

December 2017

Climate risk management with a focus on carbon pricing

**Analysis of
respondent Brazilian
companies to the
Climate Change
Program**



Prepared for:



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Executive Summary

This report is the result of a partnership between FEBRABAN and CDP to integrate environmental information into policies and business decision-making.

Recognizing CDP's experience in working with the market forces, FEBRABAN has commissioned an analysis on carbon pricing based on information reported to CDP by national and international companies, backed by the participation of over 6000 corporations, 800 institutional investors, and 500 Governments from around the world.

This analysis was carried out based on the answers of 71 companies to the 2016 CDP questionnaire on Climate Change. CDP's investor-led Climate Change Program asks listed companies around the world to report on information regarding climate change and its links to business strategy, the processes of identification and management of direct or indirect climate risks, greenhouse gas emissions and the reduction targets of these companies. The information was requested by 365 institutional investors representing US\$ \$22 trillion. In addition to the 71 companies analyzed we have also considered the experience of international banks on internal carbon pricing.

The tables below present some highlights of the quantitative analysis, helping summarize the companies evaluated in relation to three main aspects addressed by the CDP questionnaire: strategy, targets, and risks.



STRATEGY | What are the companies' risk management procedures regarding climate change risks and opportunities?

- 65%** integrate climate risks into multi-disciplinary company-wide risk management processes
- 79%** of respondents incorporate climate change into the business strategy, evaluating future scenarios, opportunities and setting targets for adaptation to these changes among other objectives
- 17%** already use an internal price of carbon to guide investments, mitigate risks, and prioritize less carbon-intensive projects
- 18%** still do not use an internal price of carbon but anticipate doing so in the next 2 years
- 62%** do not use an internal price of carbon and do not anticipate doing so in the next 2 years

Revised in march 2018

TARGETS AND INITIATIVES | What the company has done to reduce its emissions of greenhouse gases (GHG) and de-carbonize its energy matrix?

- 57%** of businesses have reduction targets, but in only 8% of the cases, these are absolute targets. Companies also report other types of mixed targets, like reducing GHG emissions intensity and consumption and/or production of renewable energy. Only one company reported a long-term target, that is, a post-2020 target
- 17%** have no targets of GHG emissions reduction

RISKS | Climate risks are discussed together with the identification of the company's risks? What are the procedures regarding management of these risks?

- 90%** of the respondents reported climate risks with the potential to impact their business
- 35%** of the reported risks are driven by changes in physical climate parameters
- 33%** of the reported risks are caused by changes in regulation
- 32%** of the reported risks are caused by changes in other climate-related parameters, such as changing consumer behavior

Introduction

There are clear signs that the world has already started its journey towards a low-carbon economy. As an example of this, the global averages of the costs of renewable energy generation are already lower than those of fossil fuels and they are about to become even more competitive in 2020¹.

The transition to a low-carbon economy will cause disruptive changes, also bringing new opportunities for job creation and prosperity in the medium and long-term. Thus, business leaders and policymakers will need new tools to guide their strategies; and carbon pricing is one of the most promising tools since it increasingly contributes to driving investments and innovation to new less carbon-intensive solutions.



¹ Carbon Tracker, 2017. The end of the load for coal and gas. Accessed on Aug 2, 2017. Available at: <http://www.carbontracker.org/report/the-end-of-the-load-for-coal-and-gas/>

As businesses begin to experience the impacts of climate change, companies have identified internal carbon pricing as an important mechanism to help manage risks and capitalize on emerging opportunities in the transition to a low-carbon economy. Assigning a monetary value to the cost of carbon emissions helps companies monitor and adapt their strategies and financial planning to real-time and potential future shifts in the external market.

This trend was strengthened by the Recommendations of the Task Force on Climate-related Financial Disclosures of the Financial Stability Board, an institution integrated by the Central Bank Governors, G20 Finance Ministers, and leaders of multilateral institutions such as the IMF and the World Bank. the Task Force's report establishes recommendations for helping businesses disclosing clear, comparable and consistent information about the risks and opportunities presented by climate change; as well insights into portfolio positioning under different climate-related scenarios as key elements for the resilience of an organization's strategy.

More complete, consistent, and comparable climate-related information for market participants contributes to an increased transparency and an appropriate pricing of climate-related risks and opportunities from this underlying premise, FEBRABAN commissioned CDP to carry out this report; today CDP's disclosure system counts with nearly 6,000 of the world's largest companies, representing some 60% of global market value and investors controlling assets worth US\$ 100 trillion. Over the past 15 years CDP has mobilized key market forces (companies, investors, and buyers) worldwide to integrating climate change into their business strategy. Now, because of financial sector led initiatives, climate-related information report has the potential to become mainstream.

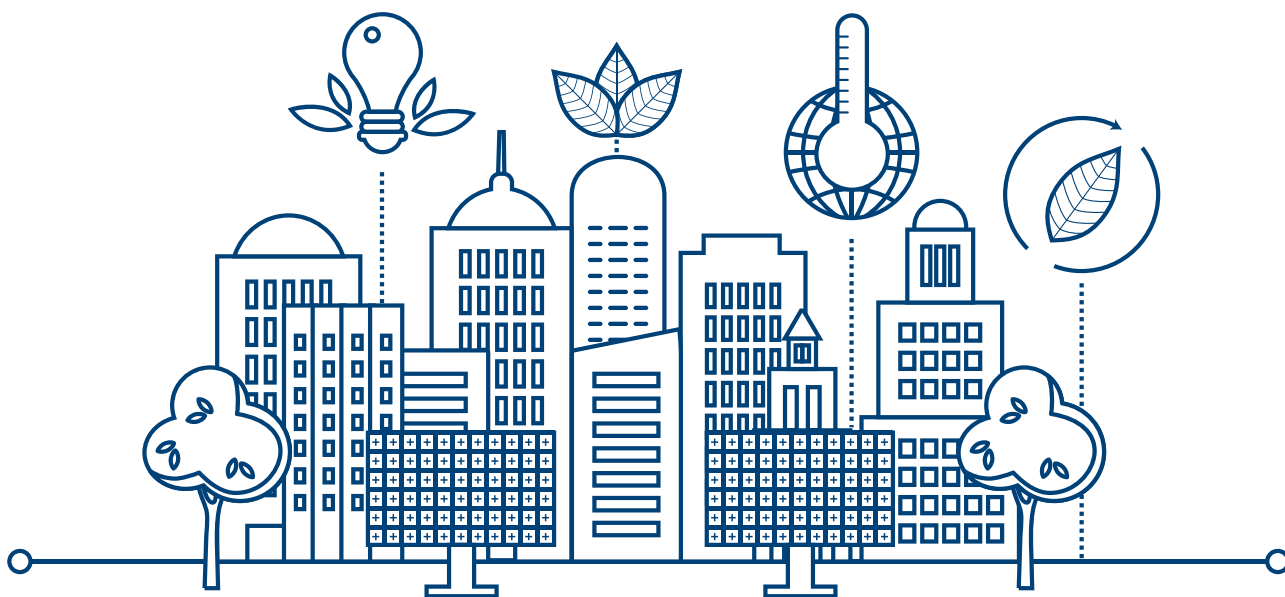
On the following pages, we share the panorama of Brazilian companies' practices for managing climate risks and building resilience into their business strategies, with the aim of supporting the decision-making of banks for an efficient management of risks associated with climate change and a more efficient allocation of capital.

Methodology

This report has been prepared based on the answers of the 71 companies that responded to the CDP's 2016 Climate Change program questionnaire, out of a total of 120 companies that were invited using their market capitalization and following the expanded IbrX 100 index as criteria.

As for the quantitative analysis we have considered all responded companies and the selected 20 companies of this sample; the sample contains respondents that have disclosed their GHG emissions inventory in the last three years in line with the study conducted by the Centro de Estudos em Sustentabilidade of Getúlio Vargas Foundation (GVces) in partnership with FEBRABAN.

In addition, we have done a qualitative analysis of these 20 companies to identify additional elements based on the criteria of the methodology of CDP scoring, which is public². The analyzed elements offer a greater depth of information and detail of internal risk management processes, highlight important aspects of the respondent companies targets and initiatives, among others, allowing for a more thorough analysis of the strategy and actions of each company within the different themes researched.



² CDP, 2017. Climate Change Scoring Methodology. Accessed on Aug 2, 2017. Available at: https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/guidance_docs/pdfs/000/000/509/original/CDP-climate-change-scoring-methodology.pdf

Sample of 71 companies

- ▲ AES Tietê S/A
- ▲ B2W Companhia Global do Varejo
- ▲ Banco Bradesco S/A
- ▲ Banco do Brasil S/A
- ▲ Banco Santander Brasil
- ▲ BM&FBOVESPA
- ▲ Braskem S/A
- ▲ BRF S/A
- ▲ BRMALLS Participações
- ▲ Centrais Elétricas Brasileiras S/A (Eletrobras)
- ▲ Centrais Elétricas de Santa Catarina S/A - Celesc
- ▲ Central Nacional Unimed
- ▲ Cetip S/A - Mercado Organizados
- ▲ Cia. Energética de São Paulo S/A - Cesp
- ▲ Cia Energética do Rio Grande Norte - Cosern
- ▲ Cia. Paranaense de Energia - Copel
- ▲ Cia. Saneamento de Minas Gerais - Copasa
- ▲ Cia. Brasileira de Distribuição (CBD) - Grupo Pão de Açúcar
- ▲ Cia. Siderúrgica Nacional - CSN
- ▲ Cielo S/A
- ▲ Cia. de Concessões Rodoviárias - CCR
- ▲ Cia. de Eletricidade do Estado da Bahia - Coelba
- ▲ Cia. Energética Minas Gerais - Cemig
- ▲ Correias Mercúrio S/A Ind. e Com.
- ▲ CPFL Energia S/A
- ▲ Cyrela Brazil Realty S/A Empreendimentos e Participações
- ▲ Duratex S/A
- ▲ Ecorodovias Infraestrutura e Logística S/A
- ▲ Edenred Brasil
- ▲ EDP - Energias do Brasil S/A
- ▲ Eletropaulo Metropolitana Eletricidade de São Paulo S/A
- ▲ Embraer S/A
- ▲ Emflora
- ▲ Fibria Celulose S/A
- ▲ Fleury S/A
- ▲ Gerdau S/A
- ▲ Grupo BTG Pactual
- ▲ Itaú Unibanco Holding S/A
- ▲ Itaúsa Investimentos Itaú S/A
- ▲ JBS S/A
- ▲ Klabin S/A
- ▲ Kroton Educacional S/A
- ▲ Light S/A
- ▲ Linx S/A
- ▲ Lojas Americanas S/A
- ▲ Lojas Renner S/A
- ▲ Marfrig Global Foods S/A
- ▲ Minerva Foods
- ▲ MRV Engenharia e Participações
- ▲ Natura Cosméticos S/A
- ▲ Newage Indústria e Comércio de Bebidas
- ▲ Odontoprev S/A
- ▲ Oi S/A
- ▲ Petróleo Brasileiro S/A - Petrobras
- ▲ Porto Seguro S/A
- ▲ QGEP Participações S/A
- ▲ Qualicorp S/A
- ▲ Raia Drogasil S/A
- ▲ Raízen
- ▲ Rio Paranapanema Energia S/A
- ▲ SLC Agrícola S/A
- ▲ Smiles S/A
- ▲ Tim Participações S/A
- ▲ Triunfo
- ▲ Tupy S/A
- ▲ Ultrapar Participações S/A
- ▲ Vale
- ▲ Valid Soluções S/A
- ▲ Via Varejo
- ▲ Votorantim Cimentos
- ▲ Weg S/A

Subsample of 20 companies

- | | |
|--|---------------------------------------|
| ▲ Braskem S/A | ▲ JBS S/A |
| ▲ BRF S/A | ▲ Klabin S/A |
| ▲ Cia. Paranaense de Energia - Copel | ▲ Lojas Americanas S/A |
| ▲ Cia. Brasileira de Distribuição (CBD)
Grupo Pão de Açúcar | ▲ Lojas Renner S/A |
| ▲ Cia. Siderúrgica Nacional - CSN | ▲ Marfrig Global Foods S/A |
| ▲ Cia. de Concessões Rodoviárias - CCR | ▲ MRV Engenharia e Participações |
| ▲ CPFL Energia S/A | ▲ Natura Cosméticos S/A |
| ▲ Ecorodovias Infraestrutura e Logística S/A | ▲ Petróleo Brasileiro S/A - Petrobras |
| ▲ Embraer S/A | ▲ Ultrapar Participações S/A |
| ▲ Fibria Celulose S/A | ▲ Vale |

CDP scoring provides a roadmap to companies to achieve best practice; and over time, it promotes behavioral changes in companies to improve their environmental performance drive changes in company behavior to improve their environmental performance. The scoring methodologies have been designed to incentivize actions that are applicable to a certain extent to all companies, in all sectors and in all geographies. It is public and goes through an annual review process³.

Read annex I for a detailed explanation of the criteria of points allocation and the scoring structure applied to this report is in Annex I.

For this report, we have selected 19 out of the 41 Climate Changes questions from the following key areas of the questionnaire:

Strategy: the treatment given to climate change and the level of integration of climate change into business strategy.

Targets and initiatives: activities and projects that companies have in place to reduce GHG emissions, to mitigate, and to adapt to climate change.

Risks: physical, regulatory or other climate change assessment risks, as well as its financial and management impacts.

³ For details of CDP scoring methodology, there is an introductory material available here: <https://www.cdp.net/en/guidance/guidance-for-companies>

An in-depth analysis of the above-mentioned topics is important because check-list approaches - i.e., the simple verification of yes or no questions, common in credit analysis procedures - are not enough to capture systemic risks, as those associated with climate change. Thus, through qualitative analysis, we can identify gaps or points of attention regarding companies' performance which may be subject bank assessments.

We have devoted a specific chapter to analyze the practices of companies that adopt an internal price of carbon, both in Brazil and internationally. The justification for a further analysis of the subject is given by the fact that this has been an effective approach for assessing climate change risks and the opportunities that may emerge in the transition to a low-carbon economy.

We have also included the experiences of 9 international banks on the theme, compiled by CDP based on the responses of the Climate Change program questionnaire and studies from other organizations.

Sample of banks

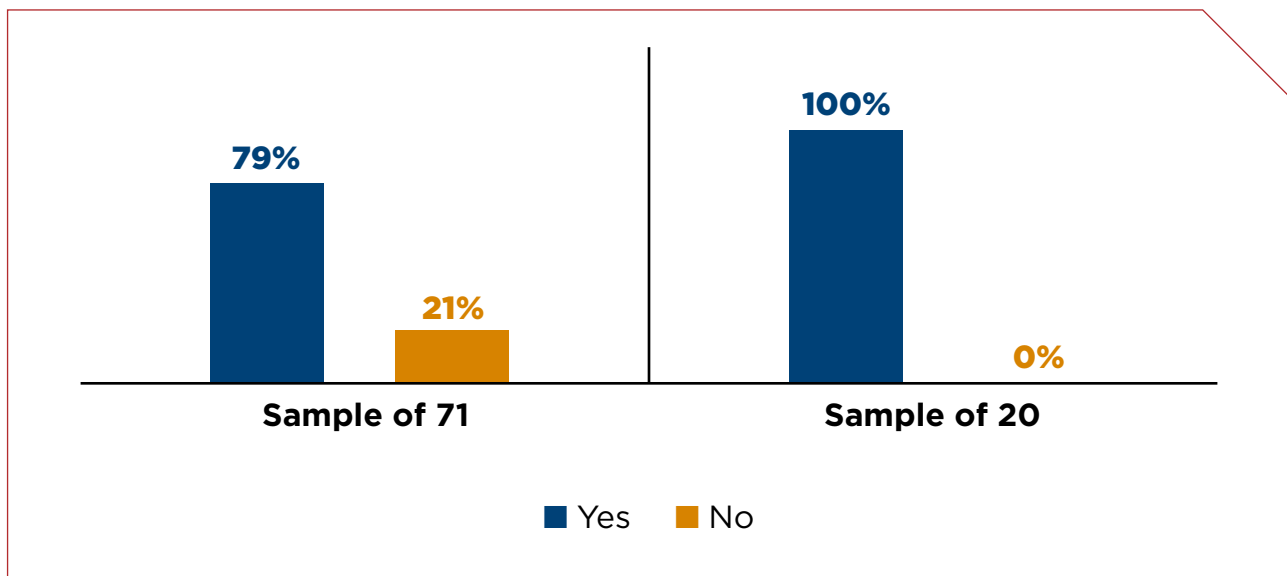
- ▲ Australia and New Zealand Banking Group
- ▲ BNP Paribas
- ▲ Garanti Bank
- ▲ HSBC
- ▲ Itaú Unibanco
- ▲ Piraeus Bank
- ▲ Société Générale
- ▲ TD Bank Group
- ▲ Yes Bank

Integration of climate change into business strategy

The first set of questions assess the level of integration of climate-related risks and opportunities to the company's practices and strategy. This set of questions focuses on the companies' processes and strategies that allow them to structure their approach to climate change.

