



RDW Transmitted by the representative
of the Netherlands

Informal Document **WP.29-192-10**
(192nd WP.29, 5-8 March 2024
Agenda Provisional item 2.3.)



Sustainability and automation

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WP.29, March 2024

17 UN Sustainable Development goals



Road Safety : 3, 9, 11
 Sustainability : 3, 6, 7, 9, 11, 12, 13, 14, 15



Illustration EU Innovation Budget (Source: Horizon 2020)

Vehicle automation: 97
million Euro (2020-2027)



Sustainability: 1.000.000
million Euro (2020-2030)

Claimed effect of vehicle automation on sustainability

Dutch Ministry IenW:
“...cooperative ITS systems.
Innovations in this field should allow us to **improve** traffic flows on our roads in terms of safety, efficiency and **environmental impact**,.....”

UNECE: “...would **ensure the benefits** that ITS could provide in terms of safety, **environmental protection**, infrastructure development, **energy efficiency** and traffic management..”



EU/ERTRAC: “ ... Also, smoother traffic will help to **decrease the energy consumption and emissions** of the vehicles.”



Claimed effect of vehicle automation on sustainability (2)



co-leader McKinsey Center for Future Mobility (Russell Hensley):
“.. So, we move toward **huge societal benefits in terms of reduced carbon emissions** and far safer vehicles, ideally with far fewer accidents and far fewer fatal accidents.”



However: these claims do not take into account emissions resulting from a number of data processes required for vehicle automation

