

GLOBAL ESG REPORT



COP25: NO SUCH THING AS A FREE LUNCH

04 Increasing regulatory intensity

06 Which sectors are the most exposed?

13 What does this mean for business?

14 The ultimate consequence – business value and asset loss



EXECUTIVE SUMMARY



Catharina Hillenbrand-Saponar,

Sector Advisor for Energy, Metals, and Machinery and Equipment

+33 (0) 1 84 11 41 29

Catharina.HILLENBRAND-SAPONAR@eulerhermes.com



Maxime Lemerle, Head of Sector and Insolvency Research

+33 (0) 184 11 54 01

Maxime.LEMERLE@eulerhermes.com



Marc Livinec, Sector advisor for Chemicals, Pharmaceuticals, Transportation, Agrifood and Transport Equipment

+ 33 (0) 184 11 61 98

Marc.LIVINEC@eulerhermes.com



Aurélien Duthoit, Sector Advisor for Retail, Technology and Household equipment

+33 (0) 1 84 11 45 04

Aurelien.DUTHOIT@eulerhermes.com



Corentin Jousserand, Economic Research Assistant

+33 (0) 184 11 5112

Corentin.JOUSSERAND@eulerhermes.com

- Four years have passed since the Paris Agreement was signed, but it is becoming increasingly clear that progress and policies on emission reductions have been largely insufficient. In a context of rising pressure to meet emissions targets, the COP25 summit is likely to be a catalyst for tightening and intensifying climate change regulation in the years to come. Indeed, the European Parliament just declared a climate emergency and the EU Commission is looking to upgrade national emission reductions to 50% by 2030, from 40% during the course of 2020. Almost every sector will be impacted by these measures.
- To calculate the impact of increasing regulatory intensity on global industry, we analyze the most important measures that are currently enacted or under discussion, grouping them into the following categories: carbon pricing, energy and efficiency mandates, mobility regulations and industry-specific taxes, fines and levies. We calculate that the negative impact will be **nearly USD 2.5tn over the next ten years**.
- **The energy sector will be hit the hardest, with an estimated cost of USD900bn. The steel sector follows, with a cost of USD 300bn. Air and marine transport faces a cost of USD55bn.** Including a number of not yet quantifiable measures, such as shipping speed limit reductions, further emissions cap reductions and industrial regulations could provide further upside to the cost impact. Other sectors at risk include automotive, chemicals, pulp and paper, retail and machinery/manufacturing.

USD 2.5tn

**The negative impact of increasing
regulatory intensity on global
industry over the next 10 years**

Figure 1 Overview of major enacted and debated climate change-related policies and regulations

Regulation	Sector(s)	Impact
Emissions cap/carbon trading - regional	Energy	Coal capacity utilisation reduced to sub 40%, gas marginalised; wholesale switch to renewables including full business overhaul. Global cost of business as usual in coal could cumulate to USD 576bn to 2040
	Airlines	Eur 179bn for each 1% CO2 price increase
	Steel	USD 18/t marginal cost increase for average European steel mill for Eur 10/t increase in CO2
	Retail	Eur 7.5bn for each Eur 10/t incremental cost of CO2
	Chemicals	Eur 20bn globally for CO2 price at next level of fuel switch
	Pulp/paper	Eur 3 60m for Eur mid 30\$/t CO2 price
Carbon border adjustment	Industrials, Metals, other export sectors	Eur 7bn export loss in Europe
Renewable energy mandates	Energy	Complete obsolescence of coal plant, 20-40% reduction in gas plant load factors depending on market structure
EV penetration mandates	Automotive	Loss of core product, factory upgrade, R&D spend
	Energy	Positive due to infrastructure requirement and incremental consumption
Vehicle emission standards	Automotive	Eur 30bn pa potential cost of fines or cost of structural industry change
	Road transport	
	Metals	Opportunity for light weight metals
ICE malus systems and driving restrictions	Automotive	Demand loss
Fuel sulphur content regulations	Shipping	USD 1-6m per scrubber, risk of repeat requirement due to obsolescence, alternative rising cost of fuel
	Airlines	Jet fuel cost increasing by USD 4/bbl
Speed limits for shipping	Shipping	Unknown as yet but cost increase due to reducing average load factors. Increased working capital requirement
Flight restrictions	Airlines	Loss of demand, likely confined to short haul
Building efficiency regulations	Retail	Building, heating/cooling adaptation cost
	Construction	Opportunity for retrofit, new build and building materials
	Electronic components	Opportunity for optimisation technology
Energy demand reduction	Metals	Opportunity for performance materials
	Energy	Volume loss and structural overhaul of the industry
	Oil/gas	Peak demand possibly to arrive already 2030 or before

Measure	Sector	Collective cost to 2030 (USD bn)	Approach/assumptions
Emissions trading	Energy (Europe)	578	Cancellation 2bnt MSR surplus plus cap adjustment -500mt
	Airlines (global)	50	38% price increase CO2, Corsia pricing to USD40/t
	Steel (global)	310	Eur18/t for average steel mill
	Retail (Europe)	11	Current sector emissions
	Chemicals Europe	484	Current sector emissions
	Pulp/Paper (Europe)	440	Current sector emissions
	Industrials (Europe)	7	Export loss from carbon border adjustment
Fuel mix mandates	Energy (Global)	300	Investment cost and residual lifetime
Mobility, vehicle standards, transport norms	Auto (Global selling into Europe)	165	5 years of hypothetical inaction or Eur 10-15bn incremental capex pa
	Shipping (Global)	4	Scrubber installation, fuel adjustment
	Energy (Global)	33	0.3mbpd demand loss from 2025 to 2030 @ USD60/bbl
Total		2382	

Sources: EU, Carbon Brief, Iata, Euler Hermes, Allianz Research

INCREASING REGULATORY INTENSITY

Four years have passed since the Paris Agreement was signed but it is becoming increasingly clear that progress and policies on emission reductions have been largely insufficient. At this stage, greenhouse gas emissions would have to reduce by 7.6% every year until 2030 in order to achieve the targets of the

