-gap will be smaller looking further ahead. Take note that this prediction includes the assumption that over time no (extra) locations will commit to their targets and/or (extra) locations will increase their emission-reduction speed, and thus the further one looks ahead the higher the uncertainty of the prediction. Therefore, locations of the largest emitters that are 'not on track' should act regarding their commitments and targets because when they continue to do what they are doing the emissions will exceed the desired emissions somewhere after 2030.

On the other hand, both the sample of most ambitious and least ambitious locations showed a negative result of respectively 41 and 12 $MtCO_2e$. Therefore, the least ambitious are closer to meeting their own targets than the most ambitious. However, most ambitious may be doing more, but also have much more ambitious targets in comparison with least ambitious locations. 30% and 39% of respectively the most- and least ambitious locations that are 'on track' only account for respectively 21% and 31% of the total emissions.

Furthermore, unlike the sample of the largest emitters, one cannot say that within the most ambitious- and least ambitious samples leading companies are present that are showing extraordinarily great implementation performance. For the most ambitious sample of locations this means that already from 2018 onwards the predicted emissions will increase towards 2030. This will result in a negative emissions-gap (predicted > desired) of 50 $MtCO_2e$ in 2018 and of an even larger magnitude by 2030. Also, for the least ambitious sample of locations it means that already from 2018 onwards the emissions will increase towards 2030. This will result in a positive emissions-gap (predicted < desired) of 10 $MtCO_2e$ in 2018 and a possible negative emissions-gap (predicted > desired) by 2030. Take note that both predictions include the assumption that over time no (extra) locations will commit to their targets and/or (extra) locations will increase their emission-reduction speed, and thus the further one looks ahead the higher the uncertainty of the prediction.

Both the trends of the largest emitters, and most ambitious locations and least ambitious locations show that the impact of the good implementation performance of 'on track' companies in the long run will be completely overshadowed by the impact of the bad implementation performance of 'not on track' companies if they continue to do what they are doing. This possibly results in smaller positive emission-gap in comparison with a 255 $MtCO_2e$ positive emission-gap in 2018. Take note that this prediction includes the assumption that over time no (extra) locations will commit to their targets and/or (extra) locations will increase their emission-reduction speed, and thus the further one looks ahead the higher the uncertainty of the prediction.

Answering RQ2, it is unlikely that 13 out of 30 companies are meeting their commitments. For 17 companies it is likely or very likely that they are meeting their commitments. The commitment to a low-carbon future exists but not all companies have high quality emission reduction targets. This is mainly due to the fact that companies have committed themselves to an intensity reduction target and/or have a short time frame, for example in terms of a commitment to an annual reduction target without a final target on the long run. Therefore, companies should commit themselves to absolute reduction targets with a long time-frame to increase the likelihood of reaching targets. Furthermore, all companies have a need for transition, a change of the business model, in order to reduce emissions in the future and accomplish a sustainable business model. But how companies are planning to get there is unknown. Almost none of the companies have a transition plan, concrete stepping stones are missing. However, some companies choose to have a very ambitious target in the future and least ambitious intermediate targets in the near future. This can be seen as stepping stones/evaluation points towards the final target. A roadmap, stepping stones, a transition plan or intermediate targets, will increase the likelihood of reaching targets. Companies should develop and adopt such plans to give answer on questions where the company stands, where it wants to go, and how it gets there. Furthermore, a wide range of measures are taken, especially a lot of attention for reusing/recycling and reducing of energy, materials and other sources. However, measures don't always result in emission reductions.

More than half of the companies showed an increase in emissions, mostly due to economic factors. Therefore, the impact of existing measures needs to be critically analysed and more measures need to be taken in a broad range of categories in order to increase the likelihood of reaching targets. In that light, companies are not always consistent by their means and processes. The legacy is good, most companies had targets before.

Companies that had no targets before is due to the fact that their targets are still underway. In the end, commitments and actions are not always coherent due to the factors mentioned above.

