DNV·GL

BUSINESS ASSURANCE

VIEWPOINT REPORT

Are companies resilient enough to climate change?

NOVEMBER 2017

SAFER, SMARTER, GREENER

CONTENTS

FOREWORD

Climate change is affecting our planet right now, disrupting national economies and people's lives. The costs are borne by people, communities, companies and countries on every continent.

Significant impacts range from changing weather patterns to rising sea levels and more extreme weather. Greenhouse gas emissions are at their highest level in history.

In the Paris Agreement signed at COP21 (2015), countries agreed to work to limit the increase in global temperatures to well below 2 degrees Celsius, with the ambitious goal of an increase of just 1.5 degrees Celsius. The UN Sustainable Development Goals (SDGs) sets targets for taking urgent action to combat climate change and its impacts.

Companies around the world are concerned about climate risks and interested in understanding how to deal with them. The need for corporate action, not only in mitigating further effects, but in adapting to the changing climate and increasing resilience to extreme weather events, is increasingly a topic of concern in many organizations.

It is critical that the private sector take action if the targets of the Paris Agreement and the UN SDGs are to be achieved. Mitigation efforts to address greenhouse gas emissions are essential. However, since companies are already feeling the impacts of climate change on their operations or see a high risk of imminent disruptive consequences, actions aimed at adapting or increasing resilience are equally central to any corporate climate strategy.

With this in mind, we set out to assess and understand efforts to adapt to climate change and increase resilience in the private sector. Which threats are of greatest concern and when might they impact companies around the globe? What proportion of companies have already undertaken actions or intend to in the near future? What are the driving factors for climate change adaptation actions and what are the barriers?

INTRODUCTION

DNV GL, supported by the international research institute GFK Eurisko, investigated private sector climate change adaptation and resilience efforts through an online survey.

While the survey was designed to map actions and perceptions related to adaptation and resilience to climate change, answers to one question indicate that respondents have interpreted adaptation and resilience to include mitigation, as well as elements of environmental management. The reader should therefore interpret the survey results in a slightly broader sense than initially intended.[1]

Nearly 98% of companies surveyed indicated at least one climate change related threat that they think will have a direct or indirect impact on their organization, with temperature increases/heatwaves, storms and floods being the biggest concerns. Only 1 in 8 companies said that climate change impacts on their organizations are expected to be more than 10 years away. Despite this, only 1 in 4 companies (and 40% of large companies) say that they are already applying adaptation or resilience measures. For more than half of the companies surveyed, laws and regulations are the biggest driver of climate change adaptation and the cost of implementing adaptation measures is the main barrier to action

The sample includes 161 companies we defined as LEADERS, the subgroup of companies that constitute frontrunners with regard to adaptation and resilience. Companies were classified as LEADERS if they indicated that they are taking adaptation or resilience actions in response to climate change and extreme weather and that they have undertaken at least one climate change risk or vulnerability assessment in the past. Our survey shows that the responses of LEADERS are unusual in many aspects.

In particular, LEADERS to a greater extent than other companies, on average, indicate that they are already feeling the effects of climate change on their assets, operations, supply chains, customers and markets. Moreover, LEADERS state that they are driven more by public concern/corporate responsibility than by laws and regulations, as compared to other companies.

The insight from this survey, collected from companies around the world and LEADERS in particular, might help to build awareness in your organization and help identify how to approach and implement climate change adaptation and resilience efforts.

[1] Respondents indicating that their organization is taking adaptation or resilience actions to climate change and extreme weather were asked to describe what actions they were taking. Only a quarter of the respondents described adaptation actions and 43% of the respondents indicated actions falling within the broader definition of climate resilience actions. This includes business continuity planning, climate and weather risk management and emergency response. The remainder described actions mostly pertaining to climate change mitigation (e.g., greenhouse gas management, carbon footprinting, and greater reliance on renewable energy), development of climate change policy and strategy, environmental (e.g., waste) management, and resource conservation (e.g., energy efficiency and conservation of water, fuel and materials).

METHODOLOGY AND SURVEY SAMPLE

- The survey was conducted in June 2017. It involved 1,241 professionals in companies in the primary, secondary and tertiary sectors across different industries in Europe, North America, Central & South America and Asia.
- The sample consists of customers of DNV GL – Business Assurance and does not claim to be statistically representative of companies worldwide.
- In the introduction to the survey, the respondents were presented with the Intergovernmental Panel on Climate Change (IPCC)[2] definitions of adaptation and resilience:

  Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

  Resilience: The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.

- The questionnaire was administered using the CAWI (Computer Assisted Web Interviewing) methodology.
- The sample includes 161 companies defined as LEADERS. The classification of a company as a LEADER is based on a list of attributes defined by DNV GL.
- To aid in understanding the survey results and in identifying the characteristics of companies that are proactive in adaptation and resilience efforts, we have attempted to identify a subgroup of companies that constitute frontrunners with regards to adaptation and resilience.

ATTRIBUTES OF COMPANIES IN THE LEADERS GROUP

The LEADERS are companies identified on the basis of the following attributes:

- The company indicates that it is taking adaptation or resilience actions towards climate change and extreme weather.
- The company indicates that it has undertaken at least one climate change risk or vulnerability assessment in the past regarding its operations, assets and supply chain, or its customers and markets.

Europe	38.5%
Asia	44.9%
North America	5.9%
Central and South America	7.7%
Others	3.0%

Figure 1: Geographic breakdown of companies in the survey (percentage of companies).

[2] IPCC, 2014: Summary for policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)].