Paris Agreement: put another way, that is a decline of 55% to reach the 1.5 degree target by 2030. Instead, emissions are still rising (+2.0% pa in 2018) and a peak is not in sight as yet. As a result, the United Nations Environment Programme (UNEP) estimates that efforts need to be stepped up by a factor of

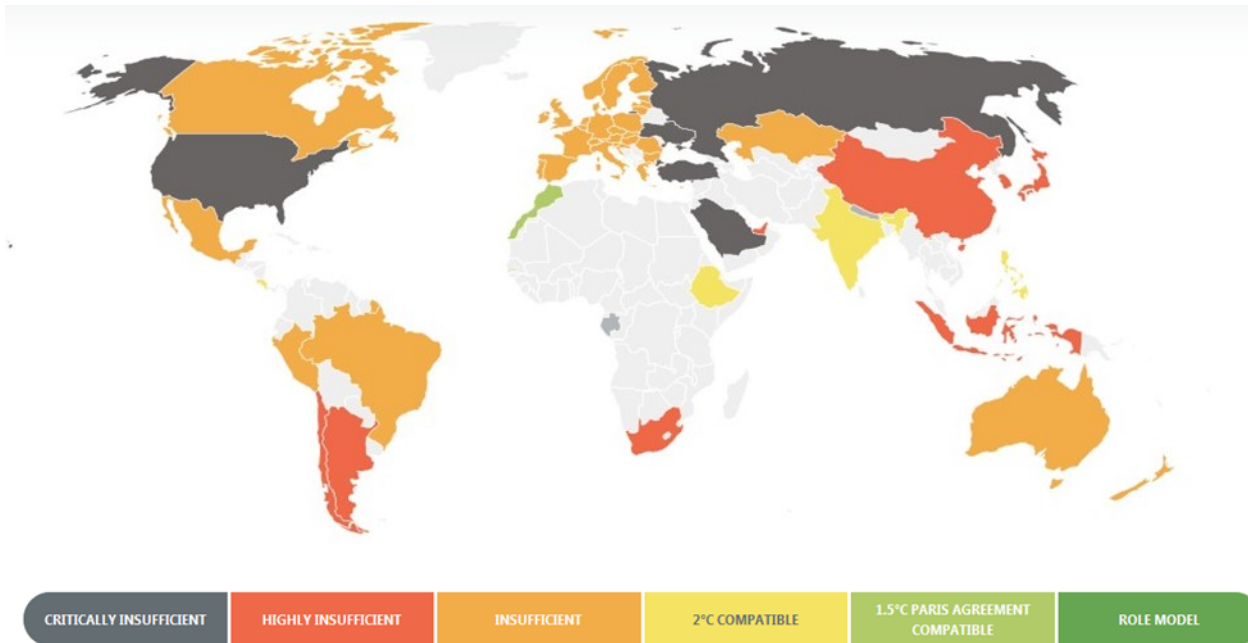
five. While in 1997, there were 72 climate change laws in place globally, by 2018 the number had increased to 1500. In a context of increasing pressure to meet targets, we expect climate change regulation to tighten and intensify in number and reach around the world.

Figure 2 Emissions gap under various scenarios

Scenario	Emissions gap 2030 (GtCO ₂ e)		
	Below 2 Degrees	Below 1.8 Degrees	Below 1.5 Degrees 2100
Current policy	18	24	35
Unconditional NDCs	15	21	32
Conditional NDCs	12	18	29

Source: UNEP

Figure 3 Adequacy of climate policies around the world with regards to the Paris Agreement



Sources: Climate Action Tracker

At the December 2019 COP 25 summit, policymakers are negotiating on a number of elements of the Paris Agreement, including global carbon trading and the implementation of nationally determined contributions (NDCs) for carbon neutrality in 2050. The latter will be a crucial cornerstone, one that could reshape business from 2020.

We believe almost every sector will be impacted by the regulatory tightening ahead. To quantify the impact, we analyse the most important measures that are currently enacted or under discussion, grouping them into the following categories:

- **Carbon pricing** – In this category are measures ranging from carbon levies over local and regional cap and

trade schemes – the most important one being the EU ETS – to initiatives regarding international carbon border adjustments.

- **Energy mix and efficiency mandates** – Policies in this category mandate the build up of renewables, in most cases with 2020, 2030 and 2050 as the key deadlines. This then cascades into technology specific targets and, where applicable, support schemes. With regards to energy efficiency, the target is demand reduction and there is a large number of follow-through regulations that are highly region- and sector-specific. Examples include the new net zero carbon building regulations, several quantified global consumption reduction targets, the banish-

ment of fossil fuels and the share of renewables within the global energy mix almost all over the world.

- **Mobility regulations** – These comprise EV targets, driving restrictions, emissions and vehicle standards, as well as fuel taxes and a shift to public transport by various means. In the widest sense, the scope of this category can be drawn out to transport of different kinds, including commercial.
- **Industry specific taxes, fines and levies** – Here we see environmental levies on airlines, fines on single use plastic bags and other windfall taxes for uncompliant or undesirable activities in the context of climate change.

WHICH SECTORS ARE THE MOST EXPOSED?

Energy

It is well understood that the energy sector is the prime target, and yet, the extent of future pressure still to come may not be fully appreciated. We believe the sector is in the midst of what we consider its largest upheaval since the invention of the light bulb. Climate-related regulation has already come with a negative cost impact of USD 1.4tn over the past 10 years, according to our estimate, and we expect a further cost of USD 900bn in the next 10 years. The following existing and about to be enacted regulations will have the biggest impact:

- **Renewables targets.** In the European Union, 20% of energy consumption is to be covered by renewables in 2020, 32% by 2030 and 50% by 2050. Meanwhile, China is targeting 20% renewables by 2030, and emerging markets are speeding up the pace, too. For example, Morocco targets 52% renewables by 2030. India targets 40% by 2030 but given its progress, it could step up ambitions. The impact is of course directly on fossil fuel power generation but extends further, all the way to up- and mid-stream energy business. We highlight large-scale high capital-intensive LNG infrastructure built in the recent wave as one area of concern.
- **Carbon trading and emissions reductions.** The EU is now targeting full carbon neutrality by 2050, with a 40% reduction goal for 2030. Some countries, such as the UK, are beginning to set net zero carbon

targets for 2050. We expect others to follow suit. As a result, on a regional level, the carbon intensity of power generation portfolios has now become a true competitive differentiator. Furthermore, the EU could see a second round of reform of the emissions trading scheme (EU ETS) in 2023. Meanwhile, the U.S. withdrawal from the Paris Agreement could actually accelerate and intensify state-level initiatives: California is targeting 50% renewables by 2025 and 60% by 2050. New York is aiming for 70% by 2030. China also has an overarching target to have emissions peak by 2030 and carbon intensity to reduce by 60-65% vs 2005. Through complementary regulation, it seems to be ahead of schedule. It launched a pilot scheme this year in a number of cities and is expected to widen it, as well as raise prices. Russia is considering emissions trading regulations, as are a number of other countries around the world. The more countries adopt such schemes, the greater the pressure will be for others to follow, and ultimately, for schemes to integrate.