79% of respondents from the sample of 71 enterprises answered that climate change is integrated into their business strategy. In the sub-sample of 20 companies, all respondents indicated that climate change is integrated into their business strategy.

Chart 1 - Climate change integrated into business strategy



The questionnaire also tries to find whether companies have documented the procedure to identify and manage risks and opportunities related to climate change. According to the CDP Reporting Guidance, these are the options:⁴

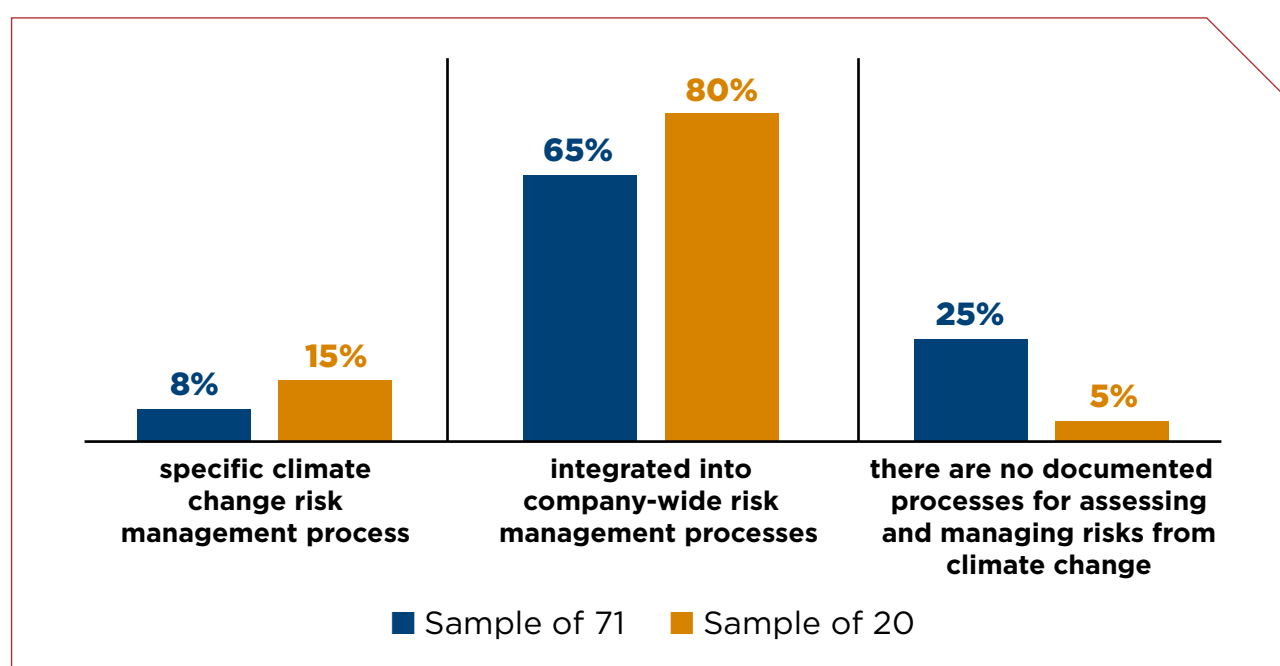
⁴ The CDP Reporting Guidance is available to respondent businesses through the CDP Online Response System (ORS).

- ▲ Integrated into multi-disciplinary company-wide risk management processes: “A documented process where climate change risks and opportunities are integrated into the company’s centralized enterprise risk management program covering all possible types/sources of risks and opportunities”;
- ▲ A specific climate change risk management process: “A documented process which considers climate change risks and opportunities separate from other business risks and opportunities”;
- ▲ There are no documented processes for assessing and managing risks and opportunities from climate change

In relation to the sample of 71 companies, most of them (65%) reported that climate risks are Integrated into multi-disciplinary company-wide risk management processes, 9% have a specific climate change risk management process. The other 25% do not have documented processes for assessing and managing risks and opportunities from climate change.

The subsample of 20 companies shows a greater integration. Only 5% of respondents documented processes for assessing and managing risks and opportunities from climate change.

Chart 2 – Processes for assessing and managing risks from climate change

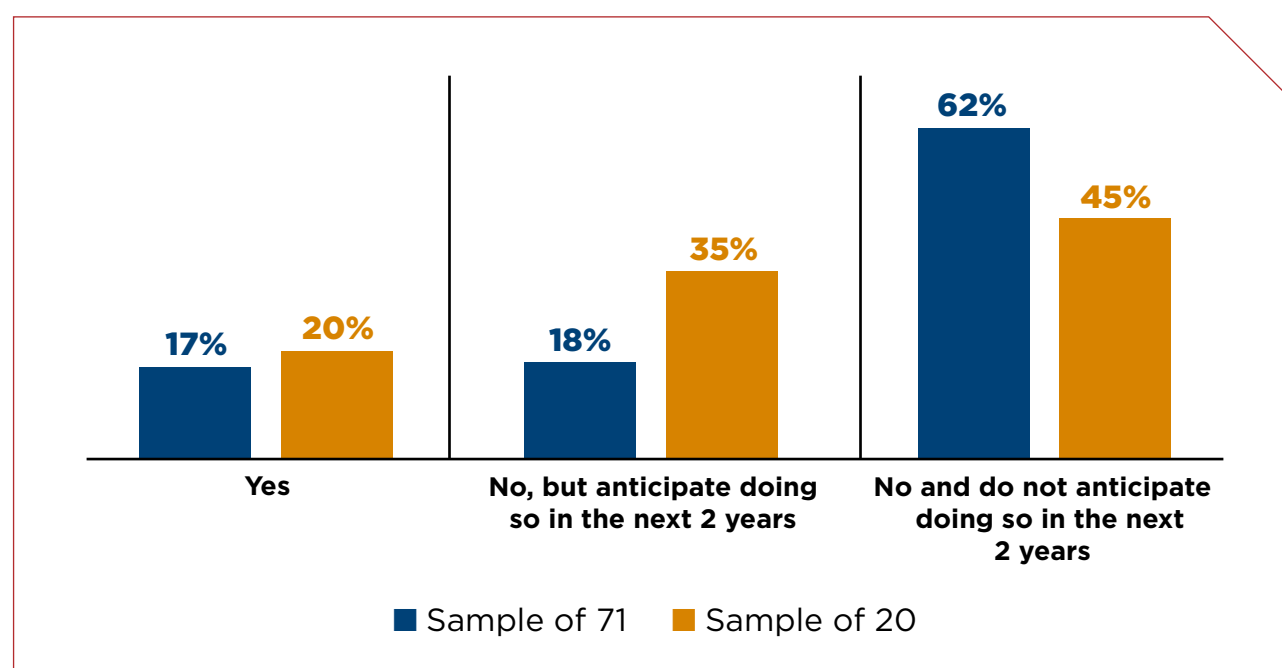


In 2013, CDP began to synthesize and collect information from its annual disclosure cycle on how companies worldwide are using internal carbon pricing. According to the latest report, published in 2017, “Putting a price on carbon: integrating climate risk into business planning”, 1,389 companies worldwide are disclosing to CDP their plans or current practice of putting a price on carbon emissions. In a later chapter, we will examine these practices in detail.

Among the 2016 respondents, 17% use an internal price of carbon; 18% responded that no, but that they anticipate doing so in the next two years; and 42% said that they do not use it and do not anticipate doing so in the next two years.

In relation to the sub-sample of 20 companies, the trend is very similar:

Chart 3 - Using an internal price of carbon



Internal price of carbon

The annual CDP survey shows that companies cite mainly the following internal carbon pricing approaches:

1

Shadow price

Most companies utilize a shadow price - attaching a hypothetical cost of carbon to each tonne of CO₂ e - as a tool to reveal hidden risks and opportunities throughout its operations and supply chain and to support strategic decision-making related to future capital investments.

2

Internal fee

Internal fee mechanisms take this approach a step further by charging responsible business units for their carbon emissions. These programs frequently reinvest the collected revenue back into clean technologies and other activities that help transition the entire company to low-carbon.

Some companies with emission reduction or renewable energy supply targets calculate and report a price of carbon to achieve these goals. Unilever, for example, uses carbon pricing as a strategy to its commitment to sourcing 100% of total energy across its operations from renewables by 2030. In 2016 Unilever expanded the use of carbon pricing by announcing an annual carbon price on emissions of CO₂ from its manufacturing network. The levy has created a Clean Energy Fund for 2017, which will be invested in installing renewable energy sources on its manufacturing sites.

Strategy: qualitative analysis parameters

The CDP questionnaire includes a reporting pathway, starting always with objective issues, followed by detailing questions in which companies must present evidence for their initial responses.

Therefore, we can evaluate aspects which reveal the level of integration of climate change into the company's strategy. Based on the CDP Scoring Methodology, we have conducted a qualitative analysis of a subsample of 20 companies, in which we evaluate some key parameters of the companies' risk identification processes, for example, the frequency in which climate risks are monitored, to whom the results are reported and the timeframe of its identification.

Within the CDP methodology, leadership indices are applied to each of these aspects as follows:

- ▲ **Frequency:** annually or a more frequently monitoring – a greater frequency allows companies to identify dynamic climate risks in advance, allowing them enough time to act.
- ▲ **To whom risks are reported:** Board or individual/sub-set of the Board or committee appointed by the Board – the higher the hierarchy, the most appropriate is the company's strategy.
- ▲ **Timeframe:** greater than 6 years – the long-term risk assessment shows a mature and more resilient strategy.

These questions also have an inductor factor and guide companies in the effective integration of climate change into their business strategy.

The table below shows the performance of the qualitative sample of respondent businesses in relation to these key aspects:

Table 1 – Climate risk identification process.

	Process of risk identification											
	Frequency				To whom results are reported				Timeframe of risks			
	Never	Sporadically	Every two years	Annually or more frequently	Nobody	Other committee	Senior manager	Board	< 1 year	1-3 years	3-6 years	> 6 years
Braskem S/A				✓				✓				✓
BRF S/A				✓				✓		✓		
Cia. Paranaense de Energia – Copel		✓				✓						✓
Grupo Pão de Açúcar				✓				✓	✓			
Resposta Não Pública	✓				✓				✓			
Companhia de Concessões Rodoviárias – CCR				✓				✓				✓
CPFL Energia S/A				✓				✓				✓
Ecorodovias Infraestrutura e Logística S/A				✓				✓				✓
Resposta Não Pública				✓				✓				✓
Fibria Celulose S/A				✓				✓				✓
JBS S/A				✓				✓				✓
Klabin S/A				✓				✓				✓
Lojas Americanas S/A		✓						✓			✓	
Lojas Renner S/A				✓		✓						✓
Marfrig Global Foods S/A				✓				✓				✓
MRV Engenharia e Participações				✓				✓			✓	
Natura Cosméticos S/A				✓				✓				✓
Petróleo Brasileiro S/A – Petrobras				✓				✓				✓
Ultrapar Participações S/A				✓		✓						✓
Vale				✓				✓				✓

Note that slightly over a half of the companies (12 companies) obtained maximum performance when those 3 aspects were assessed. That said, it is worth mentioning that the climate risk management process often guides the company's strategy. Frequency, hierarchical level in which the subject is discussed, and the timeframe reflect how the company treats the topic.

Another point assessed is the form/dimension of risk identifications: at a company level or at an asset level. The question asks about the processes of identification and management of risks linked exclusively to climate change and how they are carried out in each of the dimensions mentioned earlier. risks/opportunities may be assessed at a company level (e.g. how reputational risk can impact on the full corporation) or at an asset level (e.g. how physical impacts can affect individual facilities).

The following table shows the performance of the qualitative sample in relation to the dimensions to which its risks are identified:

Table 2 – Level of risk identification

	Risk Identification	
	Company level	Asset level
Braskem S/A	✓	✗
BRF S/A	✓	✓
Cia. Paranaense de Energia – Copel	✓	✓
Grupo Pão de Açúcar	✓	✗
Resposta Não Pública	✗	✗
Companhia de Concessões Rodoviárias – CCR	✓	✓
CPFL Energia SA	✓	✓
Ecorodovias Infraestrutura e Logística S/A	✓	✓
Resposta Não Pública	✓	✓
Fibria Celulose S/A	✓	✓
JBS S/A	✓	✓
Klabin S/A	✓	✓
Lojas Americanas S/A	✓	✗
Lojas Renner S/A	✓	✗
Marfrig Global Foods S/A	✓	✓
MRV Engenharia e Participações	✗	✓
Natura Cosméticos S/A	✓	✗
Petróleo Brasileiro S/A – Petrobras	✓	✓
Ultrapar Participações S/A	✓	✓
Vale	✓	✓

Six of the 20 companies assessed did not report on procedures for risk identification at the level of its assets. This type of approach is critical to an effective management strategy, especially for companies with various units sprayed in different regions, with different specificities and impacts.

Examples of risk identification in different levels

Risk assessment at a company-wide level must take into consideration impacts that are sensitive to any company, not just those related to specific sectors or geographies. An example from Ecorodovias:

Ecorodovias:

“In Ecorodovias, risk identification is performed on a company-wide basis using the top-down approaches (...) Ecorodovias identifies significant corporate and business-unit risks that could potentially affect our achievement of strategic corporate objectives”.

The risk assessment identified at the assets level should consider specific aspects and practical examples so that impacts are perceived in operational or business units of the company. Next, the example of CCR:

CCR:

“At the operational level, the key risks are associated with the occurrence of extraordinary weather events. The assets most exposed to risks, such as areas of high landslide, floods or fires risks, coastal routes in regions exposed to storms or with higher incidence of floating waste, are monitored more frequently and are more detailed as to the risks to which they are exposed”.

How to prioritize climate risks?

The purpose of this question is to identify the criteria adopted by companies in their evaluation process and climate risk management, and prioritize them. Some examples of prioritization:

Braskem:

“Prioritization uses a tool offered by FGV (Fundação Getúlio Vargas) with some adaptations to Braskem. The FGV tool analyses present and future scenarios until 2040, making it possible to verify the behavior and evolution of risks and opportunities over time. To assess the magnitude, the tool considers both the positive (opportunities) and the negatives impacts (risks). This evaluation has three dimensions: the people, considering the severity of the damage; the environment, whether the impact is internal or external, reversible or not and its extension; and the operations, whether the disruption is total or partial and whether the disruption is common or not.”

Copel:

“With the participation of various areas of the company raising historical data of weather events, we have developed a risk matrix. Additionally we use a mathematical modelling based on the criterion of the IPCC for climate change future projections in the State of Paraná for a period ending in 2100. With this, it was possible to make projections for future years and set criteria for the magnitude and probability of the occurrence of the events.”

Ecorodovias:

“We build for each business unit a matrix with the classification of risks, resulting in the level of the units’ exposure to each risk identified (moderate, significant, high or critical). This classification is not based only on reports and studies by consulting firms, but also on the company’s experience with similar risk materialization. In addition to a matrix for each business unit, we also build a matrix for the company as a whole. The prioritization of risks, both in the organizational level and in the business units level is dependent on this classification. A recently implemented system allows access to information and risk management quickly and reliably.”

Targets and initiatives

In this section, companies are invited to present the targets and initiatives they have in place to reduce the emissions derived from their activities, directly or indirectly, highlighting the developments of their strategies, as mentioned earlier.

CDP's methodology is based on "active targets"; targets are active when

- ▲ **You have a target that began in the reporting year, began before the reporting year and ends after it, or you had a target that ended in the reporting year, AND**
- ▲ **The target is to reduce emissions or emissions intensity, AND/OR**
- ▲ **The target is to increase renewable energy consumption or production.**

In this approach, there is also the distinction between absolute targets, intensity targets and renewable energy consumption and/or production targets. The definitions of each of these modes as described in the CDP reporting guidance.

Absolute target: An absolute target is one that describes a reduction in actual emissions in a future year when compared to a base year. The target can relate to your scope 1, scope 2 and/or scope 3 emissions in full or in part (e.g.: reduction of metric tons of CO₂e or % reduction per year)⁵

An intensity target is one that describes a future reduction in emissions that have been normalized to a business metric (e.g.: unit of product, unit revenue, unit hour worked, etc.) when compared to normalized emissions in a base year. An intensity target can relate to the company's Scope 1, Scope 2 and/or Scope 3 emissions in full or in part. (e.g.: metric tons CO₂e or % reduction per unit of product relative to base-year)

⁵ According to the specifications of the Brazil GHG Protocol Program, Scope 1 emissions refer to GHG emissions from sources owned or controlled by the reporting organization; Scope 2 are indirect emissions, and Scope 3 corresponds to the value chain emissions.

