

THE CHANGING (BUSINESS) CLIMATE:

Rising (credit) risks due to persistent heat waves



RESULTS



“AILING” SECTORS IN PARTICULAR ARE AT INCREASED RISK

Extreme weather conditions such as the 2018 heat wave are usually not the only cause of a crisis, but these are factors that can bring companies that are already at risk to the turning point.



COMPANIES SHOULD NOT LOSE SIGHT OF LONG-TERM EFFECTS

Extreme weather conditions can have strong repercussions due to the fact that they reduce existing risk buffers. A second drought year that follows in close succession will likely have many more negative effects than the first one. According to climate research, this is increasingly likely to happen.



THERE ARE SECTORAL DIFFERENCES...

Some of the effects vary greatly by industry or subsegment: traditionally weather-dependent sectors are often better prepared for weather extremes.



...AND REGIONAL CLUSTER RISKS

The 2018 heat wave hit farms particularly in the north-eastern part of the country and industrial companies along the Rhine, and at the same time retail businesses, especially in the city centres of major German cities, also suffered from heat-related losses.



RELEVANCE FOR ENTREPRENEURS AND INVESTORS

Extreme weather conditions can trigger income/earnings slumps and significantly impact working capital. The ability of businesses to service their debt in the future may be affected.



CONCRETE IMPACTS STRONGLY DIFFER

Directly affected companies may partially pass on their losses to downstream sectors or end users that are not directly affected. Thus, chain effects must also be considered.



...AND BENEFITS THAT ARE INHERENT TO THE BUSINESS MODEL...

Diversified companies serving different regions/sectors/products are more resistant to extreme weather effects and can better absorb losses.

**Pronounced heat waves can affect
the ability of companies
to service their debt.**

2018 SET NEGATIVE RECORDS

There were up to 17% fewer visitors compared to the previous year: the heat, which began in spring and ended in the late autumn, left a significant summer hole in the retail sector. The growing e-commerce sector, strong cost and competition pressure as well as an oversupply of commodities pushed store visitation in 2018 strongly below the previous year's figures, according to measurements of people traffic conducted by Shoppertrak, a retail analytics service. The hot months then set new negative records, even when compared with a large number of years in the past. The reason: the temperatures, which were already unusually high in suburban locations, were noticeably even higher in the inner cities. And before their shopping outing could become a trying experience, customers often cancelled their trips to the store altogether.

A SWIM IN THE LAKE INSTEAD OF A VISIT TO THE FURNITURE STORE

One segment that has been impacted in particular is the retail furniture trade. Customers simply did not feel like traipsing through large furniture stores, especially in August: for example, sales of mattresses were down 18% from the same month last year, while furniture sales fell by more than 5% during the same period. Even in e-commerce, the buying mood suffered from the heat. For example, the online retailer Home24 recorded significant drops.

A BATHING SUIT INSTEAD OF A WINTER JACKET

The retail textile trade came under pressure from two sides. Shopping activity was impacted, since the warmer it is, the less fun it is for customers to try something on in the store. And the merchandise situation itself was affected, too: given the summer temperatures that persisted into late autumn, textile retailers were forced to sit on their autumn and winter merchandise. According to Textilwirtschaft (dfv Mediengruppe), the revenue of fashion retailers fell by an average of 16% in August compared to the previous year. This was the biggest drop in the brick-and-mortar fashion retail trade in over 15 years. Again, e-commerce was no exception to

the trend: Zalando, for example, downgraded its revenue and earnings expectations due to the fact that the "long and exceptionally hot summer" had a negative impact on its business, the company said.

RELAXATION INSTEAD OF ELECTRONICS

In view of the high temperatures, customers did not interpret the Media Markt slogan "Hauptsache ihr habt Spaß" ("The main thing is that you have fun") as constituting an invitation to visit the huge stores of the electronics retailer: the declines in the operating business not only hit small stores, but also the industry leader Ceconomy (Media Markt, Saturn). Reuters quoted then CEO Pieter Hass as saying that "significant revenue and earnings pressure" and the "disappointing sales" could be attributed to the "unusually hot weather."