- **Fuel specific targets and regulations.** These are notably coal exits (2020s-2030s in the EU, state moratoria of new build in the U.S.) but also liquid fuel policies such as ethanol blending and further, policies such as gas boiler bans in homes, heating mandates and others. Fossil fuel vehicle bans currently target timeframes around 2040 (e.g. UK, France).

- **Energy efficiency and demand reduction** – According to the OECD, energy efficiency could deliver 57% of targeted greenhouse gas savings. The EU is targeting a 32% demand reduction by 2030 and 22 U.S. states currently have energy efficiency and savings targets. We expect this, in tandem with digitalisation and smart energy, to become a prime policy lever in the future.

In the aftermath of COP25, the next key steps will likely be the implementation of nationally determined contributions (NDCs). Amongst others, we expect those to lead to widespread upgrades of renewables build-out targets, but also acceleration of coal phase out in regions where this has not already been legislated or enacted. Importantly, we see first indications that gas, until now widely viewed as a green fuel and beneficiary from energy transitions, may face restrictive regulation soon.

In the context of all of the above, we highlight the scope for penalties, taxes, levies and other direct financial tools that can target the sector. Windfall taxes are not only very easily executable but they might provide an additional benefit of fulfilling other non-environment related objectives for policy makers. The energy sector has a substantive negative track record in terms of being at the receiving end in that regard and is in our view one of the single most exposed industries to such risk in our entire universe. By way of example, the UK Labour party has already hinted at oil sector windfall taxes should it be successful in the next election.

Figure 4 Overview of key climate change regulations affecting energy

Regulation	Time frame	Direct Impact		Indirect Impact	
		Positive	Negative	Positive	Negative
Coal exit EU (across Europe)	2025-2040	The supply demand balance of power markets will tighten. The resulting reduction in reserve margins would, all other things being equal, increase power prices, and thus margins of power generators. Counteracted by renewables build.	Loss of value of coal assets. Germany alone estimates the value of support need for affected regions at Eur 40bn. Yet to be closed plant globally could imply value loss in the order of USD 300bn into the mid 2020s	Rising relevance of gas as bridge fuel.	Rising regulatory risk for gas as second most polluting fossil fuel. Undermining of carbon trading and further EU ETS tightening as a result
Renewables shares of power mix (global)	2020, 2030, 2050	Growth and scale for renewables will provide source of earnings growth to substitute lost earnings from fossil fuel based activities albeit <100%	Crowding out of coal, gas assets. Reduced earnings base from smaller scale assets for integrated or transitioning businesses	Enhanced value for infrastructure businesses from Eur 228bn investment requirement according to the EU	Negative cost repercussions upon end markets
Reduction in EU ETS emissions cap to carbon neutrality	2050	Clean power generators will become subsidies free. Alternative processes will improve relative competitiveness.	Rising cost and declining volumes of refining. Risk of reduced utilisation of gas assets	Positive economies of scale with large scale adoption of new technologies	Greater challenge of portfolio optimisation
32% reduction of energy consumption - 1.5% pa (EU)	2030	Growth from new and value added services	Loss of volume	Emergence of broad ecosystems and sector coupling	Rising competitive intensity with new market entrants
EV penetration	2030	Significant infrastructure build out and new revenues for the energy sector. Incremental energy demand and greater demand for value added system services	Reduction of liquid fossil fuel demand. Earlier than expected peak oil demand, potential demand loss of 0.2-0.3mbpd	We estimate 18-41% increase in peak electricity demand in Europe	System strain could require substantial upgrade financing need
Revised EU Energy Performance of Buildings Directive					Reduction of exposure to adverse fuel poverty regulations
28% in primary energy use Germany	2030	200TWh reduction for households, industry, services could imply Eur 36bn loss of revenues for energy suppliers before self help	Ancillary and value added services		
-50% primary energy use Germany	2050				
Carbon neutrality (Germany, UK)	2050				
Emissions trading traffic and buildings (Germany)					
65% renewables (Germany)					
Reinforcement of local networks and prosumer	2050				
National decarbonisation programme for industry (Germany)					
20GW offshore (Germany)	2030				

Sources: Bloomberg consensus, Euler Hermes

Metals & mining

As an energy-intensive segment, steel could face a cost of **USD 300bn** over the next 10 years from intensifying climate regulation. According to CRU, the average industry margin has compressed by USD 180/t since late 2017. We recognise that there were very important drivers not related to climate change underlying this decline in profitability, notably overcapacity. But this has also occurred during the period over which we saw the most significant increase in CO2 prices to date. Rising marginal costs potentially

impact capacity utilisation and in a circular fashion profitability of the sector. We do not see the steel sector as having sufficient pricing power to pass through the impact of rising CO2 prices going forward and, hence, this piece of regulation will hit directly.

The mining segment is also impacted as an energy and emission-intensive sector. Furthermore, it is exposed to increasingly stringent environmental regulation. At the same time, there is opportunity for metals as energy transition increases

demand for performance materials, particularly in those end markets where regulatory targets require growth. The most important one is renewable energy, where build-out regulations could drive metals demand. Another example is fuel efficiency standards that would propel aluminium use in cars.

