Linking IPCC Special Report to the Paris Agreement

IMPORTANT: LRI acts as an intermediary in obtaining legal advice from third parties on the query you have raised. That advice is provided to LRI but we are able to share it with you. The third-party advisers have accepted certain duties to LRI but have not and do not accept any duty to you. LRI itself does not and cannot provide legal advice. As a consequence, LRI takes no responsibility for the content of any advice that it forwards, nor does it accept any responsibility for any delay either in obtaining or sending copies to you of the advice it receives.

In forwarding the advice to you, LRI does not intend to create a lawyer-client relationship with you and to the extent permitted by law, any liability of LRI to you (including in negligence or for any damages of any kind) is excluded. Any dispute between you and LRI shall be governed by English Law, and the English Courts will have exclusive jurisdiction.In consideration of LRI sharing the advice with you, you agree to the terms set out above.

This advice is provided in response to ***Query 61/18***

Linking the IPCC Special Report on 1.5 degrees to the COP24 negotiations

What the report states	**Page/paragraph**	**Relevance to Paris Agreement**
Global warming is likely to reach 1.5 degrees between 2030 and 2050 if it continues at the present rate (high confidence)	A.1	Article 4(1): "In order to achieve the long-term temperature goal set out in Article 2, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible". Article 1(a): "1. This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change […] by: (a) Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.

Warming greater than the global annual average is being experienced in many land regions, including temperatures 2-3 times higher than the global annual average in the Arctic.	A.1.2	Article 2(2): “This Agreement will be implemented to reflect equity”.
Climate-related risks for natural and human systems are higher at 1.5 degrees that at the present degree of warming, but lower than at 2 degrees of warming (high confidence)	A.3	Article 1(a) above. Article 8(1) below.
Impacts on natural and human systems from global warming have already been observed (high confidence). Many land and ocean ecosystems and some of the services they provide have already changed due to global warming (high confidence).	A.3.1	Article 8(1): “Parties recognize the importance of averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage.”
Future climate-related risks depend on the rate, peak and duration of warming. In the aggregate, they are larger if warming exceeds 1.5 degrees before returning to that level by 2100 than if global warming gradually stabilises at 1.5 degrees, especially if the peak temperature is high (ie around 2 degrees).	A.3.2	Article 2(1): This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by: (a) Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.

		Article 8(1).
Future climate-related risks would be reduced by the upscaling and acceleration of far-reaching, multilevel and cross-sectoral climate mitigation and by both incremental and transformational adaptation (high confidence)	A.3.3	Article 4, Article 7 and Article 8(1).
1.5 degrees of warming will lead to warming of extreme temperatures in many regions (high confidence), increases in frequency, intensity and/or amount of heavy precipitation in several regions (high confidence) and an increase in intensity or frequency if droughts in some regions (medium confidence).	B.1.1	Article 8(1).
1.5 degrees of global warming will see hot days in mid latitudes warm by up to 3 degrees and about 4 degrees if global warming reaches 2 degrees. Extreme cold nights in high latitudes will warm by up to 4.5 degrees at 1.5 degrees of global warming, and about 6 degrees at 2 degrees of global warming (high confidence).	B.1.2	Article 8(1).
Higher risks from droughts and precipitation deficits at 2 degrees of warming than at 1.5 degrees of warming (medium confidence).	B.1.3	Article 8(1).
Higher risks from precipitation events at 2 degrees of global warming than at 1.5 degrees of warming in eastern Asia and eastern North America (medium confidence). Heavy precipitation from tropical cyclones higher at 2 degrees of warming than at 1.5 degrees of warming (medium confidence).	B.1.3	Article 8(1).
Global mean sea level rise 0.1 metres higher with 2 degrees of global warming than at 1.5 degrees of global warming (medium confidence). The 0.1 metre difference exposes an additional 10 million people to associated risks (assuming no adaptation). Sea level rise will continue well beyond 2100	B.2	Article 2, 3, 4 and 8(1).