LESS "FAST MOVING" DURING THE SUMMER

It was too hot for customers to even shop at the supermarket: while fast-moving consumer goods, i.e. necessities, constitute a business that is relatively resistant to market shocks, the revenue of the Real supermarkets fell significantly in Q4 of FY 2017/18, according to Metro. The reason that was given is also the "continuing heat wave": When the weather is nice, customers avoid windowless shopping malls, and lower visitor flows lead to lower sales.

TOO HOT TO SHOP?

In preparation for more heat waves in the future, retailers are taking measures such as installing special window films or air conditioning systems. But retailers can only effectively counter declining visitor flows due to heat by actively making their physical locations more vibrant (especially in cooperation with the respective city or shopping centre marketing) and ensuring flexible offerings. As a result of increasing challenges, especially in the brick-and-mortar retail trade, more restructuring and insolvencies are expected in the near future.

Sources: Andersch analysis; interviews with market experts; Textilwirtschaft; Handelsblatt; WirtschaftsWoche; ShopperTrak; VdDW; VDM; BVDM; IFH Cologne; Bevh; company information; Destatis

2018 - A DIFFICULT YEAR FOR GERMAN RETAILERS:



MAY:

biggest sales decline in **7** years

SEP.:

biggest sales decline in **5** years

VULNERABILITY AND ADAPTABILITY OF RETAIL TO PERIODS OF EXTREME HEAT:

Susceptibility to drought damage



Ability to pass on costs



RELEVANT INDICATORS:



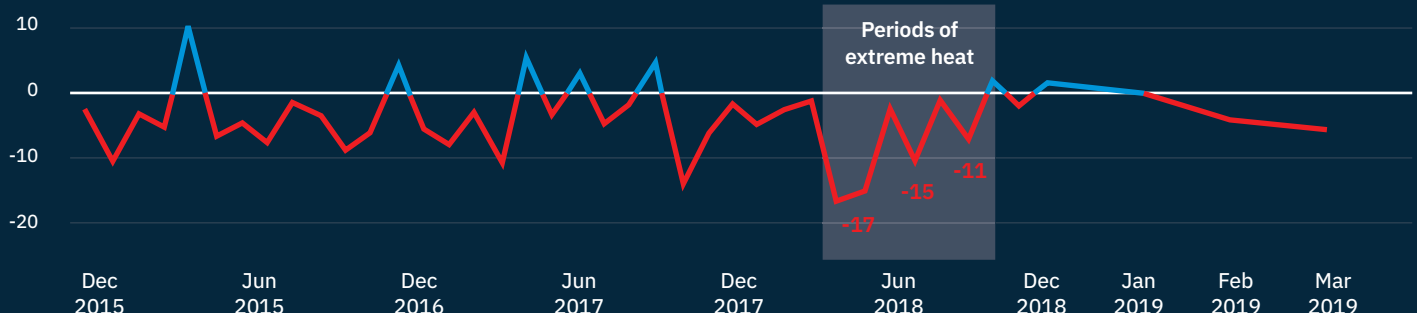
- Development of store visitation rates
- Increase in write-off percentage/sales, etc.
- Sell-through rates; rise in inventories
- Retail space productivity (revenue per square metre)
- Reduction of the average transaction value

WHAT SHOULD WE PAY ATTENTION TO IN THE FUTURE?



- Flexibility in frequency of new collections or product mix
- Measures to increase visitation despite the heat, e.g. special marketing campaigns
- Sales through alternative channels
- Close link of online and offline channels
- Cooperative partnerships to make locations generally more attractive (e.g. city marketing)
- Possibility of (temporarily) cancelling the use of retail spaces

VISITATION RATES TO PHYSICAL RETAILERS (% CHANGE OVER PREVIOUS YEAR):



2019: STARTING WITH A MORTGAGE

If there is a persistent drought, agriculture and the foodstuffs industries are naturally the main victims. In 2018, harvest yields plummeted, with a quarter of soils still considered affected by the drought and much drier compared to the spring 2018. Companies also started the year 2019 with exhausted physical and financial reserves, as they were sometimes hardly able to pass on their new costs to downstream customers within the value chain.