Figure 5 Overview of key climate change regulations affecting metals and mining

Regulation	Time frame	Direct Impact		Indirect Impact	
		Positive	Negative	Positive	Negative
More stringent emissions reporting and tightening of allowances	2020s	Transparency and development of alternative and mitigation technologies	Significantly increased cost base for the steel sector; shift towards higher grade ores. USD 18/t marginal cost increase for average European steel mill for Eur 10/t increase in CO2. We estimate 360bps of gross margin compression for each Eur 10/t increase in the price of CO2 allowances.	Risk of demand destruction and regional flow diversions	Potential loss of competitiveness (see carbon border adjustment)
EV penetration targets	2030	Rising demand for battery materials, particularly lithium and copper		Commodities price support	Commodities market volatility in function of progress to target

Sources: Eufor, Euler Hermes, Allianz Research

Air transport

Worldwide air transport is covered by the CORSIA system (Carbon Offsetting and Reduction Scheme for International Aviation), an emission mitigation scheme adopted three years ago. The total offsetting requirements are estimated to be around 2.5 billion tonnes of CO2 from 2020 to 2035. In function of the set carbon price, carbon offsetting would thus amount to a cost of **USD16-42bn** for airlines, around 1% of total revenues from international aviation in 2035 (source: IATA). We think there is ample scope for the CORSIA cost to rise as the implied current level is far removed from even the cheapest abatement technologies. In Europe, air

transport is additionally covered by the EU ETS. By virtue of that alone, the sector is at a stage where regulation is starting to bite as a result of rising CO2 prices, up over 200% since early 2018 in the European system. We estimate a negative impact of EUR180mn for each 1% increase in CO2 prices. If CO2 prices rose from the current EUR25/t to EUR35/t, this would imply an incremental cost of close to EUR8bn on the basis of current allocations alone.

Beyond this, some European countries have also been calling for increased taxation and/or CO2 levies. There is also growing support for rail and related infrastructure in order to incentivise

the air to rail switch. Germany recently increased air travel taxes and in France, there have been calls for a ban of domestic flights for short journeys. The industry could also be affected indirectly by fuel sulphur content regulations for the shipping industry (see below). This is because of related changes in the refining market that could possibly remove jet fuel supply from the market. It is also possible that jet fuel prices could increase. The US Energy Information Administration estimates the jet fuel crack spread could increase to USD 17/bbl. Forwards are in the region of USD 18-19/bbl for 2020.

Figure 6 Overview of key climate change regulations affecting airlines

Regulation	Time frame	Direct Impact		Indirect Impact	
		Positive	Negative	Positive	Negative
CORSIA emissions offset and reporting	from 2020/2025	Levels out differences between EU ETS covered and non covered airlines - positive for EU airlines exposed to long haul routes	Faster obsolescence of aircraft. Incremental cost to upgrade the fleet. We estimate an average airline might have to spend USD 7.4bn on fleet renewal for purposes of emissions optimisation. Industry sources estimate USD10bn compliance cost (source: IATA), alternatively USD16-42bn offsetting	Long term higher performing fleet and fuel cost optimisation	Negative balance sheet impact through rising leasing liabilities, margin compression through incremental aircraft lease cost
Emissions trading	2020s		Eur 179m for each 1% CO2 price increase. Eur 80bn for EU ETS price increase to Eur 35/t to 2030		Jet fuel cost increase resulting from rising oil and gas sector emissions costs
Kerosene tax	2020		Eur 0.33/l could lead to Eur 29bn cost increase for the European industry to 2030 (source: Transport & Environment)	Incentive for fuel efficiency upgrade. Minor positive working capital effect as taxes are collected before cost is incurred	
Take-off levies, carbon taxes	2020s		Reduction of net profitability		Rising regulatory risk
Flight restrictions	2020s	Margin improvement in case of unprofitable short haul routes	Volume and revenue loss		
Shipping sulfur limits	2020				Jet fuel crack spread could rise to USD 17-19/bbl from USD 13/bbl

Sources: : Iata, Delta Airlines, British Airways, Air France, Lufthansa, Carbon Brief, Euler Hermes, Allianz Research

Marine transport

From 1 January 2020, sulphur emissions by shippers will be restricted to 0.5% from 3.5%. Shippers can either switch to lower sulphur fuels, which are more expensive, or install scrubbers. However, the investment in scrubbers is significant, up to USD 6mn. Furthermore, there is a risk that scrubbers may not meet requirements in all ports and that that new scrubbers may be required with additional investment if regulations tighten. If all commercial ships currently

operating were to install scrubbers, this could cost the sea transport sector a collective additional USD 0.7bn. This is after the sector already spent USD4bn on retrofitting until mid-2019, according to the International Maritime Organization (IMO).

In addition, under new IMO rules, the industry must halve its CO2 emissions by 2050. In order to achieve this, speed limit reductions are being proposed. These could have another cost impact on the sector through

reduced load factors and greater working capital requirement. While the industry has had enough pricing power until recently to allow for a pass through, we caution that a weaker global economic and trade environment could hamper the ability to do so going forward. The issue extends out beyond the transport sector because the working capital issue and slower delivery to customers will also affect traders of the relevant merchandise.

Figure 7 Overview of key climate change regulations affecting marine transport

Regulation	Time frame	Direct Impact		Indirect Impact	
		Positive	Negative	Positive	Negative
CORSIA emissions offset and reporting	from 2020/2025	Levels out differences between EU ETS covered and non covered airlines - positive for EU airlines exposed to long haul routes	Faster obsolescence of aircraft. Incremental cost to upgrade the fleet. We estimate an average airline might have to spend USD 7.4bn on fleet renewal for purposes of emissions optimisation. Industry sources estimate USD10bn compliance cost (source: IATA), alternatively USD16-42bn offsetting	Long term higher performing fleet and fuel cost optimisation	Negative balance sheet impact through rising leasing liabilities, margin compression through incremental aircraft lease cost
Emissions trading	2020s		Eur 179m for each 1% CO2 price increase. Eur 80bn for EU ETS price increase to Eur 35/t to 2030		Jet fuel cost increase resulting from rising oil and gas sector emissions costs
Kerosene tax	2020		Eur 0.33/l could lead to Eur 29bn cost increase for the European industry to 2030 (source: Transport & Environment)	Incentive for fuel efficiency upgrade. Minor positive working capital effect as taxes are collected before cost is incurred	
Take-off levies, carbon taxes	2020s		Reduction of net profitability		Rising regulatory risk
Flight restrictions	2020s	Margin improvement in case of unprofitable short haul routes	Volume and revenue loss		
Shipping sulfur limits	2020				Jet fuel crack spread could rise to USD 17-19/bbl from USD 13/bbl

