

Wildfires: Greece case study shows potential for more frequent, damaging outbreaks

Projections suggest city suburbs most at risk



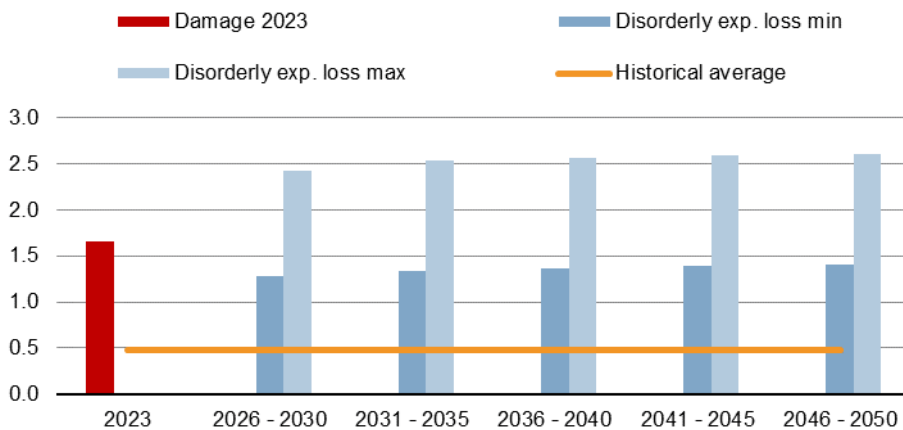
Wildfires caused around **EUR4.1 billion** in damage to property across Europe in the first nine months of 2023, with EUR1.66 bn in Greece and EUR 871m in Spain. While exceptional compared with the past, such damage, equivalent to **0.8% of 2022 GDP** in the case of Greece, could become much less unusual in the decades ahead if wildfires become **more frequent and severe due to climate change** as the Intergovernmental Panel on Climate Change (IPCC) forecasts.

We examine wildfire risk in Greece as a case study of the potential for rising climate-related costs in areas with hot dry summers such as the Mediterranean. We undertake a scenario analysis to assess future wildfire likelihood and associated damage under three climate scenarios¹ using our proprietary model, comparing it with average historical damage between 2006 and 2023.

Rather than simply extrapolating from past levels of wildfire damage, we prefer to consider the potentially greater damage that could arise if wildfires reach large metropolitan areas such as the greater Athens region.

Using an expected loss approach, annual expected wildfire damage could be 46% higher in 2026-2030 in Greece than the damage in 2023. By 2046-2050, annual expected damage could turn out to be 56% higher under the disorderly scenario than it will have been this year.

Figure 1: Projected yearly wildfire damage in Greece (disorderly scenario; EUR billion, real 2023 EUR), using expected loss method



Source: Effis

A potentially aggravating factor in the economic cost of future wildfires in Greece is the lack of insurance cover. Only **9% of wildfire losses were covered by insurance** between 1990 and 2019.

In the absence of government intervention, losses would be borne by households and businesses, as well as by domestic banks, with possible broader repercussions for lending in Greece.

¹ Following the IPCC recommendations, our scenarios are a combination of different shared socio-economic pathways (SSPs) and representative concentration pathways (RCPs). We associate the following SSP-RCP scenarios to our scenarios: Orderly: SSP1-RCP2.6, Disorderly SSP2-RCP4.5, Hot house SSP5-RCP8.5

Analysts

Arne Platteau
 +49 69 6677389-51
a.platteau@scopeesg.com

Dr. Hazem Krichene
 +49 30 278913-45
h.krichene@scopeesg.com

Head of ESG

Said Yakhoulfi
 +49 69 6677389-32
s.yakhoulfi@scopeanalysis.com

Related Research

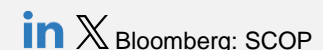
Climate risk across the big five EU economies
 19 June 2023

