

IMMINENT PERIL: THE EVIDENTIARY BASIS OF OUR APPEAL CASE AND THE URGENDA DECISION

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A recent decision by the highest court in the Netherlands has concluded that climate change is “a real and imminent threat”. The court has ordered that the Dutch government must implement more stringent carbon reduction policies to avoid dangerous levels of atmospheric warming. This is the first time any court in Europe or North America has issued a ruling on the imminence of the very serious impacts that will be caused by climate change based on a full trial and detailed assessment of the available scientific evidence. The case, known as *Urgenda Foundation v. The State of the Netherlands*, was decided by the Hague Court of Appeal on October 9, 2018, and was upheld by the Supreme Court of the Netherlands on December 20, 2019. I believe this decision by the Dutch court may be of some assistance to the B.C. Court of Appeal in deciding the most

important question in our case – which is whether climate change is an “imminent peril” within the meaning of that term in Canadian law.

Introduction

The decision by the Hague Court of Appeal addresses two points that are of special interest to our case. Firstly, it sets out the analytical approach taken by the Dutch court to determine whether “a real and imminent threat” exists in the context of the available evidence about climate change and global emissions. A real and imminent threat is the relevant test under the applicable provisions of the European Convention on Human Rights to determine whether the Netherlands government was legally obliged to implement more stringent carbon reduction policies to avoid dangerous levels of atmospheric warming. The expression “a real and imminent threat” is the English term adopted in the available English language translation of the judgment.

Secondly, the Dutch court sets out in detail the evidentiary basis of its ruling on that issue. The decision, as I explain below, is almost entirely founded on a series of scientific findings cited in the judgment about the atmospheric carbon concentration level, its past and current rate of increase, the significance of the 450 parts per million (ppm) level, and the irreversibility of accumulating levels of carbon dioxide in the atmosphere. The framework of evidentiary material presented in the Dutch case is almost identical to that which we have relied on in our case.

In important respects the Dutch case is different from ours. It is not a case of criminal liability or “excuse” (and therefore has no direct analogy with the common law defence of necessity in our case). It concerns a claim that the Dutch government has breached a duty of care it owes to its own citizens to achieve certain levels of emissions reductions by 2020, which the claimants say are essential in order to avoid the threat of grave, irrevocable climate change. The Dutch case turns specifically on Articles 2 and 8 of the European Convention on Human Rights (ECHR).

But in both the Dutch case and in our appeal, a common issue arises: given the evidence about the current state of global emissions and the available time left to avoid the increase in the earth’s average surface temperature exceeding the 1.5°C and 2°C limits recognized as dangerous, should the court make a finding that “a real and imminent threat” now exists? In the Dutch case, the court agreed that an imminent threat does exist. It ruled that the government of the Netherlands has a positive duty to implement additional emissions reductions forthwith to meet specified targets by 2020.

The focus of the inquiry in both cases is on how much more time remains to avoid an irrevocable commitment to warming that will exceed both 1.5°C and 2°C (assuming that keeping within either of those limits is still possible) and how deep the reductions in global emissions would have to be to stay within those limits.

I include in this analysis a number of direct quotes from the Hague Court of Appeal decision. I have underlined some of the key points for emphasis. In the notes that follow,

I discuss the significance of some of the important points of the scientific evidence referred to in the Dutch decision.

“A real and imminent threat”: the legal test in the Urgenda case

The claim brought by the Urgenda Foundation against the State of the Netherlands is based on rights under the European Convention on Human Rights (ECHR), in particular Articles 2 and 8. European Union member governments have obligations to their citizens relating to the interests protected by these articles, including positive obligations to take concrete action to prevent future violations of these interests (referred to as “a duty of care”). Article 2 involves a positive obligation to protect the lives of citizens, while Article 8 concerns a broader category of “the right to home and private life” which, according to the judgment, applies to all activities, public and non-public, which could endanger those rights, including “industrial activities” causing serious damage to the natural environment that supports the lives and welfare of citizens. It therefore covers adverse impacts of industrial pollution that threatens human life, health, and livelihoods.

The judgment discusses the threshold test under Dutch law that triggers the government’s duty of care – an obligation to take positive action:

This general limitation of the positive obligation, which applies here, has been made concrete by the European Court of Human Rights by ruling that the government has only to take concrete actions which are reasonable and for which it is authorized in the case of a real and imminent threat, which the government knew or ought to have known. The nature of the (imminent) infringement is relevant to this. An effective protection demands that the infringement is to be prevented as much as possible through an early intervention by the government.

— *Urgenda*, the Hague Court of Appeal, paragraph 42

Accordingly, the definition of “a real and imminent threat” applied in the *Urgenda* case clearly has a particular meaning that has been developed in other cases decided under Article 8 of the ECHR.

We cannot assume the legal test applied in the *Urgenda* case is necessarily identical to “a clear and imminent peril” under Canada’s common law defence of necessity.

Nevertheless, the *Urgenda* decision is helpful. Whatever the precise measure of “imminence” that applies in European law, *Urgenda* gives us some understanding of how, in a case that involves the complex relationships between present industrial activities (present annual levels of emissions) and future consequences (future atmospheric warming), the courts can make a reasoned finding about the time remaining before it will be too late to avoid irreversible warming that exceeds safe limits. The evidence is complex, but the evidence is available.

The Dutch court offers us guidance on how the question of “imminence” can be approached. It identifies specific aspects of the evidence, unique to the complex

relationships I have noted above, that must be taken into account by the court in making any reasoned assessment of the length of time remaining to avoid, or at least to limit as much as humanly possible, the worst impacts of global heating.