Sources: : Maersk, Euler Hermes, Allianz Research

Road transport

As a first step, the EU has made emissions reporting mandatory for road transport companies and vehicles over 3.5t under a new system, VECTO. It is

about to vote a CO2 emissions reduction target of 30% over 2019-2030. This might lead to fuel efficiencies with corresponding benefits, but, first and foremost, there is an outlook for substantial fleet

modification requirement. Absolute CO2 emissions limits are at drafting stage. We can also see driving restrictions, EV regulations and other measures as potential next levers.

Automotive

The automotive sector is facing two main climate change-related regulations:

1. National and local measures, which have a direct impact on demand, including incentives provided by governments for "green" cars, the multiplication of driving and access restrictions and bans in urban areas which are targeting internal combustion engines and changes in taxes on diesel and gasoline fuel.
2. National and supranational regulations, which have a direct impact on supply and mainly concerns two aspects: the reduction of CO2 emissions and the improvement of testing procedures and transparency.

So far, Europe has implemented the most ambitious agenda, both in terms of targets and timeframe. It is essentially made up of a combination of measures with mandatory limits for CO2 emissions,

mandatory sales targets for zero and low emission vehicles (ZLEVs), new testing procedures with the WLTP (Worldwide Harmonised Light Vehicles Test Procedure) and the Real Driving Emissions (RDE) test, as well as the obligation for carmakers to report to the European Commission both measured and declared CO2 values, as well as fuel/energy consumption. For new passenger cars, the objective is now to reduce the average CO2 emissions by -15% in 2025 and by -37.5% in 2030 on top of the -20% target set for 2021. The most important threat to the sector is financial penalties attached to this regulatory tightening: €95 for every gram that exceeds the target (95 g/km for the average fleet CO2 emission with a two years-phasing: 95% in 2020, 100% in 2021), to be multiplied by the number of vehicles sold in the EU from 01 January

to 31 December each year. Based on 2018 data for new car registrations and CO2 emissions, we have estimated the cost of inaction at EUR30bn for the panel of global car makers most involved in the European market (VW, PSA, Renault-Nissan, FCA, BMW, Ford, Daimler, Toyota and Hyundai) - almost 18% of their combined EBITDA and almost half (45%) of their combined net profits registered in 2018 (EUR67bn). At the same time, compliance has its own cost implication. We estimate that full compliance with CO2 targets, looking at all compatible scenarios in terms of the powertrain mix, would increase the average cost of cars by +7% by the end of 2020 and by +15% by 2025. We are of the view that the industry is not in position to be able to pass through any such cost increase. (See also: [New CO2 emissions regulations in Europe: A perfect storm for car manufacturers?](#))

Figure 7 Overview of key climate change regulations affecting marine transport

Regulation	Time frame	Direct Impact		Indirect Impact	
		Positive	Negative	Positive	Negative
CO2 emissions (mandatory targets)	2020,2025, 2030 (Europe) 2020 (China, Japan, Korea) 2022 (India) 2025 (US, Canada)	Early compliers (comparative advantage)	Margin pressure due to increased industrial costs (Inputs costs, factory changes, marketing) needed for a faster roll out of compliant vehicles. Extra costs of production estimated at ~EUR20bn p.a up to 2025 (i.e. 8% of 2018 EBITDA) Sustained higher CAPEX (~EUR10bn p.a up to 2025) Potential cost of penalties (Europe)	Opportunity for brand repositioning/reschuffling	Faster obsolescence for diesel-related products (producers/suppliers) Reduced resources for other challenges (Autonomous vehicles)
ZLEV sales targets	2025, 2030 (Europe)	Early compliers (comparative advantage)	Loss of core product (historical players)		
Driving/access restrictions & citi bans		Comparative advantage/booster for APVs	Increased competition		Lower global demand
ICE malus systems			Faster obsolescence for non-compliant products (producers/suppliers)		
Diesel/Gasoline fuel taxes	2020s	Accelerates move to Evs	Loss of diesel vehicles demand		Negative economies of scale

Sources: : EU, Euler Hermes, Allianz Research

Construction

The buildings and construction sector is the target of energy efficiency ambitions, thus demand reduction. Net zero energy buildings are one of the major initiatives, with the first milestone being 2020 for commercial buildings in the

EU, as well as California. First and foremost, we see opportunity as opposed to threat for construction and related sectors. We see major opportunity for building materials. The reason for this is efficient materials can be an answer to

building efficiency in a broader energy efficiency drive. The area where we do see risk is cement because of the high level of emissions.

Figure 7 Overview of key climate change regulations affecting marine transport

Regulation	Time frame	Direct Impact		Indirect Impact	
		Positive	Negative	Positive	Negative
Revised EU Energy Performance of Buildings Directive	2020	Mandate for stronger renovation incentives at national level will bring substantial retrofit opportunity. Growth in carbon neutral new build and performance materials		Rise in new build demand	Isolated capacity bottlenecks
Tighten emissions caps for metals	2020s	Rising cost of raw materials		Shift towards better performance materials	Margin compression where absence of pricing power
New buildings smart ratings scheme	2020	Retrofit and value enhancement opportunity		Opportunity for margin expansion from product differentiation	Double negative on buildings falling short of target, loss of value and margin for low rated projects
New e-mobility and infrastructure regulations	2020	Retrofit and value enhancement opportunity			Combustion of other infrastructure projects

Sources: : Maersk, Euler Hermes, Allianz Research

Agrifood

Even though food and agricultural production account for 20% of all global emissions, the bulk of which come from the livestock sector (source: FAO), there is very little regulation as yet or up and coming. However, we expect the sector to come under scrutiny by policymakers in the near future. There are already some calls for a policy framework for

CO2 emissions for agricultural food production to be put into place. The sector is also behind on voluntary action, with only six out of 16 of most global food companies having set targets to reduce supply chain emissions, according to the FAIRR investor network. We can see more stringent policies on deforestation but also feedstock

production and other issues coming forward. There could be opportunity in conjunction with energy related technologies, particularly in relation to biomass, methane and other biotech related pathways that can be deployed for sustainable heating, electricity generation and petrochemicals substitute products.

