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Climate sustainability in the academic system - the why and the how

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The climate crisis at 1.1 degrees

Photograph: Christoph Reichwein/AP,
retrieved from https://www.theguardian.com/environment/gallery/2021/jul/15/flash-floods-cause-havoc-across-europe-in-pictures

Photograph: Anadolu Agency/Getty Images, retrieved from
https://www.theguardian.com/world/2021/aug/05/people-dead-as-wildfires-continue-to-rage-across-southern-europe

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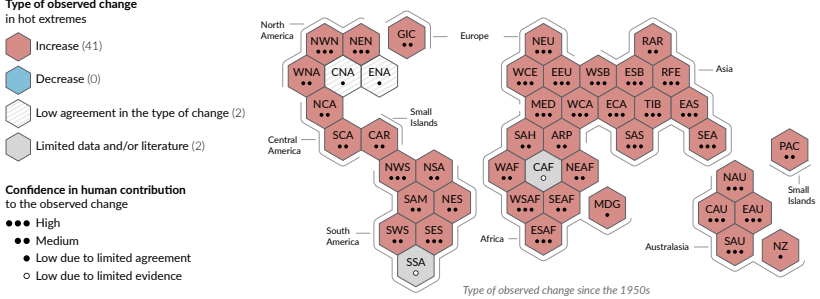
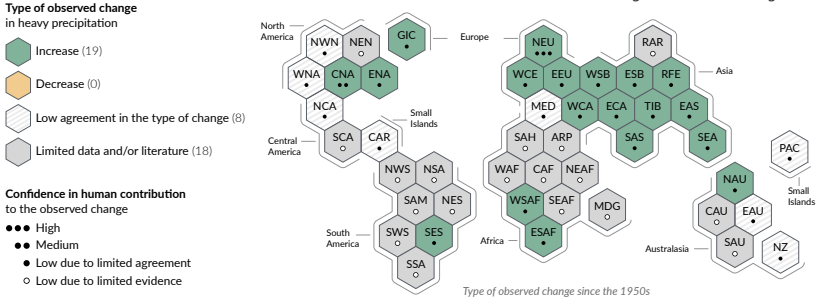
Climate change is already affecting every inhabited region across the globe with human influence contributing to many observed changes in weather and climate extremes

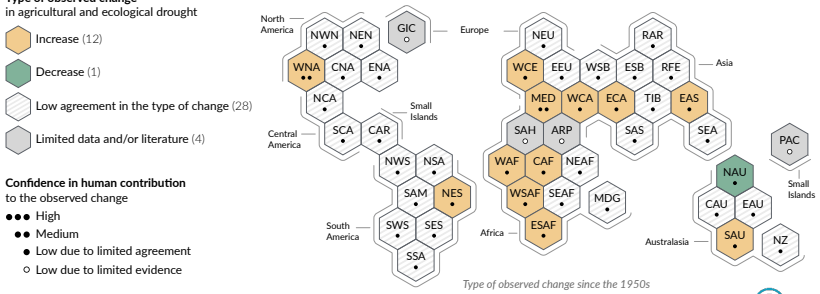
a) Synthesis of assessment of observed change in **hot extremes** and confidence in human contribution to the observed changes in the world's regions



b) Synthesis of assessment of observed change in **heavy precipitation** and confidence in human contribution to the observed changes in the world's regions



c) Synthesis of assessment of observed change in **agricultural and ecological drought** and confidence in human contribution to the observed changes in the world's regions



The climate crisis

- IPCC (2018):

420 Gigatons CO_2 emissions ``remaining'' for 66 % chance to limit global warming below 1.5 degrees

- Per person per year until 2050: ~ 1.5 tons "budget"

Climate sustainability of the academic system

- Individual researchers
- Students
- Universities
- Research institutes
- Funding organizations
- Conference organizers
- Academies, learned societies
- Ranking agencies
- Policy makers

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Both:
As individual actors
and organizations who set framework conditions for individuals

Cultural change requires change in individual behaviors
and changes in framework conditions, norms and incentives

