



## Hybrid Cities Chess Cup 2021

Malmö, Bratislava, Barcelona and Oslo compete in the first official hybrid tournament. Each team gathers in their respective venue with physical boards, however the moves are transmitted digitally.

FIDE aims to find the optimal setup for a hybrid tournament. The main reason is the pandemic, which has cancelled most chess tournaments.

A valuable benefit is however also to reduce travel and its climate impact. As an example, Malmö can, in the Swedish league, play all teams over the board, except a possible match against a club far up in north (1850 km).

Calculating the reduced CO<sub>2</sub>-emissions for a hybrid tournament requires a lot of assumptions. Some are hard to estimate, and the aim with the calculations is not to be exact.<sup>1</sup> However, it gives a rough picture of what matters.

Cities Chess Cup (CO <sub>2</sub> -equivalents)			
	In Bratislava	Hybrid event	Assumptions
Flights <sup>2</sup> Barcelona	1318	-	5 players per team.
Flights Malmö	1521	-	Travelling from Copenhagen.
Flights Oslo	1759	-	All teams fly to Vienna, close to Bratislava
Cars & public transport	120	20	Half by car (no co-riding), half by public transport. 10 km to city-venue, 15 km to airport. Car: 120 g/km.
Hotel <sup>3</sup>	425	-	Average hotel in Bratislava, 15 persons.
Venue <sup>4</sup>	160	320	50 m <sup>2</sup> /venue, or 100 m <sup>2</sup> with all teams in one city
Electricity & cameras <sup>5</sup>	-	3	4 extra laptops & 5 cameras per venue = 6kWh
<b>Sum</b>	<b>5303 kg</b>	<b>343 kg</b>	

**Total reduction:** 4960 kg CO<sub>2</sub>-equivalents, about 9 months total emission for an average EU citizen.

### Next step: green live streams

With the online tournaments attracting a great number of viewers, the climate impact of the live streams is far bigger than anything else. Hybrid Cities Chess Cup will have one live stream per team, 5 hours x 3 rounds. Malmö estimated (cautiously) an average of 100 viewers on its Twitch stream. With a few assumptions, it is possible to calculate its climate impact

- The average resolution on Twitch is 720p, which makes 1,3 GB/hour.
- The CO<sub>2</sub> emission depends on what kind electricity the servers use, as well as the viewers home country, device (computer/smartphone) and electricity subscription. The estimations for how much electricity streaming generate also vary a lot. The International Energy Agency uses 0,036 kg CO<sub>2</sub> eq per hour streaming.<sup>6</sup>

**Summing up:** 54 kg CO<sub>2</sub> eq for Malmö. However, the Opera Euro Rapid's 5,2 millions of hours watching makes up to 187 000 kg CO<sub>2</sub>, equivalent to melting 561 m<sup>3</sup> of arctic ice<sup>7</sup>. There are a few ways to handle that:

- Making the default option to watch the games without video
- Encouraging viewers that are mainly interested in the voice to play the video with low resolution
- Working for green servers as alternatives to Twitch and YouTube

Awaiting that, the best Hybrid Cities Chess Cup can do might be to offset for the CO<sub>2</sub>-emission generated by the streams. Malmö will do that. Together with the emissions that a hybrid event avoids, that's a good start.

*Axel Smith, 15/2 2021*

<sup>1</sup> In addition, I have no education to make such calculations, so there may very well be mistakes.

<sup>2</sup> <https://www.icao.int/environmental-protection/Carbonoffset/Pages>

<sup>3</sup> <https://travellandclimate.org>

<sup>4</sup> <https://educatorsinvr.com/2020/03/09/green-conference-reducing-carbon-emissions-with-a-virtual-conference/>

<sup>5</sup> <https://michaelbluejay.com/electricity/computers.html>

<sup>6</sup> <https://www.iea.org/commentaries/the-carbon-footprint-of-streaming-video-fact-checking-the-headlines>

<sup>7</sup> <https://www.theguardian.com/environment/2016/nov/03/your-carbon-footprint-destroys-30-square-metres-of-arctic-sea-ice-a-year>