Is digitalisation a poisoned gift for the environment?

FIT Europe 2021 - Team Black
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Black Team

Digitalisation: Problem or Solution?

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SEMINAR 1
22-26.02.2021

PASSAU

Co-funded by the Erasmus+ Programme of the European Union

2021 - 02 Passau

2021 - 06 Lyon

2021 - 10 Milan

2022 - 02 Bucharest

Have you thought about how much CO_2 you have produced this week using your digital devices?

01

INTRODUCTION

Have you thought about the “costs” of using the Internet?

02

EUROPE’S ENERGY SOURCES

CO_2 emissions depend on how the countries produce electricity

03

EXAMPLES

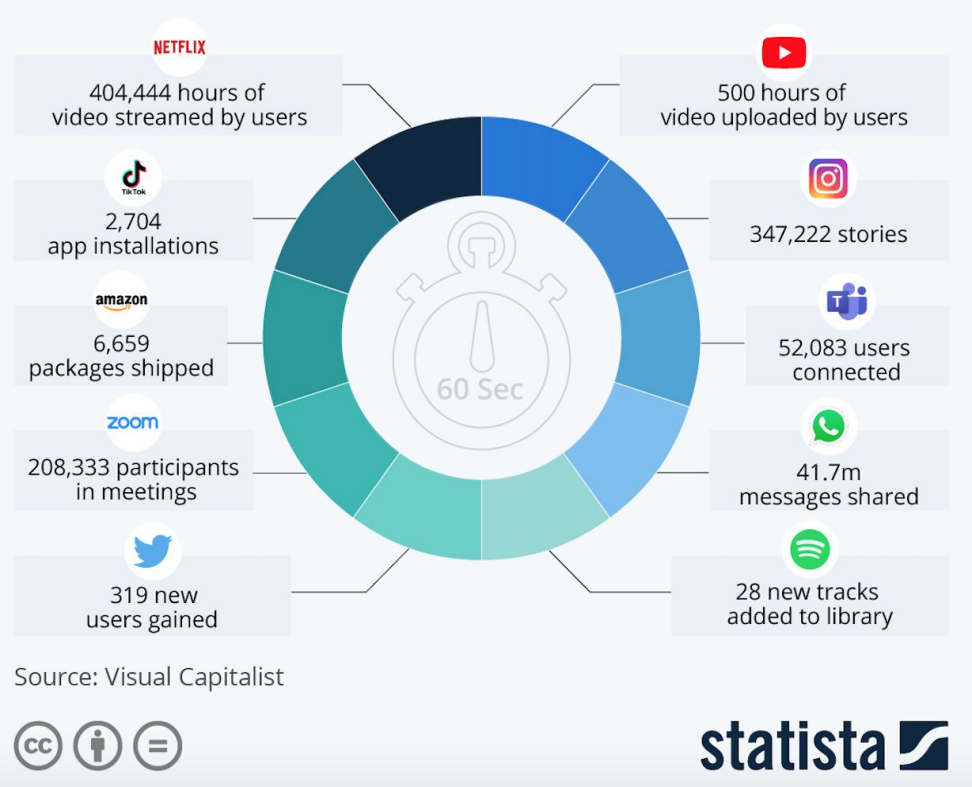
Case studies

04

CONCLUSION

Solutions and summary

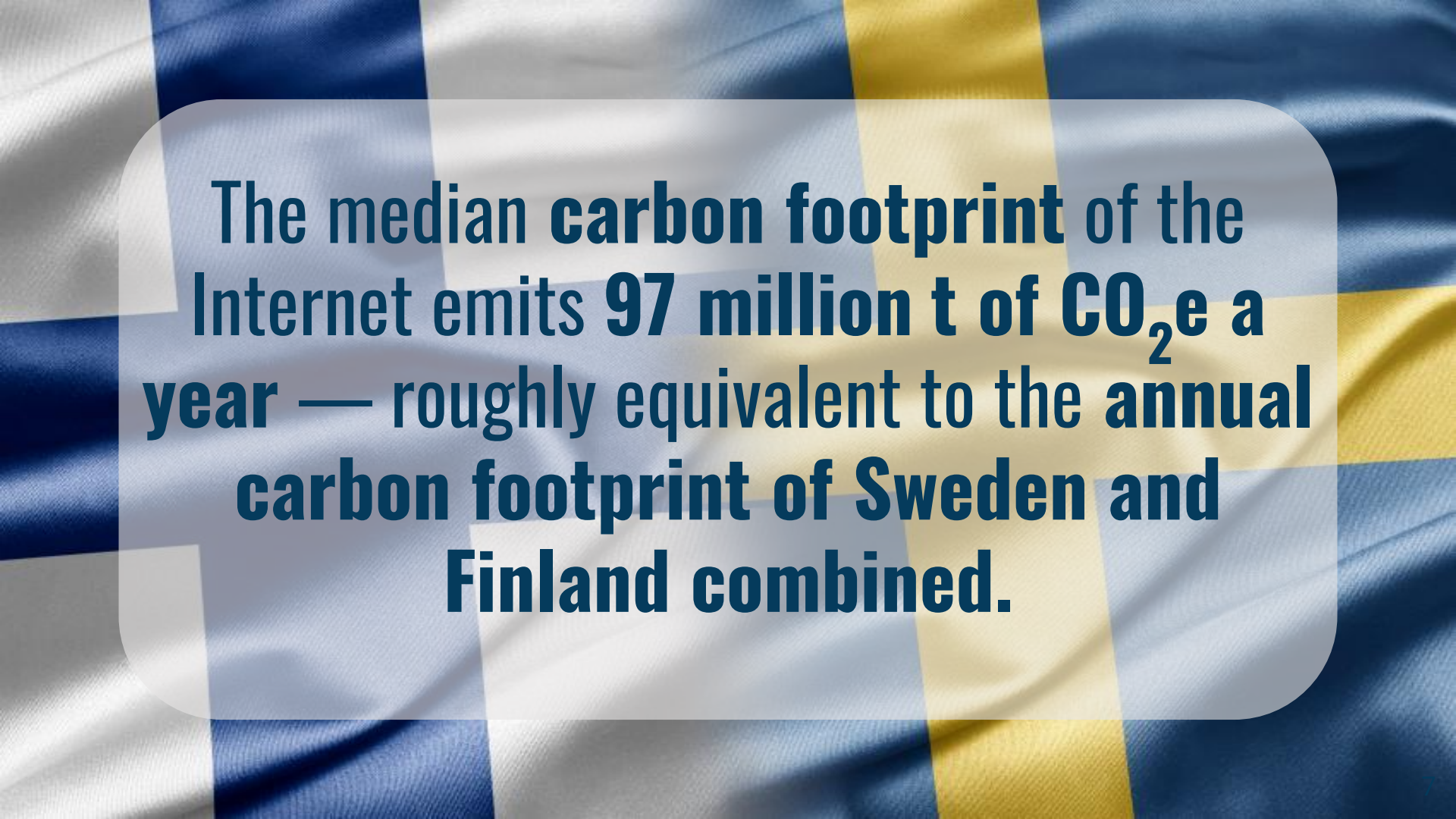
ONE MINUTE ON THE INTERNET IN 2020



01

INTRODUCTION

Have you thought about the “costs” of using the Internet?


The median **carbon footprint** of the Internet emits **97 million t of CO_2e a year** — roughly equivalent to the **annual carbon footprint of Sweden and Finland combined.**

The median **global water footprint** of Internet use is estimated to be **2.6 trillion L of water**, or the equivalent of filling over **1 million Olympic-size swimming pools**

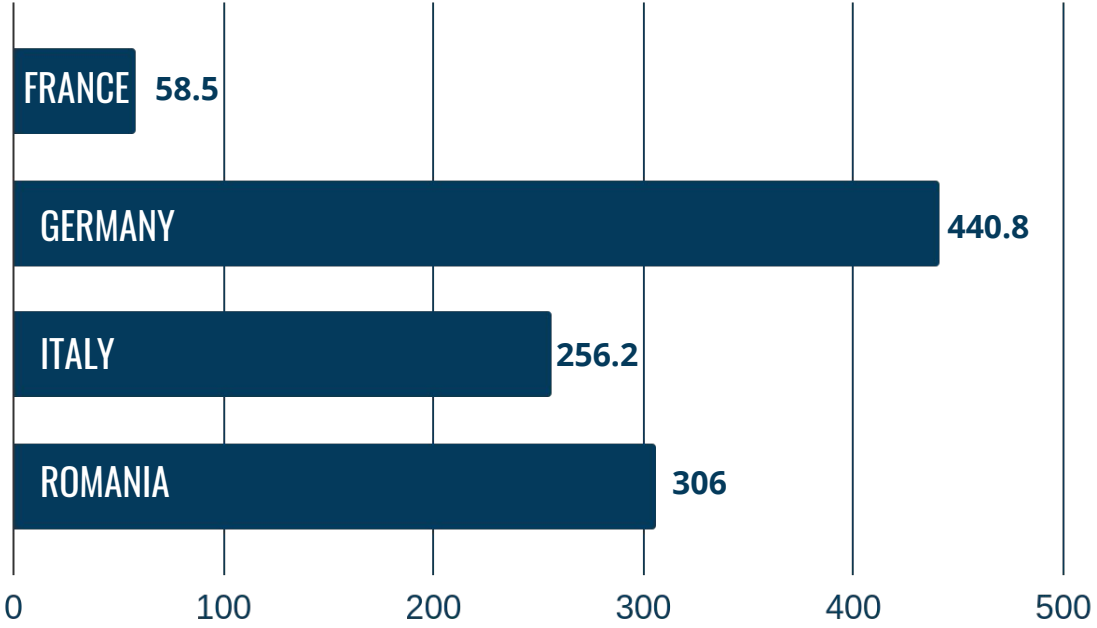
The median **land footprint** of Internet use is approximately **3400 square kilometers of land**, representing the combined size of **New York City, Rio de Janeiro and Mexico City.**

02

EUROPE'S ENERGY SOURCES

CO_2 emissions depend on how the countries produce electricity

A COMPARISON ON EMISSION FACTOR (2016)



CO_2 emissions depend on how the countries produce electricity

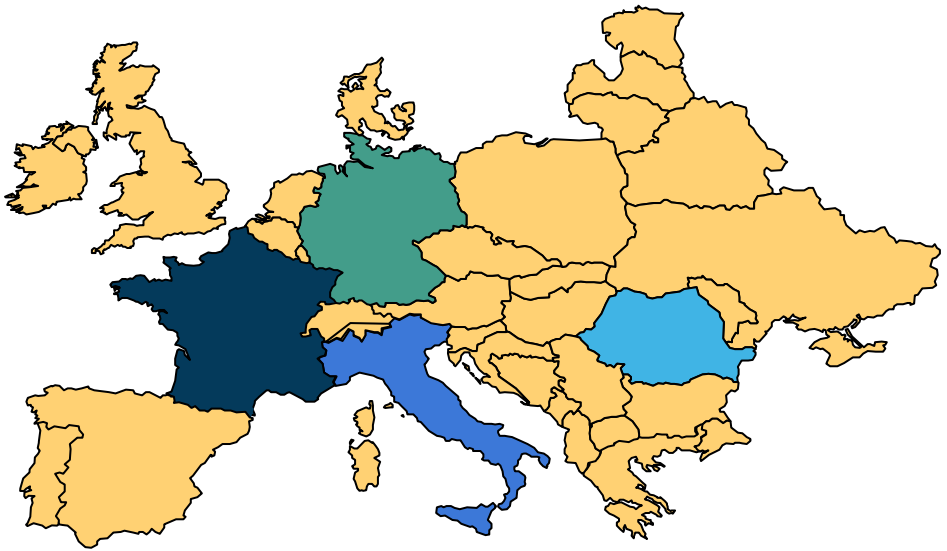
FIT countries - their main power resources

France

Nuclear power
Renewable energies
Fossil fuels

Italy

Petroleum
Other liquids
Natural gas
Coal
Hydroelectricity
Other renewable energy sources.



Romania

Coal
Hydropower
Natural gas
Nuclear energy
Wind power

Germany

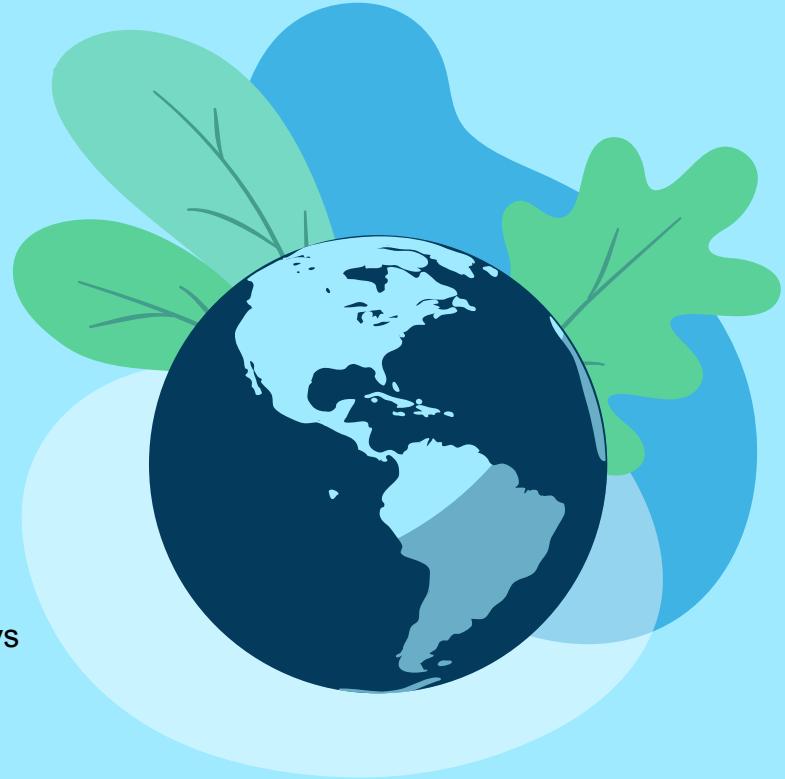
Fossil fuels
Wind
Nuclear power
Solar
Biomass

03

EXAMPLES

Case studies:

- ➔ FIT Europe seminar Zoom Meeting vs FIT Europe seminar at Passau
- ➔ Monthly Footprints for specific applications



Seminar on Zoom vs In person

5 days seminar with 8h of meeting a day on Zoom

Vs

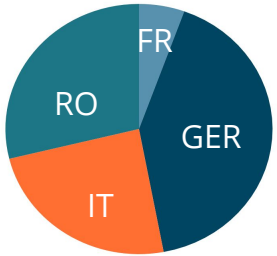
5 days seminar with 8h of meeting a day in person

40 participants
10 from each country

Seminar on Zoom vs In person

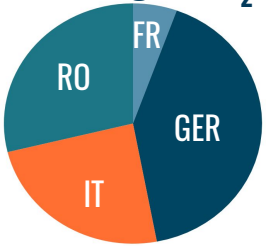
Network consumption

15,71 Kg of CO_2



Personal Laptop consumption

42.44 Kg of CO_2



Zoom server consumption

3.549 Kg of CO_2

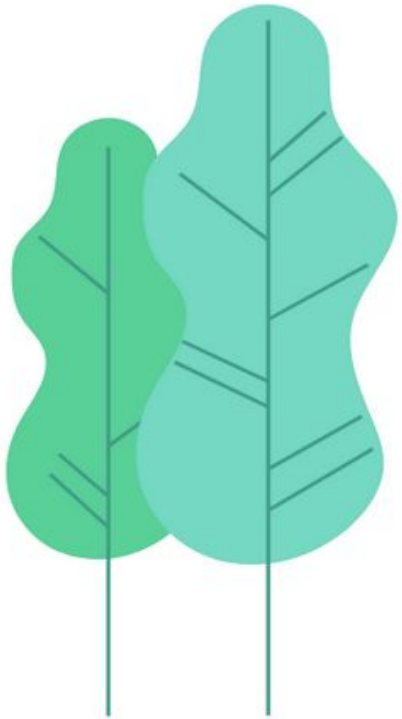
Meeting on zoom

61.7 Kg of CO_2

Network consumption HD video meeting ~ 0.037 kWh / hour / participants
Personal Laptop consumption ~ 0.100 kWh / hour / participants
Zoom server consumption ~ 0.300 kWh / hour

CO_2 Comparison

Planting a Tree:
Absorbing 20 kg of CO_2 per year



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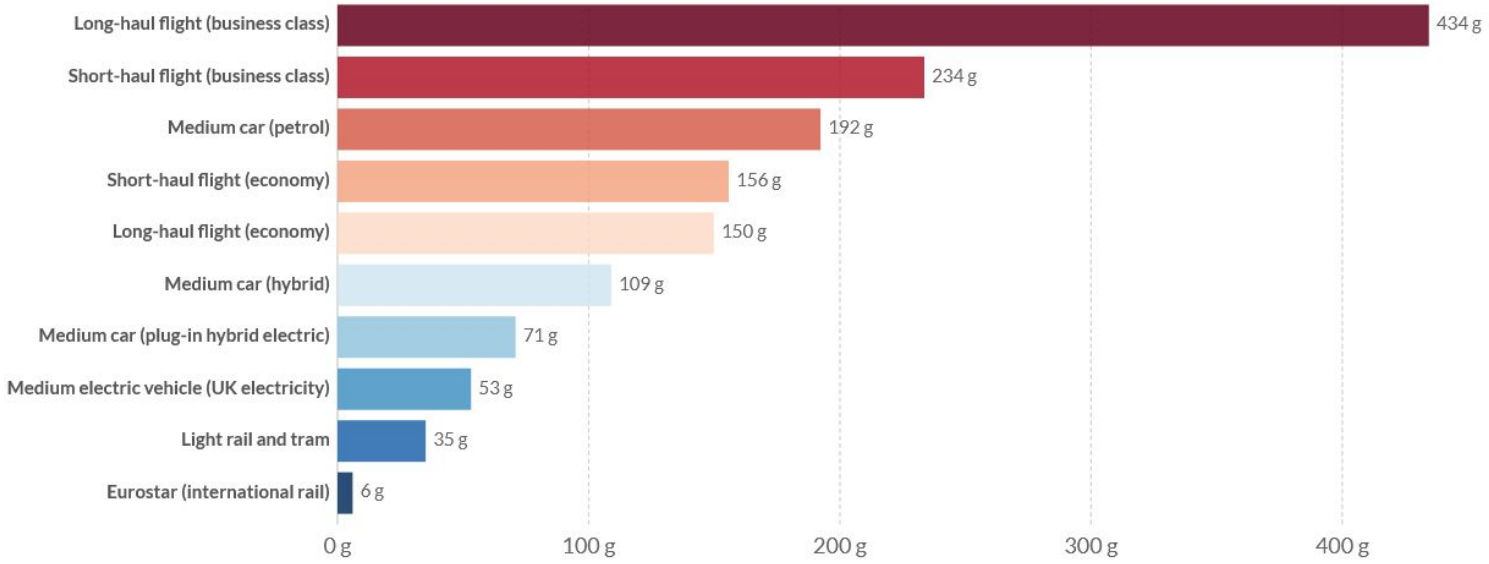
Trees are necessary to absorb the emissions

Seminar on Zoom VS in real life



Data derived in the UK [6]

Meeting in real life

Seminar on Zoom VS in real life

Bicycle distance:
Passau: 5km

Car distance (Fastest path via car):
Lyon - Passau: 916 km,
Milan - Passau: 679 km

Train distance:
No Data found, the same distance as for the car.

Plane distance (Direct path):
Bucharest - Passau: 1,080 km

Meeting in real life

Seminar on Zoom VS in real life

Travel consumption

Passau:
1.5
Kg of CO_2

Milan:
81.5
Kg of CO_2

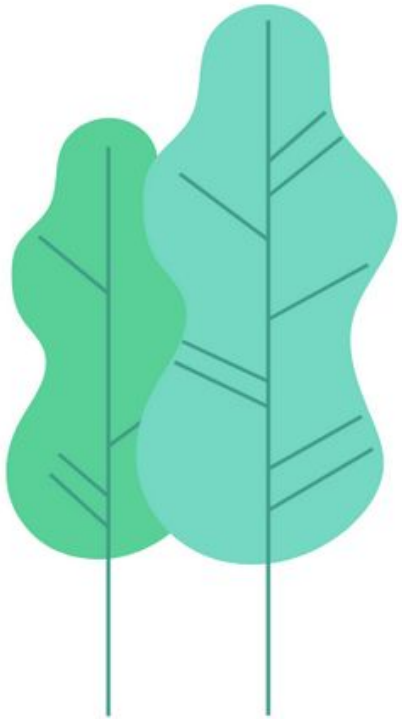
Meeting in real life
4 426
Kg of CO_2

Bucharest:
4 234
Kg of CO_2

Lyon:
110
Kg of CO_2

CO_2 Comparison

Planting a Tree:
Absorbing 20 kg of CO_2 per year



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Trees are necessary to absorb the emissions

Seminar on Zoom VS in real life
Final results

Meeting on zoom

61.7 Kg of CO_2

Meeting in real life

4 426 Kg of CO_2

Other factors not taken into account

ENVIRONMENTAL FACTORS

WATER FOOTPRINT

The amount of freshwater consumed and impacted by the storage and transmission of data.

LAND FOOTPRINT

The amount of land needed to store and transmit data.

ELECTRONIC WASTE

The electronic waste generated by the electronic devices uses for the meetings.

HUMAN FACTORS

HUMAN CONTACT

The human impact of the loss of physical contact.

HAPPINESS

Participants relationship to technology (difficulty using digital devices)

WORK EFFICIENCY

The changes in the effectiveness of participants working from home (more or less productive).

What about the other platforms ?

Monthly Footprint for Streaming Services

Platform	**Carbon Footprint** (number of trees to absorb the kg of CO_2 generated)	**Water Footprint** (number of 2L bottle of water)	**Land Footprint** (surface in A4 sheets number)
Netflix	~ 33 x 	~ 178 x 	~ 8.5 x 
Hulu	~ 18 x 	~ 191 x 	~ 9 x 
Amazon Video	~ 17 x 	~ 176 x 	~ 8.4 x 
Youtube	**~ 38 x** 	**~ 361 x** 	**~ 17 x** 
Spotify	0,18 x 	~ 2 x 	~ 0,1 x 

Assuming 4 hours of streaming a day for 30 days

Data from [4]

Monthly Footprint for Video Conferencing Applications

Platform	**Carbon Footprint** (number of trees to absorb the kg of CO_2 generated)	**Water Footprint** (number of 2L bottle of water)	**Land Footprint** (surface in A4 sheets number)
Skype	~ 2 x	~ 22 x	~ 1 x
Zoom	~ 3,2 x	~ 33.9 x	~ 1.6 x
Webex	~ 3,3 x	~ 33.7 x	~ 1.6 x
Facetime	~ 0,4 x	~ 4 x	0,2 x
Google Hangout	**~ 4 x**	**~ 39 x**	**~ 2 x**
Google Duo	~ 1 x	~ 11 x	0,5 x

Assuming fifteen 1-hour video conferencing meeting a week for 4 weeks

Data from [4]

Monthly Footprint for Social Media Applications

Platform	**Carbon Footprint** (number of trees to absorb the kg of CO_2 generated)	**Water Footprint** (number of 2L bottle water)	**Land Footprint** (surface in A4 sheets number)
Facebook	0,231 x 	~ 3 x 	~ 0,1 x 
Twitter	0,84 x 	~ 8 x 	~ 0,4 x 
Instagram	0,236 x 	~ 2 x 	~ 0,1 x 
Snapchat	0,377 x 	~ 4 x 	~ 0,2 x 
TikTok	**~ 2** x 	**~ 21 x** 	**~ 1** x 

Assuming 2 hours of app use a day for 30 days

Data from [4]

Monthly Footprint for Messaging Applications and for Miscellaneous Web Use

Platform	**Carbon Footprint** (number of trees to absorb the kg of CO_2 generated)	**Water Footprint** (number of 2L bottle of water)	**Land Footprint** (surface in A4 sheets number)
Whatsapp	**0,23 x** 	**~ 2 x** 	**~ 0,1 x** 
WeChat	0,06 x 	~ 0,6 x 	~ 0,03 x 
Online Gaming	**0,75 x** 	**~ 8 x** 	**~ 0,4 x** 
Web Surfing	0,70 x 	~ 7 x 	~ 0,3 x 

Assuming 1 hour of messaging a day for 30 days and 4 hours of miscellaneous web use a day for 30 days

Data from [4]

04

CONCLUSION

Solutions and summary

SOME POSSIBLE SOLUTIONS

To locate the data centres in cold countries and blow the outside air into them.

Cooling the data centres

Data centres produce heat and this wasted-heat could be extracted and reused elsewhere

Re using the waste heat

Data centers should be powered by renewable sources of energy.

Use renewable energy

Using energy labels help the energy efficiency of products on the EU market

EU Energy Labels

71 600

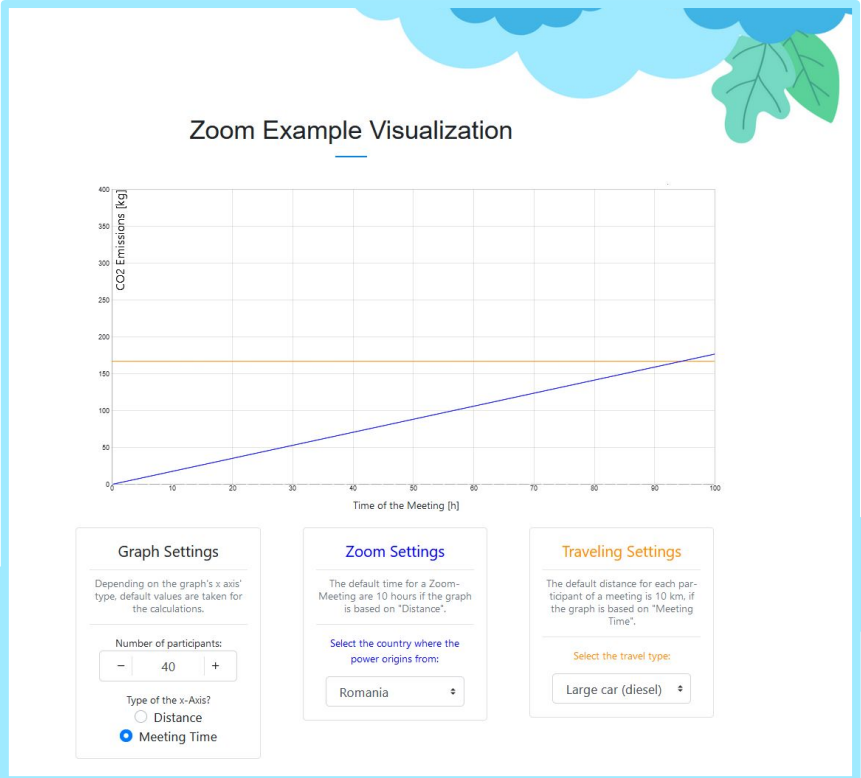
square miles of forest (over half the area of England)

will be needed to sequester the carbon emitted by our internet use at the end of 2021 if the internet traffic continues to increase like it did since March 2020 (↑20%)

Our results live!

eager-brattain-cef3da.netlify.app

Please visit our website for more information and for insights on our research



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4. Renee Obringer et al, The overlooked environmental footprint of increasing Internet use in Resources, Conservation and Recycling, Volume 167, 2021
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10. Emission factor of EU-countries

Thanks!

Do you have any questions?