Scope ESG Analysis GmbH

Lennéstraße 5
 10785 Berlin

Phone +49 30 27891 0
 Fax +49 30 27891 100

esg@scopegroup.eu
www.scopegroup.com



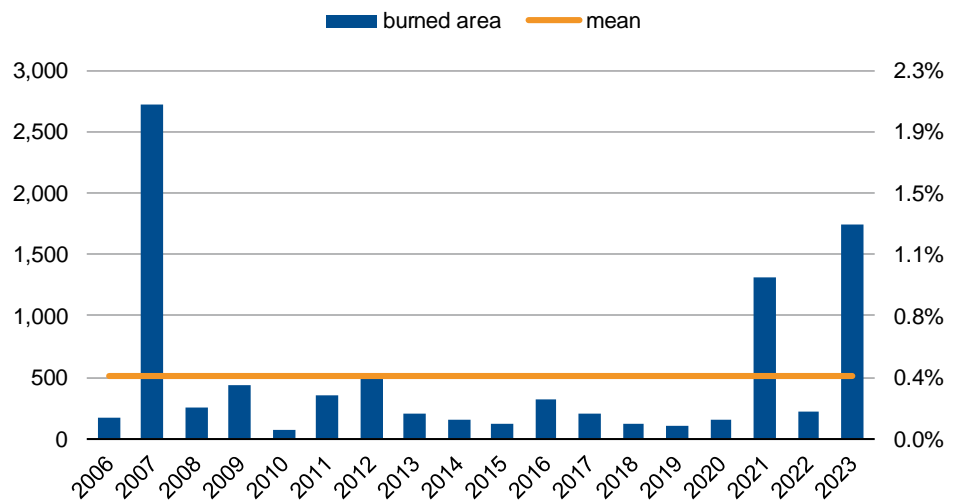
Greece typical of countries vulnerable to wildfires

Long-term costs of wildfires set to rise in Greece

Greece has long experienced weather conditions which can help the start, spread and sustain of fires like many countries in the Mediterranean. One indicator of the relevant meteorological conditions is the [Fire Weather Index \(FWI\)](#), an index which considers several variables affecting fire behaviour.

Greece is one of several regions with among the highest FWI values in the EU. This high fire risk is reflected in annual burnt area in the country, which amounted [50,735 hectares annually in the period 2006-2023 \(Figure 2\)](#).

Figure 2. Yearly burned area in Greece: sq km (LHS); % of land area (RHS)



Source: Effis

Greece recorded worst wildfires since 2007 in summer of 2023

Compared with historical wildfire seasons, the 2023 wildfire season has been particularly severe, with wildfire outbreaks in Rhodes, Evros and near Athens. By early September, more than [173,000 hectares had burned](#).

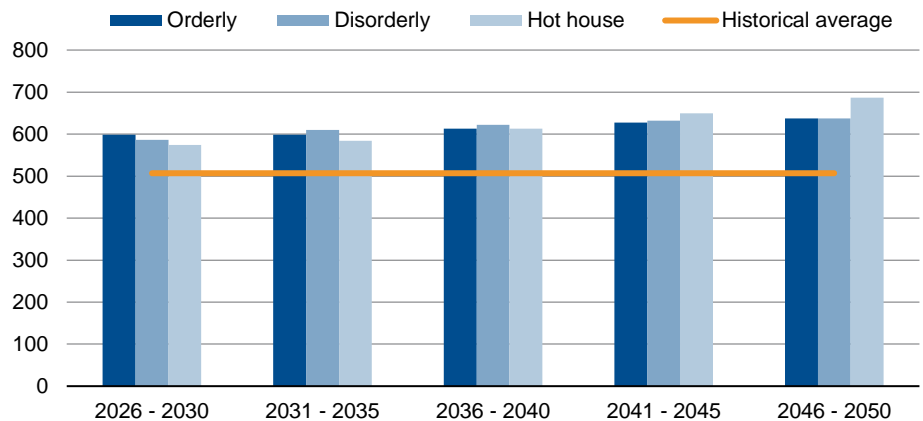
Based on the wildfire damage for 2023, and assuming that wildfire damage is proportional to km² burned area, we estimate annual average wildfire damage to amount to EUR 484 million for the period 2006-2023.

Under all climate scenarios considered, wildfire risk and associated damage is set to increase. It is thus crucial to understand the impact of wildfires on societies and asset values, and how it will change in the future.

We have developed a logistic econometric framework to predict the likelihood of a wildfire breaking out at a granularity of about 4 x 4 km. To obtain observational wildfire data, we use [Climada](#), a climate risk analysis tool developed by ETH Zürich, in conjunction with the [Fire Information for Resource Management System \(FIRMS\)](#) dataset. We then analyse wildfire likelihood conditional on several variables, including the weather, vegetation, geospatial (elevation, river vicinity) and population density variables. Finally, we use wildfire damage functions from researchers at ETH Zürich ([Lüthi et al. \(2018\)](#)) to relate wildfire intensity with asset damage.