THE PRODUCER IS AT PARTICULAR RISK

In the case of cereals, yields have fallen by around 19% compared to the average for 2014-17. The price of feed barley has increased by 53% since 2016, and farmers are usually unable to pass on their costs accordingly. This results in more restrictive access to working capital and lease financing. Despite some support from the federal government, the situation is very tense. The Federation of German foresters also expects damages of at least EUR 2 billion and 30 million solid cubic meters of damaged timber in 2019 as a result of the storms, forest fires and bark beetle infestations that can be attributed to drought. The woodworking industry has benefited from a fall in the price of lumber by over EUR 10 per solid m3 to around EUR 72 (end of 2018).

PROCESSORS POST NEGATIVE RESULTS

Due to supplier obligations to retailers, processors and intermediaries have often had to buy raw

materials externally at high prices. This has led to predominantly negative corporate results and correspondingly reduced financial reserves for 2018. The level of risk thus increases for prefinancing, which is required in some cases, and for existing financing.

FOOD RETAIL HAS BEEN ONLY SLIGHTLY IMPACTED

The strong position of the segment enables it to pass on rising expenses to its customers. The risk profile increases only to a limited extent.

NEED FOR ACTION BY FINANCIAL BACKERS

Companies in the agricultural and foodstuffs industry can usually compensate for a single drought year. If this is followed by another drought year or other extreme events, the financing risk increases exponentially. The business planning of borrowers should therefore be critically reviewed for price and volume levels and their liquidity situation so that countermeasures can be taken at short notice. In addition, it is important to develop and use early warning systems. For example, the German Meteorological Service (DWD) has developed a new long-term forecast that predicts soil moisture up to six weeks in advance and provides farmers with notifications about potential drought hazards.

Sources: Andersch analysis; interviews with market experts; BDF; DBV; BMEL; Helmholtz Centre for Environmental Research; DWD; Destatis

VULNERABILITY AND ADAPTABILITY OF AGRICULTURE AND FOODSTUFFS INDUSTRY TO PERIODS OF EXTREME HEAT:

Susceptibility to drought damage



Ability to pass on costs



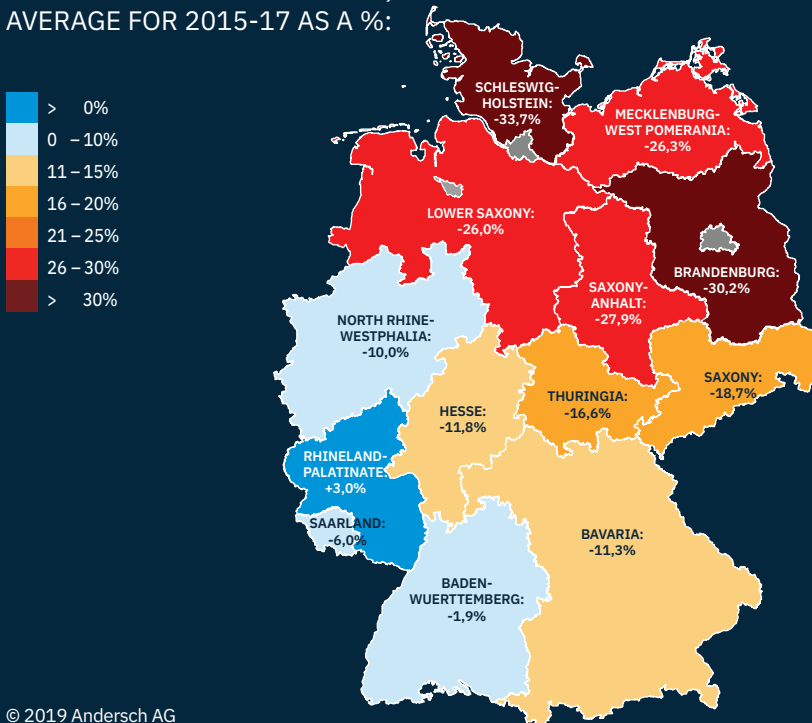
RELEVANT INDICATORS:

- Income per hectare; duration of fattening period; animal mortality
- Price increase for raw materials and supplier products (e.g. feed)
- Below-average accumulation of output stocks (= reduction of risk buffer)

