Carbon Footprint
of the 14th International Coral Reef Symposium 2021:

Based on the green strategy, the organising committee is striving to implement the 14th ICRS 2021 VIRTUAL as sustainable and climate-neutral as possible. All unavoidable CO_2 emissions caused by the implementation of the event should be offset through suitable climate protection projects. To assess the magnitude of the emissions caused, a CO_2 emission balance was carried out.

The balancing of the carbon footprint of the ICRS 2021 is based on the Greenhouse Gas Protocol (hereinafter GHG Protocol), the most widely used standard for greenhouse gas accounting. This system of accounting is comprehensible, which makes the results comparable. (Note: All information shown in the balance relates to CO_2 equivalents (hereinafter CO_2e).)
Climate-friendly events (or activities) follow the basic principle of the following chain of effects: 1. avoid, 2. reduce, 3. compensate. This applies to both the use of energy and the consumption of resources and materials.

The original planning and design of the 14th ICRS was therefore geared towards avoiding unnecessary emissions from the outset, e.g., through energy-efficient building and conference technology, waste avoidance, and climate-friendly on-site catering. Unavoidable emissions such as those generated by an international in-person event, in particular, due to air travel, are to be compensated afterwards through a portfolio of climate protection projects. These objectives will all be considered for the organization of the 15th ICRS 2022 in-person event, scheduled to take place in Bremen from 3 through 8 July, 2022.

Due to the global pandemic, the 14th ICRS will take place as a virtual event. Thus, the CO_2e footprint of the conference will be reduced, since attendees will not travel.

According to the GHG protocol, a distinction is made between three areas in greenhouse gas accounting, so-called Scopes 1, 2, and 3. Scope 1 emissions refer to direct emissions produced by the burning of fossil fuels in a company's own facilities, buildings, or through its use of vehicles. Scope 2 emissions include indirect energy-related emissions, generated by the supply of electricity and district heating or cooling elsewhere, e.g., in a power plant. All other emissions are referred to as Scope 3 emissions. These include all indirect emissions caused by the third party activities, e.g., business travel, waste generation, or food consumption.
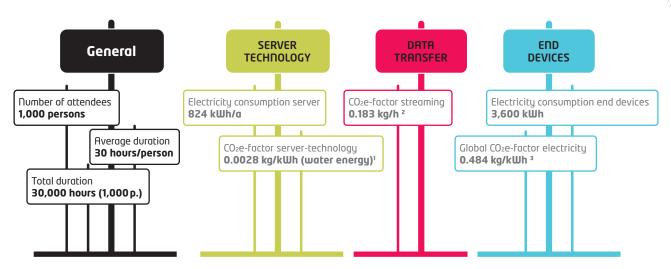
The following emission sources are classified and considered as relevant at a virtual event (the GHG Protocol recommends limiting these to climate-relevant activities):
• data centers / server technology
• data networks (locally specific)
• power consumption of end devices

The emissions from data streaming were calculated using an average value provided by the German Federal Environment Agency (183 g/h). Since we do not know anything specific about the data networks in the attendees' individual countries, we summarized the electricity consumption of end devices by applying the global emission factor for electricity (484 g/kWh). The number, type, and performance of the end devices are based on assumptions.

The IT infrastructure on an international level is very heterogeneous and dynamic, e.g., the expansion of cellular networks, fiber optic technology or the equipment of the data centers is at different stages of progress or development. To trace specific and local deviations at international conferences requires considerable effort, which is not in proportion to the benefits. Therefore, the accounting includes a safety margin of 15% for the calculation of CO_2e emissions to compensate for uncertainties.

The calculations are based on the following data and assumptions:

General	SERVER TECHNOLOGY	DATA TRANSFER	END DEVICES

Number of attendees
1,000 persons

Average duration
30 hours/person

Total duration
30,000 hours (1,000 p.)

Electricity consumption server
824 kWh/a

CO_2e-factor server-technology
0.0028 kg/kWh (water energy)[1]

CO_2e-factor streaming
0.183 kg/h [2]

Electricity consumption end devices
3,600 kWh
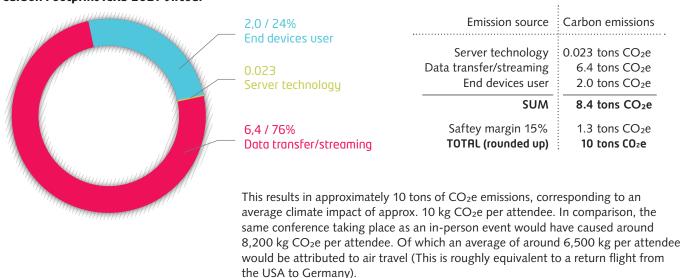
Global CO_2e-factor electricity
0.484 kg/kWh [3]

[1] https://www.plutex.de/news/neu-green-energy-zertifikat-von-plutex
[2] https://www.umweltbundesamt.de/presse/pressemitteilungen/video-streaming-art-der-datenuebertragung
[3] https://www.iea.org/commentaries/tracking-the-decoupling-of-electricity-demand-and-associated-CO2e-emissions

For the 14th ICRS Virtual, the emissions will be incurred locally through the provision and implementation of conference technology (server technology), and decentralized for the attendees through the locally-specific IT infrastructure (networks) and the personal equipment and use of end devices (computers). The local server technology will be provided in a climate-neutral way through the use of efficient server technology and the purchase of electricity from renewable energy sources (hydropower Germany). There are almost no emissions at this point. Any other emissions are fraught with uncertainties, but were calculated in a very conservative way.

The overall results of CO_2e for the 14th ICRS 2021 Virtual are as follows:

Carbon Footprint ICRS 2021 Virtual

2,0 / 24%
End devices user

0.023
Server technology

6,4 / 76%
Data transfer/streaming

Emission source	Carbon emissions
Server technology	0.023 tons CO_2e
Data transfer/streaming	6.4 tons CO_2e
End devices user	2.0 tons CO_2e
SUM	**8.4 tons CO_2e**
Saftey margin 15%	1.3 tons CO_2e
TOTAL (rounded up)	**10 tons CO_2e**

This results in approximately 10 tons of CO_2e emissions, corresponding to an average climate impact of approx. 10 kg CO_2e per attendee. In comparison, the same conference taking place as an in-person event would have caused around 8,200 kg CO_2e per attendee. Of which an average of around 6,500 kg per attendee would be attributed to air travel (This is roughly equivalent to a return flight from the USA to Germany).

All conference recordings will be available in a digital archive for a year. The balancing of this data volume will only be possible after the conference. The quality of data transmission networks and the resolution of end devices have the highest impact in terms of hosting and attending a video conference. If you want to save CO_2e emissions, it is best to stream in a fiber optic network, turn off your own video during an oral presentation, and reduce the display resolution of the transmission. Modern and energy-efficient computer technology round off the climate-friendly participation in the 14th ICRS 2021.

Bremen, July 2, 2021, p.p. Silke Strüber, beks EnergieEffizienz

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