The court in *Urgenda* discusses features of the scientific evidence that explain why even immediate efforts to arrest the continuing rise in the annual level of global emissions (and the immediate implementation of absolute reductions) will not for many additional years halt the warming increase. Hence, any assessment of the “imminence” of the risk requires a reasoned and evidence-based inquiry into the factors that will impede any quick turnaround, even after a decision to act is made on a global scale.

In *Urgenda*, the court concluded after its review of the evidence:

As is evident from the above, the Court believes that it is appropriate to speak of a real threat of dangerous climate change, resulting in a serious risk that the current generation of citizens will be confronted with loss of life and/or loss of family life”.

— *Urgenda*, The Hague Court of Appeal, paragraph 45

The evidentiary basis of *Urgenda*: the significance of the 450 ppm atmospheric carbon concentration level

The discussion of the scientific evidence and the court’s key findings about atmospheric warming and its causes are found in the initial 15 pages of the decision, principally at paragraphs 3.2-45.

At paragraphs 3.2 to 3.9 the judgment describes the main evidence about the relationship between emissions and warming:

The combustion produces CO₂ (carbon dioxide), some of which is released into the atmosphere – and stays there for hundreds of years or longer¹ – and some of it is absorbed by the oceanic and forest ecosystems². Incidentally, this absorption capacity is declining due to deforestation and rising sea water temperature.

CO₂ is the main greenhouse gas ... traps the heat emitted by the earth into the atmosphere, which in turn exacerbates global warming. It is important to note that the climate system shows a delayed response³ to the emission of greenhouse gases, meaning the full warming effect of the greenhouse gases that are emitted today will only become apparent in 30 to 40 years from now.

There are other greenhouse gases besides CO₂, such as methane, nitrous oxide ...

The Court directs attention to the atmospheric concentration of greenhouse gases:

The concentration of greenhouse gases in the atmosphere⁴ is indicated with the unit/abbreviation ‘ppm’ (parts per million). The abbreviation ‘ppm CO₂-eq’

(parts per million CO2 equivalent) is used to indicate the concentration of all greenhouse gases combined ...converted into CO2 in terms of warming effect ...

The current level of warming⁵ is at about 1.1°C warmer relative to the beginning of the Industrial Revolution. The current concentration of greenhouse gases amounts to approximately 401 ppm.⁶ Human-induced CO2 emissions continue on a global level and over the past decades, the global CO2 emissions have increased by 2% annually, which is why global warming continues unabated.

There has been a general consensus in the scientific community and the world community for some time that global temperature should not exceed 2°C.⁷

The Court highlights the important correlation between 2°C warming and a concentration level of 450 ppm:

If the concentration of greenhouse gases has not exceeded 450 ppm⁸ in the year 2100, there is a reasonable chance that this 2°C target will be achieved. However, the insight has been developed over the past few years that a safe temperature rise should not exceed 1.5°C, which comes with a lower ppm level, namely 430 ppm.⁹ With these starting points in mind, there is limited room¹⁰ (“budget”) for greenhouse gas emissions, and particularly for CO2 emissions.

The court, at paragraph 12 of its decision, reviews several major sources of the scientific evidence it relied on. With respect to the IPCC Fifth Assessment Report¹¹ published in 2014 (also called the AR5 assessment), the Court states:

According to this report, there is a ‘likely’ (>66%) chance that the rise of the global temperature can be kept below 2°C when the concentration of greenhouse gases in the atmosphere in 2100 stabilizes at about 450 ppm. ... However, it should be noted that in 87% of the scenarios included in the AR5 assessment assumptions have been included with respect to negative emissions, that is to say the extraction of CO2 from the atmosphere¹² ... Stabilization at about 500 ppm¹³ in 2100 gives more than a 50% chance (‘more likely than not’) to achieve a 2°C target. Only a limited number of studies has looked at scenarios that lead to a limitation of global warming to 1.5°C. Such scenarios assume concentrations of less than 430 ppm in 2100.

The central point established by the evidence is that as long as the atmospheric carbon concentration level does not exceed 450 ppm, there is a 66% chance that the rise in global temperature can be kept below 2°C. In our case in the B.C. court, we cited the same IPCC Fifth Assessment Report. To understand the danger and urgency of the present situation, an important finding in that report is that if the world’s leading industrial economies continue to follow the current path of global emissions, the atmospheric concentration will have reached the 450 CO₂eq level by 2030.¹⁴

The Dutch Court also cites (at paragraph 14) the *UN Emissions Gap Report 2017*:¹⁵

The 2017 UNEP report states that, in light of the Paris Agreement, increased pre-2020 mitigation actions are more urgent than ever. The UNEP also remarks that if the emissions gap is not bridged by 2030, achieving the 2°C target is unlikely. Even if the reduction targets underlying the Paris Agreement are fully implemented, 80% of the carbon budget corresponding to the 2°C target will be used up by 2030 ...

The “emissions gap” is an important and crucial calculation of the amount of additional emissions cuts required by 2030 to give us a “likely” chance that we will be able to stabilize the atmospheric concentration of greenhouse gases at about 450 ppm or below that level, and thus keep the rise of global temperature below 2°C. It represents the “gap” or shortfall between the emissions reduction commitments already made by Canada and all other countries under the terms of the December 2015 Paris Agreement (assuming those existing pledges are fully implemented within the next eleven years) and the total amount of cuts needed on a global scale to stay within the 2°C limit. The *UN Emissions Gap Report 2017* calculated that the emissions gap is 13.4 GtCO₂. For further discussion of the significance of the emissions gap, and how that evidence is presented in our case in the B.C. court, see page 8 and note 24 in this paper.