After both the quantitative and qualitative part of the analysis it is now possible to give an answer to what extent companies' emission reduction initiatives contribute to climate-change mitigation by 2030. On the short term, the share of companies as NSA on the emission-gap is big. An additional reduction of 0.26 $GtCO_2e$ was realised in 2017 according to the implementation performance of the researched locations. However, on the long term the additional reduction of GHG emissions in GtCO2e per year is too uncertain to predict. Based on my research the additional reduction of GHG emissions in GtCO2e per year decreases instead of increases towards 2030. That is highly unlikely to happen since one may assume that over time the expected impact of the commitments is likely to be larger due to the longer time frame on which companies can reduce their carbon and non-carbon GHG emissions. Because, it is plausible that more locations will commit to their targets and/or more locations will increase their emission reduction speed. To ensure additional emission reduction in future years of the same magnitude as in 2017 or even a higher magnitude, better implementation performance is needed as well as more coherent commitments and actions.

Concluding, my study aimed to improve insights in company commitments to reduce GHG emissions and their global impact. In this way, my study meets the need for better monitoring and reporting of NSAs initiatives. The study provided a clearer and an up-to-date representation of the share of companies as NSA on the emission-gap in the short term and concluded that companies, as NSAs, not always implement their actions and not always realize their commitments but still managed to reduce emissions by an additional amount of 0.26 GtCO2e in 2017. In the long term, based on past emission trends, a decrease in additional emission reduction is predicted but this prediction is highly uncertain. Better implementation performance and greater coherence between commitments and actions could lead to higher additional emission reductions and therefore an improvement of companies' emission-reduction contribution to climate-change mitigation. Which again calls for monitoring and reporting of these future NSAs initiatives.

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Appendices

A. Random sample companies – Implementation performance

- Largest emitters

Actor	Locations
3M Company	1
ACERINOX	1
Aeon Mall Co., Ltd.	1
African Rainbow Minerals	1
Ahold Delhaize	1
Air France - KLM	2
AkzoNobel	1
Alcoa Corp.	2
Altarea Cogedim	1
Ambuja Cements	1
Amec Foster Wheeler	1
American Water Works	1
ANA Holdings Inc.	1
Anglo American Platinum	1
AngloGold Ashanti	1
Anglo American	2
Anheuser Busch InBev	2
Anthem Inc	1
ArcelorMittal	11
Arcelor Mittal South Africa Ltd	1
Archer Daniels Midland	1
Asahi Kasei Corporation	1
Associated British Foods	2
AT&T Inc.	2
Aurubis AG	1
Automatic Data Processing, Inc.	1
AvalonBay Communities	1
Babcock International Group	1
Baker Hughes, a GE Company	1
Barrick Gold Corporation	1
BASF SE	4
Beni Stabili Spa SIIQ	1
Boeing Company	1
Bouygues	1
Braskem S/A	1
Bridgestone Corporation	1
Bruker Corp	1
Bunge	1
Canadian Natural Resources Limited	1
Canadian National Railway Company	1
Cargill	2
Celanese Corporation	1
Cementos Argos SA	1
CEMEX	4
China Agri-Industries Holdings Ltd	1
China Mobile	1
China Petroleum & Chemical Corporation	1
China State Construction International Holdings Ltd	1
Chugai Pharmaceutical Co., Ltd.	1
Compañía Española de Petróleos, S.A.U. CEPSA	1
ConocoPhillips	1
CSX Corporation	1
CVS Health	1
Daimler AG	1
Delta Air Lines	1
Denka Company Limited	1
Deutsche Post AG	2
Deutsche Telekom AG	3
Devon Energy Corporation	2
Domtar Corporation	1
E.I. du Pont de Nemours and Company	1
East Japan Railway Company	1
Eisai Co., Ltd.	1
Eli Lilly & Co.	1
Eni SpA	1
EOG Resources, Inc.	3
Essar Oil	1
Evonik Industries AG	2
FedEx Corporation	1
Finnair	1
FirstGroup Plc	1
Fujitsu Ltd.	1
Galp Energia SA	1
General Motors Company	1
General Electric Company	1
GGP	1
Golden Agri-Resources	1
Goodyear Tire & Rubber Company	1
Great Portland Estates	1
Harmony Gold Mining Co Ltd	1
HCP Inc.	1
HeidelbergCement AG	1
Hess Corporation	1
Hindustan Zinc	1
Hitachi, Ltd.	1
Honda Motor Company	1
Honeywell International Inc.	1
Husky Energy Inc.	1
Indorama Ventures PCL	1
International Consolidated Airlines Group, S.A.	6
Intercontinental Hotels Group	1
Intu Properties plc	1
International Paper Company	1
J Sainsbury Plc	1
Japan Retail Fund Investment	1
JBS S/A	1
JSW Steel	1
JXTG Holdings, Inc.	1

