PAULUSSEN ADVOCATEN

Unofficial translation

Court of Appeal of The Hague
Case number: 200.302.332
Session date 4 April 2024

ORAL ARGUMENTS OF MILIEUDEFENSIE ET AL.
SHELL'S REDUCTION OBLIGATION – PART 3
MODELS AND THEIR LIMITATIONS

in the matter of:

1. **Vereniging Milieudefensie**
   having its registered office in Amsterdam, the Netherlands
2. **Stichting Greenpeace Nederland**
   having its registered office in Amsterdam, the Netherlands
3. **Landelijke Vereniging tot Behoud van de Waddenzee**
   having its registered office in Harlingen, the Netherlands
4. **Stichting ter bevordering van de Fossielvrij-beweging**
   having its registered office in Amsterdam, the Netherlands
5. **Stichting Both ENDS**
   having its registered office in Amsterdam, the Netherlands
6. **Jongeren Milieu Actief***
   having its registered office in Amsterdam, the Netherlands

Respondents, original claimants,

Collectively called: "**Milieudefensie et al./Friends of the Earth Netherlands et al.**" (hereinafter: Milieudefensie et al.)

Legal counsel:
mr. R.H.J. Cox, *mr.* M.J. Reij, *mr.* A.J.M. van Diem

versus:

Shell plc
having its registered office in London, United Kingdom

Appellant, original defendant

Legal counsel:
mr. D.F. Lunsingh Scheurleer, *mr.* T. Drenth

* Vereniging Jongeren Milieu Actief, the youth organisation of Vereniging Milieudefensie, was dissolved as of 1 September 2022. Its activities have continued within Milieudefensie.

and:

Stichting Milieu en Mens
having its registered office in Zwolle, the Netherlands

Joined party on the part of Shell plc

Legal counsel:
mr. Dr D.J.B. Bosscher

Your Honours,

Introduction

1. Before the break *mr.* Reij explained that the international climate protocols, the OECD Guidelines and the UNGP all show that Shell has its own responsibility to reduce its Scope 1, 2 and 3 emissions by at least 45%. Earlier this morning it was also shown that application of Dutch liability law leads to the same outcome. Milieudefensie et al. believes that all of this demonstrates that the 45% reduction obligation as laid down in the Judgment can be upheld.

2. Shell is of the opinion, however, that the oil and gas sector in 2030 does not have to contribute, or only has to make a minimal contribution, to the necessary halving of global CO_2 emissions. Shell believes that it is up to other sectors to take the lead this decade to achieve a near 50% reduction of CO_2 emissions and compensate for its smaller contribution. In short, according to Shell the oil and gas sector, which together with the coal sector is the biggest causer of the climate problem, bears the least responsibility this decade.

3. Shell bases this remarkable assertion on modelled reduction scenarios.

4. Shell argues that it is inappropriate to impose a reduction obligation on a specific company, based on the global average necessary reduction of 45%.[1] It makes the argument that the modelling calculations show different sectoral reduction pathways for the three fossil fuels, i.e. for coal, for oil and for gas. Shell points out that coal has the biggest reduction task and that the emissions from oil and gas consequently need to be reduced less quickly. According to Shell, these differences in sectoral pathways make it clear that far less can be asked of the oil and gas sector than Milieudefensie et al. claims. Hence, far less can be asked of Shell than Milieudefensie et al. claims.

5. In its earlier court documents[2] Milieudefensie et al. already explained in detail that Shell cannot hide behind these different sectoral pathways for coal, oil and gas. Milieudefensie et al. has shown that the larger modelled reduction task of the coal sector does not mean that Shell can do less than the requested 45%.

[1] Statement of Appeal, paras. 2.3.9-2.3.11.
[2] Statement of Defence on Appeal, section 5.3 and Milieudefensie et al.'s Defence Brief of 19 December 2023, pp. 4-5, 14-15 and 26-27.

6. Milieudefensie et al. provided an explanation of the working of the models that are used to calculate reduction pathways. In scientific terms these models are called 'Integrated Assessment Models'. Hereafter I will call these Integrated Assessment Models 'IAMs' for the sake of convenience.

7. The Integrated Assessment Models – IAMs – have their limitations.

8. Milieudefensie et al. has explained that these limitations mean that the coal sector, and consequently developing countries, are being asked to make an unrealistically high and unfair contribution. This puts the outcomes of the models at odds with convention agreements, the principle of *Common but Differentiated Responsibilities and Respective Capabilities*, which will hereafter be called the CBDR principle, and other international principles of law that are connected with the global climate regime.[3] Partly because of this the modelling outcomes only have a limited relationship to the real world and they are certainly not the best guideline for determining what a fair, proportional and adequate contribution must be for Shell.

9. In this part of the oral arguments I will discuss the effect and the limitations of these models, the IAMs, in further detail.

10. I will set out in further detail how the outcomes of the models are at odds with international agreements laid down in conventions and international legal principles. In addition, I will explain that IAMs have various characteristics that make far-reaching emission reductions less attractive in the short term, while in the real world far-reaching emission reductions are highly necessary in the shortest term possible. On this point too an approach based on the outcomes of models leads to conflict with international legal principles, such as the precautionary principle and the principle of intergenerational equity.

11. If an approach is chosen that is in line with convention agreements and international legal principles, this will lead to both a bigger reduction task for developed countries and to a bigger reduction task for the oil and gas sector, than follows from the modelling results.

12. On the basis of all of this I will explain that Shell cannot hide behind the low modelled reduction percentages for the oil and gas sector.

13. Nevertheless, I will also set out what it would mean for Shell if alignment were sought with the sectoral pathways for oil and gas in the models. This will show that even such a sectoral model approach must lead to a reduction obligation of 45% in 2030 for Shell.

14. I will now first go into a number of relevant developments that have occurred since the Statement of Defence on Appeal.

Recent developments

15. The position of Milieudefensie et al. with regard to the reduction task of the coal sector, has been further confirmed in science since the Statement of Defence on Appeal. UNEP even made it part of the Emissions Gap Report 2023.

[3] Statement of Defence on Appeal, section 5.3.

16. In the Emissions Gap Report of 2023, UNEP included a section entitled "*Delivering change requires global cooperation that reflects the equity and fairness principles of the Paris Agreement*".

17. In this part UNEP states that a fair division of efforts is essential for trust between states and is consequently also essential for a successful implementation of the Paris Agreement.[4] According to UNEP, the CBDR principle entails that countries with a greater transition capacity and a greater historical responsibility for emissions must take more ambitious and faster climate measures. That is why the developed countries must take the lead in advancing to a fossil fuel-free future, according to UNEP. According to UNEP the model calculations do not sufficiently take this into account. If this is taken into account, this will lead to faster reductions in the oil and gas sector, according to UNEP. I quote UNEP:

    "*Differentiated timelines are important for the feasibility of pathways aligned with the long-term temperature goal of the Paris Agreement, which is an aspect that global modelling tends to overlook. […] Adjusting to a more feasible coal phase-out pace in all countries would require correspondingly faster declines in oil and gas use, and greater efforts by high-income countries."*[5]

18. UNEP confirms with this, just like the IPCC,[6] that modelled scenarios do not take sufficient account of the CBDR principle, even though performance of this principle is important for achieving the temperature goal of the Paris Agreement, according to UNEP.[7]

19. UNEP concludes that the phasing out of coal in the 1.5°C scenarios generated by IAMs moves so rapidly that this is not realistic for coal-dependent countries like China, India and South Africa.[8]

20. UNEP is thus stating that the results of the 1.5°C scenarios modelled on the basis of cost effectiveness are unrealistic for countries with a large coal dependency. Many developing countries would have to replace virtually all their coal-fired power stations in this decade, which is not a reasonable outcome and cannot be reconciled with the convention agreements.