At paragraph 43, the court summarizes the question it is obliged to decide:

If the government knows that there is a real and imminent threat, the State must take precautionary measures to prevent infringement as far as possible. In light of this, the Court shall assess the asserted (imminent) climate dangers.

The court then summarizes in paragraph 44 the “facts and circumstances” that support its conclusion that there is “a real and imminent threat”:

The Court takes as a starting point the facts and circumstances, some of which detailed above, established in the proceedings. For the sake of clarity, the Court lists the most important elements below:

There is a direct, linear link¹⁶ between anthropogenic emissions of greenhouse gases, particularly caused by combusting fossil fuels, and global warming. Emitted CO2 lingers in the atmosphere for hundreds of years or longer.

Since pre-industrial times, the Earth has warmed by about 1.1°C. Between 1850 and 1980, the level of global warming was about 0.4°C.¹⁷ Since then and in under 40 years’ time, the Earth has warmed further by 0.7°C, reaching the current level of 1.1°C ... This global warming is expected to accelerate further, mainly because emitted greenhouse gases reach their full warming effect only after 30 or 40 years.¹⁸

If the Earth warms by a temperature increase of substantially more than 2°C, this will cause more flooding due to rising sea levels¹⁹, heat stress due to more intensive and longer periods of heat, ... droughts ... increasing spread of infectious diseases and severe flooding as a result of heavy rainfall ... disruption

of food production and potable water supply ... Ecosystems, flora, and fauna will also be affected ...

As global warming continues, not only the severity of its consequences will increase. The accumulation of CO₂ in the atmosphere may cause the climate change process to reach a “tipping point,” which may result in abrupt climate changes, for which neither mankind nor nature can properly prepare. The risk of reaching such “tipping points” increases at ‘a steepening rate’ with a temperature rise between 1 and 2°C (AR5 p. 72).²⁰

...

In order to achieve the 2°C target, the concentration of greenhouse gases in the atmosphere may not exceed 450 ppm. To achieve the 1.5°C target (as set in the Paris Agreement), the global concentration of greenhouse gases must be substantially lower, namely less than 430 ppm. The current concentration is about 401 ppm. This means that the concentration of greenhouse gases in the atmosphere may only rise slightly. Chances of reaching the 1.5°C target are now slim.²¹

The longer it takes to achieve the necessary emission reduction, the greater the total amount of emitted CO₂ and the sooner the carbon budget will have been used up²² ...

Assessing the imminence of the peril

Of course, it does not necessarily follow that because the highest court in the Netherlands has found that a “real and imminent peril” exists that the B.C. Court of Appeal will agree with that conclusion. The precise legal tests of what an “imminent peril” means may be different in these two different legal systems.

Also, in both cases, the result ultimately must depend on the precise details of the evidence put before the courts. The Dutch case was based on actual and very extensive evidence put forward at a lengthy trial. Our case is based on a 119-page summary of the expert evidence we propose to put forward (because we were not permitted to present our full evidence).^{*} But, as I have indicated above, the main outline of the expert evidence is identical in both cases and many of the specific sources (and much of the key data) are the same.

What is directly relevant to our case, however, is the recognition by the Dutch courts that any judicial inquiry into whether the peril is “imminent” requires that the court be guided by the available expert evidence presented to the judges. The expert evidence explains the

^{*} A discussion of the procedural and evidentiary rules that apply in our case is found at the end of the Notes section, p. 18.

factors that are driving the increase in warming, and explains what must be done to halt that increase.

In light of the approach taken by the Dutch court, it is helpful to identify some of the key parts of the summary of expert evidence we presented to the B.C. court at our initial court hearing on December 3-4, 2018.

We are on a path to 3.2°C of warming

The evidence we presented to the trial judge at our initial hearing on December 3-4, 2018, is that the world is presently on an emissions path that by 2030 will irrevocably commit us (and our children and all children) to warming that will exceed 3°C.²³

In other words, at the rate we are presently consuming oil, natural gas, and coal – and given available projections showing how emissions from fossil fuel use will continue to grow over the next eleven years – we are on a course that, if it cannot be altered, will be catastrophic.

The sole question in our appeal is whether there are “alternatives” available that will allow us to keep additional increases in the average surface warming of the earth to below 1.5°C, or at least to less than 2°C. The summary of scientific evidence we have presented to the Court explains that the only possible alternative is to make unprecedented reductions in the level of global emissions, and those deep cuts must be fully implemented within a very short period of time.

Therefore to assess the imminence of the climate peril, the court must determine (i) the magnitude of the deep emissions reductions that are required to keep warming from exceeding the 1.5°C and 2°C limits, and the timelines; (ii) identify and take into account, again based on the available expert evidence, a number of important factors that will impede any quick turnaround, even after a decision to act is made on a global scale; and (iii) assess whether there is any evidence that countries and industries have yet made decisions to act, or even made promises or declared their intentions to implement cuts of the kind required.

The emissions “gap” and the timelines

The uncontested evidence is that the remaining time available is eleven years, and the magnitude of the cuts required is a massive 25% to 50% reduction in the annual level of global emissions, to stay within 2°C and 1.5°C limits respectively.