Chemicals

The chemicals sector is a large emitter that accounts for 7% of global greenhouse gas emissions, in its own right and through indirect emissions, and growing. Before accounting for technological improvement, direct emissions could increase by 36% by 2050, according to the EU Science Hub. Globally, the sector accounts for 1.2bn of CO2 (source: IEA), of which close to 1gt comes from China and 126mt from Europe. This suggests that emissions trading alone could cost the industry USD 484bn for an increase in CO2 prices still below the Eur 40/t mark. Note, though, that there are other markets with much higher CO2 allowance pricing, for example California, where a ton of CO2 costs USD 190.

Beyond that, the industry is subject to regularly tightening pollution control and industrial emissions standards at plant level. The overarching legislation is the EU industrial emissions directive of 2010. The American Chemicals Institute estimates a total of USD 40bn emissions mitigation investment requirement by 2030 in the U.S. and Europe alone. Yet, the ACC estimates that being a carbon neutral sector requires total investments for chemicals worldwide to amount to net USD13bn per year (from 2010 to 2030) for the U.S. industry, while CEFIC estimates them a little higher at USD19bn per year. We point out, however, that such investment would likely lead to positive operating cost savings.

Furthermore, the sector in Europe is subject to the EU energy efficiency directive. Because there might be an increasing penetration of the broader economy by the chemicals sector as a result of demand growth, particularly for speciality applications, it is likely that the sector will see more rounds of regulation. Chemicals are also one of the most important oil-consuming sectors. In this context, there is potential for mitigation through carbon capture and usage (CCU), particularly in the hydrogen and ethylene industries, but that of course comes at its own very high cost point. Lastly, the chemicals sector may see indirect repercussions from regulations affecting the transport industry because of the petroleum products and refining connection.

Pulp & paper

Pulp and paper is a major emitter, accounting for c 2% of global direct industrial emissions, and highly energy intensive. As a result, it is exposed to climate change regulation in two major ways: Energy consumption and deforestation. In Europe, the sector would see a negative impact to the tune of USD400m if CO2 prices increased to

the mid Eur 30s, an amount that could be doubled for each USD 10/t if ever a U.S. emissions price were to be introduced in a similar way. The sector needs to reduce emissions by 75% by 2050 according to the CEPI industry association framework. We can also anticipate an increasing cost of certification and

raw materials if and when forestry regulations tighten. Moreover, there could be tightening in paper recycling regulations. CHP and biomass usage would mitigate, but still mandatory use would not be inconceivable.

Retail

Retail is principally exposed to energy efficiency regulation, i.e. demand reduction in relation to heating and cooling, but also lighting and broader building efficiency. The sector is impacted by the net zero energy target for new commercial buildings from 2020. Beyond that, we can see indirect exposure to transport regulations in relation to supply chains and logistics, albeit that will be already reflected in the transport sector. That being said, the

transport and logistics sector will most likely attempt to pass through its own regulation-induced cost increase. Who will be the final receiver of the corresponding pressure on margins will be a question of relative strength and the broader competitive and demand environment. Based on current emissions by the industry globally, we estimate that each Eur 10/t increase in the price of emission would lead to an incremental cost of USD8.2bn as a bottom end

value. The reality is likely to be higher as our underlying sample is dominated by large developed market retailers who, on average, achieve lower levels of emissions than their emerging market peers.

ITC

While the IT, technology and communications sectors are traditionally seen as low carbon intensive, energy consumption is growing with digitalisation. Data centers alone consume in the order of 200TWh of electricity annually. We estimate that each Eur 1/t of CO2 prices feeds into electricity prices in the order of Eur 0.6-0.8/kWh. Thus, assuming the sector only triples in size, it could face incremental costs exceeding the USD 500tn mark each year.

Telecommunications will, in the short run, increase energy consumption due to the shift to 5G. As it is, it takes ten times more energy to transport the same quantity of data over 5G infrastructure vs 4G infrastructure but the

technology will become more energy efficient over time, much like 4G and 3G in the past. 5G will account for 15-20% of all mobile subscriptions by 2025 (source: Ericsson). Over time, though, efficiency from phasing out of 2G and 2.5G technologies will compensate. We therefore see little regulatory pressure. Besides that, the next step up will also lead to greater computing, storage and data centre requirement which leads back to the large increase in IT related energy consumption as outlined above.

Semiconductors might be one segment that benefits for various reasons, namely as an enabler for compliance with new regulations –new energy

technologies - but also because we expect a rising intensity in electronic components for energy-efficient products. For instance, the shift to hybrid/electric and connected/intelligent vehicles is already translating into fast-growing computing, memory, telecom and power chip sales to the automotive industry.



Catharina Hillenbrand-Sapoznik,
Sector Advisor for Energy, Metals,
and Machinery and Equipment

“The energy sector will be hit the hardest, with an estimated cost of USD900bn. The steel sector follows, with a cost of USD 300bn. Air and marine transport faces a cost of USD55bn”

Other sectors

The energy and carbon intensity of industrial machinery and manufacturing varies widely. It is primarily affected by global greenhouse gas emissions and energy efficiency policies, as well as regulations covering specific end markets. As a whole, we calculate that the global machinery sector could face cost increases in the order of USD15bn for CO2 alone and prior to mitigation, if we were to see a carbon price in the mid Eur 30s/t. Much more importantly,

though, the industrials, capital goods and machinery sectors are heavily exposed to global trade. As a consequence, there is already an impact on relative competitiveness as a result of regional carbon trading schemes, to put it in very crude terms. Unless there is global integration, which may be the ultimate and only logical structure but in our view remains a very long way away, those differentials will widen. The consequences are indirect cost increase

es through lower capacity utilization, loss of economies of scale and the like. To make matters worse, the intermediate step of carbon border adjustments – under debate in many regions currently – could lead to a negative fallout for all export industries together in the order of USD10bn for Europe, the U.S., China and Russia alone for each 1% adjustment, according to our calculations.