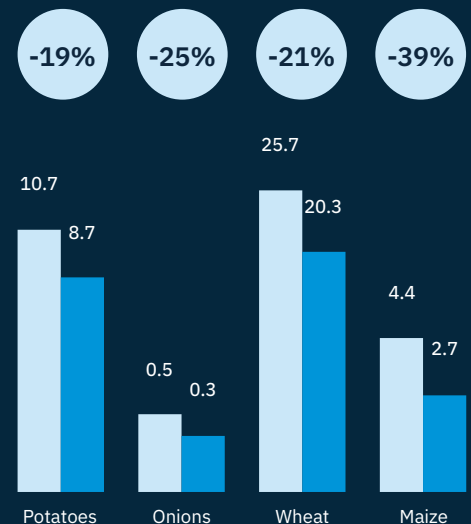
WHAT SHOULD WE PAY ATTENTION TO IN THE FUTURE?

- Adjustments in crop rotation and/or substitution with heat-resistant crops
- Development and tracking of leading indicators of extreme weather conditions
- Illustration of weather-related historical data from 2018 in future business planning
- Passing on price increases to customers
- Adjustment of quantity commitments
- Hedging against harvest and fattening losses/calamities
- Hedging supplier goods (price, quantity)

HARVEST YIELDS BY COUNTRY, CHANGE IN 2018 OVER AVERAGE FOR 2015-17 AS A %:



DEVELOPMENT OF CROP YIELDS AVERAGE FOR 2013-2017 VS. 2018 (MILLIONS OF TONS):



SUMMER HEAT RAISES THE RISK LEVEL

The energy transition places enormous demands on German energy suppliers. Downstream stages, such as, for example, energy discounters, have also come under pressure. Increased market transparency, price pressure and the consumers' willingness to change their energy supplier are threatening the business model of some market participants, as recent bankruptcies illustrate. The record summer of 2018 intensified the challenges in the energy sector and negatively impacted the operating results of energy suppliers and others, including due to the weak performance of renewable energy sources and the risks facing electricity providers that are inherent to their business models.

ENERGY SUPPLIERS SUFFER LOSSES

Energy suppliers have switched to renewable energies primarily by strongly expanding their deployment of wind turbines. As a result, wind yield fluctuations have become a key risk with direct effects to EBITDA and internal financing resources. A record result in photovoltaics (+16% over the previous year) was not able to offset this. For example, EBITDA figures for EnBW and Innogy in the area of renewable energies were 10.3% and 10.8% below the previous year, respectively.

FOSSIL FUEL POWER THWARTED

Low water levels limited the transport capacities of commercial shipping. For certain periods of time, only 60% of the required daily quantities could be delivered. At the same time, transport costs rose steeply, and weighed on the results of energy producers that generate electricity from carbon sources.

NUCLEAR ENERGY OVERHEATED

According to surface water regulations, only a limited amount of cooling water may be discharged into rivers when they are warmer than 28 degrees Celsius. However, central waterways such as the Rhine recorded water temperatures above this mark during the summer months. The output of many nuclear power plants had to be reduced accordingly, but impact on EBITDA was comparatively low.

Water levels that were up to 41% below the 10-year average caused the amount of electricity generated from run-of-river hydropower to fall by around 44%. In 2018, net electricity generation from hydropower, at 16.7 TWh, was at the second lowest level in 30 years.

HYDROPOWER HAS DRIED OUT

High losses of crops (raw materials, including mainly grasses as well as maize) had a direct impact on supply problems with a corresponding decrease in energy yield.

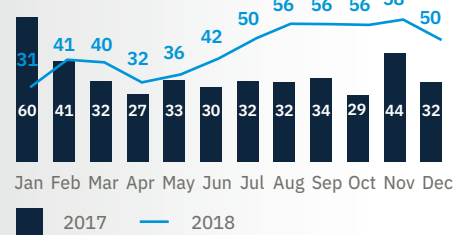
BIOMASS STARVED FOR RESOURCES

The heat also had immediate consequences for the electricity providers downstream of the energy suppliers. Many suppliers had to foot a weather-related increase in the wholesale price of electricity to more than EUR 44/KWh on average (+ approx. 30% over the previous year). Fixed-price contracts and special termination rights prevented suppliers from passing the increased costs on to consumers. Not all electricity providers were able to bear these additional costs: the bankruptcies of BEV Bayerische Energieversorgungsgesellschaft and DEG Deutsche Energie exemplify the vulnerability of the industry. We can expect an escalation of the risk situation in the energy sector due to increased heat spells in the future. Electricity providers bear the highest risk due to their limited range of options. For energy providers, it is important to develop appropriate strategies to minimize risks from increased periods of heat.