Kimberly-Clark Corporation	1
Kintetsu Group Holdings Co.,Ltd.	1
Kroger	1
Kumba Iron Ore	1
LafargeHolcim Ltd	1
LANXESS AG	2
LG Chem Ltd	1
Lonmin	1
Lowe's Companies, Inc.	1
Macerich Co.	1
Mercialys	1
Mitsubishi Corporation	1
Mitsubishi Materials Corporation	2
Mitsubishi Chemical Holdings Corporation	1
Mitsui Chemicals, Inc.	2
Mitsui Mining & Smelting Co., Ltd.	1
MOL Nyrt.	6
Mondi PLC	1
Neste Oyj	1
Nestlé	1
Newmont Mining Corporation	1
NH Foods Ltd.	1
NH Hotel Group	9
Nippon Telegraph & Telephone Corporation (NTT)	1
Nissan Motor Co., Ltd.	1
Norsk Hydro	3
Norfolk Southern Corp.	1
NTT Data Corporation	3
NTT DOCOMO, INC.	1
NTT Urban Development Corporation	1
OMV AG	3
Oneok Inc.	1
Owens Corning	1
Pennon Group	1
PepsiCo, Inc.	1
Petróleo Brasileiro SA - Petrobras	1
Pfizer Inc.	1
Piramal Enterprises	1
Potash Corporation of Saskatchewan Inc.	1
PPG Industries, Inc.	1
Procter & Gamble Company	1
Quadrant AG	1
Renesas Electronics Corporation	1
Rengo Co., Ltd.	1
Repsol	1
Republic Services, Inc.	1
Royal Dutch Shell	4
salesforce.com	5
Samsung Electronics	1
Sasol Limited	3
Sawai Pharmaceutical Co., Ltd.	1
SCSK Corporation	1
Seven & I Holdings Co., Ltd.	1
Shin-Etsu Chemical Co., Ltd.	2
Shionogi & Co., Ltd.	1
Shree Cement	1
Sibanye Gold Ltd	1

SK Hynix	1
Smithfield Foods, Inc.	1
SoftBank Group Corp	1
Sohgo Security Services Co., Ltd.	1
Solvay S.A.	6
Sony Corporation	1
Sprint Corporation	1
SSAB	1
Stagecoach Group	1
Stora Enso Oyj	1
Suez	2
Sumitomo Chemical Co., Ltd.	1
Sumitomo Metal Mining Co., Ltd.	1
Suncor Energy Inc.	1
Swire Pacific	1
Sysco Corporation	1
Tata Motors	1
Tata Chemicals	2
Tata Steel	3
Tate & Lyle	1
Tech Mahindra	1
Teradata Corp.	1
Tesco	2
Texas Instruments Incorporated	1
The Dow Chemical Company	4
The Mosaic Company	1
The Kraft Heinz Company	1
The Home Depot, Inc.	1
Toray Industries, Inc.	1
Toshiba Corporation	1
Toyo Seikan Group Holdings, Ltd.	1
Toyota Motor Corporation	1
TransCanada Corporation	1
Travis Perkins	1
Ube Industries, Ltd.	1
United Utilities	1
Union Pacific Corporation	1
UnitedHealth Group Inc	1
United Technologies Corporation	1
UPS	1
Vale	2
Vallourec	1
Vedanta Resources PLC	2
VEOLIA	7
Verizon Communications Inc.	1
Vinci	1
Volkswagen AG	2
Wacker Chemie AG	1
Wal Mart de Mexico	1
Wal-Mart Stores, Inc.	3
Walgreens Boots Alliance	1
Waste Management, Inc.	2
Wells Fargo & Company	1
West Japan Railway Company	1
WestRock Company	1
Weyerhaeuser Company	1
Wilmar International Limited	1
Yamato Holdings Co., Ltd.	1
Yum! Brands, Inc.	1

