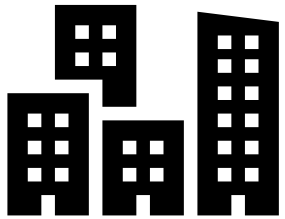
Telework



Seminar on Digitalisation and the Rebound Effect, ETH Zürich

12 November 2020

Adrian Jenny

Unclear Definition

Origins:

The Telecommuting Transportation Tradeoff by Jack Nilles 1973

International Labour Organisation:

*Work achieved **outside the employer's premises** with the help of ICTs*

not helpful in our context

Better:

*Working **from home** with the help of ICTs*

ILO 2017: Working Anytime, Anywhere, The Effects on the World of Work
Rachel Pasini 2018: Virtual Vocations: A History of Telecommuting

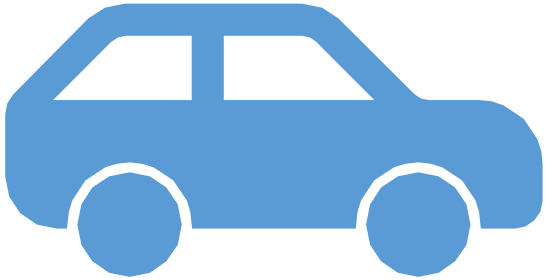
Overview

Transportation related impacts

Widening the picture

COVID-19 and the future

Transportation related impacts



Focus on direct comparison of emissions caused by vehicles

The Telecommuting Pilot Project

Several californian state agencies

Focused on business advantages

Conducted 1987 - 1990

Mainly information workers

Use of telephone and local workstation computers

JALA Associates, Inc 1990: The State Of California Telecommuting Pilot Project

Calculating emissons

Introducing EMFAC(7F) and BURDEN(7F) models

Pollutant types:

- TOG total organic gases
- ROG reactive organic gases
- CO carbon monoxide
- NOx nitrogen oxides
- SOx sulfur oxides
- PM particulate matter

Car behaviour:

- VMT/VKT – Vehicle miles/kilometres traveled
- Engine starts (hot and cold)
- Modal behaviour (accelerations, decelerations, speed) – how you drive
- Park time
- ….

Brett E. Koenig et al. 1996: The Travel And Emissions Impacts Of Telecommuting For The State Of California Telecommuting Pilot Project

What do we need to measure?

We want to get comparable results between groups

Useful metrics (per person-day):

- VMT
- # of trips
- # of cold starts
- # of hot starts

Table 2. Primary emission-producing vehicle activities and emissions produced

Emission-producing vehicle activity	Type of process (pollutant)
Vehicle-miles traveled	• Running exhaust (CO, TOG, NOx, PM) • Running evaporative emissions (TOG)
Engine starts (hot and cold)	• Start-up exhaust (CO, TOG, NOx, PM)
Engine shut-downs	• Hot soak evaporative emissions (TOG)
Modal behavior (e.g. accelerations, decelerations, average speeds)	• Running exhaust (CO, TOG, NOx, PM)
Park time	• Resting evaporative emissions (TOG) • Diurnal emissions (TOG)

Brett E. Koenig et al. 1996: The Travel And Emissions Impacts Of Telecommuting For The State Of California Telecommuting Pilot Project

Study design

2 Groups

- Telecommuters
- Control

2 Waves

- Wave 1 (161 days): no one is telecommuting
- Wave 2 (149 days): TC group has some TC days

Similar conditions

Bookkeeping (on weekdays)