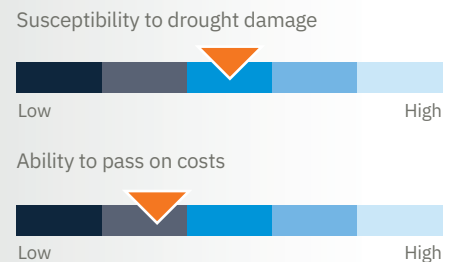
CONTRACTUALLY SHACKLED ELECTRICITY PROVIDERS

"On the other hand, the low water levels, especially on the Rhine, led to transport difficulties in the second half of the year and sharply rising logistical costs as well as the reduced availability of power plants. At the same time, the power that was supplied by wind turbines was well below the level of a normal year."
EnBW, 2018 Annual Report

DEVELOPMENT OF SPOT ELECTRICITY PRICES IN GERMANY (2017 VS. 2018; EUR/MWH):



VULNERABILITY AND ADAPTABILITY OF THE ENERGY SECTOR TO PERIODS OF EXTREME HEAT:



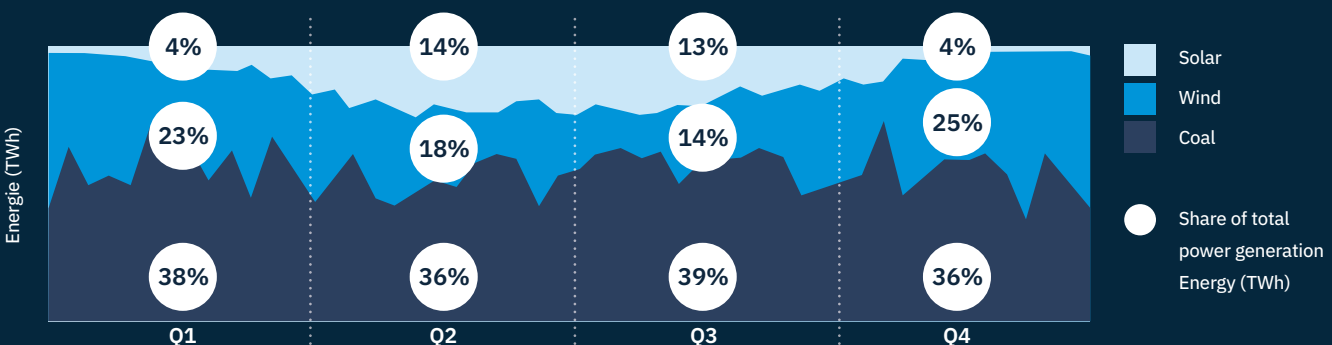
RELEVANT INDICATORS:

- Decline in plant efficiency, including in particular power generation from wind/PV energy
- Decline in electricity output (GW)
- Development of wholesale electricity prices
- Loss of energy that could not be stored/ discounts

WHAT SHOULD WE PAY ATTENTION TO IN THE FUTURE?

- Purchasing and trading instead of production
- Alternative disposal routes for cooling water
- Short-term throttling of production
- Electricity price increases (passing on price increases to customers)
- Establishment of new storage capacities
- Diversification of the energy mix
- Use of alternative substrates (biogas)

2018 WAS A DIFFICULT YEAR FOR WIND ENERGY, THE FORERUNNER OF RENEWABLE SOURCES OF ENERGY:



WATERWAYS TURNED TO DEVIANT ROUTES

The long drought caused the water levels of all bodies of water to drop sharply. As a result, cargo ships could only be partially loaded and experienced longer lay days in port. The demand for cargo ships rose accordingly, and freight prices quadrupled. Nevertheless, the transported tonnage fell sharply and a major part of the supply chain had to be switched to lorry-based transport. This also required new, more complex logistics processes at various industrial companies. For example, temporary ramps and manoeuvring areas had to be created for the increased volume of lorries.