Figure 2 shows our projections of burned area for the period 2025-2050. Whereas the expected burned area is slightly higher for the orderly and disorderly scenario compared to the hot house scenario, in the beginning of the period, it gets overtaken by 2040.

Figure 2. Projected yearly burned area in Greece (sq km)



Source: Effis

Athens: wildfires represent low-probability, high-impact event

Wildfire damage projection by expected loss method

Assessing damage based on an extrapolation of the damage caused in 2023 and burned area alone has the disadvantage in that each area is attributed the same monetary cost, whereas the cost are very area-specific, and are dependent on the assets located there.

In Greece, capital is concentrated in several urban areas, with the greater Athens area by far the most important (see **Appendix 1**).

A wildfire which reaches the suburbs of large cities might cause much greater economic damage than what has been historically observed.

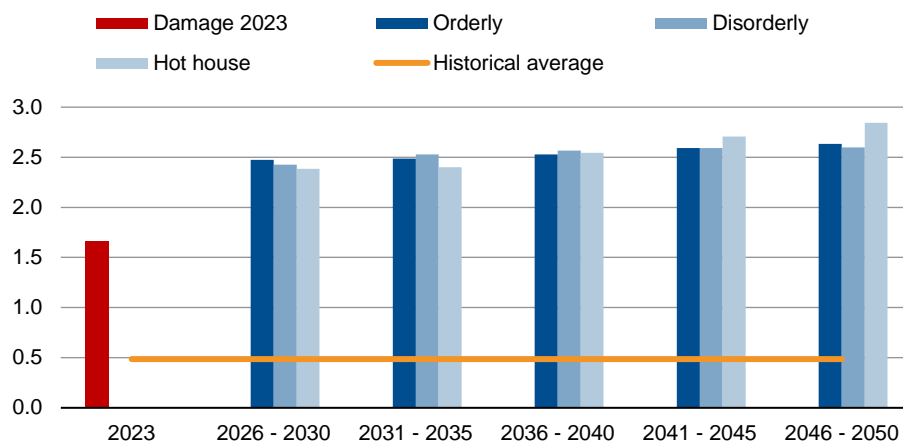
Although the likelihood of such an event is low, as we discuss later, its impact would be enormous. We can consider it a low-probability, high-impact event.

We therefore also project wildfire damage using an expected loss method, which is based on the probability of a wildfire in a certain location, the assets exposed, and the damage caused in case a wildfire breaks out.

Expected losses could run at EUR 2.91bn a year, 2046-50

Based on our wildfire risk estimates, wildfire damage functions from Lüthi et al. (2018), and produced capital estimates from the World Bank, the annual expected losses from wildfire could amount to EUR 2.4bn in 2026-2030, steadily rising throughout 2031-2040 to about EUR 2.5bn. They could amount to EUR 2.8bn in 2046-2050, exceeding the high costs of wildfires in 2023.

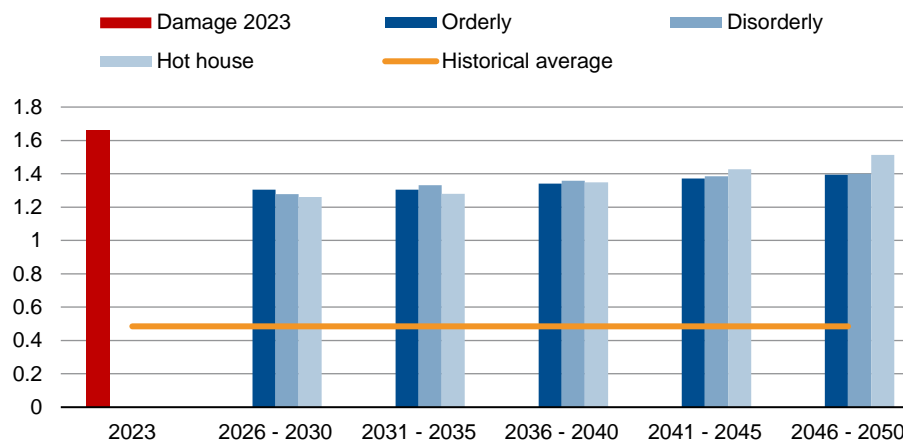
Figure 3. Projected yearly wildfire damage under several scenarios (EUR bn, real 2023 EUR) with expected loss method



Source: Copernicus, Scope ESG

As mentioned before, much of Greece’s economic capital is concentrated in and around Athens. If we repeat the same exercise but leave out the Athens region, we then find that annual expected losses range between EUR 1.3bn in the 2026-2030 period, and EUR 1.5bn by 2046-2050. Whereas this annual expected loss is below the 2023 wildfire damage, it remains far higher than the estimated EUR 484 million of average annual damage in the period 2006-2023.

