

**Registered letter**

Judge Siofra O'Leary  
President of the European Court of Human Rights  
European Court of Human Rights  
Council of Europe  
67075 Strasbourg Cedex  
France



Zurich, December 5, 2022

**Re: Verein KlimaSeniorinnen and others v Switzerland (Application no. 53600/20); Third Party Intervention**

Dear Honorable Judge O'Leary,

We

- Prof. Dr. Sonia I. Seneviratne
- Prof. Dr. Andreas Fischlin

have the honour to submit to the European Court of Human Rights following intervention providing scientific background concerning the pending case Verein KlimaSeniorinnen and others v Switzerland (Application no. 53600/20). For details on the interveners see Appendix II. This intervention builds upon an earlier intervention submitted in 2021 on the same case and which we were invited to update based on latest evidence.

**The Intervention**

Considering the "questions to the parties"<sup>1</sup> the Court has posed, and foremost question 2.3 (*[...] a-t-il adopté une réglementation appropriée et l'a-t-il appliquée au moyen de mesures adéquates et suffisantes pour atteindre les objectifs en matière de lutte contre le réchauffement climatique*), this case raises questions regarding the current and planned climate change mitigation measures in Switzerland and whether they adequately contribute to prevent a dangerous anthropogenic interference with the climate system.

In view of our expertise as laid down previously (see also Appendix II), we provide an up-to-date scientific assessment of following aspects:

- 1: the global scientific consensus on the anthropogenic interference with the climate system and the role of a temperature limit in avoiding dangerous climate change, in particular based on the latest reports of the 6<sup>th</sup> cycle of the Intergovernmental Panel on Climate Change (IPCC)
- 2: the history of the greenhouse gas (GHG) emissions in Switzerland, in particular since the base year 1990 as used within the United Nations Framework Convention on Climate Change (UNFCCC) for quantitatively assessing sources and removals on a per country basis including aspects of a historical responsibility
- 3: the adequacy of the current and planned reduction targets in Swiss climate policies and legislations in light of the 1.5°C temperature limit<sup>2</sup>

<sup>1</sup> Objet de l'Affaire (6 April 2021): <http://hudoc.echr.coe.int/eng?i=001-209313>

<sup>2</sup> Warming levels and temperature values for global warming as used in this text are always understood relative to pre-industrial levels that are generally approximated by the global mean surface temperature as measured in the period 1850-1900 (e.g. IPCC, 2021). The unit °C for temperature values stands for degree Celsius.



# 1 GLOBAL SCIENTIFIC CONSENSUS ON THE ANTHROPOGENIC INTERFERENCE WITH THE CLIMATE SYSTEM AND THE ROLE OF A TEMPERATURE LIMIT IN AVOIDING DANGEROUS CLIMATE CHANGE

There is a clear scientific consensus that humans have interfered with the climate system and caused global warming, as expressed also in the latest IPCC (Intergovernmental Panel on Climate Change) report contributed by Working Group I (WGI) assessing the physical science basis and published in August 2021. That report concluded that "[i]t is unequivocal that human influence has warmed the atmosphere, ocean and land."<sup>3</sup> This key finding is based on a comprehensive assessment of the scientific literature as provided in the underlying report authored by 234 experts from 65 different countries using thousands, predominantly peer-reviewed scientific publications that were authored by more than hundred thousand scientists. These reports are also prepared following strict rules, including several rounds of reviews where authors had to formally respond to over 78,000 written comments while developing several drafts, all material that is also fully available to public scrutiny<sup>4</sup>. The global scientific consensus on the anthropogenic interference with the climate system is an established fact that is also formally approved by all 194 governments that have approved and adopted the aforementioned IPCC report. The breadth and depth of the basis that supports this key finding alone already demonstrates how strong the scientific consensus is, while numerous scientific studies analysing the consensus itself have repeatedly only confirmed the strength of this consensus being estimated to be about 97% or more, while the public perception has been found to significantly underestimate that consensus and being heavily distorted for various complex reasons that do not alter any of the aforementioned facts<sup>5</sup>.

There is also clear scientific consensus on the role of the global average temperature – in the following simply called global warming – for impacts and risks that are caused by climate change. Several IPCC reports contributed by Working Group II (WGII)<sup>6</sup>, as well as the IPCC Special Report on Global warming of 1.5°C by all three working groups<sup>7</sup>, all based also on as broad scientific consensus similar to the one more specifically illustrated for IPCC WGI above, have concluded that more global warming causes higher adverse impacts and risks for humans, in particular for the most vulnerable, as well as for human and natural systems. These impacts and risks present dangers already with recent human-caused global warming of 1.07°C<sup>8</sup>, not only for the most exposed and/or most vulnerable humans, animals, and plants, but also for many physical and natural systems such as glaciers, ice-sheets, sea-ice, ecosystems (e.g. forests, grasslands, tundra, freshwater and marine ecosystems etc.), as well as human systems (cities and other settlements, health, agricultural, water, transport, energy sectors etc.). Consequently, any limitation of global warming can reduce some of the impacts and risks that would otherwise result if global warming would exceed that limit.

Limiting global warming to 1.5°C as mentioned in Article 2 of the Paris Agreement of the United Nations Framework on Climate Change<sup>9</sup> and as also ratified by Switzerland together with 194<sup>10</sup> other Parties out of 198 Parties to the UNFCCC, offers at present a large risk reduction compared to higher levels of global warming (2°C or more). These include risks from future impacts in many sectors, regions, people, animals, and plants. As highlighted in a public letter signed by 20 climate scientists in relation with a climate-related legal case in Switzerland (hereafter referred to L20)<sup>11</sup>, the IPCC report

<sup>3</sup> IPCC, 2021, page SPM-5, A.1 [www.ipcc.ch/report/ar6/wg1/](http://www.ipcc.ch/report/ar6/wg1/) (see Appendix I for a detailed list of references)

<sup>4</sup> All available at [www.ipcc.ch](http://www.ipcc.ch)

<sup>5</sup> E.g. Cook et al., 2016: [iopscience.iop.org/article/10.1088/1748-9326/11/4/048002](https://iopscience.iop.org/article/10.1088/1748-9326/11/4/048002)

<sup>6</sup> IPCC, 2001, 2007, 2014a,b, 2022: [www.ipcc.ch/report/ar3/wg2/](http://www.ipcc.ch/report/ar3/wg2/), [www.ipcc.ch/report/ar4/wg2/](http://www.ipcc.ch/report/ar4/wg2/), [www.ipcc.ch/report/ar5/wg2/](http://www.ipcc.ch/report/ar5/wg2/), [www.ipcc.ch/report/ar6/wg2/](http://www.ipcc.ch/report/ar6/wg2/)