Our summary of evidence, presenting data from the *UN Emissions Gap Report 2017*, confirms that the magnitude of the additional reductions (i.e. above and beyond the existing commitments made by all countries under the December 2015 Paris Agreement) needed by 2030 to give us even a 66% chance of staying within 2°C is 13.4 billion tonnes (GtCO₂eq) – equivalent to cutting the annual level of global emissions 25%, all within

the next eleven years. The evidence we presented to the court shows that to stay within the safer 1.5°C limit, the reduction in global emissions would have to be much greater, in the order of 50%.²⁴

The atmospheric carbon concentration level

In deciding whether there is any realistic prospect that deep enough cuts can be achieved within the next eleven years to avoid an irrevocable commitment to warming above 1.5°C and 2°C (i.e. whether we have a chance to achieve what I called above a “quick turnaround”) the court must take into account crucial elements of the expert evidence that explain why any rapid or immediate halt to the continuing rise in global average surface temperature is not possible.

The scientific evidence explains that even after we start to cut emissions, if we do, the warming of the earth will continue for many more decades. The most important part of the evidence on that point concerns the significance of the atmospheric carbon concentration level. The expert evidence is uncontested that once the concentration of atmospheric carbon reaches a level of 450 ppm, we are committed to 2°C of warming. The current warming of the earth is driven by the rising atmospheric concentration of greenhouse gases in the atmosphere – which, in turn, is driven by the continuing release of CO₂, methane, and other greenhouse gases from burning fossil fuels and other industrial activities.

Even if we were to immediately begin to implement deep reductions in the annual level of global emissions and sustain those cuts every year through the next decade to 2030 and after, the atmospheric concentration level of greenhouse gases will continue to increase every year for another 30 or 40 years²⁵ – because, even after the annual level of emissions from human activity begins to decline, massive amounts of oil, natural gas, and coal will continue to be burned for many more decades through to 2050 at least, even under the most optimistic scenario.

That means that after we start to reduce global emissions, the carbon concentration level will continue to rise every year for many years – although the size of the annual increases in the atmospheric concentration (currently about 2.5 ppm every year) would gradually diminish as the burning of coal, oil, and natural gas is reduced. As long as the concentration level continues to rise at all, the heating of the earth will continue.

An additional feature of CO₂ emissions that severely constrains our choices is that once the gas is released into the upper atmosphere it does not break down, it does not dissipate. It has an effective atmospheric residence time of centuries to millennia.²⁶ From the perspective of the time frame that concerns us, the atmospheric carbon concentration level reached by 2030 (and further rises that will occur over the following decades) will be irreversible. Our children will not be able to undo what we have done.

No plan to reduce emissions on the scale required

There was no evidence before Affleck J showing that governments and industries have made decisions, or even promises, to implement emissions cuts on the unprecedented scale required. When we filed our summary of evidence on November 22, 2018, no countries had made commitments of that kind.

On the contrary, our summary of evidence shows the results of multiple baseline studies (business-as-usual scenarios) that estimate the future path of global emissions up to 2030 and beyond. In making these calculations, baseline scenarios assume that no significant new carbon-reduction measures will be adopted beyond those currently implemented or already committed for future implementation. These provide the best available evidence of our present intentions, based on the commitments already made by governments. All of these baseline scenarios show that global CO₂ emissions will continue to rise to 2030 and to the end of this century.²⁷

In particular, the *UN Emissions Gap Report 2017* provides an updated projection of the future path of global emissions, looking at the period up to 2030, based on the information available in 2017 about new carbon-reduction policies adopted and any new commitments announced up to that time. The UN report concluded that even if all countries that signed the 2015 Paris Agreement fully implement all their promised reductions, the level of global emissions is projected to rise to 55.2 GtCO₂eq by 2030, a 6% increase above the 2016 level.²⁸

Any assessment by a court about whether we can keep warming within the 1.5°C or 2°C limits must carefully consider the unforgiving evidence about the rising carbon concentration level. As long as it continues to rise every year, the atmosphere will be getting hotter.

The Court of Appeal is not obliged to follow this kind of analysis because a Dutch court did so. No Canadian court is bound by the rulings of a foreign court on this question.

However, the *Urgenda* decision does provide us with an example of how the available expert evidence on climate science and emissions can be used to assess the length of time we have to avoid the worst impacts of future warming. The B.C. appeal court simply needs to be guided by the summary of the expert evidence we presented to the trial judge in our case. Our summary of expert evidence explains the factors that are driving the heating of the earth, and it explains the factors that will impede even our best efforts to quickly curb and halt the continuing rise in the atmospheric carbon concentration level.

NOTES

The evidence cited by the Hague Court of Appeal in *Urgenda Foundation v. The State of the Netherlands* closely parallels and in many instances, with respect to the sources and details of the scientific findings about climate change and its causes, is identical to the summary of expert evidence we presented to Affleck J. at our hearing December 2 and 3, 2018, and which forms the evidentiary basis of our case in the B.C. Court of Appeal.

The following notes identify some of the key findings relied on by the Hague Court of Appeal, and show how those same points are addressed in our case.

The initial decision in the Dutch case was on June 24, 2015, in the lower court (District Court of the Hague). It ruled in favour of the claimants. The lengthy written judgment by the District Court sets out in extensive detail the evidence relied on in that case, which focuses on the scientific evidence (much of it drawn from the same IPCC (AR5) report that we rely on in our case) concerning the atmospheric carbon concentration level; the present and future projected increases in the concentration level; and the concept of “climate sensitivity” and the correlation between increases in the concentration level and future increases in warming. It cites in detail the *UN Emissions Gap Report*, and provides estimates of the emissions “gap” by 2030 that correspond to our figures.