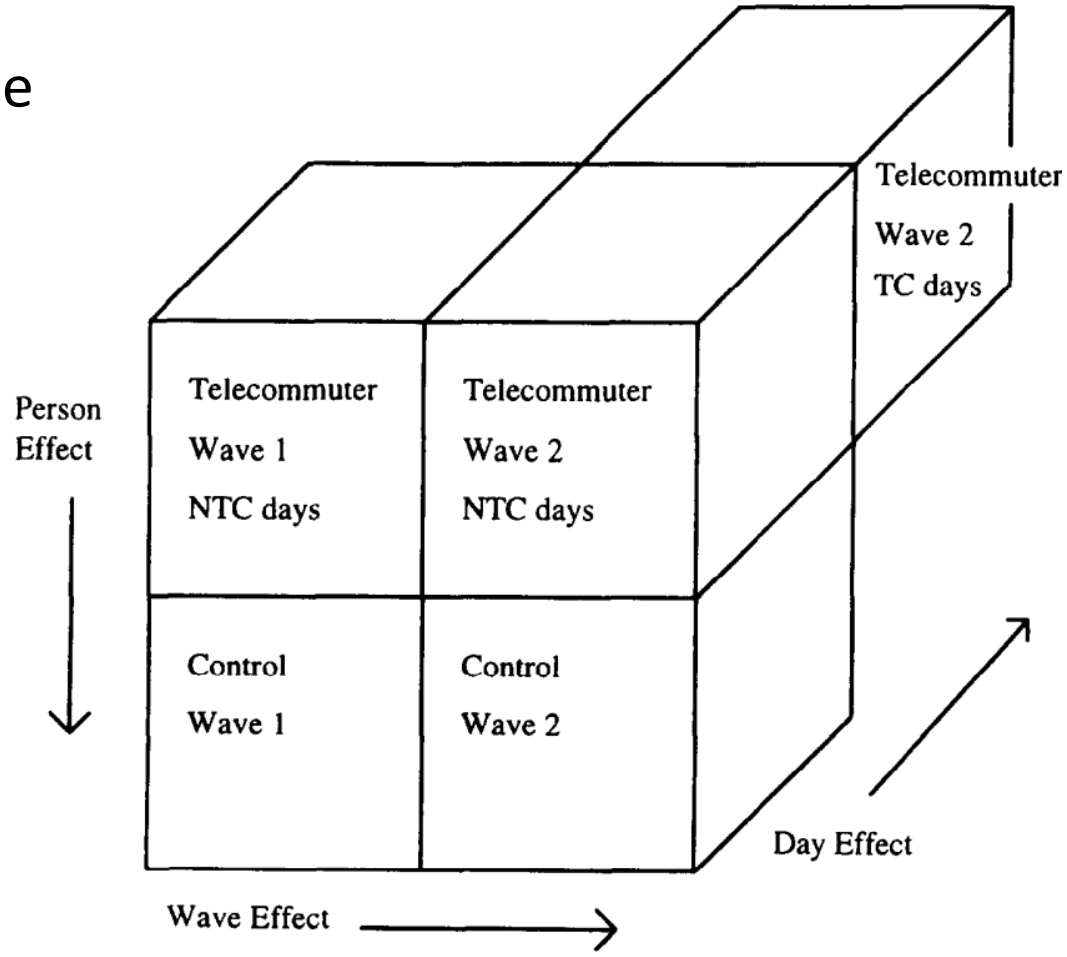
Brett E. Koenig et al. 1996: The Travel And Emissions Impacts Of Telecommuting For The State Of California Telecommuting Pilot Project

Results – Different effects

Study design helped to investigate three different effects:

- Person effect
- Wave effect
- Day effect

Effective comparision helps to reduce variance in results



Brett E. Koenig et al. 1996: The Travel And Emissions Impacts Of Telecommuting For The State Of California Telecommuting Pilot Project

