



CO₂ Reduction in Arctic Science

General Assembly INTERACT III
Station Managers' Forum IV
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Kilpisjärvi Biological Station and Online
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Carbon footprint

- In order to limit global warming to 1.5°C, **we must reduce our carbon footprint to around 2 - 2.5 t CO₂e per year per capita by 2030**, and to 0.7 t CO₂ by 2050 (*UNEP 2020*)
- Aviation accounts for 2.8% of global CO₂ emissions (*IEA 2020*); including high altitude effects, revised estimation is higher
- Scientists and academia have a higher carbon footprint than average population
→ Academic flights account for the largest share of carbon-intensive activities
- For our individual carbon footprint, travel has the highest impact

Example:

Max Planck Institute for Astronomy in Heidelberg, Germany (2018): 18.1 t CO₂e per researcher (*Jahnke et al., 2020*)

Pocket guide: CO₂ Emissions in Arctic Science

- Focus on travel
 1. Fieldwork
 - Travel to the Arctic
 - Field site access
 - Remote Sensing and Virtual Access
 - Living in the Arctic
 - Environmental costs of data and electronics
 2. Scientific life
 - Conferences and scientific gathering
 - How to decarbonize conference travel

Example: Longyearbyen

Energy supply emits ca. 80000 tonnes CO₂ annually (*Rud et al., 2018*)

→ Highest CO₂ emitter per capita in the world with ca. 40 tonnes per capita

Norway: ca. 7 tonnes per capita
UK: ca. 5.5 tonnes per capita



BUT...

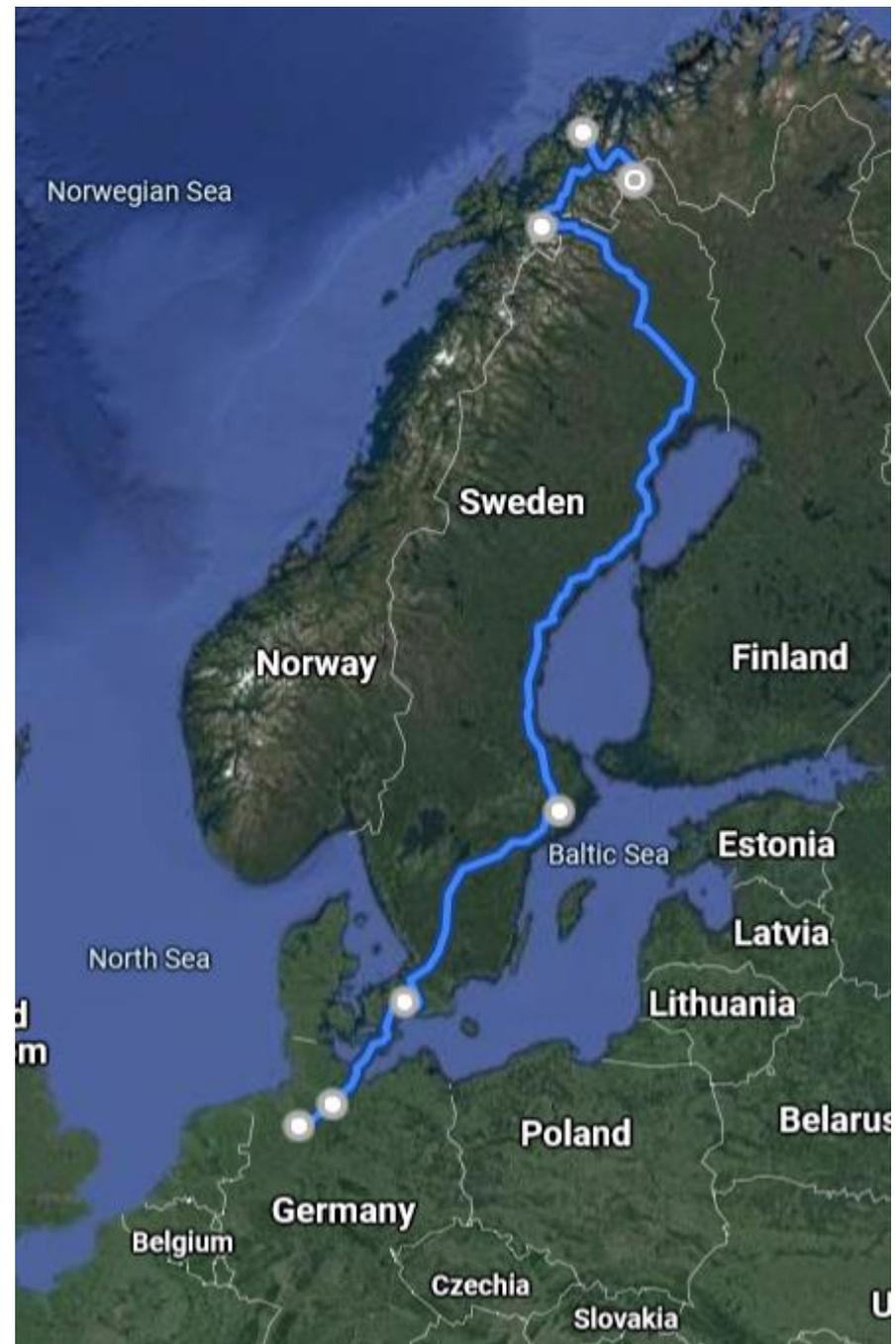
...IT'S NOT SO EASY...