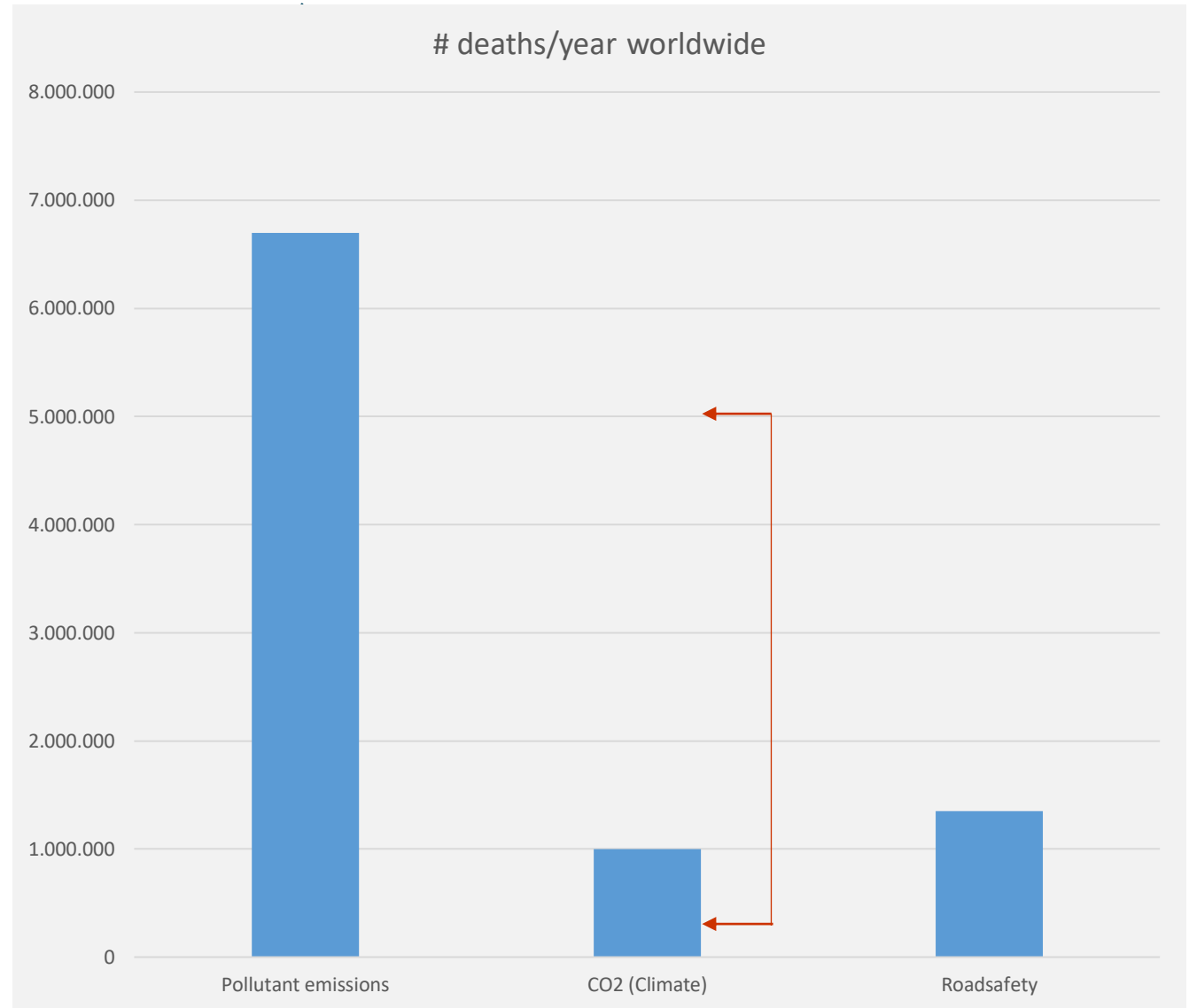


Examples

- 1) Research and development
- 2) CPU power in operation for the DDT /OEDR
- 3) Telecommunication
- 4) Data Storage (DSSAD, ISMR, etc)
- 5) Security
- 6) Related services (updates, infotainment, remote management etc.)

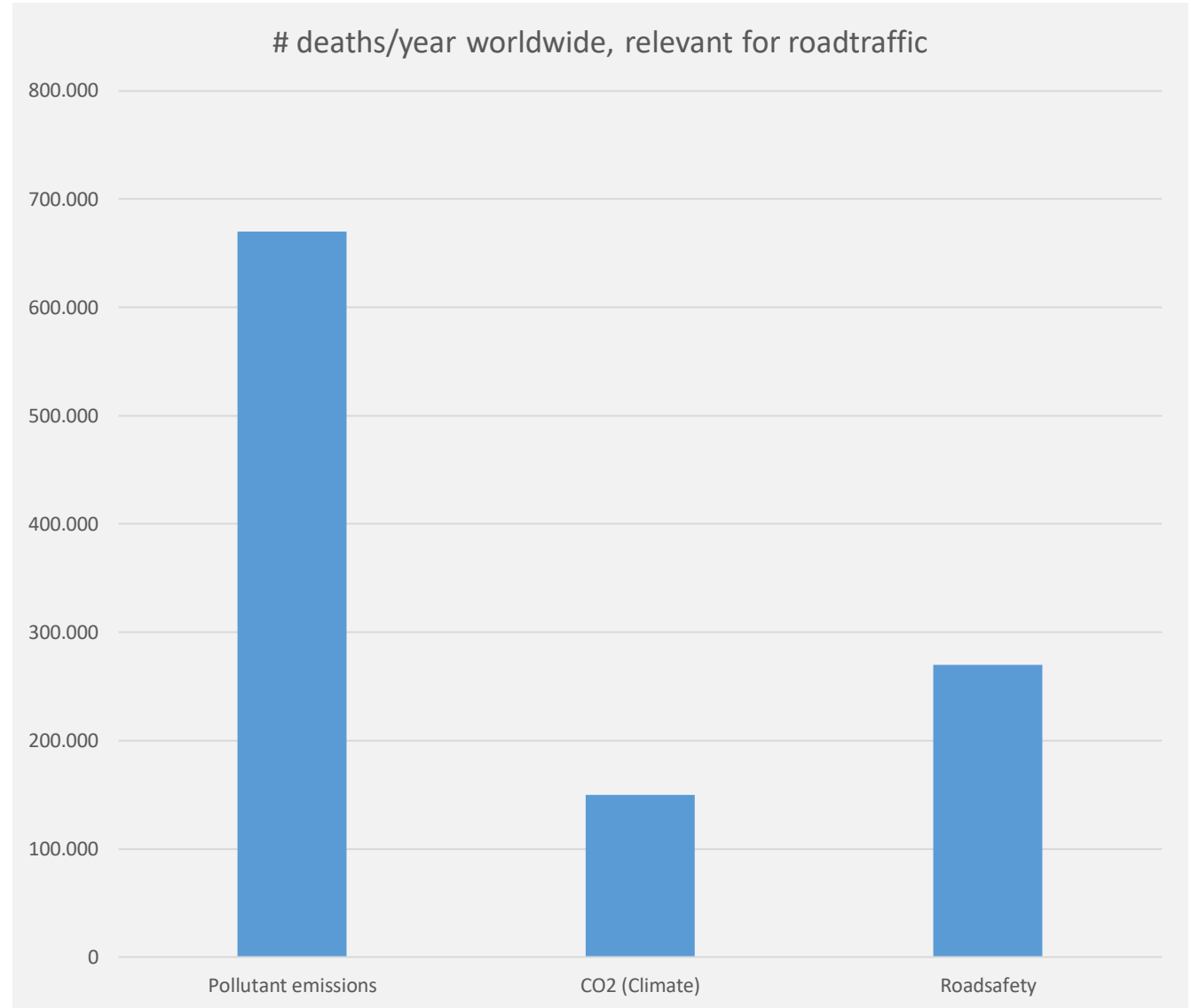
Deaths worldwide related emissions & roadsafety (WHO)

