ASIA CLEAN BLUE SKIES PROGRAM | KNOWLEDGE SHARING EVENT

STRATEGIES FOR IMPLEMENTATION OF LOW EMISSION ZONES IN ASIA

MAY 8 - 9, 2024 | 9:30 - 16:00 (GMT +7)
BANGKOK, THAILAND

Join via Zoom: *https://bit.ly/KSE_LEZinAsia*

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STRATEGIES FOR IMPLEMENTATION OF LOW EMISSION ZONES IN ASIA

Traffic-related air pollution (TRAP) and solutions (LEZ)

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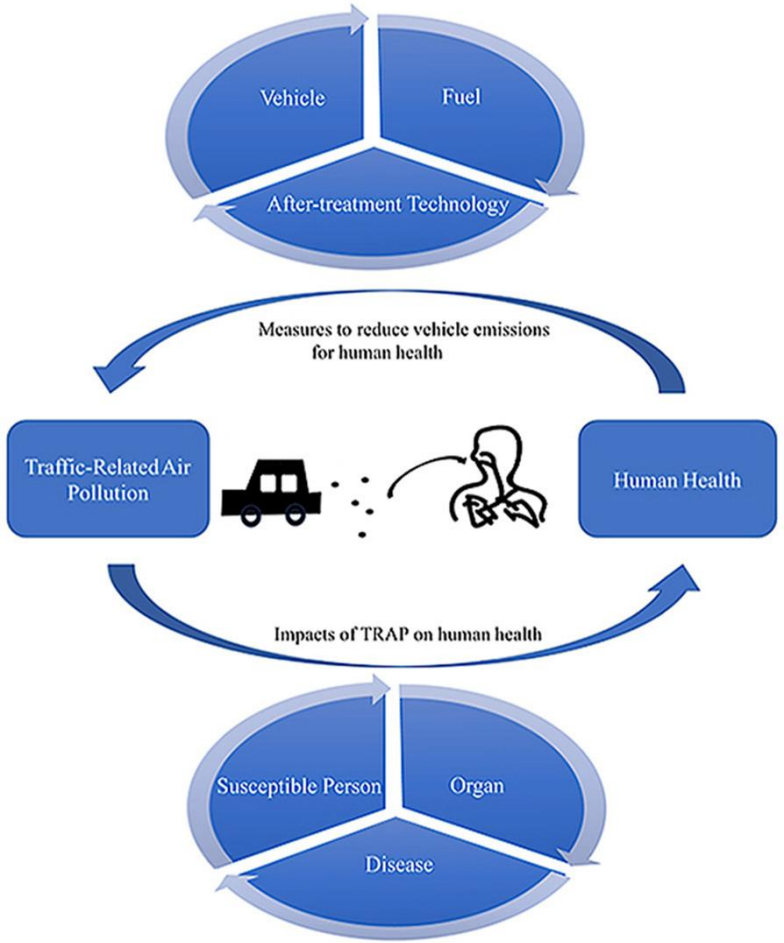
Traffic-related air pollution in Asia

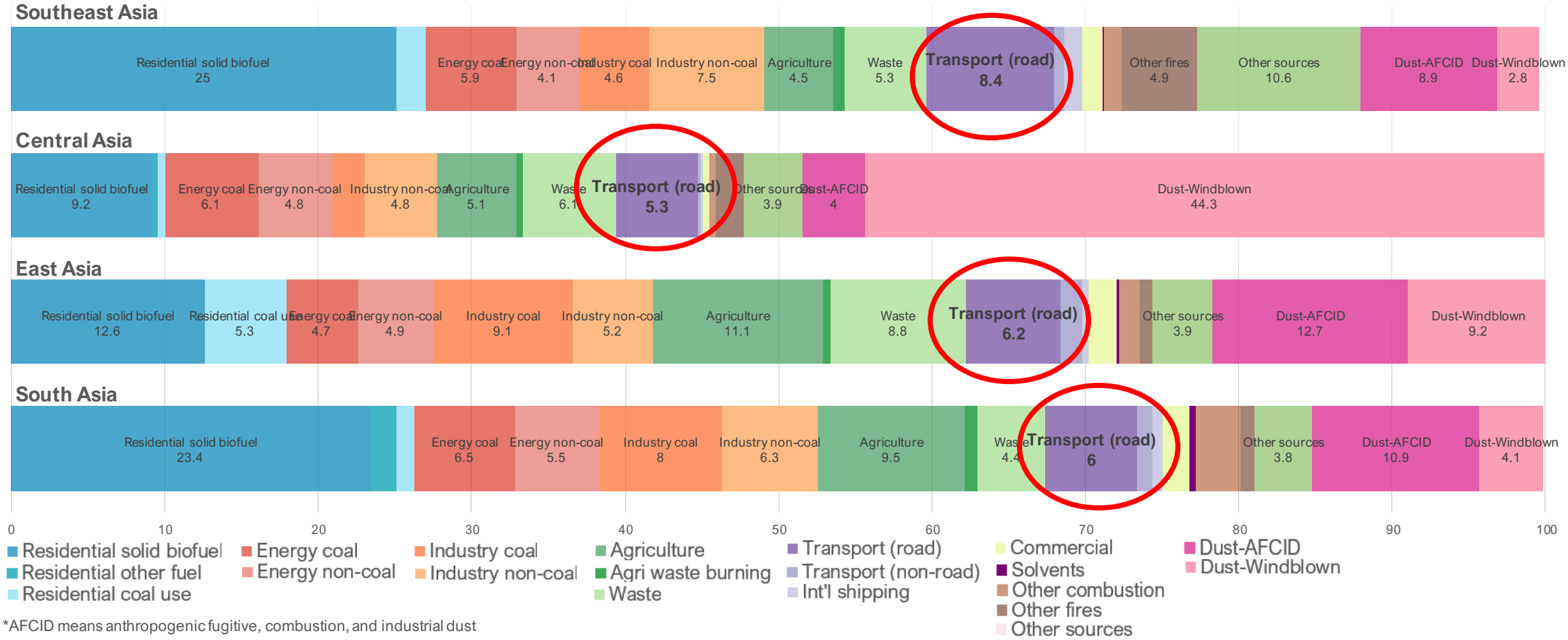


- **Traffic-related air pollution** refers to air pollution from motorized vehicles (on-road mobile sources) and emit pollutants. These pollutants can come from tailpipe emissions or non-exhaust mechanisms (non-tailpipe emissions)
  - black carbon (BC), carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx), nitrogen dioxide (NO2), PM2.5, PM10, and ultrafine particles (UFP)