The Hague Court of Appeal judgment considers and re-states in a summarized form the evidence that was accepted by the District Court. The approach followed by the Dutch courts relies very heavily on the analysis of the rising atmospheric carbon concentration level as the basic framework of its analysis.

The very recent decision of the Supreme Court of the Netherlands, released December 20, 2019, also reviews at length the details of the scientific evidence and affirms all the findings and conclusions reached by the Hague Court of Appeal. In these notes, I refer to the findings and discussion in the Hague Court of Appeal decision.

Atmospheric carbon concentration level rise is irreversible

1. “*Stays there hundreds of years or longer.*” This basic point is addressed in Part 15 of our Outline, at paragraph 15.7. Once CO₂ is released into the atmosphere it will not dissipate, it will remain there for centuries, adding to the existing concentration. Some scientists have drawn the analogy that accumulating CO₂ in the atmosphere is like a tap running into “a bathtub with no drain”. The Court in *Urgenda* observes that there is “limited room” for CO₂ emissions, and refers to there being a limited “budget” for additional emissions. See our Factum at page 3, paragraph 9, citing findings in the *UN Emissions Gap Report 2017* projecting an 80% depletion of the “carbon budget” by 2030. The Court in *Urgenda* concludes: “The longer it takes to achieve the necessary emissions reduction ... the sooner the carbon budget will have been used up.” (*Urgenda*, page 13, para. 44). That approach, recognizing the accumulating character of the CO₂ atmospheric concentration, is fundamental to any reasoned appraisal of the remaining time available to avoid the most dire consequences of climate change.

2. *“absorbed by the oceanic and forest ecosystems”*: see our Outline, Part 16, paragraphs 16.34-16.38 which provides details of the proportion of annual emissions absorbed by the ocean and land “sinks”. The available evidence we presented to the B.C. court is that between 2007 and 2016, on average, 23% of total annual CO₂ emissions (8.7 GtCO₂ per year) was absorbed into the ocean every year and about 30% (11.2 GtCO₂ per year) was absorbed into the land. The other 47% (17.3 GtCO₂ per year on average) did remain in the atmosphere, and those amounts were added to the already existing atmospheric carbon concentration. There is a contingency that the “absorption capacity” of the land and oceans will decline. Paragraph 16.37 of our summary records that in 2016, which was characterized by unusually dry conditions in tropical land areas, the annual increase in the carbon concentration level that year was 3.0 ppm, a marked increase above the previous few years and far greater than could be accounted for by the relatively small increase in global emissions that year. One significant contingency that increases our risks is that in the coming years a larger proportion of total annual emissions will remain in the atmosphere (less will be absorbed by the land and ocean “sinks”), thereby increasing the annual amounts by which the atmospheric concentration is rising. The recent range of the annual rise has been about 2.5 ppm per year.
3. *“delayed response to the emissions of greenhouse gases”*: see our Outline, Appendix R, at paragraphs R.11-R.14 which explains that current increases in the annual level of global emissions (accompanied by incremental increases in the atmospheric concentration level) will not have their full warming effects on the earth until the end of this century. The difference is between *“equilibrium climate sensitivity”* and *“transient climate response”*. But the full long-term warming effects from current emissions are unavoidable. Footnote # 17 in our Factum refers to the above discussion at R.11-R.14.
4. *“The concentration of greenhouse gases in the atmosphere”*: in our appeal case the concept of the atmospheric carbon concentration level, and our proposed evidence explaining its significance, provides the basic framework for our analysis showing why we are now facing an extreme risk that the earth’s surface warming is going to exceed both the 1.5°C and 2°C thresholds. See our Factum on page 5 at paragraphs 19-21 (under the heading “The rising atmospheric carbon concentration level”) and the detailed summary of the evidence in Part 15 of our Outline.
5. *“The current degree of warming is at about 1.1°C warmer ...”*: We give 1.0°C of warming in our Factum and Outline: see Factum paragraph 8 (page 2), paragraph 27 (page 7), and the detailed discussion of the scientific evidence in our Outline, Part 18, at paragraphs 18.3-18.10. For our 1.0°C figure, we rely on the October 7, 2018 IPCC report. In 2019, a number of authoritative scientific reports were published giving 1.1°C as the updated measure of the warming increase.
6. In our case we cite 405 ppm, which was the widely acknowledged figure for the year 2017. A new number (407.4 ppm) is now available representing the level reached in 2018, although it is not part of the evidentiary record in our case. The 2018 data was

not released until well after we filed the record in our case. Recently, some scientific sources have projected that the average level for 2020 could reach 414 ppm.

7. The impacts on natural systems and human life and societies as warming increases from the current 1.0°C to 1.5°C and then to 2°C are addressed in Part 18, and also in Part 17, in particular at paragraphs 17.31-17.33.