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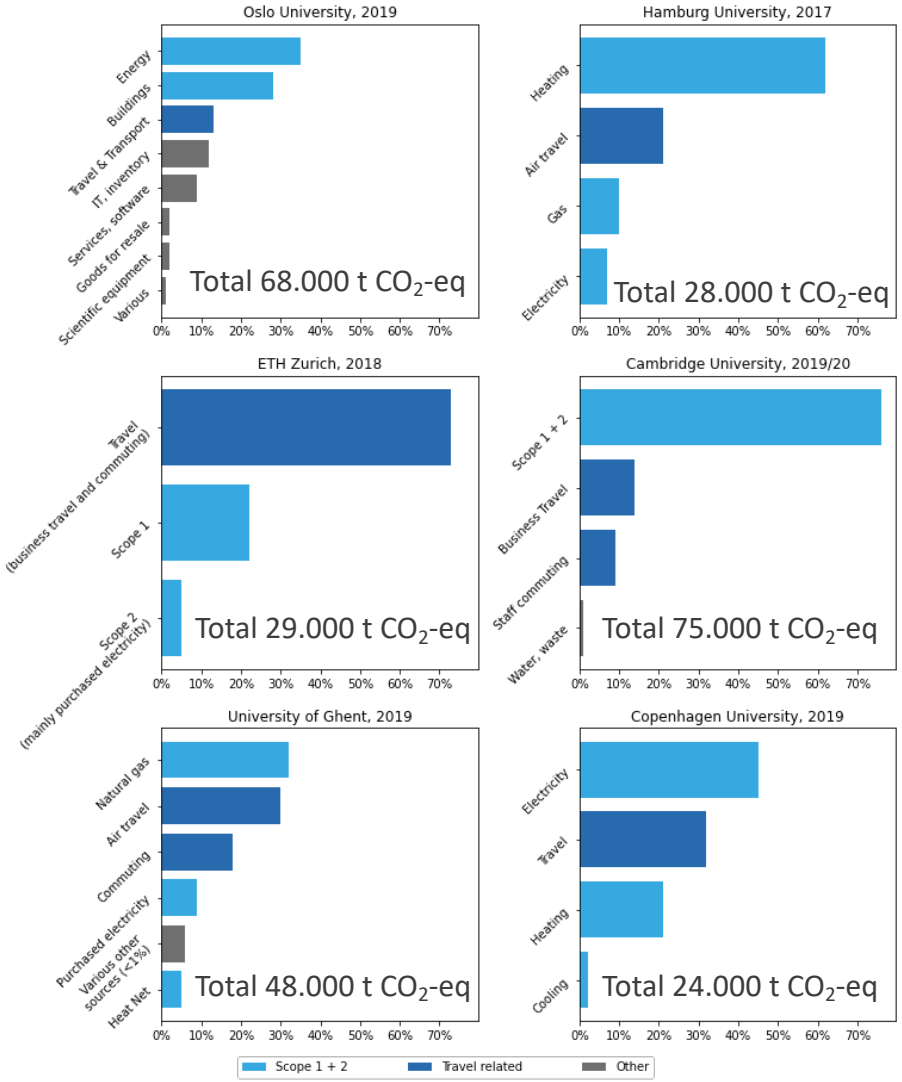
Climate impact of academia in numbers - Universities



- Scope 1: direct emissions
- Scope 2: indirect emissions associated with purchase of electricity & heating
- Scope 3: all other indirect emissions