- Most ambitious

Actor	Locations
3i Group	9
Abbott Laboratories	12
Abertis Infraestructuras	3
Aberdeen Asset Management	17
ABM INDUSTRIES INC	2
ABN Amro Holding	1
AccorHotels	1
ACERINOX	1
ADDISON LEE PLC	2
adidas AG	11
Adler Pelzer	9
Adobe Systems, Inc.	2
Advantest Corporation	3
Advanced Semiconductor Engineering	4
Advanced Micro Devices, Inc	3
Aegon	3
Ahold Delhaize	5
Air France - KLM	2
Airbus	4
Ajinomoto Co.Inc.	3
AkzoNobel	6
Alfa Laval Corporate AB	20
Allied Irish Banks plc	3
Allergan plc	7
Alliance One International Inc.	8
All Access Apparel, Inc.	2
Allstate Insurance Company	4
ALPLA	21
Alpine Electronics	7
Alstom	14
Alten	7
Amcor	18
Amdocs Ltd	17
Ansell	5
Archer Daniels Midland	15
Aryzta AG	14
Asics Corporation	11
ASUSTeK Computer Inc	13
AU Optronics	6
Autodesk, Inc.	12
Avaya	13
Aviva plc	11
Balfour Beatty	5
Banco Bradesco S/A	1
Bank of Nova Scotia (Scotiabank)	8
BANDAI NAMCO Holdings Inc.	6
Banco Santander	8
Bank of America	12
Barco NV	6
Barilla Holding SpA	7
Basil Read	1
Baxter International Inc.	21
BCD Travel	16
Beijer Alma	10
Beni Stabili Spa SIIQ	1
Berry Global Group, Inc	11
BillerudKorsnäs	3
Biogen Inc.	21
BMW AG	8
BNP Paribas	13
Bodycote plc	17
BorgWarner	15
Brammer Plc	12
Brembo SpA	10
Bridgestone Corporation	1
BROADRIDGE FINANCIAL SOLUTIONS INC	9
BRP	4
Bunge	13
CA Technologies	20
Calsonic Kansei Corporation	7
Canon Inc.	5
Cap Gemini	20
Carnival Corporation	5
Casio Computer Co., Ltd.	12
Celestica Inc.	6
CEWE Stiftung & Co. KGaA	10
Chocoladefabriken Lindt & Sprüngli AG	5
CIE Automotive	15
Ciena Corp.	8
Clariant AG	7
CNH Industrial NV	14
Coca-Cola HBC AG	17
Commerzbank AG	10
Constantia Flexibles	12
Cooper Standard Automotive	9
Croda International	14
Daikin Industries, Ltd.	18
Daiwa House Industry Co., Ltd.	6
Daifuku Co., Ltd.	8
Danieli & C Officine Meccaniche S.p.A.	4
Deere & Company	18
Dentsu Inc.	10
Deutsche Telekom AG	33
Diageo Plc	15
Dixons Carphone	3
Domtar Corporation	3
Dover Corporation	15
DS Smith Plc	24
eBay Inc.	15
Edelmann	4
Electrolux	18
Elisa Oyj	5
Ericsson	13
Essilor International	4
EVRY ASA	4
Exxaro Resources Ltd	1
FAREVA	7
Ferguson plc	6
FIRMENICH SA	10
Fisher & Paykel Healthcare Corporation	8
Foschini Group Ltd	1
FUJIFILM Holdings Corporation	17
FUJI OIL HOLDINGS INC.	6
Furukawa Electric Co., Ltd.	6
Gemalto	15
General Mills Inc.	9
Getinge AB	6