21. UNEP then compares the very high reduction task for coal with the low reduction tasks for oil and gas in the same 1.5°C scenarios. UNEP concludes that the lower reduction tasks for oil and gas lead to overly slow transition pathways for developed countries. The developed countries are far less dependent on coal and use far more oil and gas.[9] UNEP confirms that the use of oil and gas must decrease much more rapidly and that the developed countries must put in much greater efforts regarding this issue. Only in that manner can all countries together come to a lower and achievable pace for phasing out coal.

22. UNEP thus criticises the unrealistic reductions task for coal in the modelling calculations and the unreasonable pressure that this puts on developing countries. In addition, UNEP agrees that this must result in a faster reduction pace for oil and gas and thus to a higher reduction task for developed countries. UNEP considers all of this in the context of the CBDR principle. Contrary to

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[4] Exhibit MD-523, p. 36.
[5] Ibid.
[6] See, e.g., Exhibit S-140, IPCC AR6, WGIII, Chapter 3 under 3.2.2, pp. 304 to 305.
[7] Exhibit MD-523, p. 36.
[8] Ibid.
[9] Ibid.

what Shell[10] and its expert, Professor Hawkes[11] argue, Milieudefensie et al. has rightly stated that the reduction pathway for coal in the modelling calculations does not align with the CBDR principle and the convention agreements that have been made.

23. The IEA too has in the meantime adjusted its modelling to the aforementioned findings. In its most recent NZE scenario, which is the updated NZE scenario of 2023, the IEA assumes a substantially slower reduction pathway for coal. In its NZE scenario from 2021 the IEA still assumed a drop in emissions from coal by approximately 60% in 2030.[12] In its updated NZE scenario of 2023 the IEA reduced this reduction pathway to a reduction of (rounded) 47%.[13] The IEA explains this as follows:

    "Emissions from coal fall more slowly in the NZE Scenario than in comparable scenarios assessed by the IPCC reflecting a less abrupt transition in emerging market and developing economies, which today are responsible for more than 80% of global coal use. As a result, emissions in advanced economies fall nearly two-times faster in the current decade than emissions in emerging market and developing economies."[14]

24. The IEA makes it clear that in its modelling it took account of the CBDR principle.[15] The IEA speaks in this respect of a difference in the pace of reduction between 'advanced economies' – by which the IEA means the OECD countries[16] – and 'emerging markets and developing economies'. 'Emerging markets and developing economies', that the IEA abbreviates to "EMDEs", means the non-OECD countries.

25. Taking account of the CBDR principle leads to a less rapid decrease in emissions from coal and a faster decrease of emissions from oil and gas in the NZE scenario, in comparison to (the median of) the scenarios that the IPCC included in AR6. This reflects a less abrupt transition in non-OECD countries, which at this time represent more than 80% of global coal usage, according to the IEA. The result, according to the IEA, is that OECD countries must reduce their emissions almost twice as fast as non-OECD countries in this critical decade.

26. It is not surprising that the IEA came to the above insight. The IEA publishes reports on energy markets and the global energy infrastructure annually and brings together all its knowledge of the energy markets and of the global energy infrastructure in the NZE scenario. The IEA takes account of elements varying from policy developments, use of technology, investments, supply chains, infrastructure, innovation and costs. The IEA includes the various circumstances of individual countries and regions in this approach.[17]

27. The IEA's explanation again shows that application of the CBDR principle calls for a greater reduction of emissions from oil and gas in developed countries, so that developing countries have more time to make the transition and they can follow a fairer and more achievable emission

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[10] Shell's Brief commenting on exhibits of 19 September 2023, p. 9.
[11] Exhibit S-123, inter alia p. 3. See also para. 4.8, pp. 21-23.
[12] Exhibit MD-362, p. 199, Table A.4. Compared to the reference year 2019, the reduction task is 60% rounded.
[13] Exhibit MD-525, p. 198, Table A.4. This table from the NZE scenario of 2023 leads to a reduction of a small 47%, in comparison to the reference year 2022.
[14] Exhibit MD-525, p. 59, Box 2.1 '*Integrating equity into the NZE Scenario design*'.
[15] The IEA speaks of the integration of equity in its modelling.
[16] Exhibit MD-525, p. 213. The IEA uses this term to refer to the OECD countries and Bulgaria, Croatia, Cyprus, Malta and Romania.
[17] Exhibit MD-525, p. 57. See also: Exhibit MD-568A, p. 2.

reduction pathway for coal. It indicates once again that Shell[18] and its expert Professor Hawkes[19] wrongly assert that the CBDR principle is not relevant in this context.

IAM scenarios and their limitations – cost effectiveness and coal

28. The relevancy of standards and principles of international law, like the CDBR principle, the precautionary principle and the no-harm principle, is further clarified when taking a closer look at the limitations of IAM scenarios.[20]

29. With this interpretation, Milieudefensie et al. is making use of two expert statements, of Professor Rogelj and Dr Van Beek. Professor Rogelj is Professor in Climate Science & Policy at Imperial College London, Director of Research of the Grantham Institute and author of more than 125 peer-reviewed articles about climate change, the reduction of greenhouse gas emissions and climate scenarios. He is the lead author of various IPCC reports, lead author of the Emissions Gap reports and advisor of the EU in the European Union Scientific Advisory Board on Climate Change.[21] He may rightly be considered one of the most prominent and renowned climate scientists in the world.[22] Dr Van Beek is post-doctoral researcher with the Copernicus Institute of Sustainable Development in Utrecht and is an expert in the area of the use of IAMs in climate policy and received her PhD on this subject.[23]

30. In their expert statements, Professor Rogelj and Dr Van Beek provide an explanation of the characteristics and limitations of IAMs and reduction scenarios that are relevant to this case. Both experts indicate that the mitigation scenarios calculated by IAMs are the result of a cost effectiveness analysis. According to the experts, this cost effectiveness determines to a great degree the model-based division of the mitigation measures across the world.[24] This approach based on cost effectiveness results in low-income economies reducing a relatively greater part of the emissions and a relatively bigger share in the mitigation costs than developed economies.[25] Both experts also confirm that this calculation based on cost effectiveness means that the modelling outcomes take little to no account of the principles of equity and fairness that form the basis of and are included in the UN Climate Convention and the Paris Agreement.[26] This concerns an important and commonly-heard criticism of the IAM scenarios in science[27] and a characteristic against which the IPCC also very explicitly warns repeatedly.[28]

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[18] Shell's Brief commenting on exhibits of 19 September 2023, p. 9.
[19] Exhibit S-123, inter alia p. 3. See also para. 4.8, pp. 21-23.
[20] See in this respect Milieudefensie et al.'s Defence Brief, pp. 4-6 and pp. 10-11.
[21] Exhibit MD-566, pp. 1-2 and the attached CV of Professor Rogelj.
[22] Exhibit MD-566, p. 35 (p. 2 of 28 of the CV).
[23] Exhibit MD-567, p. 1. Dr Van Beek is also cited by Shell's expert, Professor Hawkes, to substantiate the importance of IAMs. See Exhibit S-123, p. 27.
[24] Exhibit MD-566, p. 3, Exhibit MD-567, pp. 3-4.
[25] Exhibit MD-566, p. 4.
[26] Exhibit MD, 566, p. 4 and Exhibit MD-567, para. 5.3. See also: Exhibit S-140, IPCC, AR6, WG 3, pp. 304-305.
[27] Exhibit MD-567, p. 6.
[28] See, e.g., Exhibit S-140, IPCC, AR6, WG 3, p. 21. See further, e.g., pp. 304-305.