Results – Travel impacts

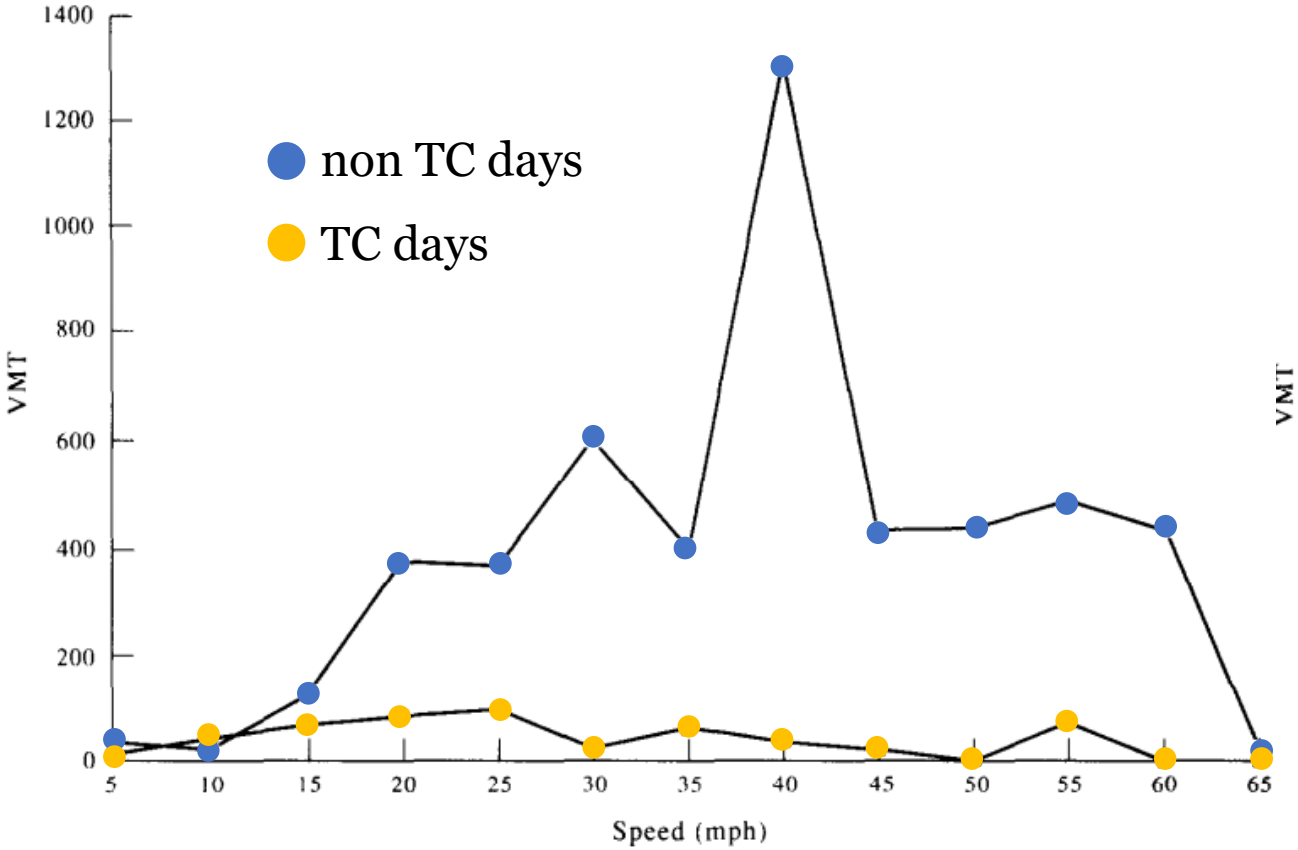
Note: values are per person-day

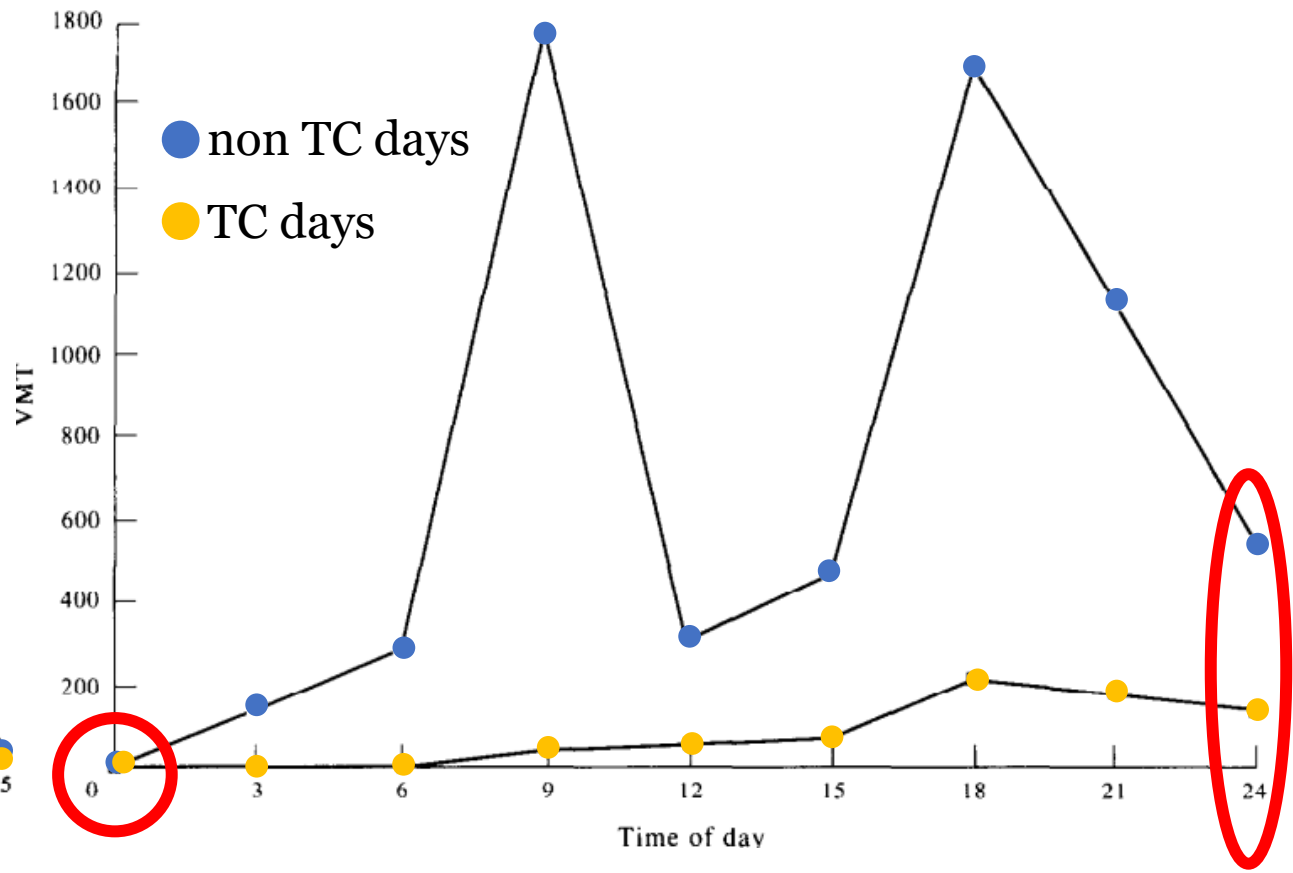
	Telecommuters			Controls	
	(1) W1	(2) W2 TC	(3) W2 NTC	(4) W1	(5) W2
VMT	44.8	10.2*	36.9	32.7	31.1
# of trips	3.76	2.73*	3.79	3.55	3.29
# cold starts	2.52	1.54*	2.61	2.49	2.20
# hot starts	1.24	1.19**	1.18	1.06	1.09

- 77% decrease in VMT
- Numbers very similar for both waves when not telecommuting
- Number of trips and cold starts reduced by 1 when telecommuting…
- Some of the VMTs are now done on the extra trip on TC days (Shopping etc.)

Brett E. Koenig et al. 1996: The Travel And Emissions Impacts Of Telecommuting For The State Of California Telecommuting Pilot Project

Results – side effects





Brett E. Koenig et al. 1996: The Travel And Emissions Impacts Of Telecommuting For The State Of California Telecommuting Pilot Project

Widening the picture

Overall effectiveness

Study from 2005, teleworking infrastructure energy savings (US and Japan)
< 15% teleworking:
0.01 – 0.4% and 0.03 – 0.36% respectively [a]

Assume 50% teleworking:
Estimated total energy savings of about 1% in both cases [a]

Work related travel only produces small share of overall emissions [b]

What about the rebound?