<sup>7</sup> IPCC, 2018 [www.ipcc.ch/sr15/](http://www.ipcc.ch/sr15/)

<sup>8</sup> IPCC, 2021, page SPM-6, A.1.3 (for global warming in 2010-2019 compared to 1850-1900, i.e. likely to be even higher for 2022 conditions)

<sup>9</sup> UNFCCC, 2015, page 3, Article 2, paragraph 1(a): "...pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;"

<sup>10</sup> The status of ratification of the Paris Agreement is available at [unfccc.int/process/the-paris-agreement/status-of-ratification](https://unfccc.int/process/the-paris-agreement/status-of-ratification)

<sup>11</sup> Letter signed by 20 climate scientists in support of a trial of climate activists in Switzerland:

[www.reseau43.ch/docs/LAC/200921\\_climat\\_F.pdf](http://www.reseau43.ch/docs/LAC/200921_climat_F.pdf) (original version, in French);

[www.reseau43.ch/docs/LAC/200921\\_climat\\_E.pdf](http://www.reseau43.ch/docs/LAC/200921_climat_E.pdf) (translation in English); [www.ethz.ch/en/news-and-events/eth-news/news/2020/09/zukunftsblog-sonia-seneviratne-yes-we-are-worried.html](https://www.ethz.ch/en/news-and-events/eth-news/news/2020/09/zukunftsblog-sonia-seneviratne-yes-we-are-worried.html) (context of letter; Blog of Prof. Sonia I. Seneviratne, ETH Zurich)



"Global Warming of 1.5°C" (IPCC SR15)<sup>12</sup>, as well as the IPCC's special reports on "Climate Change and Land" (IPCC SRCCL)<sup>13</sup> and "The Ocean and Cryosphere in a Changing Climate" (IPCC SROCC)<sup>14</sup> consistent with the most recent IPCC report by WGII<sup>15</sup>, "show that limiting warming to 1.5°C rather than 2°C would help prevent many impacts, some of them irreversible". The letter<sup>11</sup> also summarizes that "[a] climate change at 2°C rather than 1.5°C would result in an increase in hot extremes in most inhabited regions<sup>7,16</sup>, heavier rainfall in several regions<sup>7,16</sup>, more droughts in some regions<sup>7,16</sup>, the extinction of a number of plant and animal species<sup>7,16</sup>, much higher risks of permafrost degradation and food supply instability<sup>13</sup>, and a 10-35 percent probability of an ice-free Arctic in September (vs. 1 percent with warming of 1.5°C)<sup>14</sup>". Finally, it emphasizes that even a global warming stabilised at +1.5°C would incur more risks than at the current level (around +1.1°C<sup>17</sup>), as "it would represent a major threat to warm-water coral reefs<sup>14</sup> and be associated with a high risk of dryland water scarcity, of wildfire damage, of permafrost degradation, and of food supply instabilities<sup>13</sup>".

Evidence of the effects of greenhouse gas emissions on heat extremes has further strengthened in the latest IPCC Working Group I report, which entails a chapter synthesizing the evidence on changes in climate extremes with increasing global warming<sup>18</sup>. This chapter concludes that "[it] is an established fact that human-induced greenhouse gas emissions have led to an increased frequency and/or intensity of some weather and climate extremes since pre-industrial time, in particular for temperature extremes". It also states that "[s]ome recent hot extreme events would have been *extremely unlikely*<sup>19</sup> to occur without human influence on the climate system". Regarding projections, it assesses that "[in] most regions, future changes in the intensity of temperature extremes will *very likely* be proportional to changes in global warming", and that "[n]ew evidence strengthens the conclusion from SR1.5 that even relatively small incremental increases in global warming (+0.5°C) cause statistically significant changes in extremes on the global scale and for large regions (*high confidence*) [with this being particularly] the case for temperature extremes (*very likely*)"<sup>18</sup>.

Impacts to health associated with increasing human-induced global warming are also well established. Chapter 3 of the IPCC SR15 concluded that "[a]ny increase in global temperature (e.g., +0.5°C) is projected to affect human health, with primarily negative consequences (*high confidence*)"<sup>16</sup>. It also states (Section 3.4.7.1) that "[t]he magnitude of projected heat-related morbidity and mortality is greater at 2°C than at 1.5°C of global warming (*very high confidence*)", that "[t]he number of people exposed to heat events is projected to be greater at 2°C than at 1.5°C", and that "[p]opulations at highest risk [of heat-related morbidity and mortality] include older adults, children, women, those with chronic diseases, and people taking certain medications (*very high confidence*)"<sup>16</sup>. The most recent contribution by IPCC WGI to the 6<sup>th</sup> assessment cycle concluded with *high confidence* that changes in climatic impact-drivers "would be larger at 2°C global warming or above than at 1.5°C"<sup>20</sup>. Similarly, it stated that "extreme heat thresholds ... relevant to health are projected to be exceeded more frequently at higher global warming levels (*high confidence*)"<sup>21</sup>. The most recent contribution by IPCC WGII to the 6<sup>th</sup> assessment cycle concluded that risks to human health increase with human-caused global warming. E.g. it reported that "In all regions extreme heat events have resulted in human mortality and morbidity (*very high confidence*)"<sup>22</sup> and "In assessed regions, some mental health challenges are associated with increasing temperatures (*high confidence*), trauma from weather and climate extreme events (*very high confidence*)"<sup>23</sup>. For the future, WGII concluded "Climate change and related extreme events will significantly increase ill health and premature deaths from the near- to long-term (*high confidence*)"<sup>24</sup> and "Mental health challenges, including anxiety and

<sup>12</sup> IPCC, 2018, [www.ipcc.ch/sr15/](http://www.ipcc.ch/sr15/)

<sup>13</sup> IPCC, 2019a, [www.ipcc.ch/srccl/](http://www.ipcc.ch/srccl/)

<sup>14</sup> IPCC, 2019b, [www.ipcc.ch/srocc/](http://www.ipcc.ch/srocc/)

<sup>15</sup> IPCC, 2022, [www.ipcc.ch/report/ar6/wg2/](http://www.ipcc.ch/report/ar6/wg2/)

<sup>16</sup> Hoegh-Guldberg et al., 2018 (Chapter 3) in IPCC, 2018, [www.ipcc.ch/site/assets/uploads/sites/2/2022/06/SR15\\_Chapter\\_3\\_LR.pdf](http://www.ipcc.ch/site/assets/uploads/sites/2/2022/06/SR15_Chapter_3_LR.pdf)

<sup>17</sup> IPCC, 2021

<sup>18</sup> Seneviratne et al., 2021 (Chapter 11) in IPCC, 2021, [www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_Chapter11.pdf](http://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter11.pdf)

<sup>19</sup> Italic confidence and likelihood assessments follow the IPCC uncertainty guidance. E.g. *extremely unlikely* stands for a probability between 0-5%. For details cf. Mastrandrea et al., 2010.