- PS1: # deaths due to CO2/climate varies between 250.000 (WHO, 2021) and 5.000.000 (Lancet, 2021)
- PS2: # deaths varies based on geography, prosperity etc.
- PS3: # severe injuries/health problems is a multiple of # deaths



Deaths related to potentially automated road traffic

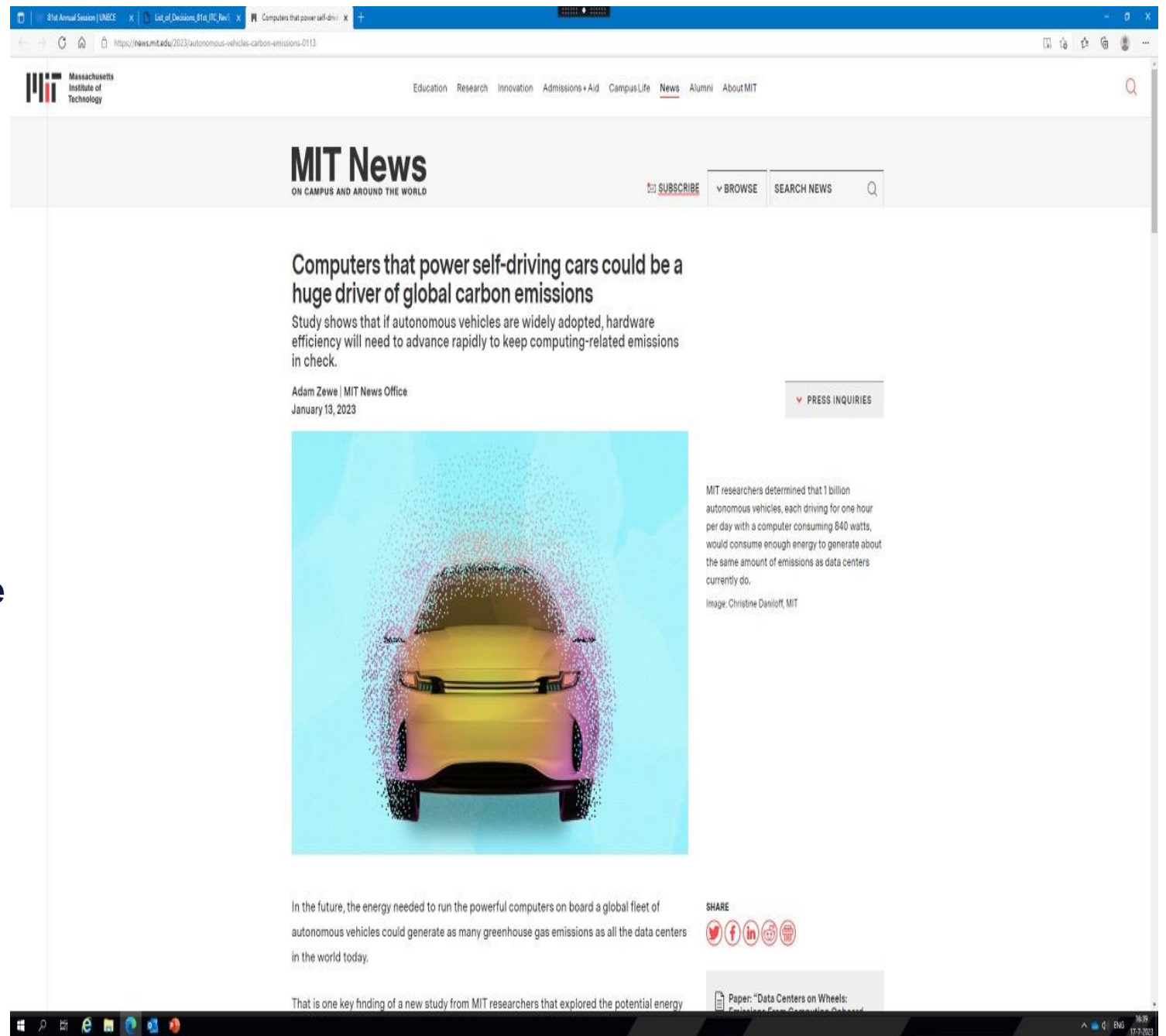
- 10% of pollutant emissions are related to road traffic (EEA, 2022)
- 15% of CO2 emissions are related to road traffic (IPCC, 2023)
- 20% of all fatalities in road traffic is related to the area where vehicle automation is being introduced (SWOV, 2019)