Figure 4. Projected years wildfire damage (EUR bn, real 2023 EUR) excluding greater Athens region under several scenarios using expected loss method



Source: Copernicus, Scope ESG

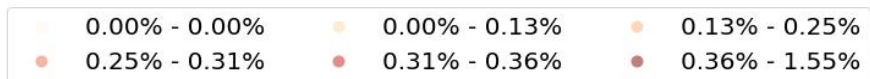
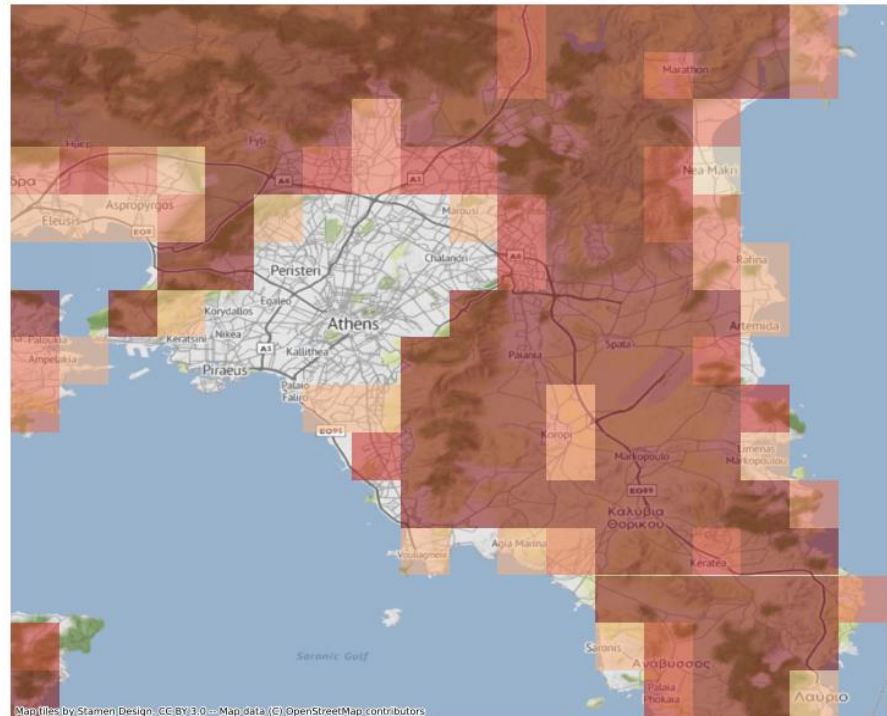
Centre and densely populated suburbs have low wildfire risk

The city centre of Athens and the suburbs in its direct vicinity have relatively low proportional expected damages, driven by the lower wildfire risk compared to the surrounding areas, as there is less flammable vegetation, while compact cities can be less vulnerable as they are better protected given the smaller area.

However, the exposure of less densely populated suburbs and rural areas is notably higher than that of the city centre.

The risk in monetary terms considers both the average annual expected damage as well as assets in a certain region. As there are few assets at risk in rural areas, expected damage is negligible.

Figure 5: Average yearly projected damage to assets as % of total value in case of wildfires in greater Athens region (disorderly scenario, 2020-2050)



Source: Scope ESG analysis

Asset-rich suburbs potentially most at risk from high damages

The city centre also has very low annual expected asset damage, given the very low probability of a wildfire reaching the centre (**Figure 6**). However, the picture changes for suburban areas.

Areas with relatively low fire risk are among those with the highest expected damage in absolute terms, given the value of assets located in these areas.