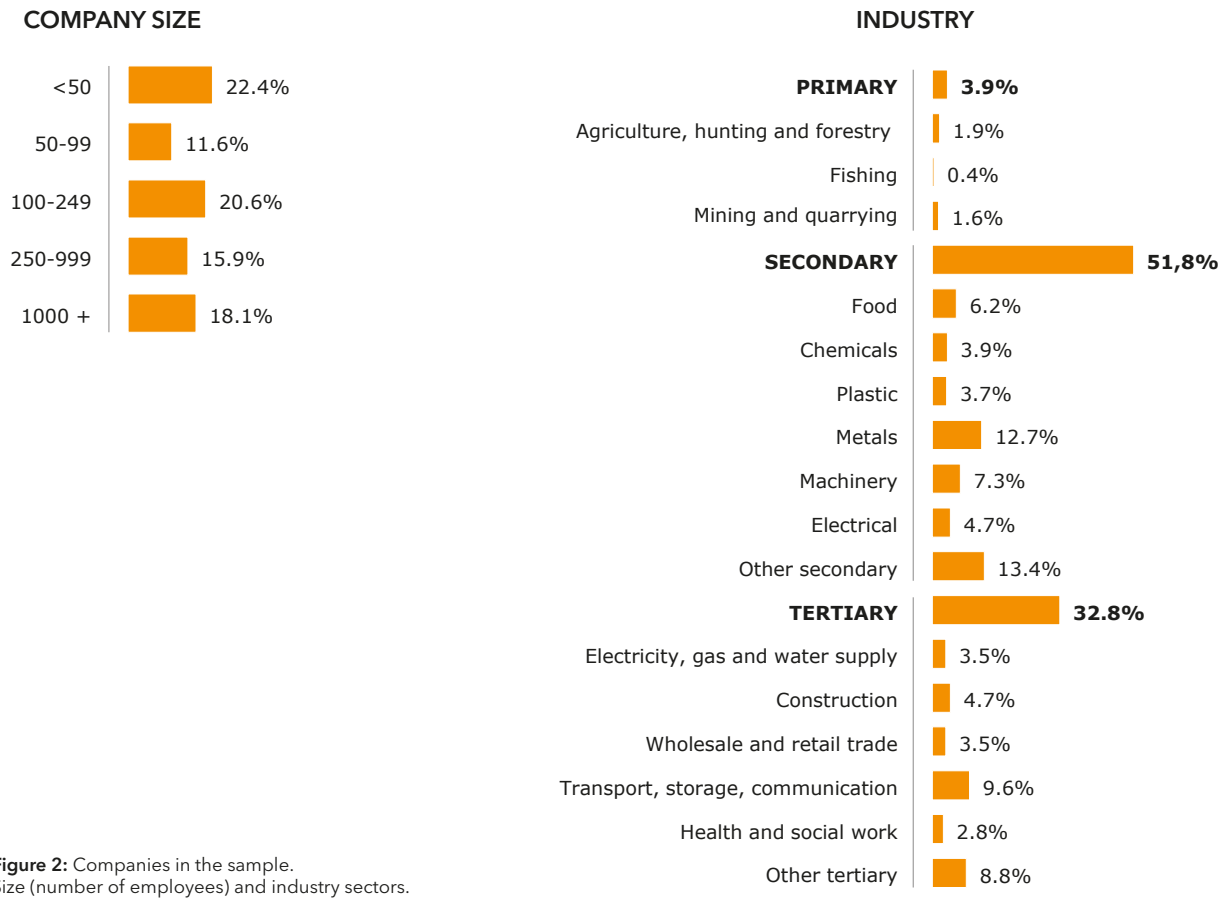


Figure 2: Companies in the sample.
Size (number of employees) and industry sectors.

NOTES TO THE READER

- In the figures in this report, green circles highlight data significantly above the survey average. Red circles highlight results significantly below the average.
- DK/DA represents "don't know" and/or "didn't answer".
- The graphs report scores obtained by: the totality of respondents; respondents across different regions; respondents in large companies employing more than 1,000 persons and LEADERS.
- For the reader's convenience, the word "average" has been used throughout the text to indicate mean scores computed across all respondents.

MAIN RESULTS

CLIMATE CHANGE HAZARDS

Companies were presented with a list of hazards that could have both direct and indirect impacts on an organization. These hazards included sudden extreme events, like storms and floods, and slow-onset or long-term stresses, such as sea level rise and drought.

Respondents were asked to identify which of these hazards will have the biggest direct or indirect impact on their organization, while being allowed to select as many answers as they deemed relevant.

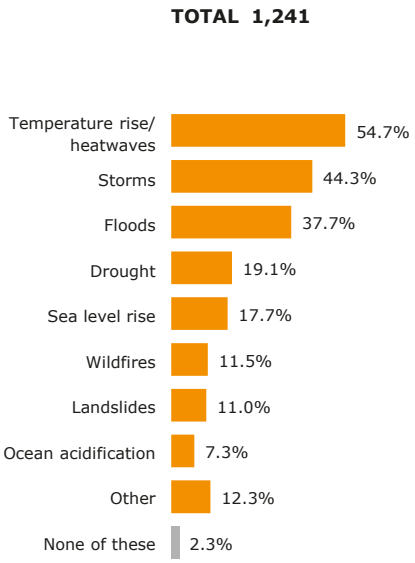
A large majority of companies surveyed mentioned at least one hazard from the list. Increased temperatures coupled with heatwaves topped the ranking of threats, with 55% of respondents selecting this option. In addition, storms (44%) and floods (38%) were also rated highly by respondents. These three top risks are followed, at a considerably lower level, by the other hazards in the list: drought (19%), rise in sea levels (18%), wildfires (12%), landslides (11%) and ocean acidification (7%). Large companies scored higher for almost all hazards.

The ranking of hazards is influenced by geographical factors. For example, in Central and South America and Europe, about 6 in 10 companies identified temperature rise/heatwaves as the dominant hazard, while in North America 6 in 10 companies identified storms as the hazard with the biggest impact.

LEADERS score higher than average for all listed hazards.

WHICH CLIMATE CHANGE RELATED HAZARDS WILL HAVE THE BIGGEST DIRECT OR INDIRECT IMPACT TO YOUR ORGANIZATION?

Figure 3: Climate change related hazards



Europe	Asia	North America	Central South America	Large Companies	LEADERS
n=465	*n=543*	*n=71*	*n=93*	*n=224*	*n=161*
58.7%	53.2%	35.2%	60.2%	59.4%	55.9%
45.2%	37.9%	62.0%	53.8%	48.7%	50.9%
33.6%	40.3%	35.2%	46.2%	47.3%	44.1%
20.0%	14.2%	22.5%	33.3%	23.2%	24.8%
20.7%	16.0%	9.9%	14.0%	20.1%	21.7%
11.8%	7.9%	21.1%	21.5%	13.4%	13.0%
8.8%	12.2%	7.0%	18.3%	13.8%	14.3%
7.3%	7.7%	4.2%	6.5%	9.4%	9.3%
12.7%	12.5%	18.3%	8.6%	8.9%	13.0%
1.3%	3.5%	1.4%	1.1%	1.3%	0.0%

CLIMATE-RELATED HAZARDS AFFECT THE ENTIRE VALUE CHAIN

Climate change and extreme weather events can affect a company's entire value chain, beyond corporate and national borders.

Depending on location some parts of the value chain will need to cope with slow-onset or long-term stresses, such as higher temperatures, a rise in sea levels, drought and ocean acidification. Other parts of the value chain could be exposed to sudden shocks such as floods, storms, heatwaves, landslides and wildfires.

These hazards are associated with an array of uncertainties regarding their timing, location and severity. Historical records on hazards provide some information about the frequency, duration, and severity of specific events. When the aim is to project future climate conditions, these records need to be complemented by appropriate models.

A GIS (Geographical Information System) that combines historical records with climate models can provide a digital solution for companies and decision-makers in assessing and managing their global and local risks for extreme weather and climate change related hazards. In figures A and B*, DNV GL's tool C-GEAR (Climatic Geo Enhanced Assessment of Risks) illustrates the two hazards that respondents in this survey said were of greatest concern: increased temperatures and storms.

Climate models have been used to project global temperature changes, whereas historical data has been used to predict storm patterns. As an example, the storm tracks of Hurricane Irma and Hurricane Harvey in 2017 are displayed. A GIS environment enables a visual understanding of climate trends, whilst allowing the incorporation of models for the estimation of impacts and risk on specific locations and geographies.

* Figures A and B on the next page show (A) a projection for global macro-level temperature increases in 2070 and (B) the Americas for storm patterns. C-GEAR can also illustrate the same pictures at a local geographical level and thus be used by companies in their risk analyses, for example.