<sup>20</sup> IPCC, 2021, Summary for Policy Makers, p. 24 ([www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_SPM.pdf](http://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf))

<sup>21</sup> Ibid.

<sup>22</sup> IPCC, 2022. Summary for Policy Makers, p.11 ([www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC\\_AR6\\_WGII\\_SummaryForPolicymakers.pdf](http://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf))

<sup>23</sup> Ibid.

<sup>24</sup> Ibid., p. 15



stress, are expected to increase under further global warming in all assessed regions, particularly for children, adolescents, elderly, and those with underlying health conditions (*very high confidence*).<sup>25</sup>

Attributable health impacts of global warming to-date have also been reported widely in the scientific literature. A recent study for 43 countries, including Switzerland, shows that 37% of the warm-season heat-related deaths during the period 1991-2018 can be attributed to human-induced climate change<sup>26</sup>. For Switzerland, the average number is about 33%<sup>26</sup>. In a recent joint comment, more than 200 medical journals have published a "call for urgent action to keep average global temperature increases below 1.5°C"<sup>27</sup>, highlighting that "[t]he risks to health of increases above 1.5°C are now well established" and that "[i]n the past 20 years, heat-related mortality among people older than 65 years has increased by more than 50%"<sup>27</sup>.

In summary, failing to halt global warming leads to additional health risks and impacts for humans, especially for the most vulnerable. In particular, limiting global warming to 1.5°C leads to substantially less risks compared to 2°C or higher levels of global warming.

## **2 HISTORY OF THE GREENHOUSE GAS (GHG) EMISSIONS IN SWITZERLAND, IN PARTICULAR SINCE THE BASE YEAR 1990 AS USED WITHIN THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC) FOR QUANTITATIVELY ASSESSING SOURCES AND REMOVALS ON A PER COUNTRY BASIS INCLUDING ASPECTS OF A HISTORICAL RESPONSIBILITY**

As a so-called Annex I Party to the UNFCCC, Switzerland is obliged to report annually to the UNFCCC secretariat about its greenhouse gas (GHG) emissions. Switzerland's GHG inventory contains statistical data in a format that conforms to the requirements of the UNFCCC and is based on the scientifically derived guidelines as prepared by The Task Force on National Greenhouse Gas Inventories (TFI)<sup>28</sup> of the IPCC. These latest data show the history of the GHG emissions resulting from Switzerland's territory since 1990 up to 2020 as contained in the latest National inventory report 2022.<sup>29</sup>

According to the national reporting Switzerland has recently<sup>30</sup> emitted following amounts of GHG: In 2019/2020, 46'108/43'291<sup>31</sup> kt CO<sub>2</sub> eq (kilo tonnes of CO<sub>2</sub> equivalent) excluding all emissions from international aviation and marine bunkers that may be related to Switzerland (5'755/2'082 kt CO<sub>2</sub> eq), indirect GHG emissions (122/121 kt CO<sub>2</sub> eq), and all sinks and removals from land use, land-use change and forestry (LULUCF, net emissions -1'933/-1'705 kt CO<sub>2</sub> eq) on the territory of Switzerland (Figure 1). Compared to the base year 1990 emissions in CO<sub>2</sub> eq, these amounts correspond to a reduction of 14/19.2% excluding LULUCF and one of 14.4/19.3% including LULUCF, where CO<sub>2</sub> with a share of 79.9/79.1% is the largest contributor, followed by CH<sub>4</sub> and N<sub>2</sub>O having a share of 10.1/10.6% and 6.5/6.7%. In this context it is important to note that the 2020 values are of questionable nature for assessing Swiss climate policies due to the rather exceptional COVID-19 pandemic. Moreover, all values vary also from year to year due to varying energy demands depending on the weather. For instance, in the building sector heating demands vary with the year-specific winter temperatures, or cooling demands vary with the year-specific summer temperatures. In 2018 the reduction compared to 1990 amounted to 13.8% and 13.1% excluding and including LULUCF, respectively. The corresponding numbers for 2015, 2016, and 2017 were 10% and 11.2%

<sup>25</sup> Ibid.

<sup>26</sup> Vicedo-Cabrera et al. 2021, Nature Climate Change [www.nature.com/articles/s41558-021-01058-x](https://www.nature.com/articles/s41558-021-01058-x)

<sup>27</sup> Atwoli et al. 2021, The Lancet: [www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)01915-2/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)01915-2/fulltext)

<sup>28</sup> See [www.ipcc.ch/working-group/tfi/](https://www.ipcc.ch/working-group/tfi/)

<sup>29</sup> FOEN, 2022 ([www.climate-reporting.ch](https://www.climate-reporting.ch)); statistics for other years are taken from the earlier submitted reports ([www.bafu.admin.ch/bafu/en/home/topics/climate/state/data/climate-reporting/previous-ghg-inventories.html](https://www.bafu.admin.ch/bafu/en/home/topics/climate/state/data/climate-reporting/previous-ghg-inventories.html))

<sup>30</sup> As the COVID-19 pandemic has affected Switzerland from March 2020 we provide numbers for both the year 2020, the most recent inventory available, and the preceding year 2019. This is an attempt to make the numbers more representative of actual recent developments in Switzerland.

<sup>31</sup> In the following the first number before the slash is for the year 2019 and the second number after the slash is for the year 2020, respectively.



(2015), 9.4% and 11.7% (2016), 11.4% and 10.3% (2017). This gives for the period from 2015 till 2019/2020 an average reduction of GHG emissions by Switzerland in CO<sub>2</sub> eq of 11.7/19.2% and 12.1/19.3%, excluding and including LULUCF, respectively. Given the large differences between the 2019 and 2020 numbers, and the special COVID-related conditions that prevailed in 2020, we ignore the 2020 numbers for the subsequent considerations. 2020 numbers do not seem representative for the actual situation, in particular also given the fact that the 2021 and 2022 economic indicators known to drive GHG emissions<sup>32</sup> indicate not only a significant emission increase in 2022, but also rather a resuming of previous emission trends from before 2020.