(high confidence) and the magnitude and rate of this rise depends on future emissions pathways.		
Marine ice sheet instability in Antarctica and/or irreversible loss of the Greenland ice sheet could result in a multi-metre rise in sea level of over hundreds to thousands of years.	B.2.2	Article 8(1).
Increasing warming amplifies the exposure of small islands, low-lying coastal areas and deltas to the risks associated with sea level rise for many human and ecological systems (high confidence). Risks are higher at 2 degrees of warming than at 1.5 degrees of warming. The slower rate of warming at 1.5 degrees reduces these risks, enabling greater opportunities for adaptation (medium confidence).	B.2.3	Article 2(1)(c) "Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development." Article 8(1). Article 7(1) and (2).
The impacts of global warming on biodiversity and ecosystems (including species loss and extinction) are lower at 1.5 degrees than at 2 degrees.	B.3	Article 2,3, and 4.
Biodiversity impacts from forest fires and invasive species are lower at 1.5 degrees of global warming than at 2 degrees (high confidence).	B.3.1	Article 2, 3 and 4.
Limiting warming to 1.5 degrees rather than 2 degrees will prevent the thawing of a permafrost area in the range of 1.5 to 2.5 million square kilometres (medium confidence).	B.3.3	Article 2, 3 and 4.
Constraining global warming to 1.5°C, rather than to 2°C and higher, is projected to have	Chapter 3, p. 179	Article 2, 3 and 4 – the need for Parties to upscale

many benefits for terrestrial and wetland ecosystems and for the preservation of their services to humans (high confidence).		mitigation efforts and maximise ambition to limit warming as close as possible to 1.5 degrees.
Risks of local species losses and, consequently, risks of extinction are much less in a 1.5°C versus a 2°C warmer world (high confidence).	Chapter 3, p. 179	Article 2, 3 and 4.
At 2 degrees of global warming, many more marine species will be shifted to higher latitudes than at 1.5 degrees of warming, reducing the productivity of fisheries and aquaculture (high confidence). Coral reefs are set to decline by a further 70-90% at 1.5 degrees of warming, and by up to 99% at 2 degrees of warming (very high confidence). The risk of the irreversible loss of many marine and coastal ecosystems increases with global warming, especially at 2 degrees of more.	B.4.2	Article 2, 3 and 4.
Current ecosystem services from the ocean are expected to be reduced at 1.5°C of global warming, with losses being even greater at 2°C of global warming (high confidence).	Chapter 3, p. 179	Article 2, 3 and 4.
1.5 degrees of warming will result in a decrease in the global annual catch for marine fisheries of about 1.5 million tonnes, rising to a decrease of about 3 million tonnes for 2 degrees of warming (medium confidence).	B.4.4	Article 8(1).
Climate-related risks to health, livelihoods, food security, water supply, human security and economic growth are projected to increase with 1.5 degrees of warming, and to increase further at 2 degrees.	B.5	Article 2, 3 and 4.
Populations at disproportionately higher risk of adverse consequences with global	B.5.1	Article 2.

warming of 1.5°C and beyond include disadvantaged and vulnerable populations, some indigenous peoples, and local communities dependent on agricultural or coastal livelihoods (high confidence). Limiting global warming to 1.5°C, compared with 2°C, could reduce the number of people both exposed to climate-related risks and susceptible to poverty by up to several hundred million by 2050 (medium confidence).		
Any increase in global warming is projected to affect human health, with primarily negative consequences (high confidence). Lower risks are projected at 1.5°C than at 2°C for heat-related morbidity and mortality (very high confidence) and for ozone-related mortality if emissions needed for ozone formation remain high (high confidence). Risks from some vector-borne diseases, such as malaria and dengue fever, are projected to increase with warming from 1.5°C to 2°C, including potential shifts in their geographic range (high confidence).	B.5.2	Article 2(1)(a) and (b), Article 7(1) and (2).
Limiting warming to 1.5°C compared with 2ºC is projected to result in smaller net reductions in yields of maize, rice, wheat, and potentially other cereal crops, particularly in sub-Saharan Africa, Southeast Asia, and Central and South America Reductions in projected food availability are larger at 2°C than at 1.5°C of global warming in the Sahel, southern Africa, the Mediterranean, central Europe, and the Amazon (medium confidence).	B.5.3	Article 2, 3 and 4. Article 8(1).