BY TRAIN (AND BUS) TO KILPISJÄRVI

ONE WAY

Bremen – Hamburg – Copenhagen –
Stockholm – Narvik – Tromsø –
Kilpisjärvi (ca. 2800 km)

- Ca. 43 hours travel time without transfer time/overnight stays
- Ca. 190€ for tickets (without hotel costs)

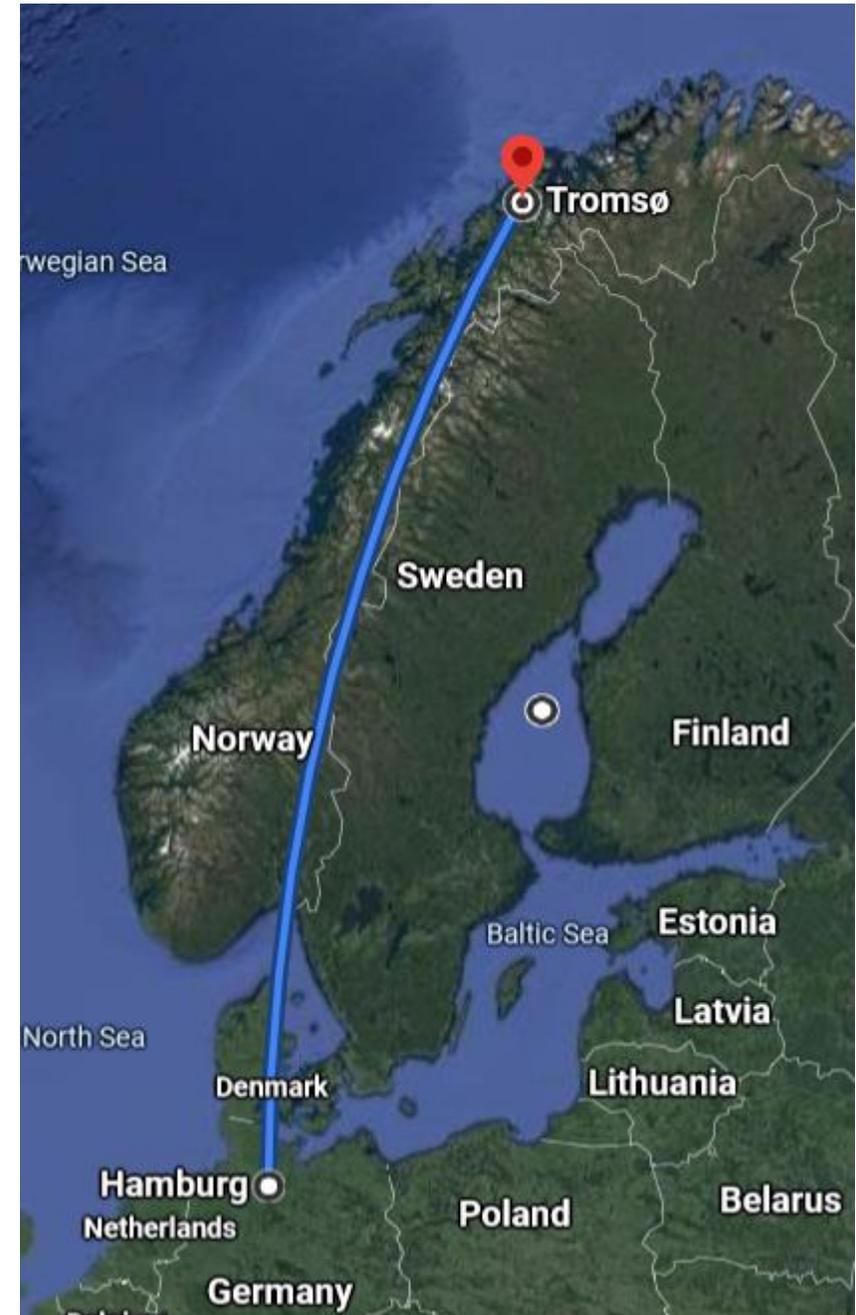


BY PLANE TO KILPISJÄRVI

ONE WAY

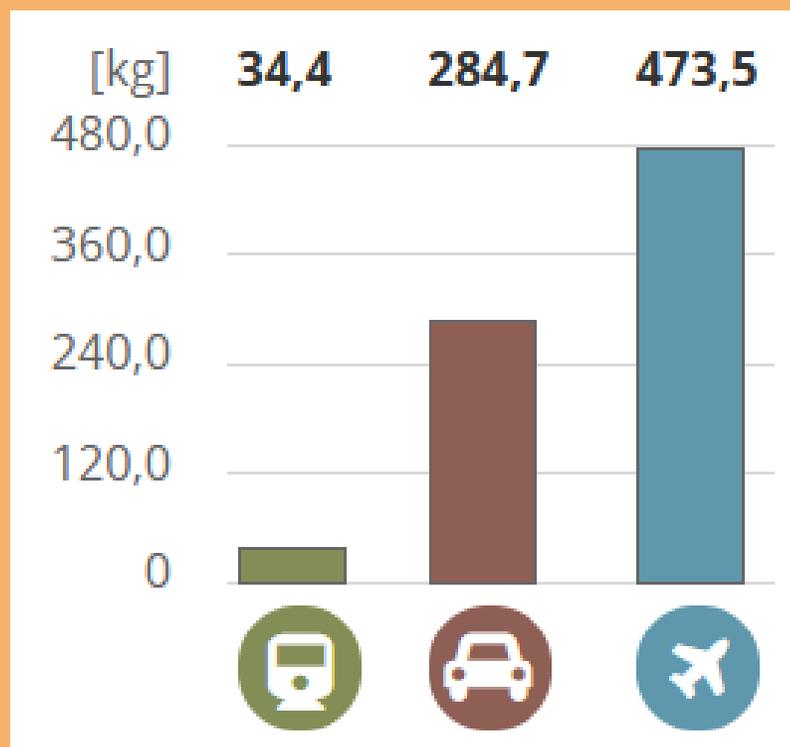
Bremen – Hamburg (Train) –
Hamburg – Oslo – Tromsø –
Kilpisjärvi

- Ca. 10 hours travel time
- Ca. 100 – 180€



WHAT TO CHOOSE?

Ecopassenger calculates for a trip
Hamburg – Narvik (CO₂ in kg)



PLANE

- *Atmosfair* calculates for a trip Hamburg - Tromsø: 406 kg CO₂

TRAIN

- *Engineer toolbox* calculates for a trip of 2800 km: 13.57 kg CO₂ (for low CO₂ el) and 60.6 kg CO₂ (for medium CO₂ el)

WHAT TO CHOOSE?

PLANE

- Comfortable way of travel
- Time saving
- High carbon footprint

ONLINE

- Many advantages and disadvantages