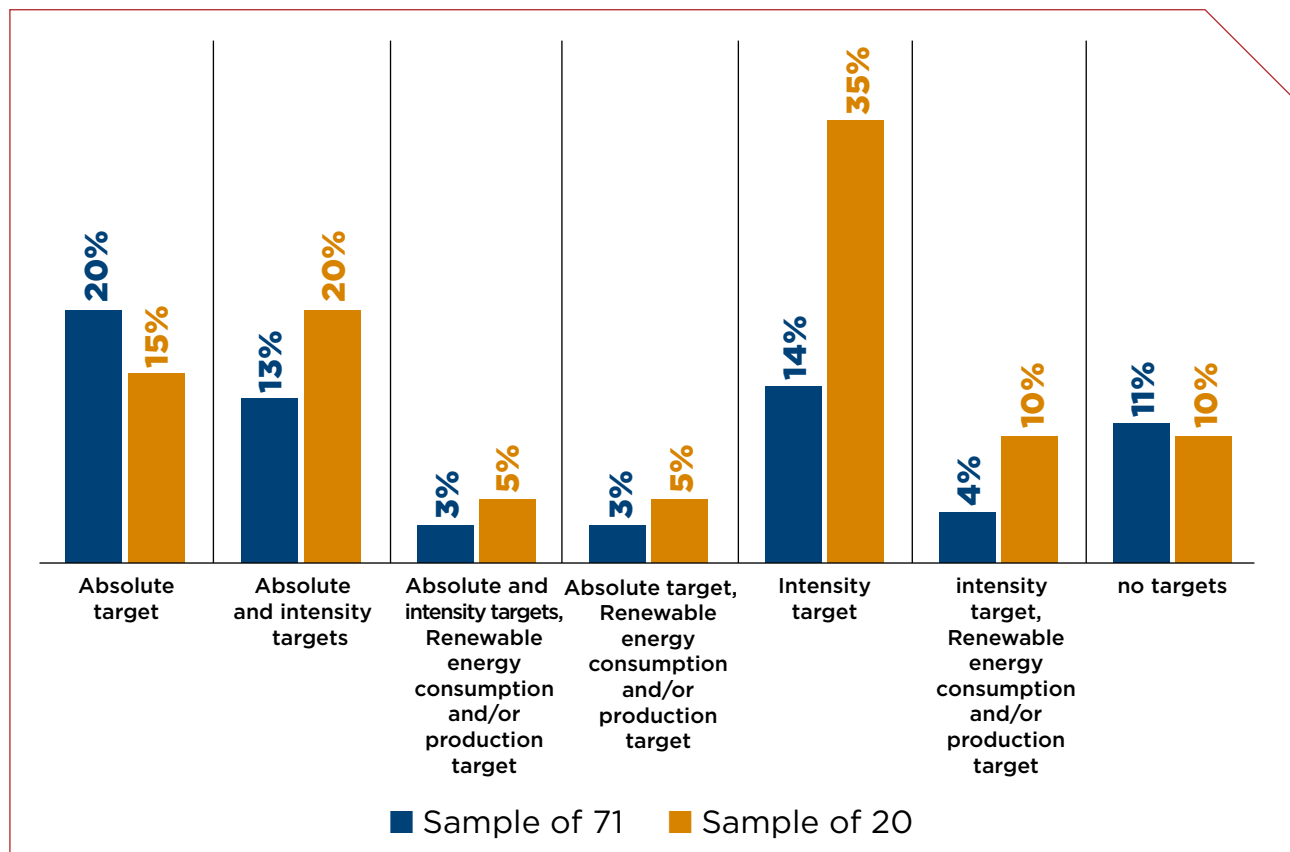
Renewable energy consumption and/or production target: the commitment to a renewable consumption target is one that commits to increase the percentage of renewable energy consumed in a future year when compared to a base year. This type of target can relate to both renewable energy produced and consumed onsite, as well as well purchased and consumed energy.

Target setting determines the horizon to follow and it also facilitates the necessary engagement for the effective transformation of business models in the face of the challenge of climate change.

In our sample of 71 companies, 57% of respondents have some sort of target of GHG emissions reduction, and most of them have more than one type of target in place, which is why the percentages do not total sum up to 100 (chart 4).

In relation to the sub-sample of 20 companies, 90% of respondents have some sort of target and there is a representative percentage of companies with targets for the reduction of emissions intensity (35%).

Chart 4 - Emissions reduction targets



In addition to the active targets, we have also evaluated the ongoing emissions reduction initiatives in the base-year. It is possible that the company's initiatives are linked directly to targets or that a company have its own specific initiatives and actions, even when it does not have pre-established targets for GHG emission reduction.

The types of emissions reduction initiatives can vary from the low carbon energy consumption and energy efficiency activities to projects to reduce emissions in the production process and transportation.

According to the CDP methodology, reduction initiatives best practices for management exists when the following information is presented: a) description of activity, b) Payback period, c) estimated annual CO₂e savings and d) when the activity and the targets have the same scope (scope 1, 2 or 3).

The following table shows that four of the 20 companies assessed do not meet any of these criteria and two others meet them partially. This highlights the need for evolution within the "journey": climate change influencing corporate strategies, which are translated into targets, that, finally, materialize in actions and results.

Table 3 – Emission reduction initiatives

	Emission reduction initiatives			
	Description of activity	Payback period presented	Carbon savings presented	Activities and targets within the same scope
Braskem S/A	✓	✓	✓	✓
BRF S/A	✓	✓	✓	✓
Cia. Paranaense de Energia – Copel	✓	✓	✓	✓
Grupo Pão de Açúcar	✗	✗	✗	✗
Resposta Não Pública	✓	✓	✓	✓
Companhia de Concessões Rodoviárias – CCR	✓	✓	✓	✓
CPFL Energia S/A	✓	✓	✗	✓
Ecorodovias Infraestrutura e Logística S/A	✓	✓	✓	✓
Resposta Não Pública	✗	✗	✗	✗
Fibria Celulose S/A	✓	✓	✓	✓
JBS S/A	✓	✓	✓	✓
Klabin S/A	✓	✓	✓	✓
Lojas Americanas S/A	✓	✓	✓	✗
Lojas Renner S/A	✓	✓	✓	✓
Marfrig Global Foods S/A	✗	✗	✗	✗
MRV Engenharia e Participações	✗	✗	✗	✗
Natura Cosméticos S/A	✓	✓	✓	✓
Petróleo Brasileiro S/A – Petrobras	✓	✓	✓	✓
Ultrapar Participações S/A	✓	✓	✓	✓
Vale	✓	✓	✓	✓

When asked whether they have low carbon products or that allow them to avoid greenhouse gas emissions from a third party, 52% of companies answered “yes”. Most of them (78%) correspond to products that avoid third-party emissions. Regarding investment in Research & Development, 80% of these products do not reach more than 10% of the budget for R&D, therefore we can infer that they are not yet the result of a more ambitious strategy of business model innovation or disruptive change.

Low-carbon products

How do you define a low carbon product?

They are defined by their wider purpose, which is solutions that contribute to the transition of a low carbon economy.

Why CDP asks about low carbon products?

As the pressing need for reducing greenhouse gas emissions continues, investors are looking at different mechanisms to reduce the carbon intensity of their investments, including favoring companies whose products and strategies are aligned with a low-carbon economy and/or are resilient to climate change.

Some Brazilian cases

Braskem - Green polyethylene (PE)

“Besides producing green polyethylene (PE) from ethanol, sugarcane instead of fossil sourced raw materials, Braskem also makes Ethyl Tertiary-Butyl Ether (ETBE), a gasoline bio additive partially made from sugarcane ethanol. Products that are substituted for both Green polyethylene and ETBE products are made from fossil raw materials. (...) the Green EP removes CO2 from the atmosphere through sugar cane plantation and considering its full life cycle, green resins compared to its substitutes have a low carbon footprint.”

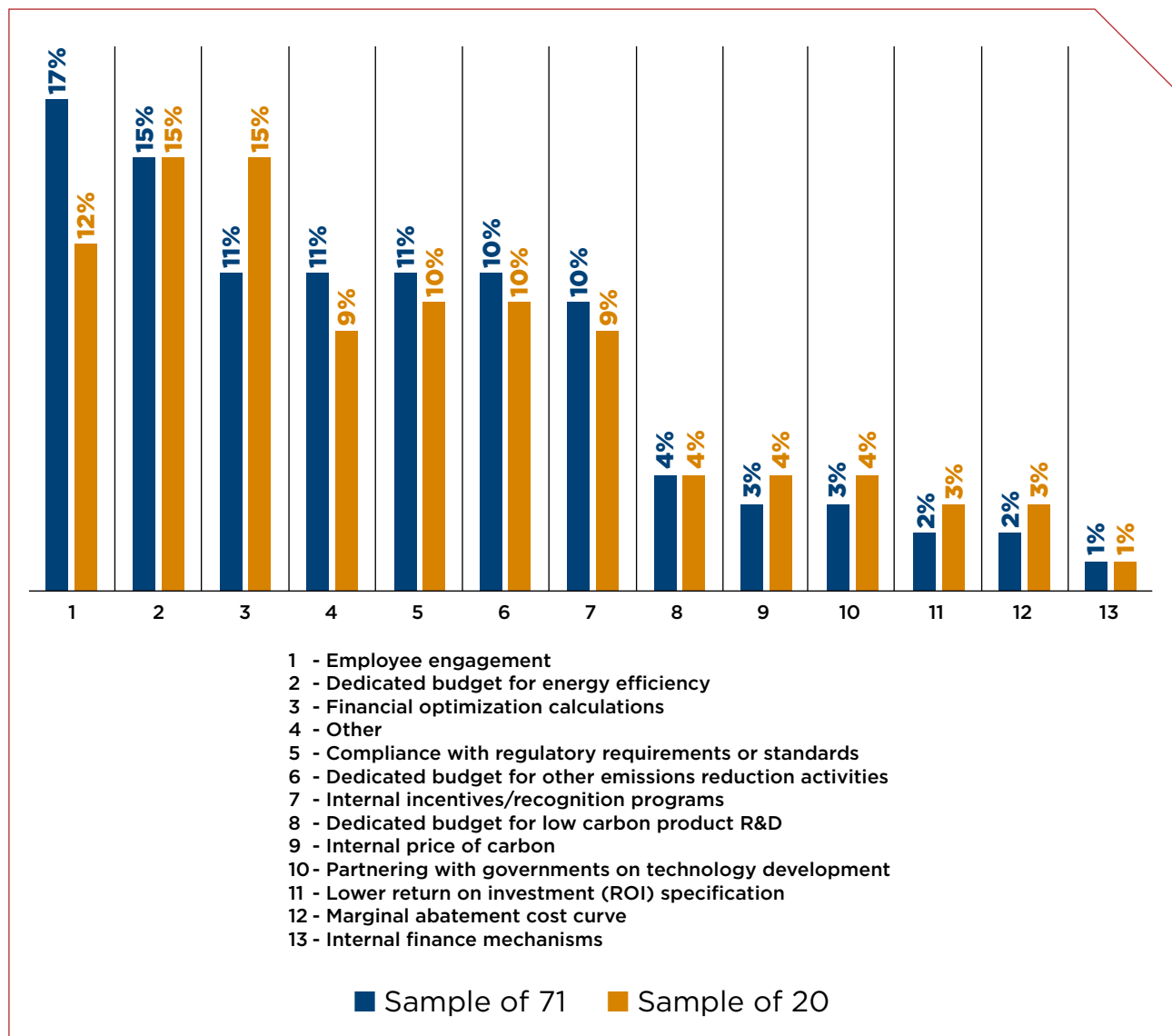
Copel - Clean energy and efficiency for all

“The main source of energy generated by COPEL is renewable (99%). Thus, the company stands out in terms of clean energy supply. Copel encourages energy efficiency projects for consumers. To that end, the company promotes public energy efficiency awareness talks. In addition, lamps, refrigerators, and electric showers have been replaced by more efficient home appliances. The company often advances calls for energy efficiency projects. Consumers present proposals for projects to be funded by COPEL's Energy Efficiency Program. The company sought to study new energy sources such as bio-energy generation: biomass and biogas for example. These are strategic projects and will help diversify the energy matrix”.

In relation to the sample of 70 companies, most respondents (62%) had emissions reduction initiatives that were active within the reporting year (including those in the planning and/or implementation phases). There is a diversity of activities, but the largest percentage of initiatives rests in energy efficiency projects, a total of 32%.

It is interesting to note the variety of methods that companies use to target investment in emissions reduction activities. For the sample of 70 companies, the most recurrent are the employee engagement programs (17%) and the existence of dedicated budget for energy efficiency projects (15%).

Chart 5 - Methods to drive investment in emissions reduction activities



The 2015 [Science-Based Targets Initiative](#) – a partnership between CDP, UN Global Compact, World Resources Institute and WWF – found that the level of effort from the corporate world is still inadequate to lead the world economy to the ideal below 2°C scenario. GHG emissions reduction targets may apply only to a small proportion of the company's emissions. To be significant, targets should cover most of the emissions. Even when numerous companies are establishing reduction targets for their direct emissions, many of these targets do not represent significant reductions. While thousands of companies are now setting emissions targets compatible with the 2°C scenario, few of these are long-term, defined as up to 2030 or beyond.⁶

Considering this scenario, since 2015 CDP and its partners have been asking companies to define science-based future-oriented targets. Recognizing that companies will need to set targets consistent with the level of decarbonization required by science to limit warming to less than 2°C compared to pre-industrial temperatures, CDP, the UN Global Compact (UNGC), World Resources Institute (WRI) and WWF formed the joint initiative Science-Based Targets. This initiative intends to increase corporate ambition on climate action by changing the conversation on GHG emissions reduction target setting. The overall goal of the initiative is to raise the ambition of corporate GHG reduction targets to support a transition to a low carbon economy and keep the planet below a 2°C temperature rise.

To set science-based targets a company must follow certain steps described in the [Science-Based Targets Initiative](#) (SBTi) site, which briefly are: a) committing to science-based GHG reduction targets, b) developing a GHG emissions reduction target, c) submitting the target to SBTi for an official validation d) announcing the target. Table 5 indicates companies with targets that meet the basic criteria of the Science-Based Targets.

⁶ CDP. Mind the Science Report. Accessed on Aug 2, 2017. Available at: <http://caringforclimate.org/wp-content/uploads/Mind-the-Science-Report.pdf>

Table 4 – Companies with targets that meet the basic criteria of the Science-Based Targets

	Targets that meet the basic SBTi criteria
Braskem S/A	X
BRF S/A	X
Cia. Paranaense de Energia – Copel	X
Grupo Pão de Açúcar	X
Resposta Não Pública	X
Companhia de Concessões Rodoviárias – CCR	X
CPFL Energia S/A	X
Ecorodovias Infraestrutura e Logística S/A	X
Resposta Não Pública	X
Fibria Celulose S/A	X
JBS S/A	X
Klabin S/A	X
Lojas Americanas S/A	X
Lojas Renner S/A	✓
Marfrig Global Foods S/A	X
MRV Engenharia e Participações	X
Natura Cosméticos S/A	✓
Petróleo Brasileiro S/A – Petrobras	X
Ultrapar Participações S/A	X
Vale	✓

Connection: strategy and targets

Two important indicators of a company's strategy strength are a) translating policies into targets and initiatives and b) their influence in decision-making processes. These are the parameters taken into consideration by the CDP methodology in evaluating best management practices.

The following matrix presents the list of companies that have described the integration of their business strategy and climate change, with examples of GHG emissions reduction targets and important decisions directly linked to their strategy.

Table 5 - Integration of climate change into the business strategy indexes

	Best management practices	
	integration of business strategy and reduction targets and energy consumption	Examples of important business decisions
Braskem S/A	✓	✓
BRF S/A	✓	✓
Cia. Paranaense de Energia - Copel	✓	✓
Grupo Pão de Açúcar	✗	✗
Resposta Não Pública	✗	✓
Companhia de Concessões Rodoviárias - CCR	✗	✓
CPFL Energia S/A	✓	✓
Ecorodovias Infraestrutura e Logística S/A	✓	✓
Resposta Não Pública	✓	✓
Fibria Celulose S/A	✓	✓
JBS S/A	✓	✓
Klabin S/A	✓	✓
Lojas Americanas S/A	✗	✗
Lojas Renner S/A	✓	✓
Marfrig Global Foods S/A	✓	✓
MRV Engenharia e Participações	✗	✗
Natura Cosméticos S/A	✓	✓
Petróleo Brasileiro S/A - Petrobras	✓	✓
Ultrapar Participações S/A	✓	✓
Vale	✓	✓

The correlation between the company strategy and its climate change targets may highlight management efficiency, thus transforming central policies into actions and initiatives that permeates business and operational units.