LOGISTICS COSTS INCREASE WHILE PRODUCTION SHRINKS

Approximately 80% of German freight transport by inland shipping is handled via the Rhine. Therefore, mainly companies along this waterway were affected. The chemical company BASF transports about 40% of its goods by ship at its main Ludwigshafen plant. The low water level and associated delivery and production losses had a negative impact of around EUR 250 million on the group result from the summer onwards. Thyssenkrupp also experienced "considerable production cutbacks." K+S

had to completely cease production at its Werra sites in Hattorf and Wintershall for three and five weeks, respectively, due to the extreme drought. IfW Kiel calculates a 1.7% decline in production in the manufacturing industry due to the effects of low-water levels.

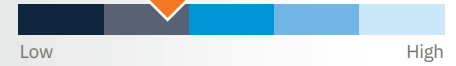
PREVENTION PAYS OFF

The specialty chemicals group Lanxess protects itself against climate-related risks by adopting a multi-supplier strategy. Traditionally weather-dependent companies have already developed detailed precautionary strategies. A company in the construction industry, such as HeidelbergCement, believes that the weather constitutes a "significant sector-specific risk that consists primarily of seasonality of demand." HeidelbergCement is preparing for weather-related sales fluctuations by diversifying its production across regions, increasing its customer orientation, developing special products and by means of operational measures as much as possible (ranging from adjusting production levels through the use of flexible working time models right up to closing individual locations).

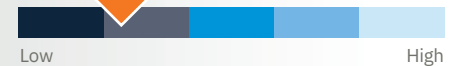
Sources: Andersch analysis, interviews with market experts; IfW Kiel; Binnenschiff.de; Federal Statistical Office of Germany; Statistical Office of the State of Baden-Württemberg; Börsenzeitung; Die Welt; Destatis

VULNERABILITY AND ADAPTABILITY OF THE ENERGY SECTOR TO PERIODS OF EXTREME HEAT:

Susceptibility to drought damage



Ability to pass on costs



RELEVANT INDICATORS:



- Delays in supply chain (inbound/outbound)
- Increased expenditures on logistics
- Lower capacity utilization/productivity
- Contractual penalties due to delivery delays
- Decline in the number of incoming orders

WHAT SHOULD WE PAY ATTENTION TO IN THE FUTURE?



- Protection against temperature-related supply chain failures (e.g. relocation of production between sites)
- Hedging of fluctuations in commodity prices or delivery costs
- Adaptation of production layout
- Regional or product diversification
- Development of special products
- Adjustment of production level
- Institution of a flexible working time model
- Development of a multi-supplier strategy

"There was a weather-related negative effect on EBITDA of around EUR 110 million. [EBITDA] well below the previous year, particularly due to disposal restrictions and higher freight costs resulting from the extreme drought in Germany (...). As a result [EBITDA for Q3/2018] declined by half." K+S AG, 2018 Annual Report, 3/2018 Quarterly Report

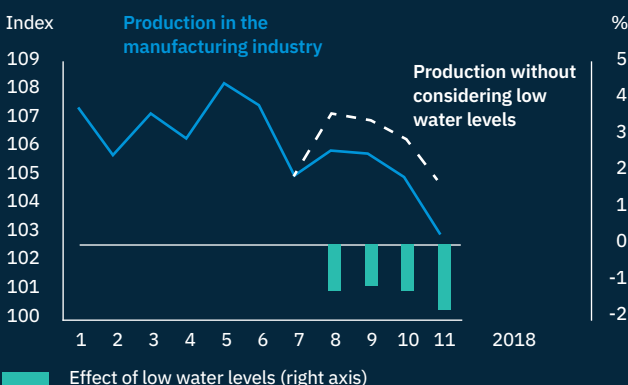
"Lanxess AG: The low water level in the Rhine has brought with it an additional seven-digit cost." Börsen-Zeitung, 11 December 2018, No. 238, p. 9

"Special expenses such as higher logistics costs that are attributable to the low water level of the Rhine" Covestro AG, 2018 Annual Report

"Due to the low water levels and the lack of coal that is being supplied per ship, RWE (.) has temporarily shut down its power plant in Hamm." WAZ, 3 August 2018, accessible at <https://bit.ly/2VzfxZi>