Khreis, H., Nieuwenhuijsen, M., Zietsman, J., & Ramani, T. (Eds.). (2020). Traffic-related air pollution. In Traffic-Related Air Pollution (pp. 1-21). Publisher. https://doi.org/10.1016/B978-0-12-818122-5.00001-6

Bai, X., Chen, H., & Oliver, B. G. (2021). The health effects of traffic-related air pollution: A review focused on the health effects of going green. Chemosphere. Advance online publication. https://doi.org/10.1016/j.chemosphere.2021.133082

Source sector contribution to ambient $PM_{2.5}$ in Asia



*AFCID means anthropogenic fugitive, combustion, and industrial dust

McDuffie E. et al. (2021). Fine Particulate Matter and Global Health: Fuel and Sector Contributions to Ambient PM2.5 and its Disease Burden Across Multiple Scales. Nature Communications, 2021 http://dx.doi.org/10.1038/s41467-021-23853-y.

Traffic-related air pollution in Asia

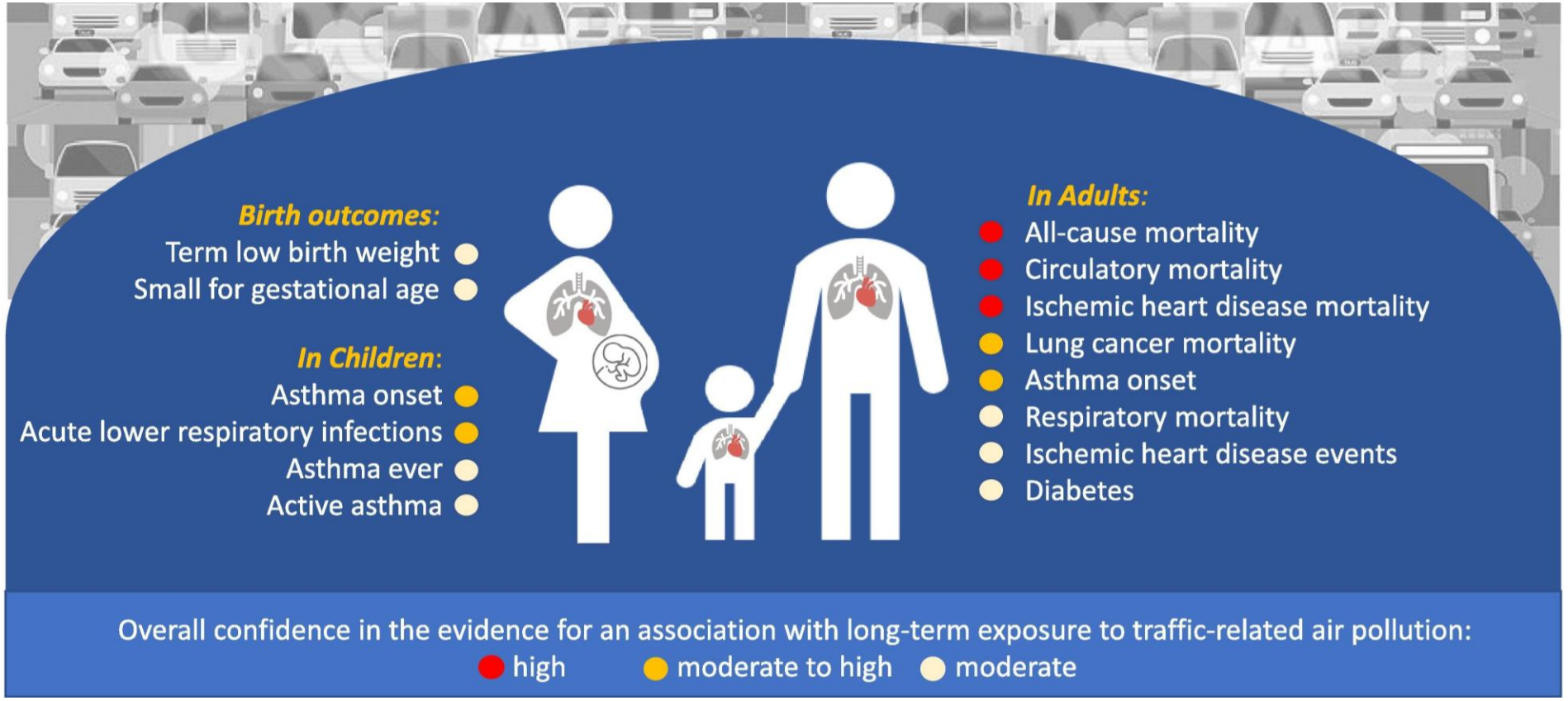
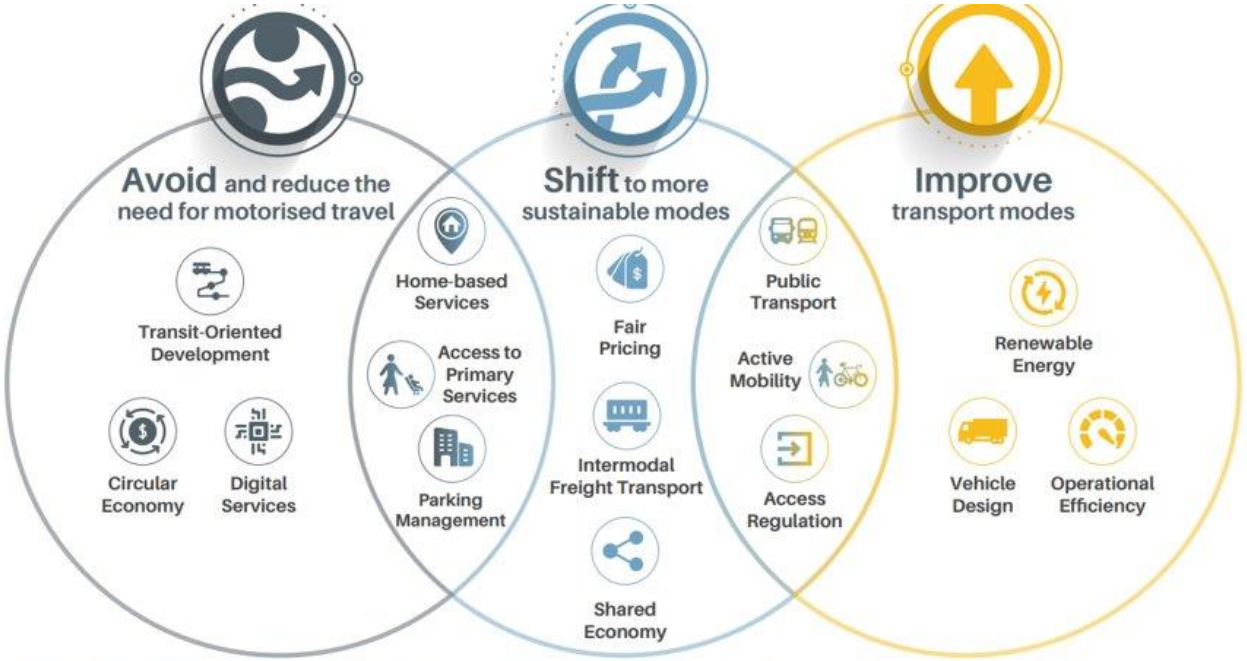