Givaudan SA	14
Goldman Sachs Group Inc.	4
Greif Inc	21
Groupe SEB	6
Groupe PSA	5
Grupo Logista	5
H&M Hennes & Mauritz AB	1
H.B. Fuller	6
Hammerson	3
Hasbro, Inc.	13
Heineken NV	23
Hertz Global Holdings	12
Hexpol AB	9
Hiscox	9
Hitachi Construction Machinery Co., Ltd.	1
Hologic, Inc.	2
Host Hotels & Resorts, Inc.	3
Husky	6
Hyundai Mobis Co Ltd	2
Imerys	24
Indian Hotels Co. Ltd.	4
ING Group	12
Intesa Sanpaolo S.p.A	14
Interplex	5
Intel Corporation	12
Invesco Ltd	5
Ipsen	5
ISS	28
Jabil Inc.	15
Johnson & Johnson	20
JPMorgan Chase & Co.	16
KBC Group	6
KDDI Corporation	4
Kellogg Company	21
Kering	23
Kikkoman Corporation	3
Kingspan Group PLC	13
Koninklijke Philips NV	4
Koninklijke KPN NV (Royal KPN)	2
Kubota Corporation	17
Kurita Water Industries Ltd.	9
LAMB WESTON / MEIJER	3
Legal and General Investment Management	2
Legg Mason, Inc.	7
Lenovo Group	7
Lexmark International, Inc.	27
Liberty Global plc	13
Linklaters LLP	15
LIXIL Group Corporation	7
L'Oréal	24
Macquarie Group	16
Maisons du Monde SA	6
ManpowerGroup	11
MAPFRE	7
Marsh & McLennan Companies, Inc.	36
MasterCard Incorporated	22
Meggitt	9
Merck & Co., Inc.	34
Metso	13

Millennium & Copthorne Hotels	6
Mitsubishi Heavy Industries, Ltd.	36
Molex Incorporated	10
MS&AD Insurance Group Holdings, Inc.	6
National Australia Bank	6
Nestlé	12
NGK Spark Plug Co., Ltd.	11
NIKE Inc.	7
Nippon Telegraph & Telephone Corporation (NTT)	1
NN Group NV	11
Nordea Bank	7
Novartis	15
NTN Corporation	8
Obrascon Huarte Lain (OHL)	5
OMV AG	3
Ontex Group NV	8
Orkla ASA	17
Panasonic Corporation	15
PepsiCo, Inc.	22
Philips Lighting	5
Philip Morris International	27
PostNL	3
PPG Industries, Inc.	20
Proximus	3
Prologis	17
PZ Cussons	3
Rabobank Group	14
Reckitt Benckiser	16
RELX Group Plc	3
Rentokil Initial	6
Ricoh Co., Ltd.	5
Robert Walters	11
ROCKWOOL International A/S	10
Rockwell Collins, Inc.	6
Rolls-Royce	18
Royal BAM Group nv	5
Royal Caribbean Cruises Ltd	9
S&P Global	14
Safran	9
SAP SE	4
Schroders	15
SDP GLOBAL CO.,LTD.	2
Securitas AB	5
Seiko Epson Corporation	12
Senior Plc	11
Ses	11
Shin-Etsu Chemical Co., Ltd.	12
Skandinaviska Enskilda Banken AB (SEB AB)	13
Smith & Nephew	5
Societe Generale	25
Solvay S.A.	19
Sopra Steria Group	11
Spirax-Sarco Engineering	23
Staples, Inc.	15
Steelcase	9
Suez	36
Sumitomo Rubber Industries, Ltd.	9
Sumitomo Heavy Industries. Ltd.	8
SuperGroup	12