Limiting global warming to 1.5°C compared to 2°C may reduce the proportion of the world population exposed to a climate change-induced increase in water stress by up to 50%	B.5.4	Article 2, 3 and 4.
Risks to global aggregated economic growth due to climate change impacts are projected to be lower at 1.5°C than at 2°C by the end of this century10 (medium confidence). This excludes the costs of mitigation, adaptation investments and the benefits of adaptation. Countries in the tropics and Southern Hemisphere subtropics are projected to experience the largest impacts on economic growth due to climate change should global warming increase from 1.5°C to 2°C (medium confidence).	B.5.5	Article 2, 3 and 4.
Exposure to multiple and compound climate-related risks increases between 1.5°C and 2°C of global warming For global warming from 1.5°C to 2°C, risks across energy, food, and water sectors could overlap spatially and temporally, creating new and exacerbating current hazards, exposures, and vulnerabilities that could affect increasing numbers of people and regions (medium confidence)	B.5.6	Article 2, 3 and 4.
Most adaptation needs will be lower for global warming of 1.5°C compared to 2°C (high confidence). There are a wide range of adaptation options that can reduce the risks of climate change (high confidence).	B.6	Article 2, 3 and 4. Article 7.
Adaptation is expected to be more challenging for ecosystems, food and health systems at 2°C of global warming than for 1.5°C (medium confidence). Some vulnerable regions, including small islands and Least Developed Countries, are projected to experience high multiple	B.6.2	Article 2(1)(c).

interrelated climate risks even at global warming of 1.5°C (high confidence).		
Modelled pathways that limit global warming to 1.5°C with no or limited overshoot involve deep reductions in emissions of methane and black carbon (35% or more of both by 2050 relative to 2010).	C.1.2	Article 4.
Limiting global warming requires limiting the total cumulative global anthropogenic emissions of CO2 since the preindustrial period, that is, staying within a total carbon budget (high confidence).	C.1.3	Article 2, 3 and 4.
Pathways limiting global warming to 1.5°C with no or limited overshoot would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems (high confidence). These systems transitions are unprecedented in terms of scale, but not necessarily in terms of speed, and imply deep emissions reductions in all sectors, a wide portfolio of mitigation options and a significant upscaling of investments in those options (medium confidence). Pathways that limit global warming to 1.5°C with no or limited overshoot show system changes that are more rapid and pronounced over the next two decades than in 2°C pathways (high confidence). The rates of system changes associated with limiting global warming to 1.5°C with no or limited overshoot have occurred in the past within specific sectors, technologies and spatial contexts, but there is no documented historic precedent for their scale (medium confidence).	C.2 and C.2.1	Article 2(1)(c) in respect of the "significant upscaling of investments". Article 3 and 4. Article 2(1)(c).

In 1.5°C pathways with no or limited overshoot, renewables are projected to supply 70–85% (interquartile range) of electricity in 2050 (high confidence). In electricity generation, shares of nuclear and fossil fuels with carbon dioxide capture and storage (CCS) are modelled to increase in most 1.5°C pathways with no or limited overshoot. In modelled 1.5°C pathways with limited or no overshoot, the use of CCS would allow the electricity generation share of gas to be approximately 8% (3–11% interquartile range) of global electricity in 2050, while the use of coal shows a steep reduction in all pathways and would be reduced to close to 0% (0–2% interquartile range) of electricity (high confidence).	C.2.2	Article 2(1)(c), 3 and 4.
Additional annual average energy-related investments for the period 2016 to 2050 in pathways limiting warming to 1.5°C compared to pathways without new climate policies beyond those in place today are estimated to be around 830 billion USD2010 (range of 150 billion to 1700 billion USD2010 across six models).	C.2.6	Article 2(1)(c), Article 9(1) to (4).
Most current and potential CDR measures could have significant impacts on land, energy, water or nutrients if deployed at large scale (high confidence).	C.3.4	Article 3 and 4.
Pathways that limit global warming to 1.5°C with no or limited overshoot show clear emission reductions by 2030 (high confidence). All but one show a 40–50% reduction from 2010 levels (high confidence).	D.1.1	Article 2, Article 3, Article 4(1).
The avoided climate change impacts on sustainable development, eradication of poverty and reducing inequalities would be greater if global warming were limited to 1.5°C rather than 2°C, if mitigation and adaptation synergies are maximized while	D.2	Article 2, 3, 4 and 7.

trade-offs are minimized (high confidence). Adaptation options specific to national contexts, if carefully selected together with enabling conditions, will have benefits for sustainable development and poverty reduction with global warming of 1.5°C.	D.3	Article 7(1).
A mix of adaptation and mitigation options to limit global warming to 1.5°C, implemented in a participatory and integrated manner, can enable rapid, systemic transitions in urban and rural areas (high confidence). These are most effective when aligned with economic and sustainable development, and when local and regional governments and decision makers are supported by national governments.	D.3.3	Article 2(1)(a), Article 4(1) and Article 7(1).
1.5°C pathways that include low energy demand, low material consumption, and low GHG-intensive food consumption have the most pronounced synergies and the lowest number of trade-offs with respect to sustainable development and the SDGs (high confidence).	D.4.2	Article 2(1)(a), Article 4(1) and Article 7(1).
Limiting the risks from global warming of 1.5°C in the context of sustainable development and poverty eradication implies system transitions that can be enabled by an increase of adaptation and mitigation investments, policy instruments, the acceleration of technological innovation	D.5	Article 2(1)(c).