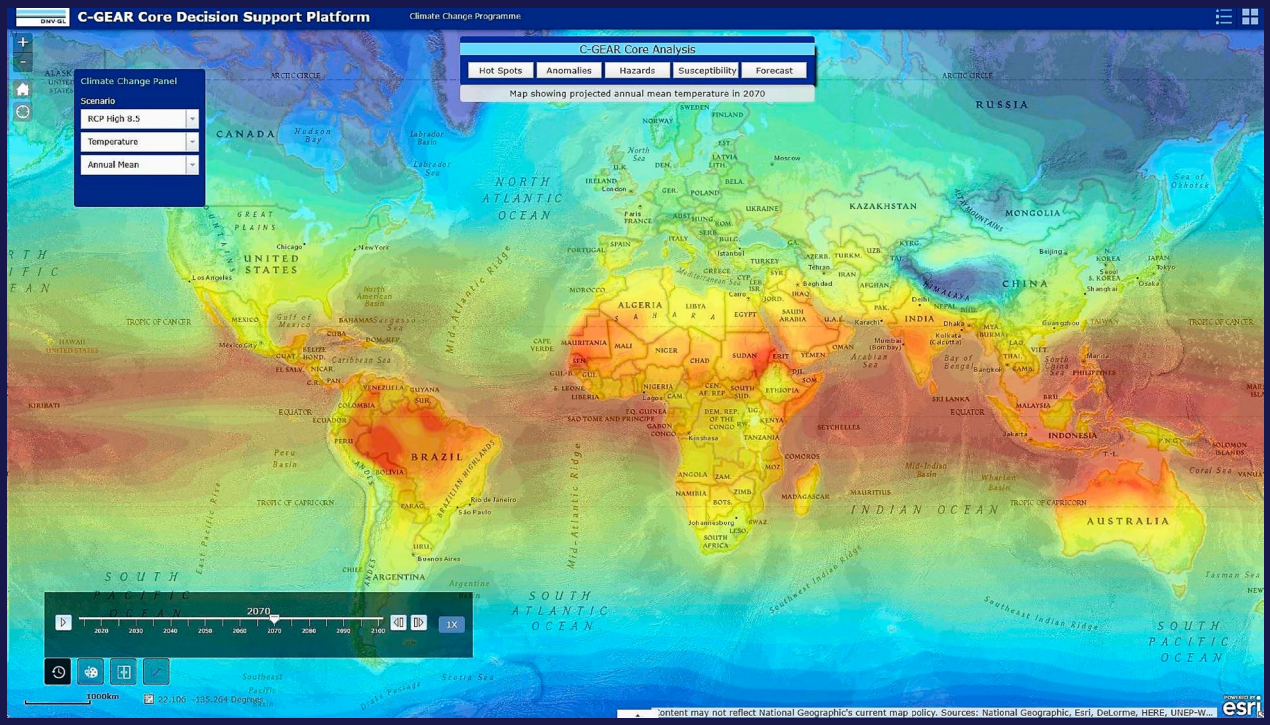


Figure A: C-GEAR displaying a projection for global macro-level temperature increases in 2070.

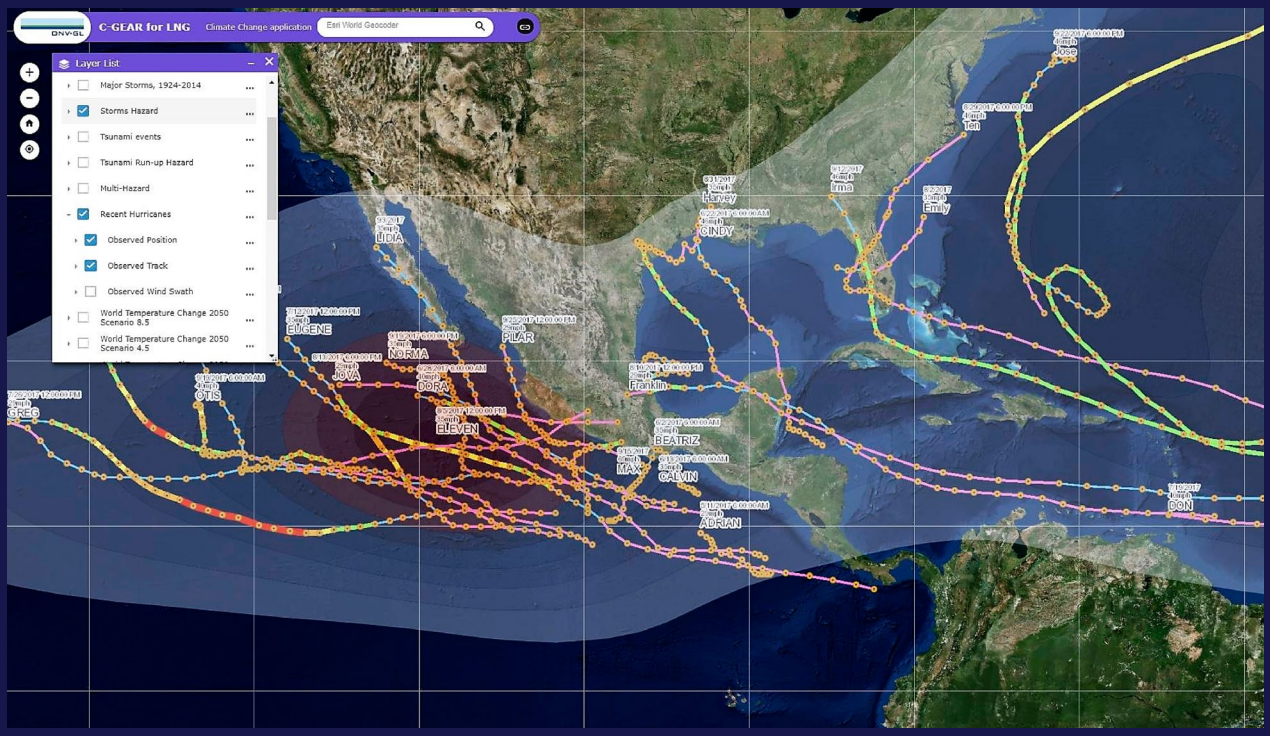


Figure B: C-GEAR displaying storm patterns for the Americas.

WHEN IMPACTS ARE EXPECTED IN THE VALUE CHAIN

Many companies expect climate change to have noticeable impacts on their organizations' value chains in the not too distant future.

We asked respondents when they expected that climate change will have noticeable impacts on four separate aspects of their value chain: own assets, operations, supply chains, and customers & markets. Figure 4 shows the results.

More than 1 in 4 companies indicate that at least one area of their value chain has already been impacted. Close to 1 in 2 companies foresee at least one impact in their value chain within 5 years and about 6 in 10 companies indicate at least one impact within a 10-year window.

More than 1 in 10 companies indicate that their assets have already been impacted at least once. Additionally, 17% of companies are noticing impacts on their operations, supply chains (12%) and customers & markets (13%).

The proportion of LEADERS indicating that climate change impacts are already noticeable is higher than the proportion across all companies surveyed:

- Own assets (25%) scores almost twice the average percentage (11%).
- The highest gap - 20% - is for operations (37% vs. 17%)
- Impact on supply chains scores 23% for LEADERS versus 12% on average.
- For customers & markets, the score for LEADERS is 30%, while the average score is 13%.

WHEN DO YOU EXPECT CLIMATE CHANGE TO HAVE NOTICEABLE IMPACTS IN YOUR ORGANIZATION'S VALUE CHAIN?

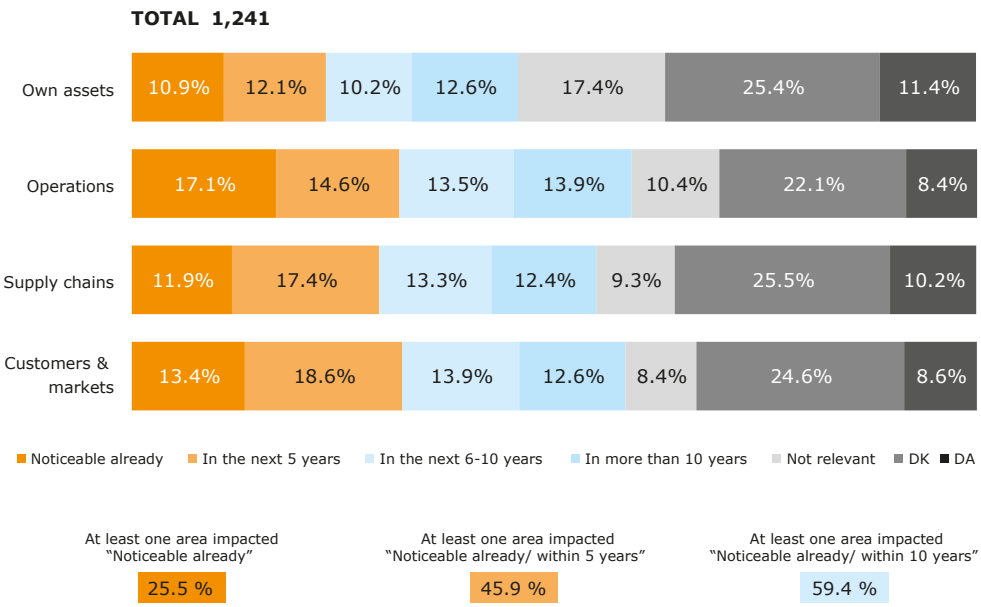


Figure 4: Expected noticeable impacts in the value chain

Looking more closely at companies' own assets (see Figure 5), about 1 in 4 respondents indicate that climate change is either already impacting or will impact their assets in the next five years.