Recent publications

University Delft (2021): “... **The outcomes show that for most scenarios and situations, the CO2 emission from the data-induced emission sources are higher than the propulsion-based CO2 norms of vehicles.**”

<https://doi.org/10.1016/j.horiz.2023.100082>




The screenshot shows a web browser displaying an MIT News article. The browser's address bar shows the URL: <https://news.mit.edu/2023/autonomous-vehicles-carbon-emissions-0113>. The MIT News logo is at the top, with the tagline "ON CAMPUS AND AROUND THE WORLD". Navigation links include Education, Research, Innovation, Admissions + Aid, Campus Life, News, Alumni, and About MIT. A search bar and a "SUBSCRIBE" button are also visible.

Computers that power self-driving cars could be a huge driver of global carbon emissions

Study shows that if autonomous vehicles are widely adopted, hardware efficiency will need to advance rapidly to keep computing-related emissions in check.

Adam Zewe | MIT News Office
January 13, 2023

[PRESS INQUIRIES](#)



MIT researchers determined that 1 billion autonomous vehicles, each driving for one hour per day with a computer consuming 840 watts, would consume enough energy to generate about the same amount of emissions as data centers currently do.

Image: Christine Daniloff, MIT

In the future, the energy needed to run the powerful computers on board a global fleet of autonomous vehicles could generate as many greenhouse gas emissions as all the data centers in the world today.