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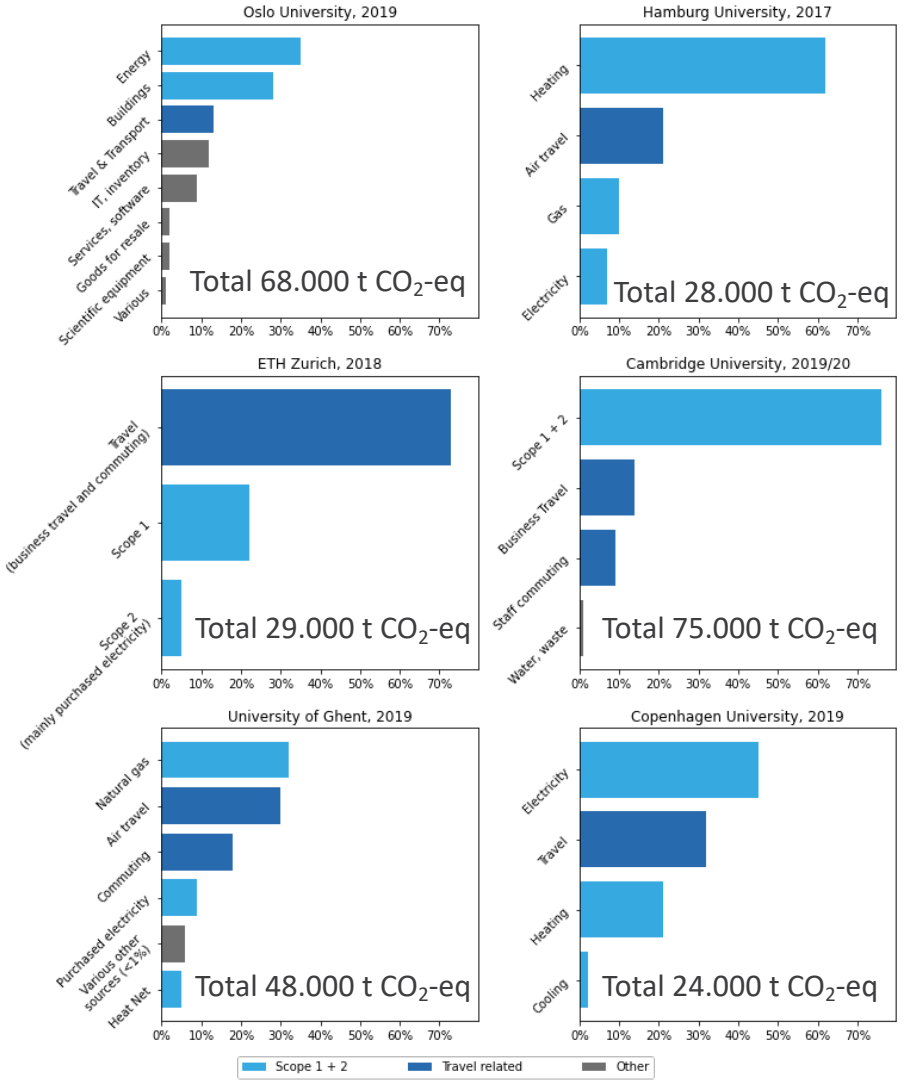
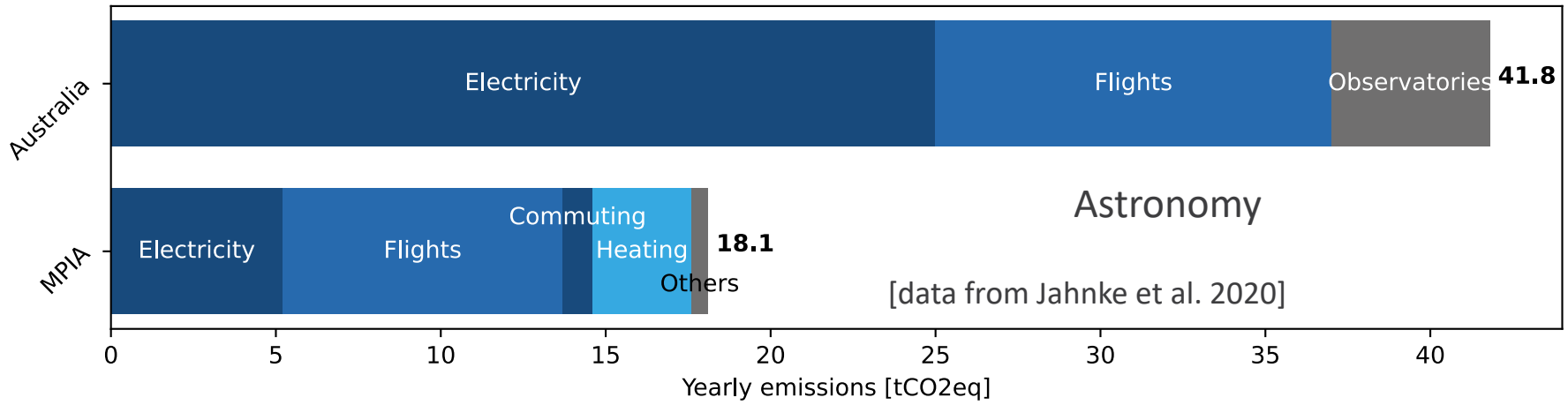


- Scope 1: direct emissions
- Scope 2: indirect emissions associated with purchase of electricity & heating
- Scope 3: all other indirect emissions

- Typical main sources:
  - electricity (unless ”green” provider or on-campus solar/wind) & heating
  - Travel
- Average per staff member ~ 5 t CO_2-eq/year
- Reports prerequisite to take meaningful action
- Lack of standardized reporting & (typically) incompleteness of scope 3

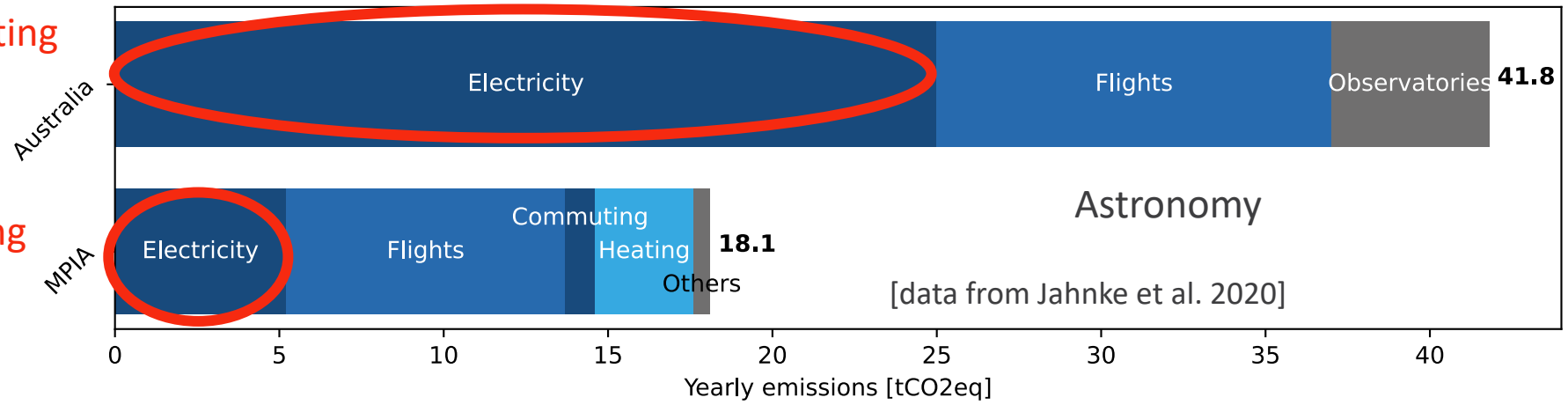
Climate impact of academia in numbers – Research institutes



