HOME NEWS CYCLING CITIES PUBLICATIONS SUM RESEARCH PROGRAM CITIES FUNDING WHO'S WHO

Cycling Cities: The Global Experience is a research and publication project. It covers 150 years of cycling policy and practice around the world in 50 cities in 25 countries–and growing. *Cycling Cities* is an invaluable resource for the growing global community of policymakers, community groups, students, and teachers. We are pleased to announce the Cycling Cities: The African Experience. Curious? We have an exhibit *Bicycles are Forever* in Tamale in Ghana at Nuku studio, May-September 2024. And we are crowdfunding: Help our African authors publish the book by donating.

Why have some capitals and business centers become true cycling cities and others not? *Cycling Cities* traces how policymakers, engineers, cyclists, or community groups have made a difference since the early twentieth century. All publications are richly illustrated with photos, tables, graphs,

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Rethinking Electric Mobility Transitions: A Global South and Social Justice Perspective

Frauke Behrendt
Associate Professor Transitions to Sustainable Mobility
Technology, Innovation & Society Group
Eindhoven University of Technology
f.behrendt@tue.nl

Trail Seminar Transport Equity, 13 May 2025

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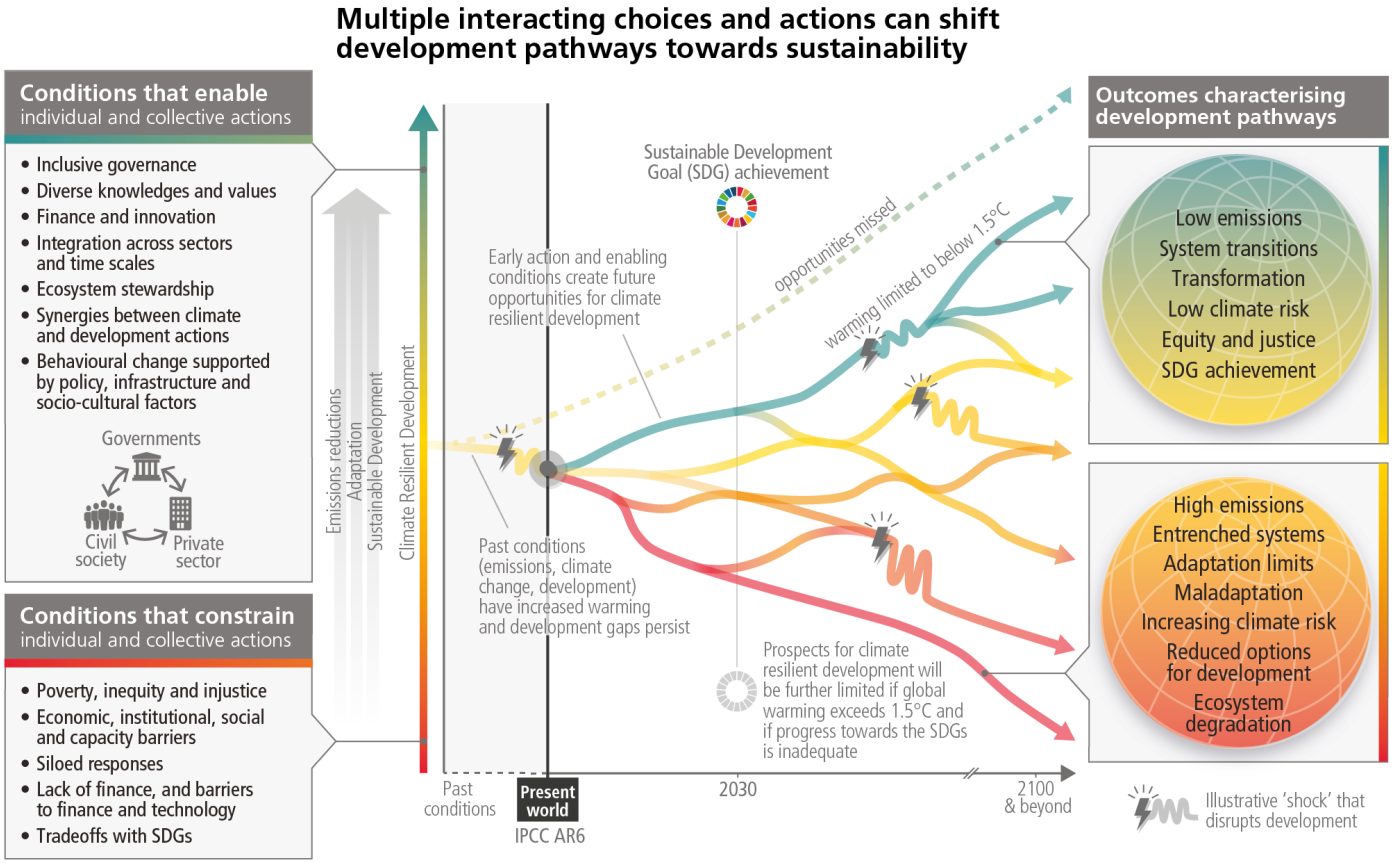
There is a rapidly narrowing window of opportunity to enable climate resilient development



https://www.ipcc.ch/report/ar6/syr/

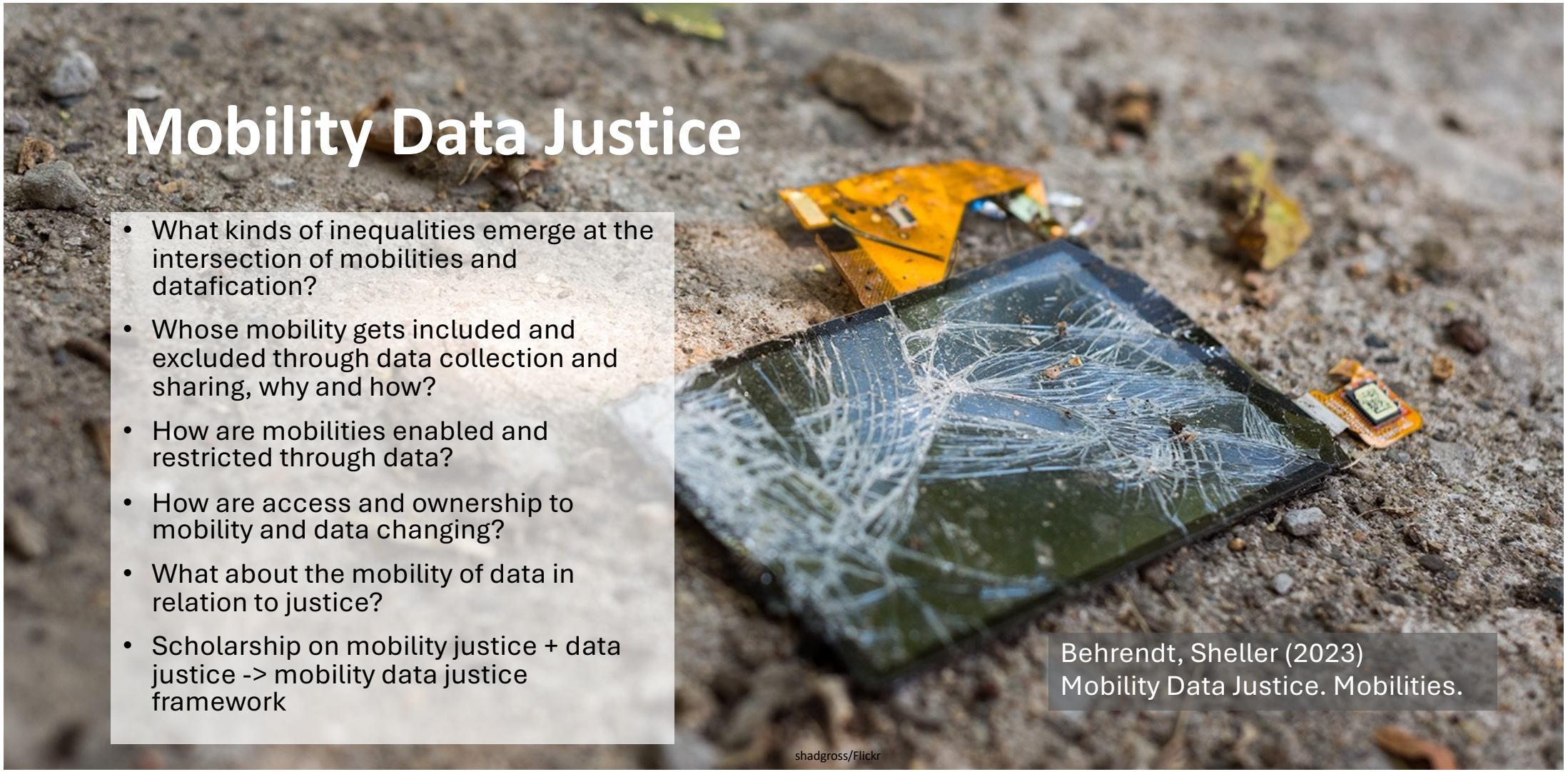
Electric Vehicles: Case Study

https://venusglobaltech.com/blogs/teslas-electric-vehicle-initiatives-driving-towards-a-sustainable-future/


New understandings of electric mobility that have more potential towards sustainable and just futures
Mobility Data Justice
Electric Cars
E3W in Bangladesh
E2W in Kenya
Micromobility UK/NL
Research Agenda Electric Mobility
Frauke Behrendt - Rethinking Electric Mobility Transitions
TU/e
EINDHOVEN UNIVERSITY OF TECHNOLOGY

Mobility Data Justice

- What kinds of inequalities emerge at the intersection of mobilities and datafication?
- Whose mobility gets included and excluded through data collection and sharing, why and how?
- How are mobilities enabled and restricted through data?
- How are access and ownership to mobility and data changing?
- What about the mobility of data in relation to justice?
- Scholarship on mobility justice + data justice -> mobility data justice framework



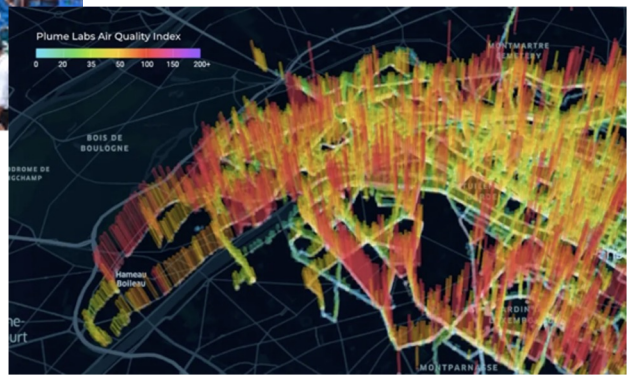
Behrendt, Sheller (2023)
Mobility Data Justice. Mobilities.

shadgross/Flickr

Mobility Data Justice

- a multi-scalar, interdisciplinary approach for examining entanglements of mobility and data with a social justice perspective
- focus on:
  - distributive
  - procedural, and
  - epistemic elements

Behrendt, Sheller (2023)
Mobility Data Justice. Mobilities.



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Mobility Data Justice > distributive perspective

a) how mobility and data are accessed, accumulated and distributed in (un)equal ways,

b) how data and mobility infrastructures lead to (in)equitable risks and benefits distributions, and

c) how moral subjects are constituted with relation to mobility and data, i.e., who is considered deserving or worthy of access to various mobility data or data mobilities, and who is targeted by such data collection, surveillance, and control.

Behrendt, Sheller (2023)
Mobility Data Justice. Mobilities.

Mobility Data Justice > procedural perspective

- who participates in decision making and design of infrastructures at intersection of mobility and data
- Including: roles of public institutions, private companies, and governance processes in (co)producing mobility data (in)justices.
- Consider how the “who” and “how” and “why” of decision making around mobility is intrinsically bound up with data, algorithms, and, increasingly AI
- AI is increasingly blackboxing how crucial decisions are reached, and leaving people out of the loop to a greater extent than ever before, undermining the very notion of procedural justice

Behrendt, Sheller (2023)
Mobility Data Justice. Mobilities.

Mobility Data Justice > epistemic perspective

- what counts as ‘data’ and knowledge in relation to mobility: knowing the world
- data systems: production of intersectional (im)mobilities, including age, gender, race, sexuality, class, and disability
- how capabilities for mobilities are supported or prevented by uses of data, and
- what other ways of knowing might be imaginable.

Behrendt, Sheller (2023)
Mobility Data Justice. Mobilities.

- Analyse existing injustices and the power relationships behind them
- Define principles for fairer approaches to mobility and data

Electric Cars

https://www.thetruthaboutcars.com/cars/news-blog/study-giant-pickups-and-suvs-more-dangerous-to-pedestrians-obviously-44503768

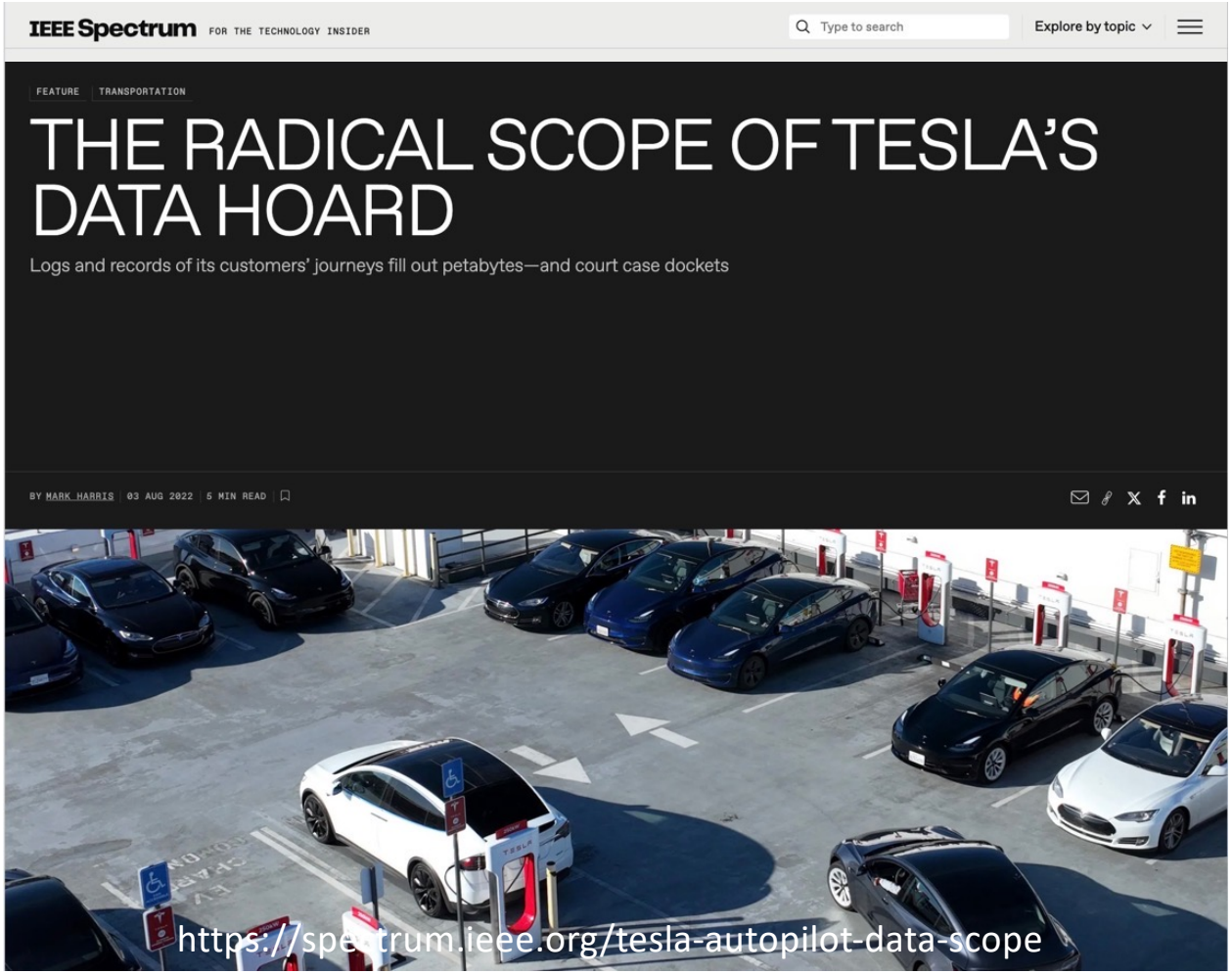
Henderson, Jason. 2020. “EVs Are Not the Answer: A Mobility Justice Critique of Electric Vehicle Transitions.” *Annals of the American Association of Geographers* 110 (6): 1993–2010. https://doi.org/10.1080/24694452.2020.1744422.