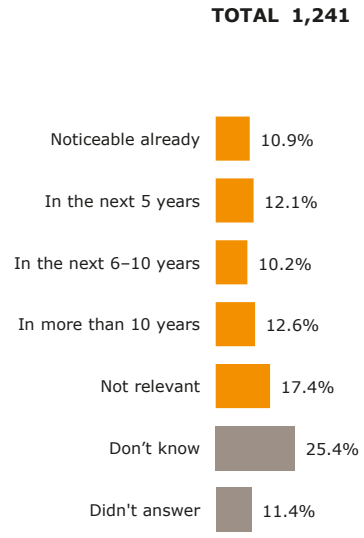
Among leaders, 1 in 4 report that impacts of climate change are noticeable already.

Only about 17% of respondents think that climate change will have no impact on their own assets. About 1 out of 3 did not reply or admitted that they had no clear opinion as to the timing of climate change impacts on their assets.

Figure 6 compares LEADERS to all other companies regarding whether they have already noticed impacts of climate change on their own assets, operations, supply chains and customers & markets. The results indicate that LEADERS, to a far greater extent than other companies, identify climate change as already having an impact on their value chain.

WHEN DO YOU EXPECT CLIMATE CHANGE TO HAVE NOTICEABLE IMPACTS IN YOUR ORGANIZATION'S VALUE CHAIN?

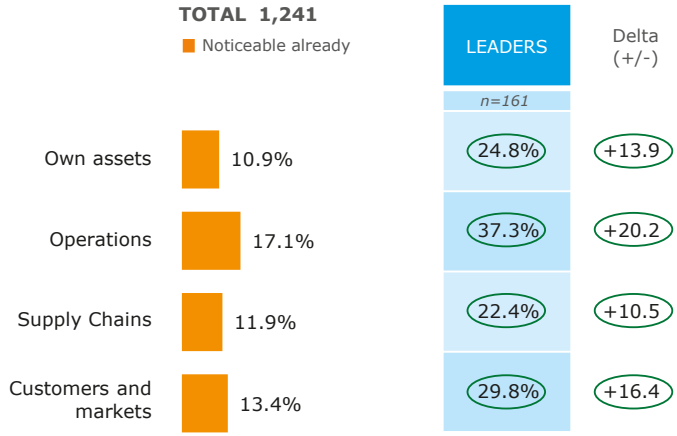
Figure 5: Time estimates for noticeable impacts on own assets



	Europe	Asia	North America	Central South America	Large Companies	LEADERS
	n=465	*n=543*	*n=71*	*n=93*	*n=224*	*n=161*
Noticeable already	11.0%	8.8%	9.9%	20.4%	13.8%	24.8%
In the next 5 years	9.7%	14.9%	8.5%	11.8%	13.8%	13.7%
In the next 6–10 years	12.0%	7.7%	11.3%	9.7%	13.0%	11.2%
In more than 10 years	16.8%	8.7%	8.5%	18.3%	13.8%	14.3%
Not relevant	22.2%	13.3%	23.9%	14.0%	15.6%	15.5%
Don't know	20.7%	30.4%	35.2%	17.2%	19.6%	9.3%
Didn't answer	7.7%	16.2%	2.8%	8.6%	10.3%	11.2%

WHEN DO YOU EXPECT CLIMATE CHANGE TO HAVE NOTICEABLE IMPACTS IN YOUR ORGANIZATION'S VALUE CHAIN?

Figure 6: Expectations on already noticeable impacts in the value chain – LEADERS versus average



FINANCIAL STABILITY BOARD

DISCLOSURE OF CLIMATE-RELATED RISKS
The Financial Stability Board (FSB) established an industry-led task force, the Task Force on Climate-related Financial Disclosures (TCFD). TCFD developed voluntary, consistent climate-related financial disclosure mechanisms so that companies can measure and evaluate their own risks and report on the financial risks posed by climate change.

Financial disclosure of climate-related risks in companies' main annual reporting provides lenders, insurers and other stakeholders with information to assess and price climate-related risks and opportunities and thereby support capital-allocation decisions.

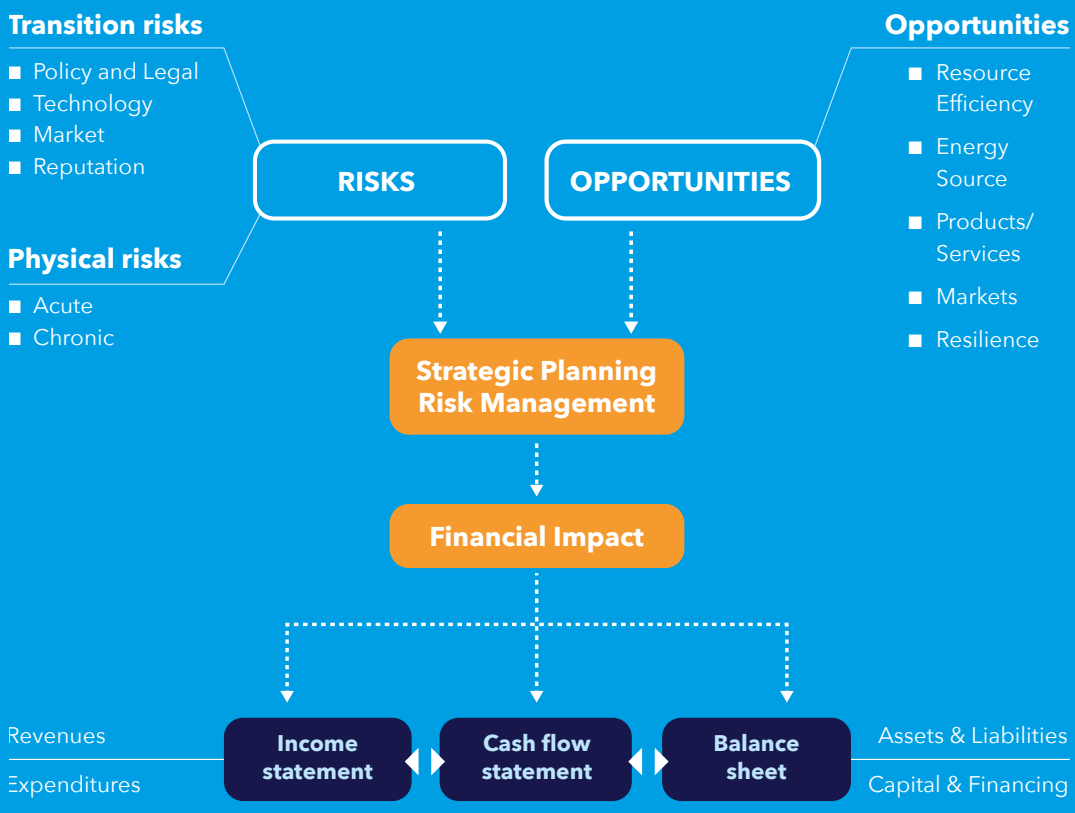
The TCFD recommendations are structured around four core elements related to how companies operate: governance, strategy, risk management, and metrics and targets. The four elements are supported by recommended disclosures. For example, there is a focus on building resilience into the strategy and on taking different climate-related scenarios into consideration in developing strategies.

The figure on page 16 shows how the FSB categorizes risks and opportunities and how they affect a company's strategic planning and risk management and consequently financial performance. In the FSB's framework, risks are divided into physical risks (those that relate to the impacts from chronic or acute events) and transition risks (those that arise from changes in policy, technology, the market or reputation related to the transition to a low-carbon economy).

While these recommendations are voluntary, the FSB envisions increasing adoption over a 5-year time-frame towards a state where companies disclose consistent and comparable information, these risks and opportunities are appropriately priced, and a broad understanding of the financial system's exposure to climate-related risks is achieved.

