Teleworking and online education as a means to reduce carbon emissions

EnviroInfo 2018

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Agenda

Open University of the Netherlands

Groups of Master Thesis Students

Research on **Online education** as a measure to reduce carbon emissions (Perez Salgado 2008, Versteijlen e.a. 2017)

Next Group of Master Thesis Students: **Teleworking**: How can the carbon footprint be reduced while retaining the quality of work performance

Work in progress -> advice and cooperation

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Open University of the Netherlands

Founded in 1984

Distance education (virtual classes and elaborated study material)

7 BSc: Computer -, Cultural -, Environmental -, **Information Science**, Law, Management, Psychology

8 MSc: Computer -, Cultural -, **Educational -**, Environmental -, **Information Science (250 students/year)**, Law, Management, Psychology

Theses in Master Information Science: **Sustainable IT**

PhD-student with prof. dr. Paquita Pérez Salgado
UNESCO Chair in Knowledge Transfer for Sustainable Development supported by ICTs

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Students at the Open University NL

Master Information Sciences:
Business Process Management and IT

- Most students have:
- ➢ A bachelor degree of a university of applied sciences
- ➢ A fulltime job in IT (-> **Telework** and not online education)
- Study about 15-20 hours/week
- ~50% between 25-35 years
- ~25% female

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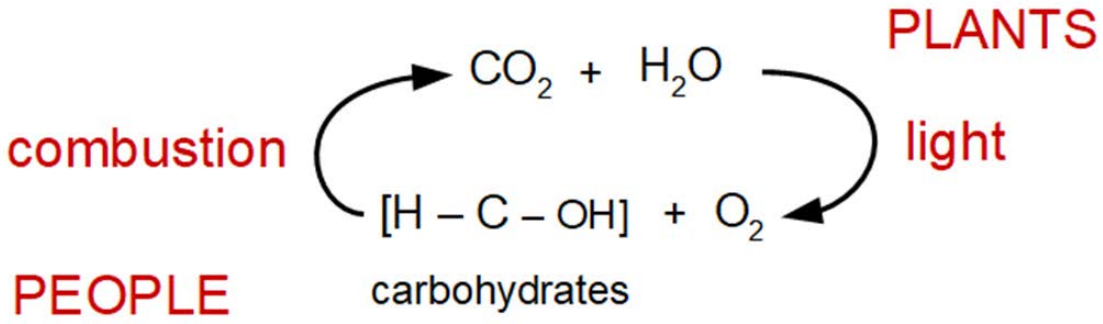
Open University of the Netherlands:

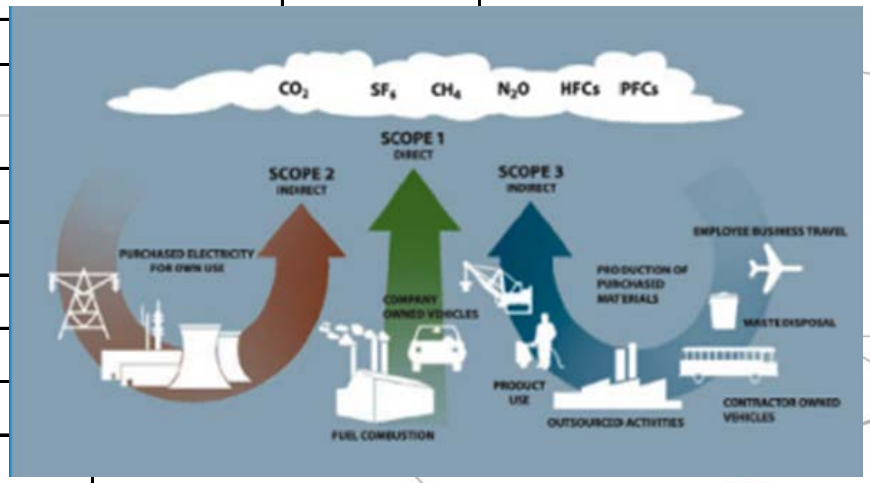
NL, BE, HQ and study centers

Scoping

Most serious challenge:
climate change due to
imbalance in carbon cycle



Three level model				
Green IT 1.0	Green of IT			
Green IT 2.0	**Green by IT, green IS**	**greening of operational processes**	**general for many companies**	**telework**
				reduced building
		greening of primary processes	branche specific	**online education**
Green IT 3.0	Paradigm change to green behavior			



Classification GHG protocol		
	Emission	**Examples**
Scope 1	**Direct** by sources owned	Heating
		Cars owned
Scope 2	**Indirect** of purhased electricity	Purchased electricity
Scope 3	**Indirect** as consequence of activities	Purchased goods
		Waste
		Travel (business, commute) of employees and students

World Resources Institute and World Business Council for Sustainable Development (2014)

Pros and cons of online education as a measure to reduce carbon emissions in higher education in the Netherlands

Starting points

Universities have signed LTA's (**long term agreement**) to improve energy efficiency

Travel related emission of university is scope 3 emission (GHG protocol)

Transport: about 23% of global GHG emissions

Definition: **carbon footprint** is: 'a measure of the exclusive total amount of carbon dioxide (CO_2) emissions that is directly or indirectly caused by an activity or is accumulated over the life stages of a product'
Expressed as **carbon dioxide equivalents** (CO_2e) (because of other gases)

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Classification online education

Content Delivered Online (%)	Type of Course	Typical Description
0%	Face-to-face	No online technology used. Content delivering: in writing or orally in a classroom.
1 to 29%	Web Facilitated	Face-to-face course that uses web-based technology.
30 to 79%	Blended	Course that blends online and face-to-face delivery.
80+%	Online	Most or all of the content is delivered online.

Allen, I. E., & Seaman, J. (2003)

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Emissions: comparison literature and public data of NL universities

- Ozawa-Meida e.a. 2013: **UK** University 2008/2009 staff and student commute: **30%** of overall emission
- Townsend & Barrett 2015: **UK** universities “travel data to complex to gather”
- Bailey & LaPoint 2016 **US**: estimation of travel data per person (staff or student) per year (kg CO_2), no relation to overall emission
- Susteach project **OU-UK** Roy e.a. 2008; Caird e.a. 2015:
  - **85%** reduction of CO_2 emission online <-> campus based
  - Comparison energy consumption of attributes in teaching model (next dia)

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Energy consumption <-> teaching model

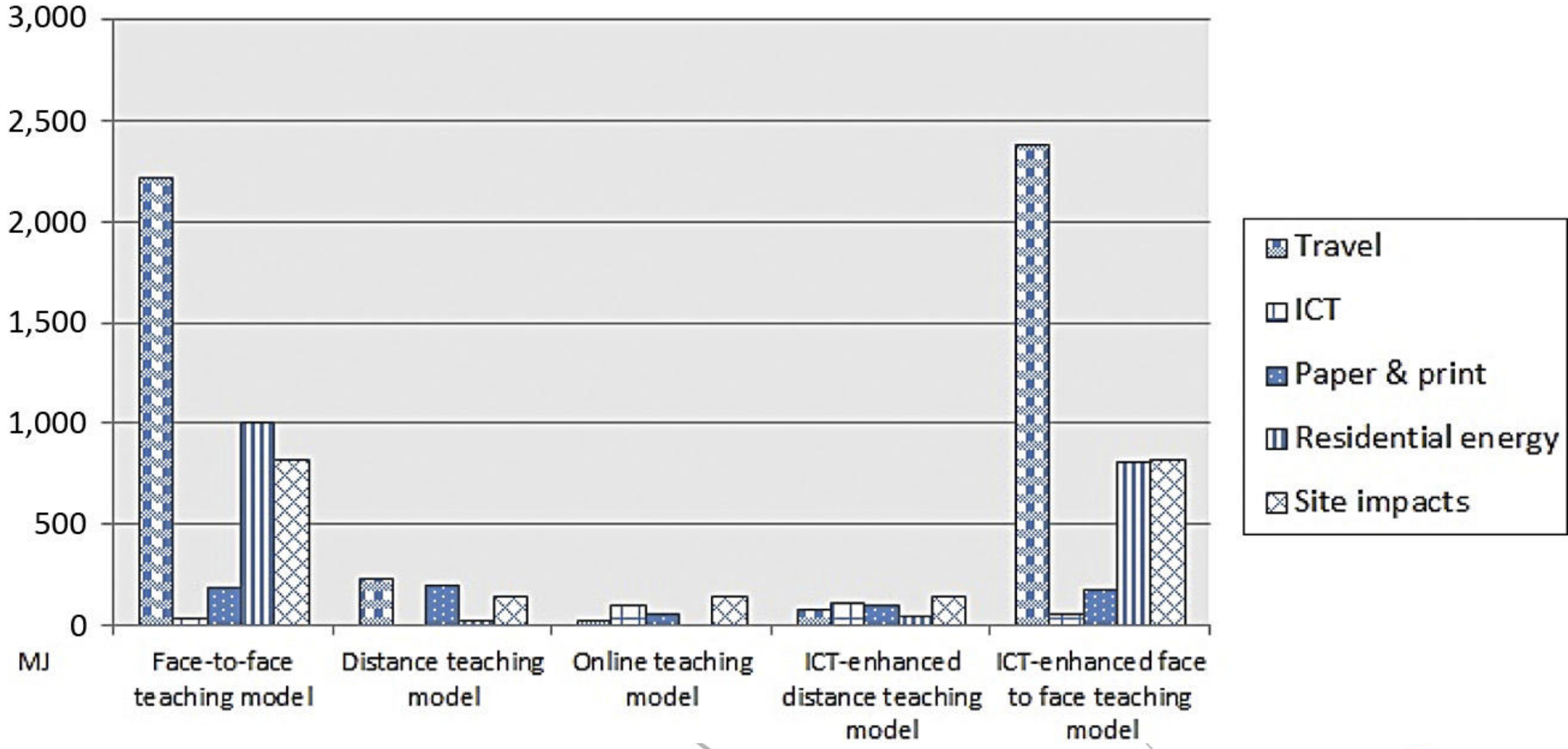

Figure 2 from: Caird S, Lane A, Swithenby E, Roy R, Potter S: Design of higher education teaching models and carbon impacts. Int J Sustain High Educ 2015, 16:96-111

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Emission data NL Universities

University	Year	Student + staff travel	Student commute	Staff commute
		% of carbon footprint Uni	% of carbon footprint Uni	% of carbon footprint Uni
Utrecht UAS	2014	91		
Utrecht University	2015	40		
Amsterdam UAS	2014	81	72	4
University of Amsterdam	2014	58	35	8
Rotterdam UAS	2011	85		
Erasmus University Rotterdam	2011	70	50	10
UAS = University of Applied Sciences			commute = 'home' <-> university	

Conclusions

Online education provides opportunity of significant CO_2 reduction:
30-85%

Leading to **question** for qualitative empirical research:

What is the **attitude** of professionals towards **online education** and **CO_2 reduction**?

-> **semi-structured interviews** 9 professionals
(part sustainable-IT-specialists, part education specialists)

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Pros and cons

Responsibility activates the student

Personalised education

Good monitoring and coaching

Attendance

Ability

Non-committal behaviour

Study phase

Attendance promotes learning

Student needs discipline

Face-to-face supervision

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Conclusions

Opportunities for blended education ->
find optimal combination of face-to-face with online

Further research on how this will affect

- Educational quality
- Carbon footprint of the university

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Master theses Teleworking

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Research question:
How can the **CO_2-eq-footprint** be reduced while retaining the **quality of work performance**?

Subquestions (preliminary)

L1 What is CO_2-eq-footprint and how can it be calculated?

L2 What amount of reduction can be obtained by telework?

L3 What are barriers and facilitators of telework?

L4 How is ‘quality of work’ measured?

Strategy Case Study

E1 What is the CO_2-eq-footprint of the case (sub)organization?

E2 What amount of reduction can be obtained by telework?

E3 Do the respondents recognize the barriers and facilitators from literature (delete, add, join)?

E4 Do the respondents recognize the quality aspects from literature?

E5 Do the respondents recognize other aspects that affect telework?

Thesis research started this Monday

Do you have suggestions?

Do you like to cooperate?

Devil's advocate

1. Online education -> students do not travel to university -> footprint university is lower
   but they study at home: what about energy consumption and carbon footprint at home?
   There are some references that energy consumption at home does not change… is that true?
2. Should we consider a country (or Europe) as a whole for energy reduction and not reduce it on institute level?
3. And what when we can travel without carbon footprint but with energy consumption; should we still be concerned?

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Thank you!

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Article …Online Education…:

https://doi.org/10.1016/j.cosust.2017.09.004

Master theses:
http://dspace.ou.nl/handle/1820/2010

European course on green IT:
https://www.ou.nl/web/green-sustainable-data-centres/home

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