Brand, C. (2024). Confronting mobesity is vital for the global electrification of transport. In Nature Energy. Nature Research. https://doi.org/10.1038/s41560-024-01559-x

Electric Cars

Rouhana, F., Zhu, J., Chacon-Hurtado, D., Hertel, S., & Bagtzoglou, A. C. (2024). Ensuring a just transition: The electric vehicle revolution from a human rights perspective. *Journal of Cleaner Production*, *462*. https://doi.org/10.1016/j.jclepro.2024.142667

Prause, L., & Dietz, K. (2022). Just mobility futures: Challenges for e-mobility transitions from a global perspective. *Futures*, *141*(June), 102987. https://doi.org/10.1016/j.futures.2022.102987


IEEE Spectrum FOR THE TECHNOLOGY INSIDER
Type to search
Explore by topic
FEATURE TRANSPORTATION
THE RADICAL SCOPE OF TESLA'S DATA HOARD
Logs and records of its customers' journeys fill out petabytes—and court case dockets
BY MARK HARRIS | 03 AUG 2022 | 5 MIN READ
https://spectrum.ieee.org/tesla-autopilot-data-scope

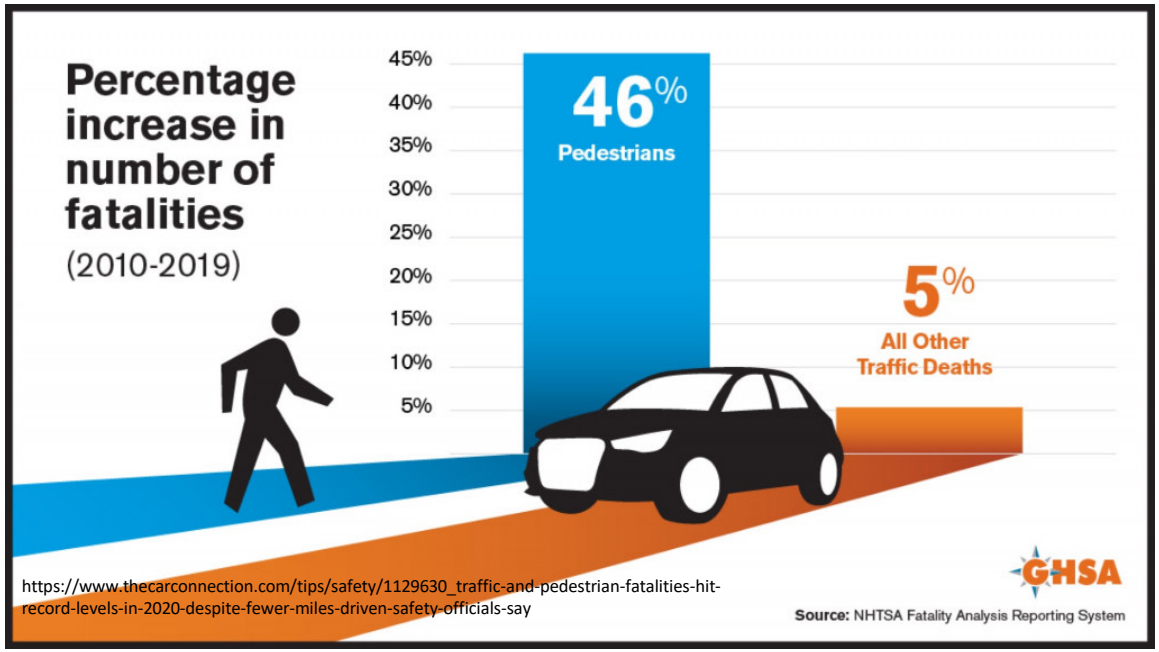
EVs, AVs & Vulnerable Road Users

https://www.thecarconnection.com/tips/safety/1129630_traffic-and-pedestrian-fatalities-hit-record-levels-in-2020-despite-fewer-miles-driven-safety-officials-say

https://datafromsky.com/wp-content/uploads/2023/01/vulnerable-road-user-graphic-1536x864.png

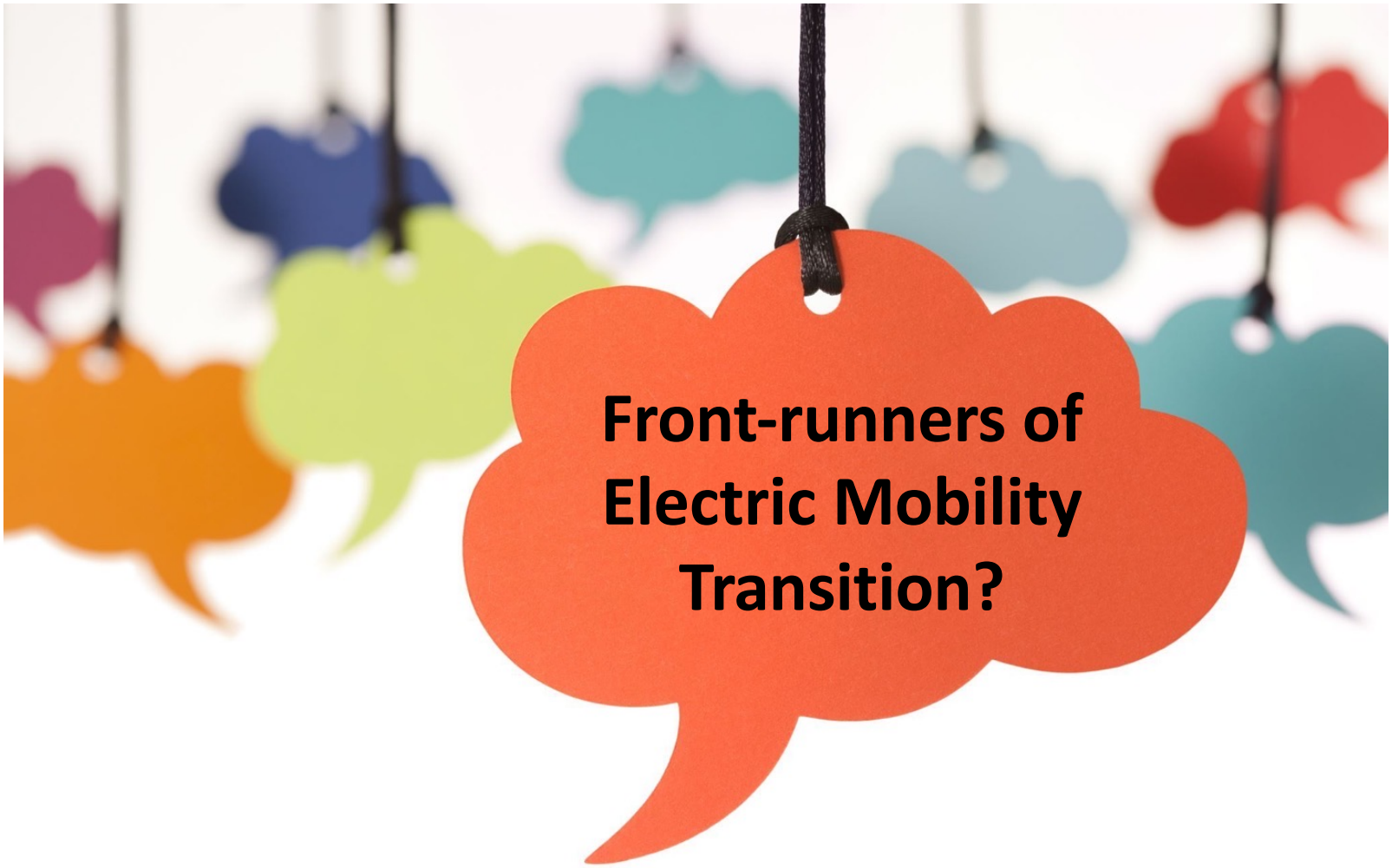
Martínez-Buelvas, L., Rakotonirainy, A., Grant-Smith, D., & Oviedo-Trespalacios, O. (2022). A transport justice approach to integrating vulnerable road users with automated vehicles. *Transportation Research Part D: Transport and Environment*, *113*. https://doi.org/10.1016/j.trd.2022.103499

Killing

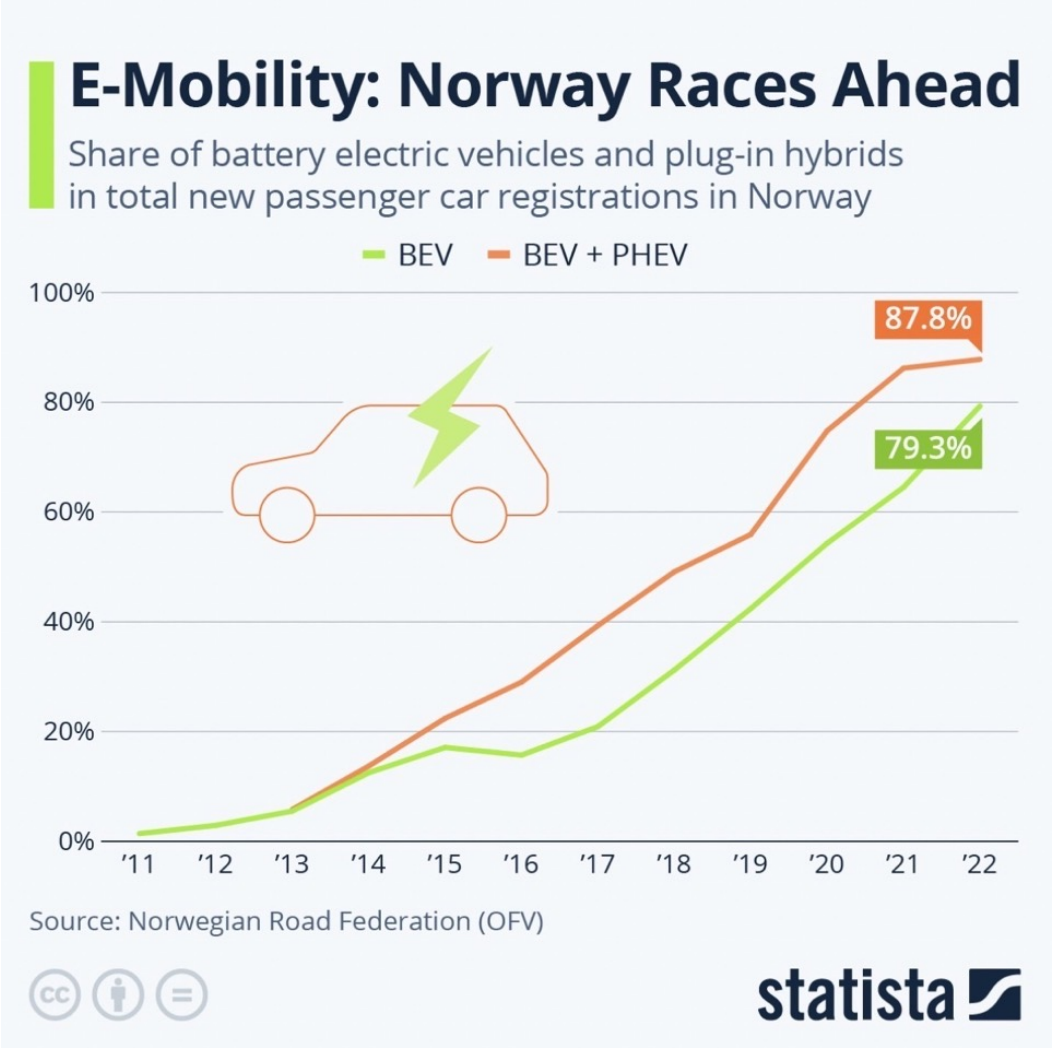


https://www.thecarconnection.com/tips/safety/1129630_traffic-and-pedestrian-fatalities-hit-record-levels-in-2020-despite-fewer-miles-driven-safety-officials-say

https://www.faz.net/aktuell/reise/radfahren-berlin-deutschland-unfall-tote-rad-leihraeder-15919978.html

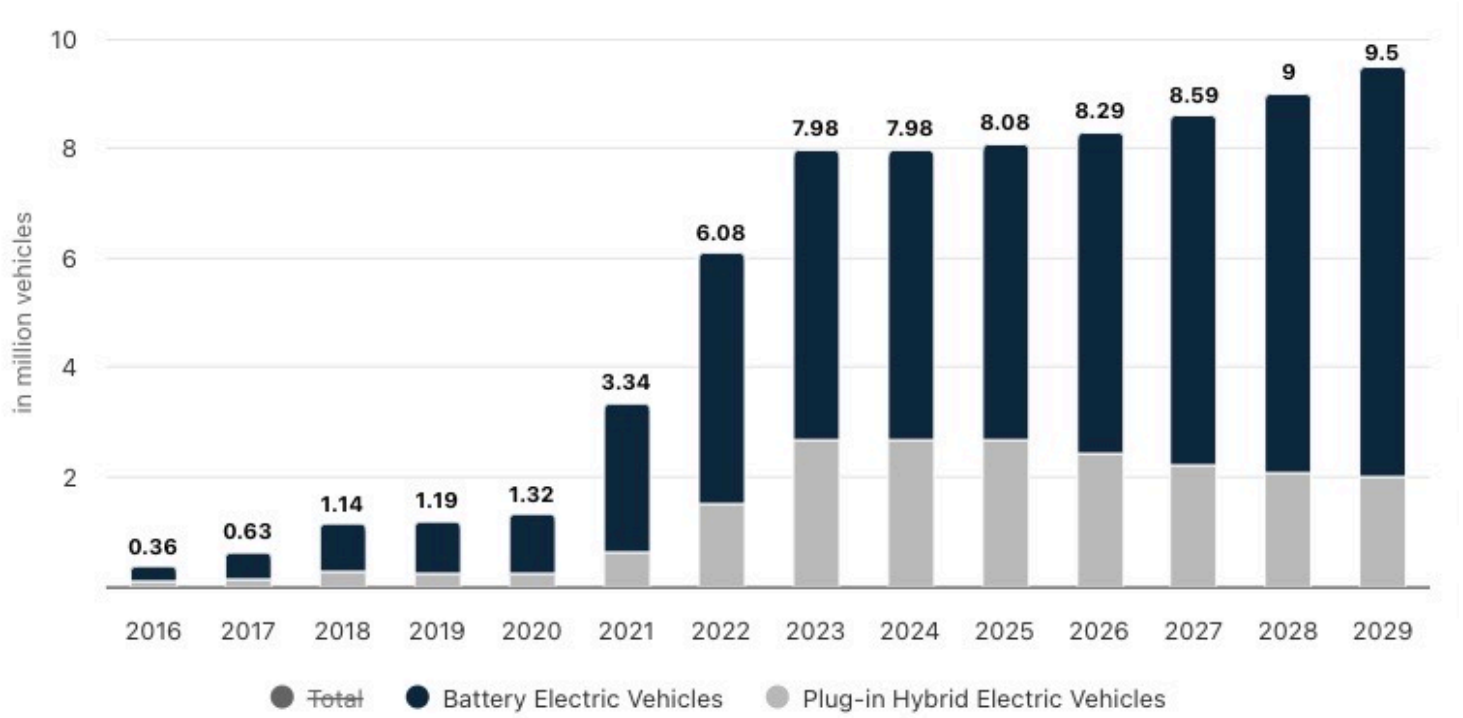

Front-runners of
Electric Mobility
Transition?

Front-runners of Electric Mobility Transition?



Front-runners of Electric Mobility Transition?

Vehicle Sales in China



Most recent update: Nov 2024

Source: Statista Market Insights

Number of electric cars in Germany in April 2022:

???

Estimated number of electric rickshaws in Bangladesh:

???