CLIMATE-RELATED

RISKS, OPPORTUNITIES, AND FINANCIAL IMPACT



The figure is based on "Recommendations of the Task Force on Climate-related Financial Disclosures", June 2017, ref. https://www.fsb-tcfd.org.

DRIVERS OF CLIMATE CHANGE ADAPTATION ACTIONS

Respondents were asked to identify the driving factors for their organisation in developing climate change adaptation actions. They could select all the options they believed applied to their organisation.

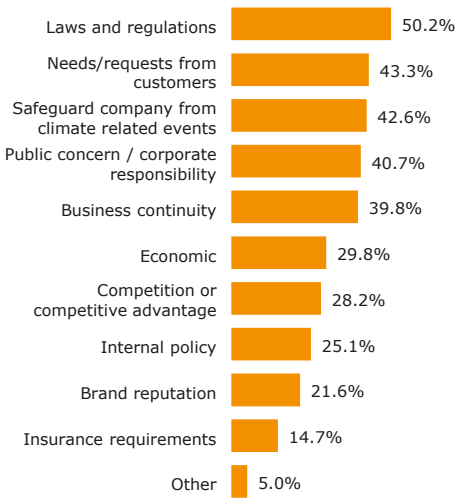
"Laws and regulations" (50%) is the top driver. This is followed by "Needs/requests from customers" and "Safeguard company from climate related events", both with 43%. Then comes "Public concern/ corporate responsibility" and "Business continuity", both with 40%.

For large companies and LEADERS, the landscape of drivers is quite clear. They indicate all driving factors at a higher rate than the average and interestingly "Public concern/corporate responsibility" is indicated as equally important to "Laws and regulations". The latter is instead clearly favoured in the overall average.

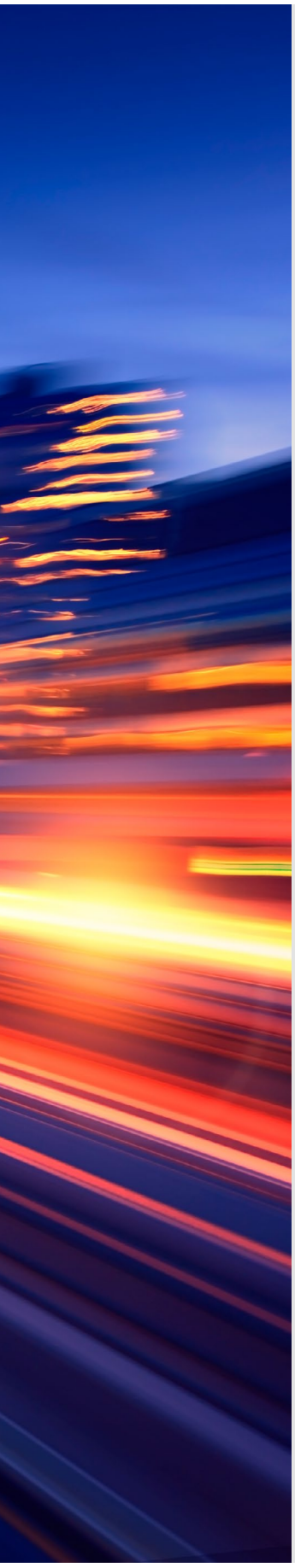
LEADERS score higher than average for all the driving factors.

WHAT ARE THE DRIVING FACTORS FOR YOUR ORGANIZATION IN DEVELOPING ACTIONS FOR CLIMATE CHANGE ADAPTATION?

Figure 7: Drivers for companies in developing actions for climate change adaptation



Europe	Asia	North America	Central South America	Large Companies	LEADERS
n=465	*n=543*	*n=71*	*n=93*	*n=224*	*n=161*
52.3%	49.5%	38.0%	52.7%	58.0%	53.4%
42.4%	46.0%	35.2%	36.6%	48.2%	53.4%
38.1%	44.9%	40.9%	44.1%	47.3%	55.3%
44.3%	36.7%	36.6%	49.5%	58.0%	58.4%
37.2%	39.4%	36.6%	55.9%	50.5%	54.7%
31.6%	25.1%	36.6%	40.9%	38.0%	37.9%
30.5%	25.8%	26.8%	26.9%	39.7%	41.6%
27.1%	21.7%	18.3%	36.6%	33.5%	36.0%
24.5%	18.4%	11.3%	23.7%	35.3%	35.4%
17.2%	11.6%	21.1%	11.8%	19.2%	19.9%
6.0%	3.9%	12.7%	1.1%	1.8%	6.2%



THE INTERNATIONAL STANDARD ON BUSINESS CONTINUITY

Business continuity is chosen by 4 in 10 respondents as an important driving factor for their company to develop climate change adaptation actions. Business Continuity is defined as the capability of the organization to provide continued delivery of products or services at acceptable predefined levels, despite potential, likely or actual disruptive events, such as in the event of climate change related hazards.

Disasters can strike at any time. These range from large-scale natural catastrophes and acts of terror to technology-related accidents and environmental incidents. The causes of hazards may be different – whether human negligence, malevolence or natural disasters – but to have a good plan for how to ensure continued operations is critical, regardless.

The ISO 22301:2012 standard specifies requirements for planning, establishing, implementing, operating, monitoring, reviewing, maintaining and continually improving a documented management system to protect against, reduce the likelihood of occurrence, prepare for, respond to, and recover from disruptive incidents when they arise.

The requirements specified in ISO 22301 are generic and intended to be applicable to all organizations, or parts thereof, regardless of type, size and nature of the organization.

ISO 22301 has adopted the new High-Level Structure (HLS) and standardized text agreed in ISO. This ensures consistency with all future and revised management system standards, making it easier to integrate with ISO 9001 (quality), ISO 14001 (environmental), ISO 45001 (occupational health and safety) and ISO/IEC 27001 (information security), for example.

PROCESSES MOST SUBJECT TO ISSUES

Using our performance benchmarking tool, Lumina™ [3], we analyzed the audit data of DNV GL customers worldwide with an ISO 22301 certified business continuity management system audited from January 2015 to September 2017. This included approximately 1,500 records of findings. On average a business continuity management system audit ends up with 2 findings per day of audit. Out of these, approximately 1.3 findings per day are identified in **Chapter 8 Operation**.

[3] Lumina™ is a registered trademark of DNV GL. To find out more about Lumina™, visit **dnvgl.com/lumina**

The table in figure A shows, based on the F/d (findings per day) metric in the business continuity management system, the 5 areas/processes that are most often subject to issues. To indicate the degree of severity, we distinguish severe findings from all findings. It is relevant to note that 4 out of the top 5 finding areas relate to **Chapter 8 Operation**.

TOTAL NUMBER OF ISO 22301 CERTIFICATES ISSUED WORLDWIDE

If we look at the number of 22301 certified companies worldwide, we notice a steady increase since the standard was launched in 2012. The tables below show the breakdown of certificates, geographical spread and top countries as reported in the ISO Survey 2016.[4]

Description	Process	Severe findings	All findings
Establish and implement business continuity procedures	8.4	0.08	0.42
Business impact analysis and risk assessment	8.2	0.10	0.39
Exercising and testing	8.5	0.05	0.24
Business continuity strategy	8.3	0.04	0.20
Documented information	7.5	0.02	0.08

Figure A. 5 areas/processes most often subject to issues.

Standard	Number of certificates in 2015	Number of certificates in 2016	Change	Change in %
ISO 22301	3133	3853	720	+23%

Figure B: Growth of ISO 22301 certification from 2015 to 2016.

Geographical Breakdown	Year 2016
TOTAL	**100%**
Africa	1.7%
Central / South America	1.1%
North America	4.7%
Europe	27.7%
East Asia and Pacific	18.2%
Central and South Asia	41.8%
Middle East	4.8%

Figure C: Geographical breakdown in 2016

Top 10 countries (number of companies certified)	
India	480
United Kingdom	345
Japan	200
Singapore	160
Netherlands	64
Republic of Korea	48
United Arab Emirates	47
Philippines	43
USA	40
Turkey	39

Figure D: Top 10 countries in 2016.