Symrise AG	12
Synthomer plc	10
Tarkett	13
Tate & Lyle	7
Telekom Austria AG	4
Telegraaf Media Groep	4
Telefonica	6
Tenneco	17
Terumo Corporation	6
Terex Corporation	12
Teva Pharmaceutical Industries Ltd	33
Textron Inc.	14
The Coca-Cola Company	8
The Home Depot, Inc.	4
Thomas Cook Group	12
TJX Companies, Inc.	7
Toppan Printing Co., Ltd.	5
Toyobo Co., Ltd.	6
Trelleborg AB	28
Twenty-First Century Fox	5
UCB SA	9
Uni-Charm Corporation	4
Unilever plc	26
United Utilities	1
Univar	13
Vaisala Oyj	7
Vallourec	10
Vedanta Resources PLC	2
Vermilion Energy Inc.	3
Vodafone Group	13
Volkswagen AG	19
Wacker Chemie AG	3
Wal-Mart Stores, Inc.	7
Weener Plastik GmbH	9
West Pharmaceutical Services	9
WestRock Company	12
Woolworths Holdings Ltd	1
WorleyParsons	7
XP Power	4
Xylem Inc	20
YOOX Net-A-Porter Group	5
Zignago Vetro SpA	3
Zurich Insurance Group	22

- Least ambitious

Actor	Locations
Adecco Group AG	19
Agilent Technologies Inc.	8
Alumina	3
Amcor	1
AMG Advanced Metallurgical Group NV	10
Anheuser Busch InBev	8
Aptiv	16
Arcadis	8
ARM Holdings	8
Asics Corporation	11
Assa Abloy	27
Astellas Pharma Inc.	29
Atos SE	32
Axtel	1
Ball Corporation	18
Barry Callebaut AG	15
BASF SE	8
Biogen Inc.	21
BlackRock	7
Boeing Company	8
Booz Allen Hamilton	4
British American Tobacco	4
Bristol-Myers Squibb	2
Burberry Group	13
Cap Gemini	17
Cargill	20
Celanese Corporation	9
Coca-Cola European Partners	21
Compagnie Financière Richemont SA	8
Croda International	17
Cummins Inc.	7
Daimler AG	23
DANFOSS	18
Danone	19
Diasorin SpA	6
E.I. du Pont de Nemours and Company	22
Ericsson	13
Estee Lauder Companies Inc.	19
Evonik Industries AG	17
Expeditors International of Washington	26
FAREVA	1
Flextronics International	2
Furukawa Electric Co., Ltd.	18
G4S Plc	19
Geberit AG	4
Geodis	2
Gestamp	15
GKN	18
Grimaldi Group	14
GRIFOLS	13
Hansoll Textile Ltd	1
Hanesbrands Inc.	11
Harman International Industries Inc	11
Hirose Electric Co., Ltd.	8
Hongkong & Shanghai Hotels Ltd	3
Huber + Suhner AG	6
Hyatt Hotels	9
IKEA	11
IMI plc	12
Imperial Brands	10
INDRA A	14
Indorama Ventures PCL	13
Ingenico	15
International Consolidated Airlines Group, S.A.	6
Inventec Co Ltd	3
J Sainsbury Plc	4
Janus Henderson Group PLC	11
JBS S/A	8
Johnson Controls International PLC	5
Juniper Networks, Inc.	5
Kaercher Global	6
Kagome Co., Ltd.	5
KDDI Corporation	4
Keysight Technologies Inc	4
Kimball Electronics Group	5
Klepierre	13
Koninklijke DSM	3
Kongsberg Gruppen ASA	6
Kurita Water Industries Ltd.	1
LANXESS AG	12
LEGRAND	25
Leonardo	8
Lerøy Seafood Group	5
LG Electronics	6
Luossavaara-Kiirunavaara AB	5
Marfrig Global Foods S/A	1
Mattel, Inc.	10
McCormick & Company, Incorporated	10
Medtronic PLC	10
Melia Hotels International SA	12
Metsä Board	4
Micron Technology, Inc.	3
MOL Nyrt.	16
Mondi PLC	8
Multi Packaging Solutions	2
Nabtesco Corporation	4
National Express Group Plc	4
Nichirei Corporation	7
Nisshinbo Holdings Inc.	14
Nomura Holdings, Inc.	10
Norsk Hydro	18
NTN Corporation	8
Old Mutual Group	5
ON Semiconductor	5
Pernod Ricard	13
Petroleum Geo-Services ASA	2
Pioneer Corporation	8
Prudential PLC	14
PUMA SE	17
Randgold Resources	2
Reynders Label Printing	4
Royal BAM Group nv	5
Royal Dutch Shell	4
S.C. Johnson & Son, Inc.	23
Sanden	10
Sasol Limited	4