(van der Straeten 2022)

Number of electric cars in Germany in April 2022:

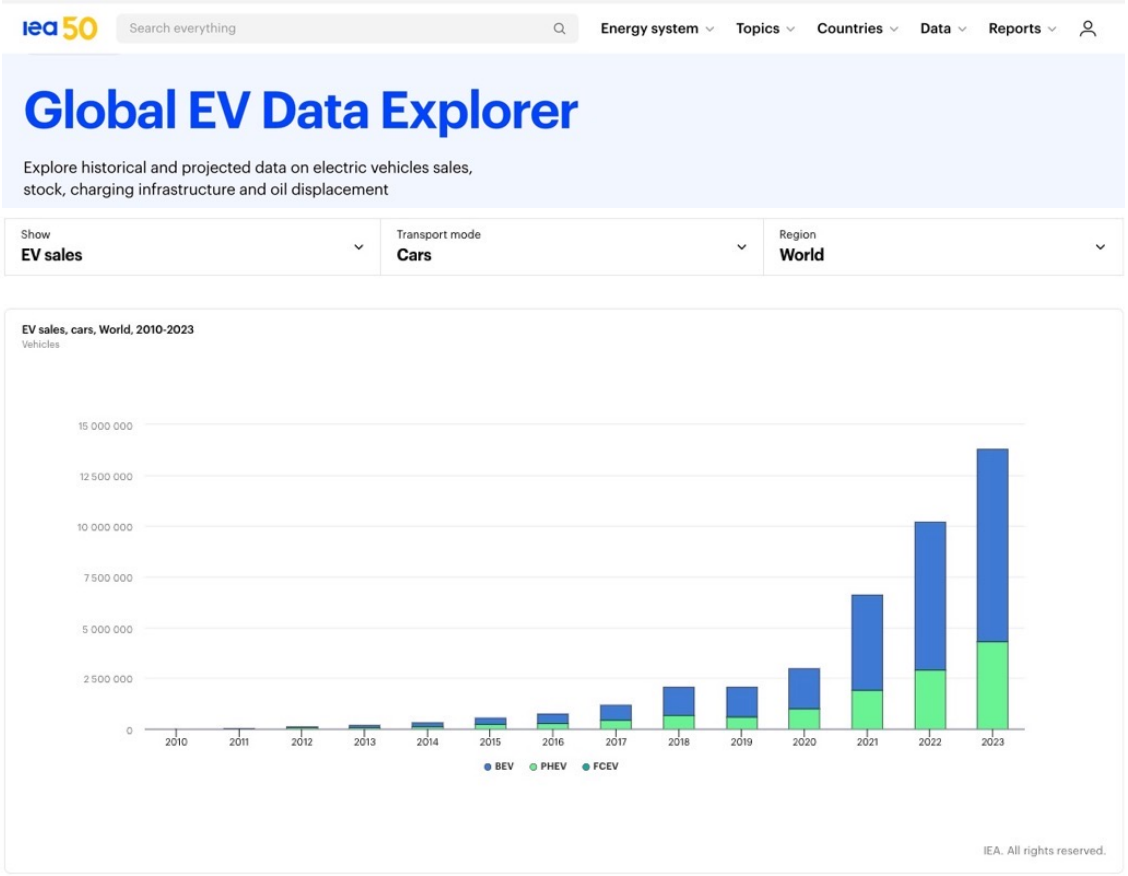
687.200

Estimated number of electric rickshaws in Bangladesh:

1-4 Million

(van der Straeten 2022)

Electric Mobility Statistics



https://www.iea.org/data-and-statistics/data-tools/global-ev-data-explorer

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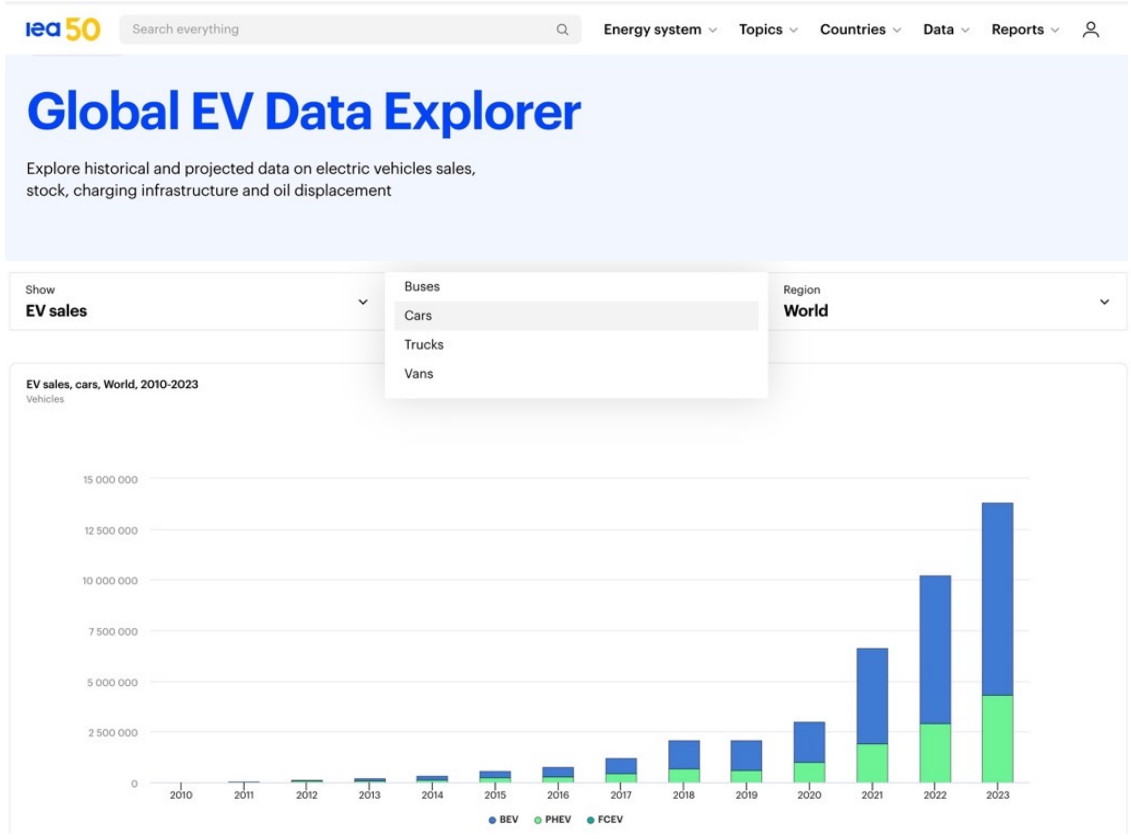
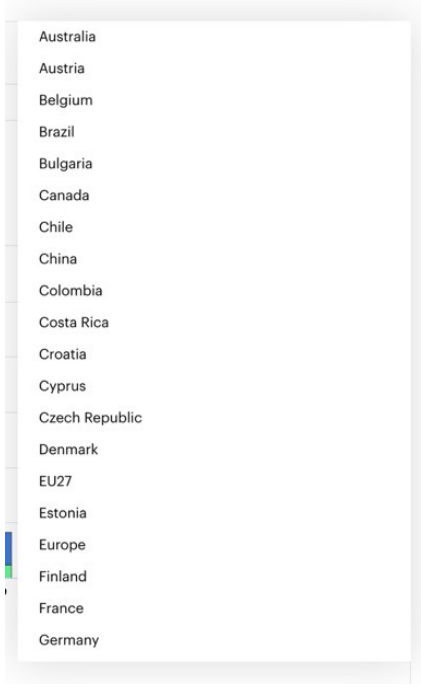
Electric Mobility Statistics





https://www.iea.org/data-and-statistics/data-tools/global-ev-data-explorer

1-4 Million Electric Three-Wheelers in Bangladesh

V. d. Straeten, Behrendt & Groh (under review) The vehicle multiple: Governing the “unruly” electric mobility transition in Bangladesh. Journal of Environmental Policy and Planning.

Invisibility in National Policy Documents & Visions

- the definition of an electric vehicle in the Bangladesh Road Transport Act 2018 does not cover battery-operated bicycles or rickshaws
- The same applies to the BRTA Electric Motor Vehicle Registration and Operation Guideline, a policy to expedite the import and domestic manufacturing of EVs
- In its Integrated Energy and Power Master Plan 2023, Bangladesh's energy ministry aims for 50% share of EVs in 2050, but excludes e-rickshaws from the definition
- four dedicated EV charging stations charge 34 electric cars with government registration
- -> Exclusion of e-rickshaws in agenda-setting and policy-making on the national level

V. d. Straeten, Behrendt & Groh (under review) The vehicle multiple: Governing the "unruly" electric mobility transition in Bangladesh. Journal of Environmental Policy and Planning.

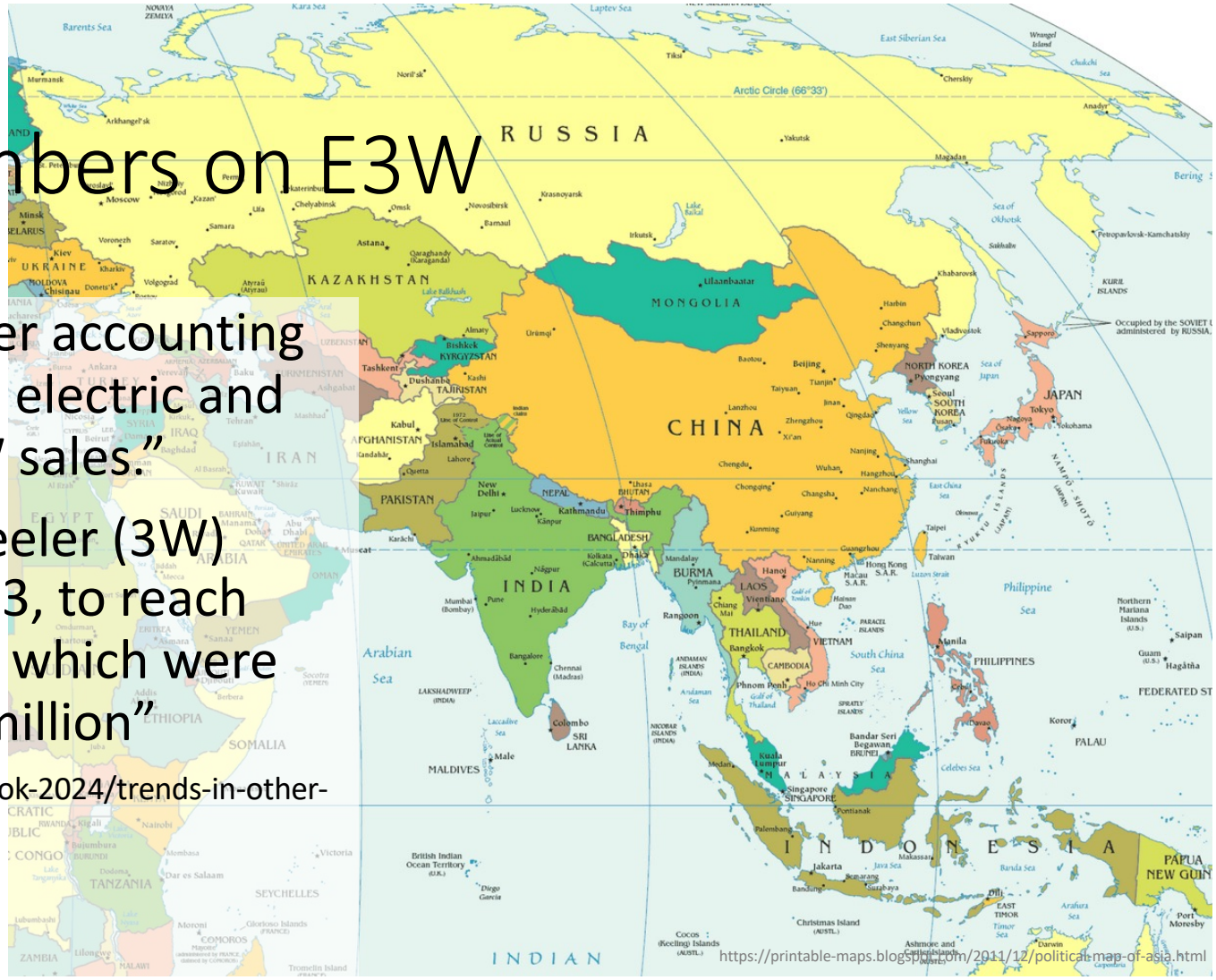
Moving millions more…

- Rickshaws as Paratransit/shared/informal mobility/MaaS
- Vs privately owned electric cars in Global North
- What counts? Trips? Vehicles?

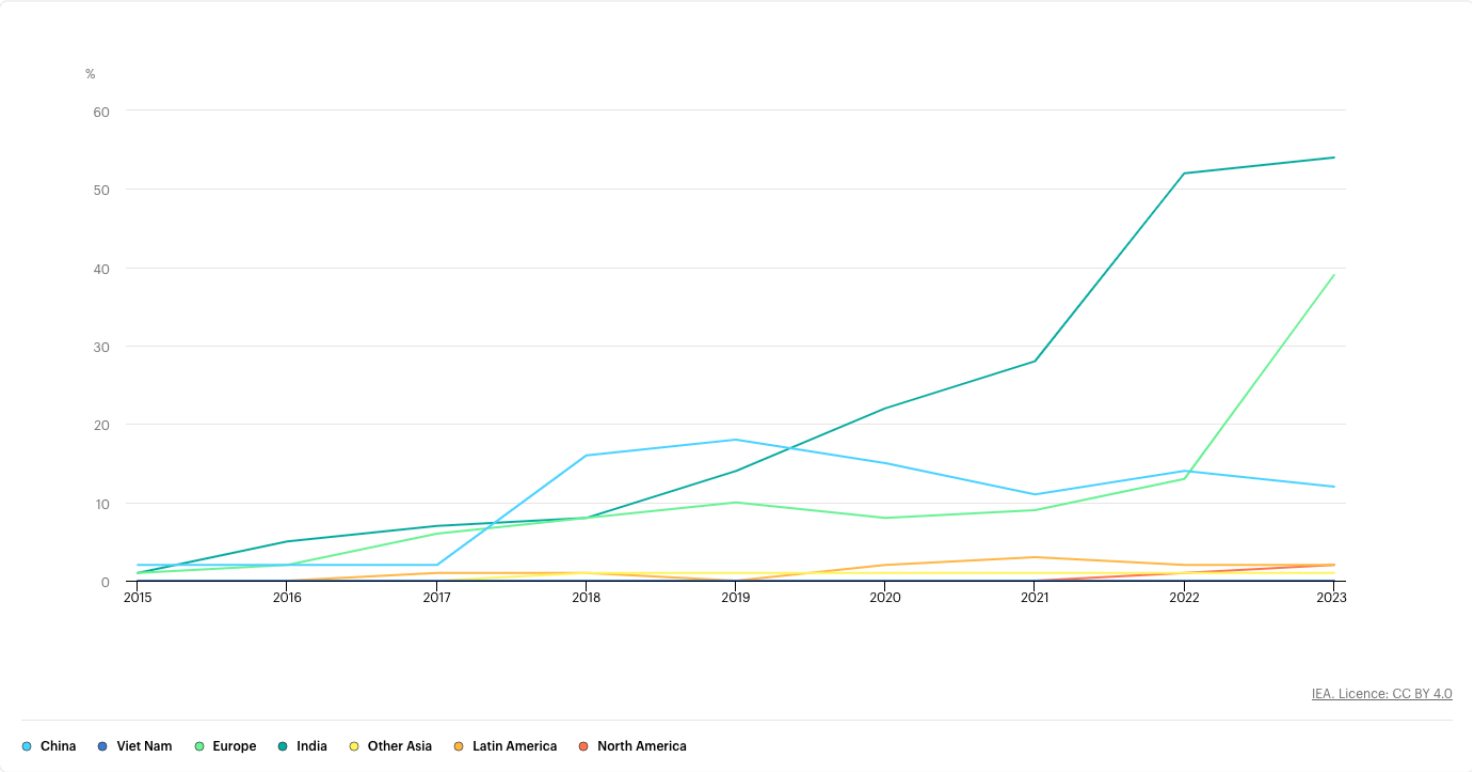
Asia Market Numbers on E3W

- “China and India together accounting for more than 95% of all electric and 80% of conventional 3W sales.”
- “Globally, the three-wheeler (3W) market grew 13% in 2023, to reach 4.5 million sales, 21% of which were electric”, i.e. “almost 1 million”

https://www.iea.org/reports/global-ev-outlook-2024/trends-in-other-light-duty-electric-vehicles



Electric three-wheeler sales share by region, 2015-2023



EU?