[4] ISO Survey of Management System Standard Certifications 2016: https://www.iso.org/the-iso-survey.html

ACTIONS UNDERTAKEN OR PLANNED

We asked respondents to indicate whether their organisations are taking any adaptation or resilience actions.

A total of 40% of respondents report that they are currently implementing or in the process of planning actions. Another 25% say they plan to assess relevant actions within the next 3 years.

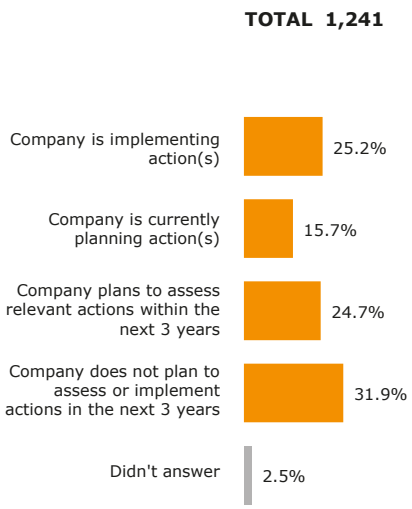
For large companies, 40% say that they are already deploying either adaptation or resilience actions against climate change risks. An additional 40% report currently planning actions or an intention to assess actions within the next 3 years.

Inclusion in the LEADER category requires answering that the company is currently implementing actions, which explains their 100% score for this metric.

North America stands out relative to the other regions, with a smaller proportion of companies reporting that they are currently implementing or planning actions and a higher proportion reporting no plans to assess or implement actions in the next 3 years.

IS YOUR ORGANIZATION TAKING ADAPTATION OR RESILIENCE ACTIONS TO CLIMATE CHANGE AND EXTREME WEATHER?

Figure 8: Adaptation or resilience actions



	Europe	Asia	North America	Central South America	Large Companies	LEADERS
	n=465	*n=543*	*n=71*	*n=93*	*n=224*	*n=161*
Company is implementing action(s)	23.7%	26.7%	16.9%	24.7%	40.2%	100%
Company is currently planning action(s)	14.2%	15.8%	8.5%	26.9%	17.4%	0%
Company plans to assess relevant actions within the next 3 years	28.8%	17.9%	35.2%	33.3%	22.8%	0%
Company does not plan to assess or implement actions in the next 3 years	32.0%	35.4%	39.4%	14.0%	17.9%	0%
Didn't answer	1.3%	4.2%	0.0%	1.1%	1.8%	0%

BENEFITS AND RETURN ON INVESTMENT

We asked the 313 companies indicating that they are implementing adaptation or resilience actions what benefits they expect from these measures. Respondents were instructed to select all the options they deemed applicable to their organizations.

Companies that are already taking actions cite "Decrease of environmental accidents" (53%) as the most expected benefit generated by their adaptation or resilience actions.

The relevance of external market-related benefits is high as well, along with "Competitive advantage" (45%) and "Financial savings" (44%) scoring very close to the top expected benefit.

In general, companies predict adaptation or resilience actions to provide several advantages, including improved relations with stakeholders, employees, authorities and shareholders.

The return on climate-related investments is expected in a short timeframe. Almost 1 company in 2 is expecting a return in 5-years' time, while a return is forecasted within 10 years for about 6 in 10.

LEADERS, as well as large companies, score higher than the average for all the possible responses. Interestingly, LEADERS view benefits not just in financial terms but see a more far-reaching value creation.

LEADERS are expecting return on investments in a shorter time span, with 1 in 2 expecting returns within a 5-years window (see figure 10).

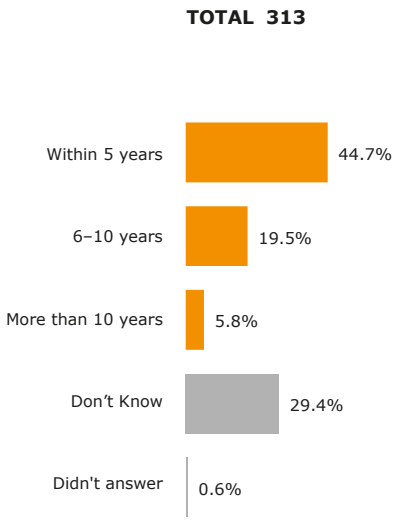
WHAT BENEFITS DO YOU EXPECT FROM THESE MEASURES?

Figure 9: Expected benefits

	Europe	Asia	North America	Central South America	Large Companies	LEADERS
	n=110	*n=145*	*n=12*	*n=23*	*n=90*	*n=161*
Decrease of environmental accidents	43.6%	63.5%			51.1%	55.3%
Competitive advantage	50.9%	42.8%			52.2%	52.2%
Financial savings	45.5%	42.1%			43.3%	47.2%
Improved relations with other stakeholders	38.2%	38.6%			48.9%	44.1%
Increased brand equity	42.7%	36.6%			45.6%	41.6%
Improved relations with employees	34.6%	30.3%	*Low sample*		34.4%	39.1%
Improved relations with authorities	40.0%	29.0%			45.6%	42.9%
Shareholder satisfaction	38.2%	18.6%			38.9%	35.4%
Value creation	29.1%	24.1%			36.7%	35.4%
Other	6.4%	5.5%			7.8%	9.3%
No benefits achieved	1.8%	0.0%			0.0%	1.2%

WHAT IS THE TIMEFRAME FOR RETURN ON INVESTMENT FOR THESE MEASURES?

Figure 10: Time expected for return on investments



	Europe	Asia	North America	Central South America	Large Companies	LEADERS
	n=110	*n=145*	*n=12*	*n=23*	*n=90*	*n=161*
Within 5 years	51.8%	40.0%	*Low sample*		44.4%	51.6%
6–10 years	19.1%	17.2%			21.1%	19.3%
More than 10 years	5.5%	6.2%			5.6%	7.5%
Don't Know	22.7%	35.9%			27.8%	21.7%
Didn't answer	0.9%	0.7%			1.1%	0.0%

BARRIERS TO CLIMATE CHANGE ADAPTATION ACTIONS

When asked about the barriers preventing implementation of measures to enhance adaptation capabilities in their organisations, respondents indicate four main factors: "Costs of implementing adaptation measures" (36%), "Lack of awareness" (35%), "Climate change considered to have limited impact" (34%) and "Lack of long term focus" (33%).

Companies could select any options applicable to their organisation. It is interesting to note that "Lack of policy and/or regulatory incentives" is indicated by almost 1 in 4 companies.

When it comes to the cost of implementing measures, 41% of the large companies and 50% of the LEADERS identify this as one of the main barriers, well above the average of all respondents.

LEADERS report lower percentages relative to the average for all barriers except for the costs of implementation (50% vs 36%).

WHAT ARE THE MAIN BARRIERS FOR YOUR ORGANIZATION TO ADOPT MEASURES TO ENHANCE RESILIENCE TO CLIMATE CHANGE AND EXTREME WEATHER?

Figure 11: Main barriers to the adoption of climate change adaptation measures

	Europe	Asia	North America	Central South America	Large Companies	LEADERS
	n=465	*n=543*	*n=71*	*n=93*	*n=224*	*n= 161*
Cost of implementing adaptation measures	29.9%	39.0%	26.8%	46.2%	40.6%	50.3%
Lack of awareness	28.6%	42.9%	21.1%	33.3%	32.1%	25.5%
Climate change considered to have limited impact	39.8%	29.7%	45.1%	23.7%	30.4%	23.0%
Lack of long term focus	30.1%	36.5%	23.9%	40.9%	29.5%	28.0%
Lack of policy / regulatory incentives	26.5%	19.5%	15.5%	29.0%	26.3%	21.1%
Lack of leadership from top management	14.6%	13.3%	9.9%	20.4%	11.6%	12.4%
Lack of providers / supplier of services	2.6%	10.5%	2.8%	5.4%	5.8%	6.2%
Other	11.2%	12.0%	25.4%	6.5%	10.3%	13.0%

CLIMATE CHANGE RISK AND VULNERABILITY ASSESSMENTS

We asked respondents to indicate whether or not they have conducted at least one climate change risk or vulnerability assessment for their own operations, assets, customers & markets and supply chain.