31. It is good to take a moment to look at a number of the articles from these climate conventions. Article 3(1) of the UN Climate Convention sets out the principle of intergenerational equity, the equity principle, and the CBDR principle. I quote the UN Climate Convention:

    "The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof." [29]

32. On the basis of this principle, developed countries then took on the obligation in Article 4(2) of the UN Climate Convention to take the lead in addressing climate action and limiting their own national greenhouse gas emissions.

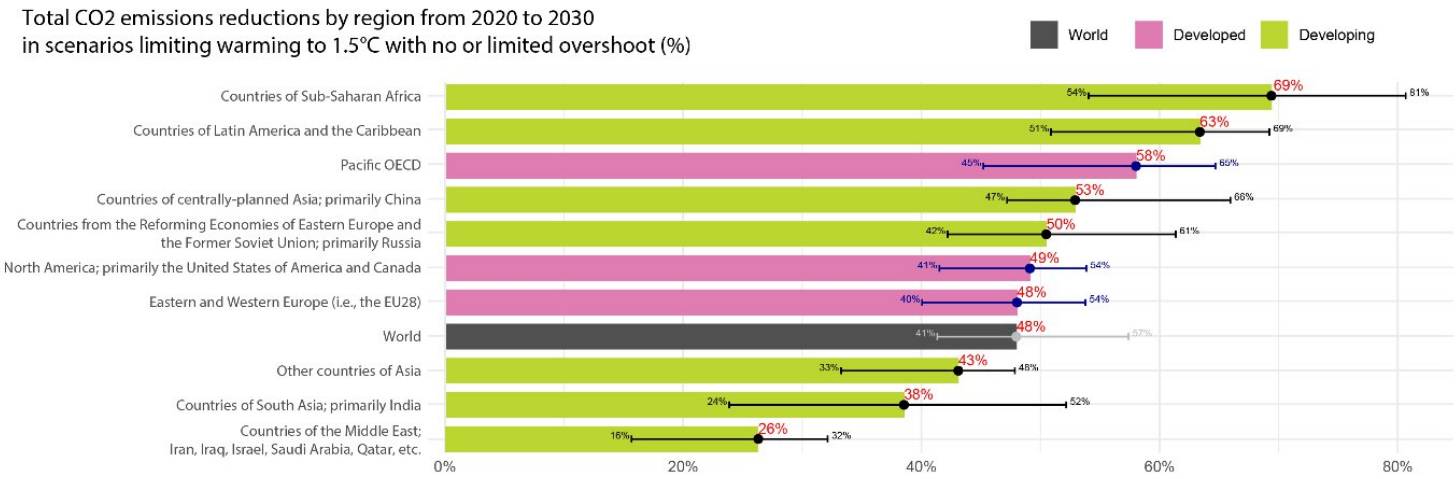
33. The CBDR is again included, confirmed and further operationalised in Article 4 of the Paris Agreement.[30] It is, inter alia, important that convention parties in the fourth paragraph of Article 4 of the Paris Agreement once again confirm that the developed countries must take the lead. Developed countries commit to achieve absolute emission reduction targets for their entire national economy. Developing countries have lighter obligations under the Paris Agreement. They must continue strengthening their mitigation efforts and are encouraged to gradually switch to emission reduction targets for their entire economy.[31]

34. It is enlightening to compare these convention agreements to the modelling results of the IAM scenarios. This specifically concerns the results of the C1 scenarios from the AR6 report of the IPCC.

35. With the term C1 scenarios the IPCC is specifically referring to the scenarios with a 50% chance of 1.5°C with no or limited overshoot.[32]

36. The following figure shows the way in which these C1 scenarios – i.e. the scenarios for a 50% chance of 1.5°C – divide the reduction task for CO_2 emissions across the world:

[29] Link to the Dutch version https://wetten.overheid.nl/BWBV0001115/2013-01-09#Verdrag_2_Verdragtekst.
[30] Exhibit MD-145.
[31] The IEA acknowledges this interpretation of the Paris Agreement, see Exhibit MD-525, p. 180.
[32] See for a description Exhibit S-140, IPCC, AR6, WG3, p. 21.



37. This figure, from Professor Rogelj's expert statement, makes everything clear that the Court needs to know about the consequences of modelling on the basis of cost effectiveness.

38. Contrary to the convention agreements and the CBDR principle, the C1 scenarios assume that various regions that are still developing will take the lead when reducing CO2 emissions. Sub-Saharan Africa, one of the poorest regions in the world, has the biggest reduction task and has to reduce its total emissions by no less than 69% in 2030. It is closely followed by South America and the Caribbean region with a 63% reduction in 2030. China and Russia will also be allocated a bigger reduction task than the United States, Canada and Europe, which are around the global average pace.

39. Professor Rogelj and Dr Van Beek explain that these modelling results are to a significant degree caused by the enormous model-based reduction in the use of coal in this decade, as the IPCC, the UNEP and the IEA already stated.[33] These modelling results cannot be reconciled with the convention agreements that were made and place a significant part of the reduction task with countries that have the most limited transition capacity.

40. As Professor Rogelj indicates with reference to passages from the IPCC AR6 report, the IPCC itself also makes it perfectly clear that the IAMs do not take account or barely take account of the social, political and institutional factors that are very relevant for transition capacity.[34] This is the reason why the IPCC warns that the cost effective global division that the models show must not be confused with the capabilities and non-capabilities of division in the real world.[35]

41. It is consequently clear that the modelling results, whereby regions like Sub-Saharan Africa, South America and Asia must take the lead in the mitigation task, are not realistic in the real world. In addition, these modelling results are at odds with the agreements made in the UN Climate Convention and the Paris Agreement and the legal principles that form the basis of these conventions. Because of the aforementioned limited transition capacity and the conflict with the convention agreements, the modelling results will never be realised in the real world.

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[33] Exhibit MD-566, p. 10, and Exhibit MD-567, p. 7. Another influence relates to the CO_2 reductions in the country sector. The C1 scenarios assume (as median) a global and complete elimination of all agriculture-related CO_2 emissions in 2030. This task lies with developing countries for the greater part.

[34] Exhibit MD-566, p. 5.

[35] See also Exhibit S-140, IPCC AR 6, WG3, pp. 304 and 305.

42. Shell's expert Professor Hawkes does not take any of this into account when he asserts that the reduction pace for coal in the IAMs is 'reasonable'.[36] He cites mainly arguments and examples for the possibilities of a coal exit in Europe. He does not, however, take account of the impossibilities of a rapid coal exit in developing countries, that use more than 80% of the coal.[37] The IEA and Professor Rogelj did do so and, contrary to Professor Hawkes, did explicitly take account of the findings of the IPCC and the UNEP on the limitations of the IAM scenarios in the global division of the reduction task.

43. Professor Hawkes did indicate in this respect that what he believed to be a correct interpretation of the CBDR principle entails that developed countries finance the phasing out of coal in developing countries.[38] This reasoning of Professor Hawkes cannot be reconciled with the agreements in the UN Climate Convention and the Paris Agreement. It was agreed in both climate conventions that precisely the developed countries were to take the lead and reduce the emissions in their own national territory.

44. The financing solution suggested by Professor Hawkes, which provides that all of a sudden the developing countries have to take the lead in reducing their national emissions, is therefore not a solution. That the financing solution is not a solution, is also explained very well by Professor Rogelj and Dr Van Beek in their expert statements.[39] Professor Hawkes's reasoning therefore cannot be followed.

45. The financing aspect, in which developed countries support the developing countries, does recur in a different capacity in the Paris Agreement. It has been laid down in Article 9 of the Paris Agreement that developed countries must provide financial resources to developing countries to support the adaptation need and the lighter mitigation task of the developing countries. However, this agreement in Article 9 is an agreement which was made *in addition* to the agreement from Article 4 that the developed countries must take the lead. Professor Rogelj and Dr Van Beek also explain that even the financial commitments made in connection with Article 9 are not being performed on a structural basis by the developed countries.[40]

46. Shell's expert, Professor Hawkes, refers in this respect to the Just Energy Transitions Partnerships.[41] These are financing mechanisms whereby developing countries are assisted in making the transition to a sustainable energy system, with a focus on countries that still use a lot of coal. The examples mentioned by Professor Hawkes relate to South Africa, Indonesia and Vietnam. These are fine initiatives, but they do not in any way detract from the foregoing. A visit to the websites to which Professor Hawkes refers shows that the asserted goals do not in any way come close to the reduction pathways that Professor Hawkes mentions for coal and the financing provided in the framework of these initiatives also does not come close to what would be necessary to achieve this.

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[36] Exhibit S-123, paras. 4.1 and 4.3.
[37] Exhibit MD-566, pp. 10 and 11. See in this respect the *IEA Coal in Net Zero Transitions* report, Exhibit MD-553, p. 33.
[38] Exhibit S-123, p. 3 and p. 21.
[39] Exhibit MD-566, pp. 4-5 and Exhibit MD-567, pp. 8-9.
[40] Ibid.
[41] Exhibit S-123, p. 22.

47. To reiterate, the developed countries have their own national reduction task to perform and have legally bound themselves to do so by being convention contracting parties.

48. These findings are highly relevant for Shell's duty of care. As UNEP and the IEA show, complying with the CBDR principle by definition means that the emissions of the oil and gas sector will have to decline more rapidly worldwide than ensues from the modelling results. This is also relevant for Shell. In addition, it ensues from the CBDR principle that the emissions of developed countries will have to decline far more rapidly. This is particularly relevant for Shell, as it is primarily the developed countries where Shell sells its products and achieves 70% of its revenue.[42] The relevance of the CBDR principle for the climate plans of companies is also explicitly acknowledged in the climate protocols for companies that *mr.* Reij discussed earlier today.

49. The remark made by Shell's expert, Professor Hawkes, that the CBDR principle is not appropriate for application to non-state actors like Shell, therefore makes no sense. Moreover, the CBDR principle is based on equity. Equity is a particularly relevant legal principle to be applied under Dutch law to establish the duty of care to which Shell is subject.

50. A party acting with due care therefore cannot hide behind modelling calculations based on cost effectiveness. The outcomes thereof do not do justice to a fair and legitimate division of efforts and are not sufficiently rooted in the real world. These modelling calculations therefore cannot serve as guidance for establishing Shell's duty of care. Shell therefore cannot keep pointing to the coal sector as an argument for doing nothing itself or for doing far too little.

51. Shell's expert, Professor Hawkes, then went on to make the very bold statement that every suggestion for a lower reduction task for coal than the high reductions that ensue from the IAM scenarios, would make achieving the temperature goals of the Paris Agreement impossible.[43] Taking account of the remarks of the IPCC, UNEP and the IEA it should be clear that this is incorrect. This is simply stirring the pot on the part of Hawkes, because he wants to prevent the acceptance of a higher reduction task for oil and gas on behalf of Shell. UNEP specifically indicates, as already mentioned, that a more equitable division of the reduction task is in fact crucial for the successful implementation of the Paris Agreement. The IEA too – according to Professor Hawkes himself a "*widely respected source of information on energy and decarbonisation options*"[44] – shows in its updated NZE scenario of 2023 that it is necessary to bring the phasing out of coal to a more equitable and achievable level.

52. Milieudefensie et al. believes that with these kinds of machinations and with his unnuanced and clearly incorrect statements about the CBDR principle, Professor Hawkes is damaging his credibility.

53. The foregoing shows that the outcomes of IAM scenarios cannot serve as the starting point for determining an equitable reduction task for the global oil and gas sector. An equitable reduction task for the global oil and gas sector will have to be much higher than the percentages arising from modelled scenarios. I will now go into other characteristics and limitations of the IAM scenarios. Those characteristics and limitations show that the modelling outcomes for the oil and gas sector

[42] Exhibit MD-568H, and Exhibit MD-535B.
[43] Exhibit S-123, p. 21 and p. 16.
[44] Exhibit S-123, p. 7.

are far too low and therefore must be raised. All of this shows once again that the modelled sector reduction pathways are not a good indicator for determining Shell's duty of care. I will explain this.

IAM scenarios and their limitations – Carbon Dioxide Removal (CDR)

54. A first relevant aspect to be discussed is the use of CDR in IAM scenarios. As already explained in *mr*. Reij's arguments, CDR is an abbreviation for the term Carbon Dioxide Removal. CDR is the catch-all term for techniques for removing CO_2 from the atmosphere.

55. IAMs are based on the hypothesis that later on this century CDR will be able to remove enormous quantities of CO2 from the atmosphere. It has already been extensively discussed in these proceedings that there are large risks and limitations connected with this model-based reliance on CDR.[45] As already explained in the written arguments, reliance on CDR will be at the expense of the necessary far-reaching CO_2 reductions in the short term.[46]

56. Because an adequate climate approach has been lacking for the last thirty years, the point has been reached that almost no IAM scenario can be made without some degree of CDR. There are, however, very good reasons for relying on CDR techniques as little as possible.

57. In this respect Milieudefensie et al. has explained in these proceedings that scientists widely recognise that there are very significant uncertainties regarding the CDR hypothesis. The future availability of CDR is highly uncertain.[47]

58. At this point in time CDR techniques are still only in the demonstration stage and there is no noteworthy removal of emissions from the atmosphere. For this reason too the scalability of these techniques is highly dubious. Because of the enormous uncertainties regarding the CDR hypothesis, CDR cannot be a reason to lower the emission reduction requirement.[48] Kicking the can of the reduction task down the road by gambling on these uncertain techniques is at odds with the precautionary principle and the principle of intergenerational equity.

59. Even if in a couple of decades the CDR hypothesis were to some extent proven to be true and these techniques would therefore become available to some degree, there are sustainability limits concerning the degree of scaling up CDR. The scaling up of CDR is accompanied by considerable environmental and socio-economic risks in the area of food production, biodiversity, availability of water and the energy and finance necessary for scaling up.[49] When such *real world* limits are taken into account, it turns out that CDR is far from capable of being applied on a large scale as happens in the world of modelling. Even if the uncertainty of the scaling up of CDR is overcome, CDR cannot play the role in the real world that it plays in the world of modelling. These limits to CDR are also broadly recognised by scientists.[50]

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[45] Statement of Defence on Appeal, sections 6.4.3 – 6.4.5, Milieudefensie et al.'s Defence Brief of 19 December 2023, sections 21, 33, 35 to 37, Milieudefensie et al.'s Written Arguments of 19 March 2024, section 2.8.
[46] Milieudefensie et al.'s Written Arguments of 19 March 2024, section 2.8.
[47] Ibid See also: Exhibit MD-566, p. 14.
[48] Exhibit MD-460, p. 3 and pp. 10-11, and Exhibit MD-516, cover sheet and pp. 2592 and 2598-2601.
[49] Exhibit MD-579B, pp. 484-486.
[50] See, e.g., Exhibit MD-135, IPCC SR15, SPM, p. 17, paras. C.3-C3.5. See also Exhibit MD-566, p. 14, Exhibit MD-567, p. 11 and Exhibit MD-579B, pp. 484-486.

60. The only CDR method that is currently being applied to any degree, is CDR based on nature based solutions. This means activities in the land sector, in particular reforesting, i.e. planting of trees. While growing, trees and plants absorb CO_2 from the atmosphere through photosynthesis. Although some CO_2 is absorbed in this manner, the land sector as a whole is still a source of emissions.

61. Milieudefensie et al. already explained in the Statement of Defence on Appeal, on the basis of findings of the IPCC and various other scientific sources, that the land sector cannot compensate for a delay in reducing fossil fuel emissions.[51] In addition, the capacity of the land sector to absorb CO2 is very adversely affected by the increasing global warming. Increased global warming may lead to this capacity of the land sector disappearing in whole or in part.[52] All of this is again confirmed by other authoritative sources, like the European Academies Science Advisory Council[53] and the United Nations Environment Assembly.[54] The IPBES, the Intergovernmentel Science-Policy Platform on Biodiversity and Ecosystem Services, published a report together with the IPCC confirming this.[55]

62. The CDR hypothesis makes it possible, using modelling, to artificially increase the carbon budget. The consequence of that hypothesis is that in the IAMs fewer emissions will have to be reduced in the short term. Instead, a large dependency on CDR takes its place. This results in enormous risks for the future. When modelling results that rely on the large-scale use of CDR as the starting point for the reduction task, this will lead to conflict with the precautionary principle and the principle of intergenerational equity. Future generations will consequently be confronted with an enormous and possibly unsolvable problem.

63. That the IAM scenarios rely to a very large extent on CDR, is also evident from the IPCC AR6 report itself. The IPCC makes it clear that (the median of) the total CDR[56] use up to 2100 in C1 scenarios is 670 $GtCO_2$.[57]

64. As previously stated, the C1 scenarios are the scenarios for a 50% chance at 1.5°C. To illustrate: the aforementioned 670 $GtCO_2$ that follows from the C1 scenarios, is 17 times the current annual global CO_2 emissions. That 670 $GtCO_2$ would therefore have to be captured and stored safely underground somewhere.

65. It is difficult to conceive just what an enormous quantity this is and what an enormous task this encompasses. If we had started this task in 2020, we would have to remove approximately 8.4 $GtCO_2$ every year for eighty years. This is more than the total CO_2 emissions of the United States and the European Union in 2022 together. This must then be captured every year, for 80 years and safely stored underground. As indicated, however, CDR techniques are still in their infancy.

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[51] Statement of Defence on Appeal, sections 6.4.3. and 7.4. See also Milieudefensie et al.'s Defence Brief of 19 December 2023, section 35. See also Exhibit MD-463, p. 812.
[52] See also section 2.8 of Milieudefensie et al.'s Written Arguments of 19 March 2024.
[53] Exhibit MD-510, pp. 3-4.
[54] Exhibit MD-511, p. 2.
[55] Exhibit MD-509, pp. 15-17 and 19.
[56] The IPCC uses the term CCS in this respect, which in this case includes CCS and the CDR techniques BECCS and DACCS.
[57] Exhibit S-140, IPCC, AR6 WG3, Chapter 3, Table 3.6, p. 353. Of this 670 $GtCO_2$, 330 $GtCO_2$ is BECCS.

66. Based on the foregoing it should be clear that large-scale modelling of CDR lacks any sense of reality value in most C1 scenarios. Nevertheless, these numbers may remain abstract. So a further explanation is necessary to gain a better picture of what we are talking about.

67. The IEA shows what is necessary to remove 2 $GtCO_2$ per year from the atmosphere and safely store it underground. This takes place using BECCS.

68. BECCS is an abbreviation for the term BioEnergy with Carbon Capture and Storage. It is a combination of biomass power stations using CCS. The idea behind BECCS is that CCS is used when burning biomass to produce power. The CO_2 that is released through this incineration is captured and stored underground.

69. The biomass for BECCS is obtained by cultivating fast growing crops. Because plants absorb CO_2 while they are growing by means of photosynthesis, this is seen as a way to remove CO_2 from the atmosphere. When they are full-grown, the plants are harvested. The harvested biomass is then incinerated in power stations that, as already mentioned, are equipped with CCS, so that no CO_2 is released into the atmosphere. Of course, at the same time new crops are planted that in turn absorb CO_2 during their growth process, until they have matured, are harvested and incinerated. And then the BECCS process goes on and on.

70. The IEA makes it clear that 135 million hectares of land are necessary to grow biomass for BECCS to capture 2 GtCO2 per year.[58] This is approximately the total land area of Peru, the 20th largest country in the world. The 2 $GtCO_2$ per year, which thus entails an enormous task, is only a very limited amount of CDR, compared to the use of CDR assumed by the C1 scenarios. I would like to remind you that (the median of) the C1 scenarios are based on 670 Gt in CO_2 removal up to 2100, which comes down to a removal of 8.4 $GtCO_2$ per year - for 80 years.

71. Because the opportunities for cultivating crops for bio-energy are slim and spread out broadly across the world, so are the capabilities for BECCS, according to the IEA.[59] The region where the crops are grown and could be incinerated in biomass power stations, is usually not the region where the CO_2 can be safely stored underground. According to the IEA, connecting biomass power stations that are spread out across the world with CO_2 storage locations will require an enormous CO_2 transport infrastructure to be set up. The IEA believes that it would therefore be an enormous logistical challenge to make this target of 2 $GtCO_2$ of BECCS per year possible.[60]

72. Other sources present a similar picture of what the scaling up of CDR would mean with regard to global scope and cooperation. For example, a peer reviewed article indicates that capturing and storing 5 $GtCO_2$ per year would require a globally operating industry that is more or less the size of the current oil industry.[61]

73. Then we have the finances. In order to remove (rounded) 5 $GtCO_2$ per year from the atmosphere, an enormous amount of money will have to be spent annually. According to the IEA this amounts to 1300 billion US dollars annually.[62] This is an amount that is 50% bigger than was invested in

[58] Exhibit MD-525, p. 153.
[59] Exhibit MD-525, p. 153.
[60] Exhibit MD-525, p. 153.
[61] Exhibit MD-517, p. 2.
[62] Exhibit MD-525, p. 154.

fossil fuels in 2022.[63] The world will thus have to invest more money in removing CO_2, than is currently being invested in the fossil energy supply.

74. According to the IEA, it would be an enormous international task to raise that 1300 billion every year. According to the IEA, this would require close global cooperation for the rest of this century.[64] Without close international cooperation for decades, a climate approach making use of CDR technologies would in any event not be possible.

75. Of course, the need for international cooperation also applies to the energy transition in general. But it is good to realise that this need for cooperation will definitely not decrease, as the energy transition is not being accelerated, indeed is being delayed. If the energy transition is not accelerated now, society will become dependent to an even greater degree on stable and united global cooperation, in which countries are and remain willing to work together for the rest of this century when it comes to taking climate action. But then it will be a cooperation whose chance of success has become much smaller, because the world has made itself dependent on uncertain CDR techniques and warming has now far exceeded the 1.5°C.

76. This point of the absolute need for international cooperation, cooperation that is necessary in every climate scenario, indicates that Shell and its experts cannot use the narrative that it would be wise to delay the energy transition. That narrative of Shell and its experts seems to come down to a recommendation to the world to not become too dependent on international cooperation in the interest of energy security. It has been suggested that countries must first step up their national production of oil and gas in order to reduce the dependence of international cooperation. However, this reasoning does not make countries less dependent on international cooperation in the framework of the energy transition, but rather more. Delaying the energy transition will only increase the need for cooperation, while at the same time reducing the chance of taking successful climate action. Shell and its experts do not take these aspects into account. Shell's energy security narrative cannot succeed for many other reasons as well. I will come back to this in detail in the next hour.

77. Expressing fear of international dependence is a strange statement to be made by a large multinational company, that trades products worldwide, on which countries are dependent to the greatest possible degree. The director of the IEA, Fatih Birol, puts it very well in the introduction to the NZE report as his primary message. I quote: "*I would like to highlight one message in particular: in an era of international tensions, governments need to separate climate from geopolitics. Meeting the shared goal of preventing global warming from going beyond critical thresholds requires stronger cooperation not fragmentation. Climate change is indifferent to geopolitical rivalries and national boundaries – in its causes and its effects. What matters is emissions, regardless of which country produces them, calling for leadership on collaborative efforts to tackle them*".[65]

78. As previously mentioned, more on this later. For now, the conclusion is that gambling on the CDR hypothesis entails substantial uncertainties is at odds with the precautionary principle, that the use of CDR would be incredibly expensive and that this would require close and long-term stable global cooperation.

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[63] Ibid.
[64] Ibid.
[65] Exhibit MD-525, p. 4.

79. Given all the risks discussed above, it cannot be a surprise that various experts now argue that following a reduction pathway that to a great extent relies on CDR is in conflict with the Paris Agreement, human rights and several international legal principles, such as the principle of intergenerational equity.[66] This criticism is justified.

80. The Paris Agreement is about a rapid reduction of emissions in accordance with the best available science (Article 4(2)) and reduction targets that should represent the highest possible ambition (Article 4(3)). In view of the related risks and uncertainties, emissions trajectories that are highly dependent on CDR go against these provisions of the convention. These CDR-dependent emissions trajectories simply shift the reduction task to the long term. They do not aim for the highest possible ambition for emission reductions in the short term. Consequently they are acting contrary to the highest ambition principle laid down by convention. In addition, if the uncertainties regarding CDR materialise, this will inevitably lead to a warming higher than 1.5˚C, with all associated risks and dangers for humans and the environment.[67]

81. For that reason the best available science also has consequences for Shell's obligations. Taking into account the risks and limits of CDR will necessarily lead to higher emission reductions in the short term.[68] These higher emission reductions will have to come from the oil and gas sector and from the developed countries. As already explained before, the IAM scenarios assume far too high a reduction task for the coal sector and for the developing countries. It follows that the necessary acceleration of climate action will have to come from the oil and gas sector.

82. This makes it clear once again that Shell's reduction obligation must also represent the highest possible ambition. As discussed earlier today, the highest ambition principle also follows from Dutch law and from the international climate protocols for companies.

83. Human rights law and international legal principles, like the precautionary principle and the principle of intergenerational equity, demand that both states and important systemic players like Shell make every effort to achieve the highest possible emission reductions this decade. It is not the intention to present the bill and the consequences to future generations.

84. Shell is aware of the limitations of IAM scenarios, or in any event should be aware of these limitations. It is clear that it cannot hide behind those limitations. It has turned out that Shell can make a contribution of a 45% reduction over its entire Scope 1, 2 and 3 emissions by 2030 without this being too onerous. It must therefore make this contribution.

85. I refer in this respect to the judgment of the German Constitutional Court in the case of Neubauer versus Germany. In the Neubauer case part of the federal climate act was declared unconstitutional. The Constitutional Court therefore told the German government to increase its reduction target for 2030. The Constitutional Court came to this judgment because the carbon budget was not proportionally distributed between current and future generations. The Constitutional Court indicated in this respect that it may not be the case that one generation takes up a large part of the carbon budget and only accounts for a relatively small part of the reduction task. The Constitutional Court therefore does not permit postponing large reduction efforts, because this means that following generations will be saddled with a drastic reduction burden and their lives will be exposed to a serious loss of freedom.[69, 70]

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[66] Exhibit MD-515A, pp. 772-773.
[67] Milieudefensie et al.'s Written Arguments of 19 March 2024, section 2.
[68] See also: Exhibit MD-460, p. 3 and pp. 10-11, and Exhibit MD-516, cover sheet and pp. 2592 and 2598-2601.
[69] Exhibit MD-381, p. 1 (concerning para. 192 of the Neubauer judgment, Order of 24 March 2021, 1 BvR 2656/18, 1 BvR

86. What the German Constitutional Court explicitly does not permit is, however, precisely what would happen if Shell were to be allowed to base its position on a reduction pathway that is based on large quantities of future CDR, instead of far-reaching emission reductions in the short term. CDR literally and figuratively presents the bill to future generations.

87. In the Urgenda case, this Court of Appeal also attached consequences to the substantial risks of CDR. The Court opted to base its reasoning on reduction pathways from AR4 instead of AR5, because 87% of the scenarios in AR5 are based on negative emissions by the use of CDR. On the basis of a report of the European Academies Science Advisory Council, the Court concluded at the time that the possibility of removing CO2 from the atmosphere in the future using certain techniques is very uncertain and that the climate scenarios that are based on such techniques are not particularly realistic in view of the current state of affairs. According to the Court, it could not be assumed that under the AR5 scenarios the temperature target could actually be achieved.[71] As explained, this risk still exists and it has certainly not become less. On the contrary. The risk has increased.

IAM scenarios and their limitations – the discount rate

88. I explained before that the limitations of IAMs in relation to the coal sector and the use of CDR necessarily lead to a greater reduction task in the oil and gas sector. There is a third limitation of IAMs that leads to a greater reduction task in the oil and gas sector. This third limitation relates to the discount rate applied by IAMs. I am now going to discuss this discount rate with you.

89. As stated, IAMs make a calculation based on the principle of cost effectiveness. IAMs do this over the period to 2100. When IAMs execute this cost effectiveness calculation, the costs of climate measures must therefore be calculated over a long period of time. The calculation to 2100 is executed by means of applying a discount rate.

90. The discount rate is a percentage by which the expected costs in the future are discounted back to a net present value, so that the costs that are made at different points in time, can be compared to each other. A discount rate in essence describes the degree to which something will be cheaper in the future compared to today. Using a high discount rate makes mitigation measures in the future relatively cheap compared to the mitigation measures that have to be taken now.[72]

91. This becomes clearer on the basis of an example. Most C1 scenarios – i.e. the scenarios for a 50% chance of 1.5°C – apply a discount rate of 5%.[73] With this discount rate of 5%, for example, a CDR measures that is taken in 2074 and that costs one billion in 2074, has a net value of only (rounded) 90 million for the modelling calculation in 2024.[74]

92. By using a high discount rate of 5%, future CDR measures have a large cost benefit in the modelling calculation. The choice for the discount rate consequently influences the cost effective reduction project proposed by the model, whereby according to models high discount rates make mitigation

288/20, 1 BvR 96/20, 1 BvR 78/20).

[70] See in this respect also the decision of the Supreme Court of Hawaii of 13 March 2023, Exhibit MD-570F-1, p. 14 at the bottom and p. 15 at the top, and the decision in Juliana v. the United States of America, Exhibit MD-570E, pp. 6 and 7.

[71] Court of Appeal of The Hague, 9 October 2018, ECLI:NL:GHDHA:2018:2591, para. 49.

[72] Exhibit MD-517, p. 6, Exhibit MD-566, p. 6 and MD-567, p. 15.

[73] Exhibit MD-566, p. 6.

[74] Exhibit MD-517, pp. 6-7.

more attractive later this century, instead of far-reaching emission reductions in the short term, to 2030. Applying a higher discount rate thus leads to postponing climate action until a later time this century, while applying a lower discount rate in fact leads to more climate action in the short term. In view of this, science also indicates that a lower discount rate of 2-3% deserves the preference when making IAM scenarios, according to Professor Rogelj and Dr Van Beek.[75]

93. This makes it clear that applying a high discount rate is at odds with the precautionary principle and the principle of intergenerational equity.[76] After all, a high discount rate reduces the mitigation efforts of the current generation at the expense of future generations. The task is thus pushed to the future, so that the current generation has to put in less effort. This even though the delayed mitigation increases the risk of an overshoot of the 1.5°C target, with all associated risks.

94. Future generations will in any event be disproportionately affected by climate extremes, as these extremes will increase in frequency, duration, intensity and geographical scale.[77] This risk is all the more present because, as previously explained, it is not certain that the CDR techniques will become available in the future at a sufficiently large scale and there are also limits to the degree in which these techniques can be used.

95. The consequence of applying a high discount rate is therefore that future generations will not only have to deal with larger climate consequences, but to in addition face the financial and factual task of cleaning up the pollution of the current generation later this century. This enormous task is thus asked of future generations in a situation in which they will have to deal with a bigger warming of the earth than 1.5°C, a situation in which they also face a greater risk of irreversible tipping points and a situation in which it is uncertain whether this greater warming can be brought back down to 1.5°C.

96. These future generations will have to make enormous financial and other efforts to find out whether reducing the warming is still possible. Applying a high discount rate thus leads to the most unreasonable intergenerational relationships conceivable. An intergenerational relationship in which the interests of future generations are sacrificed so that the current generation can avoid more of their own responsibility and their capabilities of having to engage in far-reaching emission reductions now.

97. The advantage of a lower discount rate is thus that the current generation takes far more of its own responsibility to do what is possible and necessary to contribute to limiting the warming to 1.5°C. This will prevent a greater warming of the earth, reduce the risk of tipping points and future well-being is made less dependent on uncertain CDR techniques for removing CO_2 from the atmosphere. I quote the IPCC: *"The modelled cost-optimal balance of mitigation action over time strongly depends on the discount rate used to compute or evaluate mitigation pathways: lower discount rates favour earlier mitigation, reducing both temperature overshoot and reliance on net negative carbon emissions"*.[78]

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[75] Exhibit MD-566, p. 6, Exhibit MD-567, p. 15.
[76] Exhibit MD-566, p. 6, Exhibit MD-567, pp. 14-15 and Exhibit MD-517, pp. 6-7. The principle of 'intergenerational equity' is mentioned in the preamble to the Paris Agreement.
[77] Exhibit MD-567, p. 14.
[78] Exhibit MD-567, p. 15. See for the citation Exhibit S-140, IPCC, WG3, Chapter 3, p. 362.

98. Various studies show, moreover, that fast climate action may require larger investments in the short term, but that the costs and economic consequences in the longer term will consequently be more favourable. What is more, the costs of climate measures will be lower in case of rapid climate action than the climate damage that will arise when postponing rapid climate action.[79] In other words: on balance, the costs of delayed climate action are greater for society. Penny wise, pound foolish. Postponing the necessary investments now means that the world will ultimately be worse off financially and economically, because the costs of climate harm in the future and the climate measures that will have to be taken then will be far greater than the costs that are saved now.

99. The conclusion of the foregoing is that IAM scenarios shift the reduction task to the long term too easily by applying a high discount rate. If this were taken into account, this would lead to higher emission reductions in the short term for the oil and gas sector.[80]

IAM scenarios and their limitations – climate harm is not included

100. Another important limitation of cost-effectiveness based IAMs, is that IAMS do not include the costs and damage associated with the consequences of climate change in their calculations. This too leads to postponing climate action far into the future.

101. The IAMs generally make their calculation on the basis of a comparison with a 'business-as-usual' reference scenario. In that reference scenario, damage caused by climate change does not exist. The reference framework to which climate action is compared is thus a world in which the economy continues functioning and there are no adverse impacts due to climate change.[81] This flaw in the IAMs has two important consequences:

    I. First of all, the costs of emission reductions in IAMs are systematically overestimated because the benefits of avoided climate impacts are not taken into consideration. This results in every climate measure only being seen as a cost item, which presents an inaccurate picture of the societal costs of climate measures.[82]

    II. Secondly, the cost effectiveness of far-reaching emission reductions in the short term (before 2030 and 2040) is systematically underestimated. If account is taken of the benefits of avoided climate damage, then according to research this will lead to an acceleration of measures in the short term, including in cost effective emission reduction projects.[83] This is also logical. If IAMs were to take account of the damage caused by climate change in the interim, this would lead to a different cost effectiveness analysis and larger reductions in the short term will be more attractive.[84]

102. As already mentioned, in the real world climate change does, of course, cause damage. This damage will increase if global warming further increases as a result of climate measures being taken too late. The longer or the higher the temperature is above 1.5°C, the greater the risk of

[79] Exhibit MD-567, pp. 15-16. See also Exhibit MD-531A, pp. 1-3, Exhibit MD-531B, pp. 6-10, Exhibit MD-579F, pp. 1-3 and Exhibit MD-522, p. 32.
[80] Considering the model-based reductions in coal are already too high.
[81] Exhibit MD-566, pp. 6-7. See also Exhibit MD-522, pp. 31.
[82] Exhibit MD-566, pp. 6-7.
[83] Ibid.
[84] Ibid.

passing tipping points, with potentially irreversible consequences, as explained in detail in the written arguments.[85] The IAMs also do not take such effects and the damage that results from them into account.[86]

103. Although the IPCC explicitly warns, in crystal clear words, of such an overshoot of the 1.5°C target,[87] many IAM scenarios assume a reduction pathway that temporarily overshoots the temperature target.

104. It is very relevant to know in this respect that the C1 scenarios of the IPCC AR6 report of 2022 are now virtually all overshoot scenarios, while this was far less the case in the SR15 report of 2018. Although in both reports the IPCC does speak of scenarios '*limiting warming to 1,5°C with no or limited overshoot'*, the scenarios in the 2022 AR6 report are a good deal less ambitious than those from the SR15 report of 2018. The scenarios from SR15 were geared to a maximum warming of approximately 1.5°C, but most AR6 scenarios are now overshooting this temperature and have a maximum warming that is closer to 1.6°C.[88] This 1.6°C is the limit for still being counted among the C1 category of scenarios.

105. In most AR6 scenarios the overshoot is thus already 'baked in', which makes it necessary in these scenarios to realise negative emissions by means of CDR and to bring the temperature back down to 1.5°C. As already explained, it is very uncertain, however, whether the necessary CDR techniques will be available at scale. This as such already entails major risks when taking the AR6 scenarios as a starting point for Shell's duty of care.

106. It may surprise you that the more recent AR6 scenarios from 2022 are less ambitious than the 2018 scenarios of SR15. The fact that the more recent AR6 scenarios are less ambitious than those earlier scenarios, is again the result of the fact that the IAMs make their calculations on the basis of cost effectiveness.[89]

107. Because of the lack of the necessary stringent climate measures since 2018, over the past few years far too much has been invested in new fossil fuel infrastructure, including by Shell. The fossil fuel infrastructure has expanded since 2018, or in any event has not been phased down in line with the SR15 scenarios from 2018. Due to the lock-in effect generated by the fossil fuel infrastructure that has been newly installed since 2018, the costs of phasing out the fossil fuel infrastructure have increased compared to the SR15 scenarios from 2018.

108. This cost growth related to the lock-in for phasing out fossil fuel infrastructure, makes it less attractive for the IAMs of AR6 to model fast climate action in the short term (to 2030). This means that investments in new fossil fuel infrastructure not only cause a lock-in in the real world, but also in the modelling world.

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[85] Milieudefensie et al.'s Written Arguments of 19 March 2024, section 2.8.
[86] Exhibit MD-567, pp. 16-17, see also Exhibit MD-566, p. 12.
[87] Exhibit MD-495A, p. 87.
[88] Exhibit MD-566, p. 5 and pp. 8-9. It ensues from IPCC, AR6, WG3, section A. III.II.3.2.1 that the median for warming in all C1 scenarios from AR6 is 1.58°C, while in SR15 the median was still 1.52°C. Consequently the chance of actually remaining under 1.5°C (without overshoot) has fallen from some 46% in the scenarios from SR15 to 38% in the scenarios from AR6.
[89] Exhibit MD-566, p. 5 and pp. 8-9.

109. New investments in fossil fuel infrastructure thus create a lock-in, which in turn kicks the can of the global reduction task further down the road for reasons of cost effectiveness. Any delay in taking climate measures thus leads to greater investments in fossil fuel infrastructure, which in turn lead to climate scenarios with lower reduction targets for 2030.

110. This results in another important insight. This is the insight that the fossil fuel industry influences the outcome of models through its investment behaviour and to this extent creates its own modelling reality. Just like the fossil fuel lock-in does in the real world. The longer the fossil fuel industry continues investing in new fossil fuel infrastructure, the greater the resulting fossil fuel lock-in. The greater the fossil fuel lock-in, the more the IAM scenarios will have to take this into account. This makes it more attractive for IAM scenarios to continue postponing climate action. A process thus arises in which ever continuing fossil fuel investments lead to an ever decreasing reduction task to 2030.[90] By continuing to invest in new oil and gas fields, the oil and gas sector creates the result desired by it, i.e. that climate action is only pushed ever further into the future.

111. It means that the ever changing modelling results of IAMs – 'moving goalposts' in other words – are a particularly poor guideline for what a specific company, that has known for years what it should do, must do. It is of the greatest importance that this process of ever shifting and ever decreasing reduction targets is brought to a halt. Important systemic players like Shell cannot and may not hide behind these decreasing reduction targets to reduce their climate action efforts. For Shell it has been clear for years what has to happen and it could have taken action much earlier.[91]

Conclusion

112. I am now coming to the conclusion of this first part of my oral arguments. In summary, it can be concluded that there are various reasons why Shell cannot hide behind the low modelled reductions for the oil and gas sector from IAM scenarios.

113. In this respect I have reflected on the circumstance that the modelling results based on cost effectiveness do not align with convention agreements and international legal principles with regard to the global division of the reduction task.

114. I also explained that IAMs have various characteristics that make far-reaching emission reductions in the short term less attractive based on modelling, while in the real world far-reaching emission reductions are highly necessary in the shortest term possible. On this point too an approach based on the outcomes of models leads to conflict with international legal principles, such as the precautionary principle and the principle of intergenerational equity. The German Constitutional Court confirmed the importance of application of these legal principles in the Neubauer case.

115. On the basis of all of this it can rightly be concluded that Shell cannot hide behind the low modelled reduction percentages for the oil and gas sector. These sector outcomes do not do justice to a fair

[90] Exhibit MD-566, p. 5.
[91] See in this respect also the Statement of Defence on Appeal, paras. 574 et seq.

and legitimate division of the climate task and are not sufficiently rooted in the real world. These modelling calculations therefore cannot serve as guidance for establishing Shell's duty of care. The IAMs modelling results are certainly not the best guidance for determining a fair, proportional and adequate contribution for Shell.

116. The foregoing leads to the conclusion that these sector outcomes for the oil and gas sector cannot detract from the conclusions as these ensue from the climate protocols, i.e. that companies must seek as much alignment as possible with the global average. Based on the highest ambition principle, companies that have the capacity to do so must indeed do more than the global average.

117. Nevertheless, in the second part of my oral arguments I will set out what it would mean for Shell if alignment were nevertheless sought with the sectoral pathways for oil and gas that follow from the models. This will show that even such a sectoral approach must lead to a reduction obligation of 45% in 2030 for Shell.