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Climate Liability after *Lliuya v RWE*: Causation and Duty Demystified

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Abstract: Around the world, plaintiffs exposed to climate-related harms or hazards are increasingly bringing tort claims against private corporations. Many argue that these lawsuits are dead on arrival because tort law is ill-equipped to address the complexities posed by climate change. In this article, I aim to demonstrate the opposite. I will show that causation is no longer an insurmountable hurdle and that plaintiffs stand a realistic chance of succeeding in court. Moreover, imposing a duty of care on major greenhouse gas (GHG) emitters is neither arbitrary nor unfair, but fully consistent with well-established tort doctrine and case law. Applying the principle of several liability, major GHG emitters should be held liable in proportion to their contribution to the climate-related harm or hazard suffered by the plaintiff. To build my argument, I draw on a prominent climate liability case from Germany that was recently decided: *Lliuya v RWE* – in which the court endorsed many of the arguments presented here and confirmed that major GHG emitters can, in principle, be held liable for climate-related harms and hazards. Since the concepts of causation and duty of care share a common core across jurisdictions, my analysis of German doctrine and case law will offer valuable insights for climate liability litigation around the world.

I Introduction

Climate litigation is on the rise. Since 2017, the number of lawsuits has more than doubled globally.[1] And not only the volume has grown, but also the rate of success.

1 *M Burger/MA Tigre*, Global Climate Litigation Report: 2023 Status Review (2023) 14.

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In 2021, the German Federal Constitutional Court issued a landmark ruling, holding that the government has a constitutional duty to accelerate climate protection.[2] Just one year later, the Brazilian Federal Supreme Court held that the federal government must implement and allocate sufficient funds to mitigate climate change.[3] In April 2024, the European Court of Human Rights (ECtHR) confirmed that states have a positive obligation to adopt effective measures to mitigate climate change and that Switzerland had failed to comply with this obligation.[4]

Since all these lawsuits were brought by individuals (or groups of individuals) against states, they can be categorised as vertical climate litigation.[5] Typically, these lawsuits are based on public law, such as constitutional law or international conventions. Such type of litigation, however, is not the subject of this article. I will focus on horizontal climate litigation – that is, lawsuits brought by individuals against other individuals, especially private corporations. Unlike vertical climate litigation, these lawsuits do not seek stricter laws or government action but rather compensation, reimbursement, or injunctive relief. For this reason, horizontal climate litigation is often referred to as climate (change) liability. And because liability is usually a matter of private law, these lawsuits are primarily based on tort law.[6]

Much has been written about climate liability and tort law. The prevailing view is that tort law is ill-suited to address the challenges posed by climate change. Two core issues have been identified: causation and the duty of care. Many argue that climate change is inherently too complex to establish a causal link between two

2 Entscheidungen des Bundesverfassungsgerichts (BVerfGE) 157, 30; see also *LJ Kotzé*, Neubauer et al. versus Germany: Planetary Climate Litigation for the Anthropocene? (2021) 22 German Law Journal (GLJ) 1423.

3 *PSB et al v Brazil* (on Climate Fund); an English summary is available at: <https://climatecasechart.com/non-us-case/psb-et-al-v-federal-union/>; see also *MA Tigre*/*J Setzer*, Human Rights and Climate Change for Climate Litigation in Brazil and Beyond: An Analysis of the Climate Fund Decision (2023) 54 Georgetown Journal of International Law (Geo J Int'l L) 593.

4 ECtHR *Verein KlimaSeniorinnen Schweiz and Others v Switzerland* [GC], 9.4.2024, no 53600/20; see also *A Hoffmann*, Five key points from the groundbreaking European Court of Human Rights climate judgment in Verein KlimaSeniorinnen Schweiz v Switzerland (2024) 26 Environmental Law Review (Env L Rev) 91.

5 *M Payandeh*, The role of courts in climate protection and the separation of powers, in: W Kahl/M-P Weller (eds), Climate Change Litigation (2021) 62, no 8; *M-P Weller et al*, Climate change litigation in Germany, in: W Kahl/M-P Weller (eds), Climate Change Litigation (2021) 378, no 1.

6 *EM Penalver*, Acts of God or Toxic Torts? Applying Tort Principles to the Problem of Climate Change (1998) 38 Natural Resources Journal (NRJ) 563, 597; see also *M Olszynski et al*, From Smokes to Smokestacks: Lessons from Tobacco for the Future of Climate Change Liability (2017) 30 Georgetown Environmental Law Review (Geo Envtl L Rev) 1; *M Spitzer*/*B Burtscher*, Liability for Climate Change: Cases, Challenges and Concepts (2017) 8 Journal of European Tort Law (JETL) 137.

individuals – let alone to justify imposing a duty of care on private corporations for an everyday activity such as GHGs.[7]

In this article, which builds on earlier work originally developed in German,[8] I seek to refute these (and other) objections. I will illustrate that causation no longer poses an insurmountable challenge. Thanks to advances in climate science, specific climate-related harms and hazards can now be attributed to specific emitters – and the science is so robust that plaintiffs stand a reasonable chance of proving their claims in court. Moreover, imposing a duty of care on major GHG emitters is not arbitrary or unfair, but fully consistent with well-established tort doctrine and case law. Although most emitters were not required to switch their manufacturing processes to a less harmful alternative design, they did have a duty to warn from the mid-1960s onward – which they failed to fulfil. Applying the principle of several liability, GHG emitters should be held liable in proportion to their contribution to the climate-related harm or hazard suffered by the plaintiff.

To build my argument, I will not provide a comprehensive overview of the ongoing climate liability cases in different jurisdictions around the world.[9] Instead, I will focus solely on one prominent case from Germany that was recently decided: *Lliuya v RWE,* in which the court affirmed many of the arguments I present here. This limited scope is appropriate for three reasons. First, although *Lliuya v RWE* is sometimes mentioned in academic papers outside the German-speaking world, it is rarely discussed in depth because most of these papers (and their authors) are primarily interested in the common law jurisdictions.[10] Filling this blind spot should be fruitful, as *Lliuya v RWE* is a well-researched case that could inspire climate liability cases in many other jurisdictions.

Second, with a broad perspective, much gets lost; only by focusing on a specific case is it possible to conduct a thorough legal analysis. Since the facts of climate

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7 Most prominent *DA Kysar*, What Climate Change Can Do about Tort Law (2011) 41 Environmental Law (Envtl L) 1, 8ff; see also (among many others) *D Weisbach*, Negligence, Strict Liability, and Responsibility for Climate Change (2012) 97 Iowa Law Review (Iowa L Rev) 521, 534ff; *G Wagner*/*A Arntz*, Liability for climate damages under the German law of torts, in: W Kahl/M-P Weller (eds), Climate Change Liability (2021) 405, no 28ff. But see *CW Callahan*/*JS Mankin*, Carbon majors and the scientific case for climate liability (2025) 640 Nature 893, 893: 'the scientific case for climate liability is closed'.

8 *J-E Schirmer,* Nachhaltiges Privatrecht (2023) 170ff.

9 Cf *RF Stuart-Smith et al,* Filling the evidentiary gap in climate litigation (2021) 11 Nature Climate Change (Nat Clim) 651; *J Setzer*/*C Hingham,* Global Trends in Climate Change Litigation: 2025 snapshot (2025) 10 ff.

10 Cf *M Burger et al*, The Law and Science of Climate Change Attribution (2020) 45 Columbia Journal of Environmental Law (Colum J Envtl L) 57, 211ff; *Stuart-Smith et al* (2021) 11 Nat Clim 651, 653; *L Benjamin*, Carbon major companies and liability for loss and damage, in: M Doelle/SL Seck (eds), Research Handbook on Climate Change Law and Loss & Damage (2021) 391.

liability cases differ in many ways – some involve past, others future, conduct; some are brought against utilities, others against automakers, and so on – it is difficult (if not outright impossible) to make concrete normative claims that transcend a specific case.

Third, and perhaps most importantly, my focus on *Lliuya v RWE* is not so limited after all. Most of my arguments should be applicable (or at least transferable) to climate liability scenarios that are factually similar to *Lliuya v RWE*. The concepts of causation and duty of care, despite their differences in detail, share a common core across jurisdictions – and this common core, especially in European countries, is heavily influenced by German tort law and doctrine.[11] Thus, my analysis should be insightful for the many *Lliuya v RWE*-like cases, not only in Germany, but around the world.[12]

The article is structured as follows. Part II introduces the main features of *Lliuya v RWE*, both factual and normative. The subsequent parts deal with the two core issues of climate liability: Part III discusses causation, and Part IV focuses on the duty of care. Since German private law applies in *Lliuya v RWE*, as will be shown below, I use it as a benchmark. However, I include comparative observations throughout to demonstrate if and how my argument is likely to hold in other jurisdictions. For the sake of brevity and readability, I limit these comparative observations to the private laws of other European countries and the United States.

II *Lliuya v RWE*

Compared to most climate liability cases, the facts of *Lliuya v RWE* are relatively straightforward.[13] The plaintiff, Saúl Luciano Lliuya, owns land in Huaraz, Peru, where the family's home is located. Huaraz lies at the foot of the Cordillera Blanca mountain range, which contains several glaciers. The glacier above Huaraz, the Palcaraju, has shrunk considerably in recent decades, while the glacial lake has increased in volume. Lliuya fears that the glacial lake could burst into the valley at any time and flood his home. To provide some protection, Lliuya reinforced the out-

11 *M Infantino*/*E Zervogianni*, The European Ways to Causation, in: M Infantino/E Zervogianni (eds), Causation in European Tort Law (2017) 85, 103.

12 Similar *RH Weaver*/*DA Kysar*, Courting Disaster: Climate Change and the Adjudication of Catastrophe (2017) 93 Notre Dame Law Review (Notre Dame L Rev) 295, 329ff (discussing avenues for cross-national 'doctrinal evolution' in climate liability).

13 For more details and information (pleadings, court orders, etc), visit <https://rwe.climatecase.org/en>.

er walls and added a second floor as a refuge, which cost him the equivalent of approx € 12,800.

For a small part of this sum, Lliuya seeks reimbursement from RWE AG. RWE, founded in 1898 as a stock corporation, is one of Germany's largest utilities, generating electricity primarily through burning coal. According to Lliuya, this makes RWE partly responsible for the flood risk threatening his home. His argument is threefold: Since the retreat of the Palcaraju glacier and the growth of the glacial lake are due to climate change, and since RWE has partly contributed to climate change by emitting GHGs, RWE should also partly reimburse him for his mitigation efforts. This makes his claim backward-looking: Lliuya is not aiming – at least not primarily – to stop or limit RWE's future potential emissions. Instead, he is targeting RWE's decades of actual emissions that (allegedly) contributed to the present flood risk threatening his property. *Lliuya v RWE* is therefore factually similar to climate liability scenarios involving (1) *climate victims* exposed to sea level rise or other existential slow-onset events; and (2) *major emitters* with a long history of GHG emissions.[14]

Although the events of *Lliuya v RWE* largely took place in Peru, Lliuya sued RWE in a German court under German private law. This may be counterintuitive, but it follows directly from European law: within the EU, plaintiffs seeking compensation for environmental damage, ie, damage mediated via air, water, soil, and the like, are free to forum shop. For both international jurisdiction and the applicable law, plaintiffs can choose between the place of conduct and the place of damage. In other words, in the courts of EU Member States, defendants cannot invoke the doctrine of *forum non conveniens* to defeat a climate liability claim.[15] As a result, most plaintiffs make strategic choices about where to sue and which law to apply.

Lliuya opted twice for the place of conduct, namely German courts and German law. There are good reasons for this. Most notably, unlike in the US and other common law jurisdictions,[16] German private law does not explicitly recognise the political question doctrine. Nor does it impose a strict standing requirement. While questions concerning the separation of powers and legally protected interests do arise in German civil litigation, they are treated as matters of substantive law rather than as

14 Such similar climate liability scenarios would be, for example, *Kivalina v Exxon Mobil or AFIEGO et al v Total*. For more cases, visit the Climate Change Litigation Databases provided by the Sabin Center for Climate Change Law on <https://climatecasechart.com>.

15 Art 4 Brussels Ia Regulation and art 7 Rome II Regulation; see for more details *E-M Kieninger*, Conflicts of jurisdiction and the applicable law in domestic courts' proceedings, in: W Kahl/M-P Weller (eds), Climate Change Litigation (2021) 119, confirmed by OLG Hamm – 5 U 15/17, Beck-Rechtsprechung (BeckRS) 2025, 11476, nos 98ff, 122ff.

16 *MR Grossman*, Climate Change and the Individual (2018) 66 American Journal of Comparative Law (Am J Comp L) 345, 353ff.

threshold issues of admissibility. This significantly lowers the procedural barriers for plaintiffs seeking access to the courts.[17] Moreover, German private law offers a remedy that in principle closely aligns with Lliuya's reimbursement claim. Like many other jurisdictions,[18] the German Civil Code (*Bürgerliches Gesetzbuch*, BGB) recognises the concepts of *negotiorum gestio* (*Geschäftsführung ohne Auftrag*) and unjust enrichment (*ungerechtfertigte Bereicherung*). According to the German Federal Court of Justice (*Bundesgerichtshof*, BGH), these concepts can be invoked when the defendant's wrongful actions pose a hazard to the plaintiff who (instead of seeking an injunction under sec 1004 (1) BGB) incurred expenses to mitigate the hazard.[19] This is precisely Lliuya's position: he blames RWE's emissions for having contributed to the flood risk threatening his home; but instead of seeking a prohibitory injunction, he took preventive action himself by reinforcing the exterior walls and adding a second floor – for which he now seeks reimbursement. This approach has important doctrinal and procedural implications: although Lliuya is seeking payment, his claim is based not on a climate-related harm but on a *climate-related hazard*. Thus, Lliuya does not have to convince the court that RWE's actions harmed his body or property, but 'only' needs to show that RWE contributed to the flood risk that poses a hazard to his home.

Lliuya's journey through German courtrooms began with a setback. The District Court of Essen was not convinced by his claim and dismissed the case in its entirety at first instance.[20] On appeal, however, Lliuya secured an important interim success that made headlines around the world: the Higher Regional Court (*Oberlandesgericht*, OLG) of Hamm found his claim to be plausible and allowed the case to proceed to the evidentiary stage. This was a major breakthrough because German civil courts will only enter the evidentiary stage if the plaintiff's claim is considered legally conclusive (*schlüssig*). In other words, civil judges will only hear witnesses and experts if – assuming the facts presented by the plaintiff are true – the legal basis of the claim is so strong that the court expects the plaintiff to prevail. By entering the evidentiary stage, the OLG Hamm thus implicitly confirmed that RWE can, in principle, be held liable for climate-related harms or hazards.[21]

17 *S Schwemmer et al*, Global Legal Tactics: Germany National Report (2024) 37 f.

18 *B Fauvarque-Cosson*/*D Mazeaud*, European Contract Law: Materials for a Common Frame of Reference: Terminology, Guiding, Principles, Model Rules (2008) 35ff. For functionally similar concepts in English common law, see *S Duncan*, Negotiorum gestio: A Civilian Concept in the Common Law? (2006) 55 International and Comparative Law Quarterly (Int'l & Comp L Q) 253.

19 BGHZ 60, 235, 243; 98, 235, 240; 236, 369 no 10; see also BGH Neue Juristische Wochenschrift (NJW) 2004, 603, 604 (rebutting scholarly criticism).

20 LG Essen, Zeitschrift für Umweltrecht (ZUR) 2017, 372.

21 *Wagner*/*Arntz* (fn 7) no 24; *Schwemmer et al* (fn 17) 47 and 60.

For reasons of procedural economy, in the evidentiary stage, the OLG Hamm initially focused on the most pressing factual question – namely, whether Lliuya's property is actually at risk of flooding. To assess this, the court appointed two expert witnesses who prepared detailed reports. These experts ultimately estimated the probability that the glacial lake would burst and cause a minor flood wave to reach the plaintiff's property within the next 30 years at under 1%. Although a private expert retained by the plaintiff presented well-founded criticisms of the court-appointed experts' methodology and conclusions, the OLG Hamm remained unconvinced and fully adhered to the court experts' findings in its judgment rendered in May 2025. This left Lliuya's reimbursement claim without a foundation: according to established doctrine, a property owner may seek a prohibitory injunction – and even reimbursement for mitigation costs – only in the face of an imminent hazard. Since the court found that such a low flood risk did not meet this threshold, it dismissed the claim with final effect.[22]

However, the ruling does not amount to a general rejection of climate liability – quite the opposite. Over the course of more than 60 pages, the OLG Hamm provides a detailed explanation of why Lliuya's reimbursement claim is legally conclusive (*schlüssig*) and would have succeeded had the plaintiff proven the alleged facts.[23] In other words, the court makes explicit what it had previously only implied: that major emitters like RWE can, in principle, be held liable for climate-related harms and hazards under German private law. Although the claim was ultimately dismissed, the decision primarily focuses on innovative solutions to the core issues of climate liability: causation and duty of care.

In doing so, the OLG Hamm draws on many arguments previously developed in German legal literature.[24] This paper seeks to make these arguments accessible to an English-speaking audience – thereby refuting common objections raised against climate liability worldwide. To this end, the remainder of this paper will conduct a thought experiment that effectively carries the logic of *Lliuya v RWE* to its conclusion: suppose the flood risk were serious, and Lliuya faced an imminent hazard to his property; how, then, could the remaining requirements of his reimbursement claim – namely the core issues of climate liability: causation and duty of care – be established?

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22 OLG Hamm – 5 U 15/17, BeckRS 2025, 11476 no 353ff. The ruling is final because the OLG Hamm did not permit an appeal to the BGH and taking the case to the German Federal Constitutional Court is virtually impossible.

23 OLG Hamm – 5 U 15/17, BeckRS 2025, 11476, nos 94–322.

24 In particular, *W Frank*, Klimahaftung und Kausalität (2018) ZUR 28; *Schirmer* (fn 8) 119ff; *E-M Kieninger*, Klimaklagen im internationalen und deutschen Privatrecht (2023) 187 Zeitschrift für das gesamte Handelsrecht und Wirtschaftsrecht (ZHR) 348.

Crucially, this is not merely abstract theorising. The thought experiment could quickly become reality: had the plaintiff not been Lliuya, but a neighbour living closer to the glacial lake, the court-appointed experts might well have assessed the flood risk as significantly higher. The same could hold true for climate victims in other parts of the world, particularly those exposed to sea level rise or other existential slow-onset events. With the OLG Hamm's decision in hand, it has become considerably more likely that climate liability scenarios factually similar to *Lliuya v RWE* will increasingly be brought before civil courts – where the questions of causation and duty of care will sooner or later become decisive.

III Causation

Many argue that causation is the dead end of climate liability. Establishing a causal link between specific emissions and a specific climate-related hazard or harm is widely regarded as an impossible task.[25] However, as I will demonstrate in this Part, this is no longer the case. To illustrate my point, I will break down the issue of causation into three sub-issues: scientific causation, legal causation, and contributory causation. In *Lliuya v RWE* – supposing there is a serious flood risk to the plaintiff's property – these sub-issues are: (A) Is there robust scientific evidence that RWE's emissions contributed to the flood risk? (B) Is this scientific evidence robust enough to persuade a civil court? (C) Is the court able to quantify RWE's causal contribution and will it accept a mere contribution as a basis for liability?

A Scientific causation

In *Lliuya v RWE* the causal chain consists of three parts. Lliuya claims that (1) RWE's emissions caused climate change, including its effects in Huaraz; (2) climate change caused the retreat of the Palcaraju glacier; and (3) the Palcaraju's retreat caused the flood risk that is (supposedly) threatening Lliuya's home. As we shall see, there is robust scientific evidence for each part of the causal chain.

25 *Wagner*/*Arntz* (fn 7) no 41: 'difficult, if not impossible to establish a causal link'; *Spitzer*/*Burtscher* (2017) 8 JETL 137, 167: 'the plaintiff in climate change cases will fail the but-for test'.

1 RWE's emissions caused climate change in Huaraz

Since 1880, the global mean temperature has risen by more than 1 °C.[26] The cause of this increase is well understood. While natural factors such as solar radiation and volcanic eruptions also account for a very small portion of the warming, the latest assessment report by the Intergovernmental Panel on Climate Change (IPCC) states that it is 'unequivocal' that the dominant driver of climate change is anthropogenic GHG emissions, especially CO_2.[27] Recent findings even attribute 'virtually all (97 %–98 %)' of the warming to anthropogenic GHG emissions.[28]

However, the global perspective alone is not sufficient for the first part of the causal chain. It is also necessary to show that anthropogenic climate change has reached Lliuya in the Cordillera Blanca. For a long time, it was unclear whether this region was affected by climate change. Although temperatures in Peru and in the Andes generally rose in line with the global trend until about 1980, the rate of warming significantly slowed after that, and in some cases it actually decreased. This led some climate scientists to conclude that natural rather than anthropogenic factors dominate the Andean climate.[29] In 2021, however, a study by Stuart-Smith et al demonstrated the opposite. Using local temperature data and modelling the regional climate trend, the researchers found that the temperature in Huaraz had increased by 1 °C since 1880, fully consistent with the global trend. More importantly, they identified the dominant factor. Referring to the terms of the internationally accepted IPCC likelihood scale, Stuart-Smith et al determined that it was 'extremely likely' (> 95 % probability) that the observed warming in Huaraz was due to anthropogenic climate change.[30]

But to what extent have RWE's GHG emissions contributed to all of this? The first step is to trace RWE's share of cumulative historical emissions. According to Richard Heede's groundbreaking emission accounting studies, 0.38 % of all indus-

26 *IPCC*, Sixth Assesment Report – Working Group I: the Physical Science Basis (Summary for Policymakers) (2021) 5.

27 *IPCC* (fn 26) 5ff (quote at 5).

28 *K Haustein et al*, A Limited Role for Unforced Internal Variability in Twentieth-Century Warming (2019) 32 Journal of Climate (JCLI) 4893; see also *IPCC* (fn 26) 5ff.

29 In particular, the highly variable surface temperature of the North Pacific Ocean (known as the Pacific Decadal Oscillation, or PDO) was thought to be the dominant factor, see *M Falvey*/*RD Garreaud*, Regional cooling in a warming world: Recent temperature trends in the southeast Pacific and along the west coast of subtropical South America (1979–2006) (2009) 114 Journal of Geophysical Research (JGR) 1.

30 *RF Stuart-Smith et al*, Increased outburst flood hazard from Lake Palcacocha due to human-induced glacier retreat (2021)14 Nature Geoscience (Nat Geosci) 85; see also (for the Andes as a whole) *IPCC*, Sixth Assesment Report – Working Group I: the Physical Science Basis (Full Report) (2021) 1995.

trial GHGs ever emitted can be attributed to RWE.[31] However, because GHGs are partly absorbed by the oceans and other climate sinks, the share of historical emissions does not directly correspond to the contribution to global warming. This is where Earth system models come in, as they can convert shares of historical emissions into quantifiable contributions to global temperature rise. Simply put, this conversion is done by modelling and comparing two worlds: a 'complete world' based on the real world, in which the share of historical emissions is included, and a 'partial world' in which this share is excluded.[32] Following this procedure, a recent study arrived at the best estimate that RWE's emissions contributed to 0.003 °C – or 0.321 % – of total global warming.[33]

2 Climate change caused Palcaraju's retreat

Satellite images show that the glaciers in the Cordillera Blanca have shrunk by approximately a quarter since the mid-1980s.[34] The Palcaraju glacier above Huaraz is in even worse shape. According to the aforementioned study by Stuart-Smith et al, it has lost nearly half of its size since 1880 – from 4,250 metres to 2,400 metres – with particularly significant retreat after 1980.[35] In contrast, the glacial lake has grown to record levels – in record time. In 1987, it had a volume of about 2 million cubic metres; by 2020, the volume had increased to 12 million cubic metres.[36] '[A]s the

31 *Carbon Majors*, The Carbon Majors Database (2024) 28; fundamentally *R Heede*, Tracing anthropogenic carbon dioxide and methane emissions to fossil fuel and cement producers, 1854–2010 (2014) 122 Climatic Change (Clim Change) 229. Since RWE burns most of the coal it produces in its own power plants, RWE's share of cumulative historical emissions consists almost exclusively of so-called Scop. 1 emissions.

32 For details see *Burger et al* (2020) 45 Colum J Envtl L 77ff.

33 *R Licker et al*, Attributing ocean acidification to major carbon producers (2019) 14 Environmental Research Letters (ERL) 124060, Supplementary Material, Table 5 (over the emission period 1880–2015; the uncertainty range is +/- 0.000072 °C or +/- 0.0078 %). Almost identical (for the emission period 1880–2010) *B Ekwurzel et al*, The rise in global atmospheric CO_2, surface temperature, and sea level from emissions traced to major carbon producers (2017) 144 Clim Change 589, Supplementary Material 2, Table 5. Note that due to a lack of emissions data for earlier periods, RWE's 0.321 % contribution to climate change is based solely on its GHG emissions from 1965 onward, see <https://carbonmajors.org/Entity/RWE-136>.

34 *P Burns/A Nolin*, Using atmospherically-corrected Landsat imagery to measure glacier area change in the Cordillera Blanca, Peru from 1987 to 2010 (2014) 140 Remote Sensing of Environment (RSE) 165.

35 *Stuart-Smith et al* (2021) 14 Nat Geosci 87f.

36 *R Ahmed et al*, Expansion of Moraine-Dammed Glacial Lakes and Historical GLOF Events in Cordillera Blanca Region of Peruvian Andes (2023) 7 Earth Systems and Environment (ESEV) 131, 138.

glacier ice has simply been replaced by lake water', another study explains, 'close to 100 % of the lake growth can be explained by glacier retreat.'[37]

However, tropical glaciers such as the Palcaraju are subject to strong natural melting factors, including intense solar radiation and fluctuating ocean temperatures. To rule out the influence of these natural factors as the primary cause of the retreat, Stuart-Smith et al modelled the size of the Palcaraju glacier with and without anthropogenic global warming and compared it to its actual size. The study found that the size of the glacier would have fluctuated by an average of only 230 metres had it been influenced by natural factors alone. Given these drastic differences, the researchers are 'virtually certain' (> 99 % probability) – the highest confidence level on the IPCC scale – that anthropogenic climate change is the 'necessary cause' of the Palcaraju's retreat.[38]

3 Palcaraju's retreat caused the flood risk

Due to its exposed location below the Palcaraju glacier, the city of Huaraz is at risk of being hit by a glacial lake outburst flood (GLOF). Typically, GLOFs are triggered when avalanches of rock or heavy snow collapse into a glacial lake. The impact can create a tidal wave that destroys or overtops the dam containing the glacial lake. Because the Palcaraju is a hanging glacier that runs along extremely steep cliffs, it is particularly vulnerable to avalanches hitting the lake at high speed.[39] Against this background, it is not surprising that several studies by international experts have concluded that large parts of Huaraz are at high GLOF risk.[40] According to the standard classification, this level of risk means that even in the highly likely event of a small avalanche, people in buildings could be injured and buildings could be severely damaged or even destroyed.[41]

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37 *C Huggel et al*, Anthropogenic climate change and glacier lake outburst flood risk: local and global drivers and responsibilities for the case of lake Palcacocha, Peru (2020) 20 Natural Hazards and Earth System Sciences (NHESS) 2175, 2180.

38 *Stuart-Smith et al* (2021)14 Nat Geosci 85, 88; see also *Huggel et al* (2020) 20 NHESS 2175, 2180 f.

39 *A Emmer*/*V Vilímek*, Review Article: Lake and breach hazard assessment for moraine-dammed lakes: an example from the Cordillera Blanca (Peru) (2013) 13 NHESS 1551.

40 *MA Somos-Valenzuela et al*, Modeling a glacial lake outburst flood process chain: the case of Lake Palcacocha and Huaraz, Peru (2016) 20 Hydrology and Earth System Sciences (HESS) 2519; *H Frey et al*, Multi-Source Glacial Lake Outburst Flood Hazard Assessment and Mapping for Huaraz, Cordillera Blanca, Peru (2018) 6 Frontiers in Earth Science (Front Earth Sci) 1; *Huggel et al* (2020) 20 NHESS 2175, 2180.

41 *H Raetzo et al*, Hazard assessment in Switzerland – Codes of Practice for mass movements (2002) 61 Bulletin of Engineering Geology and the Environment (Bull Eng Geol Environ) 263.

But is the high GLOF risk in large parts of Huaraz due to anthropogenic climate change or is it merely a natural hazard given the state of the Palcaraju glacier? Again, the study by Stuart-Smith et al provides a clear answer. Using their modelled data on the size of the Palcaraju and the glacial lake, the researchers found that in the absence of anthropogenic global warming, Huaraz would face only a medium GLOF risk. This would constitute a significant improvement over the current situation: if a medium GLOF were to strike, people and buildings would suffer only limited impacts, rather than the personal injuries and severe destruction associated with a high GLOF risk.[42] Thus, mitigation measures like those Lliuya took – reinforcing the outer walls and adding a second floor to his home to protect his family and property – would not have been necessary under a medium GLOF risk.

As the OLG Hamm made clear, this suffices to complete the three-part chain of scientific causation:[43] (1) because of RWE's emissions, temperatures rose worldwide, including in Huaraz; (2) because temperatures rose, the Palcaraju glacier retreated; and (3) because the Palcaraju retreated, large parts of Huaraz are now exposed to a high rather than a medium GLOF risk, requiring more extensive mitigation efforts. Of course, none of this happened because of RWE's emissions alone but the scientific studies clearly show that RWE's contribution was a factor. Without RWE's emissions, temperatures (including those in Huaraz) would be slightly lower. And because the warmer it gets, the more glaciers retreat and the more severe avalanches occur,[44] the GLOF risk would likewise be slightly lower without RWE's emissions. Every avoided emission makes a difference – a small difference, but a discernible difference.[45]

Since *Lliuya v RWE* is based on a climate-related hazard, the causal chain is sufficiently completed by linking RWE's emissions to the increased GLOF risk. As explained above, whether RWE's actions ultimately caused *harm* to Lliuya's life or property is not the decisive legal issue in this context. However, if the final part of the causal chain in question had actually involved harm, it should be equally possible to establish scientific causation. Suppose a GLOF had hit Lliuya's property and destroyed it. Scientific causation could not be dismissed by arguing that RWE's emissions made no difference, ie, that the GLOF would have struck anyway. This ignores

42 *Stuart-Smith et al* (2021) 14 Nat Geosci 85, 88; see also *Huggel et al* (2020) 20 NHESS 2175, 2181.

43 OLG Hamm – 5 U 15/17, BeckRS 2025, 11476 no 175f. Generally, see *Callahan*/*Mankin* (2025) 640 Nature 893, 893: 'the scientific case for climate liability is closed'.

44 *IPCC* (fn 30) 1818; *W Haeberli et al*, Increasing risks related to landslides from degrading permafrost into new lakes in de-glaciating mountain ranges (2017) 293 Geomorphology 405; *A Emmer et al*, Glacial Lake Outburst Floods in the Cordillera Blanca, in: V Vilímek et al (eds), Geoenvironmental Changes in the Cordiller Blanca, Peru (2024) 169, 179.

45 Emphatically *IPCC* (fn 26) 28: 'Every tonne of CO_2 emissions adds to global warming'.

the fact that GLOFs vary. As noted above, climate science shows that the warmer it gets, the more unstable glaciers become – leading to more intense GLOFs. Therefore, but for RWE's emissions, temperatures would have been slightly lower, and the specific GLOF would have been slightly less intense. Slightly less water flowing more slowly would have reached Lliuya's property, resulting in slightly less destruction.[46] Thus, without RWE's emissions, Lliuya's overall damage would have been less – by a very small amount, but a discernible amount.

B Legal causation

The previous section has shown that there is robust scientific evidence for each part of the causal chain. But it has also become clear that this evidence is based on probabilities. It is not entirely certain whether climate change caused the warming in Huaraz or the retreat of the Palcaraju. This is not a problem in itself, however. Remaining uncertainties do not preclude causal inference, either epistemically or legally. The real question is whether the underlying knowledge base is sufficient to establish a causal link.[47]

The treatment of causation in German private law is a case in point. Similar to other jurisdictions, causation is established through a counterfactual exercise, the *conditio sine qua non* test: but for the defendant's act, the specific event would not have occurred.[48] In Germany, this test is applied regardless of whether the event in question is a harm (giving rise to compensation) or a hazard (giving rise to an injunction or reimbursement, as in *Lliuya v RWE*).[49] If the findings derived from scientific causation are fed into the *conditio sin qua non* test, the outcome in *Lliuya v RWE* is affirmative: but for RWE's emissions, the *specific* GLOF risk would not have occurred – it would have been slightly lower. However, the existence of scientific causation does not automatically imply legal causation. From a civil procedural per-

46 For the relationship between temperature and GLOF intensity, see *Huggel et al* (2020) 20 NHESS 2175, 2181; *Stuart-Smith et al* (2021) 14 Nat Geosci 85, 88; *Emmer et al* (fn 44) 179.

47 *S Steel*, Proof of Causation in Tort Law (2015) 66ff; *I Puppe*/*RW Wright,* Causation in the Law: Philosophy, Doctrine and Practice, in: M Infantino/E Zervogianni (eds), Causation in European Tort Law (2017) 17; *CA Kern*, Probability as an Element of Standard of Proof, in: L Tichý (ed), Standard of Proof in Europe (2019) 51; *P Minnerop*/*F Otto*, Climate Change and Causation. Joining Law and Climate Science on the basis of Formal Logic (2020) 27 Buffalo Environmental Law Journal (Buff Envtl LJ) 49.

48 *M Infantino*/*E Zervogianni*, Summary and Survey of the Results, in: M Infantino/E Zervogianni (eds), Causation in European Tort Law (2017) 601ff. Unlike in common law, German law does not require that the negligent aspect of the defendant's act caused the harm, because negligence (and fault in general) is reserved for a separate, later examination, see *Steel* (fn 47) 16f.

49 *Wagner*/*Arntz* (fn 7) no 83ff.

spective, causation is a fact (*Tatsache*) that must be proven in court like any other fact.[50] According to sec 286 of the German Code of Civil Procedure (*Zivilprozessordnung*, ZPO), a fact is proven if the court – after hearing and considering all the evidence – 'deems it true'. What this standard of proof requires in detail was clarified by the BGH in its famous *Anastasia* decision. Unlike criminal law, civil procedure does not demand a 'firm conviction free of all doubt'. Rather, 'if a fact remains in doubt, the judge may and must be content with a degree of practical certainty that silences the doubts without completely excluding them.'[51] Although civil judges have wide discretion as to how to achieve this practical certainty, they must still follow objective criteria – especially the laws of thought, experience, and nature. Since these laws are nothing more than empirical, statistical, or otherwise plausible interpretations of the world, many legal scholars have specified the BGH's formula as follows: a civil judge shall deem a fact true if, based on scientifically validated, widely accepted, and acceptable arguments, there is a 'very high probability' that the fact is true.[52] Consistent with this, in several decisions on complex medical issues, the BGH has accepted causation as proven on the basis of a single expert report stating that a causal link is 'highly probable'.[53]

With that in mind, everything suggests that civil judges should deem it true that RWE's emissions caused the high GLOF risk in large parts of Huaraz.[54] For each part of the causal chain, there are scientifically validated, widely accepted, and acceptable arguments. Unlike in the medical trials before the BGH, these arguments are not based on the report of a single expert, but are presented in academic studies that have undergone rigorous peer review by the international scientific commu-

50 *C Althammer*/*M Tolani*, Proof of Causation in German Tort Law, in*:* L Tichý (ed), Standard of Proof in Europe (2019) 109.

51 BGHZ 53, 245, 256.

52 *A Scherzberg*, Beweiserhebung als Kognition (2004) 117 Zeitschrift für Zivilprozess (ZZP) 163, 182f; *G Spindler*, Kausalität im Zivil- und Wirtschaftsrecht (2008) 208 Archiv für die civilistische Praxis (AcP) 283, 293; *M Schweizer*, Standard of Proof as a Decision Threshold, in*:* L Tichý (ed), Standard of Proof in Europe (2019) 19, 40f; summarising *Steel* (fn 47) 54f.

53 BGH NJW 2008, 2846, 2848; 1381, 1382. The BGH did not yet specify under which circumstances causation is 'highly probable'. However, in BGH NJW 2011, 375, 376 the judges criticised the Court of Appeal for not following an expert opinion that had determined a probability of 66 %. *G Wagner*, Proportionalhaftung bei mehreren möglichen Schadensursachen, in: T Eger et al (eds), Festschrift Schäfer (2008) 193, 197 therefore assumes that the probability is 'significantly below 100 %', see also *Steel* (fn 47) 55.

54 Likewise *W Frank*, Störerhaftung für Klimaschäden? (2017) Neue Zeitschrift für Verwaltungsrecht (NVwZ) 664, 665; *A Kling*, Die Klimaklage gegen RWE – Die Geltendmachung von Klimafolgeschäden auf dem Privatrechtsweg (2018) 51 Kritische Justiz (KJ) 213, 218ff; *P Semmelmayer*, Climate Change and the German Law of Torts (2021) 22 German Law Journal (GLJ) 1569, 1575f; *E-M Kieninger* (2023) 187 ZHR 348, 364ff.

nity. And although scientists are usually reluctant to make strong claims, in the case of *Lliuya v RWE*, the claims are almost as strong as they can be: even the parts of the causal chain with the lowest degree of certainty are still 'considered extremely likely' (> 95 % probability).

Note that this result does not reflect a uniquely German *Sonderweg*. If civil courts in other jurisdictions had to decide *Lliuya v RWE*, there is a good chance that they would also find that causation is established. The same should apply to factually similar climate liability scenarios, given the robust and expanding body of scientific evidence on sea level rise, ocean acidification, and other slow-onset events.[55] Take the Dutch courts. Although Dutch civil procedure law also grants civil judges wide discretion in assessing and determining the facts, the standard of proof is met at a 'reasonable degree of certainty'. And like their German counterparts, Dutch civil judges are bound by objective criteria in reaching this level of certainty. Because court decisions must be plausible and well-reasoned, judges cannot simply ignore or dismiss scientifically validated arguments that indicate a 'high probability'.[56] Italian civil procedure law goes even further. Italian courts consider a fact – such as a causal link – to be proven if it is more probable than not, a threshold they have accepted based on robust 'scientific probability'.[57] The same should apply *a fortiori* for common law jurisdictions, which rely on more lenient standards of proof such as the 'balance of probabilities' or 'preponderance of the evidence' to establish causation.[58]

55 *Kysar* (2011) 41 Envtl L 1, 31ff; *H-J Koch et al*, Germany, in: J Brunnée et al (eds), Climate Change Liability: Transnational Law and Practice (2011) 376 no 15.73 *M Hinteregger*, Civil Liability and the Challenges of Climate Change: A Functional Analysis (2017) 8 JETL 238, 254ff; *Burger et al* (2020) 45 Colum J Envtl L 57, 235f; *Stuart-Smith et al* (2021) 11 Nat Clim 651, 654f; *Callahan*/*Mankin* (2025) 640 Nature 893. Recent developments in climate science are also making it increasingly possible to make robust predictions about extreme weather events, see *S Marjanac*/*L Patton*, Extreme weather event attribution science and climate change litigation: an essential step in the causal chain? (2018) 36 Journal of Energy & Natural Resources Law (JERL) 265.

56 *Infantino*/*Zervogianni* (fn 48) 612f. A similar standard is applied in Austria and Poland (ibid). For more on the treatment of climate liability scenarios in Dutch civil courts, see *E de Jong*/*D van Maurik*, Global Perspectives on Corporate Climate Legal Tactics: Netherlands National Report (2024) 47ff.

57 *R Poli*, Standard of Proof in Italy, in: L Tichý (ed), Standard of Proof in Europe (2019) 197, 211–213; similar applies to Denmark, Portugal and Lithuania, see *Infantino*/*Zervogianni* (fn 48) 611ff.

58 *Steel* (fn 47) 50f, specifically on scientific and statistical evidence 85ff, 91ff; *Infantino*/*Zervogianni* (fn 11) 124ff. For more on the treatment of climate liability scenarios, see *K Bouwer*, Global Perspectives on Corporate Climate Legal Tactics: UK National Report (2024) 63ff; *L Benjamin*/*A Guillot*, Global Perspectives on Corporate Climate Legal Tactics: The United States of America National Report (2024) 43f.

C Contributory causation

So far, I have argued that there is robust scientific evidence showing that RWE's emissions increased the GLOF risk in Huaraz, and that a civil court should deem this causal link true. However, I have not yet specified the extent to which RWE's emissions contributed to the increased GLOF risk, nor whether courts would accept a mere contribution as a sufficient basis for liability. This is where we turn to next.

1 Quantification

Climate liability scenarios involve cumulative causation. *Lliuya v RWE* is a good example: RWE's emissions alone did not cause global warming or the high GLOF risk in large parts of Huaraz. It was the accumulation of all historical emissions that led to these outcomes. The bathtub analogy illustrates this well: just as every added drop causes the water in the bathtub to rise, all GHG emissions – regardless of where or when they were released – contribute to global warming, as they all ultimately affect the Earth's heat balance.[59] Thus, once an event has been attributed to climate change – such as the increased GLOF risk in Huaraz – the question is no longer *who* contributed to it, because the answer is clear: every single emitter. There is a maximally large, and for that very reason closed, circle of contributors (*geschlossener Verursacherkreis*).[60] As the OLG Hamm has now confirmed, the real question is: Can the individual contributions be *quantified*?[61]

Under German private law, the answer to this question is crucial. This is because German private law follows the principle of several liability (*Prinzip der Teilhaftung*). If multiple actors have contributed to a harm or a hazard independently and without collusion – and if each actor's contribution can be quantified – then each is liable only in proportion to that contribution. In other words, several liability is both proportional and limited to the actor's individual share.[62]

59 Emphatically *IPCC* (fn 26) 5, 28: 'Every tonne of CO_2 emissions adds to global warming'.

60 Regarding the important distinction between an open and closed circle of contributors, see *G Brüggemeier*, Haftungsrecht: Struktur, Prinzipien, Schutzbereich (2006) 188ff.

61 OLG Hamm – 5 U 15/17, BeckRS 2025, 11476 no 175f. Likewise *Koch et al* (fn 55) no 15.74; *Hinteregger* (2017) 8 JETL 238, 255f; *Kieninger* (2023) 187 ZHR 348, 368f.

62 BGHZ 66, 70, 76f; 85, 375, 383; 101, 106, 113; *G Wagner* in: Münchener Kommentar zum BGB (MüKoBGB) (9th edn 2024) § 830 BGB nos 1, 56; see also *L Röckrath*, Kausalität, Wahrscheinlichkeit und Haftung (2004) 157f; *Spindler* (2008) 208 AcP 283, 307f.

Two things are important here. First, the principle of several liability applies even when the contribution in question consists of emissions.[63] Second, as with causation itself, from a civil procedural perspective, the extent to which the defendant has contributed to the harm or hazard must be proven in court like any other fact – and the principle of several liability applies only if such proof is successfully provided. However, since it is rarely possible for the plaintiff to precisely quantify the contribution (especially in the case of emissions), the prevailing view in Germany is that the standard of proof must be relaxed. This is achieved by applying sec 287 ZPO instead of sec 286 ZPO: to prove the extent of the contribution, the court does not need to reach practical certainty based on a (very) high probability. Rather, it is sufficient for the court to rely on a well-reasoned estimate supported by a moderate probability (> 50 %).[64]

The implications for *Lliuya v RWE* are clear. As shown above, a recent study arrived at the best estimate that RWE's emissions contributed 0.321 % to total global warming. Given that, according to another study, climate change is 'virtually certain' to be the 'necessary cause' for the Palcaraju's retreat and the resulting high GLOF risk, it seems scientifically sound to apply this percentage to the GLOF risk as well – at least as a well-reasoned estimate supported by a moderate probability.[65] Thus, a German civil court should have no difficulty in applying the principle of several liability: since RWE's contribution to the increased GLOF risk can be quantified, RWE could be held liable for 0.321 % of Lliuya's mitigation costs.[66]

There is a good chance that courts in other jurisdictions would follow a similar path. In Europe, the principle of several liability is explicitly enshrined in the private laws of the Czech Republic and the Netherlands.[67] Many other jurisdictions recognise concepts such as proportional or market share liability.[68] Given that these concepts were developed for scenarios where it is scientifically *impossible* to quan-

63 OLG Hamm – 5 U 15/17, BeckRS 2025, 11476 no 145ff; *S Seidel* in: Beck-online Großkommentar (BeckOGK) (1.3.2025) § 830 BGB no 76f; see also *Spindler* (2008) 208 AcP 283, 322f.

64 Clearly BGHZ 101, 106, 113; MüKoBGB/*Wagner* (fn 62) no 56; BeckOGK/*Seidel* (fn 63) no 79; *Kieninger* (2023) ZHR 348, 363f; see also *Steel* (fn 47) 56.

65 This is all the more true given that in other cumulative causation scenarios such as the *Kindertee* complex, see below IV B 2 b ii, the BGH has simply apportioned the harm to the producers (ie, total harm divided by the number of producers involved). If such a crude estimate has been accepted in the past, it seems rather odd if a scientifically-based estimate would not suffice.

66 See generally OLG Hamm – 5 U 15/17, BeckRS 2025, 11476 no 145ff. Likewise *Frank* (2017) NVwZ 664, 666 f; *Kling* (2018) 51 KJ 213, 221f; *Kieninger* (2023) 187 ZHR 348, 368f. For slow-onset events in general *E Pöttker*, Klimahaftungsrecht (2014) 237ff.

67 *Infantino*/*Zervogianni* (fn 48) 651.

68 *Infantino*/*Zervogianni* (fn 48) 631ff.

tify causal contributions,[69] it should be relatively uncontroversial to establish several liability for *Lliuya v RWE*-like cases, where such quantification *is* scientifically feasible.[70]

2 Adequate cause

As in many other jurisdictions, German private law does not end the causal inquiry with the *conditio sine qua non* test. In order to distinguish between causal acts that justify liability from those that do not, the rather factual 'but-for' analysis is followed by a more normative stage: the adequacy test. This test is usually applied in both a negative and a positive form. While the negative form is primarily used to exclude causal events that are too remote (such as indirect effects or interruptions in the causal chain), the positive form serves to identify, among all causal acts, those that may legitimately give rise to liability. Comparable to the 'substantial factor test' in Ireland or the 'material contribution test' in England, an act is considered an adequate cause if it substantially increased the risk of the harm or hazard – the so-called *Risikoerhöhungsformel* (risk increase formula).[71]

Returning to *Lliuya v RWE*, at first glance, a causal contribution of 0.321 % may not appear to meet the risk increase formula. If 99.679 % of the high GLOF risk was caused by other emitters, it seems difficult to argue that RWE's 'drop in the ocean' played a substantial role.[72] This line of reasoning, however, rests on a flawed premise – as has now been affirmed by the OLG Hamm: rather than considering the emitter's total contribution in isolation, the focus should be on the relative extent of the emitter's contribution compared to that of other emitters.[73] This vis-à-vis approach more accurately reflects the rationale behind the risk increase formula (or similar tests in other jurisdictions), because these formulas and tests are inherently comparative. It is only by comparing the defendant's causal contribution with those

69 *Steel* (fn 47) 161ff.

70 Similar for the common law, *Penalver*, 38 NRJ 563, 593; *Shi-Ling Hsu*, A Realistic Evaluation of Climate Change Litigation through the Lens of a Hypothetical Lawsuit (2008) 79 University of Colorado Law Review (U Colo L Rev) 710, 758ff; *Kysar* (2011) 41 Envtl L 1, 37; *Burger et al* (2020) 45 Colum J Envtl L 57, 235ff; *Stuart-Smith et al* (2021) 11 Nat Clim 651, 653.

71 *Infantino*/*Zervogianni* (fn 48) 597–609. The material contribution test (or the law on 'material contribution' in general) is blurry, however; see *Steel* (fn 47) 240ff.

72 *Wagner*/*Arntz* (fn 7) no 50; see also *J Peel*, Issues in Climate Change Litigation (2011) 5 Carbon & Climate Law Review (CCLR) 15, 16f.

73 OLG Hamm – 5 U 15/17, BeckRS 2025, 11476 no 186ff. Similar *Hsu*, 79 U Colo L Rev 710, 751. Note that this relative approach is widely recognised in vertical climate litigation (individuals v states), see eg, Hoge Raad 19/00135 (2019) no 5.7.1.; BVerfGE 157, 30 no 202.

of (hypothetical) others that one can distinguish substantial from trivial contributions – and identify, among all causal acts, those that may legitimately give rise to liability.[74]

From this relative perspective, RWE's purported 'drop in the ocean' emerges as a significant surge. RWE ranks as the 44th largest GHG emitter in the world,[75] with cumulative emissions exceeding those of entire industrialised nations such as the Netherlands or Venezuela.[76] Moreover, RWE's annual emissions are about eight million times higher than those of the average German citizen – and nearly double the total emissions of the entire German agricultural sector.[77] And while ordinary citizens and farms have not substantially increased the GLOF risk, it seems reasonable to conclude that RWE has.[78]

IV Duty of care

We now turn to the second core issue of climate liability: the duty of care. Do utilities such as RWE have a duty to protect climate victims like Lliuya from harm, and if so, what safety measures must they take? Before examining a possible rationale for such a duty, a prominent objection must first be addressed. Proponents of the so-called 'legalisation defence' claim that considering a duty of care is redundant because utilities (like most other major GHG emitters) are exempt from liability anyway. The basic argument usually goes as follows: since utilities operate under valid permits and otherwise comply with all applicable climate-related public law – such as emissions trading schemes, environmental impact assessment laws, and similar

74 *H Lange*, Adäquanztheorie, Rechtswidrigkeitszusammenhang, Schutzzwecklehre und selbständige Zurechnungsmomente (1976) 31 JuristenZeitung (JZ) 198, 198f; *Infantino*/*Zervogianni* (fn 48) 631ff.

75 <https://carbonmajors.org/Entity/RWE-136>.

76 See *European Commission*, Emissions Database for Global Atmospheric Research (EDGAR): CO_2 Emissions 2023 (<https://edgar.jrc.ec.europa.eu/report_2024#emissions_table>).

77 Emissions from 2018 serve as the reference point. For the comparison, I used the CO_2 calculator of the German Federal Environmental Agency (*Umweltbundesamt*), which takes into account various areas of life with an impact on the climate, ranging from heating to other consumption; GHG such as methane and nitrous oxide are converted into CO_2 equivalents with the corresponding climate impact, see <https://uba.co2-rechner.de/>.

78 Generally, OLG Hamm – 5 U 15/17, BeckRS 2025, 11476 no 188ff. Likewise *Kieninger* (2023) 187 ZHR 348, 368. For major emitters in general, see also *M Byers et al*, The Internationalization of Climate Damages Litigation (2017) 7 Washington Journal of Environmental Law & Policy Contents (Wash J Envtl L & Pol'y) 264, 310ff; *Burger et al* (2020) 45 Colum J Envtl L 57, 229ff.

regulatory frameworks – their practice of emitting GHGs is fully legalised and therefore cannot be regarded as wrongful under private law.[79]

A No legalisation defence

However, the legalisation defence falls short for several reasons. First, it is incorrect to claim that climate-related regulation legalises GHG emissions across the board. This becomes evident, for example, in the EU Emissions Trading System Directive (ETS Directive),[80] which establishes the legal framework for emissions trading within the EU and is often cited by advocates of the legalisation defence.[81] While it is true that Member States must ensure that only emitters holding a valid permit are allowed to participate in emissions trading (art 4), this does not amount to a blanket legalisation of emission activities or an acknowledgement of their harmlessness. As art 6 makes clear, the sole criterion for granting a permit is whether the emitter is capable of monitoring and reporting emissions. An assessment of climate-related risks – and a declaration that such risks are tolerable for individuals – is not part of the permitting process. As the OLG Hamm has rightly emphasised, the same applies to the remainder of the ETS Directive. Nowhere in its text is it stated – or even implied – that participating in an emissions trading scheme renders GHG emissions lawful in and of themselves.[82] The same holds true for other existing climate-related regulations under public law.[83]

Second, the legalisation defence ignores the fact that, in many jurisdictions, public law and private law define legality independently of one another. This is

79 *Wagner*/*Arntz* (fn 7) no 69ff; *Spitzer*/*Burtscher* (2017) 8 JETL 137, 162ff. This argument is sometimes referred to as the 'regulatory compliance defense', see *MG Faure*/*A Nollkaemper*, International liability as an instrument to prevent and compensate for climate change (2007) 26A Stanford Environmental Law Journal (Stan Envtl LJ) 123, 153–155.

80 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC [2003] Official Journal (OJ) L 275/32.

81 *Wagner*/*Arntz* (fn 7) no 69ff; *Spitzer*/*Burtscher* (2017) 8 JETL 137, 162ff.

82 OLG Hamm – 5 U 15/17, BeckRS 2025, 11476 no 282f. Similar *M Peeters et al*, The Regulatory Approach of the EU in View of Liability for Climate Change Damage, in: M Faure/M Peeters (eds), Climate Change Liability (2011) 90, 116ff; *Hinteregger* (2017) 8 JETL 238, 254.

83 Likewise *Koch et al* (fn 55) no 15.83; *Faure*/*Nollkaemper* (2007) 26A Stan Envtl LJ 123, 155f (regarding the European Directive on Environmental Liability).

especially true for civil law systems.[84] The German doctrine provides a typical example: a public law rule or standard is not automatically binding in private law – it is merely indicative in nature.[85] Consequently, common law concepts such as displacement or preemption, which preclude injunctions and other individual claims in the presence of relevant statutory law, have no true equivalent in civil law.[86] This is made particularly clear by sec 906 BGB, which states that compliance with emission limits or targets laid down in statutes or statutory instruments only 'normally' suspends injunctions or compensation claims. Duties of care are therefore not dictated by public law but determined by the principles and standards of private law itself.[87] This so-called 'autonomy of private law' can go so far that duties of care may 'impose stricter requirements and demand greater care than public law provisions', as the BGH has consistently ruled.[88] This has wide-ranging implications. For example, even if fumes from a factory remain within the limits set by public law, damages claims by affected parties can be successful if the fumes are 'by their nature and extent capable of causing harm and considerable disadvantages' – namely considerable harm to property or health.[89] This is precisely the case in most climate liability scenarios. Climate victims like Lliuya face the risk of losing their property, suffering detriment to their health, or both.

B Climate liability as production liability

Given that the legalisation defence is misleading and climate liability is not excluded *a priori*, how, then, can a duty of care be justified? Taking a step back, a possible rationale becomes clear. As shown in the section on causation, climate-

84 *Faure*/*Nollkaemper* (2007) 26A Stan Envtl LJ 123, 155f; *M Hinteregger*, Comparison, in: M Hinteregger (ed), Environmental Liability and Ecological Damage in European Law (2008) 579, 591. 2008; *Spitzer*/*Burtscher* (2017) 8 JETL 137, 163f; *de Jong*/*van Maurik* (fn 56) 45f.

85 *Weller et al* (fn 5) no 71f; see also *R Wilhelmi*, Risikoschutz durch Privatrecht (2009) 35ff.

86 While it is a matter of ongoing debate whether the concepts of displacement or preemption preclude certain climate liability claims in common law jurisdictions (namely in the United States, see *Burger et al* (2020) 45 Colum J Envtl L 57, 156 ff), these concepts are peculiar to the (US) common law and cannot be uncritically applied to other legal systems, see also supra I (regarding the standing requirement in general).

87 To be clear, there is one (and uncommon) exception in the event of an express stipulation of strict private law compliance in the relevant statute, such as in sec 14 of the Federal Environmental Impact Protection Act (BImSchG).

88 BGHZ 139, 43, 46f; see also BGHZ 139, 79, 83; BGH NJW 1999, 2815, 2816; confirmed regarding climate liability OLG Hamm – 5 U 15/17, BeckRS 2025, 11476 no 282ff.

89 BGH NJW 1999, 1029, 1030; see also BGH NJW 2015, 2023 no 27.

related harms or hazards result from a complex chain of interrelated environmental effects: due to GHG emissions, temperatures rise, glaciers melt, and so on. Considering this environmental context, in many legal systems (including Germany), climate liability scenarios fall into the category of environmental liability, a subset of general tort law.[90]

Environmental liability is closely related to another branch of tort law: the liability of manufacturers for dangerous products.[91] There are two reasons for this. Not only have courts often drawn on the doctrinal foundations of product liability when addressing environmental claims but, more importantly, the close connection stems from a factual overlap: environmentally mediated harms or hazards are typically adverse effects of the manufacturing process – namely the result of waste, residual materials, pollution, and the like. For this reason, Gert Brüggemeier aptly refers to environmental liability as 'production liability for harms caused by environmental pollution'.[92]

This interplay is perfectly illustrated by *Lliuya v RWE* and other similar climate liability scenarios. Utilities such as RWE produce electricity, and because they burn fossil fuels in the process, GHGs are released as a form of industrial 'waste'. These adverse by-products of the manufacturing process then trigger a complex chain of interrelated environmental effects that ultimately contribute to the climate-related harm or hazard suffered by climate victims like Lliuya.

With this understanding comes a new perspective. Because environmental liability not only overlaps factually with product liability but also draws on it conceptually, the well-established set of product liability duties can be extended to climate liability cases. Perhaps utilities like RWE could be accused of a manufacturing defect, a design defect, or a failure to warn?

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90 *M Hinteregger*, Summary and Conclusions, in: M Hinteregger (ed), Environmental Liability and Ecological Damage in European Law (2008) 637, 642ff; *Spitzer/Burtscher* (2017) 8 JETL 137, 155ff. Note that this should not be confused with the Environmental Liability Acts, which many (especially European) countries enacted in the last decades. Unlike the here discussed tortious environmental liability, this specific liability regime is usually a strict (no-fault based) liability, but (for climate liability claims often too) limited in scope.

91 *M Hinteregger*, Industrial plant, in: M Hinteregger (ed), Environmental Liability and Ecological Damage in European Law (2008) 67, 68: 'product liability law is regarded as a model for environmental liability cases'. Again, the (general) tort-based product liability should not be confused with the (specific) Product Liability Acts, which many countries (especially in the EU due to the Product Liability Directive) enacted in the last decades, introducing a strict (no-fault based) liability regime with a more limited scope.

92 *G Brüggemeier*, Umwelthaftungsrecht – Ein Beitrag zum Recht der 'Risikogesellschaft'? (1989) 22 KJ 209, 213.

1 No manufacturing or design defect

From an environmental liability perspective, the counterpart to a manufacturing defect is the hazardous incident that disrupts regular operations.[93] However, in the case of utilities such as RWE, the problem is not an accidental GHG release, but precisely the regular operation that systematically emits GHGs. Translated into the defect taxonomy of product liability, the situation therefore more closely resembles a design defect: the very design of the manufacturing process – generating electricity by burning fossil fuels – ultimately harms or threatens climate victims.[94]

But accusing utilities like RWE of a design defect would be going too far for two reasons. First, in most jurisdictions (including Germany), a design defect requires the existence of a less harmful alternative design.[95] It is not enough that this alternative design exists only in theory; it must be cost-effective and ready for mass production.[96] Second, the ready-to-use alternative design must exist at the time the dangerous product is first put on the market.[97] In order to hold utilities like RWE liable for a design defect, it would therefore be necessary to show that a cost-effective and ready-to-use less harmful alternative design for generating electricity was available when the manufacturing process first began. This, of course, is a lost cause in the case of RWE (and probably most other utilities). In 1900, when the first RWE coal-fired power plant went into operation, renewable energy sources or other climate-neutral technologies were not yet ready for practical use.[98]

93 *Brüggemeier*, 22 KJ 209, 213f.

94 Similar *DA Grossman*, Warming up to a Not-So-Radical Idea: Tort-Based Climate Change Litigation (2003) 28 Colum J Envtl L 1, 44ff; *D Hunter/J Salzman*, Negligence in the Air: The Duty of Care in Climate Change Litigation (2007) 155 University of Pennsylvania Law Review (U Pa L Rev) 1741, 1785; *L Leone*, Putting the Heat on the Fossil Fuel Industry: Using Products Liability in Climate Change Litigation Notes (2011) 21 Public Interest Law Journal (PILJ) 365, 385.

95 See for Europe *WH van Boom et al*, Product Liability in Europe, in: H Koziol et al (eds), Product Liability (2008) 255, 287; for North America *B Feldthusen et al*, Product Liability in North America, in: H Koziol et al (eds), Product Liability (2008) 359, 372.

96 BGHZ 181, 253 no 16; on a similar approach of North American courts *Feldthusen et al* (fn 95) 378.

97 MüKoBGB/*Wagner* (fn 62) § 823 BGB no 1090.

98 Although water and wind power were tried and tested alternatives for centuries, and solar-powered steam engines had been in use since the mid-19th century, there was still a long way to go before large scale electricity generation was ready for mass production, see *M Heymann*, Die Geschichte der Windenergienutzung: 1890–1990 (1995); *T Bradford*, Solar Revolution: The Economic Transformation of the Global Energy Industry (2008).

2 Failure to warn

This leaves the third category of product liability defects, the failure to warn. Because the duty to warn is often crucial in hard cases, there is a rich and detailed body of case law and doctrine, particularly in Germany.[99] Here, the courts (supported by most legal scholars) apply a rather strict standard. Not only must the manufacturer 'continuously monitor scientific and technical developments in the relevant field', which, in the case of large corporations, also includes 'monitoring the outcomes of scientific congresses and specialist events, as well as evaluating the entire body of international scholarship'[100] but, moreover, the manufacturer cannot wait for the scientific community to discover new findings but must take 'organizational precautions' and initiate its own research.[101] If the product turns out to be dangerous, the manufacturer must switch to an alternative, less harmful design; if such a design does not yet exist, the manufacturer must develop it and issue a warning in the meantime. Particularly in the case of looming health risks, a serious (not necessarily urgent) suspicion of harm is sufficient; the duty to warn arises as soon as there are reasonable 'indications that the product is dangerous'.[102] This is essentially in line with the requirements of other European and North American jurisdictions.[103]

Applying these product liability requirements to climate liability scenarios, utilities such as RWE are subject to a monitoring duty. Utilities that generate electricity by burning fossil fuels must continually assess new risks associated with their production practices. As soon as there are reasonable indications that these practices are dangerous, they must take action, either by switching to a less harmful alternative design or by issuing a warning.[104] The key question, then, is: When did such reasonable indications arise regarding climate-related harms and hazards?

Legal scholars often refer to the late 1980s as the earliest possible point in time, arguing that the dangers of climate change were, at best, an 'extravagant' scenario before then.[105] Climate historians, by contrast, point to a period some two decades

99 *S Lenze*, German product liability law: between European Directives, American Restatements and common sense, in: D Fairgrieve (ed), Product Liability in Comparative Perspective (2005) 100.

100 BGHZ 80, 199, 203; see also BGHZ 80, 186, 191: 'Analysis of the accessible and ... available (foreign) scholarship and general scientific expertise'.

101 BGH NJW 1990, 906, 907.

102 MüKoBGB/*Wagner* (fn 62) para 1119.

103 *van Boom et al* (fn 95) 305 ff; *Feldthusen et al* (fn 95) 377 ff.

104 Likewise *T Voigt* in BeckOGK (1.5.2025) § 823 BGB para 813; see also *G Hager*, Umweltschäden – ein Prüfstein für die Wandlungs- und Leistungsfähigkeit des Deliktsrechts (1986) NJW 1961, 1966: 'comparable to the product monitoring duty, [emitters] have an emissions monitoring duty'.

105 *Wagner*/*Arntz* (fn 7) no 69.

earlier. As the OLG Hamm rightly noted, this appears to be far more accurate: by the mid-20th century, theoretically sound knowledge and robust empirical evidence of global warming was already available – not only in the US, but also in Europe.[106] At the same time, representatives of the fossil fuel industry were informed by prominent scientists that their products and manufacturing processes posed climate-related risks.[107] In 1965, the Science Advisory Committee to the US President stated in a widely noted report that '[t]he climatic changes that may be produced by the increased CO_2 content could be deleterious from the point of view of human beings', explicitly pointing to slow-onset events such as glacial melting and sea level rise.[108] A few years later, NATO classified climate change as a threat to national well-being, and the German Physical Society cautioned against 'irreversible consequences on a global scale'.[109]

Given these (and other)[110] developments, the mid-1960s marked not only the acceleration of global warming, but also the intensification of scientific and public debate surrounding it. Had utilities such as RWE complied with their monitoring duty, they would have become aware of the increasingly alarming findings of climate scientists and expert committees. Moreover, had they fulfilled their duty to take organisational precautions – by initiating their own research – they would inevitably have identified the climate-related risks inherent in their own production processes.[111]

Transposing the requirements of product liability clarifies what utilities like RWE were obliged to do in this situation. Since no less harmful and ready-to-use production design for electricity was available in the mid-1960s – renewable energy sources such as wind and solar did not reach the stage of mass production until two

106 *SR Weart*, The Discovery of Global Warming (2008) 19ff.

107 *N Oreskes*/*EM Conway*, Merchants of Doubt (2011) 169ff; *B Franta*, Early oil industry knowledge of CO_2 and global warming (2018) 8 Nat Clim 1024; *G Supran*/*N Oreskes*, Assessing ExxonMobil's climate change communications (1977–2014) (2017) ERL 084019.

108 President's Science Advisory Committee, Restoring the Quality of our Environment (1965) 119ff (quote at 127).

109 *KF Hünemörder*, Die Frühgeschichte der globalen Umweltkrise und die Formierung der deutschen Umweltpolitik (1950–1973) (2004) 141ff; Deutsche Physikalische Gesellschaft, Machen Menschen das Wetter? (1971) 1.

110 From the very beginning, the fossil fuel industry was also spreading disinformation on global warming, see *C Bonneuil et al*, Early warnings and emerging accountability: Total's responses to global warming, 1971–2021 (2021) Global Environmental Change (GEC) 102386; *B Franta*, Early oil industry disinformation on global warming (2021) 30 Environmental Politics (Env Pol) 663.

111 Similar *Grossman* (2003) 28 Colum J Envtl L 1, 44, 48; *Hunter*/*Salzman* 155 U Pa L Rev 1741, 1785ff; *Leone* (2011) 21 Boston University Public Interest Law Journal (B U Pub Int LJ) 365, 397ff.

decades later – utilities were not required to switch.[112] But that does not mean they were exempt of their monitoring duty entirely. Given that there were ample and credible indications that burning fossil fuels contributes to climate change and poses serious health risks – particularly for climate victims living near glaciers or in coastal regions – utilities like RWE should, at the very least, have issued a warning in the meantime.[113]

a Duty to warn: recipients and content

The rationale behind the warning duty is straightforward: manufacturers of dangerous products have a duty to warn users so that they can mitigate the risk by taking precautions.[114] When applied to climate liability scenarios, climate victims like Lliuya are the natural recipients of such warnings. Not only were they (and often still are) exposed to evolving climate-related risks such as melting glaciers; Lliuya's initiative to reinforce the outer walls of his home and add a second floor serves as a compelling example that climate victims can often mitigate climate-related risks quite effectively.[115]

But it is not only climate victims who should have been warned. Those who purchased the product, namely the electricity customers, could have taken effective precautions as well.[116] The reason for this is somewhat technical. In the fossil fuel era of the mid-1960s, when no alternative, less harmful design to generate electricity existed, the amount of fossil fuels burned by utilities was determined by the customers' thirst for electricity. Because grids must be kept stable and electricity can hardly be stored, utilities must feed just as much electricity into the grid as is consumed by the customers. When less electricity is consumed, less is produced and ultimately fewer GHGs are released – effectively limiting climate-related risks.

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112 See *Heymann* (fn 98); *Bradford* (fn 98). The situation is different for nuclear power, which did become a practicable option in the mid-1960s but, due to its own hazard potential, it is highly questionable whether it can represent a less harmful alternative design.

113 Similar *Grossman* (2003) 28 Colum J Envtl L 1, 44, 48; *Hunter*/*Salzman* 155 U Pa L Rev 1741, 1785ff; *Leone* (2011) 21 B U Pub Int LJ 365, 397ff; *Olszynski et al* (2017) 30 Geo Int'l Envtl L Rev 1, 28ff; sympathetic *de Jong*/*van Maurik* (fn 56) 24ff. In the US, the failure to warn was used as a course of action in multiple (mostly still pending) climate lawsuits, see *Benjamin*/*Guillot* (fn 58) 18ff.

114 *Lenze* (fn 99) 105.

115 For more details on the so-called property-level flood risk adaptation (PLFRA), see *M-S Attems et al*, Implementation of property-level flood risk adaptation (PLFRA) measures: Choices and decisions (2020) 7 WIREs Water e1404.

116 Similar for buyers of GHG-releasing products *Hunter*/*Salzman* 155 U Pa L Rev 1741, 1787f; *Leone* (2011) 21 B U Pub Int LJ 365, 397ff; *Olszynski et al* (2017) 30 Geo Int'l Envtl L Rev 1, 29ff.

Regarding the content of the warning, it is acknowledged in German case law and doctrine – as it is in other jurisdictions – that the manufacturer must provide adequate instructions for precautions. This includes instructions for proper use if a particular direction or scope of use is dangerous.[117] But instructions alone are not enough; the warning has to explicitly point to the 'expected damage if [the] instructions are disregarded'; reference is the 'least informed and therefore ... most vulnerable user group'.[118] Hence, utilities such as RWE should have explicitly warned that consuming fossil fuel-based electricity triggers health risks for people living near glaciers and oceans. By the mid-1960s, ample and credible indications existed, and unlike today, the effects and dangers of climate change were neither obvious nor generally known – especially not to the least informed user groups.

b Hypothetical causation of the warning

But even if climate victims and electricity consumers had been warned by utilities like RWE, is it realistic that they would have heeded the warning? And even if the warning had been heeded, to what extent would climate-related harms and hazards have been mitigated? These questions address the main objection to the idea of a warning: its chances of success, or more precisely, its hypothetical causation. A breach of the duty to warn would give rise to liability only if the particular climate-related harm or hazard in question would not have occurred had the warning been given.

Since it is difficult for plaintiffs to present and prove hypothetical facts in court, they are granted certain privileges in many legal systems.[119] Regarding German product liability, for example, plaintiffs can rely on the presumption of proper adherence (*Vermutung hinweisgerechten Verhaltens*). Provided there are no indications to the contrary, it is presumed that the plaintiff would have heeded the warning as instructed.[120] While whether the presumption holds depends on the specific case, the chances of it holding are quite good in climate liability scenarios like *Lliuya v RWE*.

117 *Lenze* (fn 99) 105.

118 BGH NJW 1994, 932, 933.

119 For Europe, see *Infantino/Zervogianni* (fn 48) 615ff; *van Boom et al* (fn 95) 291 f; for England and the US, see *Steel* (fn 47) 233ff, 257ff.

120 *Lenze* (fn 99) 105; *Steel* (fn 47) 214ff.

i Climate victims

For climate victims like Lliuya, compliance with the warning is neither contrary to experience, nor does their behaviour in dealing with the risk suggest otherwise. In fact, taking present behaviour as a benchmark, one can draw a clear conclusion: if many climate victims respond to today's climate alarms from the media or the IPCC by taking precautions,[121] there is good reason to believe that they would have behaved similarly in response to warnings in the past. This is especially true since the warnings would have come directly from the profiteers of fossil energy like RWE, whose (bad for business) statements should therefore be particularly credible.[122]

ii Electricity consumers

Electricity consumers, on the other hand, present a more complicated case. Unlike with climate victims, it seems counterintuitive to hold up the presumption of proper adherence here: not only are there significant downsides to limiting or changing energy consumption patterns – most people would rather shower hot than cold, to take one obvious example – but it is also unlikely that a rational agent is willing to bear these downsides if the benefits mostly accrue to strangers such as climate victims like Lliuya. But while all of this is theoretically sound, it is also an empirical fact that an increasing number of today's consumers are doing exactly that.[123] According to a recent study on environmental awareness by the German Federal Environment Agency, around three-quarters of those surveyed save energy for environmental reasons.[124] In addition, the number of consumers purchasing so-called green or climate-neutral electricity almost tripled to 42 % within a decade, albeit it is more costly than fossil electricity.[125]

In view of this development, the conclusion drawn for climate victims can also be drawn here. If many of today's electricity consumers are changing their consumption patterns in order to behave in a more climate-friendly way, there is good

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121 *IPCC*, Special Report on the impacts of global warming of 1.5 °C (Summary) (2017) 20 ff; specifically on property-level flood risk adaptation (PLFRA) *Attems et al* (2020) 7 WIREs Water e1404.

122 Likewise *Leone* (2011) 21 BU Pub Int LJ 365, 388, 403. The warning by corporate profiteers becomes all the more important where – as in Huaraz, Peru – trust in state (warning) authorities is low, see *Huggel et al* (2020) 20 NHESS 2175, 2181ff.

123 *M Carrington et al*, Consumption Ethics: A Review and Analysis of Future Directions for Interdisciplinary Research (2021) 168 Journal of Business Ethics 215; *SM Hassan et al*, Consumer ethics: A review and research agenda (2022) 39 Psychology & Marketing 111.

124 *Umweltbundesamt*, 25 Jahre Umweltbewusstseinsforschung im Umweltressort – Langfristige Entwicklung und aktuelle Ergebnisse (2021) 19f.

125 Bundesnetzagentur/Bundeskartellamt, Monitoringbericht 2023 (2023)189 (reporting on the time span 2012–2022).

reason to believe that past electricity consumers would have behaved similarly in response to warnings. Of course, it is by no means certain that warnings in the mid-1960s would have anticipated today's developments. But given that this was the period when the Western public first became sensitive to environmental issues,[126] and given that the warnings would have been issued from the particularly credible fossil fuels profiteers themselves, it is quite plausible that a warning would have led to a reduction in electricity consumption.

In the case of electricity consumers, however, this is where the real questions begin. Even if one presumes that consumers would have heeded the warning, they would not have stopped using electricity altogether, but would have 'only' reduced their consumption. As a result, utilities like RWE would have continued to burn fossil fuels, the global temperature would have continued to rise, and climate risks would still have materialised – just to a lesser extent than what actually occurred. Yet how much less is extremely difficult to quantify, because the expected change in consumption patterns remains largely speculative.[127]

But this is not necessarily a cause for concern for the plaintiffs in climate liability cases. Once again, climate victims like Lliuya benefit from the presumption of proper adherence. Under German law, the presumption relates both to the *if* and the *how* of compliance. Not only is it presumed that the recipients would have heeded the warning in the first place, but also – because it is the producer's duty to provide clear and adequate instructions – that following those instructions would have prevented the harm or hazard *altogether*.[128] And when heeding the instructions concerns the proper direction or scope of use, it is presumed that recipients would have adjusted their use to a non-harmful level. Comparable presumptions (or similarly plaintiff-favouring doctrines) operate in other jurisdictions as well.[129]

Thus, in climate liability scenarios like *Lliuya v RWE* it is not the plaintiffs' responsibility to prove to what extent electricity consumers who had been provided with warnings would have reduced their consumption, or how exactly climate-

126 *L Epstein*, Fifty Years Since Silent Spring (2014) 52 Annual Review of Phytopathology 377; *U Grober*, The discovery of sustainability, in: J Enders/M Remig (eds), Theories of Sustainable Development (2014) 6.

127 *Grossman* (2003) 28 Colum J Envtl L 1, 44, 48. However, robust scientific estimates do exist, see *B Franta*, Measuring Climate Damages from Historical Delays in Fossil Fuel Controls, working paper 2022 on file with author (concluding that if the fossil fuel industry had taken concerted action to phase out fossil fuels as early as the 1980s, global warming would likely have been limited to less than 1.5°C).

128 Implicitly BGHZ 116, 60, 66 and 73 (Kindertee I). In investment law, this corresponds to the idea that the investor would *not have* acquired the investment product *at all* if the information had been correct (Vermutung aufklärungsrichtigen Verhaltens), BGHZ 193, 159 no 35f; see also *Steel* (fn 47) 217.

129 *Steel* (fn 47) 259 (for product liability in the US).

related harms and hazards would have been prevented.[130] Since utilities had to provide instructions on the proper direction and scope of use, it is presumed that electricity consumers would have adjusted their use to the designated non-harmful level. If defendants like RWE wish to challenge the hypothetical causation of the warning, *they* must rebut the presumption of proper adherence. If they fail to do so – which is likely, given the speculative nature of the endeavour – the above-described principles of several liability apply: if the defendant's contribution can be quantified based on a well-reasoned estimate supported by moderate probability, then liability should be allocated in proportion to that contribution.[131] That is, RWE should be held liable for 0.321 % of Lliuya's mitigation costs. Importantly, this does not conflict with the earlier finding that the duty to warn only applies from the mid-1960s onward. The reason is straightforward. Due to a lack of emissions data for earlier periods, RWE's 0.321 % contribution to climate change (and the increased GLOF risk) is already based solely on its GHG emissions from 1965 onward.[132]

V Conclusion

Climate liability is neither excessive nor radical. As far as German private law is concerned, there is no need to introduce new concepts of causation or novel duties of care. As the OLG Hamm rightly confirmed, it is simply a matter of applying well-established tort doctrine and case law. And what holds true for Germany is likely to apply to many other jurisdictions as well.

Thus, the question is no longer whether tort law is capable of accommodating climate liability claims. It clearly is. The real question is whether climate change *should* be addressed through the tort system. There are many good arguments against this: collective action problems like climate change are best addressed at the international level by the political branches, not through bipolar disputes in civil courts. Moreover, if major GHG emitters are only liable proportionate to their contribution, litigation becomes burdensome and costly.[133]

130 Similar *Leone* (2011) 21 BU Pub Int LJ 365, 400 ff.

131 For a product liability case BGH NJW 1994, 932, 934 (Kindertee II);1995, 1286, 1288 (Kindertee III); see also *J Meyer*, Von Saugern und Säften – ein Zwischenstandsbericht zum Kindertee-Komplex (1995) Zeitschrift für Wirtschaftsrecht (ZIP) 716, 718.

132 See above III A 1 and <https://carbonmajors.org/Entity/RWE-136>.

133 See eg, *VE Schwartz et al*, Does the Judiciary Have the Tools for Regulating Greenhouse Gas Emissions? (2011) 46 Valparaiso University Law Review (Val U L Rev) 369.

These (and other) objections, however, do not necessarily weigh against climate liability.[134] Of course, climate liability is not the first best solution and will not stop climate change on its own. Other instruments, particularly emissions trading schemes, are far more effective and efficient. But these instruments have not yet been fully implemented. In this transitional phase, tort law – and private law more broadly – plays an important societal role as a transformative force. Civil litigation provides a 'legal opportunity structure':[135] by filing a climate liability lawsuit, anyone suffering from climate-related harms or hazards can trigger a debate about the responsibility of major GHG emitters. In doing so, private law's 'drama between plaintiff and defendant'[136] gradually reveals which behaviour of major GHG emitters is socially acceptable and which is not. Ultimately, these bipolar disputes can stimulate public debate and help lay the groundwork for first-best (or at least better) solutions to combat climate change – just as tort litigation has done many times before.[137]

134 *Schirmer* (fn 8) 369ff.

135 *C Hilson*, New social movements: the role of legal opportunity (2002) 9 Journal of European Public Policy (JEPP) 238.

136 *H Dagan*, Reconstructing American Legal Realism & Rethinking Private Law Theory (2013) 113.

137 Similar *L King*, Narrative, Nuisance, and Environmental Law (2014) 29 Journal of Environmental Law and Litigation (J Envtl L & Litig) 331; *DA Kysar*, The Public Life of Private Law: Tort Law as a Risk Regulation Mechanism (2018) 9 European Journal of Risk Regulation (EJRR) 48.