In the next section, these targets and initiatives will be addressed in the light of the CDP's methodology regarding performance and best practices.

Plan vs. Action – Translating strategy into actions, decisions and results

The proposed question is the following: how to connect the influence of climate change on the company's strategy and identify the results of this interaction. The subject of this analysis is the strategy of the company as a whole, as well as its developments and decisions. In such a way, it is possible to give both specific business units examples and cross-industry corporate initiatives.

Braskem:

“One of the pillars of Braskem's sustainability strategy is to be among the best large chemical companies in the world in terms of greenhouse gas emissions (GHG) intensity and a major player in carbon sequestration, as a result of the use of renewable raw materials. In line with the update and approval of this strategy, we focus on activities such as (...) implementing of a computer-based information system to collect and manage information together with the SAP system, integrating all units and eliminating spreadsheets and consequently increasing the reliability of emission inventory data, as well as reducing the uncertainty of the measurement process (...)”

Ecorodovias:

“In the short term Ecorodovias has a GHG emissions reduction target linked to senior executive variable remuneration. This target has enabled the growth of the company's commitment to combat climate change. In addition, all road concessions were implemented recently following the lean six-sigma processes, with a strong driver for energy efficiency and waste reduction. Since flooding may substantially affect transport and storage activities, the logistics business unit of the group, Elog, also takes weather events into consideration in order to set its pricing strategy.”*

* Lean Six Sigma is a methodology that relies on a collaborative team effort to improve performance by removing waste and reducing variation. Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors).

Business resilience: climate risk management

According to CDP's approach, companies are invited to report risks related to climate change in three spheres (risk types): regulatory, physical and other risks. These risks may be:

- ▲ **Currently being experienced or expected to arise in the future;**
- ▲ **Already managed and therefore not expected to generate negative residual impacts (e.g., because of an insurance policy);**
- ▲ **Newly identified;**
- ▲ **Risks which cannot be managed;**
- ▲ **Well understood;**
- ▲ **With high levels of uncertainty regarding the likelihood of the risk materializing and the extent to which it will impact the business.**

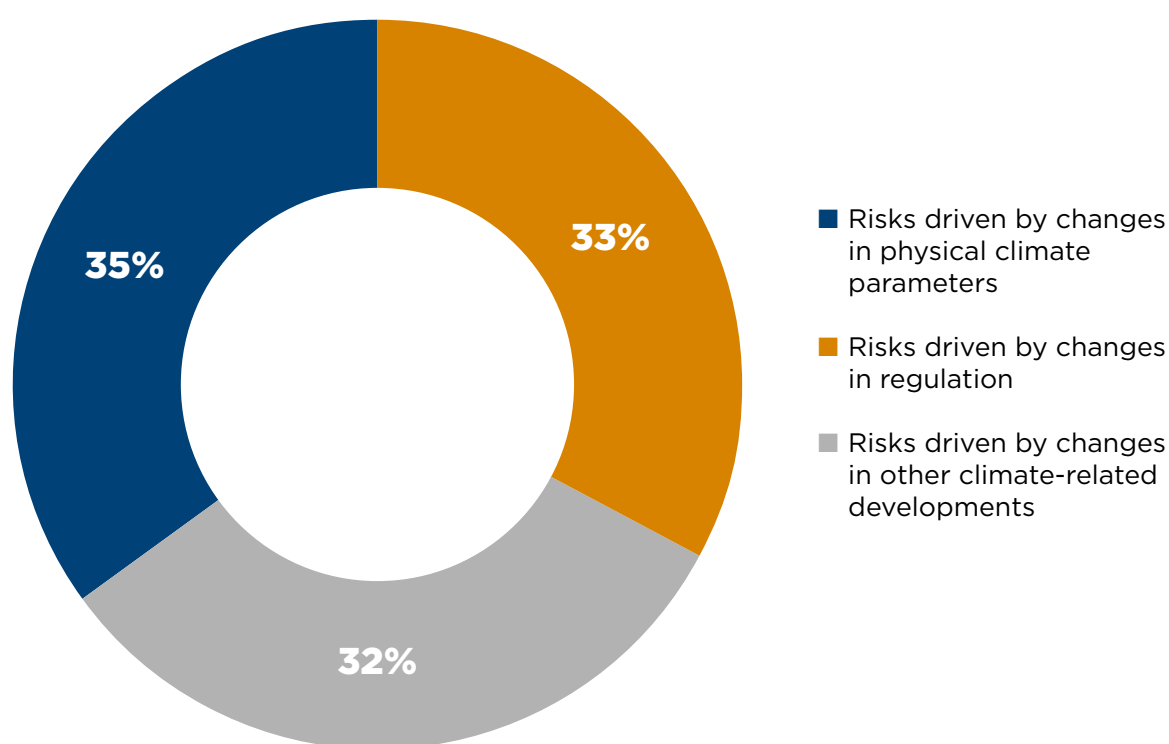
Regulatory risks arise from current and/or expected city, state, regional, national or global governmental policy related to climate change. Risks include, but are not limited to, the imposition of emissions limits, energy efficiency standards, and carbon taxes or emissions trading schemes.

Physical risks may arise from dramatic extreme weather events or subtle changes in weather patterns; they may also due to changes in mean (average) temperature, changes in precipitation patterns, sea level rise, among others.

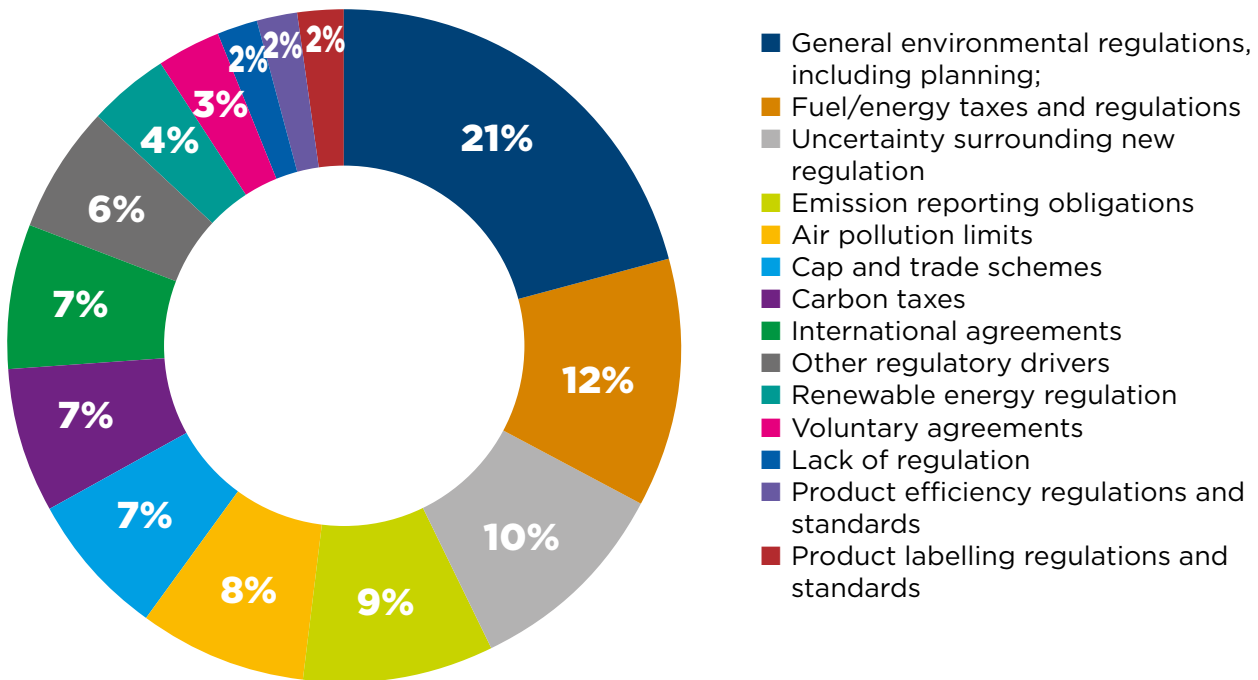
Other climate-related risks include reputation, changing consumer behavior, induced changes in human and cultural environments, fluctuating socio-economic conditions, increasing humanitarian demands, amongst others.

For the quantitative analysis of the risk module, we used the sample of 70 companies. We assessed the companies' awareness of the different types of risks (physical, regulatory and others) associated with climate change. Most respondents report that at least one of those types of risk have the potential to generate a substantive change in their business operations, revenue or expenditure. This approach is in line with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) of the Financial Stability Board which considers the physical risks of climate change and transition risks, the latter included in the CDP categories "regulatory" and "other".

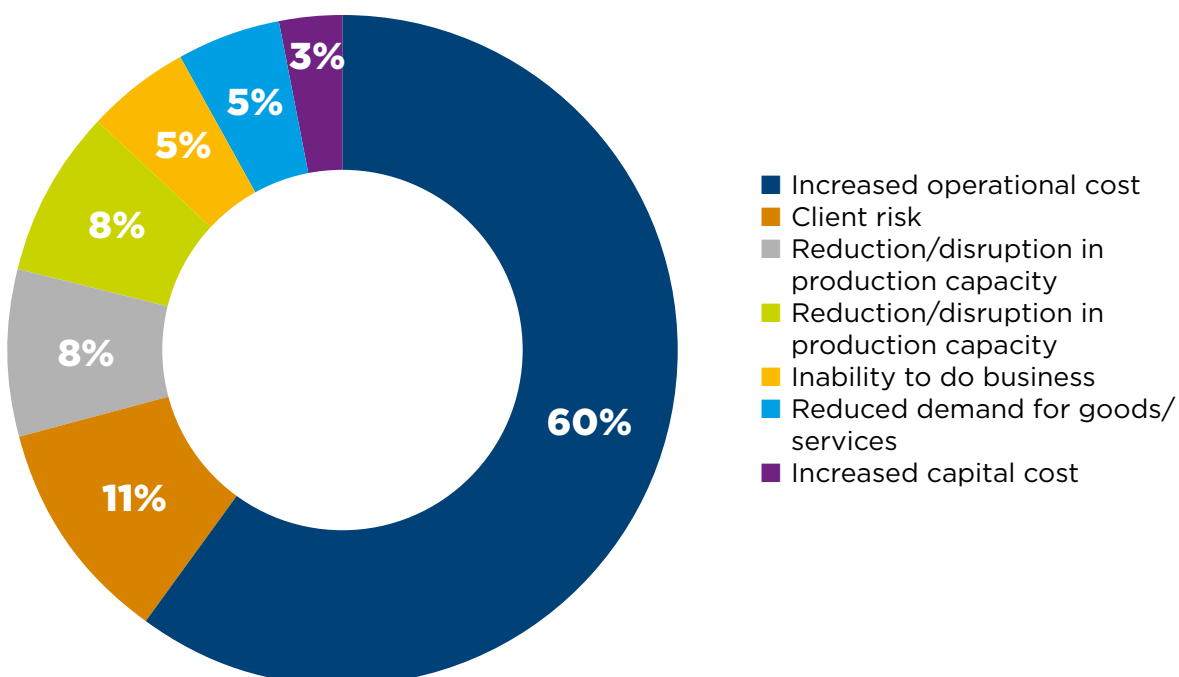
Chart 6 – Climate risks with the potential to impact businesses (CC5.1)



In the category of risks that are driven by changes in regulation, the most frequent driver corresponds to General environmental regulations (21%), followed by Fuel/energy taxes and regulations (12%), Uncertainty surrounding new regulation (10%) and Emission reporting obligations (9%).

Chart 7 – Risks driven by changes in the regulation (risk driver) (CC5.1a C1)

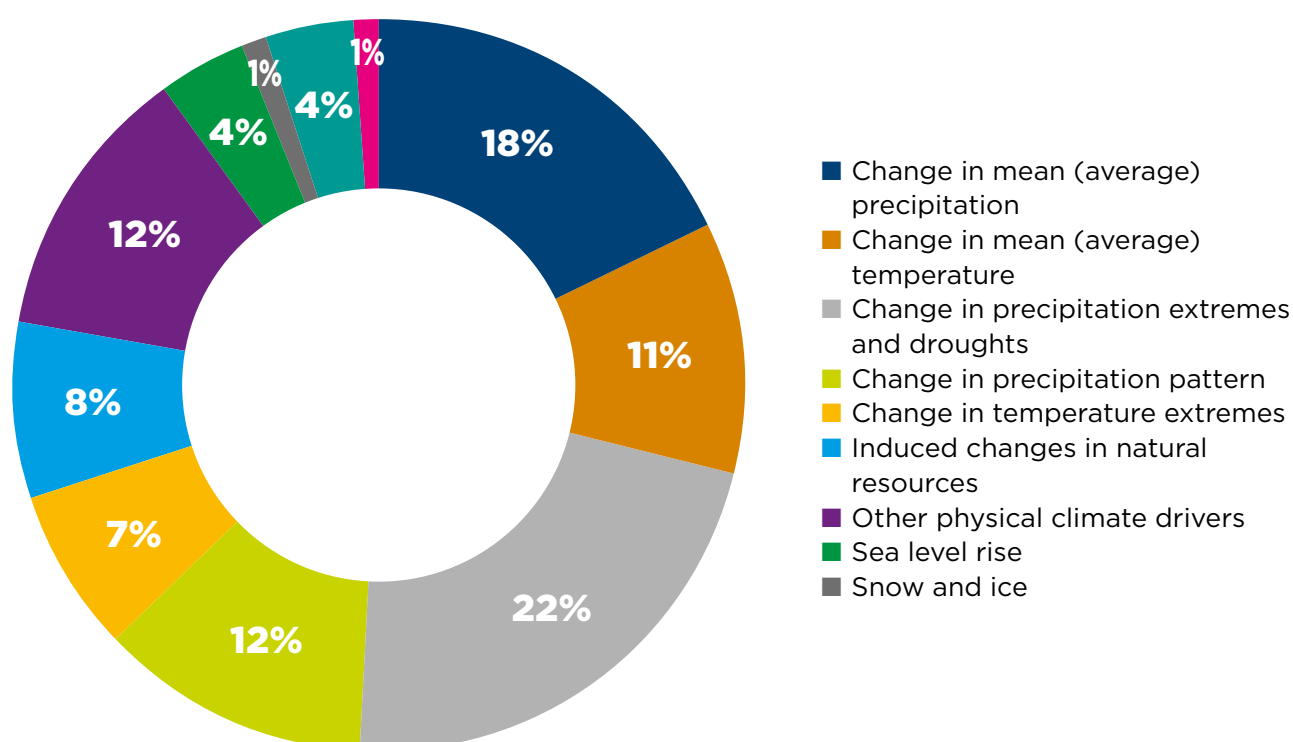
In relation to potential impacts caused by regulatory risks, increased operational cost is the most recurring (60%).

Chart 8 – Risks driven by changes in regulation (potential impact)

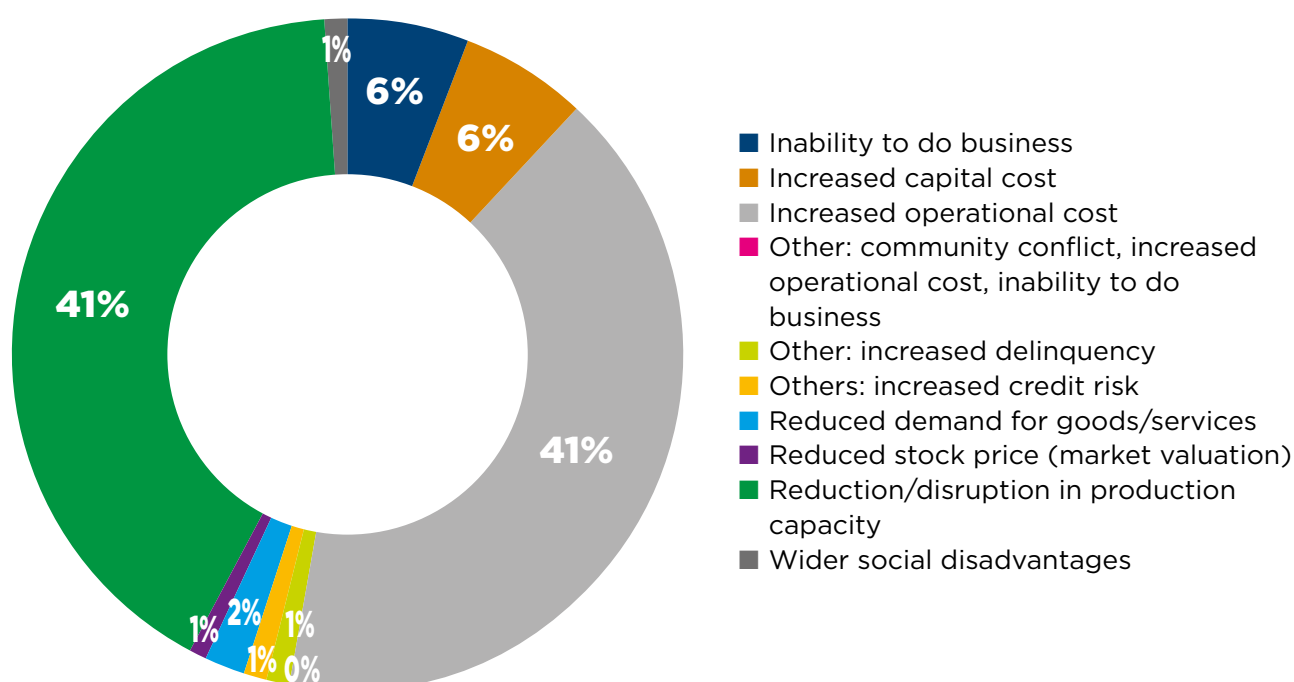
Most of the risks driven by change in regulation are direct (79%), that is, they affect the operations of the companies themselves. In relation to the timeframe in which the risk is analyzed, we see varied perceptions, being the >6 six years timeframe the most quoted option (34%). In 30% of cases the probability is reported as high and in 32% of the responses the impact of the risk is assessed as low.