Climate impact of academia in numbers – Research institutes

88 % from computing

75-90 % from computing



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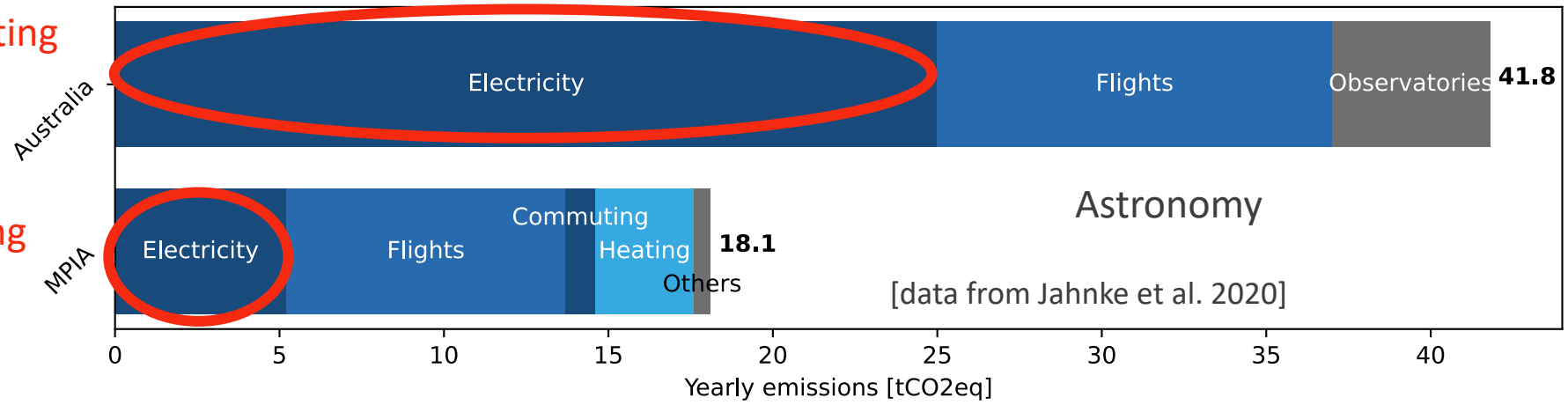

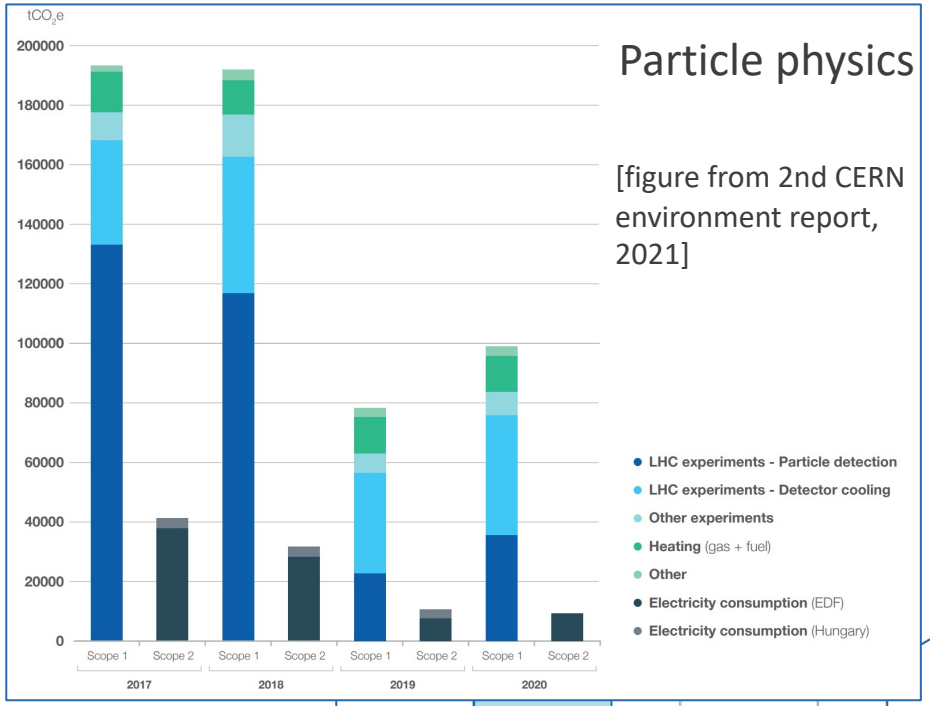

Particle physics

[figure from 2nd CERN environment report, 2021]