Electrification of Two-Wheelers in Kenya

Behrendt, V. d. Straeten, Nyamai, Dankers (developing) Electrification of Two-Wheelers in Kenya.

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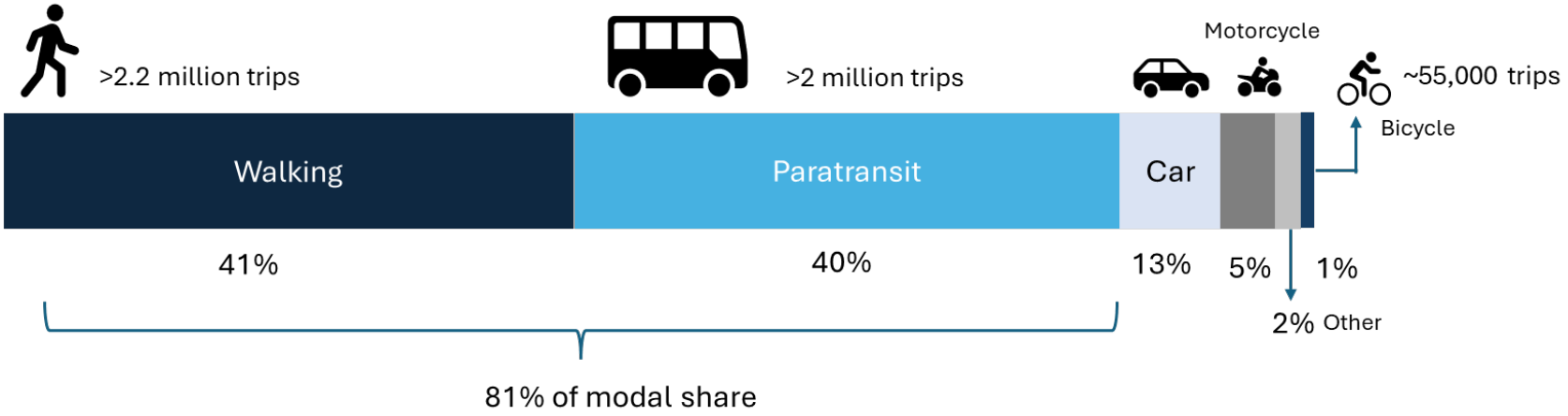
Boda Bodas - ICE

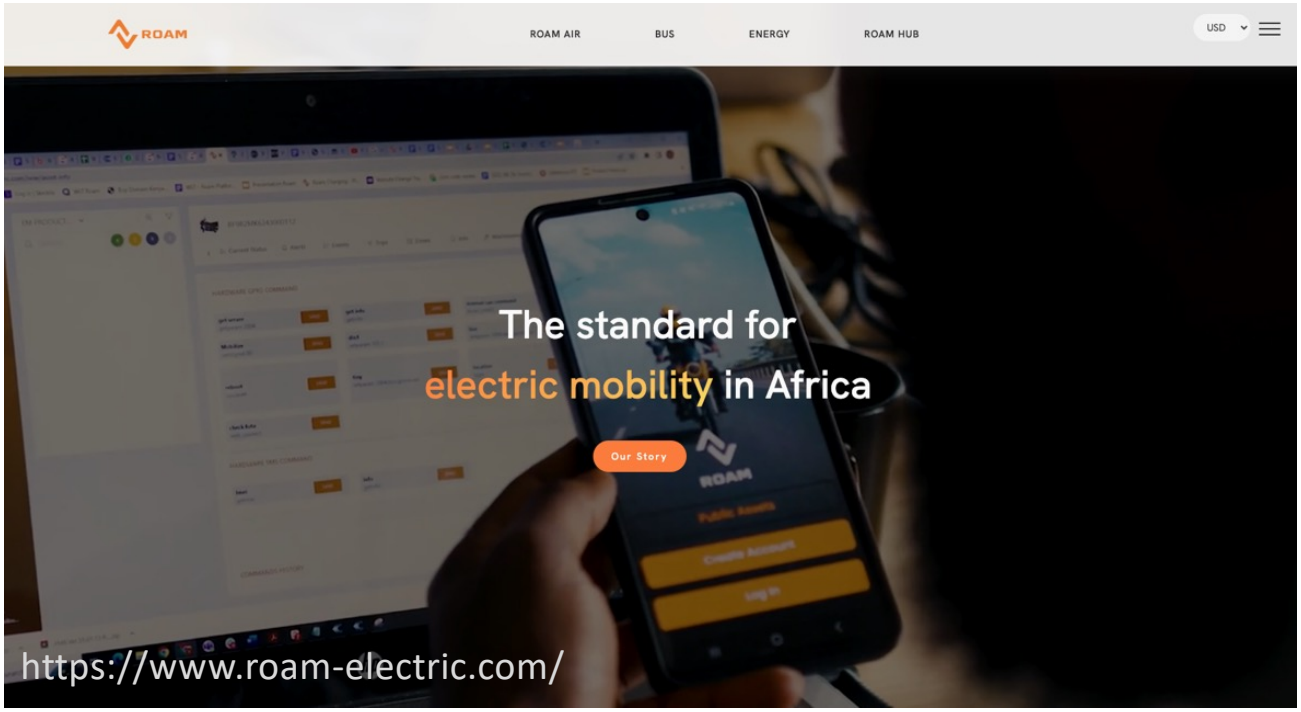
- Motorbikes for passenger & freight mobility
- Around 3m riders
- Major employment opportunity for male youth, + during covid
- Navigate urban traffic
- Rural areas not served by other means, dirt roads
- High accident rates, low uptake of safety gear & training
- Established repair & maintenance
- Air pollution, emissions, fuel import
- Contrast: Matatus - organised & powerful

Mobility context



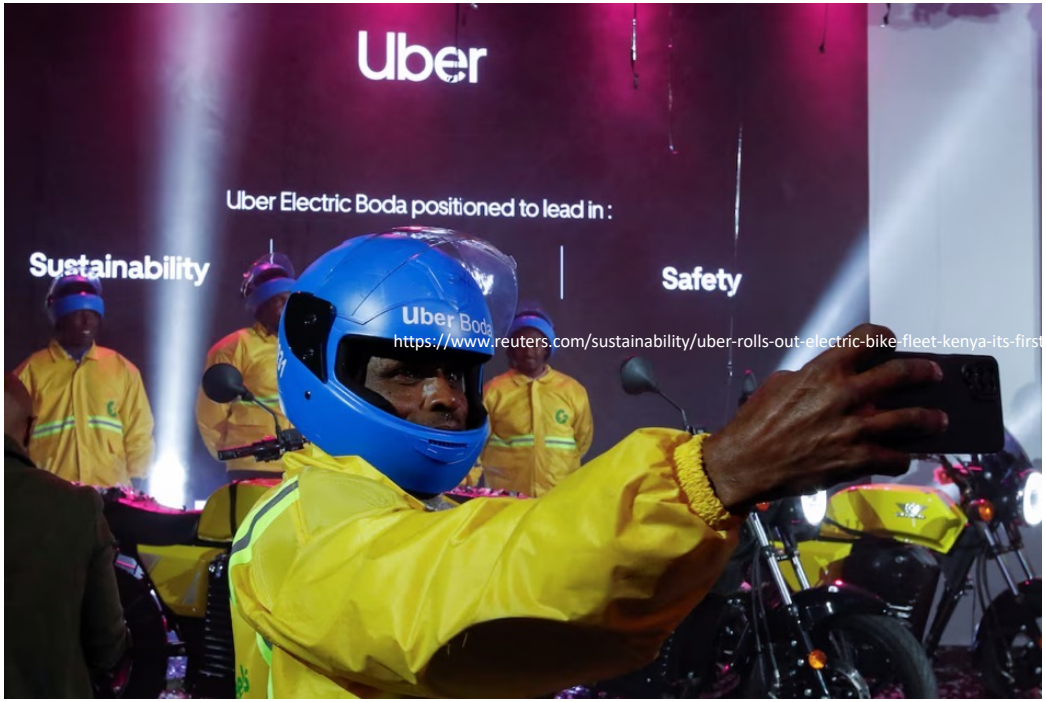
Nyamai (2024) Urban mobility and spatial justice: Prospects for non-motorized mobility in Nairobi. PhD
Behrendt, V. d. Straeten, Nyamai, Dankers (developing) Electrification of Two-Wheelers in Kenya.

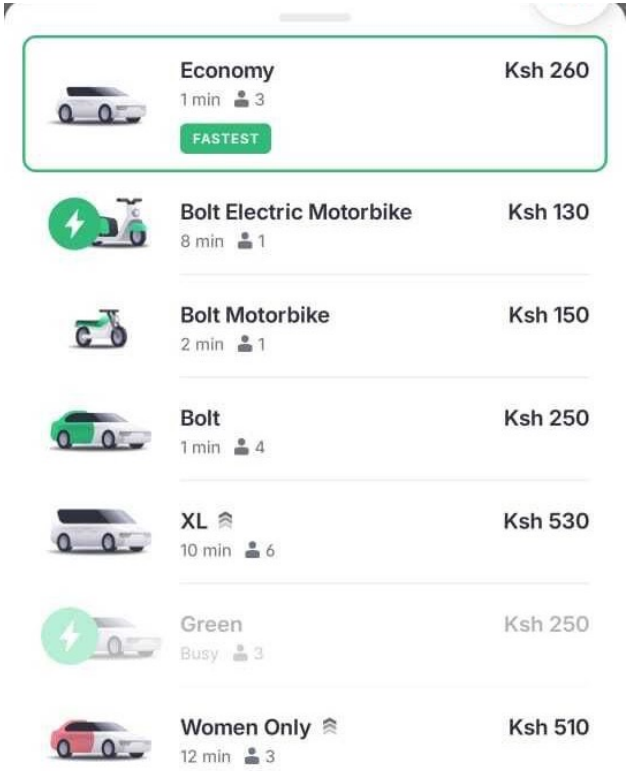
Roam



Behrendt, V. d. Straeten, Nyamai, Dankers (developing) Electrification of Two-Wheelers in Kenya.

Platforms





Behrendt, V. d. Straeten, Nyamai, Dankers (developing) Electrification of Two-Wheelers in Kenya.

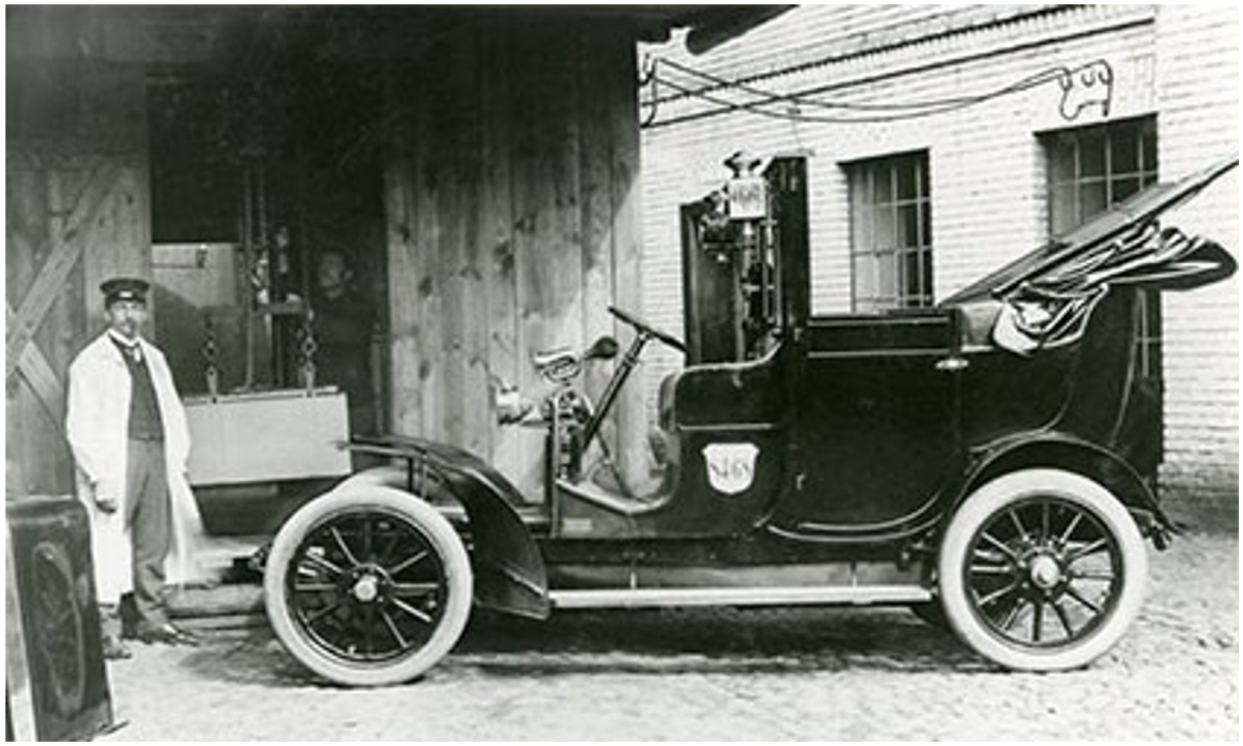
Greenwheels (x Roam x Uber)

Behrendt, V. d. Straeten, Nyamai, Dankers (developing) Electrification of Two-Wheelers in Kenya.

Swapping Stations

Behrendt, V. d. Straeten, Nyamai, Dankers (developing) Electrification of Two-Wheelers in Kenya.