In relation to the risks driven by changes in physical climate parameters, the risk driver cited more often is Change in precipitation extremes and droughts (22%), followed by Change in mean (average) precipitation (18%).

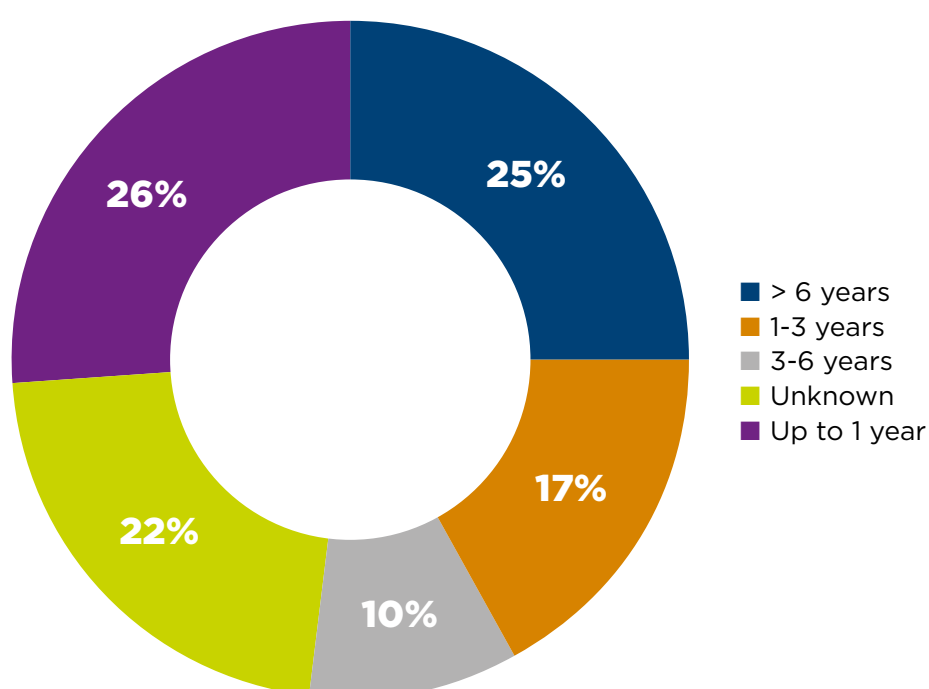
Chart 9 – Physical risks (risk driver)



As for the potential impact, Reduction/disruption in production capacity and Increased operating costs are the most ticked: 41% each.

Chart 10 – Physical risks (potential impact)

In relation to the timeframe in which these risks are observed, the perception is quite varied and is shown in the following graph.

Chart 11 – Risks driven by changes in physical climate parameters – Timeframe

Regarding best practices for risk identification, CDP's methodology considers whether companies can describe the following aspects for each of the categories of risks: risk description, b) timeframe, c) likelihood of the risk materializing, d) Magnitude of impact, e) Estimated financial implications (qualitative/quantitative) and f) description of the management method. The last two aspects - Estimated financial implications and management methods – are the major factors to assess the companies' performance in climate risk management.

To ensure the legal and financial sustainability of the company in subsequent years, a proper identification of regulatory risks is crucial to the strategic management of the company. Changes in regulation may involve fines and emission limits that would directly impact the production of the company. Table 5 shows the performance of the qualitative sample in relation to the identification of regulatory risks.

More than half (13) of the companies evaluated did not report the Estimated financial implications arising from the regulatory risks and 5 of them did not describe the Magnitude of impacts.

In the same analysis, three companies did not provide explanations relating to their risk management methods. Three other companies did not present practical examples of management methods, showing only a description of the risk management methodology.

A similar review was conducted, however on the identification of physical risks, which may bring serious implications to the business units or productive units of the companies, such as water shortage, disruption of operations caused by flood, among others. The performance of these 20 companies, as compared to the same aspects for each identified risk is shown in table 6.

In this category, only six of the 20 companies reported their Estimated financial implications of the risks identified. Among the 14 remaining companies, eight described unmeasured implications, while the other six did not have any Estimated financial implications resulting from physical risks.

In relation to Management methods, while five companies submitted only the description of their methods without examples, three companies did not provide any information on their risk management methods.

Performance analysis of companies in identifying other risks (the last category assessed) generated the data in table 7. This class of risks includes changing consumer/supplier behavior, reputation damages, changes in local socio-economic conditions, amongst others. In other words, these risks can impact several links in the supply chain of companies; so, their risk management is strategically crucial in the long term.

Among the 20 companies evaluated, 14 did not identify measurable financial implications arising from the risks identified, and six of them showed unmeasurable implications.

Among the 20 companies evaluated, five did not provide any information regarding management methods of the risks dealt in this section, while three companies reported only the method description. 12 companies, representing slightly over 50%, reported both the description of their management methods and practical examples.

Some general conclusions can be drawn from the main indicators in identifying risks (financial implications and management methods):

- ▲ **More than half of this sample showed no financial implications arising from the risks identified. The difficulty in assessing climate risk shows that companies have an internal fragility in assessing environmental issues in accordance with the company's business.**
- ▲ **The pricing of these impacts is critical to promote and to alert decision makers about these risks and their possible implications.**

▲ In relation to Management methods, more than half of the evaluated companies described this method and gave a practical example of it. This information shows that companies use a tactical management, in general in the short and medium term. In addition to factor long-term actions and measurements, an effective risk management must have a robust quantification and management strategy. This fragility and short-termism of companies often align with the desire for immediate returns sought by investors.

Table 6 – Qualitative analysis of regulatory risks

	Regulatory risks					
	Description	Timeframe	Likelihood	Magnitude of impact	Estimated financial implications ¹	Management method ²
Braskem S/A	✓	✓	✓	✓	✓	✓
BRF S/A	✓	✓	✓	✓	✓	✓
Cia. Paranaense de Energia – Copel	✓	✓	✓	✓	✓	✓
Grupo Pão de Açúcar	✗	✓	✓	✓	!	✓
Resposta Não Pública	✓	✓	✓	✓	!	✓
Companhia de Concessões Rodoviárias – CCR	✓	✓	✓	✓	!	✓
CPFL Energia S/A	✓	✓	✓	✓	!	✓
Ecorodovias Infraestrutura e Logística S/A	✓	✓	✓	✓	✓	✓
Resposta Não Pública	✗	✗	✗	✗	✗	✗
Fibria Celulose S/A	✓	✓	✓	✓	✓	✓
JBS S/A	✓	✓	✓	✓	!	✓
Klabin S/A	✓	✓	✓	✓	!	✓
Lojas Americanas S/A	✓	✓	✓	✓	✗	!
Lojas Renner S/A	✓	✓	✓	✓	!	!
Marfrig Global Foods S/A	✓	✓	✓	✓	✗	!
MRV Engenharia e Participações	✗	✗	✗	✗	✗	✗
Natura Cosméticos S/A	✓	✓	✓	✓	✗	✗
Petróleo Brasileiro S/A – Petrobras	✓	✓	✓	✓	✓	✓
Ultrapar Participações S/A	✓	✓	✓	✓	!	✓
Vale	✓	✓	✓	✓	✓	✓

¹ Quantitative implications = “OK”; Qualitative implications = “!”; None = “✗”

² Description of management method and example = “OK”; Only management method description = “!”; None = “✗”

Table 7 – Qualitative analysis of physical risks

	Physical risks					
	Description	Timeframe	Likelihood	Magnitude of impact	Estimated financial implications ¹	Management method ²
Braskem S/A	✓	✓	✓	✓	✓	✓
BRF S/A	✓	✓	✓	✓	✓	✓
Cia. Paranaense de Energia – Copel	✓	✓	✓	✓	✓	✓
Grupo Pão de Açúcar	✓	✓	✓	✓	✗	✗
Resposta Não Pública	✓	✓	✓	✓	!	!
Companhia de Concessões Rodoviárias – CCR	✓	✓	✓	✓	✓	✓
CPFL Energia S/A	✓	✓	✓	✓	!	✓
Ecorodovias Infraestrutura e Logística S/A	✓	✓	✓	✓	✓	✓
Resposta Não Pública	✗	✗	✗	✗	✗	✗
Fibria Celulose S/A	✓	✓	✓	✓	✗	✓
JBS S/A	✓	✓	✓	✓	!	✓
Klabin S/A	✓	✓	✓	✓	!	✓
Lojas Americanas S/A	✓	✗	✗	✗	✗	!
Lojas Renner S/A	✓	✓	✓	✓	!	!
Marfrig Global Foods S/A	✓	✓	✓	✓	!	!
MRV Engenharia e Participações	✗	✓	✓	✓	✗	!
Natura Cosméticos S/A	✓	✓	✓	✓	✗	✗
Petróleo Brasileiro S/A – Petrobras	✓	✓	✓	✓	!	✓
Ultrapar Participações S/A	✓	✓	✓	✓	!	✓
Vale	✓	✓	✓	✓	✓	✓

¹ Quantitative implications = “OK”; Qualitative implications = “!”; None = “✗”

² Description of management method and example = “OK”; Only management method description = “!”; None = “✗”

Table 8 – Qualitative analysis of other risks

	Other risks					
	Description	Timeframe	Likelihood	Magnitude of impact	Estimated financial implications ¹	Management method ²
Braskem S/A	✓	✓	✓	✓	✓	✓
BRF S/A	✓	✓	✓	✓	!	✓
Cia. Paranaense de Energia – Copel	✓	✓	✓	✓	✗	✗
Grupo Pão de Açúcar	✗	✗	✗	✗	✗	✗
Resposta Não Pública	✓	✓	✓	✓	!	!
Companhia de Concessões Rodoviárias – CCR	✓	✓	✓	✓	✓	✓
CPFL Energia S/A	✓	✓	✓	✓	!	✓
Ecorodovias Infraestrutura e Logística S/A	✓	✓	✓	✓	✓	✓
Resposta Não Pública	✗	✗	✗	✗	✗	✗
Fibria Celulose S/A	✓	✓	✓	✓	✗	!
JBS S/A	✓	✓	✓	✓	✓	✓
Klabin S/A	✓	✓	✓	✓	!	✓
Lojas Americanas S/A	✓	✗	✓	✗	✗	!
Lojas Renner S/A	✓	✓	✓	✓	✗	✓
Marfrig Global Foods S/A	✓	✓	✓	✓	!	✓
MRV Engenharia e Participações	✗	✗	✗	✗	✗	✗
Natura Cosméticos S/A	✓	✓	✓	✓	✗	✗
Petróleo Brasileiro S/A – Petrobras	✓	✓	✓	✓	✓	✓
Ultrapar Participações S/A	✓	✓	✓	✓	!	✓
Vale	✓	✓	✓	✓	✓	✓

¹ Quantitative implications = “OK”; Qualitative implications = “!”; None = “✗”

² Description of management method and example = “OK”; Only management method description = “!”; None = “✗”

Business resilience: internal carbon pricing

Internal carbon pricing is an effective approach to measuring and managing climate-related risks and opportunities that may emerge in the transition to a low-carbon economy . According to the CDP report “Putting a price on carbon: embedding climate risk into business planning”, released in October 2017, Companies disclose a variety of reasons for using an internal carbon price: to reveal hidden carbon risks and opportunities, or even as a deliberate tool to transition to a low-carbon business model.

The most effective way to embed this tool into business practice depends on the objective a company is seeking to achieve. Thus, its influence in the decision-making process is equally important as the price ranges adopted.

In September 2017 CDP and Ecofys issued a how-to guide of best practice approaches to carbon pricing (How to guide to corporate internal carbon pricing: four dimensions to best practice approach) based on interviews with leading companies. This survey resulted in the four-dimensional vision presented in the following figure. A best practice ICP approach must have clear objectives and find the optimal combination of the four dimensions of ICP. This forms the 4D shape of the ICP approach.

Figure 1 – 4D framework to approach internal carbon pricing

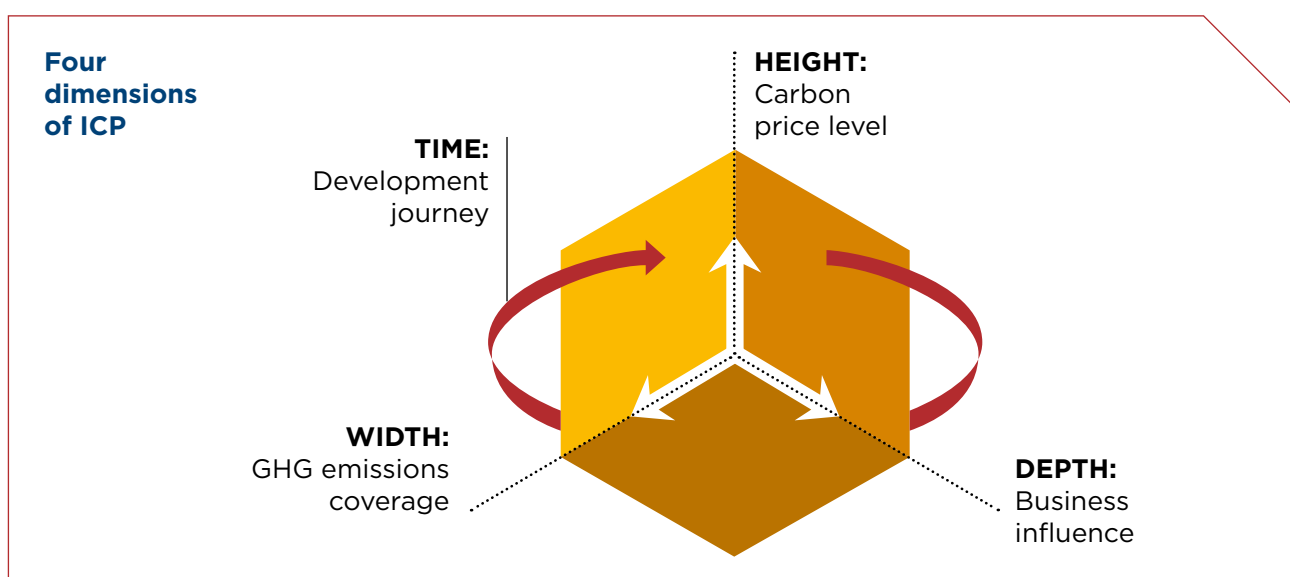


Table 9 – Four dimensions and how to build best practices of internal carbon pricing⁷

Dimension	ICP Parameter	Best practice ICP approaching
Height	Price level per unit of GHG emitted (e.g. US\$/tCO ₂) that the company uses in business decisions	Rise to a carbon price capable of changing decisions in line with the ICP objectives Width
Width	The GHG emissions covered throughout the value chain by the ICP Approach	Grow to cover all GHG emissions hotspots in the entire value chain that can be influenced
Depth	The level of influence the ICP approach has on business decision of a company and its value chain partners	Becomes increasingly influential to have a material impact on business decisions
Time	The development of the first three dimensions over time	Be evaluated regularly to bring the company's business strategy in line with a low-carbon economy

By evaluating the responses of the Brazilian companies that reported a carbon pricing, we have identified only a few parameters based on this four-dimensional vision, but at this point, the quality of the responses of Brazilian companies that reported using carbon pricing are not yet (detailed or good) enough to judge the effectiveness of their approach.

In addition, when analyzing companies that reported regulatory risks associated to climate change, but do not use an internal price on carbon and do not anticipate doing so in the next two years, we identified a gap which is the case of 37 of the 63 companies that reported climate change risks driven by changes in regulation.