[a] H. Scott Matthews, Eric Williams 2005: Telework Adoption and Energy Use in Building and Transport Sectors in the United States and Japan

[b] Christian Fuchs 2005: The implications of new information and communication technologies for sustainability

Another view on transport

Paper from 1998 lets us doubt effectiveness

Many study designs are flawed/biased

Average savings likely to be less

Trip generation effects would increase

Real benefits are about increasing travel flexibility

Patricia L. Mokhtarian, Urban Studies 1998: A Synthetic Approach to Estimating the Impacts of Telecommuting on Travel

Picture: http://www.china.org.cn/photos/2015-10/07/content_36752799_3.htm

Rebound – Office floorspace

Offices may require less floorspace, heating, IT infrastructure on-site

Now needed at home

Research shows that transportation impacts dominate however Office infrastructure savings **even less** important overall

Kurt W. Roth, Todd Rhodes, Ratcharit Ponoum 2008: The Energy and Greenhouse Gas Emission Impacts of Telecommuting in the U.S.

Rebound – Relationships

New relationships may arise through telework

- Business
- Private, Social

Travel will remain necessary to maintain relationships

“What is needed is a conscious commitment of business and individuals to reduce the amount of travels by car and plane. ICTs alone don’t solve the problem.”

Christian Fuchs 2005: The implications of new information and communication technologies for sustainability

Patricia L. Mokhtarian, Urban Studies 1998: A Synthetic Approach to Estimating the Impacts of Telecommuting on Travel

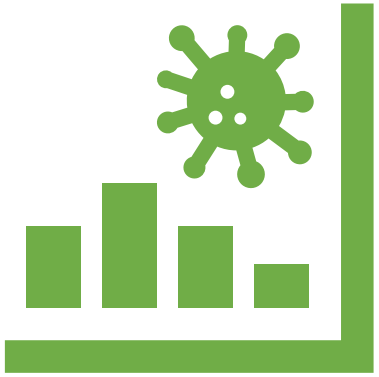
Speculation on mass-adoption

Assume teleworking becomes the norm

Let us speculate:

- companies move more IT infrastructure to “the cloud”
- not everyone commutes by car -> some public transport routes become less attractive
- no need to live close to city/workplace
- cars will change (EV etc.)
- autonomous driving, sharing economy
- less traffic (morning commute) -> better distribution, speed efficiency
- *You will have more to say in the discussion*…