Swapping Stations



Microfinance

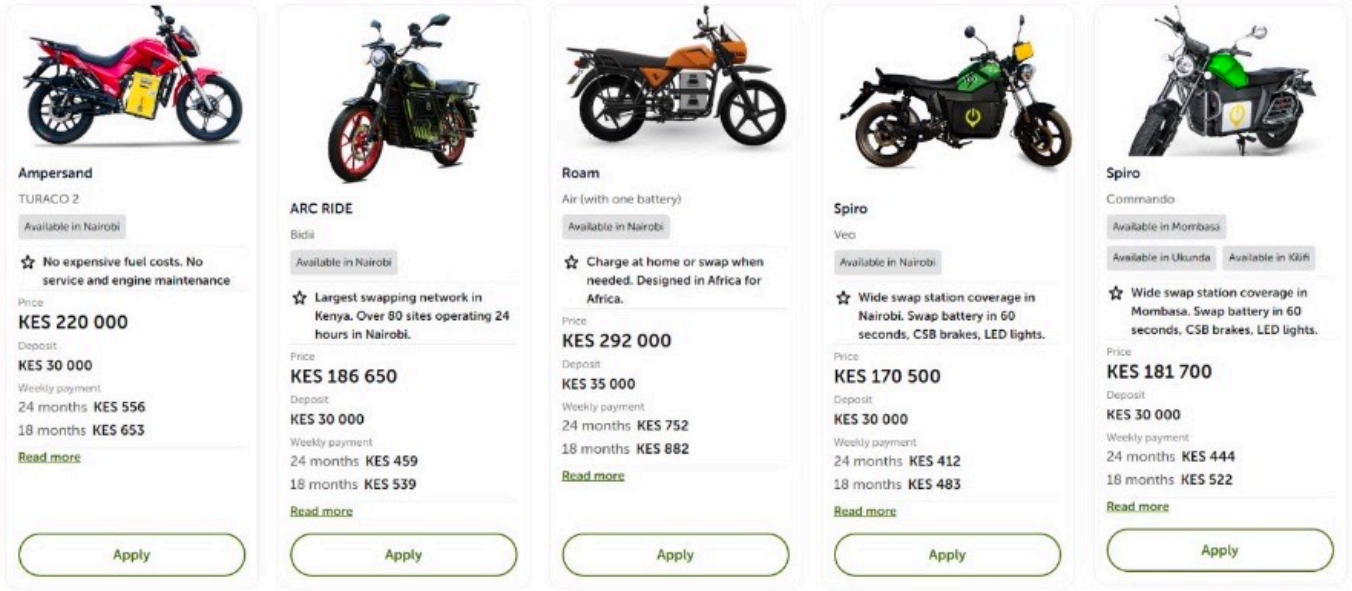
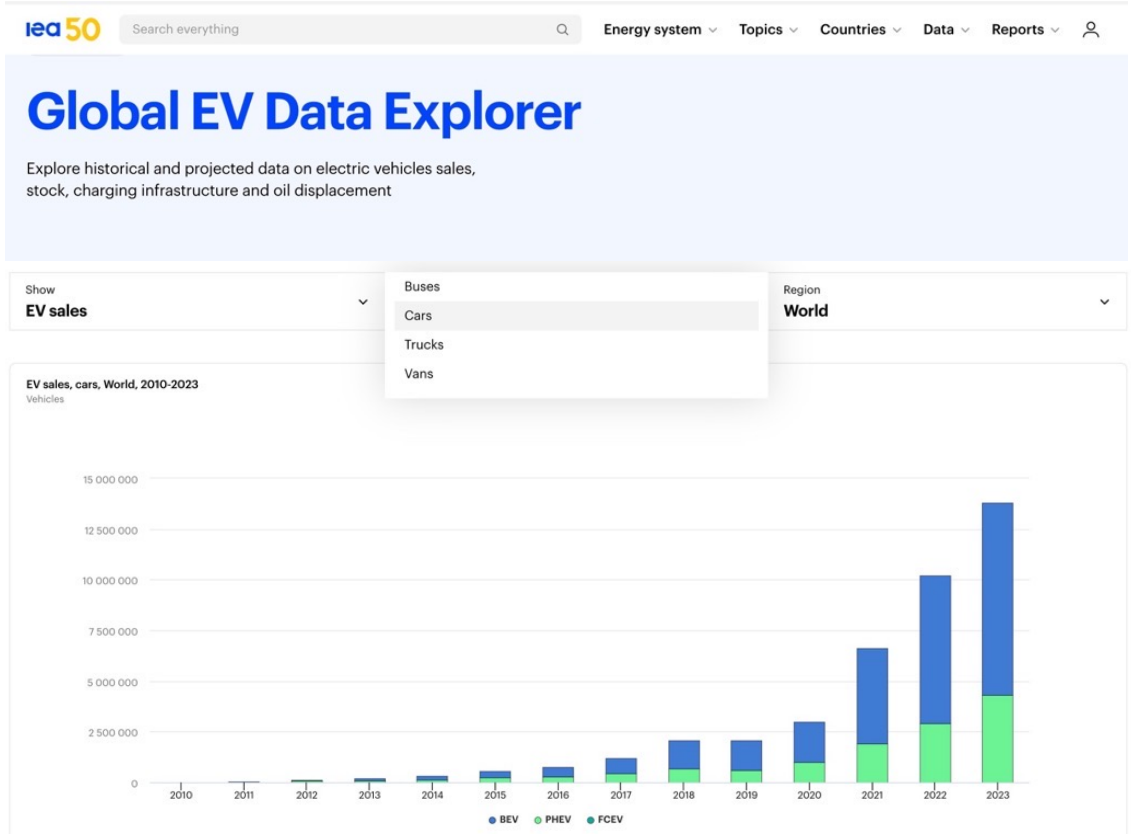


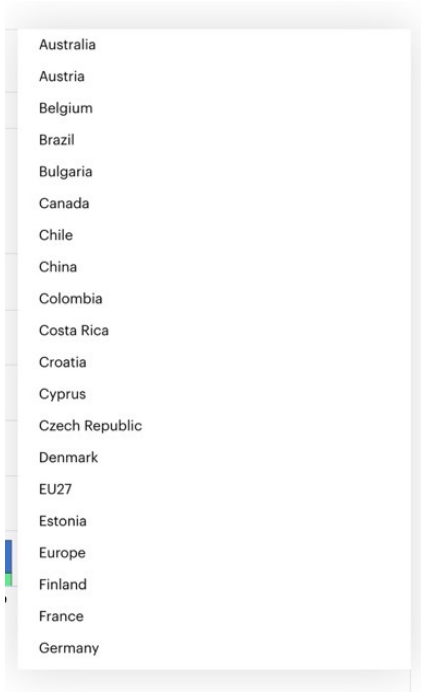
Figure 29 Electric motorcycle offers on the website of MOGO (MOGO, n.d.)

Behrendt, V. d. Straeten, Nyamai, Dankers (developing) Electrification of Two-Wheelers in Kenya.


Gender? Fatalities?

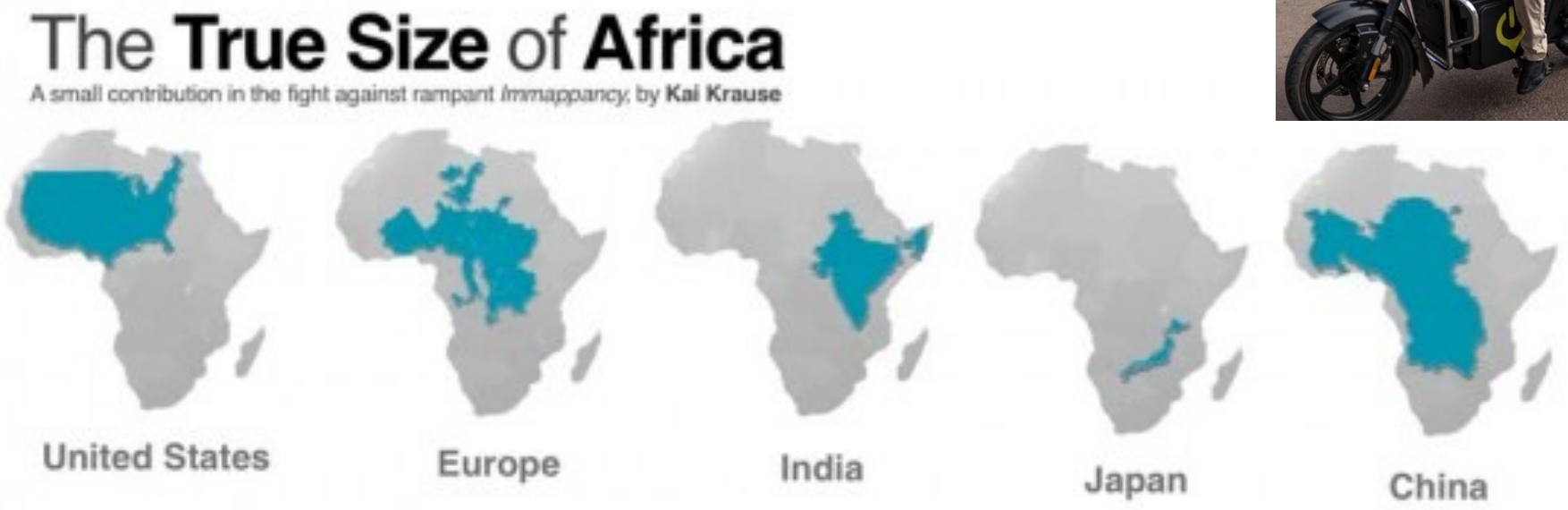
MDJ & Electric Mobility





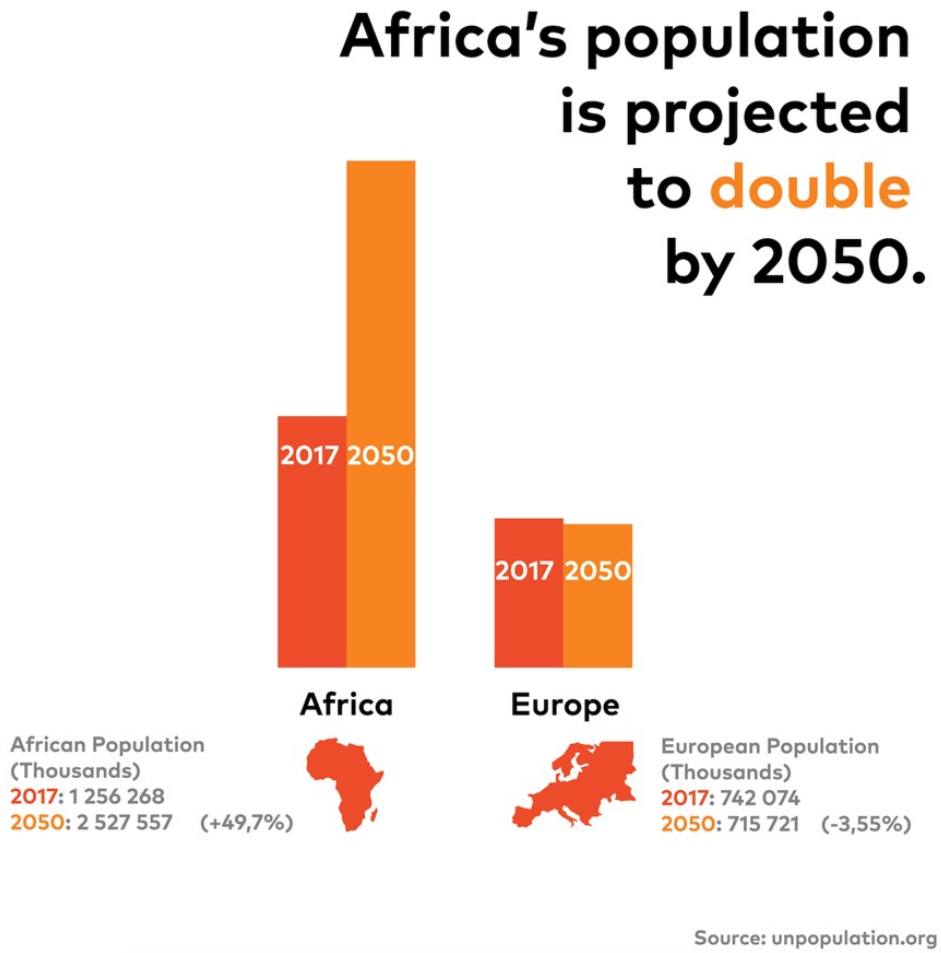
https://www.iea.org/data-and-statistics/data-tools/global-ev-data-explorer

Matters?

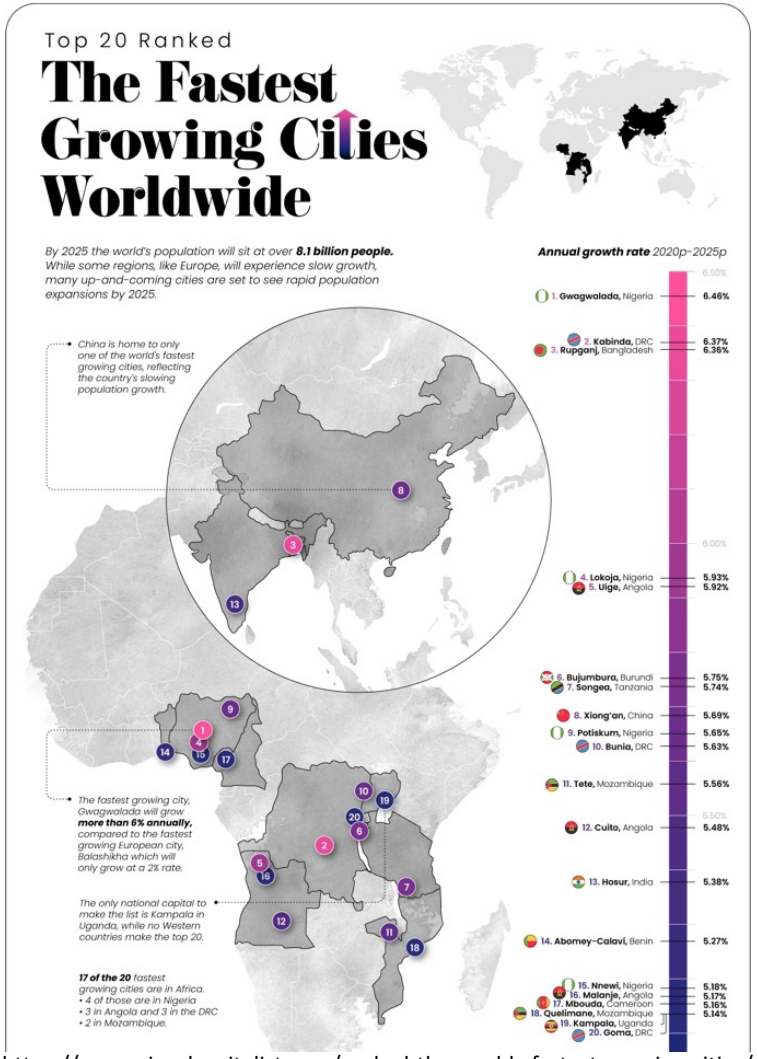


https://invisiblechildren.com/blog/2013/02/25/kai-krause-the-true-size-of-africa/

Matters?

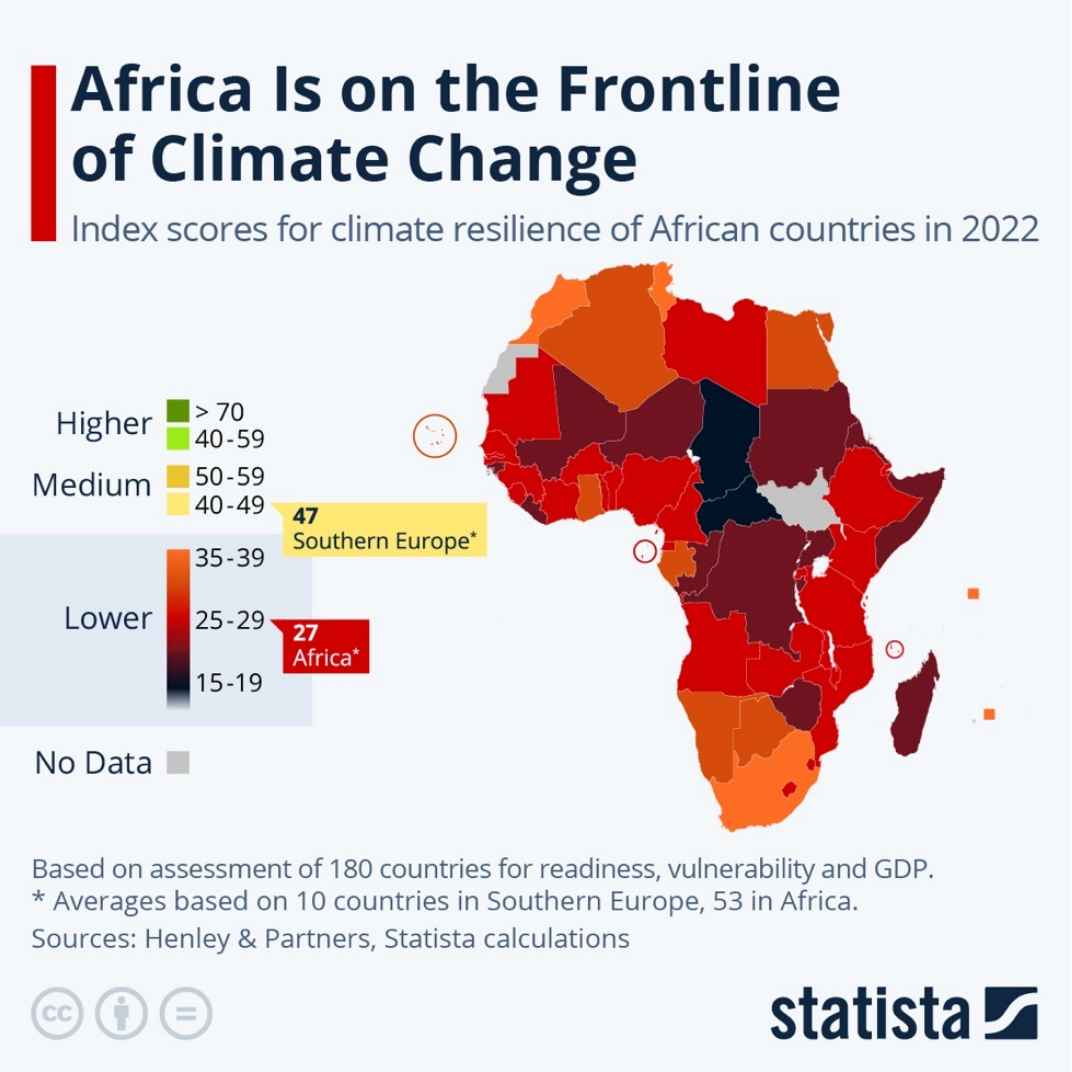

Africa's population is projected to double by 2050.
2017 2050
2017 2050
Africa
Europe
African Population (Thousands)
2017: 1 256 268
2050: 2 527 557 (+49,7%)
European Population (Thousands)
2017: 742 074
2050: 715 721 (-3,55%)
Source: unpopulation.org