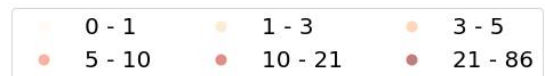
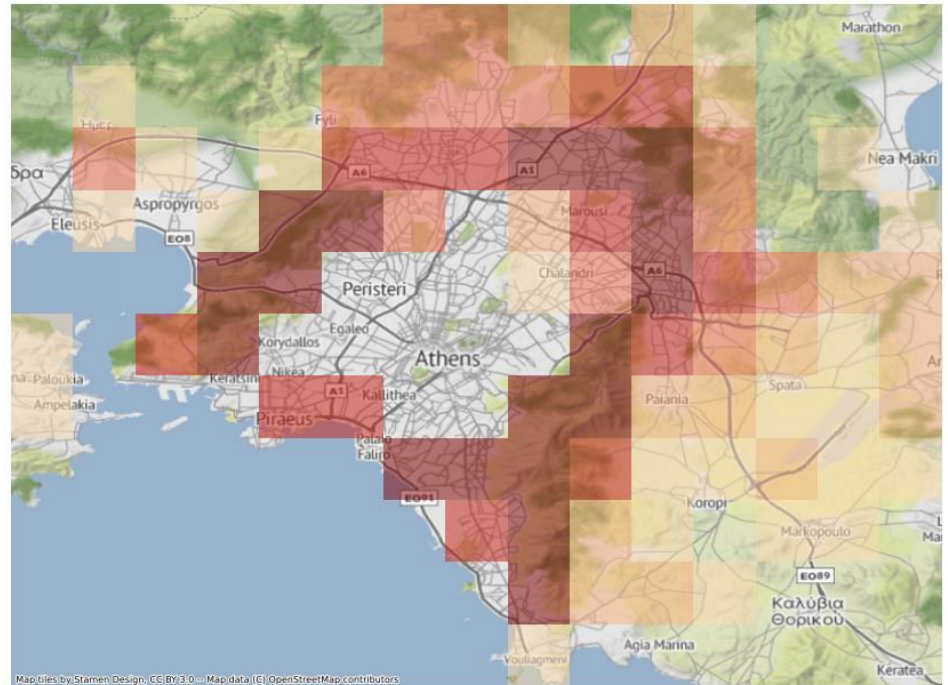
Even some areas with very low fire risk have significant expected losses, as a wildfire event in these areas may have a very low probability but a high potential impact.

Wildfire response can mitigate risks, reduce potential damage

The analysis of future wildfire damage under climate scenarios is subject to several limitations. First, like all climate forecasts, wildfire weather forecasts are inherent to model uncertainties as multiple factors, in addition to global warming, can explain future wildfire pathways. Secondly, many communities prone to wildfire risk **can adapt using several measures**, including early warning systems, suppression of fires, and even the use of fire by prescribed burning.

Projections are only indicative; show need for preventive action

Figure 6: Average yearly projected damage to assets (EUR m) in case of wildfires in Athens and surrounding region (disorderly scenario, 2020-2050)



Source: Scope ESG analysis

Adaptation can reduce wildfire risks

We only consider the impact of wildfires on asset values, and do not consider other secondary affects, such as disruptions to supply chains, loss of collaterals, increased premia, loss of labour productivity associated with health issues from wildfire smoke or immigration from habitat loss, etc, which can be of high importance to investors.

Although burnt areas have been decreasing in some regions as a consequence of improved adaptation, fire danger is projected to increase for many areas, including most of Europe and the US, even for the most benign scenarios.

Adaptation can reduce risks, it cannot completely suppress them, and many societies will have to learn how to live with increased wildfire occurrences.

The authorities in regions prone to wildfires will have to consider damage control among the climate-related environmental measures they need to introduce, including better urban planning.

Encouraging people to live in more densely populated, fire-proof areas reduces the likelihood of wildfires, as increased human activity in previously uninhabited or unvisited areas can in itself cause additional wildfire danger, as most fires are started, accidentally or deliberately, by human activity.

The compactness of high-density urban areas also makes it easier to extinguish those fires which have the highest risk of seriously harming communities.



Wildfires: Greece case study shows potential for more frequent, damaging outbreaks

Projections suggest city suburbs most at risk

Lack of fire insurance could aggravate future costs

Insurance cover remains a challenging issue

It is unclear which actors will be the most adversely affected by wildfire damage.