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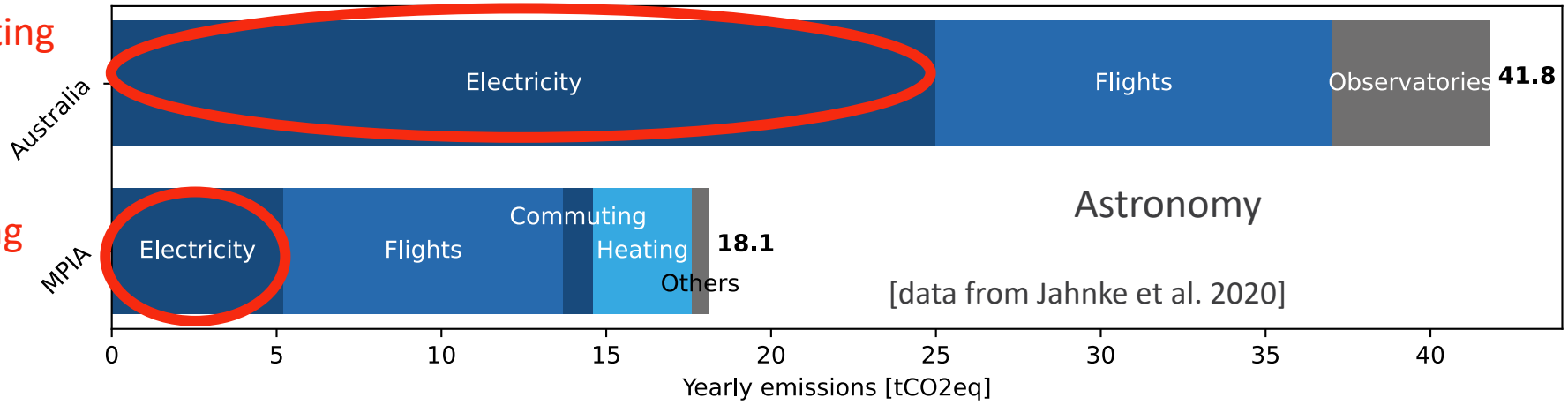
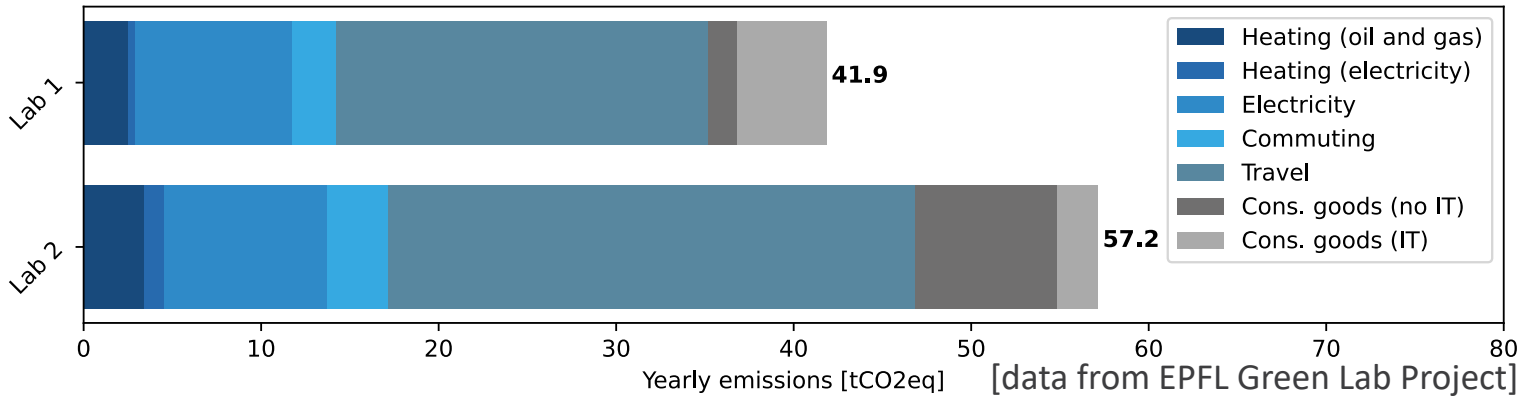