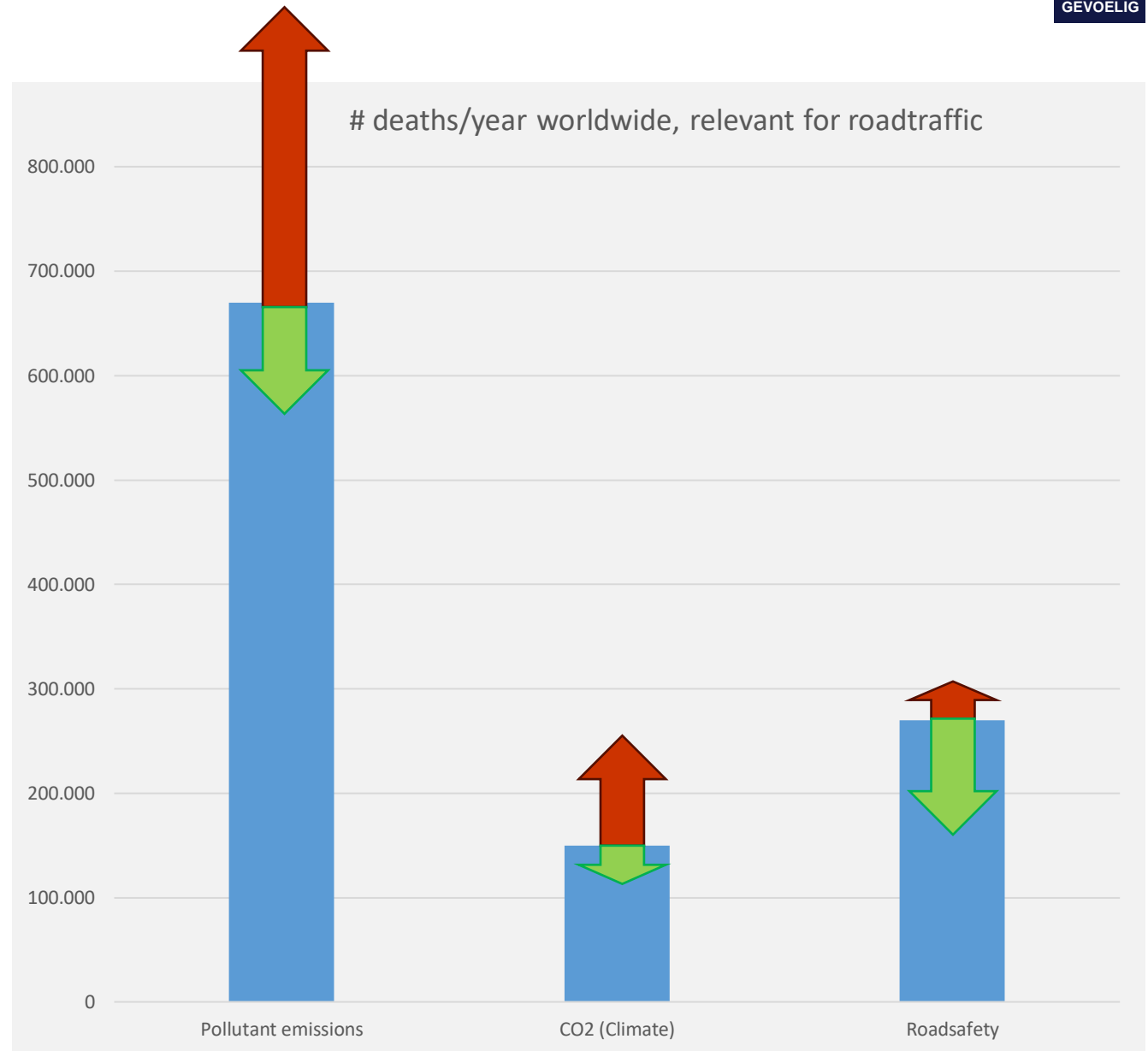
That is one key finding of a new study from MIT researchers that explored the potential energy

[Paper: "Data Centers on Wheels: Emissions From Computing Onboard"](#)

At the bottom of the page, there are social media sharing icons for Twitter, Facebook, LinkedIn, and YouTube, along with a "SHARE" label. The Windows taskbar is visible at the very bottom of the screenshot.

Opposite effects of vehicle data/connectivity/automation on # deaths (indicative)

- Reduction road fatalities
- Increase in environmental fatalities due to more pollutant emissions and more CO2 resulting from increased energy consumption/production