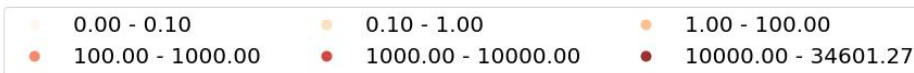
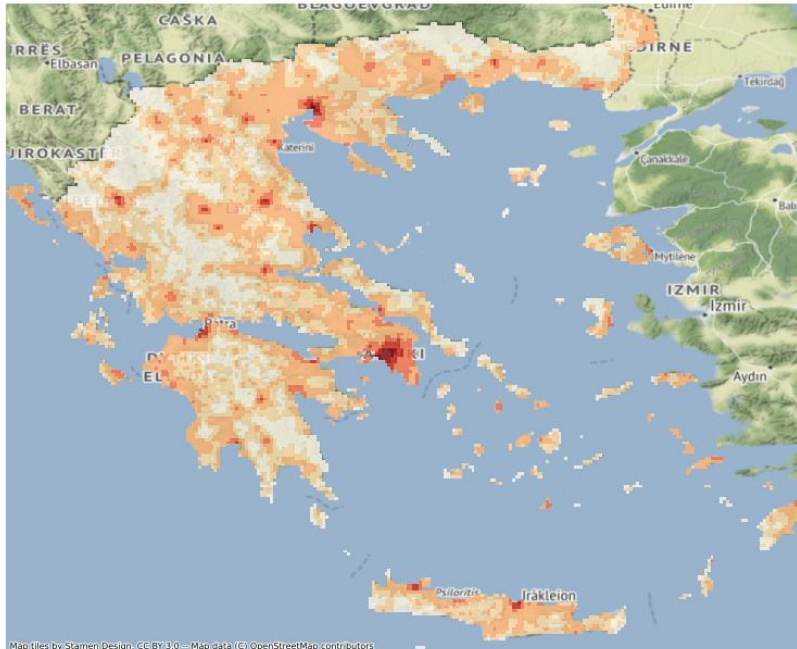
In the case of Greece, only 15% of residential dwellings and about 230,000 commercial properties are covered by fire insurance. Yet, increasing coverage may be difficult, as insurers are expected to increase premia if risks increase.

Hence, households and businesses face a large part of the expected damage, as well as banks who have collaterals in wildfire prone areas. Whereas damage could also be (partly) borne by governments, this would lead to budgetary trade-offs.

Yet, despite the risks, millions of homes are still being built in wildfire-prone areas, notably in the US. Changing this trend may be one of the easier ways to protect communities and homeowners while reducing the economic costs and financial risks.

Appendix

Figure 1: Greece's wealth is concentrated in Athens
 Distribution of produced capital in Greece, 2018 (EURm)



Source: World Bank, Climada



Wildfires: Greece case study shows potential for more frequent, damaging outbreaks

Projections suggest city suburbs most at risk

Scope SE & Co. KGaA

Lennéstraße 5
D-10785 Berlin
info@scopegroup.com

Scope ESG Analysis GmbH

Lennéstraße 5
D-10785 Berlin
esg@scopegroup.eu

Scope Fund Analysis GmbH

Lennéstraße 5
D-10785 Berlin
info@scopeanalysis.com

Scope Ratings GmbH

Lennéstraße 5
D-10785 Berlin
info@scoperatings.com

Scope Ratings UK Limited

52 Grosvenor Gardens
London SW1W 0AU
info@scoperatings.com

www.scopegroup.com
www.scopeexplorer.com
www.scoperatings.com

Disclaimer

© 2023 Scope SE & Co. KGaA and all its subsidiaries including Scope Ratings GmbH, Scope Ratings UK Limited, Scope Fund Analysis GmbH, and Scope ESG Analysis GmbH (collectively, Scope). All rights reserved. The information and data supporting Scope's ratings, rating reports, rating opinions and related research and credit opinions originate from sources Scope considers to be reliable and accurate. Scope does not, however, independently verify the reliability and accuracy of the information and data. Scope's ratings, rating reports, rating opinions, or related research and credit opinions are provided 'as is' without any representation or warranty of any kind. In no circumstance shall Scope or its directors, officers, employees and other representatives be liable to any party for any direct, indirect, incidental or other damages, expenses of any kind, or losses arising from any use of Scope's ratings, rating reports, rating opinions, related research or credit opinions. Ratings and other related credit opinions issued by Scope are, and have to be viewed by any party as, opinions on relative credit risk and not a statement of fact or recommendation to purchase, hold or sell securities. Past performance does not necessarily predict future results. Any report issued by Scope is not a prospectus or similar document related to a debt security or issuing entity. Scope issues credit ratings and related research and opinions with the understanding and expectation that parties using them will assess independently the suitability of each security for investment or transaction purposes. Scope's credit ratings address relative credit risk, they do not address other risks such as market, liquidity, legal, or volatility. The information and data included herein is protected by copyright and other laws. To reproduce, transmit, transfer, disseminate, translate, resell, or store for subsequent use for any such purpose the information and data contained herein, contact Scope Ratings GmbH at Lennéstraße 5 D-10785 Berlin.