Significance of the carbon concentration level reaching 450 ppm

8. The Dutch court accepted scientific evidence that an atmospheric carbon concentration level of 450 ppm will lead to a 2°C increase in global average surface temperature. We presented the same evidence to the B.C. Court at our original hearing on December 3-4, 2018. The leading source we cite on that point is the IPCC's report *Climate Change 2014: Mitigation of Climate Change*, April 12, 2014. In our summary of expert evidence we also cite a crucial finding taken from the same IPCC report that the concentration level is projected to exceed 450 ppm CO₂eq by 2030 and will reach concentrations between 740 and 1300 ppm CO₂eq in 2100. That evidence regarding the significance of the concentration level reaching 450 ppm is found in the Appellants' Factum at page 5, paragraphs 19 – 21, and is set out in more detail in Part 15 of our Outline of Proposed Evidence at paragraphs 15.12-15.3 (AB 101); Part 16 at paragraphs 16.19-16.23 (AB 105); and in Appendix R (AB 165).
9. "*lower ppm level, namely 430 ppm*": The evidentiary record in our case does not include the figure of 430 ppm representing the concentration level that must not be exceeded in order to keep warming within 1.5°C. However, our summary of evidence sets out the scientific evidence showing that in order to stay on a pathway consistent with keeping warming below 1.5°C, global emissions must be reduced to an annual level of between 25 and 30 billion tonnes of CO₂eq (GtCO₂eq) by 2030. The actual annual level in 2016 was 51.9 GtCO₂ eq. The currently projected level of global emissions to 2030 is 55.2 GtCO₂eq, based on current policies. Therefore, the evidence we presented to the B.C. Court shows that the reduction needed to stay within 1.5°C is about 50%. In contrast, the available evidence shows that the reduction needed by 2030 to stay within 2°C is about 25%.
10. "*limited room (budget)*": this is an acknowledgment by the Dutch court that the additional amount of emissions that can be released into the atmosphere and still keep the carbon concentration level below 450 ppm is fixed.
11. In our case, we also refer extensively to the scientific findings found in the IPCC Fifth Assessment Report (AR5). It is our principal source of global emissions projections, and the source of the mitigation scenarios cited in Part 16 of our Outline of proposed Evidence and also the cited source for our summary of the evidence on other climate science issues i.e. climate sensitivity: see Appendix R at paragraph R.3.
12. "*negative emissions ... extraction of CO₂ from the atmosphere*": The IPCC Fifth Assessment Report (2013-2014) includes mitigation scenarios that calculate the scale of future emissions reductions required to keep future warming to less than 2°C. The

Dutch court agrees that most of those scenarios are based on the assumption that in future years new technologies will be successfully developed, capable of removing CO₂ from the atmosphere – referred to variously as “negative emissions” and “Carbon Dioxide Removal (CDR) technologies”. The technologies do not exist. A number of proposed CDR technologies envision chemical processes and materials that would directly absorb CO₂ out of the air. The idea is that even if during the next few decades the atmospheric carbon concentration level continues to rise and exceeds 450 ppm, future large-scale deployment of CDR technologies will allow us to extract CO₂ from atmosphere, and thus eventually lower the atmospheric concentration to less than 450 ppm – and avoid dangerous heating of the earth. A number of very small-scale, experimental prototypes of some of these ideas have been developed. But fundamental questions remain about the future viability of any these schemes. In our Outline of Proposed Evidence in Part 16, at paragraphs 16.4-16.6 and in Figure xi, we present a summary of our proposed expert evidence based on a series of mitigation scenarios known as the SSM pathways. These pathways all show that even if deep cuts of this kind were to begin (theoretically) as early as 2020, based on all of those projections the atmospheric carbon concentration level will still eventually rise above 450 ppm, over the next few decades. This is referred to as “overshoot” of the carbon concentration level. Many mitigation scenarios count on the future development of “negative emissions” technologies to address overshoot. Our Outline of Proposed Evidence explains that those “technologies ... do not yet exist”. Most of these scenarios envision that, in future decades, CDR technology will be available to remove as much as 10 to 20 billion tonnes of CO₂ (GtCO₂) from the atmosphere every year, for many years, to give us a chance to bring the atmospheric carbon concentration level down to within safe limits. Removal of 20 GtCO₂ every year would be an enormous amount, equivalent to about 40% of the world’s total annual emissions at present. In paragraph 49 of its decision, the Hague Court of Appeal concludes that any option to remove CO₂ from the atmosphere in future by CDR technologies “is highly uncertain and that the climate scenarios based on such technologies are not very realistic”. The Hague Court of Appeal rejected any suggestion that the possible future development of CDR technologies can be relied on as any evidence that the threat of dangerous warming can be ameliorated.

13. “*Stabilization at about 500 ppm*”: The Dutch court here is considering the scientific evidence from the IPCC’s Fifth Assessment Report about the correlation between the rising concentration level and level of warming. The IPCC report concluded it is likely that temperature changes can be kept to less than 2°C as long as the carbon concentration level does not exceed 450 ppm. Those studies are presented in our Outline, Part 16, at paragraphs 16.19-16.23. The specific implications of the concentration level reaching 500 ppm are discussed in paragraph 16.22 of our Outline.
14. Baseline studies (business-as-usual” scenarios) are studies that calculate future levels of accumulated greenhouse gases (GHGs) in the atmosphere, based on the assumption that countries around the world *do not act to substantially reduce current patterns of coal, oil, and natural gas consumption*. In conducting these studies, scientists add together the warming effects of all the GHGs, principally carbon

dioxide, methane, and nitrous oxide. The combined concentration is measured as “CO₂equivalent” (CO₂eq). The IPCC’s Fifth Assessment Report concluded that if we continue on the present path, the combined concentration will exceed the 450 CO₂eq level by 2030:

Baseline scenarios (scenarios without explicit additional efforts to constrain emissions) exceed 450 parts per million (ppm) CO₂eq by 2030 and reach CO₂eq concentrations between 750 and more than 1300 ppm CO₂eq in 2100.

— IPCC, 2014, *Summary for Policymakers*, SPM 3, p. 8 (emphasis added)

That is clear evidence that if we continue to follow the current emissions pathway, by 2030 the atmospheric GHG concentration will reach 450 ppm CO₂eq and we will be irrevocably committed to average surface warming that will exceed 2°C. The above quote, taken from the IPCC 2014 report, is cited in Part 15 of our Outline of Proposed Evidence, at paragraphs 15.12-15.13.