Scandic Hotels Group	6
SEGRO	7
Shangri-La Asia	3
Sherwin-Williams Company	18
Skanem	6
SNC-Lavalin Group Inc.	7
SSAB	5
Stagecoach Group	4
Straumann Holding AG	5
Sumitomo Mitsui Financial Group	14
SuperGroup	11
Swiss Life Holding	3
TDK Corporation	12
Teijin Ltd.	6
Telstra Corporation	1
TELEPLAN	10
Telenor Group	9
Tesco	6
THK Co., Ltd.	16
Toto Ltd.	6
TUI Group	35
Ube Industries, Ltd.	2
UBM plc	7
Univar	9
Vaisala Oyj	2
Varian Medical Systems Inc	5
VEOLIA	9
Verizon Communications Inc.	9
Visteon	8
Weg S/A	10
Whirlpool Corporation	11
Wyndham Worldwide Corporation	12
Yokohama Rubber Company, Limited	8
ZF Friedrichshafen AG	22
Zignago Vetro SpA	3
Zurich Insurance Group	22

B. Random sample companies – Coherence of commitments and actions

HeidelbergCement AG
Mitsui Mining & Smelting Co., Ltd.
AIRFRANCE KLM
Samsung Electronics
ANGLO AMERICAN PLATINUM
Swire Pacific Limited
Tesco
UnitedHealth Group Inc
Chugai Pharmaceutical Co., Ltd.
Devon Energy Corporation
Deutsche Post AG
Solvay S.A.
AbbVie Inc
LANXESS AG
Honda Motor Company
PepsiCo, Inc.
United Utilities
Procter & Gamble Company
Tata Steel
Tata Chemicals
Vale
Evonik Industries AG
Wilmar International Limited
Alcoa Corp
ALPLA
Kellog Company
Lindt & Sprungli
Wistron
Impala Platinum Holdings
KDDI Corporation

C. Draft framework – Coherence of commitments and actions

Component	Leading question	Criteria	Score	Result
Commitment	What is the company planning to do?	- Has the company committed to a low-carbon future vision? - Are its emissions reduction targets ambitious enough to get there?	Yes= 1; No= 0; Partly= 0,5 Yes= 1; No= 0	Max= 2
Transition plan	How is the company planning to get there?	- Does the company have a transition plan to achieve its low-carbon vision? - Will it drive the evolution of the business?	Yes= 1; No= 0; Partly= 0,5 Yes= 1; No= 0; Partly= 0,5	Max= 2
Present	What is the company doing at present?	- Does the company implement significant measures to reduce emissions? - Does the implementation of significant measures lead to an emission reduction?	Yes= 1; No= 0; Partly= 0,5 Yes= 1; No= 0	Max= 2
Legacy	What has the company done in the recent past?	- Has the company had an emission reduction target in the past? - Has the company reached the target?	Yes= 1; No= 0 Yes= 1; No=0	Max= 2
Consistency	- How do all these plans and actions fit together?	- Is the business strategy consistent with emissions reduction targets? - Do any business activities undermine the company's ability to reach a low-carbon future? (Greenwashing)	Yes= 1; No= 0; Partly= 0,5 Yes= 0; No= 1; Partly= 0,5	Max= 2
				Max= 10