"The historic low water level of the Rhine as well as temporarily subdued demand from the automotive industry (...) also heavily impacted the results of the Steel Europe business area, which has been discontinued. Adjusted EBIT amounted to EUR 38 million compared to EUR 163 million during the same period last year." thyssenkrupp AG, Press Release, 12 February 2019

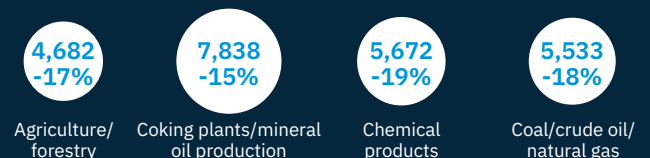
EFFECTS OF LOW WATER LEVELS ON PRODUCTION IN THE MANUFACTURING INDUSTRY:



INLAND SHIPPING SUFFERS HEAT STROKE CARGO TRANSPORT IN 2018 COMPARED TO THE PREVIOUS YEAR (%):

Weser Region: -9%
Canal Area of Western Germany: -11%
Danube Area: -25%
Brandenburg: -28%
Rhine and Main rivers and their tributaries: -9%

INDUSTRIES THAT ARE AFFECTED IN PARTICULAR SERVICE MEASURED IN TONS PER KILOMETRE (MILLIONS OF TONS PER KILOMETRE, Δ VS. 2017 %):



DAMAGES IN THE DOUBLE-DIGIT BILLION EURO RANGE

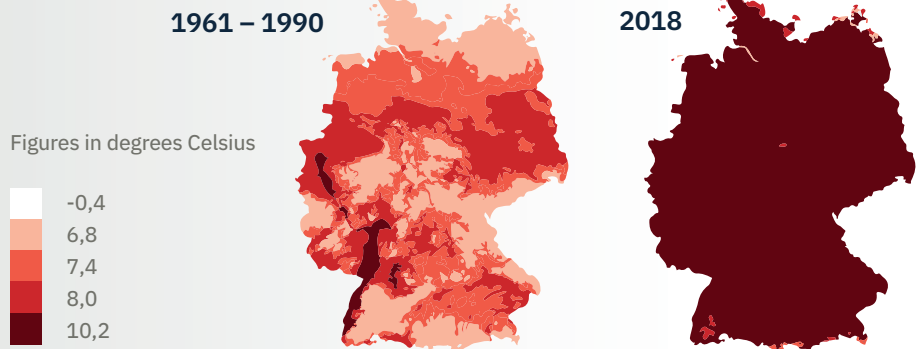
The year 2018 was not just marked by an unusually long summer. Overall, ten out of twelve months were much too dry. Such a heat wave or period of drought in our latitudes exceeds the capability of individual companies to adapt and often overwhelms infrastructure. In addition to crop failures and the heat-related drop in consumption, the cargo traffic is negatively impacted, production processes are interrupted, and plants are damaged. Michael Kunz, spokesman for the Centre for Disaster Management and Risk Reduction (CEDIM) at the Karlsruhe Institute of Technology, estimates that the total economic impact from heat damage in 2018 in the tens of billions. For the insurance industry, this has been the fourth-most expensive year since 1980, according to the 2018 Allianz Annual Report.

NO EASING OF THE CRISIS IS EXPECTED

In years with average rainfall and temperatures, even week-long dry periods in the summer can be compensated for by the moisture from winter and spring that has been collected in the soil. The soil acts as a buffer. But despite heavy rainfall during the winter, the precipitation deficit from 2018 is far from compensated for. In April, the soil moisture was at a level that was normal for June. Therefore, even a relatively average summer could cause high heat damage in 2019. But rising temperatures and extreme weather events are expected. What is considered to be a record summer today could become the new normal in the years to come.