A total of 1 in 2 companies has already performed or plans to execute over the next 3 years an assessment in at least one of the four areas. Companies are mainly focused on their own organizations, with 17% having carried out an assessment for their own operations and 16% for their own assets.

The geographical variation in responses is striking, with Central/South American respondents scoring above average in all four categories of assessments, European respondents scoring near average in all four, and Asian and North American respondents scoring below average in all four.

For those companies that have already performed an assessment, we found that the rate of implementing further adaptation/resilience actions is high as well.

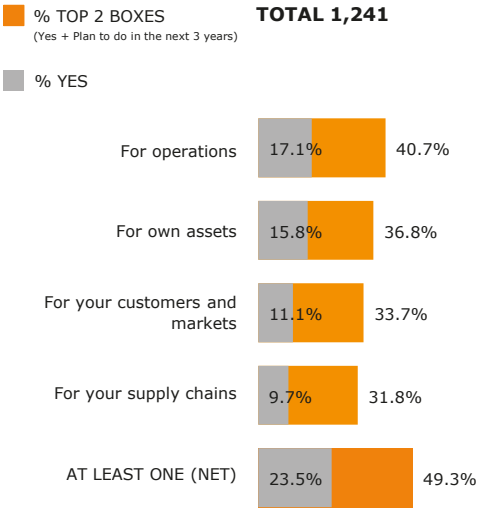
More than 60% of the companies that have already conducted an assessment – on assets, operations, supply chains or customer & markets – are already carrying out actions for climate change adaptation or resilience.

By definition, all of the LEADERS have performed at least one assessment in at least 1 of the 4 categories.

The majority of LEADERS have performed risk or vulnerability assessments on their operations (92%) and their assets (80%). For these particular categories, the difference against the average is also unusually high.

HAS YOUR ORGANIZATION PERFORMED A CLIMATE CHANGE RISK OR VULNERABILITY ASSESSMENT?

Figure 12: Performed climate change risk or vulnerability assessments



% TOP 2 BOXES (Yes + Plan to do in the next 3 years)

Europe	Asia	North America	Central South America	Large Companies	LEADERS
n=465	*n=543*	*n=71*	*n=93*	*n=224*	*n=161*
43.9%	35.0%	26.8%	57.0%	48.2%	91.9%
38.3%	33.5%	26.8%	50.5%	43.8%	80.1%
37.0%	29.7%	19.7%	47.3%	34.4%	66.5%
34.6%	26.9%	23.9%	47.3%	33.9%	62.1%
52.7%	44.0%	33.8%	66.7%	52.7%	100%

BEST PRACTICES FOR RISK MANAGEMENT

RISK MANAGEMENT AND CLIMATE CHANGE ADAPTATION

In the global economy, with transitional changes across economic sectors and industries, effective and informative risk management is a competitive advantage.

Organizations that have well developed and implemented processes for risk management will have a better basis for decision making and experience fewer surprises. It establishes a foundation for improved planning, performance and effectiveness, and consequently better relationships with stakeholders. A risk management strategy for adaptation should be an integral part of the risk management framework in any organisation, as it allows companies to develop a balanced portfolio of actions to reduce their vulnerability and build resilience towards climate change.

Risk management addressing climate change adaptation builds on generic risk management principles. However, since climate conditions are changing, past (historical data) cannot serve as a reliable guide for the future. Therefore, the effects of upcoming climate changes must be integrated into the risk assessment. This can be done, for instance, by incorporating projections of future climatic changes.

Thereafter, the adaptation risk assessment is a structured process by which climate-related hazards are identified based on an understanding of relevant climate scenarios and their potential adverse impacts to the system whose performance is evaluated and described.

A comprehensive strategy, based on risk-based prioritisation schemes, allows for the comparison of adaptation options in a structured way to find the most cost-effective set of actions. The future can be predicted only with a measure of uncertainty – especially when it comes to the timing, location and severity of extreme weather – therefore the uncertainty needs to be quantified and managed in the risk assessment. There are alternative approaches to this, depending on context, data availability and the level of analytical complexity required.

IDENTIFYING THE RIGHT ADAPTATION STRATEGY AND ACTIONS

The scope of an adaptation risk assessment is to identify suitable paths to climate resilience. Some strategies favour infrastructural upgrades, such as flood containment walls, others focus on emergency-preparedness and management, as in the case of early warning systems and evacuation procedures.

Depending on the nature of the hazard and problem at hand, one strategy may be preferable to others. However, initially, the entire range of potential solutions should be considered, along with possible combinations of different strategies.

A feasibility analysis of the adaptation solution from a business, financial and societal standpoint can be conducted using various techniques, including computer simulation. Some adaptation strategies can be rather invasive of ongoing business activities. For example, the installation of flood defense walls may hinder access to facilities and have an adverse impact on daily operations. Thus, benefits need to be weighed against their potential business implications. On the other hand, it has been observed in various contexts that adaptation solutions may carry a broad range of co-benefits for local societies and businesses alike. In relation to this point, adaptation solutions need to be designed considering the social context in which they will be applied, and thus account for local values, customs and practices. It is often beneficial to be transparent with relevant stakeholders by properly mapping and conveying measures, in compliance with corporate social responsibility principles, and to enable platforms for public-private partnerships in implementing adaptation measures.

To summarize, a climate change risk analysis should provide decision-makers with an understanding of what losses and gains are likely to occur in the future, what measures should be taken to reduce losses and when to take them. As the climate changes, potential hazards and impacts need to be monitored on a regular basis and actions and priorities updated continually.

With the recent focus on risk management thinking in the ISO High Level Structure,[5] the company management system (e.g. quality, environment, safety or business continuity) can provide a very good framework for incorporating, analysing and addressing risks and actions on climate change.[6]

[5] All new management standards under the International Standard Organization (ISO) are aligned with a common framework, which include a High Level Structure (HLS) with standard clauses and identical text and common terms and definitions.

[6] Reference: ViewPoint survey "Where are you on the Risk Management journey?", winter 2017: https://www.dnvgl.com/viewpoint.

CLIMATE RESILIENCE-RELATED TOOLS AND SERVICES

We asked respondents whether their companies were likely to procure any tools or services in the next 3 years to build climate resilience. Respondents could indicate the likelihood of purchase under each category of tools and services listed.

Over 50% of respondents indicate their companies are likely to procure at least one tool and/or service for climate resilience in the next 3 years.

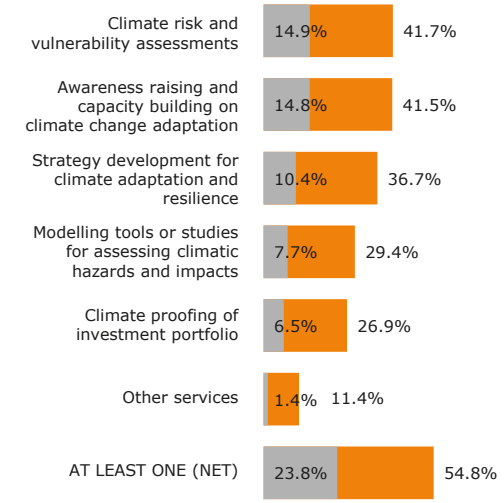
About 40% plan to perform assessments and the same percentage plan to buy specific tools or services to raise awareness and build capacity, while 36% plan to invest in strategy development.

The geographical breakdown of the results parallel the pattern seen in the previous question.