Image from Boogaard, H. et al (2022). Long-term exposure to traffic-related air pollution and selected health outcomes: A systematic review and meta-analysis.

Avoid-Shift-Improve Framework



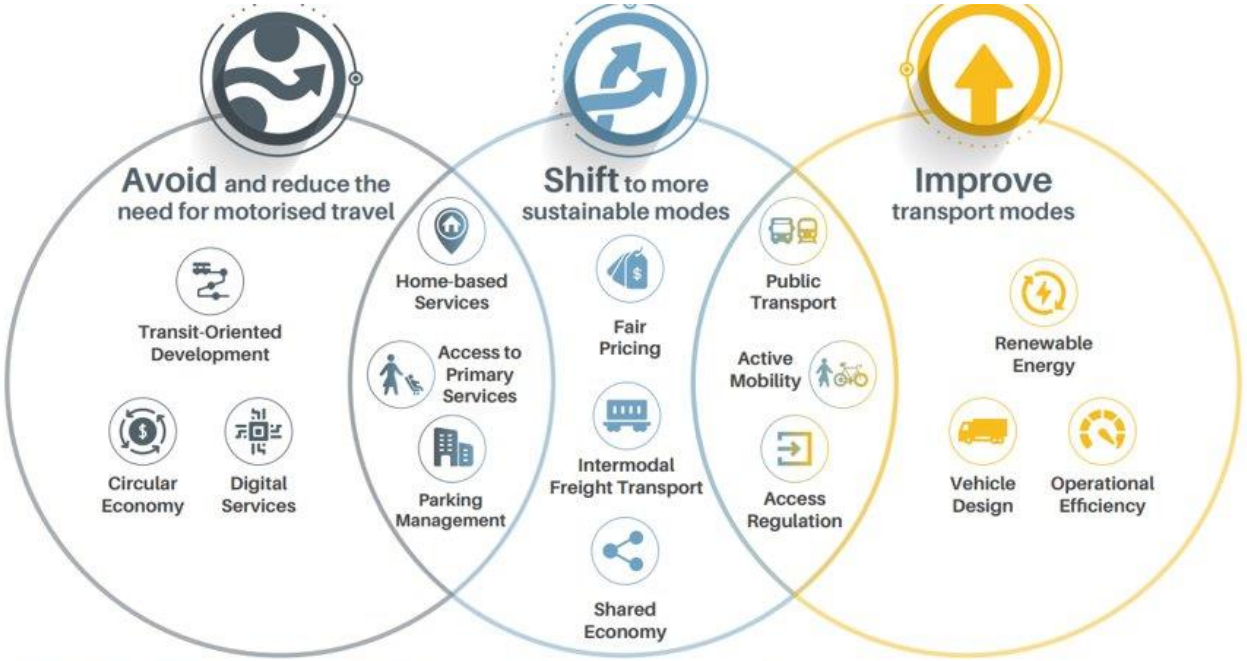
*The A-S-I diagramme presents a non-exhaustive list of measures for illustrative purposes only.

… aims to reduce energy consumption, transport emissions, and road congestion

SLOCAT (2021), Tracking Trends in a Time of Change: The Need for Radical Action Towards Sustainable Transport Decarbonisation, Transport and Climate Change Global Status Report – 2nd edition, https://tcc-gsr.com/wp-content/uploads/2021/06/1.1-Global-Transport-and-Climate-Change.pdf

Bongardt, D., Stiller, L., Swart, A., & Wagner, A. (2019). Sustainable Urban Transport: Avoid-Shift-Improve (A-S-I) Integrated. Transformative Urban Mobility Initiative. https://www.transformative-mobility.org/wp-content/uploads/2023/03/ASI_TUMI_SUTP_iNUA_No-9_April-2019-Mykme0.pdf

Avoid-Shift-Improve Framework



*The A-S-I diagramme presents a non-exhausive list of measures for illustrative purposes only.

What should you do when your tummy starts getting bigger?

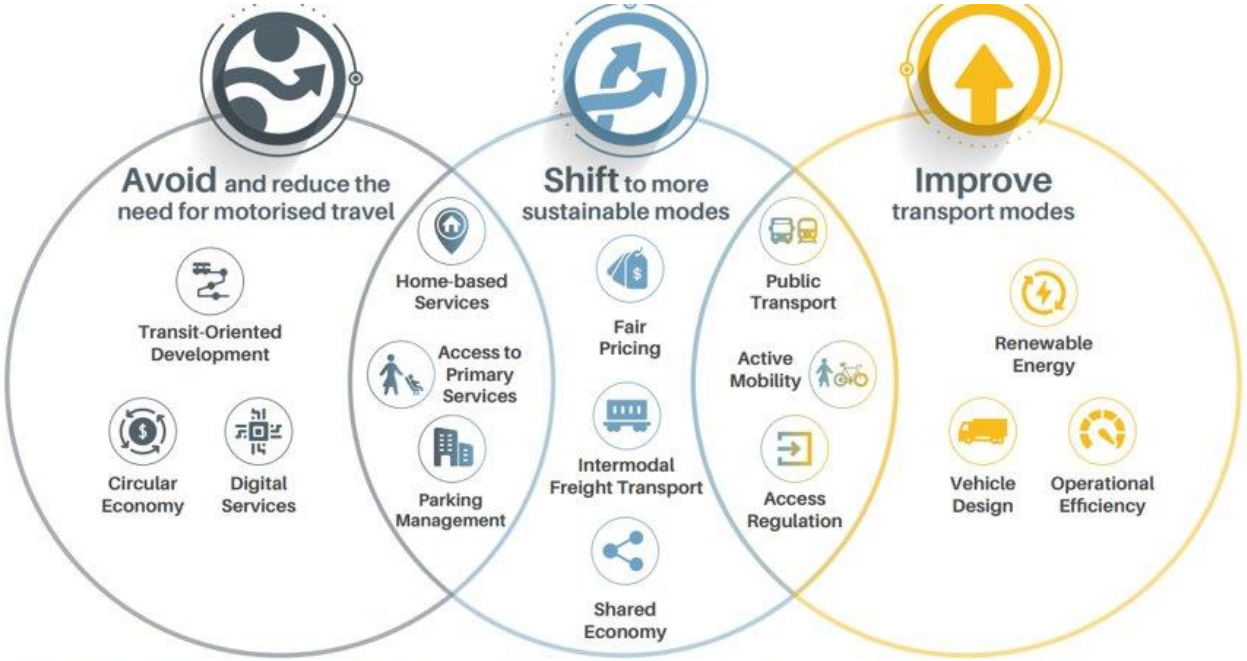
BUY BIGGER CLOTHES

AVOID UNNECESSARY EATING

SHIFT TO EATING HEALTHIER FOODS

IMPROVE LIFESTYLE

Avoid-Shift-Improve Framework



*The A-S-I diagramme presents a non-exhausive list of measures for illustrative purposes only.

What should you do when your tummy starts getting bigger?

AVOID UNNECESSARY EATING

AVOID/REDUCE TRAVEL (MOTORIZED AND DISTANCE)

SHIFT TO EATING HEALTHIER FOODS

SHIFT TO ENERGY-EFFICIENT TRANSPORT MODES

IMPROVE LIFESTYLE

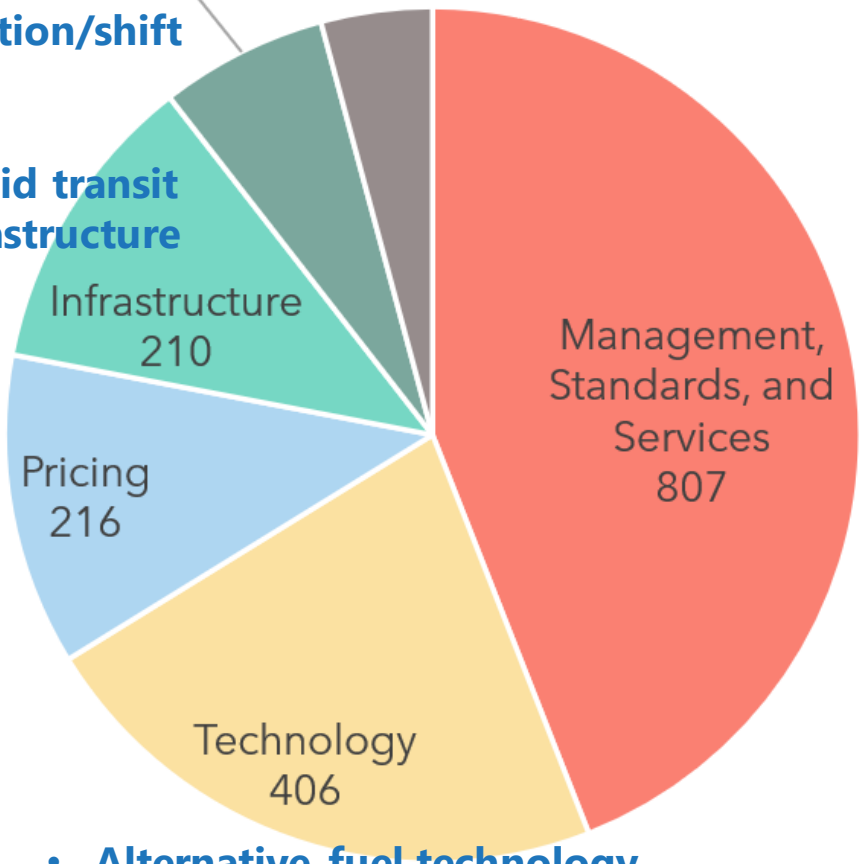
IMPROVE EFFICIENCY OF OPERATIONS, VEHICLES, AND FUELS

Urban policy interventions to reduce traffic emissi AP

o reduce traffic-related emissions and air pollution: A systematic evidence map (Khreis, et al. 2023)

- 376 papers, with 58 unique policy interventions, and a 1,139 unique policy scenarios
- Most studied interventions:
  - Alternative fuel technology
  - Vehicle emission regulation

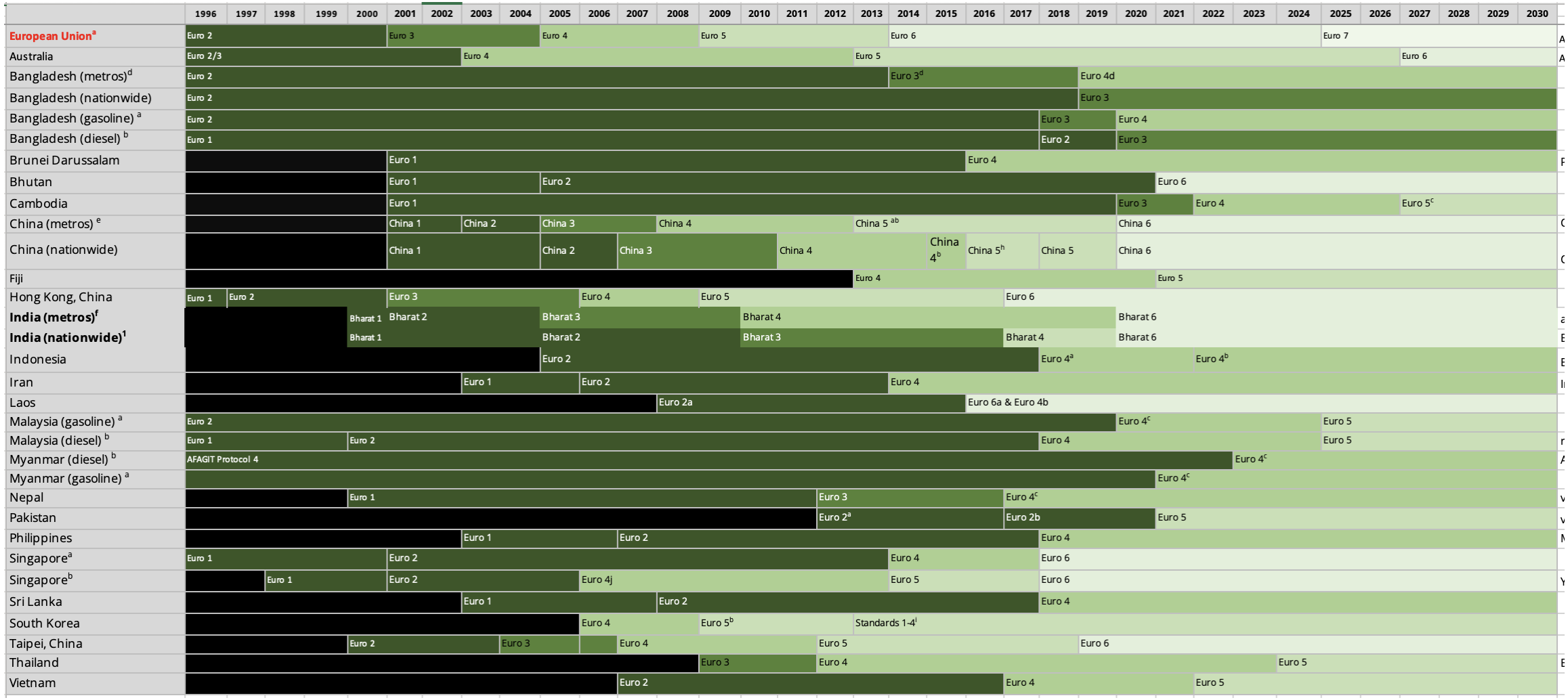
Frequency of studies on Transport Policy categories



- **Development density and mixed developments**
- **Public transit promotion/shift**
- **Bus rapid transit or mass rapid transit**
- **Public transportation infrastructure**
- **Vehicle emission regulation**
- **Vehicle use restriction**
- **Vehicle retirement or replacement**
- **Parking charges**
- **Road pricing**
- **Alternative fuel technology**
- **Vehicle retrofitting**

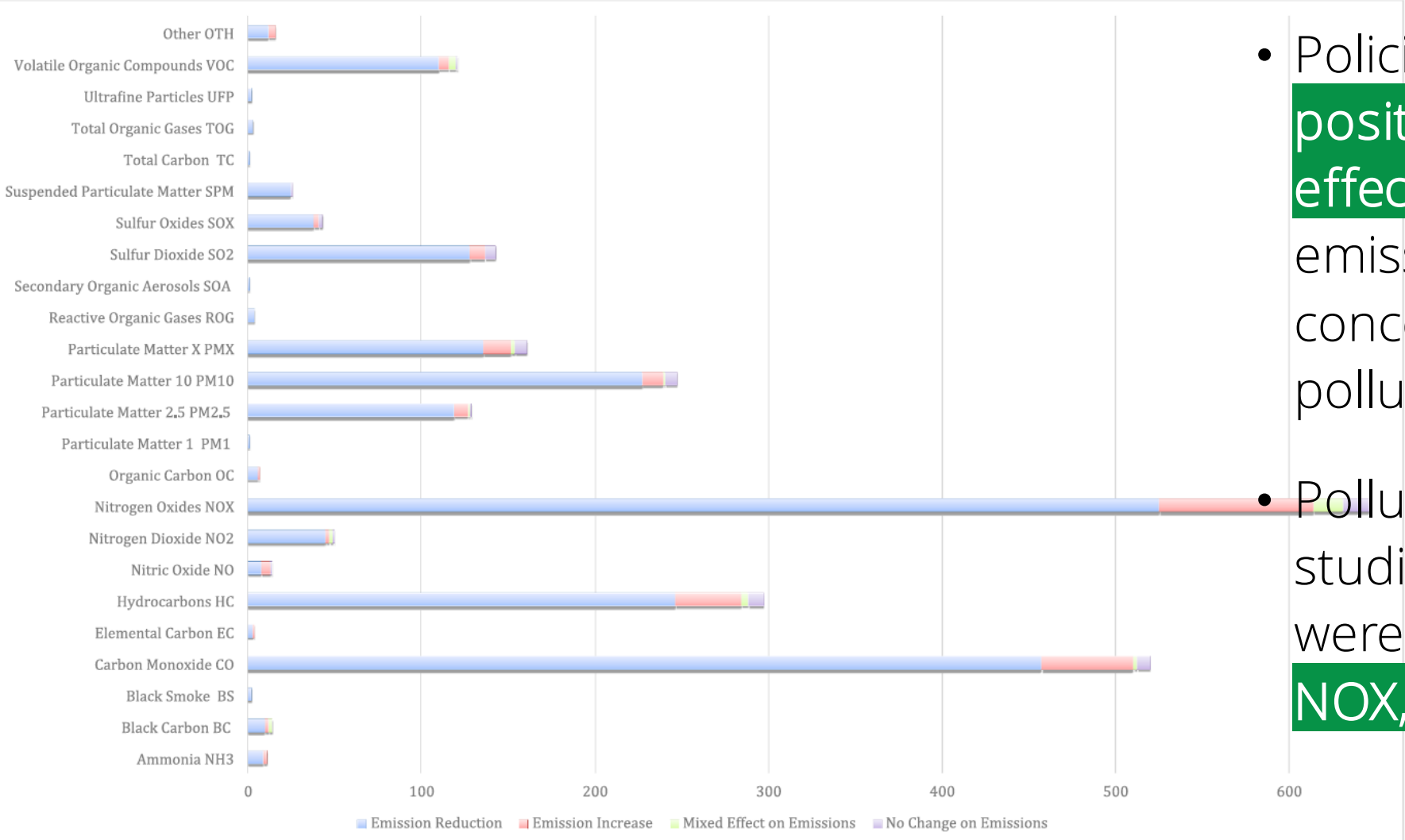
Urban policy interventions to reduce traffic emissi AP

Low Emissio Zones



Clean Air Asia (2021)

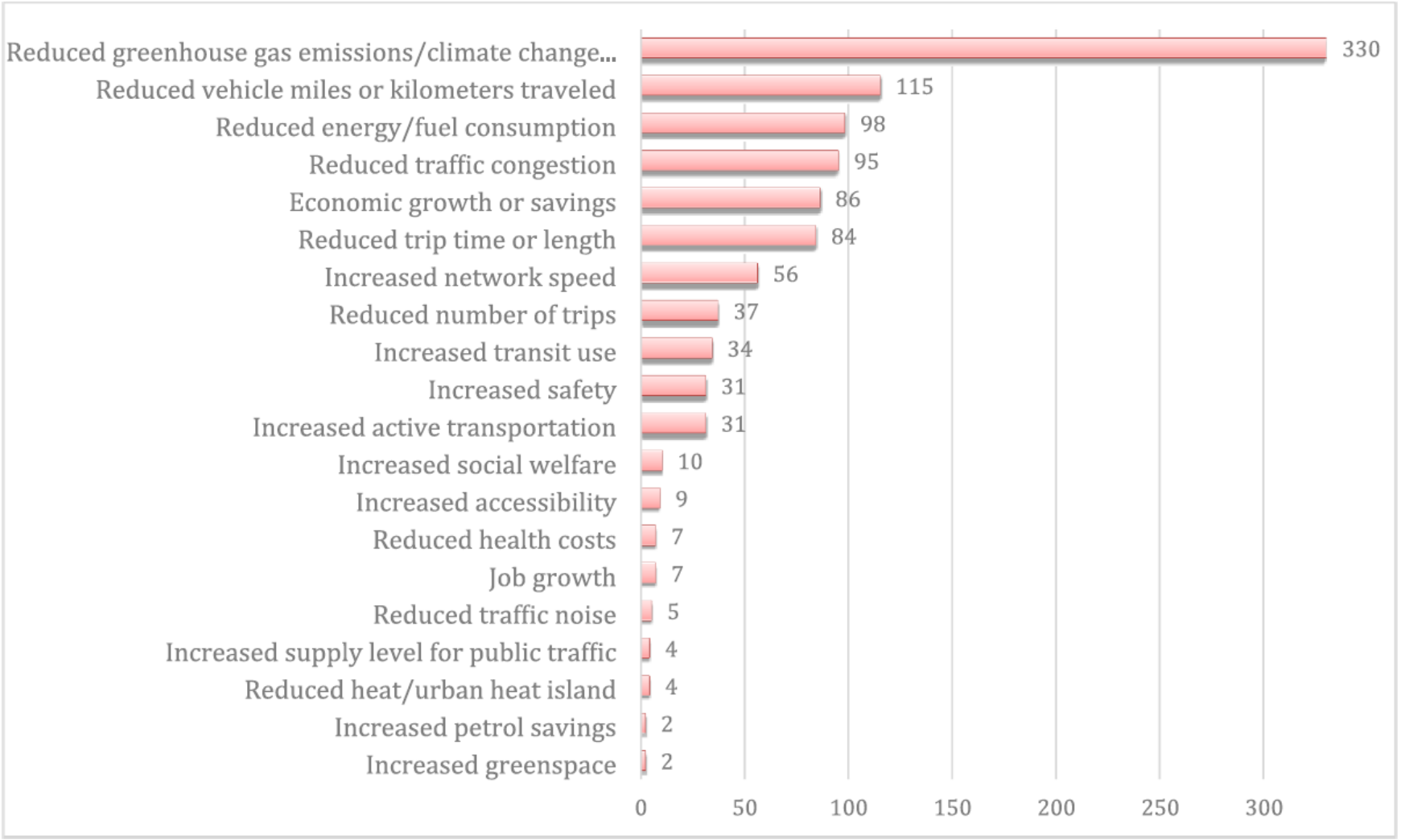
Emission effects per pollutant



- Policies may have positive/mixed effects, no effects, or even increase emissions and concentrations of different pollutants
- Pollutants most frequently studied for TRAP effects were PM10, NO2, PM2.5, NOX, and CO

Urban policy interventions to reduce traffic-related emissions and air pollution: A systematic evidence map (Khreis, et al. 2023)

Co-benefits of policies



Urban policy interventions to reduce traffic-related emissions and air pollution: A systematic evidence map (Khreis, et al. 2023)

Low Emission Zone

ITDP

WHAT IS A LOW EMISSION ZONE?

→ A defined zone that restricts the use of polluting vehicles

Car-free zones are low emission zones

LOW EMISSION ZONES CAN APPLY TO

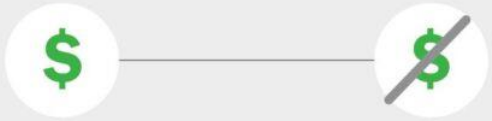
Passenger vehicles (cars, taxis, motorcycles)

Public vehicles (buses, municipal vehicles)

Vans and small trucks

Heavy-duty freight vehicles

A LOW EMISSION ZONE CAN BE



Priced vehicles pay to enter, price varies based on emissions level

Not priced vehicles below a minimum emission standard are banned, non-compliant vehicles that enter pay a fine

A LOW EMISSION ZONE IS NOT

→ A single corridor → A street or area that does not explicitly restrict vehicles

Can contribute to:

- Street redesigns
- Service improvements
- Incentives
- Land use reform
- Stricter sub-zones

ITDP. (2023, February 22). What is a Low Emission Zone? Institute for Transportation & Development Policy. Retrieved from https://itdp.org/2023/02/22/what-is-a-low-emission-zone/

Case Studies: Europe

Barcelona, Spain

95 km² low-emission zone (2020) using number plate recognition to monitor compliance. Polluting vehicles are not allowed on exits. Over 100 license plate-reading cameras detect non-compliant vehicles and penalize from 200 to 260 Euro.

Brussels, Belgium

Implemented a low-emission zone which required online registration for cars, including foreign ones. Unregistered or non-compliant cars face fines of 150 Euro daily. Brussels encourages drivers to switch to cleaner vehicles or alternative transport methods.

Milan, Italy

Milan several areas: Area B (75% of the city), bans the most polluting vehicles. The standard for vehicles will increase until 2030, with diesel vehicles banned. Non-compliant vehicles pay a fine of 80 Euro. Area C requires a daily fee of 7.50 Euro. Milan is investing in alternatives, increasing bus services, and establishing a fund for cleaner vehicles. Area B is expected to halve PM10 and NOx3 pollution by 2026.

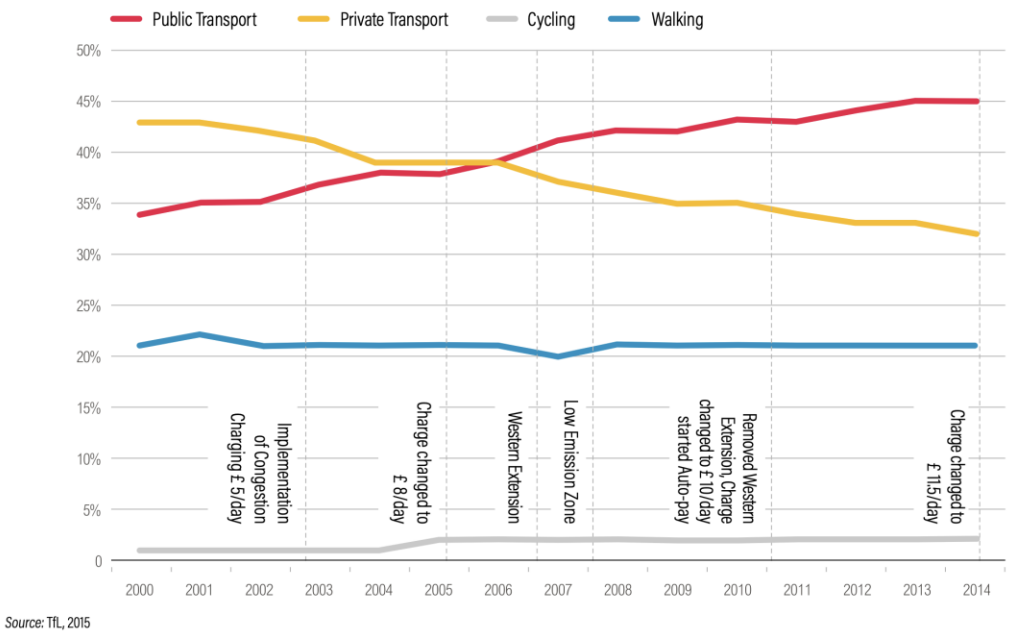
Transformative Mobility. (n.d.). Low Emission Zones. Retrieved from https://transformative-mobility.org/low-emission-zones/