- “Conference feeling”

TRAIN

- Additional costs
 - detailed planning
 - more costs
 - more time
- Travel as experience/adventure
- Small carbon footprint

How to conduct science in future?

- Get the institutions involved
- CO₂ Compensation
- Building „resilient Arctic Science“ (*Petrov et al., 2020*)
 - community relevant and locally embedded, Citizen Science
- Awareness and Outreach

What role could station managers play?



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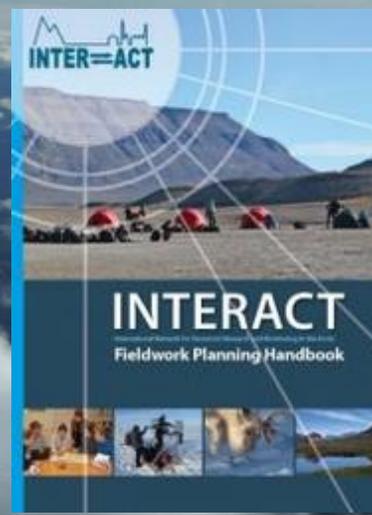
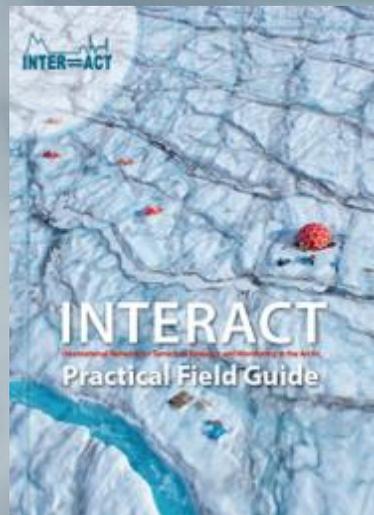
Introduction

1. Greenhouse gas emissions
2. The carbon footprint
3. Travel
4. Get the institutions involved
5. CO₂ Compensation
6. Futures of the scientific world
7. Conclusion

Glossary

References

Pocket guide on CO₂ Reduction in Arctic Science to be published next year



**STAY
TUNED!**



**Thank you very much
for your attention!**