COVID-19 and the future



Fast telework adoption

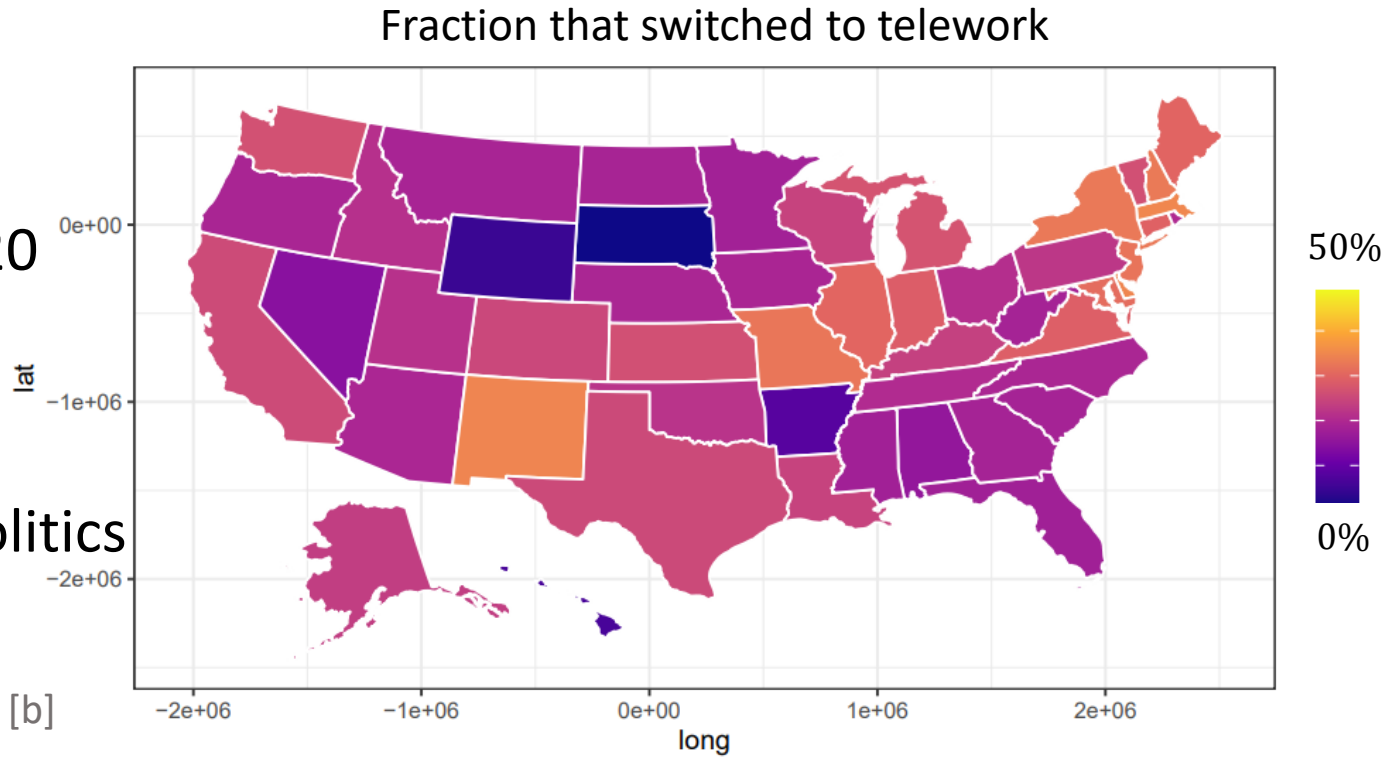
MIT Study: [a]

From less than 15% telework

To nearly 50% telework in March 2020

There is a caveat

BLS unemployment definition and politics



Survey, Workplace Evolutionaries: [b]

From 31% of respondents part time telework

To 77% full time and 88% at least part time in April 2020

[a] Brynjolfsson, et al. 2020: John Joseph Horton Papers; COVID-19 and Remote Work: An Early Look at US Data

[b] Lister Kate, North Kate 2020: Global Work-From-Home Experience Survey. Survey, San Diego: Workplace Evolutionaries

Sudden demand for cloud infrastructure

Great scalability and flexibility

Impossible a few years ago

MS Teams:

July 2019: 13 million users/day

Nov 2019: 20 million users/day

New record in April 2020:

75 million users/day

200 million meetings/day with 4.1 billion meeting-minutes

Measures:

- Reduce prefetching
- Prioritize health related workloads
- Reassign traffic to other regions
- Reduce video resolution and framerate

Mark Russinovich, CTO MS Azure June 2020: Advancing Microsoft Teams on Azure—operating at pandemic scale:
https://azure.microsoft.com/en-us/blog/advancing-microsoft-teams-on-azure-operating-at-pandemic-scale/

Update #2 on Microsoft cloud services continuity: https://azure.microsoft.com/en-us/blog/update-2-on-microsoft-cloud-services-continuity/

Long term impacts - Adoption

Cloud provider learned a lot

Increased preparedness

Reduced managers' fears

Awareness for potential savings

41% part time telework after crisis

Lister Kate 2020: Global Workplace Analytics: Work At Home After COVID-19, Our Forecast

Gartner HR Survey 2020: https://www.gartner.com/en/newsroom/press-releases/2020-04-14-gartner-hr-survey-reveals-41--of-employees-likely-to-

Long term impacts – Emissions/Energy Use

25% increase in energy use in NYC households

10% reduction overall

17% reduction in CO2 emissions, April 2019/April 2020

50% from transport (8.5%)