⁷ CDP e Ecofys, 2017. How-to-guide to corporate internal carbon pricing: four dimensions to best practice approach. Available at: <https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/002/740/original/cpu-2017-how-to-guide-to-internal-carbon-pricing.pdf?1507652226>. Accessed in: October 20, 2017.

Table 10 – Companies that reported regulatory risks associated with climate change vs use of internal carbon pricing

Companies that reported regulatory risks	Uses internal carbon pricing		
	Yes	No, but we anticipate doing so in the next 2 years	No
AES Tietê S/A	x		
B2W Companhia Global do Varejo		x	
Banco Bradesco S/A		x	
Banco do Brasil S/A			
Braskem S/A	x		
Centrais Elétricas Brasileiras S/A - Eletrobras	x		
Companhia Energética Minas Gerais - Cemig	x		
Cia. Siderúrgica Nacional - CSN			x
Cia Energética do Rio Grande Norte - Cosern			x
Cia. Brasileira de Distribuição (CBD) Grupo Pão de Açúcar			x
Companhia de Concessões Rodoviárias - CCR		x	
Companhia de Eletricidade do Estado da Bahia - Coelba			x
CPFL Energia S/A	x		
Cyrela Brazil Realty S.A. Empreendimentos e Participações			
Rio Paranapanema Energia S/A			x
Duratex S/A	x		
EDP - Energias do Brasil S/A	x		x
Gerdau S/A			
Itaúsa Investimentos Itaú S/A	x		
Itaú Unibanco Holding S/A	x		
JBS S/A		x	
Klabin S/A	x		
Light S/A			x
Lojas Renner S/A			x
Lojas Americanas S/A		x	
Marfrig Global Foods S/A			x
Natura Cosméticos S/A	x		
Petróleo Brasileiro S/A - Petrobras	x		
Porto Seguro S/A			x
Tim Participações S/A			x

Companies that reported regulatory risks	Uses internal carbon pricing		
	Yes	No, but we anticipate doing so in the next 2 years	No
Ultrapar Participações S/A			x
Vale		x	
Weg S/A			x
MRV Engenharia e Participações			x
Oi S/A			x
Fibria Celulose S/A		x	
BRMALLS Participações			x
Cia. Saneamento de Minas Gerais - Copasa			x
BRF S/A			x
Cia Paranaense de Energia - Copel		x	
BM&FBOVESPA			x
Cielo S/A			x
Tupy S/A			x
Emflora			x
Banco Santander Brasil	x		
Ecorodovias Infraestrutura e Logística S/A			x
Correias Mercúrio S/A Ind. e Com.			x
Edenred Brasil	x		
Raízen			x
Eletropaulo Metropolitana Eletricidade de São Paulo S/A		x	
QGEP Participações S/A		x	
Raia Drogasil S/A			x
NewAge Indústria e Comércio de Bebidas Ltda.			x
SLC Agrícola S/A			x
Grupo BTG Pactual			x
Kroton Educacional S/A			x
Fleury S/A			x
Via Varejo			x
Minerva Foods			x
Smiles S/A			x
Triunfo			x
Linx S/A			x
Central Nac. Unimed Coop. Central			x

Climate-related risks, a growing concern of investors

Investor concern about climate risk and opportunities is on the rise and the use of internal carbon pricing is also a way for companies to show them that they are addressing these issues in their businesses. Even the passive funds are increasing their engagement: Within the last year, the world's two largest issuers of passive funds, BlackRock (\$5.1 trillion in Assets Under Management) and Vanguard (\$4.4 trillion in Assets Under Management), both voted against the management of ExxonMobil and Occidental, and instructed the oil giants to report on the impact of global measures designed to keep climate change to 2°C. Both asset management firms have indicated that this will be a focus area moving forward.

In a 2016 paper by BlackRock Investment Institute, the firm notes that they believe “climate factors have been under-appreciated and underpriced...” but that this could change as the effects of climate change become more visible. They show that a group of global companies that reduced their carbon footprints indeed outperformed companies which did not, albeit in time-limited and small sample size tests. Blackrock Investing Institute goes on to note that climate change factors play out in different time horizons, with regulatory factors often having an immediate effect, technological factors affecting companies in the medium-term, and physical impacts becoming more significant in the long-term.

Carbon pricing and its ripple effects are also moving up the agenda for investors as factors that companies must consider in decision-making. A recent model developed by Schrodgers, the “Carbon Value at Risk” 16 (Carbon VaR) framework, shows that “almost half of the listed global companies would face a rise or fall of more than 20% in earnings if carbon prices rose to \$100 a ton.”⁸

⁸ CDP, 2017. Putting a price on carbon: integrating climate risk into business planning. Available at: <https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/002/738/original/Putting-a-price-on-carbon-CDP-Report-2017.pdf?1507739326>. Accessed on October 20, 2017.

How financial institutions are using carbon pricing

The recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) of the Financial Stability Board outlined the need of performing stress-tests with climate-related parameters, highlighting internal carbon pricing as an important metric to help companies to assess climate-related risks and opportunities in line with its strategy and risk management process. This trend, exemplified by the FSB initiative, leading financial institutions have already begun to develop innovative methods to incorporate climate-related risk metrics on risk management strategies and investment. For example, a subset of banks is exploring how to use an internal carbon price to help them analyze the potential impact of climate change on their operations and investment portfolios. Some examples of disclosures made to CDP:

Australia and New Zealand Banking Group

Internal price of carbon as applied to the decision-making process in the assessment of the client's ability in dealing with the climate-related regulatory and transition risk.

"There is a risk to business and investment should the impacts of climate change not be considered. Our customers could be impacted by climate change or legislative, regulatory or policy changes such as carbon pricing. We factor these risks, such as a price on carbon, into our lending decisions primarily through an assessment of our customer's capacity to deal with climate change and any change to regulatory environments. In financing the energy sector, in accordance with our Energy Policy, we expect our customers to build carbon risk into their business strategies and we assess those strategies as part of our due diligence processes.

In relation to our own carbon footprint investments in energy efficiency and other carbon reduction initiatives are considered in the context of balancing investments against the cost of purchasing carbon offsets to maintain our carbon neutral status. Our average cost of carbon in FY15 was \$1.77 per ton. We also consider the eligibility of Energy Savings activities to generate certificates under state-based energy savings schemes in Australia. Any revenue we generate from the sale of certificates is factored into the cost-benefit analysis. Prices gained from these certificates range from \$14-\$21 (per ton of carbon dioxide equivalent).⁹

Piraeus Bank, Greece

Internal price of carbon as applied to the decision-making process in the assessment of the client's ability in dealing with the climate-related regulatory and transition risk.

"Piraeus Bank uses informally an internal carbon price, during the quantification of its lending financial implications from climate change, on their operations. More specifically, Piraeus Bank has developed the "Climate Risk Management Model" through which, it estimates in monetary terms the volume of climate risk (both regulatory and physical climate risk) of its business borrowers. The Model examines corporate borrowers from specific sections of the loan portfolio, belonging to sectors of economic activity considered to may be adversely affected by climate change. One of the parameters inserted in the Model for the calculation procedure to be implemented is the unit price of GHG emission allowances (in € per ton of CO₂ equivalent), mainly affecting the amount of regulatory risk. The value of this parameter is defined according to the Bank's decision. In the latest climate risk assessment of the Bank's corporate borrowers which took place for the reporting year 2015, a price of € 7 / ton of CO₂ eq. was used as this parameter. Piraeus Bank does not use yet an internal carbon price in decision-making processes regarding its investment activities".¹⁰

⁹ Excerpt from the reply of the Australia and New Zealand Banking Group to the 2016 CDP Climate Change questionnaire.

¹⁰ Excerpt from the reply of the Piraeus Bank to the 2016 CDP Climate Change questionnaire.

BNP Paribas, France

Internal price of carbon as applied to the decision-making process in the assessment of the client's ability in dealing with the climate-related regulatory and transition risk. Such price may eventually be used for the analysis of future scenarios.

In November 2015, BNP Paribas made public its commitment to gradually use an internal carbon pricing system to consider the changes resulting from the transition to a low-carbon economy and the related risks in its financing decisions. BNP Paribas is working on implementing a methodology that will enable sensitivity tests to be performed based on pricing scenarios in certain pilot sectors that generate the highest level of emissions, in order to assess the impact on its main clients' business models in these sectors. The aim is to identify those clients that will find it easiest to adjust to dealing with carbon pricing in the relatively near future, and to understand how this will disrupt their cost and income structure".¹¹

Société Générale, France

Internal Carbon Tax in environmental-efficiency initiatives.

"On the reduction of greenhouse gas emissions, the Société Générale has implemented an incentive scheme which depends explicitly on the creativity of their teams. In fact, Société Générale was one of the first banks to introduce an internal carbon tax in 2011; every year, €10 per tCO₂ is charged to business lines, according to their carbon emissions. The capital accrued through the internal tax has been used to finance internal environmental-efficiency initiatives. The objective of this scheme is to demonstrate that environmentally-friendly initiatives are also opportunities to create value and innovate. A committee makes the selection, ensuring that each initiative implemented has demonstrated its environmental additionality and represents an economic interest for the Group. In 2015, 56 initiatives won awards totaling EUR 3.4 million. Over the three years of this scheme's existence, all 119 winning initiatives, involving building, IT, paper, transport or waste (since 2015), enabled annual recurring savings of an average of EUR 13 million on overheads, an average of 4,700 tons per year of CO₂ and an average of 30 GWh of energy savings.¹²

¹¹ Excerpt from the response of BNP Paribas to the 2016 CDP Climate Change questionnaire and information from the study "Internal Carbon Pricing, the growing corporate practice of I4CE, 2016, available at: <http://www.i4ce.org/wp-core/wp-content/uploads/2016/09/internal-carbon-pricing-november-2016-ENG.pdf>. Accessed on nov 9, 2017.

¹² Excerpt from the Société Générale's response to CDP Climate Change in 2016 and study information. "Internal Carbon Pricing, a growing corporate practice". Available at: <http://www.i4ce.org/wp-core/wp-content/uploads/2016/09/internal-carbon-pricing-november-2016-ENG.pdf>. Accessed on nov 9, 2017.

TD Bank Group, Canada

Price of carbon implicit in its own operations

“Having an internal price on carbon aligns with our approach to embedding climate risks in our business strategy. Applying an internal price on carbon is an effective business incentive to drive investment in GHG reduction activities. The learnings from our carbon neutrality and internal price on carbon have also driven an increased commitment to developing a range of low-carbon financial products including the financing for residential renewables and energy efficiency projects, insurance for hybrid and electric vehicles, and the issuance of a \$500 million green bond. It also provides a quantitative measure of the cost of carbon emissions as part of our operating costs. We use a carbon price to engage our 85,000 employees in our carbon neutral initiative. The actual price used is approximately \$9 per ton of CO₂e. Our internal price of carbon is dependent on the cost of RECs and carbon offsets as well as the cost of managing TD’s GHG inventory. It is calculated on an annual basis and charged back to our business groups based on the relative contribution of those groups to our overall carbon emissions. TD Environment works with Finance to determine the internal price of carbon and charge it back to the business groups as part of Occupancy costs”.¹³

Examples of how carbon pricing affects investment decisions:

“Every ton of emissions signifies a real cost to our business groups; therefore, our internal price on carbon acts as a significant driver for investment in GHG reduction initiatives. The most significant investment decisions have been made through our Enterprise Real Estate and Green IT groups. The potential for avoided costs and increased environmental benefits has led to the development of net-zero energy branches; design standards for new stores that are 45% more energy efficient; solar installations across over 122 facilities; a LEED platinum energy efficiency data center; retrofitting of existing buildings; and investment in several energy-efficient IT solutions. Our total GHG emissions from energy have decreased 20% from 2008, despite having a 26% growth in the space we occupy and doubling our revenue”.

¹³ Excerpt from the reply of the TD Group to the 2016 CDP Climate Change questionnaire.

Yes Bank, India

Yes Bank, a sector leader on climate action, believes that putting a price on carbon – either through a carbon tax, carbon trading or other mechanisms – is an opportunity to accelerate the development of a clean economy.

The Bank has adopted a methodology to derive the price per ton of absolute carbon emission, based on estimated green infrastructure investment required for its operation until 2025, in line with its target to reducing emission intensity by 10 percent a year. Energy efficient strategies include switching to LED lighting, using energy efficient materials and appliances, and adhering to green building development standards.

It is committed to mobilizing \$5 billion by 2020 for climate action through lending, investing and raising capital for climate change mitigation, adaptation and resilience. To aid India's target of meeting its Nationally Determined Contributions (NDCs) under the Paris Agreement, Yes Bank also is committed to increasing the percentage of renewable energy in its power portfolio, fund 5,000 MW of clean energy, plant 2 million trees, improve drinking water and offset carbon emissions of bank operations – all by 2020.

“Yes Bank views carbon pricing as a defining factor for future business decisions for industry, investors, and governments. To gain a greater understanding of the cost of carbon, Yes Bank implemented an internal price on carbon intensity and focused on carbon-free assets and practices to build portfolio resistance and achieve innovation at a faster rate”.

Rana Kapoor, MD, and CEO, Yes Bank, is also a high-level panel member of the Carbon Pricing Corridor initiative.¹⁴

Garanti, Turkey

Shadow price is used to energy-related CAPEX

Projects in Turkey are able to generate voluntary carbon credits, but there are no mechanisms for taxing of CO₂ or an emissions trading scheme that negatively impact the cash flow of carbon-intensive projects. Despite the difficulties in determining the cost of carbon in the absence of a regulatory framework, Garanti has been utilizing a fixed ‘forestation’ fee for carbon-intensive projects to reflect the cost of carbon in project financing. However, as stated in its Climate Change Action Plan, the bank is now enhancing its approach to better reflect the global trend on carbon pricing among the private sector and to further increase the share of low-carbon investments in our loan portfolio. The new carbon pricing scheme of the Bank rests on a “shadow price”.

“We apply our own shadow carbon price in evaluating the economics of all greenfield/brownfield fossil fuel based and renewable energy production investments in our project finance activities. If the host country already implements an emissions trading scheme (both voluntary and regulatory) or a carbon tax, then we use the actual price for carbon. If not, we use a fixed price per ton of CO₂e emitted. The price is determined to take into consideration the market dynamics and is reviewed by the Sustainability Team on a regular basis and updated when necessary”.¹⁵

¹⁴ World Bank. Accessed on Aug 2, 2017. Disponivel em: <http://pubdocs.worldbank.org/en/183521492529539277/WBG-CPLC-2017-Leadership-Report-DIGITAL-Single-Pages.pdf>

¹⁵ CPLC. Accessed on Aug 2, 2017. Available at: <http://pubdocs.worldbank.org/pt/183521492529539277/WBG-CPLC-2017-Leadership-Report-DIGITAL-Single-Pages.pdf>

HSBC

HSBC joined the Carbon Pricing Leadership Coalition (CPLC) at the highest level through Group Chief Executive Stuart Gulliver and is keen to encourage its clients to take climate risk management seriously, disclose their practices in this area and develop pathways to decarbonization to meet or even exceed the emission reduction targets agreed at COP21.

HSBC is driving climate business strategy through its Climate Business Council and has a dedicated “Sustainable Financing Unit” to develop content and products for Global Banking and Markets — HSBC’s investment bank — to help mobilize sources of sustainable finance.

“HSBC believes that major global institutions have an essential role to help finance the transition, and the innovative solutions, needed for the low-carbon economy that will keep global temperature increase below 2°C”.¹⁶

Stuart Gulliver, CEO do Grupo HSBC

Brazilian case: Itaú-Unibanco¹⁷

GHG emissions are factors of the risk assessment model for both credit operations and third-party asset management. In structured transactions, the Bank knows the destination of the resources, so it can make demands. The bank only finances sustainable projects in the medium and long term which are analyzed based on a set of criteria that the client must meet. In this sense, the bank uses GHG emissions data that companies have reported to CDP for carbon risk assessment in project finance operations, in line with the Equator Principles.