Matters?



https://www.visualcapitalist.com/ranked-the-worlds-fastest-growing-cities/

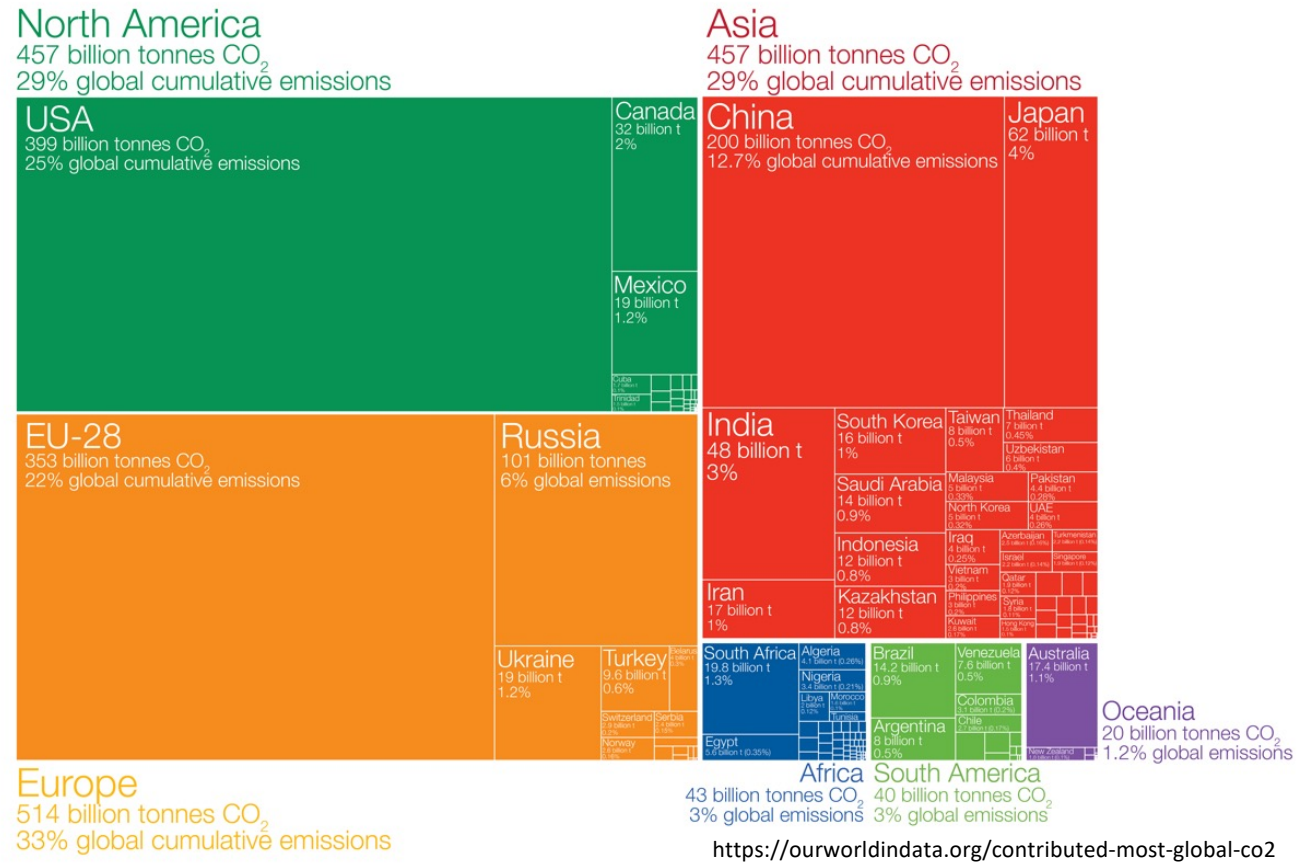
Matters?


Africa Is on the Frontline of Climate Change
Index scores for climate resilience of African countries in 2022
Higher
> 70
40-59
Medium
50-59
40-49
47
Southern Europe*
Lower
35-39
25-29
27
Africa*
15-19
No Data
Based on assessment of 180 countries for readiness, vulnerability and GDP.
* Averages based on 10 countries in Southern Europe, 53 in Africa.
Sources: Henley & Partners, Statista calculations
statista

Who has contributed most to global CO_2 emissions?

Our World in Data

Cumulative carbon dioxide (CO_2) emissions over the period from 1751 to 2017. Figures are based on production-based emissions which measure CO_2 produced domestically from fossil fuel combustion and cement, and do not correct for emissions embedded in trade (i.e. consumption-based). Emissions from international travel are not included.



https://ourworldindata.org/contributed-most-global-co2

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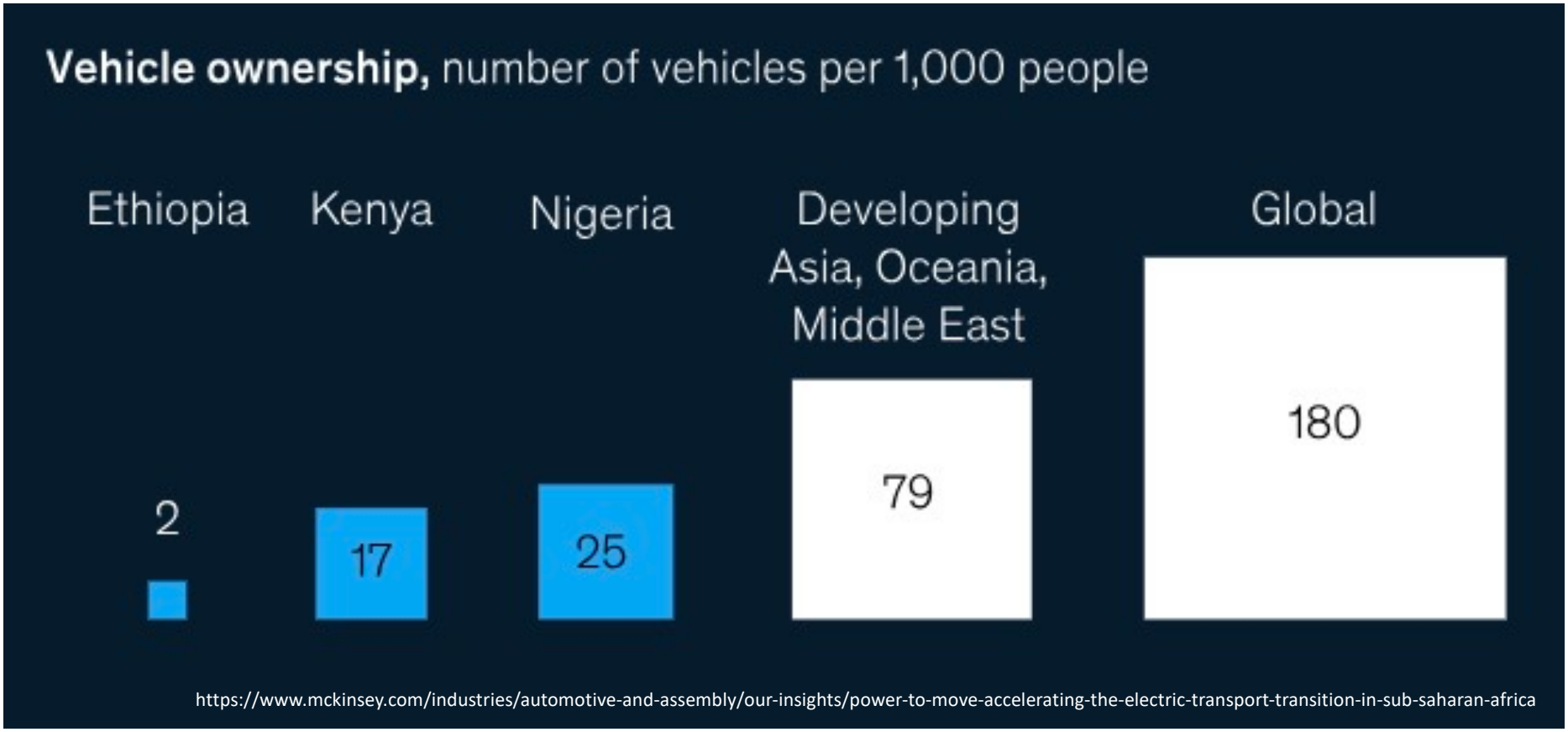
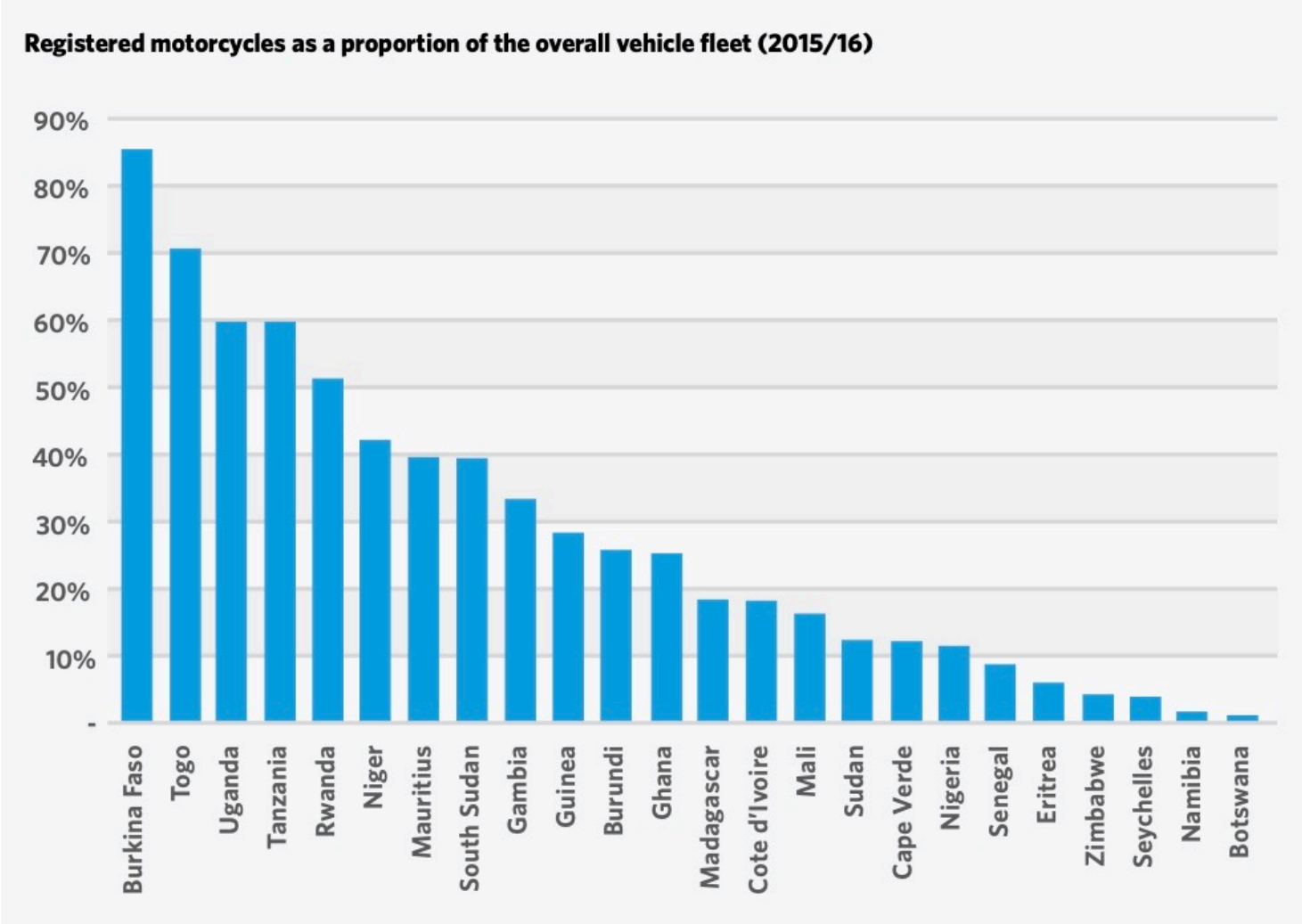
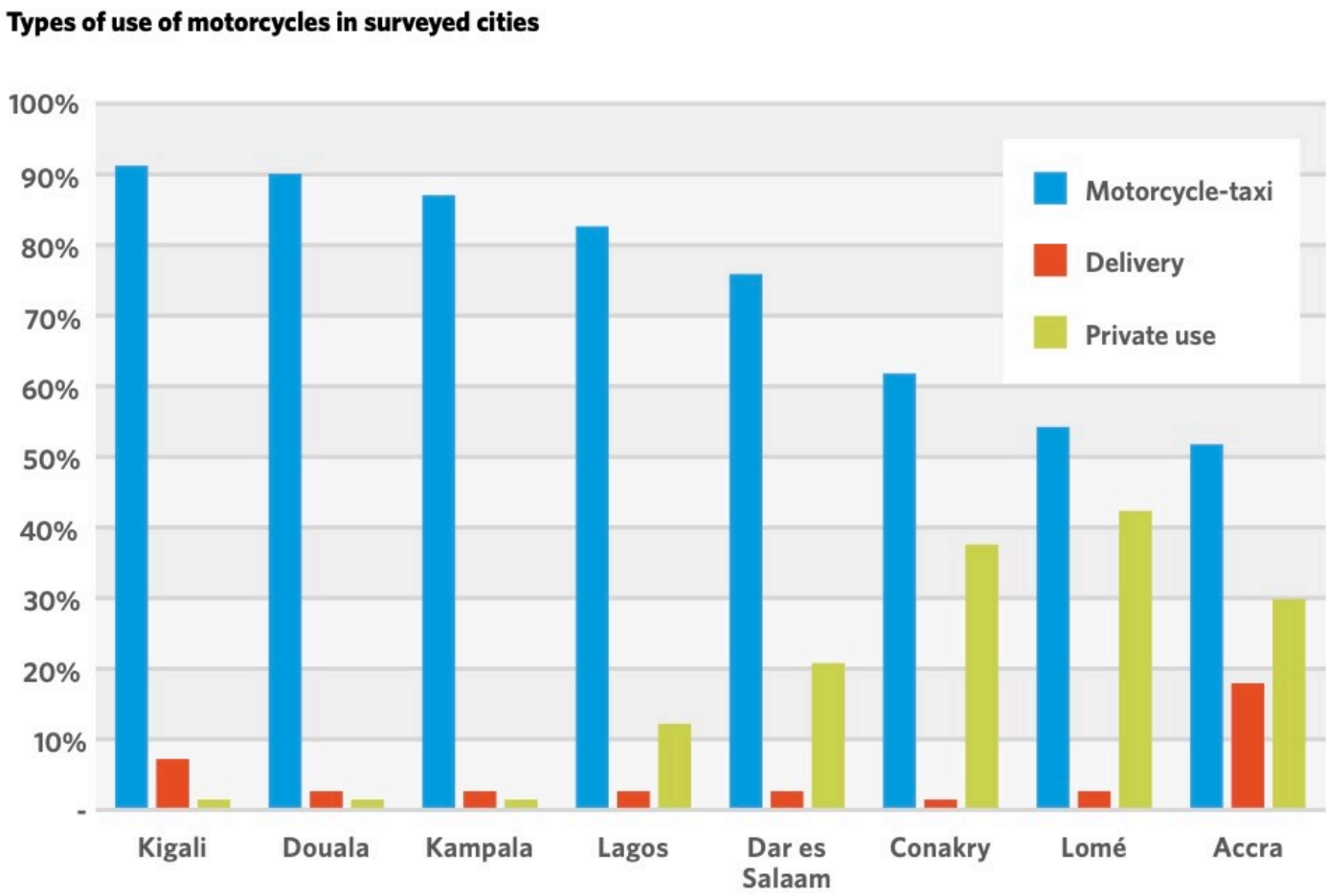
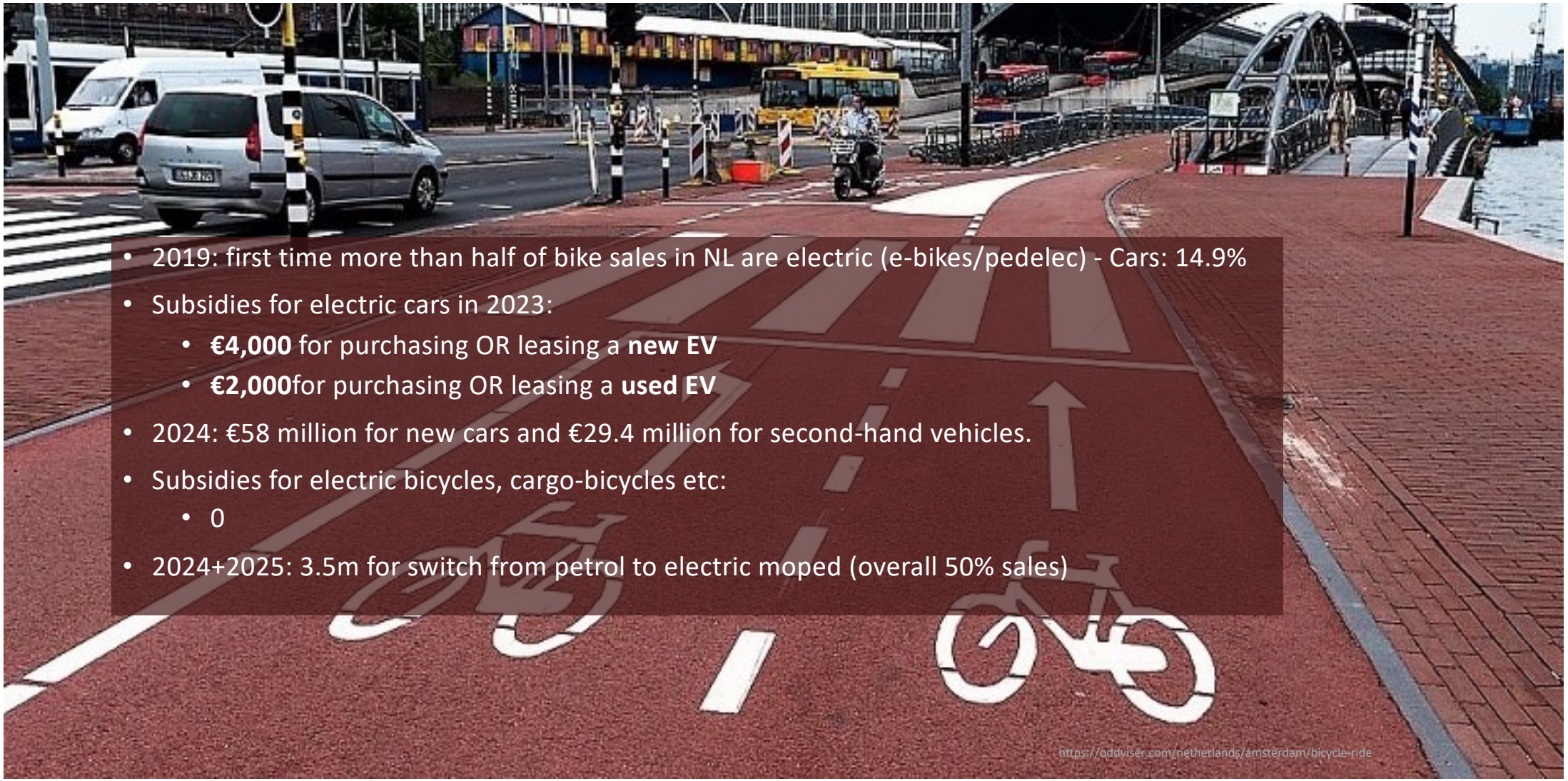