Figure 8 Overview key climate change regulations affecting industrials

	Time frame	Impact		Indirect impact	
		Positive	Negative	Positive	Negative
Carbon border adjustment EU, US	2020s	Relative competitiveness improves for domestic carbon and energy intensive industries	Exporters could see double penalisation through domestic carbon costs and border adjustment	Friction could lead to pressure for globally integrated carbon trading and level playing field	Eur 7bn loss of trade value in Europe, mostly from the US, Russia, China
Hard defined emissions reductions, e.g. Germany -50%	2030	Likely improved energy performance and sustainable cost base reduction as a result	Fines, penalties, upgrade capex requirement at nil return	Potential for broader process optimisation	Second round & supply chain multiplication

Sources: : Iata, Delta Airlines, British Airways, Air France, Lufthansa, Carbon Brief, Euler Hermes, Allianz Research

Household goods

This sector will be affected in a significant way as energy efficiency requirements for appliances tighten. Household appliances, furniture and consumer electronics are already faced with calls for more sustainable and eco-friendly product design – Europe is the region where calls are the most likely to materialize into additional legislation,

with a resolution on “planned obsolescence” already passed in early 2018. Manufacturers could be required to extend warranty periods, mention minimal product life expectancy, facilitate product repair and supply spare parts over longer periods of time, etc. with a view to make durable goods more durable. The immediate impact of such

legislation would be negative for manufacturers but generate opportunities elsewhere (repair services, organized second-hand market for appliances, etc.) which they could capture at the cost of a change in business model.

Figure 9 Overview key climate change regulations affecting household goods

Regulation	Time frame	Direct Impact		Indirect Impact	
		Positive	Negative	Positive	Negative
Resolution 2018/C 334/06 materializing into a proper Directive on planned obsolescence	2020s	Possibility to generate revenue off product lifecycle extension (repair services, spare parts...)	Higher working capital requirements for manufacturers	Possibility to improve market segmentation (growing niche market for premium, ultra-durable goods).	Durable goods retailers would also feel the pinch of longer replacement cycles
		Possibility to capture the growing second-hand market	Longer product replacement cycle hurting sales		

Sources: : EU, Euler Hermes, Allianz Research

WHAT DOES IT MEAN FOR BUSINESS?

We gauge that in a vast number of cases, companies are insufficiently prepared for the regulatory wave that is coming towards them. In order to prepare, businesses need to consider direct and second round effects. The direct impact is first and foremost a reduction in gross margins as a result of rising cost of emissions. This can be transposed onto other costs, i.e. opex or capex, for example, through mandatory equipment installations or other complementary measures. If there is successful mitigation of gross margin compression, this can nevertheless translate into reduction of operating profitability as it may have been achieved through raising other costs, for embarking onto higher cost processes or greater R&D expenditure. Examples of this are the building of high performance lignite plants by utilities in order to achieve a lower emissions profile that partially satisfied needs at the time but brought large capex burden upon cash flows. Or, witness the current efforts by the automotive industry to shift production towards electric vehicles. To understand the direct impact, a comprehensive audit of emissions across business should evaluate the following:

- **Emissions profile** across all businesses and regions, including those already covered by current schemes. Current schemes bear a high likelihood of being tightened several times over, in our view from the early 2020s. At the same time, the number of emission caps, regulation, levies and limits is multiplying across the globe. Managements should be prepared to see low levels of grandfathering, i.e. an immediate jump in their cost base from introduction of a new scheme, and rapid subsequent tightening.
- **Mitigation, abatement and process optimization.** Equipment installation, changes to supply chains, commodity management and product mix all come into this area. We particularly highlight emission certificates forward hedging, wherever possible in conjunction with end market pricing, as we are of the view that there is large upside potential in CO2 prices.
- **Regulatory management.** Considering the likely volume of regulations, there is material risk of companies being exposed to compliance risk, fines and last minute adjustment costs. Anticipatory management of regulations and proactive engagement is therefore highly advisable.
- **Business resilience** in terms of pricing power and flexibility of cost bases. Companies need to deepen understanding of pricing power in order to ascertain true or perceived potential for pass through of incremental cost. We are very concerned about high fixed cost-base businesses in this context as there is risk of lower activity and/or revenues no longer covering full costs in an adequate manner. Equally important, managements should proactively address indirect risk:
 - **Supply chain transmission and multiplication of risk.** Effects of constraining regulation tend to spread across adjacent sectors, such as related components, suppliers and often all the way down the value chain up to primary raw materials. As it trickles through, risk tends to multiply.
 - **Exposure of end customers.** Looking upwards in the chain, a business might find itself deprived of revenues as a result of certain end markets ceasing to be sustainable or customers being adversely affected by regulation. The most salient example in the climate change context is coal mining with its end market power generation, but there are also other examples, such as the solar industry, where regulatory change very high up the chain unsettled the entire value chain up to primary metals. We believe the outlook with regards to policy intensity invites thinking about the unthinkable.
- **Indirect emissions** and energy intensity. Related to supply chains, indirect emissions form part of a company's overall carbon footprint but even if isolated from direct emissions represent a risk in terms of them becoming more costly. Energy intensity may get regulated in its own right, and at the same time energy costs are arguably still the most exposed to upcoming regulation.
- **Financing, balance sheet impact cash flow and interest cost.** Any of the issues that we have looked at above may bear a visible impact on companies' balance sheets and solvability. Where assets need to be upgraded, debt financing will increase interest costs and alongside higher amortization compress operating and net profits. That in turn deteriorates debt coverage ratios such as interest cover and debt/earnings measures. Additional capex may strain cash flows and balance sheet ratios to the limit, rising working capital again burdens cash flow. Lastly there is potential for outright emissions cost liabilities to break a company's balance sheet, as evidenced by a recent large industrial bankruptcy in the UK.