and behaviour changes (high confidence)		
Sustainable development supports, and often enables, the fundamental societal and systems transitions and transformations that help limit global warming to 1.5°C. Such changes facilitate the pursuit of climate-resilient development pathways that achieve ambitious mitigation and adaptation in conjunction with poverty eradication and efforts to reduce inequalities (high confidence).	D.6	Article 2(1)(a) and (c), Article 3, Article 4(1) and Article 7(1).
International cooperation is a critical enabler for developing countries and vulnerable regions to strengthen their action for the implementation of 1.5°C-consistent climate responses, including through enhancing access to finance and technology and enhancing domestic capacities, taking into account national and local circumstances and needs (high confidence).	D.7.3	Article 2(1)(c), Article 7(6), Article 9(1) to (4), Article 10(1) and (2), Article 10(1) to (3).
Overshooting poses large risks for natural and human systems, especially if the temperature at peak warming is high, because some risks may be long-lasting and irreversible, such as the loss of some ecosystems (high confidence). The rate of change for several types of risks may also have relevance, with potentially large risks in the case of a rapid rise to overshooting temperatures, even if a decrease to 1.5°C can be achieved at the end of the 21st century or later (medium confidence). If overshoot is to be minimized, the remaining equivalent CO2 budget available for emissions is very small, which implies that large, immediate and unprecedented global efforts to mitigate greenhouse gases are required (high confidence).	Chapter 3, page 177	Article 2(1)(a), Article 3, Article 4.
Robust increases in temperature means and extremes are projected at 1.5°C compared to present-day values (high confidence).	Chapter 3, p. 178	Article 2(1)(a).

There are decreases in the occurrence of cold extremes, but substantial increases in their temperature, in particular in regions with snow or ice cover (high confidence).		
Risks to natural and human systems are expected to be lower at 1.5°C than at 2°C of global warming (high confidence).	Chapter 3, p. 178	Article 2, 3 and 4.
Risks of local species losses and, consequently, risks of extinction are much less in a 1.5°C versus a 2°C warmer world (high confidence).	Chapter 3, p. 179	Article 2, 3 and 4.
Current national pledges on mitigation and adaptation are not enough to stay below the Paris Agreement temperature limits and achieve its adaptation goals. While transitions in energy efficiency, carbon intensity of fuels, electrification and land-use change are underway in various countries, limiting warming to 1.5°C will require a greater scale and pace of change to transform energy, land, urban and industrial systems globally.	Chapter 4, page 315	Article 3: "As nationally determined contributions to the global response to climate change, all Parties are to undertake and communicate ambitious efforts as defined in Articles 4, 7, 9, 10, 11 and 13 with the view to achieving the purpose of this Agreement as set out in Article 2. The efforts of all Parties will represent a progression over time." Article 4(11): "A Party may at any time adjust its existing nationally determined contribution with a view to enhancing its level of ambition, in accordance with guidance adopted by the Conference of the Parties serving as the meeting of the Parties to this Agreement."
Adaptation needs will be lower in a 1.5°C world compared to a 2°C world (high confidence)	Chapter 4, p. 315	Article 2, 3 and 4.

Limiting global warming to 1.5°C rather than 2°C above preindustrial levels would make it markedly easier to achieve many aspects of sustainable development, with greater potential to eradicate poverty and reduce inequalities	Chapter 5, p. 447	Article 2, 3 and 4.
Impacts avoided with the lower temperature limit could reduce the number of people exposed to climate risks and vulnerable to poverty by 62 to 457 million, and lessen the risks of poor people to experience food and water insecurity, adverse health impacts, and economic losses, particularly in regions that already face development challenges	Chapter 5, p. 447	Article 2 and 3.
Warming of 1.5°C is not considered 'safe' for most nations, communities, ecosystems and sectors and poses significant risks to natural and human systems as compared to the current warming of 1°C (high confidence).	Chapter 5, p. 447	Article 2, 3 and 4.