Vehicle ownership, number of vehicles per 1,000 people
Ethiopia
Kenya
Nigeria
Developing Asia, Oceania, Middle East
Global
2
17
25
79
180
https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/power-to-move-accelerating-the-electric-transport-transition-in-sub-saharan-africa



https://www.fiafoundation.org/resources/the-wheels-of-change-safe-and-sustainable-motorcycles-in-sub-saharan-africa



https://www.fiafoundation.org/resources/the-wheels-of-change-safe-and-sustainable-motorcycles-in-sub-saharan-africa



- 2019: first time more than half of bike sales in NL are electric (e-bikes/pedelec) - Cars: 14.9%
- Subsidies for electric cars in 2023:
  - **€4,000** for purchasing OR leasing a **new EV**
  - **€2,000**for purchasing OR leasing a **used EV**
- 2024: €58 million for new cars and €29.4 million for second-hand vehicles.
- Subsidies for electric bicycles, cargo-bicycles etc:
  - 0
- 2024+2025: 3.5m for switch from petrol to electric moped (overall 50% sales)

https://oddviser.com/netherlands/amsterdam/bicycle-ride

UK

Behrendt, F. (2018). Why cycling matters for electric mobility: towards diverse, active and sustainable e-mobilities. *Mobilities*, *13*(1), 64–80.

Cairns, S., Behrendt, F., Raffo, D., Beaumont, C., & Kiefer, C. (2017). Electrically-assisted bikes: Potential impacts on travel behaviour. *Transportation Research Part A: Policy and Practice*, *103*, 327–342.

Kiefer, C., & Behrendt, F. (2015). Smart E-Bike Monitoring System: realtime open-source and open hardware GPS, assistance and sensor data for electrically-assisted bicycles. *Journal IET Intelligent Transport Systems*, *10*(2), 79 – 88.

Innovative Light Electric Vehicles for Active and Digital Travel: reducing mobility-related energy demand and carbon emissions (ELEVATE)

Ian Phillips
Christian Brand
Jillian Anable
Noel Cass
Clara Glachant
Eva Heinen
Mary Darkins
Sally Cairns
Nicholas Marks
Labib Azzouz
Theresa Nelson
Alice de Sejournet

Partners: Universities of Brighton, Oxford, Leeds + Leeds, Oxford und Brighton Councils + World Health Organisation (WHO). 2021-2025, 1.9m €

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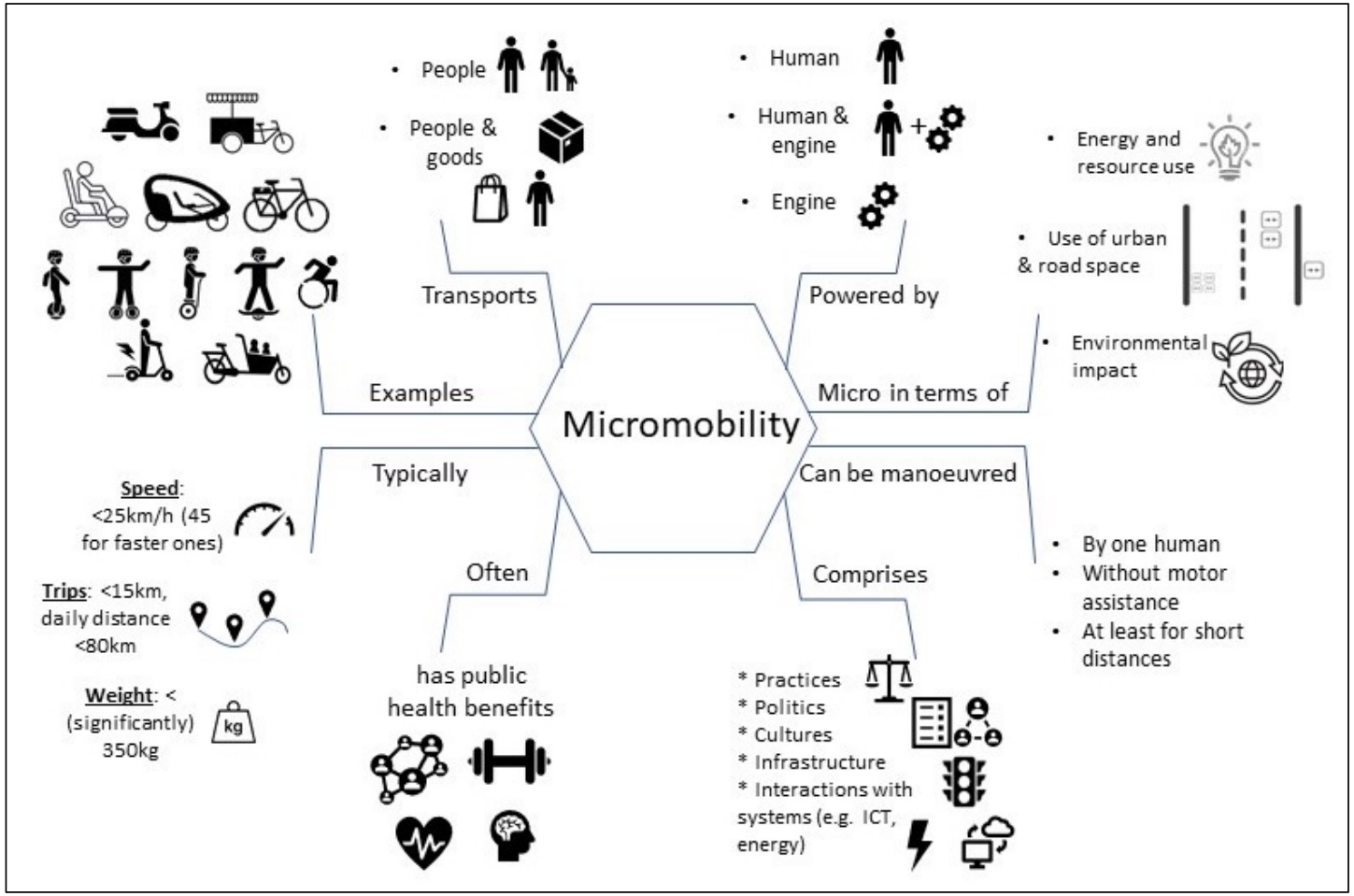
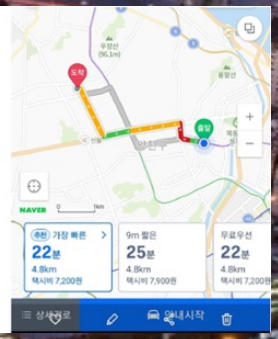


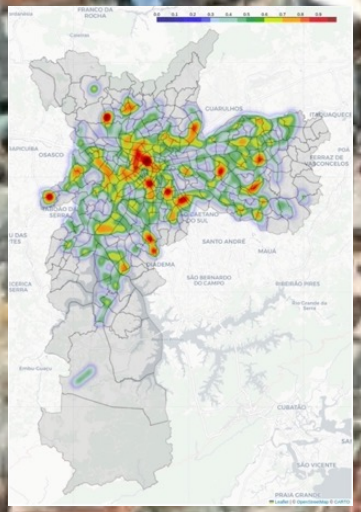
Behrendt, F., Cairns, S., Heinen, E., Brand, C., Anable, J., & Glachant, C. (2023). Conceptualizing Micromobility: The Multi-Dimensional and Socio-Technical Perspective. (*Preprint)*.

Social Justice implications of AI-driven food delivery platforms: Feeding datasets, killing riders



Chang, Behrendt (forthcoming) Riders driving at the limit of AI: Geographies of two-wheeled food delivery and traffic safety in Seoul, South Korea. Urban Geographies.

Operationalising MDJ: Designing cycling policy & app in Sao Paolo



Lima, Behrendt, Kon (developing) Cycling Towards Equity: Financial Incentives as a Strategy for Mobility Justice. Transportation Interdisciplinary Perspectives.

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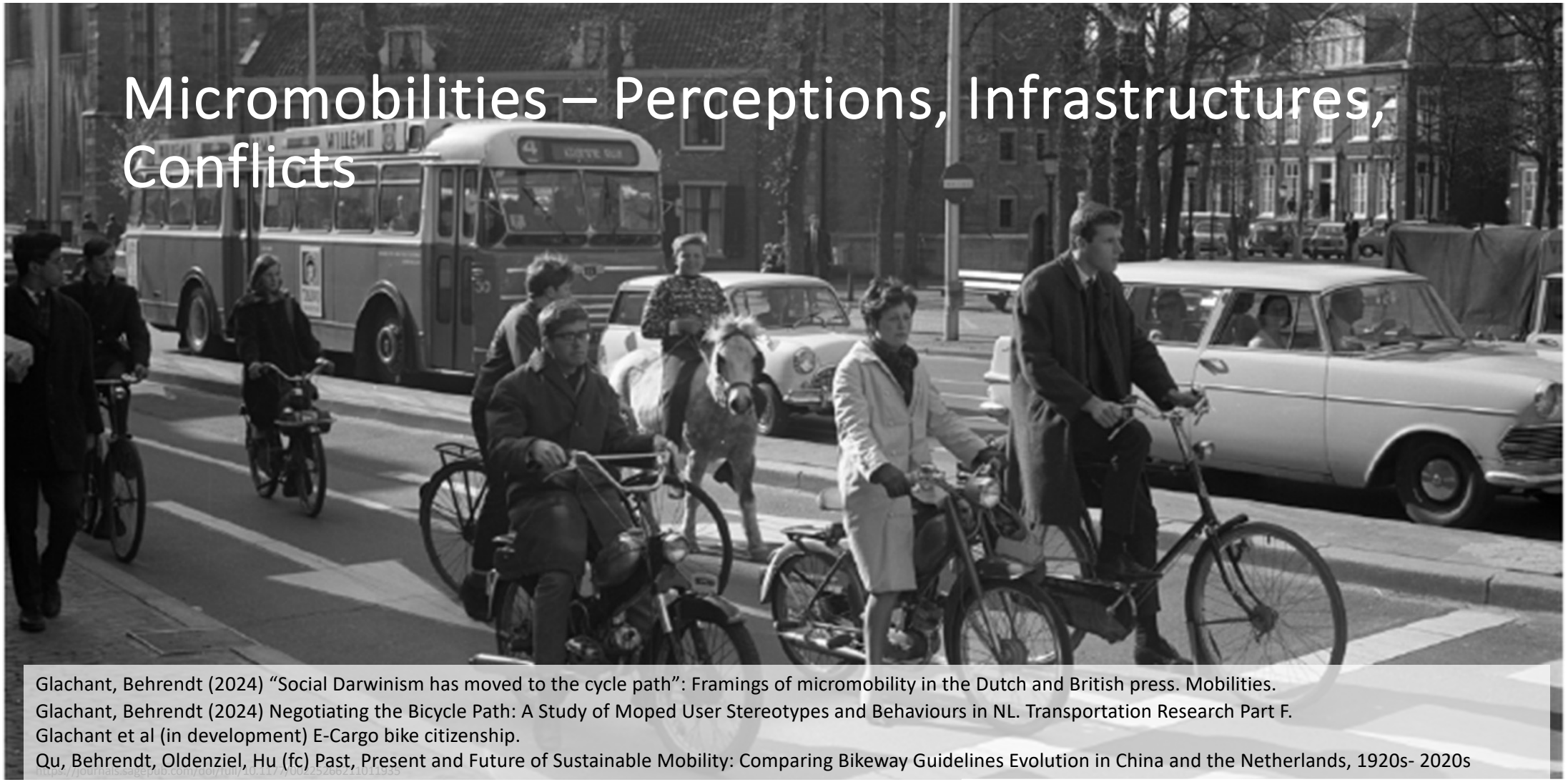
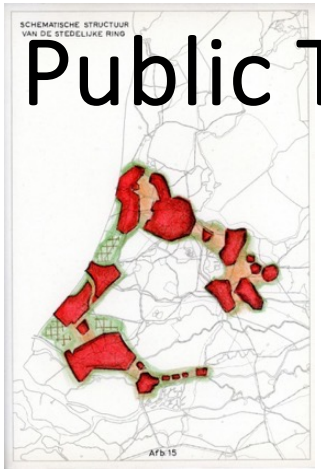
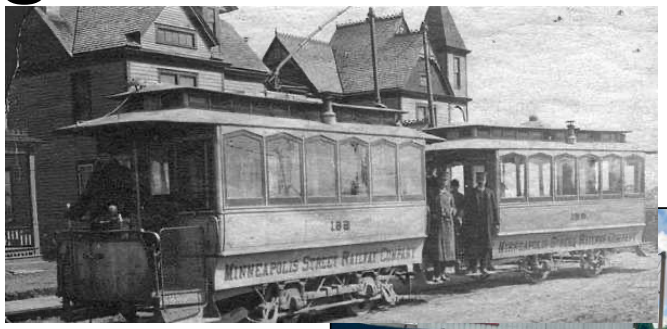
Micromobilities – Perceptions, Infrastructures, Conflicts