THE ULTIMATE CONSEQUENCE: BUSINESS VALUE AND ASSET LOSS

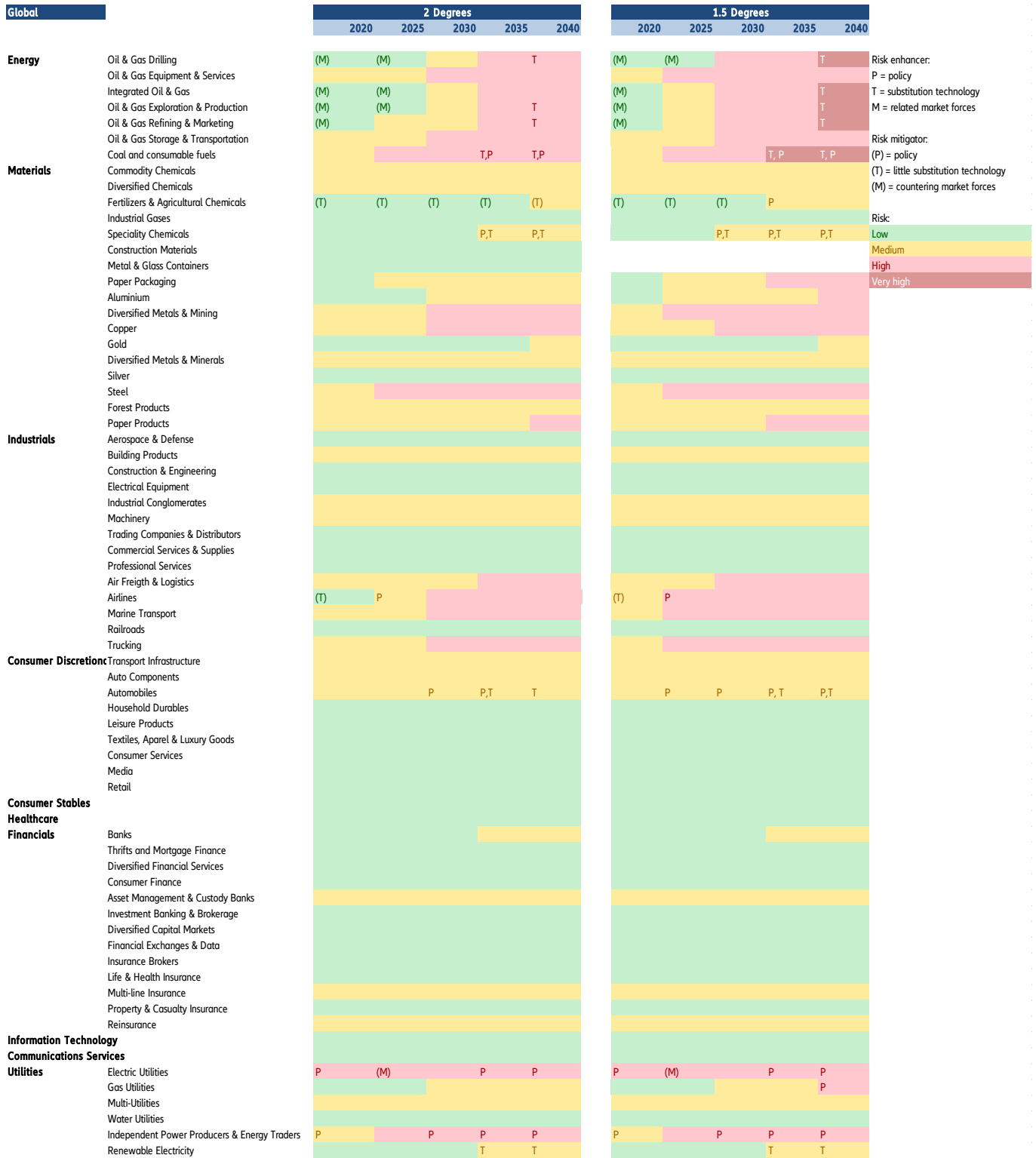
We have considered intermediate cost and business ramifications of tightening regulation in a very contained manner above. The cost of emissions could rise much higher and dynamics of new policies and regulations accelerate further. Depending on industries' readiness and speed of adaption, which in most ins-

tances we judge as insufficient, the ultimate risk is complete loss of value of certain assets or entire businesses. We have seen some of this already in the coal sector. Below, we have compiled a picture reflecting risk of total value loss by climate change scenario and time frame over which the value would be

lost. We have included the possibility of new and yet unknown policies and regulations for this exercise.



Figure 10 Asset and business value loss under various climate change scenarios



Sources: Euler Hermes, Allianz Research

Director of Publications: Ludovic Subran, Chief Economist
Euler Hermes Allianz Economic Research
1, place des Saisons | 92048 Paris-La-Défense Cedex | France
Phone +33 1 84 11 35 64 |
A company of Allianz

<http://www.eulerhermes.com/economic-research>
research@eulerhermes.com



[euler-hermes](#)



[eulerhermes](#)

FORWARD-LOOKING STATEMENTS

The statements contained herein may include prospects, statements of future expectations and other forward-looking statements that are based on management's current views and assumptions and involve known and unknown risks and uncertainties. Actual results, performance or events may differ materially from those expressed or implied in such forward-looking statements.

Such deviations may arise due to, without limitation, (i) changes of the general economic conditions and competitive situation, particularly in the Allianz Group's core business and core markets, (ii) performance of financial markets (particularly market volatility, liquidity and credit events), (iii) frequency and severity of insured loss events, including from natural catastrophes, and the development of loss expenses, (iv) mortality and morbidity levels and trends, (v) persistency levels, (vi) particularly in the banking business, the extent of credit defaults, (vii) interest rate levels, (viii) currency exchange rates including the EUR/USD exchange rate, (ix) changes in laws and regulations, including tax regulations, (x) the impact of acquisitions, including related integration issues, and reorganization measures, and (xi) general competitive factors, in each case on a local, regional, national and/or global basis. Many of these factors may be more likely to occur, or more pronounced, as a result of terrorist activities and their consequences.

NO DUTY TO UPDATE

The company assumes no obligation to update any information or forward-looking statement contained herein, save for any information required to be disclosed by law.