UN Emissions Gap Report 2017

15. The *UN Emissions Gap Report* of 2017 and the findings it published about the magnitude of the global emissions “gap” is a principal source of the proposed evidence in our case, and it is cited starting at paragraph 9 of our Factum (page 2-3). It is the basis of key evidence summarized in section II of our Factum (page 6 – 8) about the enormous scale of the reductions that would be needed by 2030 to stay within the 2°C threshold.
16. “*direct linear link between the emissions and the warming of the atmosphere*”: In paragraph 19 of our Factum (at page 5) we introduce the same relationship, between rising annual emissions from burning fossil-fuels and the annual increases in the carbon concentration level, and “the correlation between increases in the CO₂ concentration level and the warming of the earth”: see Part 15, at paragraph 15.3.
17. “*Between 1850 and 1980, the level of global warming was about 0.4 degrees*”. This statement of evidence accepted by the Dutch court is consistent with our evidence. See Outline, Part 15, at paragraph 15.5: “Two-thirds of the total surface warming has occurred since 1970”.
18. “*emitted greenhouse gases reach their full warming effect only after 30 or 40 years*”: this point, as noted above, is dealt with in detail in our Outline, Appendix R at paragraphs R.11-R.14.
19. The impacts of warming to 2°C are dealt with extensively in our Outline, Part 18, with summaries of the specific impacts of warming on sea level rise, loss of glacier mass, crop yields, drought, water supply, etc. Also, our Factum under section II (page 6) identifies several major impacts of warming to 2°C with particular reference to Canada’s Arctic region, loss of glaciers worldwide, and the impact of acidification on coral reefs and marine ecosystems.

20. “*tipping points*”: for discussion of “tipping points” in our case, see “additional serious risks” in our Outline, Part 18, at paragraph 18.51. If we are permitted to proceed to trial and call expert witnesses, we will present detailed evidence explaining in particular three extremely consequential risks of advancing warming, namely (i) methane release in the Arctic due to melting permafrost; (ii) the loss of the earth’s albedo (the capacity of the reflective white surfaces of the arctic sea ice and extensive snow cover to reflect heat away from the earth’s surface); and (iii) the risk of accelerated melting of the large ice sheets in Antarctica and Greenland. More rapid melting of the two large ice sheets (in addition to the current melting of glaciers) will bring a massive rise in sea levels that will far exceed the projected range of rising sea level generally recognized in recent studies.

Warming above 1.5°C

21. “*Chances of reaching the 1.5°C target are now slim*”. That is the conclusion by the Dutch court in its October 9, 2018 decision. The Dutch court acknowledged when it issued its judgment that the evidence available to it about the scale of the cuts that would be required to stay within 1.5°C was limited. The court stated: “*Only a limited number of studies has looked at scenarios that lead to a limitation of global warming to 1.5°C*”. One report cited by the Dutch court was the *UN Emissions Gap Report 2017*, which did include a study of the emissions reductions needed by 2030 to meet the 1.5°C target. The 2017 report found that the annual level of global emissions would have to be reduced to 36.5 GtCO₂eq by 2030, to have a 50-60% chance of staying within the 1.5°C limit. However, on October 7, 2018 a major new report was published by the IPCC – the *Special Report on Global Warming to 1.5°C*. The new report was specially undertaken to examine the most recent research available regarding mitigation scenarios that offered a 66% chance or better of keeping warming from exceeding 1.5°C. The IPCC’s study of emissions pathways for 1.5°C (which was not available to the Dutch court) shows that in the case of all scenarios, with one exception, the annual level of global greenhouse gas emissions would have to be cut down to well below 35 GtCO₂eq – and half of the pathways would require reducing the annual level of global emissions to 25-30 GtCO₂eq. The summary of evidence we presented to the B.C. court projects that global emissions based on current policies are on track to increase to an annual level of 55.2 GtCO₂eq by 2030. If keeping the increase in future warming to less than 1.5°C would require that by 2030 we reduce the total global emissions to an annual level of 25-30 GtCO₂eq – which is the range given in the IPCC 2018 Report - that means cutting total emissions by 50% within the next eleven years.
22. “*The longer it takes to achieve the necessary reductions ... the sooner the carbon budget will have been used up*”. Fundamental to the Dutch court’s decision that there exists “a real and imminent threat” is their acceptance that each year of delay in implementing reductions reduces the chances of staying under the 2°C or 1.5°C limits.

Current pathway to 3.2°C

23. Our proposed evidence showing that the world is presently on an emissions path that by 2030 will irrevocably commit us to average surface warming that will far exceed 2°C and is projected to reach 3.2°C is found in the Factum at pp. 2-3, paragraphs 9-12. Further particulars of that evidence are set out in Part 17 of the Outline, at paragraphs 17.15 - 17.25 (AB 111-112), citing the *UN Emissions Gap Report 2017*. Substantially the same projection was published a year earlier on November 3, 2016, in the 2016 edition of the same report, which estimated that the emissions gap was 12 to 14 GtCO₂eq; see Outline, Appendix T at paragraph T-9 (AB172).

The magnitude of the emissions “gap”

24. Our proposed evidence showing the massive scale of the cuts in the annual level of the global emissions that would have to be fully implemented within the next eleven years to keep warming within the 1.5°C and 2 °C limits is summarized in our Factum at pp. 6-7, in paragraphs 22 to 26, and is described in more detail in Part 17 of our Outline of Proposed Evidence.