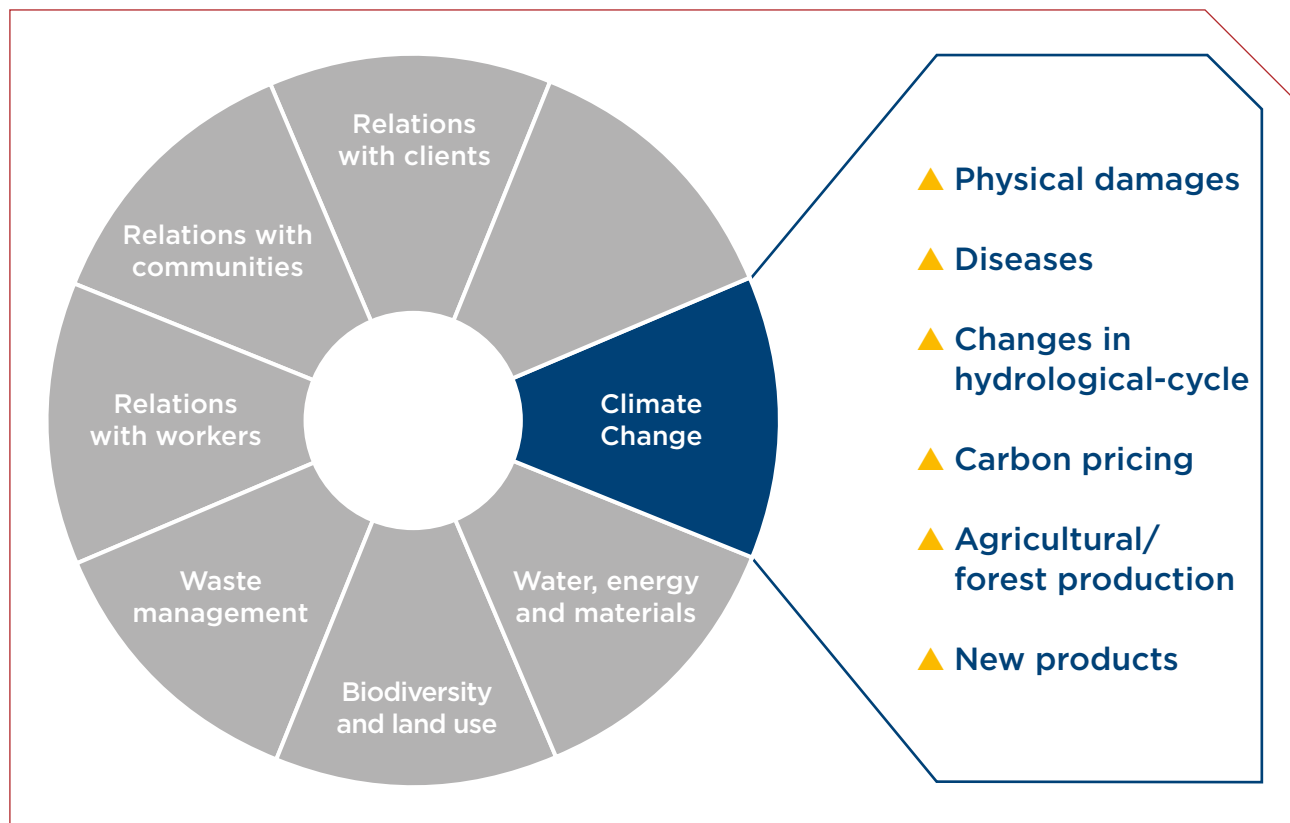
¹⁶ CPLC. Accessed on Aug 2, 2017. Available at: <http://pubdocs.worldbank.org/pt/183521492529539277/WBG-CPLC-2017-Leadership-Report-DIGITAL-Single-Pages.pdf>

¹⁷ The information in this case were compiled based on interviews with Itaú Asset Management analysts and public information disclosed by the company on their analysis methodology for ESG matters and on issues specifically related to climate change.

In the investment process for third-party asset management, climate change is one of the eight dimensions considering the integration methodology of Itaú Asset Management (IAM) ESG matters.

The way this method is applied in the analysis of the impacts related to climate changes is described in a 2017 publication entitled *Climate Change and its Impacts*¹⁸. The approach consists in the insertion of environmental variables to traditional valuation models, through the analysis of the impact of these variables on the cash flow of the companies over time. This process consists of a phase of research and construction of sectoral scenarios followed by a phase of appraising the impact on companies, factoring their idiosyncrasies and management capacity. These impacts can materialize in distinct forms, as shown in Figure 2.

Figure 2 – Social and environmental dimensions analysis and climate change impact types





















¹⁸ Itaú Asset Management, 2017. Climate change and its impacts. Available at: https://www.itaubr.com.br/_arquivosstaticos/Itau/PDF/Sustentabilidade/mudancas_climaticas-asset.pdf. Accessed on nov 10, 2017.

Different scenarios are constructed, and emissions pricing is one of the types of impacts considered. IAM analysts start from the premise that carbon pricing in the medium term can affect the cost structure of the carbon-intensive industries such as oil and gas industry, heavy industry and thermoelectric generation facilities. But they also predict that some low or negative emission sectors, such as the forest and the renewable energy generation ones, will be able to accrue revenue by selling credits and carbon emission rights in organized markets.




Itaú, however, says that taking into consideration the evolution of the issue in other countries as well as the targets adopted in Brazil, the emission pricing is expected to become a material risk in the medium term.¹⁹

The time horizon considered for the different types of impact on climate change is presented in Figure 3 below:

Figure 3 – Value drivers of climate change by impact horizon

Horizon	Short term	Medium term	Long-term
Physical damages			
Diseases			
Changes in hydrological-cycle			
Carbon pricing			
Agricultural/forest production			
New products			

Materiality

 High
  Medium
  Low

Source: Itaú Asset Management (IAM), 2017

¹⁹ Itaú Asset Management, 2017. Climate change and its impacts. Available at: https://www.itaubr.com.br/_arquivosstaticos/Itaui/PDF/Sustentabilidade/mudancas_climaticas-asset.pdf. Accessed on nov 10, 2017.

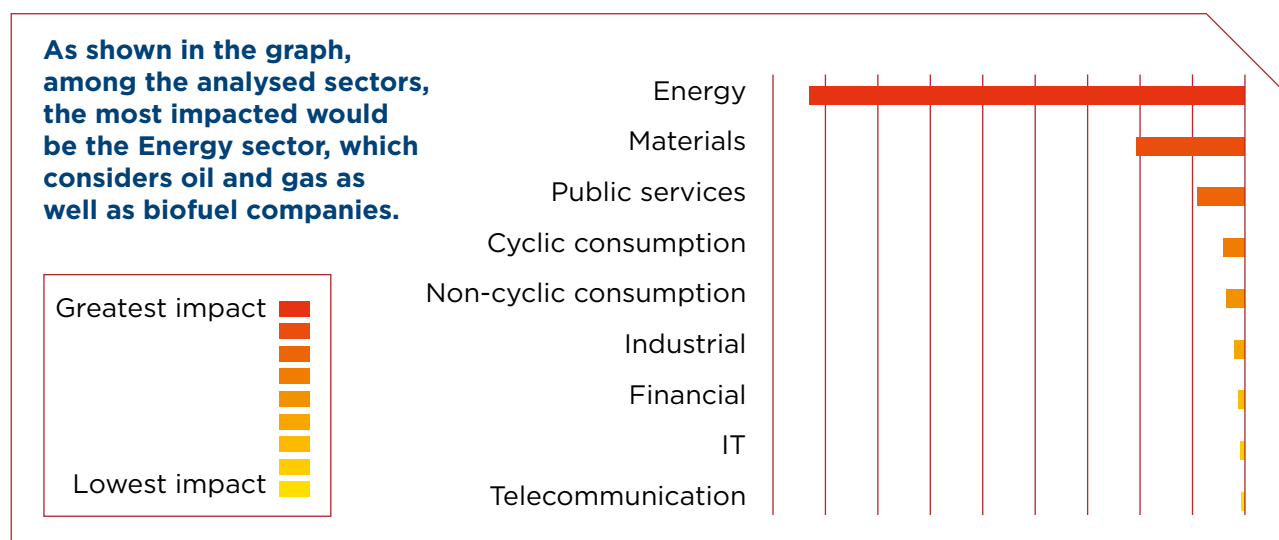
Itaú Asset Management explains that these value drivers were delimited based on their recurrence and coverage for various sectors of the economy. Of course, the impact varies according to each company's industry, analysis horizon, performance region and capacity to manage these risks and opportunities.

To evaluate the impact of emissions pricing, Itaú Asset Management considers the Scope 1 emissions, as well as mitigation and adaptation actions reported by the companies to CDP together with an estimate of US\$60 per ton of CO₂.

In addition, climatic risks are also considered in the valuation of companies. The valuation derives indexes and quantitative metrics for each relevant impact on the company analyzed. That is, how a risk or opportunity can materialize quantitatively to increase or decrease the company's cash flow. This step is important to ensure that companies that have been adapting to the effects of climate change on their businesses are not disproportionately penalized by adverse sectoral scenarios. For example, it is reasonable to assume that a future legislation taxing carbon emission should adversely affect power generation companies that own coal-fired power plants. However, when a company has initiatives for carbon capture and sequestration, the impacts tend to be smaller.

Cash flows are projected over time and brought to present value by the weighted average cost of Capital (WACC) of the company. It is worth noting that this is a probabilistic analysis, that is, each event is assigned with a probability of occurrence based on technical studies, occurrence history, expert opinions and consulting businesses.

The above methodology was applied to about 100 listed Brazilian companies in accordance with the IBX-100 and broke down into 10 sectors according to the Global Industry Classification Standard (GICS). Thus, Itaú Asset Management reached the detailed results presented in Figure 4:

Figure 4 – Risks of climate change and valuation of companies

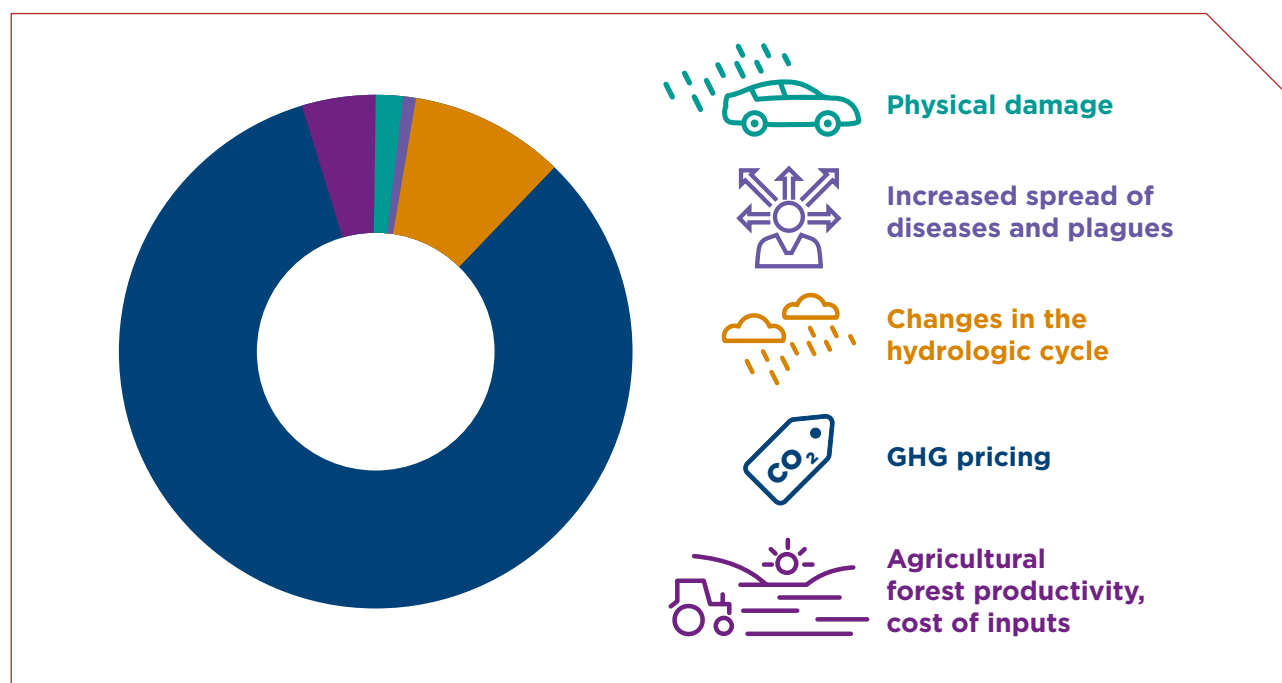
Source: Itaú Asset Management (IAM), 2017

Because of its analysis of the negative impacts of climate change in the valuation of companies, Itaú Asset Management highlights in its White Paper the sectors that would be most impacted. Within the energy sector, the negative impacts in the oil and gas industry should occur mainly because of the increased production costs and the reduction of revenue, due to decreased demands in a future scenario of carbon emissions pricing.

The second most impacted sector is the Materials sector, especially considering the increased costs related to water shortage in metallurgy and mining. Another major risk in this sector is the increased costs in a carbon pricing scenario, either directly or through energy consumption. In aggregate, the impact on the sector is mitigated when pulp and paper industry is included.

In the sector of non-cyclical consume, the main impact is given as a function of increasing costs in the food industry, due to variations in agricultural productivity. In the Industrial Sector, losses occur mainly in the light of the physical damage caused by extreme weather events, especially for companies in the segment of road concession and logistics.

Itaú Asset Management analysts concluded that in an intersectoral view, the main impact on companies' market value must be given by the price of carbon as shown in Figure 5 below.

Figure 5 – Impact of climate change on companies' value by type

Source: Itaú Asset Management, 2017

Itaú Asset Management analysts emphasize that the companies most affected by carbon pricing tend to be those of sectors of intensive energy use and emissions generation, such as the listed companies of the oil and gas industry, the steel industry, petrochemical industry and the power sector. However, carbon pricing should reach virtually all companies of the analysis to some degree. If not directly, through their supply chain and mainly through the acquisition of electricity. According to them, the ability to transfer these costs to customers and additional emissions reduction will be a key factor for the competitiveness of the business.

They also conclude that the large Brazilian companies are not yet adequately prepared to handle a possible future legislation establishing carbon pricing via market or taxation. The establishment of an internal price of carbon is still not widespread and few companies recognize the pricing as a real future risk. They exemplify that with data from the CDP report "Embedding the carbon pricing into strategy", which in 2016 revealed that from the 517 world-wide companies reporting the adoption of an internal price of carbon, only 15 were Brazilian.

They point out that the quality of management of the impacts of climate change varies considerably between companies. The values of the impacts shown above were consolidated into sector level and hide significant differences between companies in the same sector. In the financial sector, for example, banks with credit portfolio more exposed to agricultural sectors tend to be more sensitive to climatic variations.

Carbon Pricing Corridors

The Carbon Pricing Corridors initiative aims to provide a valuable benchmark for business and investors who are seeking to make strategic decisions consistent with a low-carbon economy, but who struggle with a lack of information about the risks and opportunities involved in the transition. The initiative can also inform governments; many are turning to carbon pricing as a mechanism to achieve their climate goals, and much more are seeking to reform existing carbon pricing policies to put a price on carbon. To help them, the Carbon Pricing Corridors Initiative stimulates their participation in dialogues with political and business leaders on the carbon price signals needed for a transition.

The initiative's work will complement the recommendations developed by the Task Force on Climate-related Financial Disclosures (TCFD), which are expected to outline the need for enhanced stress testing of climate-related risks, as organizations consider the potential financial impacts of carbon pricing so that business strategies become resilient to climate change as recommended by the TCFD.

In May 2017, the Carbon Pricing Corridors Initiative released a study on the power industry, first in a series of Corridors reports that will be published over the next two years.

The experiences of financial institutions reported above were compiled in the context of the discussions of the Carbon Pricing Corridors Initiative and Carbon Pricing Leadership Coalition, that since 2016 formed a Working Group of financial institutions of which CDP is a co-chair.

Conclusions

After evaluating the set of practices of Brazilian respondents to the CDP in relation to their climate risk management, we found that a lot of progress has been made in relation to the perception of the risks. There is still space, however, to further evaluate likely impacts so that they are effectively considered in the decision-making process.

For example, of the 20 companies analyzed in the qualitative sample, 13 didn't report their estimated financial implications and the management methods – factors considered as crucial to assessing the performance of companies in relation to climate risk management.

In quantitative analysis, when we compare the respondents, the subsample of 20 companies shows more mature indexes in relation to the universe of 71 companies. We attribute this to the fact that the experience of reporting through public platforms such as CDP and the Brazilian GHG Protocol program contributed to the maturing of their business practices regarding climate change management. However, pricing carbon is not a predominant practice within this group: only 10 out of the 20 companies use an internal price on carbon. In addition, none of the companies reporting an internal price on carbon met the best practices parameters set by the CDP and Ecofys quadridimensional approach.

Although 79% of Brazilian companies report that climate change is integrated into their business strategy, most of these companies was not able to demonstrate the robustness of these strategies neither their compliance to the methodology of the CDP that considers, for example, the translation of the policies into concrete targets and initiatives, as well as their influence on decision-making processes relevant to the company. These parameters are taken into consideration by the CDP methodology in evaluating best management practices. In that regard, contrary to what was observed in the quantitative sample, most companies from the qualitative sample - 15 of the 20 companies - were able to describe clearly and objectively the integration of their business strategy and climate change, with examples of targets for the reduction of GHG emissions.