“The extraordinary drought of 2018 will not be an isolated event. [...] Climate research agrees: The chance of such weather extremes is becoming more and more likely with climate change. In the future, we should expect more droughts in Germany, maybe even at relatively regular intervals.”
Press Release for the 2019 DWD Climate Press Conference, which can be found at: <https://bit.ly/2J1fXUZ>

HIGH DEGREE OF DEVIATION FROM LONG-TERM AVERAGES AVERAGE TEMPERATURE FOR APRIL (°C)



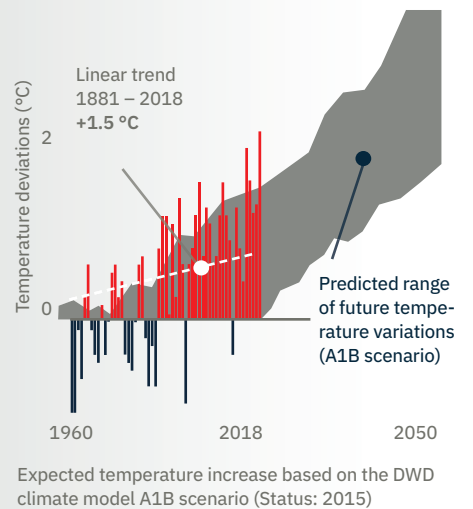
GREATEST RISK FACTOR FOR THE ECONOMY

At the 2019 World Economic Forum in Davos, it was widely agreed that extreme weather events will be the biggest risk factor in the coming years. Climatologists not only expect an increase in the number of hot days and heat waves, but also long-lasting extreme weather situations, since high- and low-pressure areas are increasingly stabilizing in one place for long periods of time. This is increasing the frequency of extreme droughts in individual regions. The risk areas in Germany are mainly the eastern and northern parts of the country and the catchment area of the Rhine, which consequently suffers from low water availability. In light of these factors, companies need to develop strategies for dealing with extreme weather events in a timely manner. Financial backers should address potential credit risks, especially in weather-sensitive industries, and they should also advocate the establishment of appropriate early-warning mechanisms.





Sources: Andersch analysis; interviews with market experts; BMU; DWD; Destatis; Süddeutsche Zeitung

“If the dry weather continues in the coming months, the drought of 2018 could be repeated or even surpassed.”
Dr Udo Busch, DWD, head of agricultural meteorology, accessible from: <https://bit.ly/2L385ox>

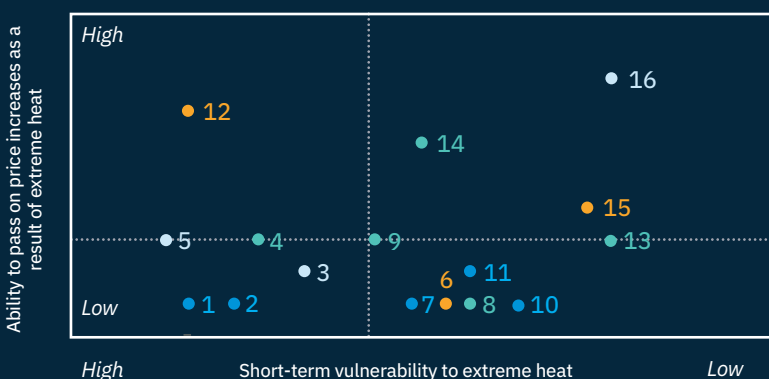
TEMPERATURE VARIATION IN GERMANY



2018 - A CHALLENGING YEAR

-  The **warmest** year
Temperature > 2° C above average
-  The **driest** year
Only 2/3 of the usual rainfall amount
-  The year with the **most hot days**
(daily high > 30° C)
-  The **sunniest** year
2,015 sunshine hours

IMPACTS OF INCREASINGLY FREQUENT CLIMATE PHENOMENA ON SELECTED INDUSTRIES



- 1 Clothing retail
 - 2 Consumer electronics retail
 - 3 Forestry operations/forest owners
 - 4 Hydropower
 - 5 Farming
 - 6 Chemicals industry
 - 7 FMCG retail
 - 8 Energy providers
 - 9 Wind farm operators
 - 10 Retail toy trade
 - 11 Retail furniture trade
 - 12 Inland shipping
 - 13 Solar plant operators
 - 14 Diversified energy producers
 - 15 Industrial conglomerates
 - 16 Wood processors
- Retail trade
 - Energy industry
 - Agriculture/forestry
 - Manufacturing industry

YOUR CONTACT PERSONS

Are you interested in learning more about possible credit risks due to persistent extreme weather conditions?

We look forward to receiving your inquiry, and we will gladly schedule a no-obligation appointment where we can jointly discuss your concerns.



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