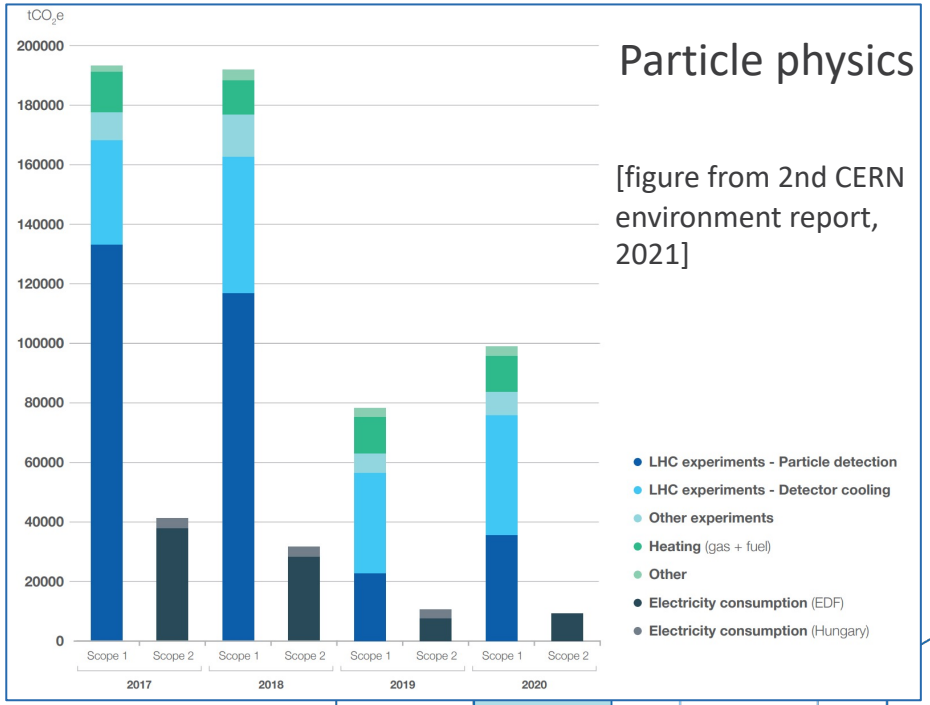
Astronomy

[data from Jahnke et al. 2020]

Life sciences



[data from EPFL Green Lab Project]



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Adshead et al., 2021:
27.5 Mio t CO_2-eq emissions from clinical trials
~ 20 % from air travel

Climate impact of academia in numbers - conferences

- Typically ~ 1 t CO_2-eq emissions per participant from air travel

  [Spinellis, Louridas, PLoS ONE 8(6) (2013) e66508]

- Often 10 - 20 % of participants cause > 50 % of emissions

- Virtual vs. in-person: 94 % (Tao et al. 2021) to 98 % (Duane et al. 2021) reduction in emissions

- Choice of conference location: ~ 20 % emissions reduction by optimizing location for 4 examples [Stroud, Feeley, Ecography 38: 402–404, 2015]