We have also identified sophisticated practices of leading companies, such as the use of economic modeling for planning based on climate scenarios, in line with the recommendations of the Financial Stability Board TCFD. However, even leading companies still don't manage their climate risk at the level of the assets, also reflecting the associated potential impacts with productive units, business units or any other level that is below the company as a whole.

National and international experiences point to the practice of internal carbon pricing as an important exercise to integrate climate change into decision making and lead organizations to better investment decisions and resilient strategies to climate change.

Attention points for financial institutions

Attention points for financial institutions taken from the analysis of international and Brazilian companies practices in relation to the internal carbon pricing:

Companies at risk: among the 63 companies that pointed out that risks driven by changes in regulation could impact their business, 37 do not use an internal price on carbon and do not anticipate doing so in the next two years. This can make them more vulnerable to the effects of regulation if they fail to internalize the costs of pricing associated with their business.

It is unclear whether companies are prepared for the long-term: only 15% of companies that use an internal price on carbon disclose to stress test their investments and operations disclose assumptions that the price level will increase over time. The remaining 85% assume a static price or do not reveal their practice. In addition, few companies disclose price premises after 2025, although the return on investment (ROI) period for assets of certain carbon-intensive sectors extends far beyond this range.

In Brazil, only two companies report their premises for calculating their internal price on carbon and both companies are working with static prices, taking the European emissions trading schemes and the carbon tax implemented in Chile as references.

In this context, it is important that financial institutions from Brazil examine what companies are doing to adapt and adopt procedures to incorporate the financial risks of climate change to their credit and investment analysis. Among its benefits, we highlight the increasing resilience of their portfolios to the systemic risks presented by climate change and the opportunity to develop new financial products. Such efforts will be in consonance with other agendas that are already the object of regulatory agencies in Brazil, such as the Resolution No. 4327, of April 25, 2014 (CMN Res. 4327/2014) setting the guidelines that must be observed in the establishment and implementation of the Social and Environmental Responsibility Policy by financial institutions.

The integration of information on the impacts of climate change and on credit and investment analysis contributes particularly to the adequacy of the systems, routines and procedures for managing systemic social and environmental risks of this nature, as well as to the creation of new products and services, relevant modifications in existing products or services, protection strategies (hedge) and risk-taking initiatives (articles 7 and 8 of Resolution 4557/2017).

Therefore, the information and recommendations contained in this report can help financial institutions in meeting the specifications of the regulatory agency.

Annex I:

Scoring methodology – Points allocation

Responding companies will be assessed across four consecutive levels which represent the steps a company moves through as it progresses towards environmental stewardship. The levels are:

- ▲ **Disclosure;**
- ▲ **Awareness;**
- ▲ **Management;**
- ▲ **Leadership.**

At the end of the scoring, the number of points a company has been awarded per level is divided by the maximum number that could have been awarded. The fraction is then converted to a percentage by multiplying by 100 and rounded to the nearest whole number.

A minimum score of 80%, and/or the presence of a minimum number of indicators on one level will be required to be assessed on the next level. If the minimum score threshold is not achieved, the company will not be scored on the next level (see below for figures).

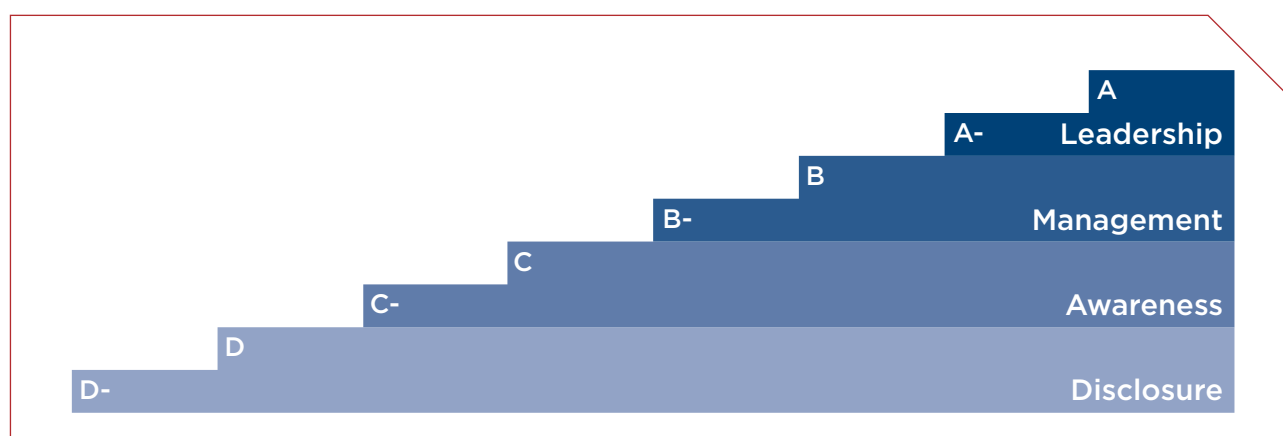
Figure 1 – Level of completeness required at each level to be assessed at the next level

Disclosure	0 - 44%	D-
	45 - 79%	D
Awareness	0 - 44%	C-
	45 - 79%	C
Management	0-44%	B-
	45 - 79%	B
Leadership	0 - 79%	A-
	80 - 100%	A

Not all companies requested to respond to CDP do so. Companies who are requested to disclose their data and fail to do so, or fail to provide sufficient information will receive an F, which signifies their failure to provide sufficient information to CDP to be evaluated for Climate Change. An F does not indicate a failure in environmental stewardship.

The final letter grade is awarded based on the score obtained in the highest achieved level. For example, Company XYZ achieved 88% in Disclosure level, 82% in Awareness and 65% in Management will receive a B. If a company obtains less than 44% in its highest achieved level, its letter score will have a minus. For example, Company 123 achieved 81% in Disclosure level and 42% in Awareness level resulting in a C-. However, a company must achieve over 80% in Leadership to be eligible for an A and thus be part of the A-List, which represents the highest scoring companies.

Figure 2 – Scoring routes towards leadership



Results will be communicated to responders with their current level, indicating which areas of environmental stewardship they are performing well in, and which actions to target for improvement. Questions may include criteria for scoring across more than one level. All the questions are scored for the disclosure level. Some of the questions have no awareness, management or leadership level scoring associated with them.

CDP scoring does not yet make any assessment of the impacts of a company's disclosed environmental management or environmental risk mitigation activities. The CDP score is based solely on activities and positions disclosed in the CDP response, which are necessarily limited in nature.

It, therefore, does not consider the range of other company actions not mentioned in the response, and score users are asked to be mindful that actions not mentioned in the response may be environmentally positive or negative. Since environmental issues can be extremely specific to environmental, geographical, social and business contexts in which they occur, assessing the impact and developing comparable measures of impact will only be attempted in future versions of the methodologies, likely alongside sector-specific methodology development, as part of a new CDP initiative called **Reimagine Disclosure**.



Disclosure Level Scoring

Every question in the questionnaires is scored for disclosure. In general, the number of points allocated to each question depends on both the amount of data requested and its relative importance to data users. Where the information is of particularly high importance, questions have more than one point attached to a single piece of information. Questionnaire modules have the disclosure score weighted to indicate which sections are most important to data users; modules with more points allocated are of greater importance to data users. Questions which allow text responses are usually scored according to how many of the required data points are supplied – all required data points are set out in the scoring methodologies.



Awareness Level Scoring

The awareness score measures the comprehensiveness of a company's evaluation of how environmental issues intersect with its business. Companies' evaluations should include the impacts of business activities on the environment, and how these activities affect people and ecosystems, as well as impacts the environment may have on business activities. This will influence the degree of business risk that a particular company faces.

The awareness score does not indicate that a company has taken any actions to address environmental issues beyond initial screenings or assessments. Action to address issues is measured in the next level of scoring - Management.

To progress to the Management level, a company must have scored over a threshold percentage of the available awareness points, showing that they have assessed a broad range of environmental issues and demonstrated a basic level of awareness of how these issues intersect with its business.



Management Level Scoring

Management points are awarded for answers that provide evidence of actions associated with good environmental management, as determined by CDP and its partner organizations. Answers representing more advanced environmental stewardship have more points associated with them.

After assessing how its business impacts the environment and how the environment impacts its business, a company can decide which actions to take to reduce negative impacts. Efforts can be made to mitigate risk, advance environmental accounting in at-risk sites, make risk assessments more robust and comprehensive, implement an environmental policy and integrate environmental issues into business strategy.

The management score rewards action in all these areas. Since environmental issues can be context-specific as well as often being specific to a particular company's business operations, it is all but impossible to recommend a particular course of action as universally correct to all companies, especially in the forests and water programs. Management scoring, therefore, relies on companies' disclosure of processes and procedures more than judging the appropriateness or effectiveness of actions undertaken.



Leadership Level Scoring

To earn leadership status, the company response must score leadership points as detailed in the methodology. These actions represent best practice as formulated by organizations working with CDP to advance environmental stewardship (e.g. CEO water mandate, CERES, WWF) and in many cases, have already been reported to CDP by companies leading in environmental policy and practice.

To reach leadership status in the Climate Change program, a company must again score highly at all other levels, as well as disclose actions that mark them as leaders. In addition to reporting their emissions of GHGs (Greenhouse Gases) and perform verification of the third party considering the scopes 1, 2 and 3 in more than 70% of them.



A-List

To acknowledge companies' positive and effective actions to mitigate risks due to climate change, water issues and deforestation, CDP recognizes organizations awarded a high leadership score via inclusion in the A List of their respective program. For a company to achieve A-List status, companies must ensure several items are included in their response, as well as pass several checks carried out by CDP after the submission of the response.

Annex II

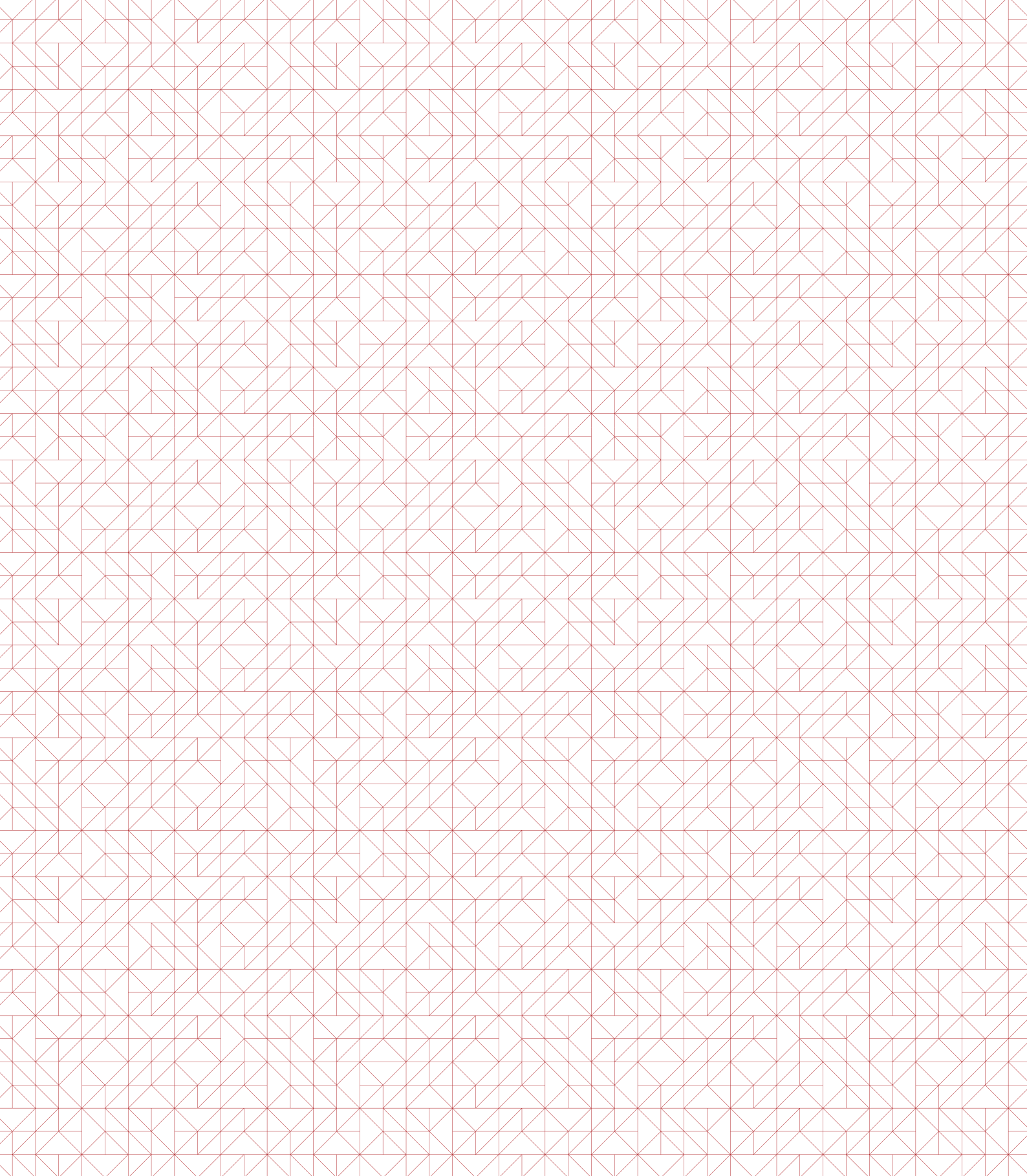
Questions of the CDP Climate Change questionnaire considered in the analysis

		Quantitative	Qualitative
CC2.1	Please select the option that best describes your risk management procedures regarding climate change risks and opportunities.	x	x
CC2.1a	Please provide further details on your risk management procedures regarding climate change risks and opportunities		x
CC2.1b	Please describe how your risk and opportunity identification processes are applied at both company and asset level		x
CC2.1c	How do you prioritize the risks and opportunities identified?	x	x
CC2.2	Is climate change integrated into your business strategy?	x	
CC2.2a	Please describe the process of how climate change is integrated into your business strategy and any outcomes of this process		x
CC2.2c	Does your company use an internal price of carbon?	x	
CC2.2d	Please provide details and examples of how your company uses an internal price of carbon	x	x
CC3.1	Did you have an emissions reduction or renewable energy consumption or production target that was active (ongoing or reached completion) in the reporting year?	x	x
CC3.1a	Please provide details of your absolute target	x	x
CC3.2	Do you classify any of your existing goods and/or services as low carbon products or do they enable a third party to avoid GHG emissions?	x	
CC3.2a	Please provide details of your products and/or services that you classify as low carbon products or that enable a third party to avoid GHG emissions	x	x
CC3.3	Did you have emissions reduction initiatives that were active within the reporting year (this can include those in the planning and /or implementation phases)	x	x
CC3.3a	Please identify the total number of projects at each stage of development, and for those in the implementation stages, the estimated CO2e savings		x
CC3.3b	For those initiatives implemented in the reporting year, please provide details in the table below	x	
CC3.3c	What methods do you use to drive investment in emissions reduction activities?	x	
CC5.1	Have you identified any inherent climate change risks that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply	x	x
CC5.1a	Please describe your inherent risks that are driven by changes in regulation	x	x
CC5.1b	Please describe your inherent risks that are driven by changes in physical climate parameters	x	x

Annex III

Companies that reported internal pricing of carbon or wishing to adopt it in the next two years

AES Tietê S/A	Yes
B2W Companhia Global do Varejo	No, but we anticipate doing so in the next 2 years
Banco Bradesco S/A	No, but we anticipate doing so in the next 2 years
Banco Santander Brasil	Yes
Braskem S/A	Yes
Centrais Elétricas Brasileiras S/A - Eletrobras	Yes
Cia. Paranaense de Energia - Copel	No, but we anticipate doing so in the next 2 years
Companhia de Concessões Rodoviárias - CCR	No, but we anticipate doing so in the next 2 years
Companhia Energética Minas Gerais - Cemig	Yes
CPFL Energia S/A	Yes
Duratex S/A	Yes
Edenred Brasil	Yes
EDP - Energias do Brasil S/A	No, but we anticipate doing so in the next 2 years
Eletropaulo Metropolitana Eletricidade de São Paulo S/A	No, but we anticipate doing so in the next 2 years
Fibria Celulose S/A	No, but we anticipate doing so in the next 2 years
Itaú Unibanco Holding S/A	Yes
Itaúsa Investimentos Itaú S/A	Yes
JBS S/A	No, but we anticipate doing so in the next 2 years
Klabin S/A	No, but we anticipate doing so in the next 2 years
Lojas Americanas S/A	No, but we anticipate doing so in the next 2 years
Natura Cosméticos S/A	Yes
Petróleo Brasileiro S/A - Petrobras	Yes
QGEP Participações S/A	No, but we anticipate doing so in the next 2 years
Vale	No, but we anticipate doing so in the next 2 years
Votorantim Cimentos	No, but we anticipate doing so in the next 2 years



Prepared for:

