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Disruptors of the EU Social Contract Resulting from Climate Change Impacts, Climate-Related Policies, and Biodiversity Loss

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EXPRESS²

Specify and protect the EU Social Contract

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1. Executive summary

This report provides a comprehensive analysis of how climate change impacts and climate-related policies are acting as fundamental disruptors to the European social contract, the foundational framework binding citizens and states through reciprocal commitments of security, legitimacy, autonomy, justice, and stability. The report has been elaborated with the following methodology: it combines a critical literature review, analysis of recent judicial decisions, assessment of sectoral vulnerabilities, and synthesis of empirical data from European agencies and international organizations to diagnose the principal channels through which climate disruption affects core social contract dimensions. In addition, semi-structured interviews with a range of academics, stakeholders, and members of public institutions (following the guidelines included in Annex I to this report) were conducted to further inform and enrich the report's content.

The report finds that environmental degradation and policy responses increasingly converge to undermine the conditions required for governmental authority, social cohesion, and distributive justice across the continent.

The main risks identified include extreme weather and chronic climate hazards accelerating financial burdens, destabilizing public finances, eroding sovereign creditworthiness, and deepening regional and social inequalities. Essential societal functions and critical infrastructure (specifically, energy, transport, water, and food systems) face escalating risk, threatening both material security and access to basic services. The transition to climate neutrality carries profound economic and social trade-offs, including labour market disruptions, energy poverty, and international vulnerability transfers, which disproportionately affect marginalized populations and threaten EU solidarity.

Judicial and policy innovations are emerging, with courts increasingly recognizing states' obligations to protect citizens from foreseeable climate impacts and to design mitigation and adaptation measures adhering to principles of equity and intergenerational justice. The report calls for a deliberate reconstruction of Europe's social contract, integrating eco-social contract theory and just transition principles, and strengthening institutional trust through inclusion, accountability, and transparent governance. Ultimately, Europe's ability to navigate climate disruption will determine the future viability of its democratic institutions and social justice in the Anthropocene era.

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2. Acronyms and abbreviations

e.g.	*exempli gratia*
et al.	*Et alli,* and others
EU	European Union
n. d.	No date
No.	Number
Pp.	Pages
Vol.	Volume

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3. Introduction

3.1. Introduction

The European Union is navigating an unprecedented crisis shaped by the interconnected triple planetary crisis (climate change, biodiversity loss and pollution) (UNEP, 2021). The impacts of climate change generate profound social and economic risks that disproportionately threaten the most vulnerable communities and citizens across Europe. As climate hazards intensify, the very foundations of the contemporary European social contract (the implicit agreement guaranteeing security, welfare, and stable living conditions) are being fundamentally challenged.

This disruption is not only the result of escalating anthropogenic climate impacts. Crucially, the policies designed to mitigate these threats and adapt to them often give rise to unintended negative consequences and complex trade-offs, paradoxically magnifying the risks they seek to contain (Geidel et al., 2022; Tapia et al., 2022). Climate change now operates as a multifaceted risk multiplier (Arab Water Council & World Food Programme, 2022, pp. 13, 20), exacerbating long-standing inequalities, undermining economic stability, and straining social cohesion across the continent (Faus Onbargi, 2022; Ganzleben & Kazmierczak, 2020). These disruptive effects compromise essential dimensions of human well-being, economic resilience, and public trust in institutions (Barrio & Martinez Romera, 2024; Otto & Gugushvili, 2020).

3.2. A Framework for the Assessment of the Climate Disruption of the EU Social Contract

The social contract, a core element of political and moral theory, is a conceptual framework that defines the constitutive obligations and expectations that underpin a legitimate society. This framework can be condensed into five distinct dimensions, moving from the necessary conditions for individual existence to the enduring requirements for a just and stable political community. These dimensions are: i) guarantees of individual preservation and security; ii) the constitution of legitimate political authority and sovereignty; iii) the realization of political autonomy and freedom; iv) the establishment of justice, equality, and fair distribution; and v) the maintenance of stability and public allegiance.

The first dimension, the guarantee of individual preservation and security, mandates that the political association must provide physical protection and

ensure the fundamental sphere of personhood, livelihood, and life for its members (Sasan, 2021). For classical contract theorists like Hobbes and Locke, this was the primary rational impetus for abandoning the hazardous state of nature, as men seek self-preservation, a contented life, and security from foreign invasion and domestic harm (Abat i Ninet et al., 2024, pp. 9–12). Compliance with this dimension requires that the state, by possessing and exercising its legitimate coercive authority, is capable of defending and protecting the person and goods of each associate using the whole common force, thereby successfully deterring individuals from reverting to a condition of generalized conflict (Hobbes, 2004, p. 152).

The second dimension is the constitution of legitimate political authority and constraint, which transforms the multitude into a unified political body governed by established rules. This involves establishing rule based on the consent of the people and constituting a moral and collective body or Sovereign (Abat Ninet & Stegink, 2023, pp. 78–79). Crucially, this dimension mandates that the authority granted is not absolute but restricted by a publicly known legal framework, ensuring governmental accountability (Boucher & Kelly, 1994, pp. 4–5). Compliance requires that the political structure is rooted in an original pact or agreement and that the government is restricted by law, reflecting the trust reposed in it by the people (Boucher & Kelly, 1994, pp. 140–141).

The third dimension is the realization of political autonomy and moral freedom, which defines the social contract not merely by the authority it establishes but by the freedom it secures through self-legislation. Rousseau emphasizes that the fundamental problem the contract solves is finding an association where the individual obeys only himself and remains as free as before (Cohen, 2010, p. 12). This is achieved because the law is the expression of the general will and serves the common good (Abat Ninet & Stegink, 2023, pp. 97–100). Compliance is achieved when the laws genuinely enable individuals to view their obligations as self-imposed, ensuring civil and moral freedom from personal dependence (Rawls, 2003a, p. 12).

The fourth dimension is the establishment of principles of justice and fair distribution. John Rawls generalized the contract idea so that the principles of justice for the basic structure of society are the object of the original agreement (Boucher & Kelly, 1994, p. 228). This dimension focuses on justifying the rules that assign basic rights, duties, prospects, and opportunities in a fair system of social cooperation between free and equal persons, specifically aiming to mitigate the effects of arbitrary contingencies (Rawls, 2003a, p. 25). Compliance with this dimension requires that the political system adhere to the selected principles, such as securing equal basic liberties for all and ensuring that social and economic inequalities are

arranged to be to the greatest expected benefit of the least advantaged members of society (the difference principle) (Rawls, 2003a, pp. 65–73).

The final dimension is the enduring stability and equity realization, which assesses the practical success and long-term viability of the principles chosen in the preceding stage. This dimension focuses on the post-contractual outcome of the established Basic Structure, requiring that the resultant system be stable over time and successfully deliver reciprocal benefits (Rawls, 2003a, pp. 434–441). Stability implies that the institutions are self-enforcing, generating their own moral support and sufficiently strong sense of justice among citizens, thereby avoiding reliance on extensive coercion (Gauthier, 1986, p. 15). Compliance requires that the basic structure effectively fosters mutual trust and confidence and maintains the conditions necessary for *enduring cooperation*, ensuring that the distribution of burdens and benefits, regulated by the principles of justice, maintains the allegiance of citizens through a publicly recognized conception of justice that establishes civic friendship (Rawls, 2003a, pp. 411–413).

Across the report, each principal section features a dedicated analysis of disruptions that follows the detailed exposition of climate-related risks. Within these disruption-focused subsections, the five dimensions serve as guiding analytical framework for evaluating the effects of climate change and related policy responses on Europe's social contract. By systematically applying these categories throughout the report, it becomes possible to identify where the integrity of the social contract is most at risk.

3.3. State of the Art: The Social Contract Facing Climate Change

There is a burgeoning literature on the social contract, spurred by the urgency of the climate crisis, which moves beyond classical conceptualizations to articulate a need for a profound global re-architecture, often termed a new *Eco-Social Contract* (Gough, 2022; Kempf et al., 2022; Kempf & Hujo, 2022; Krause et al., 2022). This new focus fundamentally contributes to the debate by shifting the social contract from an anthropocentric and state-centric concept primarily concerned with security and individual liberty to a complex, multi-scale framework demanding ecological sustainability, social justice, and intergenerational equity (Norton & Greenfield, 2023, p. 7).

Theorists linking the social contract to climate change extend and challenge classical formulations by reinterpreting the social contract as a normative foundation not only for political legitimacy but also for sustaining planetary life. Building on the Enlightenment tradition of Hobbes, Locke, and

Rousseau, contemporary approaches highlight the need to embed ecological interdependence and responsibility within this framework. Whereas the traditional model emphasized consent, individual rights, and state authority as the basis of legitimacy (Abat i Ninet et al., 2024, pp. 9–10; Martinico, 2024, pp. 7–8), these authors argue that the anthropocentric and growth-oriented orientation of such theories has rendered them inadequate for today's intertwined crises of climate change, inequality, and democratic fragility (Marques, 2020; Ó'Briain, 2024). In their view, the social contract must move beyond its focus on material security and economic expansion, to include recognition of planetary boundaries and the moral obligations owed to future generations and non-human life (Galgóczi, 2023, pp. 64, 69; Saujot et al., 2024, pp. 23–24, 53, 83).

The climate crisis introduces existential risks that challenge the state's most fundamental duty: guaranteeing individual preservation and security (Norton & Greenfield, 2023, p. 11). Climate change impacts, experienced primarily through extreme weather events, necessitates a fundamental renegotiation of the social contract as established security expectations are breached (Adger et al., 2017). The literature emphasizes that adaptation to climate risks is a contested and political process where expectations for state protection are critical mediators of impacts (Adger et al., 2013, p. 332). This environmental threat necessitates moving beyond the national state as the sole guarantor of security, recognizing the supranational and elusive nature of the climate threat (Hayward & O'Brien, 2010; Saujot et al., 2024, p. 89).

To address this, the emerging *Eco-Social Contract* debate adds several critical aspects:

First, the inclusion of nature and intergenerational justice is paramount (*Andrea Lozano Barragán, et al v Presidencia de la República et al*, 2018; Page, 1999; Reed & Hallenbrook, 2025). The new eco-social contract demands a contract with nature, recognizing that humans are part of the global ecosystem and must operate within planetary boundaries (Galgóczi, 2023, p. 68; Huntjens & Kemp, 2022, p. 10; Norton & Greenfield, 2023, p. 7). This concept of justice is not limited to distributional fairness among living individuals, but extends to future generations, whose security and well-being are intrinsically tied to the present generation's actions (Hayward & O'Brien, 2010, p. 201). Legal scholars are specifically exploring how social contract theory can inform the enforcement of constitutional sustainability clauses to make the vague notion of future generations operable in law (Kirchmair, 2023). The most ambitious proposals call for an end to the anthropocentric vision of law, moving toward a "natural contract" that grants legal rights to living organisms and ecosystems (Toussaint, 2023).

Second, the debate introduces new conceptual frameworks to analyse the transition and contestation around responsibility. The literature advocates for distinguishing the singular "social contract" from "social contracts" (plural), recognizing multiplicity and diversity in relationships across society, including those between individuals, organizations, and the state (Blackburn & Pelling, 2018, p. 2). A core contribution is the analytical recasting of the contract into three concurrent and intersecting forms: the Legal-institutional Social Contract (formal laws and constitutions), the Imagined Social Contract (i.e. citizen expectations and aspirations), and the Practiced Social Contract (i.e. the real-life balance of rights and responsibilities) (Blackburn & Pelling, 2018, pp. 4–5).

Third, the literature extensively links the eco-social contract to "Just Transition" principles, particularly within the world of work (Bachelet, 2023; Galgóczi, 2023; Krause et al., 2022; Triangle, 2023). The new contract must simultaneously combine environmental and social objectives to speed up the low-carbon transition in an equitable manner. Trade unions, having pioneered the just transition concept, demand that the eco-social contract provide climate-friendly jobs, workers' rights, and universal social protection, ensuring that the burdens of decarbonization are not unfairly borne by workers and vulnerable groups (Bachelet, 2023; Celis, 2023, p. 92; Fultz & Kulke, 2023, pp. 52–56). The concept pushes for the existing welfare state to evolve into an eco-social state, which integrates ecological and social priorities and acts as an "enabler" of green transition rather than just a "shock absorber" (Fritz & Lee, 2023; Hirvilammi et al., 2023; Mandelli, 2023).

Fourth, the eco-social contract framework is applied to sectoral governance, notably the energy sector, which is identified as chiefly responsible for the climate crisis. A new social contract in this sector is seen as the implementation vehicle for Energy Justice, defined as a "just" agreement between energy sector stakeholders and society designed to protect citizens' rights and well-being in the modern economy (Heffron & De Fontenelle, 2023; Heffron & Sokołowski, 2024).

Finally, existing literature highlights that the success of the eco-social contract is contingent on rebuilding public trust and confidence in institutions (government, media, and science) (Groff, 2022). Thus, the success of the *Eco-Social Contract* hinges on agencies' ability to adapt, participate authentically, and uphold accountability in ways that resonate with collective aspirations and evolving social values (Shannon, 1990).

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4. Climate Change Impacts: Consequences for the EU Social Contract

4.1. Health

Climate change strikes at the core of one of the principal foundations of the social contract: the collective commitment to safeguard public health and human security. The accelerating alterations in global and regional climates are amplifying direct and indirect threats to physical and mental well-being, exposing deep structural inequalities and testing the resilience of health systems worldwide. This section examines how these converging health risks, ranging from heat-related illnesses and mortality to climate-induced disease proliferation and mental health deterioration, undermine the social contract's essential promises of protection, security, and social justice. After outlining the principal pathways through which climate change affects morbidity and mortality (heatwaves, floods, droughts, and other extreme events), this section focuses on the emergence and expansion of infectious diseases and the growing crisis of mental health linked to environmental disruption. The section then analyses how these escalating health risks reverberate across the different dimensions of the social contract, eroding its foundational principles.

Heat-Related Illnesses and Mortality

Human activities have undeniably driven global warming, raising Earth's surface temperature through unequal and unsustainable patterns of energy use, land use, and consumption (Calvin et al., 2023, p. 4). This rising frequency, duration, and intensity of extreme heat events constitute a primary climate change risk that poses existential threats to human health and critical socioeconomic systems (Arnell et al., 2019).

First, the increased frequency and intensity of extreme heat events are leading to significant human mortality and morbidity across all regions (Lee, Calvin, Dasgupta, Krinner, Mukherji, et al., 2023, p. 6). The physiological consequences of exposure to extreme heat, resulting from the compromised ability to regulate internal body temperature, include heat cramps, exhaustion, and heat strokes, and also exacerbate a range of pre-existing chronic conditions, such as cardiovascular, respiratory, and cerebrovascular diseases (European Environment Agency, 2019, p. 82; IPCC, 2023b, p. 1073). The combined stress of heat and dehydration can also lead to acute kidney injury and subsequent failure (Ebi, Capon, et al., 2021, p. 699). Moreover, the mortality risk for individuals with a psychiatric diagnosis triple

during heatwaves, which may be due to psychotropic medications sometimes impairing the body's ability to regulate temperature (Lawrance et al., 2022, p. 453). Europe, identified as the fastest-warming continent (European Environment Agency, 2025a, p. 11), has already faced devastating consequences, exemplified by the record-hot summer of 2022, which was linked to between 60,000 and 70,000 premature deaths across the continent (European Environment Agency, 2024a, p. 206, 2025a, p. 11). Since 2003, heat-related deaths have risen in about 94% of regions, with an estimated overall mean increase of 17.2 deaths per 100,000 inhabitants (Daalen et al., 2024, pp. 5–6). Such high mortality rates are projected to escalate dramatically without sufficient adaptation, potentially increasing heat-related deaths in the EU more than 30-fold under a 3°C global warming level (GWL) scenario by the end of the century (Forzieri et al., 2017, p. 202).

Second, the rising heat poses a grave and growing threat, especially for vulnerable population segments, where susceptibility and exposure often intersect (IPCC, 2023a, p. 12). Critically exposed groups include the elderly (Bell et al., 2018, p. 272; Oudin Åström et al., 2015), children (Sheffield et al., 2018) and pregnant women (Bednar-Friedl et al., 2022, p. 1860). Socio-economic factors significantly heighten vulnerability, as low-income households often reside in densely-inhabited urban quarters, in dwellings with poor insulation, or in areas subject to the urban heat island effect, often lacking adequate access to cooling or green spaces (European Environment Agency, 2024a, p. 19; Ward et al., 2016). The risk is already assessed as critical in Southern Europe and Western-Central Europe for the general population (European Environment Agency, 2024a, p. 28).

Third, extreme temperatures increase the risk of occupational injuries. Exposure to high temperatures, fatigue, and impaired concentration lead workers to make more mistakes and slow their reflexes, increasing the risk of accidental injuries (Martínez-Solanas et al., 2018). This vulnerability applies particularly to workers exposed to high heat, such as those in sectors with a high percentage of outdoor workers like agriculture and construction (Bednar-Friedl et al., 2022, p. 1863). One study in Washington State found a 0.5% increase in the chances of outdoor construction workers experiencing traumatic injuries per 1°C increase in the maximum daily humidex (a composite index representing perceived heat by combining air temperature and humidity) (Calkins et al., 2019).

The mounting human cost of extreme heat acts like a severe fever in the global body politic: it not only causes immediate, visible failure (mass mortality during heatwaves) but also critically degrades the functionality of deep systemic operations, exhausting the patient (occupational injuries) and compounding pre-existing illnesses (chronic diseases), guaranteeing a

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much more fragile and costly future if the underlying fever (warming) is not urgently broken.

Illness and Mortality Resulting from Other Effects of Climate Change

Global warming is causing significant changes across all major climate system components, including the increasing frequency of heavy precipitation, intensification of drought in many regions, and accelerating sea-level rise globally. Floods and storms, in particularly, are widely considered the most common and devastating extreme weather event worldwide (Aerts, 2018; Ebi, Vanos, et al., 2021, pp. 300–301).

First, the increasing frequency and intensity of heavy precipitation events are leading to acute physical trauma, injury, and immediate mortality from drowning and associated incidents (Bell et al., 2018, p. 276). The intensification of the hydrological cycle is also linked to the increasing frequency and intensity of tropical cyclones and/or extratropical storms: as warming enhances evaporation and wind speeds, tropical storms intensify, and their surges can be aggravated by sea-level rise (Rice et al., 2014, p. 515).

Second, drought amplifies atmospheric hazards by creating conditions favourable to dust storms, which can cause or worsen respiratory diseases (Gwon et al., 2023). The synergistic occurrence of drought and extreme heat also facilitates wildfires, releasing toxic aerosols and smoke into the atmosphere that are detrimental to cardiopulmonary health (Franchini & Mannucci, 2015, p. 2). Overall, the mortality and morbidity burden from wildfire smoke exposure is increasing globally, with projections indicating significant increases in respiratory illness and mortality, particularly in Southern Europe (European Environment Agency, 2024a, p. 152).

The health consequences of these hydrological extremes and sea-level rise, whether acute (floods) or chronic (drought, salinization), function like the stress fractures that accumulate over time in infrastructure: they are difficult to isolate and quantify individually, but their compound effect progressively weakens the foundation of health systems, economic stability, and psychological well-being, leading to inevitable societal collapse if left unaddressed.

Emergence and Spread of Infectious Diseases

Alterations in temperature, precipitation, and extreme weather, is accelerating the expansion and transmission of a wide array of climate-sensitive infectious diseases (Akin et al., 2015). Critically, nearly two-thirds of human and domestic animal pathogens in Europe are climate-sensitive,

and 58% of infectious diseases affecting humans have been aggravated by climate hazards globally (Mora et al., 2022).

First, the modification of meteorological conditions, particularly rising temperatures, facilitates the geographical expansion, increased density, and prolonged seasonal activity of arthropod vectors, enabling the spread of vector-borne pathogens into new areas. Ectothermic vectors, such as mosquitoes and ticks, are highly sensitive to external climatic conditions, affecting their survival, reproduction rates, habitat suitability, and the rate of pathogen maturation within them (Colón-González et al., 2021). In Europe, warmer temperatures have driven the northward movement and expansion to higher elevations of the species of tick serving as primary vector for Lyme disease and Tick-Borne Encephalitis (European Environment Agency, 2024a, p. 29). This changing climate is projected to extend the tick activity season and increase Lyme disease incidence in the Northern Hemisphere (Eisen et al., 2016). Simultaneously, warmer conditions are making Southern and Central Europe increasingly suitable for the introduction and local transmission of mosquito-borne diseases previously considered tropical, such as dengue, chikungunya, and Zika, largely spread by the expanding Asian tiger mosquito (Daalen et al., 2024, p. 8; European Environment Agency, 2024a, p. 29). Furthermore, the risk of West Nile Virus, transmitted by *Culex* mosquitoes, is expanding across Europe, with projections indicating increased risk in Southern and Eastern parts of Western and Central Europe (Daalen et al., 2024, p. 8).

Second, extreme hydrological events, including heavy precipitation, floods, and droughts, disrupt water and food systems, directly contaminating sources and accelerating the spread of water- and food-borne illnesses. High temperatures, coupled with heavy rainfall or drought, are associated with increased risks of diarrheal and gastrointestinal diseases (Levy et al., 2018). Flooding mobilizes faecal pathogens from fields and pastures, leading to the contamination of downstream rivers and lakes, overwhelming water treatment systems, and causing sewage overflow, which results in waterborne disease outbreaks such as leptospirosis (Obels et al., 2025; Semenza & Paz, 2021, p. 6). Conversely, drought conditions concentrate pathogens in reduced water supplies due to lowered flow rates, increasing viral and bacterial loads (Alpino et al., 2016). Beyond extreme events, warming ambient temperatures enhance the survival, reproduction, and virulence of many foodborne pathogens, such as *Salmonella* and *Campylobacter* (Yun et al., 2016), often leading to higher incidence rates during the extended warmer seasons in Europe.

Third, warming oceans and ecosystem disturbances increase the risk of pathogen proliferation and facilitate zoonotic spillover events between wildlife, livestock, and humans. Marine ecosystems are particularly

vulnerable to warming, which favours the proliferation of pathogenic marine bacteria such as *Vibrio* species (e.g., *V. vulnificus* and *V. cholerae*) (Semenza & Paz, 2021, p. 6). Elevated sea surface temperatures and low salinity have coincided with the emergence and geographic expansion of *Vibrio* infections, particularly in Northern Europe and the Baltic Sea area, posing risks to recreational water users (Dupke et al., 2023, pp. 65–66). Furthermore, warming waters and eutrophication exacerbate harmful algal blooms in both marine and freshwater environments, producing toxins that can cause human intoxications via seafood consumption or contaminated water (Cherif et al., 2020, p. 64). In terrestrial and aquatic systems, climate-driven changes in species distribution and habitat degradation force vectors and reservoir animals into closer proximity with human populations and livestock, accelerating the emergence of zoonotic pathogens (European Environment Agency, 2024a, p. 261; Lee, Calvin, Dasgupta, Krinner, Park, et al., 2023, pp. 51–52). This disruption increases the likelihood of viruses crossing over from animal hosts to humans, a process known as spillover (IPCC, 2023b, p. 1067).

Mental Health Deterioration and Psychological Distress

The degradation of mental health represents a profound consequence of climate hazards (Crane et al., 2022), often acting as a risk amplifier that disrupts the fundamental socioeconomic, cultural, and environmental conditions required for mental wellness (Lawrance et al., 2022, p. 475). The resultant outcomes span a continuum, ranging from mild, transitory psychological distress to severe, chronic, and debilitating mental illnesses (Lawrance et al., 2022, p. 446).

The psychological burdens resulting from climate change represent a rapidly accelerating threat to global mental health, amplifying existing social vulnerabilities and manifesting through multiple complex pathways of exposure.

First, acute climate events, such as floods, wildfires, hurricanes, and heatwaves, are documented triggers for psychiatric disorders and increased rates of psychological distress (W. J. W. Botzen et al., 2020, pp. 172–175). These extreme weather events induce trauma, leading to heightened anxiety, depression, and post-traumatic stress disorder (PTSD). Research in Europe has strongly linked flooding to elevated rates of PTSD, anxiety, and depression (Bednar-Friedl et al., 2022, p. 1863). For instance, residents displaced for a year or longer following UK floods were significantly more likely to experience these mental health issues (Cruz et al., 2020). Wildfires and associated displacement or trauma are also linked to high burdens of PTSD, depression, paranoia, and psychological distress (Bell et al., 2018, p.

274; Matthew Mckinnon et al., 2022, p. 86). Furthermore, high ambient temperatures, often associated with heatwaves, have been shown to increase hospital admissions and emergency room visits for mood and behavioural disorders, including schizophrenia, dementia, and substance misuse (Yoo et al., 2021). Extreme heat events are also associated with an increased risk of suicide (Ebi, Vanos, et al., 2021, p. 299). Studies quantifying this risk found that a 1°C rise in monthly average temperature correlated with a 0.7% rise in suicide rates in the United States and a 2.1% rise in Mexico (Burke et al., 2018).

Second, chronic exposure to increased ambient temperature significantly reduces population well-being, diminishes life satisfaction, and increases negative emotional states like irritability and fatigue (Hayes et al., 2018, p. 7). Unlike acute events, these are subtle, gradual changes that still provoke intense emotional responses (Crane et al., 2022, pp. 1–2). General population studies indicate that temperatures above 21°C correlate with increased stress, anger, and fatigue, while reducing positive emotions (W. J. W. Botzen et al., 2020, p. 176). Long-term exposure to high temperatures (e.g., average higher than 23°C) has been associated with a 7% increased risk of developing major depressive disorder for every 1°C increase above that threshold (W. J. W. Botzen et al., 2020, p. 184). Critically, there is no current empirical evidence suggesting that psychological or biological adaptation occurs over time to eliminate this negative response to very warm temperatures (IPCC, 2023b, p. 1078).

Third, awareness of climate threats and ecological degradation leads to distinct forms of psychological distress and grief, even in the absence of direct acute impacts (Fritze et al., 2008, p. 5). This overarching anxiety and emotional response to the current and anticipated ecological crisis has been conceptualized using terms such as ecoanxiety and ecological grief (Ebi, Vanos, et al., 2021, p. 303). Ecoanxiety is described as the chronic fear of environmental doom or anxiety arising from constant exposure to threatening climate problems (Matthew Mckinnon et al., 2022, p. 87). Ecological grief represents sorrow in response to the experienced or anticipated loss of valued species, ecosystems, and meaningful landscapes, which is viewed as a natural and legitimate response, especially for those maintaining strong ties to the natural environment. A related psychological condition is solastalgia, defined as the homesickness and distress experienced when one's home environment is negatively and profoundly transformed while the individual remains physically present (Albrecht, 2017). This distress can stem from long-term environmental changes, such as drought or landscape degradation, and can heighten clinically significant psychological distress by removing the natural environment as a source of solace (Cunsolo & Ellis, 2018, p. 277).

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Fourth, the mental health impacts resulting from climate change fall hardest and disproportionately on the most vulnerable and marginalized population groups. This includes individuals with pre-existing mental and physical health conditions, who are highly susceptible to acute events and heat extremes. For those with psychiatric diagnoses, mortality rates during heatwaves can be significantly higher, partly because certain psychotropic medications can impair the body's ability to regulate temperature (thermoregulation). Children and adolescents are also highly vulnerable, susceptible to post-traumatic stress, anxiety, depression, and developmental impacts following extreme events (Hickman et al., 2021). Older adults are particularly susceptible to heat-related mental and physical health issues due to biological factors like less efficient thermoregulation and medication use, leading to increased hospitalizations and mortality during heatwaves (W. J. W. Botzen et al., 2020, p. 186). Additionally, low-income populations and Indigenous peoples face heightened risks; low-income households often lack resources for adaptation and recovery, while Indigenous communities, whose identity and culture are often profoundly connected to the land and traditional livelihoods, experience severe mental health effects (including ecological grief and reduced mental health) associated with ecological loss and cultural disruption caused by climate hazards (W. J. W. Botzen et al., 2020, p. 87).

Disruptions of the Social Contract Arising from Climate-Related Health Risks

The negative health effects described above present a profound challenge to the foundations and operationalization of the social contract, disrupting the very dimensions upon which political legitimacy, stability, and justice are predicated.

The guarantee of individual preservation and security is undermined, as this foundational aspect of the contract requires society to protect life, personhood, and ensure safety, often seen as the primary motivation for exiting the state of nature. Rising deaths, illness, and occupational injuries resulting from heatwaves, extreme weather (floods, droughts, wildfires), and the accelerated spread of infectious diseases represent a direct failure of the political association to fulfil its core purpose of procuring the safety of the people. Domestic and regional courts have increasingly recognized this failure, in particular in the context of human rights.

In *Verein KlimaSeniorinnen Schweiz v. Switzerland* (2024), the European Court of Human Rights (ECtHR) ruled that Article 8 of the European Convention on Human Rights (ECHR) includes a right to effective protection by State authorities against serious adverse impacts of climate change on individuals' life, health, well-being, and quality of life (para. 519). The case

concerned a group of older women and their association who argued that Switzerland's inadequate action in reducing greenhouse gas emissions exposed them to life-threatening heatwaves. In the case, the Court underscored that the State bears a primary obligation to adopt and effectively implement regulations and measures capable of mitigating both current and potentially irreversible future effects of climate change (para. 545). In a broader environmental protection context, in *Cannavacciuolo v. Italy* (2025), the ECtHR for the first time found a violation of the right to life under Article 2 of the ECHR arising from the State's failure to address decades of large-scale environmental pollution. The Court held (para. 375-392) that Article 2 is applicable and imposes a positive obligation on States to take all appropriate steps to safeguard the lives of those within their jurisdiction from real and imminent risks related to environmental hazards. The Court then proceeded to assess Italy's response (para. 394-468), concluding that the authorities had not adopted adequate measures in a timely and comprehensive manner to address the systemic pollution, inform affected populations, and mitigate the risks, thus finding a breach of the Convention.

Similarly, the *Inter-American Court's Advisory Opinion OC-32/25* (2025) noted that "the damage caused by environmental degradation and climate change constitutes one of the most serious threats to the capacity of present and future generations to enjoy the right to life" (para. 394). Other jurisdictions where similar cases have been adjudicated include Colombia (where courts[1] and the Council of State (del Pilar García Pachón et al., 2021, p. 66) have intervened in cases where failures in public planning and risk management directly endangered populations due to flood exposure) and Canada (where *Burgess v Ontario Minister of Natural Resources and Forestry* (2004) brought into focus negligence law when the government overlooked rising flood levels despite prior knowledge, leading to assertions that the Ministry had a duty to prevent foreseeable flooding (Ahmad & Sen, 2024, p. 8)).

This failure to provide fundamental security in the face of the negative health effects resulting from climate change may simultaneously jeopardize the legitimate political authority of the State (Ellis, 2023, p. 187; Sasan, 2021, p. 44). Judicial decisions have directly challenged governmental authority when climate action proves inadequate. In *Friends of the Irish Environment v. Ireland* (2020), the Supreme Court invalidated the

[1] Decision T-269/15 of 12 May 2015. Also, In *José Noé Mendoza Bohórquez et al. v. Department of Arauca et al.* (2022), internally displaced persons and migrants living in a flood-prone area argued that the government failed to protect them from severe flood risks exacerbated by climate change due to the absence of adequate adaptation measures, such as relocation plans or protective infrastructure (Setzer & Higham, 2025, p. 24).

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government's National Mitigation Plan, ruling that it fell short of the specificity required by statute because a reasonable reader could not understand how Ireland would achieve its binding 2050 emission reduction targets. The Court reaffirmed the importance of specificity and coherence in plans adopted under statute, effectively holding the government accountable for producing inadequate climate policy frameworks. Furthermore, there is the risk that managing extreme health crises might be used as a justification for extraordinary government responses (such as the temporary suspension of legal guarantees), hence challenging essential constraint that authority must be limited by established legal rules, risking the usurpation of sovereign power (Rousseau, 2012, p. 189). Legal scholarship has explored this tension, with some arguing that climate emergency declarations occupy an uncomfortable status in public law, positioned ambiguously between emergency measures and rhetoric (Stacey, 2022). However, courts have generally resisted this pathway, instead emphasizing that climate action must occur within constitutional frameworks and the rule of law, as demonstrated by the *Inter-American Court's Advisory Opinion OC-32/25*, which established that climate action must respect democratic rule and public participation as essential foundations (para. 425, 530-539).

The realization of political autonomy and freedom is strained when climate-related health risks exacerbate existing social tensions. If citizens view the political structure as unable to protect their person and goods, they may perceive their allegiance as a gratuitous contribution, thereby undermining the basis for rational self-legislation and moral independence. The German Constitutional Court's *Neubauer* (2021) decision directly addressed this dimension through its groundbreaking concept of "intertemporal freedom" (para. 183). The Court held that fundamental rights safeguard freedom across temporal dimensions, requiring that opportunities of freedom be proportionately distributed across generations (para. 192). The Court reasoned that excessively generous current emission allowances lead to considerable restrictions on freedom (para. 195), as future generations would be forced into "radical abstinence" to preserve their posterity (para. 193), while having "no voice of their own in shaping the current political agenda" (para. 206). Additionally, the pervasive psychological impacts, including trauma, anxiety, and the loss of well-being from both immediate disasters and chronic environmental change, may compromise the reflective and rational capacities necessary for citizens to act autonomously and judge means for their preservation effectively, eroding the conditions for meaningful self-legislation (Rawls, 2003a, p. 209). In *Held v. Montana* (2024), plaintiffs presented evidence of depression after learning about climate change in school, psychological trauma after experiencing wildfires, and feelings of powerlessness and despair when thinking about the future (Varvastian, 2025, pp. 301–302). The *KlimaSeniorinnen* applicants

emphasized risks to their physical and mental health from increasingly frequent and intense heatwaves (para. 66). A similar argument was presented by the claimants in *Duarte Agostinho* (2024) (para. 3).

Concerning the establishment of justice and fair distribution, as noted above, the negative health effects resulting from climate change especially impact vulnerable groups. Judicial decisions have increasingly recognized these distributive injustices, though with varying degrees of depth (Patterson et al., 2024). The *KlimaSeniorinnen* case explicitly acknowledged that elderly women are extremely vulnerable to heat effects, with substantially increased risk of death and health problems during heatwaves compared to the population as a whole. However, scholars have criticized the Court's failure to fully engage with intersectional disadvantage and the socially constructed impacts of climate change, noting that while the Court recognized vulnerability, it failed to properly address how differential impacts should affect victim status determinations (Heri, 2025, pp. 16–22). The Inter-American Court's Advisory Opinion OC-32/25, in turn, represents the most comprehensive judicial treatment of distributive justice concerns, recognizing that the climate crisis does not affect all people equally (para. 261) and that Indigenous Peoples (para. 101), Afro-descendant communities, rural and fishing populations, women, children, older persons, and socioeconomically marginalized groups face disproportionate impacts (para. 389). The Court ruled on specific duties of states to prevent harm and ensure protection for these groups, affirming that climate action is a human rights obligation requiring gender-sensitive (para. 566, 572), intersectional (para. 598, 625), and participatory approaches (para. 530-539).

Finally, the maintenance of stability and public allegiance is jeopardized by the negative health effects resulting from climate change, as stability relies on institutions being self-enforcing by generating a strong public sense of justice, trust, and citizen loyalty, ensuring cooperation is willing (Rawls, 2003a, pp. 4–5, 2003b, p. 185). When the negative health consequences from climate change produce rampant suffering, inequality, and destabilization, they erode the basic understanding that society is a fair system of cooperation for mutual advantage, which is a necessary condition for stability (Gauthier, 1986, p. 11; Rawls, 2003a, p. 25). As this erosion deepens, even the capacity for justifiable civil disobedience (one of the stabilizing devices of a constitutional system (Rawls, 2003a, p. 336)) may become compromised, since a crisis so pervasive can prevent a common sense of justice from being effectively appealed to (Rawls, 2003a, pp. 340, 60), thereby further accelerating the dissolution of civic trust. Nevertheless, while the necessity defence in climate civil disobedience cases has enjoyed limited success (with acquittals in jurisdictions including the United States, Switzerland, France, and Germany) (Coca-Vila, 2024, p. 568), courts

remain divided on whether such defences should be accepted within democratic states with legitimate political authority (Rausch, 2019).

4.2. Erosion of Economic Stability and Fiscal Resilience

The stability of the EU social contract rests heavily on predictable economic functioning and robust public finances (Boucher & Kelly, 1994, p. 20; Frazier, 2025, pp. 36–38; Mascherini, 2024). Potentially cutting EU GDP by 7% by the end of the century and resulting in estimated losses of EUR 2.4 trillion between 2031 and 2050 if warming exceeds 1.5°C (European Environment Agency, 2025b), climate change introduces substantial macroeconomic and fiscal risks that destabilize Member States and threaten EU-level solidarity mechanisms.

Destabilization of Public Finances

The destabilization of public finances constitutes a critical channel through which climate change imposes systemic threats upon the EU and its Member States.

First, climate change serves as a potent macroeconomic and fiscal risk to EU Member States, capable of compromising economic performance and burdening public finances (European Environment Agency, 2024a, p. 305). The fiscal strain arises from a confluence of reduced government revenues (stemming from lower economic activity, such as depressed labour productivity and hampered growth) and simultaneous spikes in government expenditures dedicated to disaster recovery and managing related social costs (W. Botzen et al., 2020). The increase in average global temperatures is theorized to heighten the downside risk to overall economic activity, raising the probability of contractions due to factors like disturbed trade or production networks (Kiley, 2024, p. 1134). Research on high temperatures in China, for instance, demonstrates a significant causal link to increased local fiscal stress and losses in tax revenue, as heat adversely affects labour productivity and firms' profitability (Yang & Tang, 2022, pp. 6–7). Extreme weather events, in turn, generally reduce economic growth in the short term, a trend projected to continue in the coming decades in both developing and industrialised countries (Lee, Calvin, Dasgupta, Krinner, Park, et al., 2023, pp. 54–55).

Second, the accumulating costs associated with weather- and climate-related extremes are manifesting as substantial and accelerating financial burdens across Europe. Total estimated economic losses of assets in the EU due to these extremes reached EUR 738 billion between 1980 and 2023

(European Environment Agency, 2025a, p. 11). Notably, the average annual economic losses for the period 2020–2023 were observed to be two and a half times greater than those incurred during the preceding decade, with over EUR 162 billion on economic loses materializing between 2021 and 2023 alone (European Environment Agency, 2025a, p. 11). Even individual extreme events can deliver sudden, major financial shocks that severely test national budgets and fiscal capacity. For instance, the extensive floods in Germany, Belgium, and the Netherlands in 2021 resulted in estimated damages of EUR 44 billion (European Environment Agency, 2024a, p. 306).

Third, the physical impacts of climate change are demonstrably influencing sovereign creditworthiness and subsequently increasing the cost of borrowing for nations. Climate change has been recognized by major financial institutions and credit rating agencies, such as Standard & Poor's and Moody's, as a global mega-trend that will negatively impact sovereign credit ratings through channels affecting economic growth, fiscal performance, and public finances (Kelly et al., 2015, p. 11). This heightened risk perception is particularly acute for lower-rated sovereigns, typically those possessing less diversified economies, lower incomes, weaker infrastructure, and limited fiscal flexibility, increasing their susceptibility to the financial implications of climate hazards (W. Botzen et al., 2020, p. 30).

Fourth, pronounced geographic disparities in vulnerability and adaptive capacity across the EU are deepening economic and financial inequalities. Physical climate risks disproportionately affect certain regions, reinforcing an existing north-south divide within Europe (European Environment Agency, 2024a, pp. 343–345). Southern Europe and Central-Eastern European countries are hotspots for multiple risks and exhibit the highest levels of fiscal vulnerability (European Environment Agency, 2024a, pp. 18–19; Naumann et al., 2021). Welfare loss as a percentage of GDP, resulting from climate impacts, is estimated to be more than five times higher in Southern Europe compared to Northern Europe under high-warming scenarios (European Environment Agency, 2024a, pp. 343–345).

Financial Market Instability and Insurance Gaps

The viability of the European financial system, property markets, and insurance markets is exposed to substantial and accelerating climate risks, which are increasingly recognized as a major component of financial systemic risk. Economic losses stemming from weather- and climate-related extremes directly affect insurers, investors, public finances, and the wider economy. The systemic nature of climate change can create aggregate risk drivers that necessitate system-wide action for mitigation.

First, the physical risks stemming from extreme weather and chronic climate impacts compromise the economic substance of large industrialized nations and erode corporate profitability. Climate impacts affect corporates through the destruction of physical capital, disruption of production and supply chains, and adaptation costs. These dynamics reduce corporate profits, raise insurance costs, depress security prices, and increase market volatility (Zhou et al., 2023). Analysis suggests that while climate risk pricing is still mixed, financial markets are rapidly factoring in climate-related risks, suggesting a large potential repricing event remains open (European Central Bank, 2021, pp. 10–23). Market risk losses could be particularly relevant for EU investment funds, which could face asset write-downs in corporate equity and bonds in adverse scenarios (European Central Bank, 2021, p. 5).

Second, climate shocks transmit and amplify risks across the financial system, tightening credit conditions and increasing the potential for wider crises. Physical climate risks expose banks through their loan portfolios, increasing the probability of default, particularly for uninsured assets (de Bandt et al., 2025). In the aftermath of major extreme events, such as the August 2023 flood in Slovenia, banks promptly revise their perceptions of climate risks and adjust lending policies, imposing tighter borrowing conditions, including reduced loan amounts and increased borrowing costs, especially for small and medium-sized enterprises (SMEs) located in high-risk areas (Pavlič et al., 2026). These changes often occur even for exposed firms that were not directly affected by the disaster, demonstrating an anticipation of future risks (Pavlič et al., 2026). Such tightening of credit supply, coupled with market amplification mechanisms like fire sales or the interconnectedness of financial institutions, significantly heightens the potential for financial instability (Anisimov & Magnan, 2023). Overall, climate risks to the viability of European financial markets, property markets, and insurance markets are currently assessed as substantial, necessitating innovation in forward-looking modelling to identify prospective financial losses and underpin effective policy action (European Central Bank, 2021).

Third, as a manifestation of this systemic weakness, insurance protection gap (the uninsured portion of total economic losses from climate hazards) is widening, transferring financial vulnerability back onto the public sector and households (Zhou et al., 2023, pp. 236–239). Only about 35% of economically relevant climate losses are estimated to be currently insured in the EU (European Central Bank, 2021, p. 7), and this share is even lower in Southern Europe, at around 12% (Alogoskoufis et al., 2021).[2] As climate change intensifies, the insurability of natural catastrophe-related risks and

[2] Other data from 1980 to 2023 indicates that less than 20% of Europe's climate-related losses were privately insured (European Environment Agency, 2025c).

the affordability of coverage are becoming major concerns. Rising claims and projected growth in losses force insurers to raise premiums or reduce coverage (Tesselaar, 2024, pp. 4–5). Severe climate change scenarios predict that the combination of rising premiums and low economic growth may cause a collapse of insurance markets in certain vulnerable European regions where premiums become unaffordable for consumers (Tesselaar, 2024, p. 20).

Losses in Labour Supply and Productivity

The specific impact of climate change on labour is severe.

First, the primary consequence of climate change on the labour force is manifested through heat stress, a factor already impacting workers globally (Dasgupta & Robinson, 2023). Warming directly reduces both the quantity of labour offered (labour supply, i.e. the number of hours worked) and the quality of output during those hours (labour productivity). Some studies note that the future effects of climate change could potentially reduce global labour productivity by between 18 and 24.8 percent (Dasgupta et al., 2021). For instance, modelling for Switzerland suggests that labour productivity losses, which currently amount to approximately CHF 665 million annually, could potentially triple by the end of the century under a high-emissions pathway, underscoring that even cooler countries face escalating economic burdens from heat (Stalhandske et al., 2022). Globally, 133.6 billion potential work hours were lost in 2018 due to high temperatures, representing an increase of 45 billion hours since 2000 (IPCC, 2023b, p. 1074).

Second, these losses carry a pronounced geographic and macroeconomic dimension, disproportionately affecting certain parts of Europe. Assuming no climate change mitigation or adaptation, daily average outdoor labour productivity in several southern European countries (specifically Bulgaria, Greece, Italy, Macedonia, Portugal, Spain, and Turkey) could decline by approximately 10 to 15% from present-day levels by the end of the century (Gosling et al., 2018). Conversely, countries in Northern Europe, such as Denmark, Estonia, Finland, Norway, and Sweden, are projected to see considerably smaller declines, generally settling around 2–4% (Gosling et al., 2018).

Third, climate change-related labour losses are critically mediated and compounded by existing economic and organizational structures. In sectors characterized by physically demanding work, such as construction, the vulnerability to heat stress is intensified by organizational practices like work intensification and time pressure (Schaupp, 2024). The rise in adverse weather events, which currently delay 45% of construction projects globally with projected increases in frequency and intensity, also triggers new

industrial conflicts regarding the distribution of costs due to declining profitability (Schaupp, 2024, p. 72).

Fourth, climate change profoundly generates losses in labour through livelihood security erosion, especially in the Global South via slow onset events. Slow onset events, such as protracted drought, land degradation, and salination resulting from rising water levels and floods, significantly reduce agricultural productivity, compromising the viability of rural livelihoods based on farming (Yea, 2025). In the Southern Hemisphere, where the consequences of climate change are felt most strongly and informality levels are high, this loss of livelihood compels men from economically marginal farming households into hyper-precarious, circular transnational labour migration as an adaptive survival strategy (Yea, 2025).

Disruptions of the social contract arising from climate-related economic risks

The economic and financial fallout resulting from climate change directly attacks the viability of the social contract across its core dimensions by undermining the material conditions necessary for security, justice, autonomy, and political stability.

Climate-induced economic losses (such as severe GDP contractions and the collapse of insurance markets) erode the material foundation necessary for the guarantee of individual preservation and security. In contrast, mechanisms that enable States or individuals to seek compensation from those responsible for the economic damage caused by climate change play a vital role in reinforcing such guarantee. By enabling the transfer of resources from major emitters or states that have failed to mitigate their emissions to those bearing the brunt of climate-induced economic losses (such as lost livelihoods), these systems help to restore the material conditions essential for personal safety and societal stability. This principle has now gained significant traction in international law. The International Court of Justice's recent advisory opinion affirms that states responsible for, or failing to prevent, greenhouse gas emissions may be obliged to compensate affected populations for specific and demonstrable losses (Stallard & Rannard, 2025). Judicial application of this principle is, however, uneven when it comes to private actors. However, judicial application of this principle remains uneven in the case of private actors. The recognition by one of Germany's Higher Regional Courts in Luciano Lliuya v. RWE AG that corporate liability for climate-related harm is possible in principle (even though the case was ultimately dismissed) nonetheless suggests the potential for extending this principle to private entities (Walker-Crawford et al., 2025).

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The constitution of legitimate political authority suffers when the government's capacity to govern for the common good is compromised by financial instability. Courts have increasingly scrutinized governments' fiscal decisions in the climate context, particularly where inadequate climate action raises sovereign borrowing costs and financial risk (Wallimann-Helmer, 2023). Legal analyses suggest that failure to manage climate crises undermines State legitimacy by breaching the trust reposed in rulers and threatening the collective wealth essential for a functioning commonwealth (Sulyok, 2024).

Political autonomy and freedom, in turn, are fundamentally threatened when the economic or fiscal consequences of climate change prevent affected groups from meaningfully participating in economic and public life. The *Inter-American Court of Human Rights Advisory Opinion OC-32/25* directly engages with this issue, affirming that States have a duty to proactively address how climate-driven inequality and vulnerability can erode people's capacity for genuine participation and self-determination. The opinion requires States to adopt urgent and effective action, grounded in human rights, to mitigate disproportionate risks and safeguard not only material well-being but also the ability of all persons (especially those in vulnerable situations) to exercise autonomy and enjoy substantive public and economic life.

The establishment of justice and fair distribution is directly frustrated because climate impacts act as morally arbitrary contingencies that unfairly determine distributive shares. The deepening geographic disparities, where Southern and Central-Eastern Europe face greater fiscal vulnerability and welfare loss, mean that life prospects are being settled by factors (like location and climate vulnerability) that liberal justice seeks to mitigate. The pervasive nature of systemic climate risk exposure on financial markets and insurance threatens to increase concentrations of wealth and power. The Difference Principle, which insists that economic inequalities must benefit the least advantaged, is incompatible with a situation where climate-induced economic damage disproportionately harms the most vulnerable individuals and regions. Notably, climate lawsuits are being used as social corrective tools to redistribute risks and costs. Parties from the Global South (often facing the greatest vulnerability) are seeking reparations and compensation at international forums, and courts are beginning to enforce the principle that inequalities resulting from climate-induced damage are incompatible with liberal justice. Decisions in cases like *Smith v. Fonterra* (2022) in New Zealand and *Milieudefensie v. Shell* (2024) in the Netherlands have signalled that large emitters bear a duty to prevent adverse financial and distributive impacts caused by their failure to mitigate. Moreover, cases like *Assad v. Seu* (2024) indicate ways in which corporations may become liable to their shareholders due to failing to plan

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for the foreseeable physical risks of climate change (Setzer & Higham, 2025, p. 28)

Finally, the maintenance of stability and public allegiance is jeopardized as climate-induced economic crises would erode the public sense of justice and trust necessary for willing cooperation. Stability requires institutions to be self-enforcing by assuring citizens that society is a fair system of cooperation for mutual advantage. Accelerating economic losses and growing systemic climate risk in financial and insurance markets fundamentally challenge this assurance. Moreover, the vulnerability of the construction and other physically demanding sectors, leading to industrial conflicts, shows a breakdown in social coordination.

4.3. Disruption of Essential Services and Critical Infrastructure

The social contract relies on the continuous provision of vital societal functions, including energy, transport, and communication networks. Climate change compromises the physical assets and systems necessary for enabling such provision, leading to large-scale disruption and impacting human well-being and mobility.

Fragility of Energy Supply

Climate change undermines Europe's energy resilience by intensifying heat, drought, and extreme weather. These pressures reduce hydropower output, disrupt thermal and nuclear plants, strain electricity networks, and damage infrastructure, triggering cascading failures across transport and water systems.

First, climate change poses fundamental challenges to the resilience of the European energy sector, driven by chronic warming and subsequent water resource instability (European Environment Agency, 2025a). The stability of thermal power generation, which constitutes a significant portion of Europe's electricity supply (including nuclear power), is directly compromised because these facilities rely on vast quantities of water for cooling (Ali et al., 2023). Concurrent prolonged droughts and high-water temperatures diminish river flows and cooling capacity, often necessitating reductions in generation or outright shutdowns, a fragility already observed in countries such as France, Germany, and Spain during recent warm summers (European Environment Agency, 2024b). Moreover, the chronic impacts of climate change threaten water-dependent renewable energy sources, while simultaneously fuelling dramatic increases in demand. Hydropower operations (a key component of the energy mix) are

increasingly impacted by altered seasonality and quantity of water supply resulting from reduced snow cover and glacier melt. The overall productivity of hydropower generation is expected to experience losses, particularly in Southern Europe and Western Central Europe, especially with warming exceeding 3°C Global Warming Level (Bednar-Friedl et al., 2022, p. 1877). Compounding this supply pressure is the surge in peak electricity demand for cooling driven by intensifying and more frequent heatwaves (Bednar-Friedl et al., 2022, p. 1820).

Second, acute extreme weather events inflict direct physical damage, threatening both supply and distribution infrastructure, with the risks accelerating rapidly. Physical hazards such as inland and coastal floods, wildfires, and storms cause damage to energy production, transmission, and transportation infrastructure, resulting in disruptions to supply (European Environment Agency, 2025c). The aggregate damage costs from multiple climate hazards to critical infrastructure across Europe could increase 10-fold by the 2080s under medium warming scenarios if current adaptation strategies are not significantly enhanced (Bednar-Friedl et al., 2022, p. 1854).

Third, distinct infrastructural stability risks emerge in high-latitude regions due to the degradation of the cryosphere. In Arctic regions, the widespread thawing of permafrost physically threatens pipelines and facilities that are built upon frozen ground, adding to infrastructural instability (Jimenez Castaneda & Lal, 2023).

Compromise of Built Environment and Transportation Networks

First, the built environment and critical transportation networks across Europe are facing rapidly escalating physical climate risks, translating into substantial economic burdens and threatening the continuous provision of essential societal functions. While the direct economic losses today are largely related to river floods and windstorms, climate change is projected to dramatically alter the dominant risk profile, with future risks being increasingly driven by chronic and intense heat and drought conditions (Bednar-Friedl et al., 2022). Specifically, expected annual damage in the transport sector is projected to surge to over EUR 10 billion by the 2080s, with heatwaves expected to be the dominant factor, accounting for 92% of total damage by that time (European Environment Agency, 2025a).

Second, acute climate hazards directly compromise the structural integrity and functionality of land-based transport systems. Both fluvial (river) and pluvial (rain-generated) flooding severely disrupt roads, rails, and key utilities. Flooding events, such as those experienced in Germany, Belgium,

and the Netherlands in 2021, have demonstrated the capacity to disrupt water and electricity supply alongside transport routes (Bednar-Friedl et al., 2022). Simultaneously, the intensifying heat extremes cause direct material failures; heatwaves result in thermal expansion, leading to road melting, the softening of asphalt, railway asset failures, and track buckling, which necessitates costly repair and maintenance, alongside imposing widespread speed restrictions to ensure safety (European Environment Agency, 2025a).

Third, transportation hubs and infrastructure in coastal and polar regions face distinct, accelerating risks from other critical hazards, notably sea level rise and cryosphere degradation. The combined impact of sea level rise and storm surges is projected to disrupt port operations and surrounding areas, particularly near the North Sea and Mediterranean coasts (Ali et al., 2023). Analysis suggests the number of airports vulnerable to inundation from sea level rise and storm surges may double between 2030 and 2080 absent adaptation efforts (Bednar-Friedl et al., 2022).

Disruptions of the social contract arising from climate-related infrastructural risks

Climate-driven disruptions to critical infrastructure and essential services (including energy, transport, and communications) constitute a profound challenge to the social contract by undermining the State's capacity to secure safety and individuals' preservation. The International Court of Justice's 2025 advisory opinion on climate change and human rights explicitly affirms that states are legally bound to conduct adaptation planning and adopt measures that ensure the resilience of infrastructure and services against foreseeable climate risks. The ICJ concluded that a failure to act on adaptation, including infrastructure resilience, could constitute a breach of a state's international human rights obligations, specifically the rights to life, a healthy environment, and an adequate standard of living. The court emphasized that adaptation is not discretionary, but a legal requirement, and decisively placed the responsibility for protecting vital infrastructure on state authorities.

This principle has also been reflected in the decisions of different national courts. For instance, courts in India have increasingly found the government liable for failing to ensure resilient infrastructure, particularly where such failures endanger public health and basic needs (Gill & Ramachandran, 2021). Cases concerning damages due to ineffective stormwater control or inadequate maintenance of the sewage system and draining system have also arisen in Norway, highlighting liability for specific failures in essential services related to water management (Colombo, 2021, p. 101).

Building on similar ideas, France now requires that Environmental Impact Assessments for major infrastructure projects explicitly incorporate consideration of climate vulnerability and adaptation measures (Torre-Schaub, 2021a, p. 1453). Legal challenges related to large infrastructure projects, such as the Notre-Dame-des-Landes airport, have exposed shortcomings in climate change considerations within Environmental Impact Assessments. While some courts have dismissed these claims due to the legislation in force at the time, these judicial reviews signal an evolving expectation that climate risks must be rigorously integrated into infrastructure planning and approval processes (Torre-Schaub, 2021b).

As it regards the constitution of legitimate political authority, it is to be noted that governments commonly object that strategic climate claims are non-justiciable political acts, arguing that judicial intervention would result in interference with the political power held exclusively by the legislative and executive branches (D'Alessandro & Castagno, 2024, p. 26). For instance, in Canada, climate claims have been dismissed because courts are reticent to impose a positive duty on governments to legislate over an issue (Ahmad & Sen, 2024, p. 4). Similarly, US courts in *Dawson v. Murphy* (2024) refused to recognize that State Pension Fund's investments in oil and gas violated constitutional rights (including an alleged right to a stable environment derived from the state constitution), considering such decision a non-justiciable political question (Bagwell, 2024). However, courts have increasingly asserted their role in enforcing rights in the face of lack of governmental action (D'Alessandro & Castagno, 2024, p. 35; Parker et al., 2022, p. 87), particularly when the government's failure to adapt to climate risks (which threaten essential services) is deemed a matter of fundamental human rights and public accountability (Setzer & Higham, 2025, p. 24).

Finally, systemic failures in energy, transport, and communication due to climate change's negative effects limit the practical sphere in which individuals can exercise their freedom and independence, constraining the ability of individuals to manage their own affairs and make genuine and informed choices (Rawls, 2003b, p. 158).

4.4. Threats to Food and Water Security

Reduced Agricultural Productivity and Food Price Inflation resulting from climate change

Climate change is rapidly destabilizing Europe's food system, driving severe losses and widening inequality through escalating heat, droughts, and extreme weather.

First, the nexus between climate change and agricultural systems presents an increasingly urgent systemic risk to Europe's food yield production, which in turn translates directly into higher food prices and exacerbated social inequality. Generally, crop production systems in Europe are projected to be less negatively affected than those in other continents, but this global outlook masks severe regional vulnerabilities (Elbehri, Aziz et al., 2015). Specifically, Southern Europe is acutely susceptible to deteriorating conditions for food production, influenced by declining precipitation and an increased frequency of extreme heatwaves and droughts. A global warming level of approximately 2.7°C, projected maize yield losses across the EU-28 could reach up to 28% (Bednar-Friedl et al., 2022, p. 1876). Furthermore, projected changes in wheat yield show an annual average reduction across several European regions at 2°C of warming. Key elements contributing to this include soil degradation (with projections indicating that 89% of Europe's agricultural area is likely to have soil degraded by processes like erosion and loss of organic carbon) and the decline of pollinator populations (European Environment Agency, 2025a, p. 72). Climate warming also facilitates the range expansion and alters the host-pathogen associations of pests, diseases, and weeds, increasing biotic stress on crops and livestock across Europe (Lee, Calvin, Dasgupta, Krinner, Park, et al., 2023, p. 57).

Second, beyond affecting yield volume, climate change fundamentally compromises food quality and nutrition. Elevated atmospheric carbon dioxide concentrations (a hallmark of climate change) are projected to decrease the protein content and overall nutritional values of many crops, including critical cereal grains such as rice and wheat (Barioni et al., 2022, pp. 464–465). This reduction in quality extends to livestock feed, as elevated carbon dioxide could reduce plant protein and mineral concentrations in forage (Godde et al., 2021). Climate change alters the prevalence and distribution of pathogens and their vectors, further stressing animal health (Bednar-Friedl et al., 2022, p. 1844).

Third, Europe's highly globalized food system means its security is critically exposed to transboundary climate risks (European Environment Agency, 2025a, p. 174). The EU relies heavily on international imports for commodities such as maize, soy, coffee, cocoa, and tropical fruits, many of which originate in countries highly vulnerable to climate hazards. This exposure subjects the EU economy to climate impacts occurring far outside its borders through international trade linkages. Exploratory analysis of agricultural yields indicates that negative agricultural spillover effects originating in the rest of the world could increase internal EU welfare losses, potentially reaching EUR 8 billion under 3 °C warming (Wojciech et al., 2020, p. 4).

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Increasing Water Stress

First, water scarcity is intensifying across the European continent, currently affecting 20% of Europe's territory and 30% of the population every year, and this situation is projected to increase with further climate change (European Environment Agency, 2024b). Climate change impacts contributing to this include rising temperatures, changing precipitation patterns, reduced snow cover, glacier melt, increased evapotranspiration, and more frequent and severe drought events (European Environment Agency, 2024b, p. 73).

Second, climate change degrades both the quantity and quality of freshwater, which compromises human health and aquatic ecosystems. More frequent and severe droughts increase water temperatures and reduce streamflow, which reduces the effectiveness of water treatment facilities and encourages the growth of toxic algae and bacteria (European Environment Agency, 2024b, 2025a). Accelerating sea-level rise drives ubiquitous saltwater intrusion into coastal freshwater sources, critically degrading water security. The resulting salinization of coastal aquifers and groundwater sources severely impacts the availability of fresh water for drinking and agricultural use (Calvin et al., 2023, p. 79). Moreover, increased salt intake from contaminated drinking water is a recognized risk factor for hypertension and has been observed to increase blood pressure in exposed coastal populations (IPCC, 2023b, p. 1071).

Disruptions of the social contract arising from risks to food and water security

The climate-induced destabilization of Europe's food system (manifested by reduced yields, food price inflation, deepening inequality, water scarcity, and the degradation of freshwater quantity and quality) strikes directly at the fundamental premises of the social contract.

The guarantee of individual preservation and security is immediately threatened by the instability of the food system. When heat, drought, soil degradation, and expanding pests cut crop productivity and harm livestock health, they endanger the "abundance of materials that conduce to life" (Hobbes, 2004, pp. 112–113). Similarly, the degradation of food and water quality and safety represent a direct failure of the political body to ensure the preservation and security of its members. Climate change litigation frequently frames food and water scarcity as a direct threat to basic preservation and security obligations of the state, particularly the duty to protect life and health. For example, In the *Teitiota v. New Zealand* (2020) case, although the claim was ultimately unsuccessful on procedural grounds, evidence was presented that one of the petitioner's children

suffered a serious blood disorder caused by contaminated drinking water resulting from the consequences of climate change (Martin, 2024, pp. 178–179). In the Ugandan case *Mbabazi and Others v The Attorney General* (0212), currently pending, plaintiffs have sought relief for impacts on their rights to life, water, food, and health stemming from insufficient mitigation and adaptation policies, which included seeking an order to protect them from extreme climatic conditions such as floods.

Cases related to food and water scarcity often highlight issues of justice and fair distribution, arguing that climate-driven impacts disproportionately burden the poorest and most vulnerable, requiring the courts to mandate protective measures. For example, in South Africa, a grassroots movement won a challenge against a development threatening a vital aquifer, with the court mandating municipal authorities to consider climate-driven water scarcity in planning, explicitly invoking rights to water and fair local distribution (Barnard, 2021, p. 42; Donger, 2022). Moreover, indigenous peoples, such as Nicaragua's Rama community, have brought attention to how internal heterogeneity and social marginalization intensify the unfair impacts of weather-driven scarcity, often with limited legal recourse due to systemic barriers (Papworth et al., 2022).

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5. Climate-Related Policies: Consequences on the Social Contract

Climate-related policies, while aimed at long-term climate stability, involve immediate structural transformations that could entail significant negative trade-offs, capable of generating new inequities and vulnerabilities, particularly when social justice is overlooked. This section aims to explain how poorly designed or misguided climate-response actions can produce disruptions to the social contract.

5.1. Induced Vulnerability from Climate Responses

When actions intended to reduce climate risk inadvertently increase vulnerability, generate new inequities, or displace risks temporally or spatially (Lager et al., 2023).

Inter-temporal and Physical Lock-in Effects

Inter-temporal lock-in emerges from near-term decisions, notably when societies invest in long-lived infrastructure such as flood-control reservoirs, irrigation systems, and hard protective barriers.

First, lock-ins from maladaptation can arise from constructing poorly conceived or costly infrastructures that affect the ability of future generations to adapt (Breen et al., 2022; Mathews et al., 2021; Sustainability Directory, 2025). These infrastructures, while initially reducing risk and enabling economic growth, create path dependencies that gradually constrain the options for future adaptation and often impose significant social and financial burdens on coming generations (Glavovic et al., 2023, p. 2132; IPCC, 2023a, p. 27).

Second, the existence of robust protective infrastructure does more than mitigate hazards; it encourages more intensive development and increased exposure within areas regarded as secure, a pattern consistently documented across floodplains in Europe and North America and river basins in Asia (Burby, 2006; Kates et al., 2006; Tiggeloven et al., 2020). These developments trigger self-reinforcing feedback cycles: rising protection standards incentivize asset accumulation in risk-prone zones, which in turn expands demands for further infrastructure investment, making alternatives like managed retreat or nature-based approaches

increasingly difficult to pursue politically and economically (Hanf et al., 2025; van de Wal et al., 2024, p. 2).

Third, economic and energy systems are similarly vulnerable to lock-in risks, which escalate transition costs and lead to stranded assets. The continued installation of unabated fossil fuel infrastructure will inevitably "lock-in" greenhouse gas emissions, requiring premature retirement or underutilization of assets to meet climate targets (Calvin et al., 2023, p. 95). Avoiding this necessitates early action; delayed investment in low-emitting alternatives prior to 2030 will increase future transition costs and raise the value of stranded assets to the higher end of projections (Calvin et al., 2023, p. 95).

Exacerbation of Social Inequity through Adaptation Measures

Adaptation actions frequently exacerbate existing structural inequalities and create new injustices, as they often fail to incorporate considerations of social justice, equity, and procedural fairness (Brousseau et al., 2024; Gancheva et al., 2023; Zahnow et al., 2025), often negatively affecting low-income populations, racial and ethnic minorities, disabled people, and women, especially when policy frameworks fail to foreground intersectionality (Adaptation Fund Board, 2022; Deering, 2019).

One of the most prominent forms of inequitable adaptation consists in the spatial displacement of risk and costs. For instance, flood protection systems narrowly designed to safeguard high-income or politically influential areas may divert floodwaters, increasing hazard exposure and asset loss for adjacent, less-resourced neighbourhoods (Gancheva et al., 2023; Zahnow et al., 2025). Such urban maladaptation, documented in comparative city studies in Europe and the United States, frequently privileges political and economic elites, resulting in gentrification, the displacement of the poor, and persistent environmental injustice (Brousseau et al., 2024, pp. 1652–1656; Gancheva et al., 2023, pp. 36, 54–58).

In the agricultural sector, large-scale adaptation interventions such as irrigation programs protect intensive producers but can exacerbate water stress and trigger resource competition with other local users, especially smallholders, women, and indigenous communities (Adaptation Fund Board, 2022, pp. 47–50; Deering, 2019, pp. 2, 4–7). Reviews of gender-transformative and intersectional adaptation approaches demonstrate that policies neglect the complex social dynamics that shape vulnerability, and rarely address unequal land tenure regimes or the multidimensional disadvantage facing marginalized producers (Adaptation Fund Board, 2022, pp. 19–23, 50–55; Deering, 2019, pp. 6–7).

Financial and systemic mechanisms further entrench adaptation inequity by shifting cost burdens downward. Vulnerable groups are often less able to adapt due to limited resources, financial constraints, and policy barriers (Gancheva et al., 2023, pp. 57–58; Zahnow et al., 2025). Market-based solutions (including risk-based insurance premiums) can signal risk but also render coverage unaffordable for poor households (Gancheva et al., 2023). The result is that the financially exposed are forced either to pay a disproportionate share of adaptation costs or forego coverage entirely, thus intensifying their vulnerability to climate shocks (Gancheva et al., 2023, pp. 57–58; Zahnow et al., 2025).

Finally, procedural justice deficits pervade adaptation governance, impeding inclusion, accountability, and recognition of intersectional needs (Adaptation Fund Board, 2022, pp. 45–75; Brousseau et al., 2024, pp. 1657–1658). Participatory and gender-transformative methods have proven effective in improving equity outcomes when substantively embraced, yet most adaptation initiatives continue to feature only superficial consultation and lack comprehensive metrics to monitor social impacts ((Brousseau et al., 2024, pp. 1649, 1655–1658; Deering, 2019, pp. 20–21). Structural exclusion, deficient social data, and lack of support for leadership and agency among marginalized groups remain widespread limitations (Adaptation Fund Board, 2022, pp. 75–83).

Disruptions of the social contract from induced vulnerability from climate responses

The state's duty to ensure individual safety and security, especially in responses that might increase vulnerability or shift risks, is foundational to rights-based climate claims (Savaresi, 2025). When governments fail to take adequate mitigation or adaptation measures, litigants argue this violates rights such as the right to life, health, and housing, which triggers the state’s positive obligation to protect its citizens (Kalis & Priebe, 2024). For example, communities in Kenya have sought enforcement of constitutional rights after experiencing displacement, loss of life, and property due to climate change-induced flooding (Beggs et al., 2025).

Similarly, in Colombia, cases concerning severe flood risks and inadequate post-disaster reconstruction, such as in the *José Noé Mendoza Bohórquez* (2022) and *Josefina Huffington Archbold* (2022) matters, have compelled courts to recognize the state's legal duty to provide protective and adaptive responses to foreseeable climate hazards, particularly for highly vulnerable populations (Setzer & Higham, 2025). However, the concept that protective infrastructure (like flood barriers) could create "lock-ins" that worsen long-term exposure relates to the underdeveloped category of "failure-to-adapt" cases, which challenge governments for ignoring foreseeable physical

climate risks (Rydberg, 2024, p. 363). Unlike mitigation targets, securing robust rulings on adaptation remains difficult due to the absence of clear legal standards or metrics equivalent to carbon budgets (Setzer & Higham, 2025, p. 6).

Concerns over legitimate authority, specifically regarding long-lived infrastructures and fossil fuel investments constraining future adaptation, are at the heart of systemic mitigation litigation involving intergenerational justice. As mentioned above (see section 3.1.5.), the German Federal Constitutional Court in *Neubauer* recognized this dynamic, ruling that inadequate post-2030 emission reduction targets disproportionately burdened future generations by exhausting the national carbon budget prematurely. Moreover, the argument that governance failures (lack of inclusion, data gaps, token participation) in adaptation and mitigation actions erode trust and legitimacy provides the impetus for judicial intervention itself (Niehaus, 2023, p. 417). Courts are seen as an important check on the executive and legislative branches, offering an alternative venue for marginalized and excluded interests, such as youth and future generations, in the face of governmental inaction (Fraser & Henderson, 2022, pp. 8–9). However, this judicial involvement constantly intersects with the delicate balance of the separation of powers doctrine, raising questions of justiciability concerning whether courts are legitimately equipped to mandate complex, polycentric climate policy solutions (D'Alessandro & Castagno, 2024, p. 7; Niehaus, 2023, p. 421).

Similarly, the ruling in *Daniel Billy et al. v. Australia* (2022) affirmed that the government's climate inaction violated the human rights obligations owed to Indigenous Torres Strait Islanders, directly connecting climate change to the curbing of their autonomy and self-determination (Rydberg, 2024, p. 365).

Finally, maladaptation is also a clear example of a breach of the Rawlsian principles of justice and fair distribution, with many instances noted above (such as when flood protections shift risk to marginalized communities) where burdens are imposed on the least advantaged based on their social status and lack of political power, rather than mitigating these disadvantages. Furthermore, litigation against powerful actors, known as "polluter pays" cases, seeks to remedy environmental injustice by compelling those responsible for significant emissions (or deception) to bear the burden of compensation or adaptation (Rydberg, 2024, p. 363; Setzer & Higham, 2025, p. 34).

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5.2. Economic and Social Trade-offs of Decarbonization Policies

Mitigation policies designed for a transition to a climate-neutral economy, as laid out in the European Green Deal, introduce immediate and system-wide economic trade-offs that place financial and social strains on vulnerable populations.

Transition Costs and Energy Poverty

First, the requisite transition toward a low-carbon economy necessitates a structural reconfiguration of the global economy, carrying substantial economic costs in the short-term, even though discounted long-term benefits render the transition highly worthwhile (Kelly et al., 2015, p. 3). A key facet of this transition risk is the financial exposure presented to corporations and investors from assets that may become "stranded" (i.e. physical assets related to fossil fuels or energy-inefficient production processes that must be abandoned) (Alessi et al., 2022, p. 1). Macroeconomic analysis indicates that nearly half of existing coal and oil assets may become stranded during an arduous divestment period (Kelly et al., 2015, p. 23), resulting in lock-in risks and reduced feasibility of adaptation and mitigation options if actions are delayed (Lee, Calvin, Dasgupta, Krinner, Mukherji, et al., 2023, p. 26). The financial implications of this rapid revaluation are profound, potentially leading to systemic financial crises, sometimes termed "green swan" risks (W. Botzen et al., 2020, p. 160). For the European banking system specifically, if fossil-fuel and high-carbon assets are only 15–25% riskier than current assessments suggest, losses could increase up to 40% in some countries, or fire-sale dynamics triggered by a limited initial depreciation could lead to significant losses for the system as a whole.

Second, the implementation of climate change policies often entails disruptive changes to existing economic structures, leading to significant distributional consequences both within and between countries. Analysis indicates that climate change policies, particularly market-based instruments such as carbon pricing schemes, tend to increase income inequality by imposing financial burdens and raising energy and food costs, disproportionately affecting poor and low-income households (Bettarelli et al., 2024). Furthermore, stringent climate change policies are linked to shifts in labour markets that can result in higher unemployment rates (especially for low- and medium-skilled workers in carbon-intensive sectors), since job disruptions and transitions toward emerging green industries often require significant upskilling or reskilling that many displaced workers may find challenging (Consejo Económico Y Social

España, 2024; European Commission, 2025; Javed & Usman, 2025; Marin & Vona, 2019; Mohommad, 2021; Vandeplas et al., 2022).

International Spillover Effects and Vulnerability Transfer

First, the highly interconnected EU economy is intrinsically vulnerable to severe physical climate risks occurring in third countries, such as extreme weather events, water stress, or reduced productivity, cascade back into Europe, and which result in, among other effects, price volatility, market disruptions, and supply shortages of essential goods. Quantitative analyses confirm the significant nature of these economic vulnerabilities, projecting that international spillover effects alone could increase the EU's internal welfare losses related to climate impacts by approximately 20% (Wojciech et al., 2020, p. 11). This affects critical supply chains, including pharmaceuticals and raw materials, where dependence on climate-vulnerable third countries is high (European Environment Agency, 2024a, pp. 288–290). Regarding agricultural commodities, the negative transboundary effects resulting from global crop yield changes are estimated to reach between €2 billion at 1.5°C warming and €8 billion at 3°C warming (Wojciech et al., 2020, p. 39). While these transboundary risks might be at least partly addressed by increasing internal production, this in turn introduce substantial internal environmental trade-offs, particularly by intensifying water resource competition within the European territory. Moreover, policies promoting self-sufficiency in import-dependent countries risk displacing more diverse and climate-resilient crops (Anisimov & Magnan, 2023, p. 49).

Second, the green transition itself necessitates vast quantities of critical raw materials. The aggressive pursuit of these resources risk generating new, intense mining activity that can create "green sacrifice zones" both overseas and within the continent (Brock et al., 2021; Ó'Briain, 2024; Van Meer & Zografos, 2024; Zografos, 2022). For example, the extraction of resources like lithium is often concentrated in water-scarce regions and is linked to pollution, threatening to exacerbate local climate vulnerabilities and possibly trigger social unrest or humanitarian crises that could subsequently disrupt supply chains back to the EU. More broadly, the EU's reliance on global value chains means that its agricultural imports impose a high water footprint on originating countries (Bednar-Friedl et al., 2022, p. 1871).

Disruptions of the social contract from the economic and Social Trade-offs of Decarbonization Policies

The destabilization resulting from land-use and carbon sink strategies, characterized by transition costs, energy poverty, and international

vulnerability transfer, presents a multifaceted disruption to the established dimensions of the social contract by revealing and exacerbating existing social and global inequities.

The principles of preservation and security, as well of fair distribution, are challenged when decarbonization policies introduce economic measures that exacerbate existing vulnerabilities, such as when rising energy prices and adaptation costs worsen energy poverty among low-income groups. Although specific case rulings detailing the worsening of energy poverty due to transition costs are not comprehensively documented, the underlying risk and disproportionate burden are central to the emerging wave of just transition litigation (Setzer et al., 2024, p. 257).

This type of litigation probes the distribution of the benefits and burdens of the transition away from fossil fuels, addressing the risk that essential needs like heating or cooling become unaffordable, thereby alleging a failure of the State's duty to protect citizens' well-being (Setzer et al., 2024, p. 257). Moreover, when courts impose stringent mitigation targets on governments, this may compel the adoption of economically and socially costly measures that inevitably force a difficult balance between climate protection and potentially competing interests, such as economic stability and energy security (D'Alessandro & Castagno, 2024, p. 222; Doelle et al., 2024, p. 301)

Challenges to legitimate authority emerge when unequal burdens from transition policies erode trust in institutions and when decisions are perceived as technocratic or lacking genuine participation. Just transition litigation explicitly addresses this by challenging laws, projects, or policies adopted to deliver climate mitigation based on procedural deficiencies (Setzer & Higham, 2025). The Chilean case of *Company Workers Union of Maritima & Commercial Somarco Limited and Others v. Ministry of Energy* (2021) is illustrative. In it, workers successfully argued that their livelihoods were threatened by the national decarbonization plan and that they were not consulted regarding the transition (para. 6-9), implying a top-down decision-making process that weakened the perception of fairness. The court intervened to order the Ministry of Energy to implement a plan including job reintegration or conversion for affected workers, validating the contention that climate policy must align with procedural justice and collective purpose (para. 11).

The effects on autonomy and freedom are often manifested through rising costs that constrain individuals' focus to survival over civic engagement, making genuine freedom and civic participation unattainable for the least advantaged. This economic dimension intersects critically with access to justice, as climate change litigation is recognized as inherently expensive, potentially excluding many people, particularly those in the Global South,

from accessing the courts (Niehaus, 2023, p. 422). The high litigation costs, coupled with the risk imposed by the "loser pays" principle in many jurisdictions, create a severe financial barrier for plaintiffs, especially those representing vulnerable groups (D'Alessandro & Castagno, 2024, p. 190). This restricts the capacity of marginalized communities to legally contest transition policies that constrain their economic autonomy or disproportionately impose financial burdens.

Finally, the transfer of economic vulnerability heightens geopolitical tension, undermining stability and trust. The potential for perceived unfairness to breed resentment and disengagement is institutionalized in the dynamics of trade-related climate disputes. Disputes over trade-restrictive measures (like Carbon Border Adjustment Mechanisms) or over subsidies for renewable energy, reflect the delicate balance between a state's right to pursue climate objectives and the constraints of the multilateral trading system (Asmelash, 2024, p. 329). This legal uncertainty and the potential for disputes exacerbate international economic tensions and weaken long-term cooperation on climate solutions.

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6. Discussion

6.1. Systematic Erosion across All Dimensions of the EU Social Contract

The evidence presented demonstrates that climate disruption operates as a multi-dimensional threat that simultaneously attacks each of the five constitutive dimensions of the social contract framework.

First, the guarantee of individual preservation and security—the most elementary obligation of political society—faces catastrophic failure. Heat-related mortality claiming 60,000 to 70,000 lives in Europe during the summer of 2022 (European Environment Agency, 2025a), the proliferation of climate-sensitive infectious diseases affecting nearly two-thirds of European pathogens (Mora et al., 2022), and the destabilization of food systems threatening the "abundance of materials that conduce to life" (Hobbes, 2004) collectively represent the state's incapacity to fulfil its foundational duty. Courts have begun to recognize this failure, with the European Court of Human Rights affirming in *Verein KlimaSeniorinnen Schweiz v. Switzerland* (2024) that states bear primary obligations to protect citizens from serious adverse climate impacts, and the Inter-American Court establishing in its Advisory Opinion OC-32/25 (2025) that environmental degradation constitutes one of the gravest threats to present and future generations' right to life.

Second, the constitution of legitimate political authority is compromised when governments prove incapable of governing for the common good in the face of climate destabilization. Judicial invalidation of inadequate climate plans, as in *Friends of the Irish Environment v. Ireland* (2020), and the growing recognition of states' duty to adopt specific, measurable mitigation and adaptation strategies reflect institutional acknowledgment that climate inaction undermines governmental legitimacy. The fiscal destabilization resulting from EUR 738 billion in economic losses between 1980 and 2023 (European Environment Agency, 2025a), coupled with deteriorating sovereign creditworthiness in vulnerable member states, further erodes the capacity of governments to maintain public trust and effective authority.

Third, the realization of political autonomy and freedom is threatened as climate impacts constrain citizens' capacity for meaningful self-legislation and genuine choice. The German Constitutional Court's landmark concept of "intertemporal freedom" in *Neubauer v. Germany* (2021) articulates how current emissions impose radical constraints on future generations, forcing them into abstinence while denying them voice in present political processes. The psychological toll—manifested through ecoanxiety, ecological

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grief, and solastalgia—alongside the material constraints from infrastructure failures and economic disruption, progressively narrows the sphere within which individuals can exercise autonomy and manage their own affairs.

Fourth, the establishment of justice and fair distribution is systematically violated as climate impacts function as morally arbitrary contingencies that unfairly determine life prospects. Southern European welfare losses projected to exceed Northern European losses by more than five-fold under high-warming scenarios (European Environment Agency, 2024a), the disproportionate vulnerability of the elderly, children, low-income populations, and Indigenous peoples to health impacts, and the widening insurance protection gap leaving 65% of climate losses uninsured in the EU (European Central Bank, 2021) collectively demonstrate how climate change generates inequalities incompatible with Rawls's Difference Principle. The Inter-American Court's Advisory Opinion OC-32/25 represents the most comprehensive judicial recognition of these distributive injustices, requiring intersectional, gender-sensitive, and participatory approaches to climate action.

Fifth, the maintenance of stability and public allegiance is jeopardized as the cumulative effects of climate disruption erode the mutual trust and sense of justice necessary for willing social cooperation. When citizens experience systemic failures in health protection, economic security, infrastructure resilience, and equitable treatment, the perception of society as a fair system of cooperation for mutual advantage dissolves. The proliferation of climate litigation across jurisdictions—ranging from youth plaintiffs in *Held v. Montana* (2024) presenting evidence of psychological trauma to communities in South Africa challenging developments threatening vital aquifers—signals fracturing confidence in institutions and growing demands for judicial intervention where political processes have failed.

6.2. Climate Action as a Disruptor

A critical insight from this analysis is that climate-related policies themselves can function as disruptors to the social contract when inadequately designed or implemented without sufficient attention to distributional justice. Three particular concerns may be highlighted:

Inter-temporal lock-in effects emerge from investments in long-lived protective infrastructure that initially reduce risk but subsequently encourage intensive development in hazard-prone zones, creating path dependencies that constrain future adaptation options and impose substantial financial burdens on coming generations (Glavovic et al., 2023). The continued installation of unabated fossil fuel infrastructure similarly

locks in emissions, escalating transition costs and expanding the value of stranded assets (Calvin et al., 2023).

Spatial displacement of inequity characterizes adaptation measures that privilege high-income or politically influential areas while diverting hazards and costs to marginalized communities. Flood protection systems benefiting elites while increasing exposure for adjacent vulnerable neighbourhoods, large-scale irrigation programs serving intensive producers while exacerbating water stress for smallholders, and risk-based insurance premiums rendering coverage unaffordable for poor households collectively demonstrate how adaptation can entrench rather than ameliorate structural injustice (Brousseau et al., 2024; Gancheva et al., 2023).

International spillover effects and vulnerability transfer manifest when EU policies aimed at strengthening domestic resilience inadvertently offshore environmental and social damage to vulnerable populations beyond Europe's borders, contradicting principles of global justice and equitable transition (European Environment Agency, 2025a).

These concerns underscore that the transition to climate neutrality cannot be assessed solely by its environmental effectiveness; its legitimacy depends equally on whether it upholds or violates the normative commitments embedded in the social contract framework.

6.3. Geographic and Social Dimensions of Disproportionate Impact

The spatial and demographic distribution of climate disruption reveals systematic patterns of vulnerability that challenge the EU's foundational commitment to cohesion and solidarity.

Geographic divides are intensifying, with Southern Europe and Central-Eastern European countries facing convergent risks across health (critical heat vulnerability for general populations), economic stability (highest fiscal vulnerability and welfare losses), agricultural productivity (projected maize yield losses reaching 28% at 2.7°C warming), and labour productivity (outdoor work declining 10-15% by century's end compared to 2-4% in Northern Europe) (Bednar-Friedl et al., 2022; European Environment Agency, 2024a). This reinforcement of north-south disparities threatens to transform the EU from a community of shared prosperity into a geography of structural disadvantage.

Sociodemographic vulnerability compounds geographic exposure, with elderly populations facing tripled mortality risk during heatwaves, children

experiencing developmental impacts and psychological trauma, pregnant women confronting heightened health risks, outdoor workers in construction and agriculture enduring increased occupational injuries, low-income households lacking resources for adaptation and residing in heat-prone urban environments, and Indigenous communities experiencing severe mental health effects from cultural and livelihood disruption (W. J. W. Botzen et al., 2020; Lawrance et al., 2022). These patterns violate the requirement that social and economic inequalities be arranged to benefit the least advantaged members of society.

Intersectional disadvantage emerges where multiple forms of marginalization converge. The failure of most adaptation initiatives to incorporate substantive participatory processes, monitor intersectional impacts, or address unequal land tenure regimes perpetuates structural exclusion and deficient recognition of complex vulnerability dynamics (Adaptation Fund Board, 2022; Deering, 2019).

6.4. The Imperative of Eco-Social Contract Reconstruction

The evidence assembled in this report affirms that contemporary climate disruption necessitates fundamental reconstruction of the social contract beyond its classical anthropocentric and state-centric foundations. The emerging eco-social contract framework, as articulated in recent scholarship and increasingly reflected in judicial decisions, demands several transformative extensions.

Inclusion of nature and intergenerational justice requires recognizing that humans exist within planetary boundaries and bear obligations to future generations whose security depends on present actions. Legal innovations—from constitutional sustainability clauses to proposals for granting legal rights to ecosystems—reflect efforts to operationalize these commitments (Galgóczi, 2023; Norton & Greenfield, 2023).

Integration of Just Transition principles mandates that decarbonization simultaneously advance environmental and social objectives, providing climate-friendly employment, protecting workers' rights, and ensuring universal social protection while avoiding unfair burden distribution onto vulnerable groups (Bachelet, 2023; Krause et al., 2022).

Evolution toward the eco-social state necessitates welfare systems that function not merely as shock absorbers responding to climate impacts but as proactive enablers of green transition, integrating ecological and social

priorities within a unified governance framework (Fritz & Lee, 2023; Hirvilammi et al., 2023).

Reconstruction of institutional trust recognizes that the success of any reconstituted social contract depends fundamentally on rebuilding public confidence in government, media, and science through authentic participation, transparent accountability, and demonstrated alignment between stated commitments and actual policies (Groff, 2022).

6.5. Way Forward

The systematic identification of climate disruptors in this report serves not as prophecy of inevitable collapse but as diagnostic foundation for deliberate reconstruction. Several critical pathways emerge from the analysis.

Immediate adaptation imperatives demand urgent investment in resilient infrastructure, health system strengthening to address heat-related mortality and infectious disease proliferation, water security enhancement to address scarcity affecting 30% of Europe's population annually, and agricultural transformation to address projected yield losses and soil degradation affecting 89% of agricultural land (European Environment Agency, 2024b, 2025a).

Just mitigation design requires systematic integration of equity considerations into all climate policies, including comprehensive social impact assessment before policy adoption, meaningful participatory processes ensuring marginalized communities' substantive inclusion, intersectional monitoring frameworks tracking differential impacts, and robust compensation mechanisms addressing transition costs and stranded assets (Adaptation Fund Board, 2022; Calvin et al., 2023).

Legal and institutional innovation must continue the trajectory established by landmark judicial decisions, including enforcement of states' positive obligations to protect citizens from foreseeable climate risks, development of liability frameworks holding both public and private actors accountable for climate-related harm, integration of climate considerations into all major planning and approval processes, and creation of effective mechanisms for intergenerational representation in policy formation.

Enhanced solidarity mechanisms must address the deepening geographic disparities threatening EU cohesion, including targeted fiscal support for Southern and Central-Eastern European member states facing disproportionate impacts, risk-sharing instruments preventing insurance market collapse in vulnerable regions, coordinated adaptation investment

ensuring equitable access to protective infrastructure, and international cooperation addressing transboundary risks and preventing vulnerability transfer beyond European borders.

Knowledge and monitoring infrastructure requires establishing comprehensive systems for tracking climate impacts across all dimensions of human well-being, developing forward-looking risk modelling integrating physical, economic, and social vulnerabilities, creating publicly accessible data enabling informed democratic deliberation, and implementing adaptive governance mechanisms allowing policy revision as understanding evolves.

7. Conclusions

This report has systematically examined how climate change and climate-related policies constitute fundamental disruptors to the European social contract, the foundational agreement that binds citizens to the state and to one another through reciprocal commitments of security, legitimacy, freedom, justice, and stability. The analysis reveals a crisis of unprecedented scale and complexity, where environmental degradation and policy responses converge to undermine the very premises upon which legitimate political authority and social cohesion rest.

Climate change operates not as a singular threat but as a systemic disruptor that exposes and amplifies the fragilities embedded within contemporary political arrangements. The five dimensions of the social contract (i.e. preservation and security, legitimate authority, political autonomy, justice and fair distribution, and stability and allegiance) function as interdependent elements of a unified normative framework. When climate impacts undermine any single dimension, cascading effects threaten the integrity of the entire system.

The finds presented demonstrates that the EU has entered a period where established expectations of security, prosperity, and stability can no longer be sustained without fundamental transformation. The question facing contemporary societies is not whether the social contract will change in response to climate disruption, but whether that change will be deliberate, equitable, and democratically legitimate, or chaotic, unjust, and imposed through crisis.

The proliferation of climate litigation, the emergence of eco-social contract theory, the evolution of constitutional interpretation to include intertemporal freedom and intergenerational equity, and the growing recognition of states' positive obligations regarding climate action collectively signal that legal and political systems possess capacities for adaptive reconstruction. These developments offer grounds for cautious optimism that the normative commitments underlying the social contract (i.e. protection, legitimacy, freedom, justice, and stability) can be reaffirmed and strengthened even as their institutional manifestations undergo necessary transformation.

Yet this reconstruction faces formidable obstacles. The acceleration of climate impacts, the widening of geographic and social disparities, the complexity of global coordination, the persistence of short-term political incentives, and the erosion of institutional trust create conditions where deliberate, equitable transformation becomes progressively more difficult. The window for managed transition narrows with each passing year of inadequate action.

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This report has sought to provide a comprehensive diagnostic framework identifying the core disruptors threatening the European social contract in the climate era. Its analysis reveals both the magnitude of the challenge and the conceptual resources available for response. Whether European societies successfully navigate the transition from a social contract premised on perpetual growth and stable climate to one recognizing planetary boundaries and intergenerational obligations will determine not merely the continent's environmental future but the viability of democratic governance and social justice in the twenty-first century.

The ultimate test of the social contract has always been whether political institutions can evolve to protect human dignity and enable collective flourishing in the face of changing circumstances. Climate disruption arguably represents the most profound test of that adaptive capacity in the history of modern political systems.

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10. Annex I. Key Informant Interview Questions

Introduction

The EXPRESS² project aims to provide insights for a new social contract in Europe that could accommodate key concerns. In order to do so, we seek to understand the main challenges relating to climate change and potential solutions for ensuring the well-being of people in the EU in a just way.

- Can you briefly introduce your organization, and describe your experience with climate, environmental, or social policy in the EU?
- Has your organisation contributed to the development or consultation of EU or national legislation on climate or biodiversity? If so, how?

Challenges & Policy Gaps

- From your field of expertise, what are the most significant ways climate change negatively impacts the well-being of people in the EU?
- Are there any challenges or impacts that you consider to be overlooked or under-discussed?
- From your area of expertise, which EU and Member State (MS) policies do you consider most effective or urgently needed for mitigating these impacts?
- Are there any actions you believe are misguided or ineffective?
- From your perspective, what are the main negative impacts on the well-being of people in the EU do current climate or biodiversity policies create, and what solutions would you suggest to mitigate these impacts from your area of expertise?
- In your view, which institutions or actors most influence the climate change and well-being policy agenda at EU or national level, particularly within your field?
- Are there organizations, groups, or stakeholders you believe should play a greater role?

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EU Commitments

- From your area of expertise, what is your opinion of the current EU climate and biodiversity commitments, and are there any barriers in connection to your field that may hinder them being achieved?
- Which EU and Member State (MS) policies or actions relating to your area of expertise do you consider most effective or urgently needed for achieving current EU commitments?
- Do you believe other commitments are necessary and, if so, are there any barriers in connection to your field that may hinder them being agreed and/or achieved?

Closing

- Are there any other important topics or debates on these issues that we have not discussed?
- Would you recommend any other experts, organizations, or stakeholders we should speak with?

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