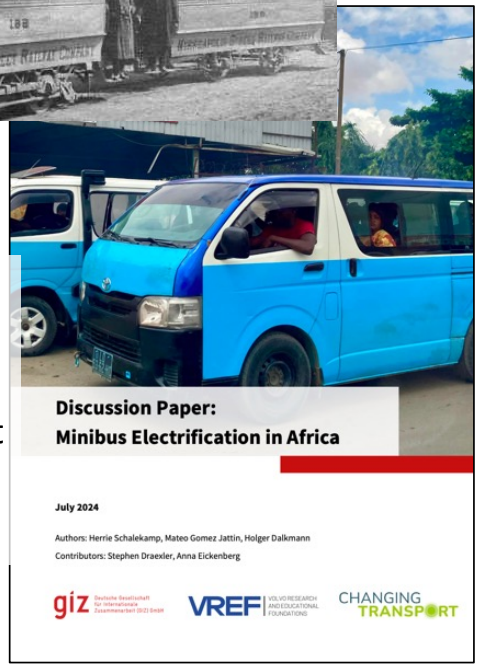


Glachant, Behrendt (2024) “Social Darwinism has moved to the cycle path”: Framings of micromobility in the Dutch and British press. Mobilities.
Glachant, Behrendt (2024) Negotiating the Bicycle Path: A Study of Moped User Stereotypes and Behaviours in NL. Transportation Research Part F.
Glachant et al (in development) E-Cargo bike citizenship.
Qu, Behrendt, Oldenziel, Hu (fc) Past, Present and Future of Sustainable Mobility: Comparing Bikeway Guidelines Evolution in China and the Netherlands, 1920s- 2020s

Public Transport – Integrating and Electric







Ploeger, J., & Oldenziel, R. (2022). Bicycle-Oriented Development: How the Dutch Railroad Shaped Urban Planning and Discovered Cyclists along the Way, 1960-1990. *Journal of Urban History*.

Janko, Krzysztof (PhD) multimodality within transit-oriented development frameworks in Berlin and Randstad in the Netherlands

Bird, Peter (PhD) Cycling Cities US/SA/NL

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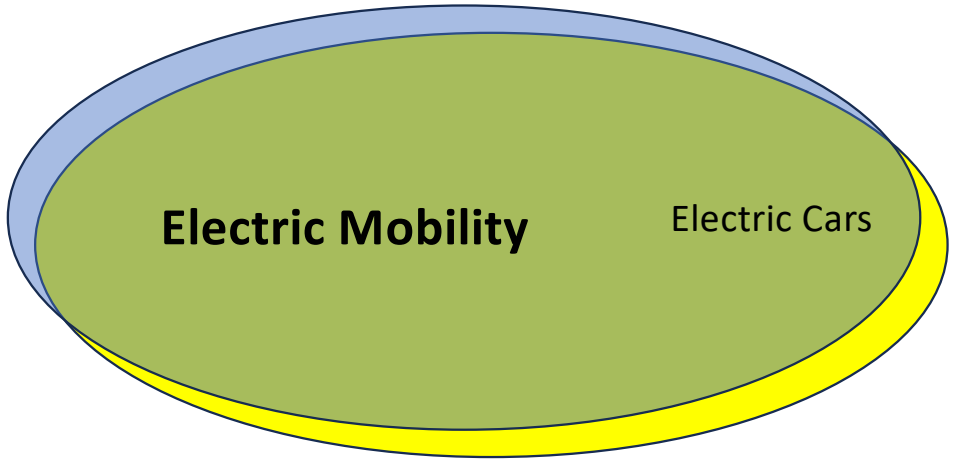
Epistemic

Procedural

Distributive


Electric Mobility
Electric Cars
Mobility/Energy/Digital Transition
Global North

Cycling

Walking

Active Mobility

Non-Motorized Transport

Micromobility

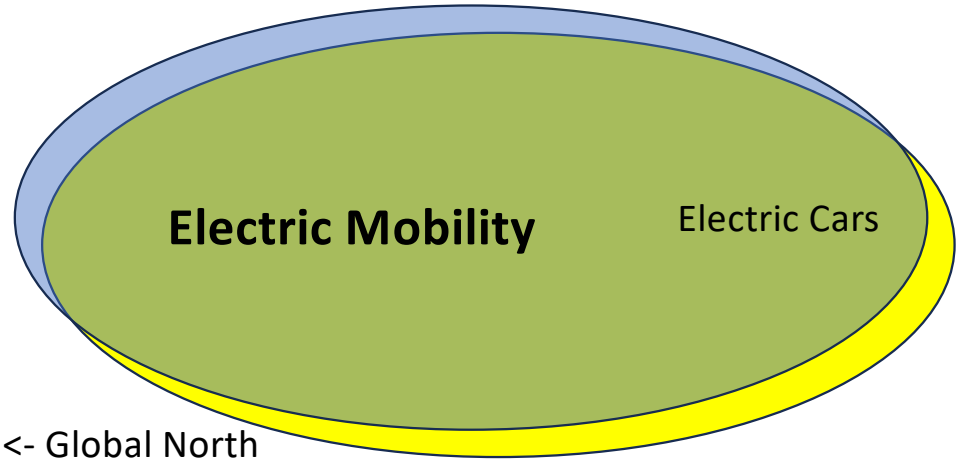
2-Wheelers

3-Wheelers

Light Electric Vehicles (LEV)

Public Transport

MaaS/Shared Mobility

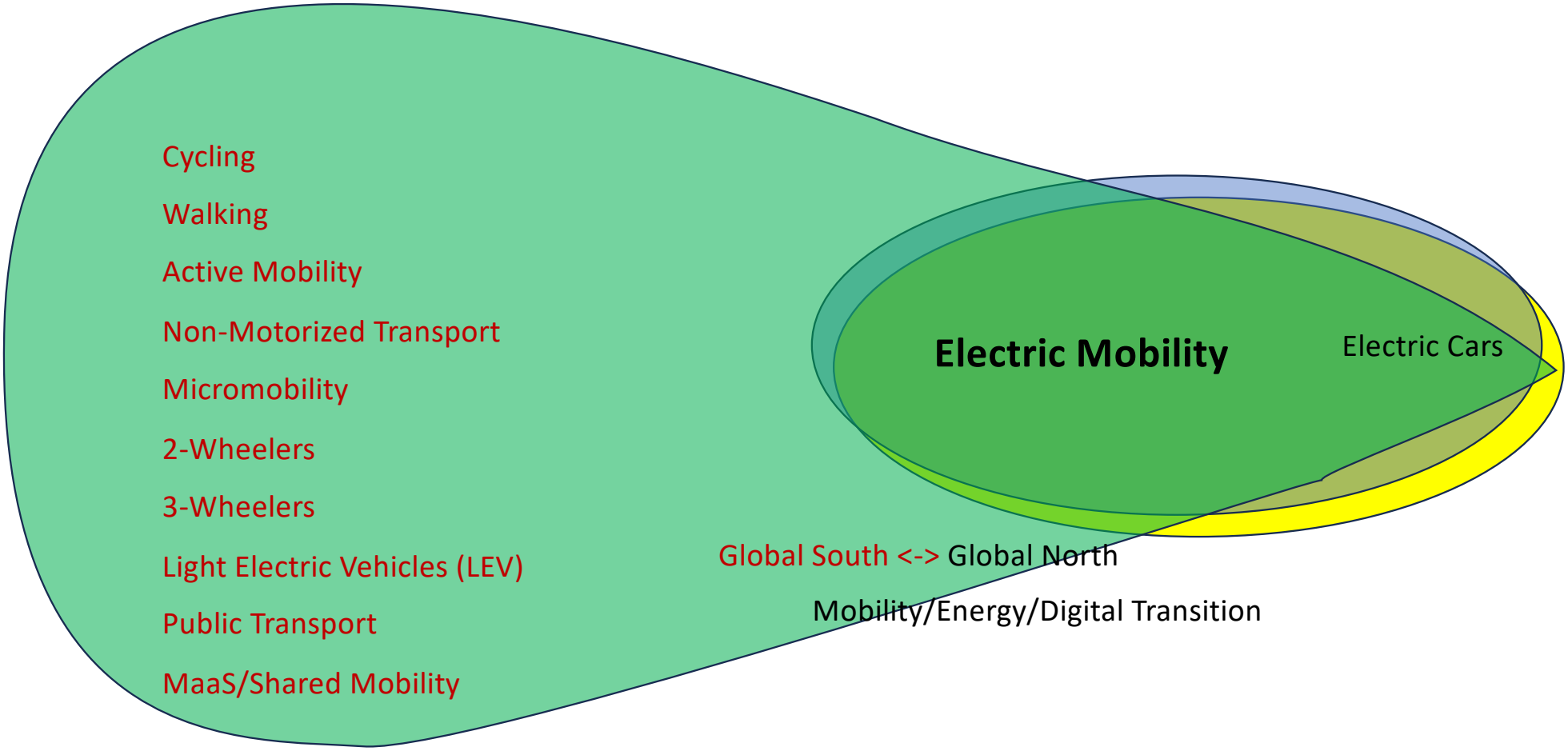


Global South <- Global North

Mobility/Energy/Digital Transition

Behrendt, F. (2018). Why cycling matters for electric mobility: towards diverse, active and sustainable e-mobilities. *Mobilities*, *13*(1), 64–80.

Behrendt, F., Cairns, S., Heinen, E., Brand, C., Anable, J., & Glachant, C. (2023). Conceptualizing Micromobility: The Multi-Dimensional and Socio-Technical Perspective. (*Preprint)*.



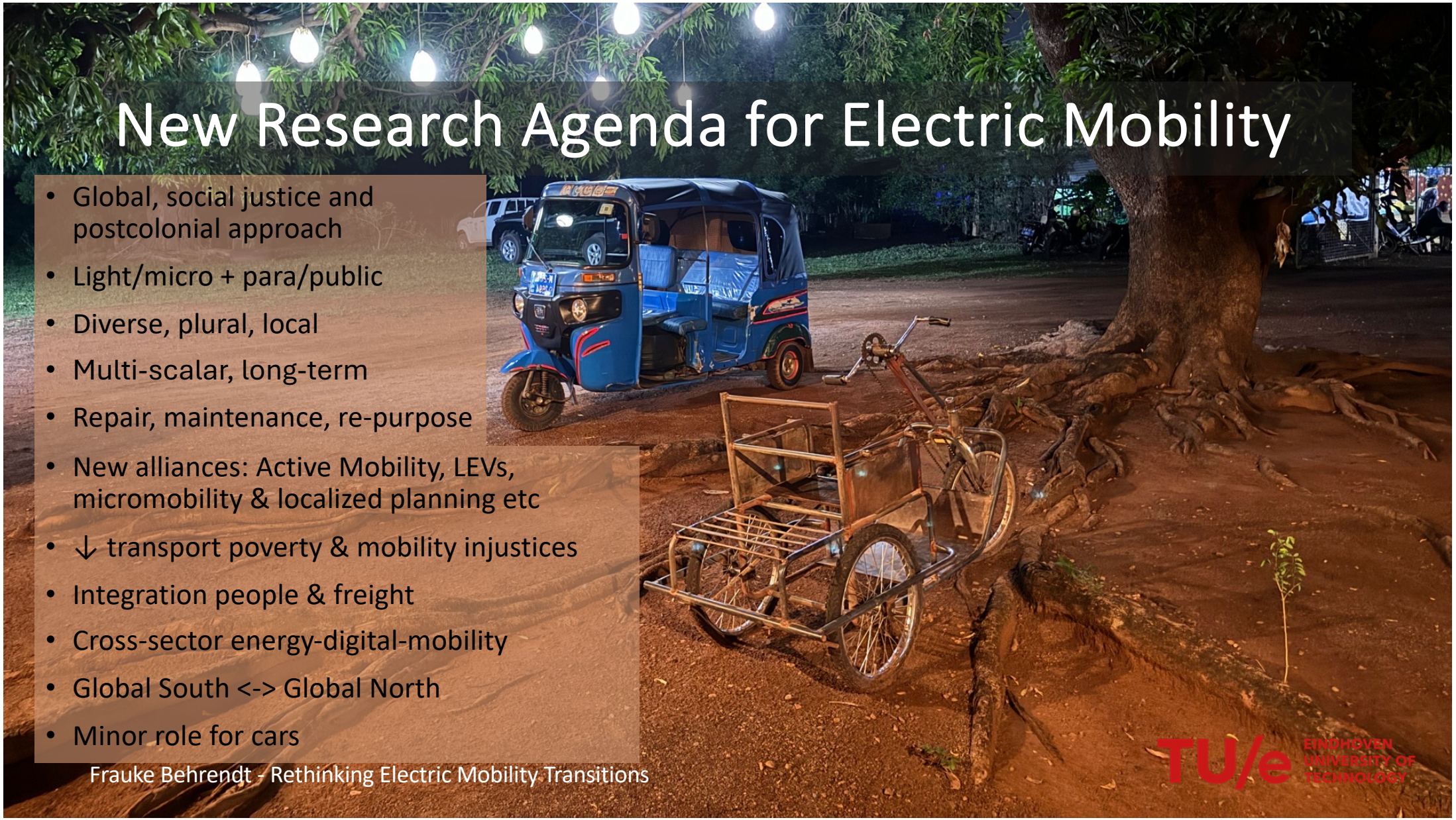
Behrendt, F. (2018). Why cycling matters for electric mobility: towards diverse, active and sustainable e-mobilities. *Mobilities*, *13*(1), 64–80.

Behrendt, F., Cairns, S., Heinen, E., Brand, C., Anable, J., & Glachant, C. (2023). Conceptualizing Micromobility: The Multi-Dimensional and Socio-Technical Perspective. (*Preprint)*.

Imagine…

- Policies, Investment, infrastructure currently geared towards electric cars and their charging infrastructure (and AI) – go to light/micro+para/public electric mobility
- Cities and countries with low automobility rates lead the path
- High automobility cultures radically change
- Creating more sustainable and socially justice mobility futures
- Radical shift in what counts as electric mobility, who is involved and who benefits

New Research Agenda for Electric Mobility



- Global, social justice and postcolonial approach
- Light/micro + para/public
- Diverse, plural, local
- Multi-scalar, long-term
- Repair, maintenance, re-purpose
- New alliances: Active Mobility, LEVs, micromobility & localized planning etc
- ↓ transport poverty & mobility injustices
- Integration people & freight
- Cross-sector energy-digital-mobility
- Global South <-> Global North
- Minor role for cars

HOME NEWS CYCLING CITIES PUBLICATIONS SUM RESEARCH PROGRAM CITIES FUNDING WHO'S WHO

Cycling Cities: The Global Experience is a research and publication project. It covers 150 years of cycling policy and practice around the world in 50 cities in 25 countries–and growing. *Cycling Cities* is an invaluable resource for the growing global community of policymakers, community groups, students, and teachers. We are pleased to announce the Cycling Cities: The African Experience. Curious? We have an exhibit *Bicycles are Forever* in Tamale in Ghana at Nuku studio, May-September 2024. And we are crowdfunding: Help our African authors publish the book by donating.

Why have some capitals and business centers become true cycling cities and others not? *Cycling Cities* traces how policymakers, engineers, cyclists, or community groups have made a difference since the early twentieth century. All publications are richly illustrated with photos, tables, graphs,

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