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D. Final framework – Coherence of commitments and actions

Commitment	
Low-carbon (economy) future	- Reducing CO2e emissions - Reducing (fossil) energy consumption - Increasing renewable energy consumption
Score	**Condition**
1	The company is aiming at 2 or 3 aspects of a low-carbon (economy) future
0.5	The company is aiming at 1 aspect of a low-carbon (economy) future
0	The company is aiming at 0 aspects of a low-carbon (economy) future
Good emissions reduction targets	- Target type; absolute - Target scope; broad - Target ambitiousness; high - Target time frame; long
Score	**Condition**
1	The company incorporates 3 or 4 aspects of good emissions reduction targets
0.5	The company incorporates 1 or 2 aspects of good emissions reduction targets
0	The company incorporates 0 aspects of good emissions reduction targets
Need and plan for transition	
Transition plan	Roadmap: time, steps (actions/measures), finance, performers; - Where is the company now? - Where does the company want to go? - How does the company get there?
Score	**Condition**
1	The company has a detailed transition plan to achieve its low-carbon future
0.5	The company has a vague transition plan to achieve its low-carbon future
0	The company has not a transition plan to achieve its low-carbon future
Need for transition	Change of the business model
Score	**Condition**
1	The company has to change the entire business model of the company in order to reduce emissions
0.5	The company has not to change the entire business model of the company in order to reduce emissions but parts of it

Present	
Emission reduction measures	- Energy efficiency - Emissions efficiency - Material efficiency in production - Material efficiency in product design - Using products more intensively - Reducing overall demand for product services
Score	**Condition**
1	The company has implemented significant measures that fits one category. The company has implemented view measures that fits the majority (≥3) of the categories.
0.5	The company has implemented view measures that fits one category. The company has implemented view measures that fits the minority (<3) of the categories
0	The company has implemented no measures at all
Performance implemented measures	Less amount/% of Gt CO2e in a given year relative to the previous year(s)
Score	**Condition**
1	The implementation of significant measures, as mentioned above, has led to an emission reduction
0	The implementation of significant measures, as mentioned above, has not led to an emission reduction
-	Unknown
Legacy	
Historical emission reduction targets	Reduced amount/% of Gt C02e in a given year in the past relative to a base year
Score	**Condition**
1	The company had an historical emission reduction target
0	The company had not an historical emission reduction target
-	Unknown
Performance historical emission reduction targets	Reduced amount/% of Gt C02e in a given year in the past relative to a base year
Score	**Condition**
1	The company has reached the historical emission reduction target
0	The company has dropped the historical emission reduction target
-	Unknown

Consistency	
Strategy consistency	- Means - Processes
Score	**Condition**
1	The company organises their activities by means and processes that only fulfil a low-carbon future and therefore have a positive effect on CO2e reduction
0.5	The company organises their activities by means and processes that slightly fulfil a low-carbon future and therefore have a moderate effect on CO2e reduction
0	The company organises their activities by means and processes that not fulfil a low-carbon future and therefore have a reverse effect on CO2e reduction.
Undermining commitments	- Poor environmental performance - Positive communication
Score	**Condition**
0	The company has a poor environmental performance (≤ 3) and is guilty of using positive communication (multiple signs of greenwash)
0.5	The company has a moderate environmental performance (4-6) and is slightly guilty of using positive communication (view signs of greenwash)
1	The company has a good environmental performance (≥7) and is therefore not guilty of using positive communication (signs of greenwash)