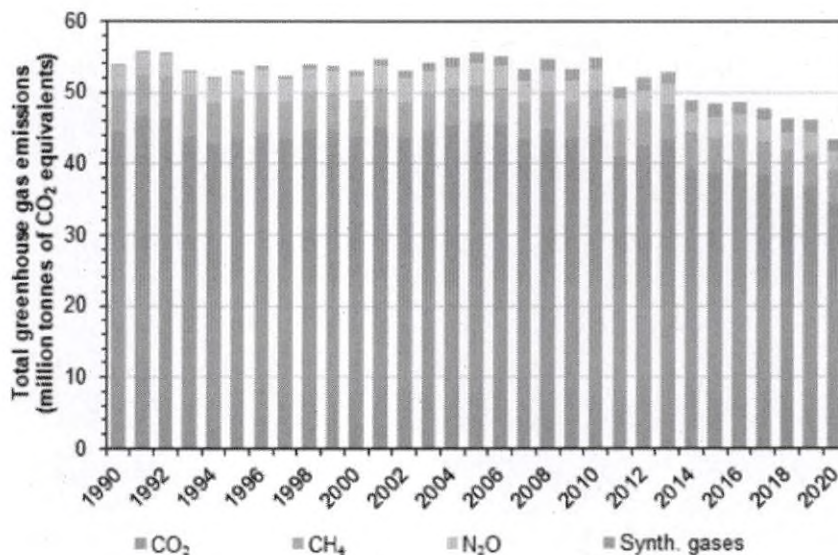


Figure 1: Total greenhouse gas (GHG) emissions of Switzerland since 1990 up to 2020 based on the national GHG inventory of Switzerland using the methodology as required by the United Nations Framework Convention on Climate Change (UNFCCC). Shown are only sources from the territory of Switzerland as emissions from international aviation and navigation are excluded. Similarly, sources and sinks resulting from land use are also excluded (Source: FOEN, 2022).

Historic emissions before the base year 1990 matter as global warming is basically determined by the CO<sub>2</sub> accumulated in the atmosphere by past emissions<sup>33</sup>. Switzerland's historic emissions are not officially quantified and historical emissions are generally characterized by considerable uncertainties. Nevertheless, scientific research continues to estimate the historical responsibility of groups of countries from 1870 up to the present. For instance, the Global Carbon Budget<sup>34</sup> estimated the historical contribution of EU27 to the globally accumulated carbon content of the atmosphere as 16.9%. Inasmuch as Switzerland is comparable to other European countries, these estimates are comparable to the actual historical responsibility of Switzerland, which contrasts with that of the currently main emitters. China e.g. has become since 2005 worldwide the biggest GHG emitter, while its historical responsibility has been estimated to currently still be only 14.4%<sup>34</sup>.

It should be noted, as highlighted in L20<sup>35</sup>, that the decrease in emissions in Switzerland<sup>36</sup>, like in some other countries<sup>37</sup>, has been associated with an increase in emissions in other countries, due to an increased consumption of imported products and relocations of industrial production to other countries, in particular China. Hence, in the context of determining responsibilities for climate change not only the domestically produced GHG emissions, but also the consumption footprint of a country matters. According to 2019 data from the Global carbon atlas<sup>38</sup> (Figure 2), Switzerland ranks 13<sup>th</sup>

<sup>32</sup> KOF Swiss Economic Institute of ETH Zurich: Business Situation Indicator available at [www.kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-business-situation-indicator.html](http://www.kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-business-situation-indicator.html)

<sup>33</sup> IPCC, 2021, SPM-37, Figure SPM.10 ([www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_SPM.pdf](http://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf))

<sup>34</sup> Available from [www.globalcarbonproject.org/carbonbudget/](http://www.globalcarbonproject.org/carbonbudget/)

<sup>35</sup> See footnote #11

<sup>36</sup> [www.bafu.admin.ch/dam/bafu/fr/dokumente/klima/fachinfo-daten/kenngroessen\\_thg\\_emissionen\\_schweiz.pdf.download.pdf/Kenngroessen\\_2020\\_F.pdf](http://www.bafu.admin.ch/dam/bafu/fr/dokumente/klima/fachinfo-daten/kenngroessen_thg_emissionen_schweiz.pdf.download.pdf/Kenngroessen_2020_F.pdf)

<sup>37</sup> [www.hautconseilclimat.fr/wp-content/uploads/2019/09/hcc\\_rapport\\_annuel\\_2019\\_v2.pdf](http://www.hautconseilclimat.fr/wp-content/uploads/2019/09/hcc_rapport_annuel_2019_v2.pdf)

<sup>38</sup> <http://globalcarbonatlas.org/>



among the countries with highest per capita CO<sub>2</sub> emissions when considering also consumption-related emissions<sup>39</sup>.

Consumption Per capita (tCO<sub>2</sub>/person)

Rank	Country	tCO <sub>2</sub> /person
1	Singapore	27
2	Qatar	26
3	Kuwait	23
4	Brunei Darussalam	23
5	United Arab Emirates	21
6	Malta	20
7	Saudi Arabia	18
8	Belgium	17
9	Trinidad and Tobago	17
10	United States of America	17
11	Luxembourg	15
12	Australia	14
13	Switzerland	14
14	Canada	14
15	Bahrain	14
16	South Korea	14
17	Mongolia	13
18	Taiwan	12
19	Oman	12
20	Hong Kong	11

Figure 2: Ranking of countries based on per capita CO<sub>2</sub> emissions when including not only domestic but also consumption-related emissions (based on 2019 data in tCO<sub>2</sub>/person. Source: <http://globalcarbonatlas.org/>)

We also highlight the following conclusion of L20<sup>40</sup> regarding the CO<sub>2</sub> emissions pathways in Switzerland compared to other countries with similar levels of development: Switzerland was excluded from the list of 18 countries selected in Le Quéré *et al.*'s 2019 study<sup>41</sup> on successful decarbonisation for it failed to meet the study criteria, namely to have accomplished a significant decrease in CO<sub>2</sub> emissions (relative to annual variability) for at least a decade, both in domestic emissions and in its carbon footprint beyond its borders, an indicator of the national efforts made to contribute to the reduction of CO<sub>2</sub> emissions globally. L20 highlighted that Swiss emissions (CO<sub>2</sub>, energy only) have decreased by 1.5% per year in the last decade, but that Switzerland's carbon footprint shows the opposite trend and has grown by 1.3% per year due to increased consumption<sup>40,41</sup>. Thus, L20 concluded that Switzerland is not performing better, rather worse than a number of other comparable countries including adjacent neighbours (Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, the USA, Finland, France, Hungary, Ireland, Italy, the Netherlands, Portugal, Romania, Sweden) with respect to reducing its entire CO<sub>2</sub> footprint at the global level<sup>40, 41</sup>.

In summary, despite some progress in climate policies made in recent years, Switzerland's contribution to human-induced climate change, including its historical responsibility, are roughly as high if not higher as those of many other European countries in light of above set of criteria.