The concentration level will continue to rise for 30 or 40 more years

25. Even if reductions in the annual level of global emissions were to begin in 2020 (there is no evidence in the record to suggest that will happen) massive additional amounts of CO₂ and other greenhouse gases will continue to be released into the atmosphere every year for another 30 to 40 years at least, until the burning of all carbon-based fuels (oil, natural gas, and coal) is reduced to zero. Hence the annual rises in the atmospheric carbon concentration level will continue to occur for many decades – although we can expect that the size of the annual increases (currently about 2.5 ppm per year) will gradually diminish, but only if the scale of annual emissions declines in absolute terms. The proposed evidence on this important point is set out in Part 16 of the Outline, at paragraphs 16.24-16.28. (AB 106-107).
26. Our Outline of Proposed Evidence summarizes the evidence on this point in Part 15, at paragraph 15.7 (AB 100). See Note # 1 above.
27. Baseline studies all show that global emissions based on current policies will continue to rise to 2030 and until the end of this century: see our Factum page 8, paragraph 31, and our Outline of Proposed Evidence at paragraphs 16.07-16.18. The IPCC’s Fifth Assessment Report concluded that the only pathways consistent with keeping warming below 2°C requires emissions reductions on a global scale starting by 2020: Outline Appendix S at S.14-S.17 (AB 170)
28. See Factum page 9, paragraph 34, and Outline of Proposed Evidence, Part 17 at paragraph 17.19

Procedural and evidentiary rules applicable to our case

In our legal case, we are relying on the common law defence of necessity, which holds that in a situation where there is "a clear and imminent peril", conduct disobeying the law undertaken by a citizen to avoid a serious peril (in this situation direct action to halt or delay the construction of the Trans Mountain pipeline expansion) can be excused from criminal liability. But to succeed in that defence, we have to prove that we are facing an imminent peril.

Our trial judge ruled that we have failed to prove that.

Paragraph 55 of his written Reasons for Judgment is the crux of his decision. Affleck J. finds that despite our summary of the available expert evidence from climate scientists, there remains a chance that countries around the world may yet take "societal measures" sufficient "to prevent such a dire outcome":

On the evidence the applicants seek to offer, rising temperatures, to a level that is catastrophic to life, is a process that has been happening over many decades. Despite a historical lack of initiative to curb emissions over these same decades, adaptive societal measures may be taken to prevent such a dire outcome. Whether government, private industry, and citizens take these measures is a contingency that takes these changes outside of "virtual certainty" and into the realm of "foreseeable or likely" (Latimer, at para. 29). Thus, it cannot be said that the objective element of the modified objective test is satisfied.

— Reason for Judgment, para. 55, p. 3–31

The judge therefore finds that "there is a contingency" that the serious impacts caused by climate change, or at least any dire outcome, can be averted.

The judge says that "adaptive societal measures" may be taken in future to prevent a serious outcome. Because he finds such a contingency exists, he concludes that the peril in our case is merely "foreseeable and likely", but not "virtually certain". According to the judge, if we cannot show the peril is virtually certain we cannot invoke the necessity defence.

One of the unusual features of bringing our application in the B.C. Court is that we were not permitted to call any actual evidence (i.e., sworn affidavits or oral testimony from leading climate scientists and energy economists). We were only allowed to provide the court with an "outline" or written summary of the evidence *we propose to call*. Our application, presented to the trial judge on December 3-4, 2018, was therefore a preliminary application to obtain the court's "leave" or permission to call the needed scientific evidence at our trial.

A second unusual feature of this application is the standard of proof.

At our preliminary application for leave to raise the necessity defence, we were not obliged to prove, on a balance of probabilities, that there exists an "imminent peril". The

test we had to meet, in order to be allowed to call the required evidence, was simply to demonstrate that (based on the material in the Outline of Proposed Evidence) there is an *air of reality* (a legal expression) to our belief that advancing climate change is an imminent peril within the meaning of the law, and that our belief is reasonably based on objective evidence (the expert evidence of climate scientists and energy economists).

That test, an air of reality, is a relatively low threshold of proof. To meet that test, the judge needed only to be satisfied that our case about the impending threat of advancing climate change is not *fanciful*, and that if the proposed scientific evidence set out in the Outline were to be actually heard at trial – and assuming it was accepted as credible by the trial judge – the trial judge *could* decide, based on that evidence, that our belief we are facing an “imminent peril” is reasonable.

For the purposes of deciding whether our case had an air of reality, Affleck J. was bound to assume that the facts we presented to the Court in our Outline of Proposed Evidence are true. He was bound to accept, for example, that we have accurately described the recent rise in the atmospheric carbon concentration level and the significance of reaching 450 ppm. He was bound to accept the accuracy of the estimates we provided of the global emissions “gap”.

A final defining feature of our case, like the Dutch case, is that it is based on expert evidence. In this case, as in other complex litigation that involves highly technical or scientific issues, the judge may not arrive at findings or conclusions *of his own*, if his own views on matters requiring expert knowledge are unsupported by the scientific evidence that has been presented to the court.

To decide, for example, that there are “societal measures” that could be fully implemented within the next eleven years to avoid grave climate impacts on natural systems and human life, and that those measures are technologically and economically feasible, the judge would need to base his findings on expert evidence. Any purported finding that a package of “measures” on a global scale could cut the annual level of global emissions 50% (or even 25%) below the current level by 2030 would require expertise on matters related to economics, energy, technology, and other issues. A judge, unaided by relevant expert evidence, cannot make that kind of finding.