Prospected 2.6 – 8.4% reduction for 2020

Quere et al. 2020: Temporary reduction in daily global CO2 emissions during COVID-19 forced confinement

Angel Belzunegui-Eraso, Amaya Erro-Garcés 2020: Teleworking in the Context of the Covid-19 Crisis

NYTimes, Henry Fountain: The City That Never Sleeps Is Waking Up Later

Challenges in adoption - Example

Virtual general assembly
- live streamed
- no real interaction

Challenges
- discussions
- voting
- security
- …

Wirtschaft

11

Mittwoch, 11. November 2020

«Den Trend als Chance betrachten»

Arturo Devigus ist ein Experte in Sachen Generalversammlungen. Er sieht in der Digitalisierung viel Potenzial – aber auch Risiken.

Interview: Maurizio Minetti

Erste Unternehmen haben ihre physische Generalversammlung 2021 wegen der Coronakrise bereits abgesagt (Ausgabe vom 5. November). Das ab 2022 geltende neue Aktienrecht dürfte den Trend zur digitalen GV zudem weiter verstärken. Wird es je wieder Generalversammlungen mit Tausenden von Aktionären geben?

Arturo Devigus: 2020 und 2021 gehen wir von vereinzelten physischen Generalversammlungen aus. Der Trend geht in Richtung einer weiteren Digitalisierung: Es kann effizienter und günstiger sein, eine Aktionärsversammlung virtuell durchzuführen. Das haben die Unternehmen im Frühjahr selber festgestellt. Die Kosten für die Durchführung einer GV ohne physische Präsenz der Aktionäre sind signifikant tiefer als bei einer GV mit physischer Präsenz. Dies vor allem wegen Einsparungen bei der Lokalmiete und beim Catering.

dies heute auch schon physisch möglich ist. Dieses Thema müssen Unternehmen frühzeitig adressieren. Grundsätzlich gilt, dass bei der virtuellen Generalversammlung keinesfalls weniger starke Sicherheitsvorkehrungen zu treffen sind. Ganz im Gegenteil. Denn es gilt auch die Cyberkriminellen oder Hacker entsprechend abzuschirmen.

Nicht nur die GV an sich, auch die Vorbereitung dazu dürfte zunehmend digitalisiert werden. Wo steckt noch Potenzial zur Effizienzsteigerung?

Heute verschicken Unternehmen vor jeder GV zum Teil Zehntausende Einladungen per Briefpost an die Aktionäre. Um diese Quote zu reduzieren, bedarf es umfangreicher Vorbereitungen. Die voll elektronische Einladung ist bereits heute nach entsprechender Statutenanpassung möglich.

Warum halten dann Firmen am Briefversand fest?

Im Rahmen der gesetzlichen Vorschriften bestimmen die Sta-

Warum ist das so?

Es ist sehr einfach, das Weisungsformular auszufüllen, in das Antwortcouvert zu legen und abzuschicken.

Vielleicht sind aber auch die Systeme zur elektronischen Abstimmung zu kompliziert?

Ja, hier gibt es immer noch eine gewisse Hürde. Es hat sich in den letzten Jahren jedoch einiges getan. Wir zum Beispiel haben unser System mit der Einführung des QR-Codes sehr stark vereinfacht. Es existieren diverse Lösungen auf dem Markt. Es gilt immer eine sorgfältige Abwägung zu machen zwischen geforderter IT-Sicherheit und der einfachen Handhabung.

Für manche Aktionäre sind die Traktanden gar nicht so wichtig, sie gehen vielmehr an die GV, um ein Geschenk oder ein Gratis-Essen zu ergattern. Wird es solche «Fressaktien» künftig noch geben?

Viele Firmen sind schon vor Co[rona] davon weggekommen. Sta-

Neue Luzerner Zeitung 11.11.2020

Summary

Certain reduction in transport emissions

Overall savings negligible

Very dependent on technological/societal changes

Many chances and pitfalls

Learned a lot during pandemic

Many impacts to investigate