### 3 ADEQUACY OF THE CURRENT AND PLANNED REDUCTION TARGETS IN SWISS CLIMATE POLICIES AND LEGISLATIONS IN LIGHT OF THE 1.5°C TEMPERATURE LIMIT

Switzerland is long overdue in implementing legislation to reduce CO<sub>2</sub> emissions and other greenhouse gas emissions. The revision of the CO<sub>2</sub> Act, as developed by the Swiss parliaments, was subject to a referendum in which the Swiss population voted on 16th June 2021 against this revision

<sup>39</sup> Note that the respective numbers for 2020 show a ranking at 18<sup>th</sup> position for that year (<http://globalcarbonatlas.org/>). We focus here on the 2019 numbers for the reasons stated above (COVID-19 effects in 2020 and rebound of emissions since then).

<sup>40</sup> L20: See footnote #11

<sup>41</sup> Le Quéré *et al.* 2019, Nature Climate Change [www.nature.com/articles/s41558-019-0419-7.pdf](http://www.nature.com/articles/s41558-019-0419-7.pdf)



(population 51.6% no, 48.4% yes: cantons 18.5 no, 4.5 yes). As a consequence, efforts are currently under way to prolong the existing CO<sub>2</sub> Act until new legislation has been developed and is in force.

The current CO<sub>2</sub> Act defined as a target for 2020 the reduction of its GHG emissions by 20% compared to 1990. The Federal Office for the Environment FOEN expected in an April 2020 press release that Switzerland would miss this target<sup>42</sup>, which it actually did (FOEN, 2022). It missed this target only marginally, i.e. by less than 1%. However, the fact that the gap was not larger was likely thanks to the COVID-19 pandemic; as emissions appear to increase as the pandemic lessens its impacts on the economy, this smaller than expected gap must not be given overly weight. The Nationally Determined Contribution (NDC) of Switzerland as submitted to the UNFCCC foresees a reduction of GHG emissions of 50% by 2030 relative to 1990 levels. The rejected revised CO<sub>2</sub> Act attempted to implement this NDC<sup>43</sup> while planning to combine domestic reductions with emission reductions abroad, the latter by a maximal share of 25%<sup>43</sup>. Given the current political and economic situation Switzerland may have to increase the share of emission reductions abroad, which can be challenged based on its historical responsibility.

Although the Federal Council has set a target of achieving GHG neutrality by 2050<sup>44,45</sup>, Switzerland is currently regrettably missing the needed and internationally credible instruments to implement this goal, in particular in light of the limited domestic emission reductions until 2030, deferring the increasingly urgently needed domestic efforts to extremely challenging levels to actually reach GHG neutrality thereafter. Moreover, the Federal Council proposes that fossil fuels could remain in use after 2050<sup>46</sup>. This all means that currently Switzerland has limited means to comply with its NDC as targeted for 2030 under the auspices of the UNFCCC and is furthermore at present lacking any legislation committing Switzerland to a net-zero CO<sub>2</sub> emission target by a date compatible with limiting global warming to 1.5°C. This contrasts somewhat with the Swiss ratification of the Paris Agreement that was adopted by 194 Parties out of 198 on 12 December 2015<sup>47</sup>.

The latest IPCC report states "From a physical science perspective, limiting human-induced global warming to a specific level requires limiting cumulative CO<sub>2</sub> emissions, reaching at least net zero CO<sub>2</sub> emissions, along with reductions in other GHG emissions"<sup>48</sup>. As Swiss GHG emission reductions became significant only after 2010 above estimated reduction corresponds to a current trend in the most recent decade of a bit more than 1% per year (1.17%/a). Without additional efforts, i.e. extrapolating this trend until 2050, Switzerland will fail the government declared goal of reaching net zero in 2050, as emissions will still be high, i.e. would only be roughly halved (reduced by 48.1% and 49.8% excluding and including LULUCF) instead of completely avoided (48.1%) or compensated while including domestic sinks (49.8%). Only very large non-domestic compensations could then achieve the net zero goal by 2050, which are extremely likely very expensive if available at all, as the entire world needs to reach net zero by approximately mid-century to limit global warming to 1.5°C with a probability larger than exceeding that temperature<sup>49</sup>.

In the above scenario Switzerland would use up more than what could be considered a fair share of the remaining carbon budget to limit global warming to 1.5°C, regardless of the criteria used to judge fairness for following reasons:

First the latest IPCC reports estimated the globally remaining carbon budget as of 2000 to 400 GtCO<sub>2</sub> to limit global warming with a probability of 66% at 1.5°C<sup>50</sup>. As the Swiss population is ~0.11% of the world population, its per capita share of the remaining carbon budget is accordingly 0.44 GtCO<sub>2</sub> or 440'000 kt CO<sub>2</sub>. Assuming that the CO<sub>2</sub> fraction in the Swiss GHG emissions stays at the current level of 80%, Switzerland may emit as of 2020 no more than 550'000 kt CO<sub>2</sub> according to its share at the remaining global carbon budget. At the current level of its emissions<sup>51</sup> that budget would be used up by 2032 assuming a continued trend of emission reductions of 1.17%/a. These projections

<sup>42</sup> [www.bafu.admin.ch/bafu/fr/home/documentation/communiqu%C3%A9s/annonce-nsb-entre-m%C3%A9diations-m%C3%A9diations.msg-id-78720.html](http://www.bafu.admin.ch/bafu/fr/home/documentation/communiqu%C3%A9s/annonce-nsb-entre-m%C3%A9diations-m%C3%A9diations.msg-id-78720.html)

<sup>43</sup> [www.swissinfo.ch/fr/toute-l-actu-en-bref/loi-sur-le-co2--75-des-r%C3%A9ductions-d-%C3%A9missions-%C3%A0-r%C3%A9aliser-en-suisse/46017966](http://www.swissinfo.ch/fr/toute-l-actu-en-bref/loi-sur-le-co2--75-des-r%C3%A9ductions-d-%C3%A9missions-%C3%A0-r%C3%A9aliser-en-suisse/46017966)

<sup>44</sup> [www.admin.ch/gov/fr/accueil/documentation/communiqu%C3%A9s.msg-id-76206.html](http://www.admin.ch/gov/fr/accueil/documentation/communiqu%C3%A9s.msg-id-76206.html)

<sup>45</sup> [www.admin.ch/gov/fr/accueil/documentation/communiqu%C3%A9s.msg-id-80266.html](http://www.admin.ch/gov/fr/accueil/documentation/communiqu%C3%A9s.msg-id-80266.html)

<sup>46</sup> [www.admin.ch/gov/fr/accueil/documentation/communiqu%C3%A9s.msg-id-80266.html](http://www.admin.ch/gov/fr/accueil/documentation/communiqu%C3%A9s.msg-id-80266.html)

<sup>47</sup> [unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement](http://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement)

<sup>48</sup> IPCC, 2021, SPM-36, D.1

<sup>49</sup> IPCC, 2018, 2021

<sup>50</sup> IPCC, 2021, SPM-38, Table SPM.2

<sup>51</sup> Ignoring the 2020 value because of COVID-19



demonstrate that Switzerland would need in such a scenario to rely on the grand-fathering principle to a degree that may be considered by other countries that reduce their emissions more as unfair. Switzerland would need to accelerate that trend to overcome this issue. Secondly, given the historical responsibility as sketched above, Switzerland's fair share gets reduced relative to per capita computed share of the remaining carbon budget. Thirdly, the level of consumption related emissions outside of Switzerland's territory further reduces its share. Finally, in the context of fairness the criteria of having options or the capacity to contribute is also often applied<sup>52</sup>. As Switzerland is undeniably among the richest countries worldwide, this creates further obligations with respect to a fair share, which may also be fulfilled by other means than merely the reduced claim of the remaining carbon budget. However, unless those means, e.g. increased climate finances above the usual share, are actually provided, the pressure on the carbon budget share remains even higher than that to be considered as fair according to formerly listed criteria.

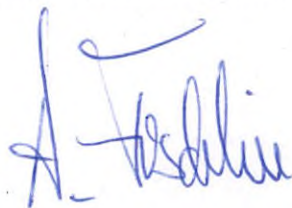
In summary, given all of above facts and scientific insights, it appears obvious that Switzerland is currently not contributing sufficiently to limit global warming to 1.5°C. While it is also clear that no merely science based set of criteria can be used to determine precisely and quantitatively what a country's ultimate fair share to limit global warming consists of, in the case of Switzerland the per capita, the historical responsibility, the consumption, as well as the option or capacity argument — all point in the same direction that Switzerland is obliged to make a bigger contribution than the average of all countries of which many have e.g. a much lower consumption or historical responsibility, while Switzerland is actually lagging behind the average of countries being in a comparable situation. As adequacy of climate action relating to specific targets depends also significantly on value judgement and not scientific aspects alone, we cannot fully respond to the raised question, yet hope having provided all arguments that are grounded in a solid natural science basis to this judgement nevertheless.

We remain at the Court's disposal in case further information or clarification is required.

Yours sincerely,



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<sup>52</sup> E.g. Claussen & McNeilly, 1998, [www.c2es.org/document/equity-global-climate-change-the-complex-elements-of-global-fairness/](http://www.c2es.org/document/equity-global-climate-change-the-complex-elements-of-global-fairness/) or Bretschger, 2013, doi: [10.1017/S1355770X13000284](https://doi.org/10.1017/S1355770X13000284)



## Appendix I: References

- Atwoli, L., Baqui, A. H., Benfield, T., Bosurgi, R., Godlee, F., Hancocks, S., Horton, R., Laybourn-Langton, L., Monteiro, C. A., Norman, I., Patrick, K., Praities, N., Olde Rikkert, M. G. M., Rubin, E. J., Sahni, P., Smith, R., Talley, N. J., Turale, S., & Vázquez, D., 2021. Call for emergency action to limit global temperature increases, restore biodiversity, and protect health. *The Lancet*, 398(10304): 939-941. doi: [10.1016/S0140-6736\(21\)01915-2](https://doi.org/10.1016/S0140-6736(21)01915-2).
- Bretschger, L., 2013. Climate policy and equity principles: fair burden sharing in a dynamic world. *Environ. Dev. Econ.*, 18: 517-536. doi: [10.1017/S1355770X13000284](https://doi.org/10.1017/S1355770X13000284)
- Claussen, E. & McNeilly, L., 1998. Equity & global climate change - the complex elements of global fairness. Pew Center on Global Climate Change, Arlington, VA 22201, USA. Pew Center Report October 29, 36pp. [www.c2es.org/document/equity-global-climate-change-the-complex-elements-of-global-fairness/](http://www.c2es.org/document/equity-global-climate-change-the-complex-elements-of-global-fairness/)
- Cook, J., Oreskes, N., Doran, P.T., Anderegg, W.R.L., Verheggen, B., Maibach, E.W., Carlton, J.S., Lewandowsky, S., Skuce, A.G. & Sarah, A., 2016. Consensus on consensus: a synthesis of consensus estimates on human caused global warming. *Environ. Res. Lett.*, 11(4): 048002. doi: [10.1088/1748-9326/11/4/048002](https://doi.org/10.1088/1748-9326/11/4/048002)
- FOEN, 2022. Switzerland's greenhouse gas inventory 1990-2019 - National inventory report 2021. Federal Office for the Environment FOEN, Bern, Switzerland. National Inventory Report and reporting tables (CRF). Submission of April 2021 under the United Nations Framework Convention on Climate Change and under the Kyoto Protocol CHE-2021-NIR, 643pp. [www.bafu.admin.ch/bafu/en/home/topics/climate/state/data/climate-reporting/latest-ghg-inventory.html](http://www.bafu.admin.ch/bafu/en/home/topics/climate/state/data/climate-reporting/latest-ghg-inventory.html) and <http://www.climate-reporting.ch/>
- Hoegh-Guldberg, O., Jacob, D., Taylor, M., Bindi, M., Brown, S., Camilloni, I., Diedhiou, A., Djalante, R., Ebi, K., Engelbrecht, F., Guiot, J., Hijioka, Y., Mehrotra, S., Payne, A., Seneviratne, S. I., T. A., Warren, R., & Zhou, G., 2018. Impacts of 1.5°C global warming on natural and human systems. In: Masson-Delmotte, V., Zhai, P., Pörtner, H. O., Roberts, D., Skea, J., Shukla, P. R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R., Connors, S., Matthews, J. B. R., Chen, Y., Zhou, Z., Gomis, M. I., Lonnoy, E., Maycock, T., Tignor, M., & Waterfield, T. (eds.). *Global warming of 1.5 °C - An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. IPCC with World Meteorological Organisation (WMO), and United Nations Environmental Program (UNEP): Geneva, Switzerland: 175-312 (in press). [www.ipcc.ch/report/sr15/](http://www.ipcc.ch/report/sr15/)
- IPCC, 2007. Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Cambridge University Press: Cambridge, UK. vii, 973pp. [www.ipcc.ch/report/ar4/wg2/](http://www.ipcc.ch/report/ar4/wg2/)
- IPCC, 2014a. Climate change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Field, C. B., Barros, V. R., Dokken, D. J., Mach, K. J., Mastrandrea, M. D., Bilir, T. E., Chatterjee, M., Ebi, K. L., Estrada, Y. O., Genova, R. C., Girma, B., Kissel, E. S., Levy, A. N., MacCracken, S., Mastrandrea, P. R., & White, L. L. (eds.). Cambridge University Press: Cambridge, UK and New York, NY, USA. xvi, 1131pp. [www.ipcc.ch/report/ar5/wg2/](http://www.ipcc.ch/report/ar5/wg2/)
- IPCC, 2014b. Climate change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Barros, V. R., Field, C. B., Dokken, D. J., Mastrandrea, M. D., Mach, K. J., Bilir, T. E., Chatterjee, M., Ebi, K. L., Estrada, Y. O., Genova, R. C., Girma, B., Kissel, E. S., Levy, A. N., MacCracken, S., Mastrandrea, P. R., & White, L. L. (eds.). Cambridge University Press: Cambridge, UK and New York, NY, USA. vi, 1133-1820. [www.ipcc.ch/report/ar5/wg2/](http://www.ipcc.ch/report/ar5/wg2/)
- IPCC, 2018. Global warming of 1.5 °C - An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Masson-Delmotte, V., Zhai, P., Pörtner, H. O., Roberts, D., Skea, J., Shukla, P. R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R., Connors, S., Matthews, J. B. R., Chen, Y., Zhou, Z., Gomis, M. I., Lonnoy, E., Maycock, T., Tignor, M., & Waterfield, T. (eds.). IPCC with World Meteorological Organisation (WMO), and United Nations Environmental Program (UNEP): Geneva, Switzerland: 630pp. (In press). [www.ipcc.ch/report/sr15/](http://www.ipcc.ch/report/sr15/)
- IPCC, 2019a. IPCC special report on climate change and land - An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems (SRCL). Shukla, P. R., Skea, J., Calvo Buendia, E., Masson-Delmotte, V., Pörtner, H.-O., Roberts, D. C., Zhai, P., Slade, R., Connors, S., van Diemen, R., Ferrat, M., Haughey, E., Luz, S., Neogi, S., Pathak, M., Petzold, J., Portugal Pereira, J., Vyas, P., Huntley, E., Kissick, K., Belkacemi, M., & Malley, J. (eds.). IPCC with World Meteorological Organisation (WMO), and United Nations Environmental Program (UNEP): Geneva, Switzerland. 1542pp. (In press). [www.ipcc.ch/srcl/](http://www.ipcc.ch/srcl/)
- IPCC, 2019b. IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC). In: Pörtner, H.-O., Roberts, D. C., Masson-Delmotte, V., Zhai, P., Tignor, M., Poloczanska, E., Minterbeck, K., Nicolai, M., Okem, A., Petzold, J., Rama, B., & Weyer, N. (eds.). IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC). IPCC with World Meteorological Organisation (WMO), and United Nations Environmental Program (UNEP): Geneva, Switzerland. i-xii, 755. In press. [www.ipcc.ch/report/srocc/](http://www.ipcc.ch/report/srocc/)
- IPCC, 2021. Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu & Zhou, B. (eds.). Cambridge University Press: In Press. [www.ipcc.ch/report/ar6/wg1/](http://www.ipcc.ch/report/ar6/wg1/)
- IPCC, 2022. Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. In: Pörtner, H.-O., Roberts, D. C., Tignor, M., Poloczanska, E., Minterbeck, K., Alegria, A., Craig, M., Langsdorf, S., S., L., Möller, V., Okem, A., & Rama, B. (eds.). Cambridge University Press: Cambridge, UK and New York, USA. 3056. [www.ipcc.ch/report/ar6/wg2/](http://www.ipcc.ch/report/ar6/wg2/)
- Le Quéré, C., Korsbakken, J. I., Wilson, C., Tosun, J., Andrew, R., Andres, R. J., Canadell, J. G., Jordan, A., Peters, G. P., & van Vuuren, D. P., 2019. Drivers of declining CO2 emissions in 18 developed economies. *Nature Climate Change*, 9(3): 213-217. doi: [10.1038/s41558-019-0419-7](https://doi.org/10.1038/s41558-019-0419-7)
- Mastrandrea, M.D., Field, C.B., Stocker, T.F., Edenhofer, O., Ebi, K.L., Frame, D.J., Held, H., Kriegler, E., Mach, K.J., Matschoss, P.R., Plattner, G.K., Yohe, G.W. & Zwiers, F.W., 2010. Guidance note for lead authors of the IPCC Fifth Assessment Report on consistent treatment of uncertainties. IPCC: Intergovernmental Panel on Climate Change, Geneva, Switzerland. Author Guidance, 5pp. [www.ipcc.ch/site/assets/uploads/2018/05/uncertainty-guidance-note.pdf](http://www.ipcc.ch/site/assets/uploads/2018/05/uncertainty-guidance-note.pdf)
- Seneviratne, S.I., X. Zhang, M. Adnan, W. Badi, C. Dereczynski, A. Di Luca, S. Ghosh, I. Iskandar, J. Kossin, S. Lewis, F. Otto, I. Pinto, M. Satoh, S.M. Vicente-Serrano, M. Wehner, and B. Zhou, 2021: Weather and Climate Extreme Events in a Changing Climate. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press. [www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_Chapter11.pdf](http://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter11.pdf)
- Vicedo-Cabrera, A.M., Scovronick, N., Sera, F., Royé, D., Schneider, R., Tobias, A., Astrom, C., Guo, Y., Honda, Y., Hondula, D.M., Abrutzyk, R., Tong, S., Coelho, M.d.S.Z.S., Saldiva, P.H.N., Lavigne, E., Correa, P.M., Ortega, N. V., Kan, H., Osorio, S., Kysely, J., Urban, A., Orru, H., Indermitte, E., Jaakkola, J.J.K., Rytli, N., Pascal, M., Schneider, A., Katsouyanni, K., Samoli, E., Mayvaneh, F., Entezari, A., Goodman, P., Zeka, A., Michelozzi, P., De donato, F., Hashizume, M., Alahmad, B., Diaz, M.H., Valencia, C.D.L.C., Overcenco, A., Houthuys, D., Ameling, C., Rao, S., Di Ruscio, F., Carrasco-Escobar, G., Seposo, X., Silva, S., Madureira, J., Holobaca, I.H., Fratianni, S., Acquaforta, F., Kim, H., Lee, W., Iniguez, C., Forsberg, B., Ragettli, M.S., Guo, Y.L.L., Chen, B.Y., Li, S., Armstrong, B., Aleman, A., Zanobetti, A., Schwartz, J., Dang, T.N., Dung, D. V., Gillett, N., Haines, A., Mengel, M., Huber, V. & Gasparri, A., 2021. The burden of heat-related mortality attributable to recent human-induced climate change. *Nat. Clim. Chang.*, doi: [10.1038/s41558-021-01058-x](https://doi.org/10.1038/s41558-021-01058-x)
- UNFCCC, 2015. Paris Agreement. Climate Change Secretariat, UNEP's Information Unit for Conventions (IUC), Bonn, Germany, 30. [unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](http://unfccc.int/sites/default/files/english_paris_agreement.pdf) and available from [unfccc.int/process-and-meetings/the-paris-agreement/](http://unfccc.int/process-and-meetings/the-paris-agreement/)



## Appendix II: Contributors

**Prof. Dr. Sonia I. Seneviratne** is Professor of Land-Climate Dynamics at the Institute for Atmospheric and Climate Science (IAC) of the Swiss Federal Institute of Technology Zurich (ETH Zurich), Switzerland.<sup>53</sup> Her research focuses on climate extremes and land-climate interactions. She investigates the processes leading to droughts and heatwaves, the impact of land processes and land cover changes on regional climate, and their changes with global warming. Prof. Seneviratne was a Coordinating Lead Author of the 2021 IPCC's Sixth Assessment Report (AR6), the Physical Science Basis, in which she coordinated Chapter 11: *Weather and climate extreme events in a changing climate*<sup>54</sup>. She was previously also a Lead Author of the 2018 Intergovernmental Panel on Climate Change (IPCC) Special Report *Global Warming of 1.5°C*<sup>55</sup> and a Coordinating Lead Author of the 2012 IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX). She also contributed to other IPCC reports<sup>56</sup>.

Prof. Seneviratne studied at the University of Lausanne (Biology), ETH Zurich (Environmental Physics) and the Massachusetts Institute of Technology (Guest student, Parsons Laboratory). She completed an MSc in Environmental Physics and a PhD thesis in Climate science at ETH Zurich. She has published more than 200 peer-reviewed articles and is listed among the Highly cited researchers of Web of science (Clarivate Analytics/Thomson Reuters). She has received several awards for her research, among others the Macelwane Medal of the American Geophysical Union, a consolidator grant of the European Research Council and the Hans-Oeschger Medal of the European Geosciences Union.<sup>57</sup>

**Prof. Dr. Andreas Fischlin** is Professor emeritus for Terrestrial Systems Ecology at the Institute of Biogeochemistry and Pollutant Dynamics (IBP) of ETH Zurich.<sup>58</sup> Since its formation in 1988, he was head of the Terrestrial Systems Ecology Group<sup>59</sup> that belongs to the Department of Environmental Systems Science of ETH Zurich. His main research interests are modeling of ecosystems, in particular forest ecosystems in a changing climate, the ecology of population cycles, and the development of a theory and methodology for the structured modeling of complex ecological systems. Since 1992 he has served the IPCC in numerous author roles<sup>60</sup> including that of a Coordinating Lead Author in the Fourth Assessment Report which made him a co-recipient of the Nobel Peace Prize 2007. Currently, Prof. Fischlin is a Vice-Chair of IPCC Working Group II (which assesses the impacts, adaptation and vulnerability related to climate change) for the Sixth Assessment cycle. He held more than 200 public lectures worldwide since 2007 focusing on IPCC assessments from all three working groups.

<sup>53</sup> The IAC focuses on atmospheric and climate processes, including links to the hydrosphere, cryosphere, and biosphere, see for more information [www.iac.ethz.ch](http://www.iac.ethz.ch).

<sup>54</sup> In the IPCC AR6 report "The physical climate basis" released in August 2021, Prof. Seneviratne was a Coordinating Lead Author of Chapter 11 ([https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_Chapter11.pdf](https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter11.pdf)), and was also involved as author in the Summary for Policymakers and the Technical Summary of the report.

<sup>55</sup> In the IPCC SR15 report, she was a Lead Author of Chapter 3, the *Impacts of 1.5°C of Global Warming on Natural and Human Systems*, and also an author of the Summary for Policymakers see [https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15\\_Full\\_Report\\_Low\\_Res.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_Low_Res.pdf).

<sup>56</sup> E.g. scoping meetings of IPCC Special Report on Climate Change and Land, and IPCC AR6 Synthesis report.

<sup>57</sup> For a CV, please see: [www.iac.ethz.ch/people/seneviratne](http://www.iac.ethz.ch/people/seneviratne).

<sup>58</sup> The IBP's mission is to advance the understanding of biogeochemical cycles and processes in natural and man-made environments and potential responses to human activity and global change, see <https://ibp.ethz.ch/>.

<sup>59</sup> The Terrestrial Systems Ecology Group was an interdisciplinary group, studying the dynamics of terrestrial ecosystems as impacted by environmental changes such as climatic change.

<sup>60</sup> These roles were Coordinating Lead Author IPCC 2<sup>nd</sup> and 4<sup>th</sup> Assessment Reports (SAR, AR4), IPCC Review Editor (3<sup>rd</sup>, 5<sup>th</sup>, and 6<sup>th</sup> Assessment Reports (TAR, AR5, AR6) plus the IPCC Special Report Global Warming of 1.5°C (SR1.5)), Lead Author IPCC Good Practice Guidance in Land Use, Land-Use Change and Forestry (LULUCF), Scientific Steering Committee Member (SSCM) and Contributing Author IPCC Special Report on Oceans and Cryosphere (SROCC), Contributor to IPCC Special Report on climate change and land (SRCCL), SSCM and Contributing Author IPCC Synthesis Report of AR6 (SYR, in prep.), Expert Reviewer SAR, TAR, AR4, AR5, AR6, IPCC Special Report LULUCF, IPCC Special Report Managing the risks of extreme events and disasters to advance climate change adaptation (SREX), SR1.5, SRCCL, SROCC



Before his supervising role in IPCC, Prof. Fischlin has advised the Swiss delegation in all United Nations Framework Convention on Climate Change negotiations for 17 years. As part of those duties, he has e.g. chaired the Structured Expert Dialogue forming a new interface between science and policy, an interface which markedly influenced the Paris Agreement. Prof. Fischlin studied at ETH Zurich biology (Master with distinction) as well as systems and control theory (Post-graduate diploma). There he graduated with a doctorate in population ecology (silver medal for exceptional PhD theses). He has published over 120 scientific works including articles in peer reviewed scientific journals and book contributions and is winner of several awards for research and teaching. He was member of various academic and advisory boards of the Swiss Academy of Sciences and Federal Departments of the Swiss government, e.g. Advisory Body on Climate Change (OcCC).<sup>61</sup>

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<sup>61</sup> For a full cv, please see [www.sysecol2.ethz.ch/staff/af/CV/pdfs/AF-CV.pdf](http://www.sysecol2.ethz.ch/staff/af/CV/pdfs/AF-CV.pdf), for the contributions to IPCC assessment reports see [www.sysecol.ethz.ch/people/ipcc-authorship.html](http://www.sysecol.ethz.ch/people/ipcc-authorship.html)