Climate impact of academia in numbers - conferences

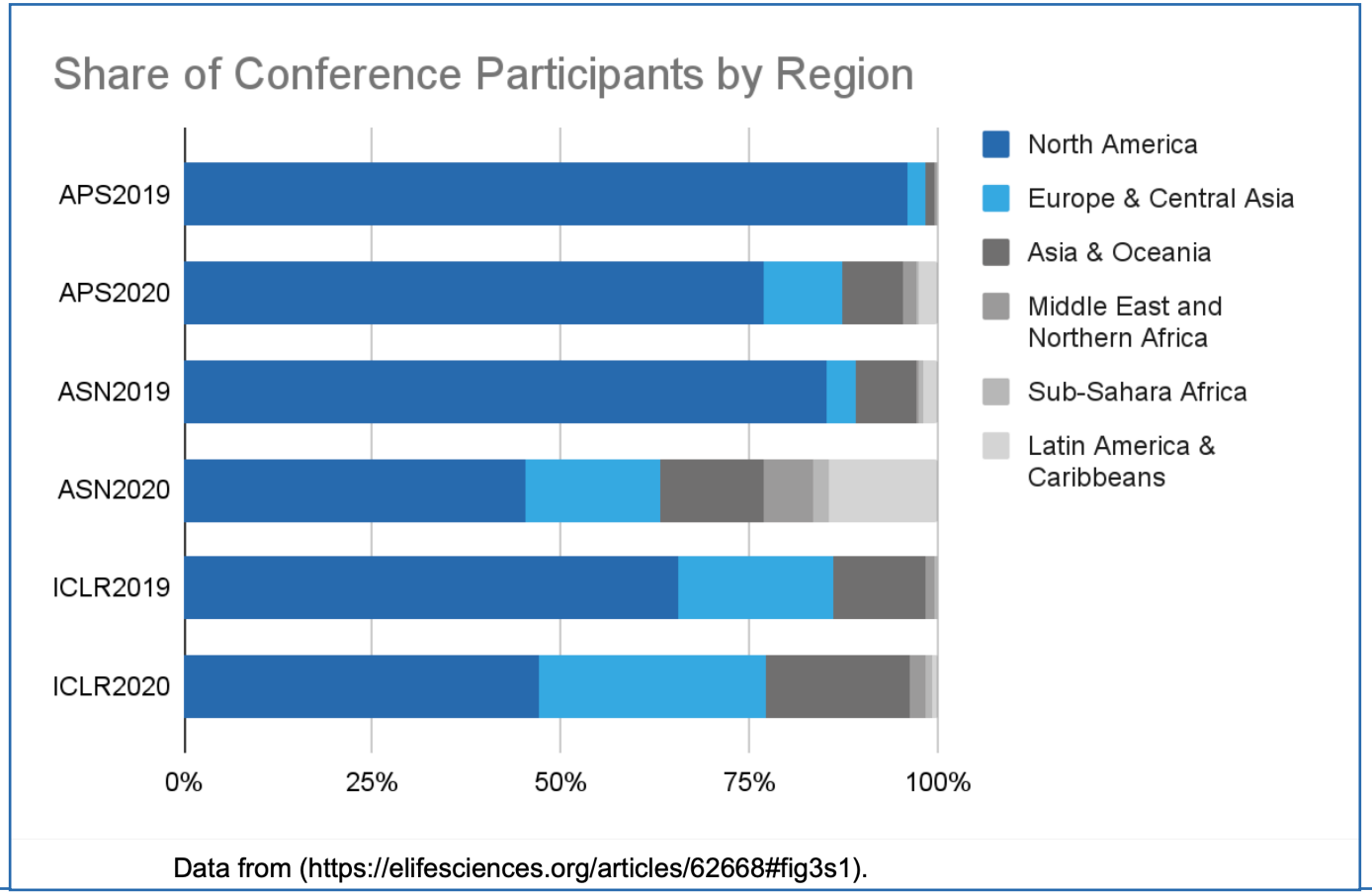
Co-benefit: Increased inclusivity of virtual/hybrid events:

2019 installments:

in person

2020 installments:

virtual



Data from (https://elifesciences.org/articles/62668#fig3s1).