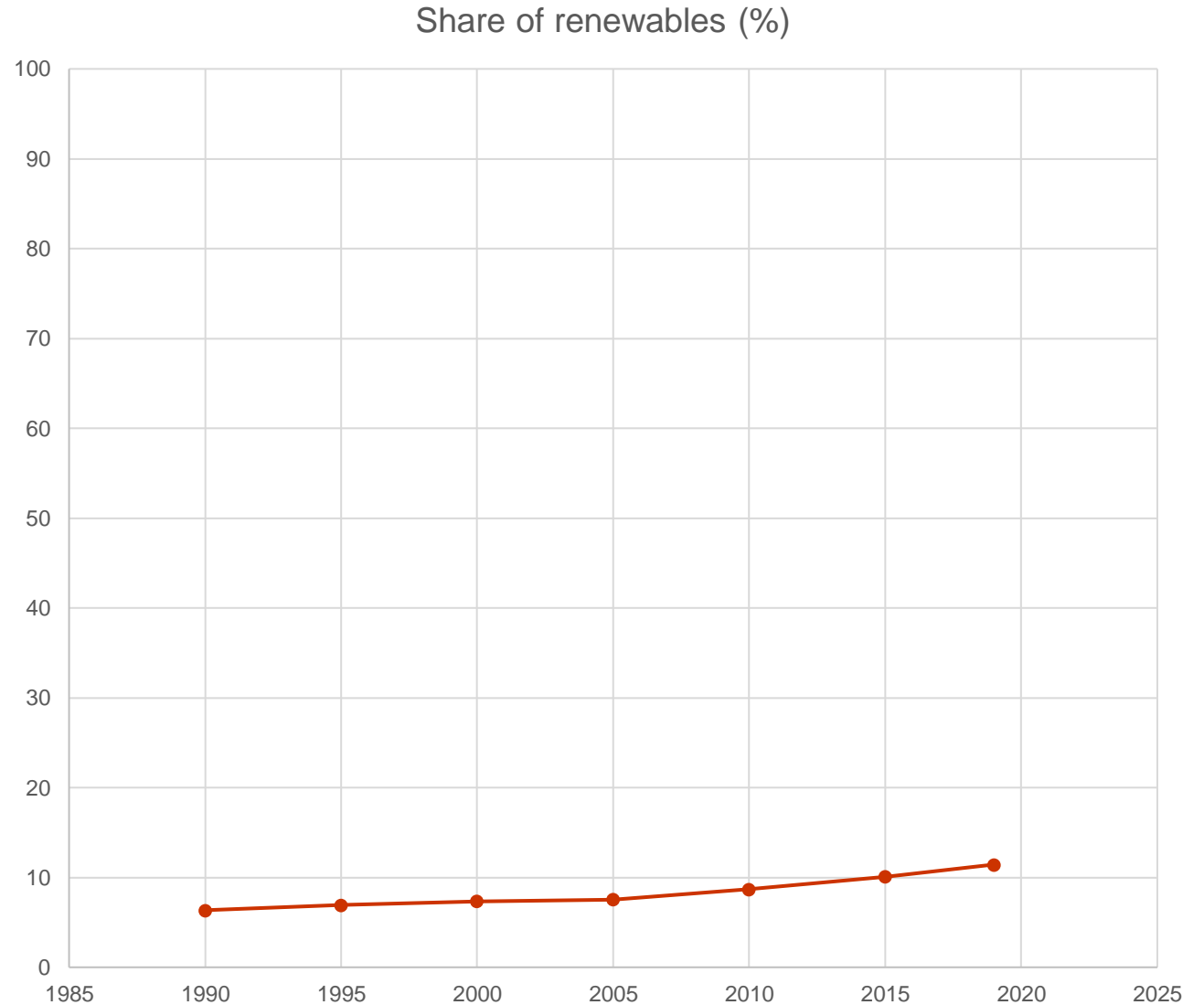
Important factors influencing these developments, e.g.

Decreasing emissions compared to TU Delft research:
+ increased energy efficiency for data processes
+ increased percentage of green energy



Yes but....

- Due to growing population and prosperity, the worldwide energy consumption increases. Consequently, the share of renewable energy hardly increased since 1990. [IEA (2020)]
- “Jevons Paradox”: improved energy efficiency can increase overall energy consumption



Important factors influencing these developments, e.g.

Decreasing emissions compared to TU Delft research:

- + increased energy efficiency for data processes
- + increased percentage of green energy
- + delayed deployment
- + optimization of local/central data

Increasing emissions compared to TU Delft research:

- increased data volumes
- increased security requirements
- increasing amount of data processes even when the vehicle is not driving
- increased number of software updates due to higher security and increasingly complex software
- increased travel distances due to self driving vehicles



Conclusions

1. The negative impact of vehicle automation on sustainability (and potentially # deaths) is underestimated
2. This impact depends on how vehicle automation will be developed (from a regulatory, commercial and technological perspective)
3. This effect is not restricted to vehicle automation, but relates to all processes using generation, processing, exchange and storage of data (e.g. electrification)
4. The common claim that vehicle automation will contribute to sustainability will require actions from WP.29 in order to make it happen!



Recommendations

1. Further research including empirical data is needed to get a better picture of the impact of vehicle automation (and other data consuming processes) on sustainability
2. GRPE already has the mandate to cover Lifecycle Assessment (LCA). Collaboration between experts from GRVA and GRPE could help to improve and maintain the models and corresponding values for LCA
3. Include WP.1 and ITC in this discussion



Technology has a role.
We have a much bigger role
(Gerry McGovern)

Thank you for your attention!