Large companies and LEADERS rated the likelihood of procuring climate change resilience services as particularly high. They indicate percentages well above the average across almost all categories.

IS YOUR ORGANIZATION LIKELY TO PROCURE ANY TOOLS OR SERVICES IN THE NEXT 3 YEARS RELATED TO BUILDING CLIMATE RESILIENCE?

Figure 13: Likelihood of procuring services and/or tools for climate resilience



% TOP 2 BOXES (Yes + Maybe)

Europe	Asia	North America	Central South America	Large Companies	LEADERS
n=465	*n=543*	*n=71*	*n=93*	*n=224*	*n=161*
51.0%	30.9%	32.4%	64.5%	50.0%	62.1%
44.3%	36.8%	25.4%	65.6%	51.8%	65.8%
42.4%	28.4%	28.2%	55.9%	46.4%	62.1%
33.3%	23.0%	21.1%	54.8%	38.4%	49.7%
28.2%	22.8%	15.5%	48.4%	37.1%	47.8%
9.7%	11.8%	14.1%	16.1%	13.8%	14.9%
64.1%	44.2%	40.9%	79.6%	63.8%	77.0%

OUR FINAL THOUGHTS

The survey on climate change adaptation and resilience shows that most organizations are aware of climate change hazard related issues, but many of them have not yet taken action to address these. At the same time, the majority believes that their organization will be impacted within the next 10 years. These results indicate that many companies are at the beginning of a journey to tackle climate change adaptation and resilience.

In the survey, only 25% of the respondents indicate they have already acted to address the impacts of climate change. At the same time, 98% of the respondents indicate that climate change related hazards will impact their organization, with temperature rise/heat waves, storms and floods being of biggest concern.

Laws and regulations are the primary drivers for taking action for half of the companies. In addition, the ability to safeguard the company from climate related events (43%) and the ability to assure business continuity (40%) drives the agenda. Interestingly, two other drivers that score about 40% are the needs and requirements of customers together with public concern and corporate responsibility, indicating a tendency that companies are taking a more external view, as well.

Among the companies surveyed, there was a small share of companies that differed from the average by a noticeable margin in almost every area of the survey. They seem to be farther ahead in the journey and we have therefore identified them as LEADERS. These LEADERS[7] report a greater concern for every climate hazard than the average company. Far more LEADERS report climate change as already having an effect on their organization's value chain. LEADERS' actions seem to be influenced by multiple aspects, as they score well above average for almost all of the drivers. At the same time, they see fewer barriers to implementing actions, as they score below average on most of the barriers to enhancing resilience.

LEADERS, per definition, have all taken adaptation and resilience actions. Whilst they identify cost to be a main barrier, LEADERS also indicate a higher willingness to invest in tools and services. At the same time, LEADERS's perception of returns on investments is comparable to the average. This result may be a signal of their awareness and understanding of the negative implications of climate change on their businesses. The survey suggests LEADERS recognize the need and urgency to proactively safeguard their business and value chain, irrespective of the time scales of expected impacts, whether in the short-term or in the distant future.

Contrary to LEADERS, the average company appears less proactive. For this group, lack of awareness, climate change being discounted to a limited impact phenomenon, and lack of long-term focus are barriers scoring almost as high as cost. Owing to this, a sensible path towards structured climate risk management and adaptive action could begin with internal awareness raising and with a better understanding of the issues at hand and possible solutions.

[7] The classification of a company as a LEADER is based on a list of attributes defined by DNV GL, ref. page 6.

Based on the results of this survey, on the experiences shared by LEADERS, and drawing from our own experience in best practices, our suggestions to those who wish to start their journey towards climate change adaptation and resilience are to:

1. Start by using precise language. For example, when discussing resilience building efforts with colleagues, describe the particular hazards that might affect your organization, like heatwaves and flooding, rather than referring more generally to "the impacts of climate change." To identify, prioritize and implement targeted actions it is important to distinguish between the risks and analyze them thoroughly.

2. Decide on the climate change adaptation actions you wish your organization to complete. Our survey suggests that a risk or vulnerability assessment for an organization's own assets and operations is a common first step. Secondly a similar assessment for your supply chain, customers and markets can be carried out.

3. Identify people within your organization who see the benefits of climate adaptation and resilience efforts and are willing to help. Our survey found that the expected benefits of resilience efforts span a variety of categories - some resulted in fewer accidents, others in financial savings, improved relations with customers, employees, authorities and shareholders. People become natural allies when it is clear to them how your actions benefit their area of work or responsibility.

With a clear understanding and commitment from your organization, you have the central elements required to start building a strategy for climate adaptation and resilience.

A structured, risk-based approach, such as a company-wide management system, can be a beneficial foundation to understand the risks and embed climate change adaptation and resilience plans and actions. These could complement ongoing efforts towards greenhouse gas emission abatement, in order to achieve a broader corporate climate strategy.

The picture drawn by the LEADERS indicates that companies need to act now and highlights the importance of building an understanding of the drivers and necessary risks and actions.

Our experience is that since a management system enables a structured approach to proactive management and identification of opportunities and threats, it can clearly support implementation of relevant actions. This may include elements such as loss prevention and incident management to minimize losses. A structured approach will help you build organizational resilience, as well as confidence and trust from stakeholders.

PROFILING THE LEADERS

- LEADERS seem to be aware of the paramount importance of climate change adaptation as a prerequisite for business continuity and for safeguarding company assets.
- Their awareness levels on climate change threats is higher, as demonstrated by the fact that they are not only implementing actions because of compliance with laws and regulations, but because they seem to believe that climate change can impact market performance.
- Climate change issues are becoming central to companies' business continuity today. The topic will continue to be a strategic priority for all businesses. LEADERS seem not only willing to invest in adaptation, but they want to move the whole organization forward, together with the value chain in which they operate, towards climate change resilience.

LEADERS' APPROACH TO CLIMATE CHANGE ADAPTATION

01. LEADERS are very aware of the potential climate impacts on their organizations generated by major climate-related hazards, with the highest concerns being increased temperatures and sudden heatwaves.

02. LEADERS' climate change awareness level is high. They take a broader long-term view while clearly reporting that impacts are felt already or expected within the next few years.

03. The primary driver for LEADERS is a decrease in environmental accidents. In addition, competitive advantage and financial savings are deemed strong drivers.

04. Characterized by having taken at least one adaptation action and one risk/vulnerability assessment, LEADERS are already actively building their climate-change resilience capacity.

05. LEADERS expect higher benefits and quicker returns. Benefits and return on investments from adaptation actions are, however, not merely money-driven. They are valuable in terms of stakeholder relationships and value creation, both for themselves and their stakeholders.

06. LEADERS perceive fewer barriers to action on adaptation and resilience. They are aware that climate change will have a significant impact on their organizations and seem to have a holistic understanding.

07. LEADERS clearly recognize the value of risk and vulnerability assessments to initiate and develop effective climate change adaptation/ resilience in their organizations.

08. LEADERS' risk or vulnerability assessments are to a great extent oriented towards operations and assets.

09. LEADERS are more likely to procure tools or services short-term in support of their climate change adaptation strategy.

10. LEADERS appear likely to invest in at least one tool or service in the next three years, and with higher scores across the portfolio of tools, they seem to be farther along in the adaptation/resilience journey than the rest of the companies surveyed.

CREDITS

DNV GL PROJECT TEAM

- Jørg Aarnes, Group Technology and Research
- Alexander F. Christiansen, Group Technology and Research
- Luca Garrè, Group Technology and Research
- Bradd Libby, Group Technology and Research
- Byron Quan Luna, Group Technology and Research
- Bente Pretlove, Group Technology and Research
- Sille Sjobakk Allum, Business Assurance
- Mauro Crippa, Business Assurance
- Cecilie Løne, Business Assurance

EXTERNAL EXPERTS

- Silvia Colleoni, Cohn & Wolfe
- Daniele Novello, GFK Eurisko

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