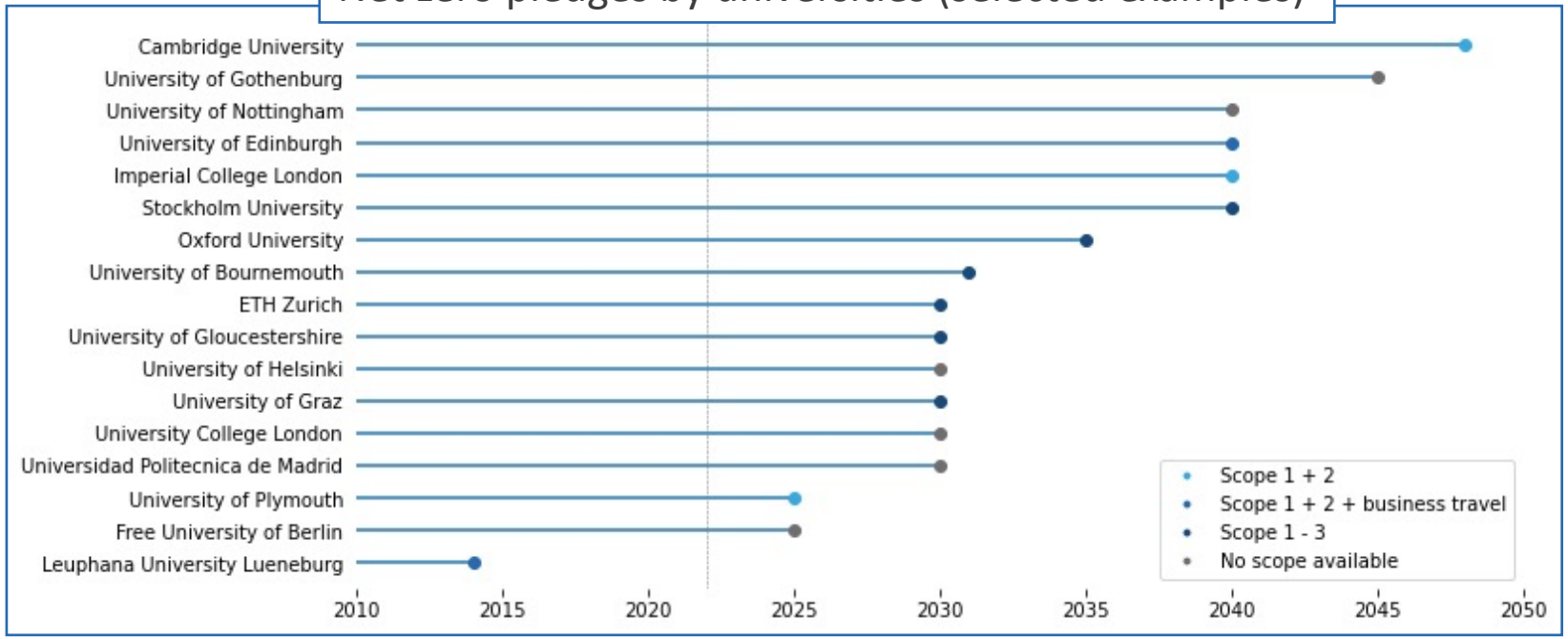
Current trends – some examples

Alliance of Science organizations in Germany (conference of university rectors, national academy Leopoldina,
science funders (DAAD, DFG, Humboldt), associations of research institutes (Max Planck, Leibniz, Helmholtz)):
Climate neutrality by 2035

Research fields (examples):
Climate sustainability papers in astronomy (2019…), neuroscience (2021), particle physics (2022)

Various initiatives to reduce flying in academia or refrain from flights under 1000 km

Net zero pledges by universities (selected examples)



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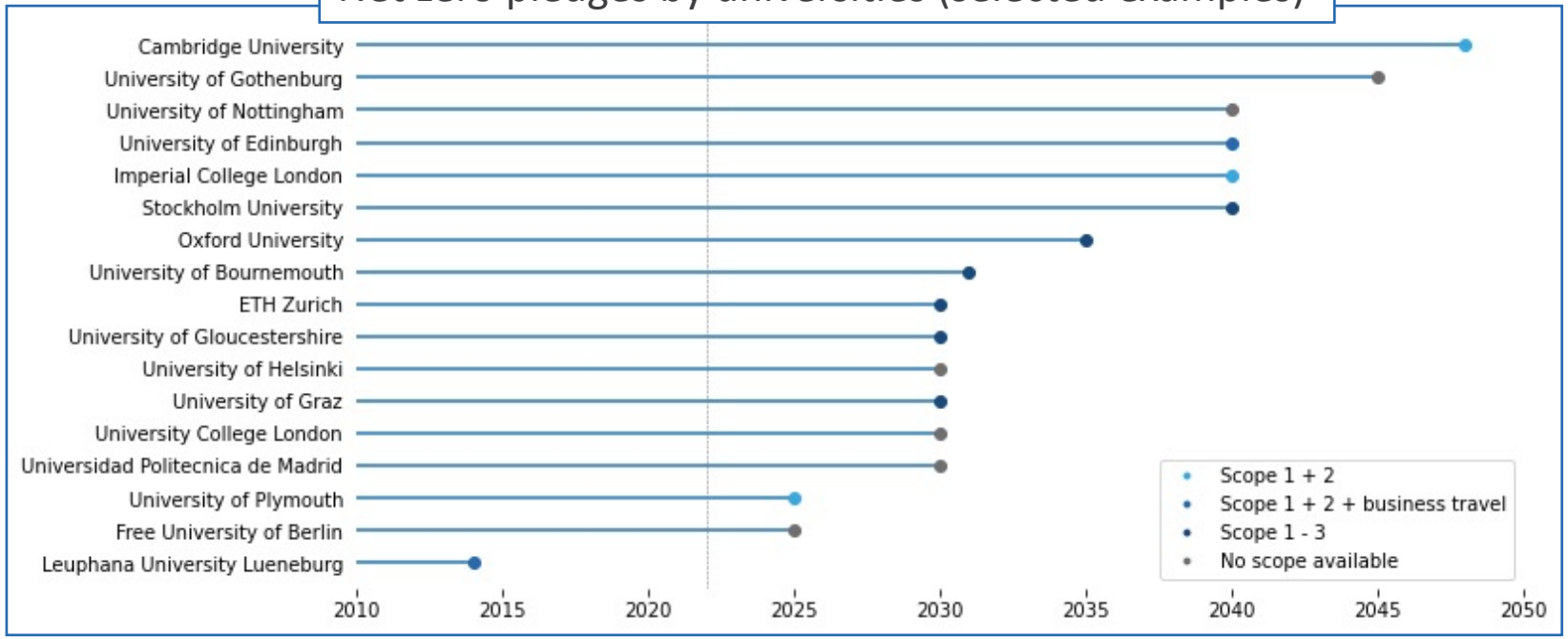

What is needed next?

- Going beyond initiatives by individual actors
- Broad dialogue with all stakeholders to transform academic system to be climate sustainable

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Pathways Towards Sustainability and Trustworthiness

#TransformingScience

11 & 12 May 2022
Brussels

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- When you are in Gallery View, right-click on any participant that has their video off. Choose “Hide non-video participants” to hide all users with their video off.

- Post your questions in the chat; audience questions will be taken in the second part of the discussion.

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