Case Studies: Europe

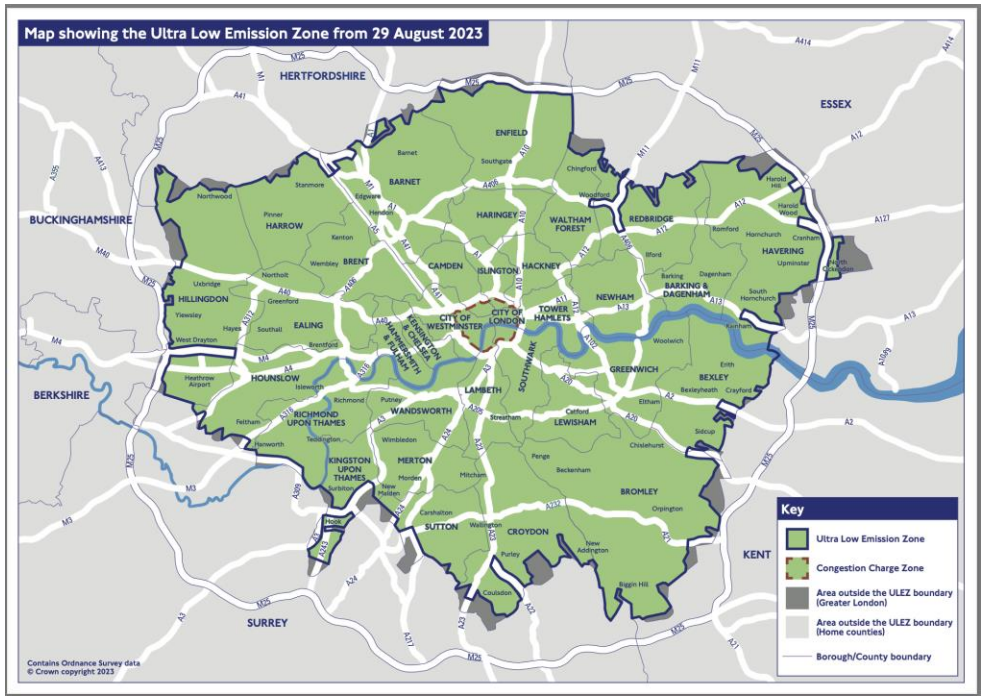
World Resources Institute. (n.d.). Study on International Practices for Low Emission Zone and Congestion Charging. Retrieved from https://files.wri.org/d8/s3fs-public/Study_on_International_Practices_for_Low_Emission_Zone_and_Congestion_Charging.pdf

London, United Kingdom

The LEZ aims to combat air pollution by limiting the entry of highly polluting vehicles and encourage the upgrade to cleaner vehicles. Non-compliant vehicles that enter the zone are charged between 100 to 200 GBP and illegally entering vehicles are penalized between 250 – 1000 GBP / day



Source: TfL, 2015



Source: TfL (2023)

Case Studies: Asia

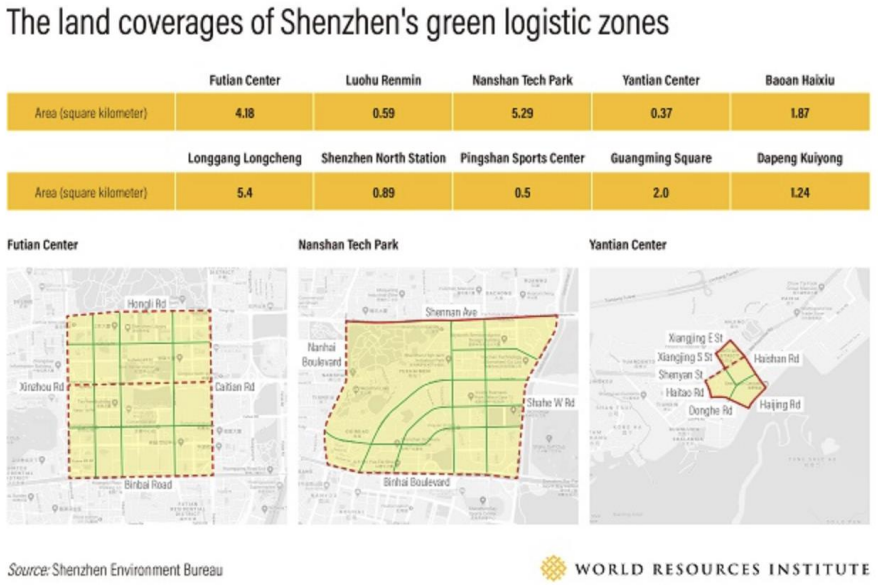
Seoul, South Korea

Seoul's low-emission zone covers the entire metropolitan area, with fines of US$212 per day. The city's "Green Transport Zone" has **reduced PM 2.5 by 16%.** Targets Grade 5 vehicles (small- to mid-size diesel car released before July 2002 or a gas-powered vehicle made before 1987). The ban is extended to the entire city when PM 2.5 levels 50 micrograms per cubic meter.

Transformative Mobility. (n.d.). Low Emission Zones. Retrieved from https://transformative-mobility.org/low-emission-zones/

Shenzhen, PR China

The establishment of LEZs are part of the air quality improvement strategy in Shenzhen, China. In 2019, there are "green logistics zones" or zero-emissions freight zones. The strategy led to the adoption of battery electric commercial vehicles and other zero-emissions freight vehicles in the zero-emissions zones.



National Association of City Transportation Officials (NACTO). (2021). Building Healthy Cities: Implementing Low-Emission Zones in Urban Freight [PDF]. Retrieved from https://nacto.org/wp-content/uploads/2021/06/BuildingHealthyCities_UrbanFreight_LEZs.pdf

TheCityFix. (n.d.). Shenzhen's Green Logistic Zones: Fast-Tracking Zero Emission Freight. Retrieved from

Importance of Public Acceptability

- Despite more people understanding the importance of air quality and its relation to a better well-being and environment, the implementation of LEZs still gain mixed reactions from road users. As such, the policies should be well-designed for the public to support the introduction of the LEZ.
- Factors:
  - Policy-specific beliefs: **beliefs about the effectiveness** of LEZs influence public acceptability.
  - Trust in government: **higher levels of trust in the government's ability to implement LEZs** effectively impacts acceptability
  - Problem awareness: **awareness of impacts of air pollutants and air quality issues** on one's health impacts acceptability
  - **Infrastructure improvements for public transport, subsidizing fares, and investing in green infrastructures** can improve one's perceptions of LEZs. These complementary measures exist in London and Stockholm.

Morton, C., Mattioli, G., & Anable, J. (2021). Public acceptability towards Low Emission Zones: The role of attitudes, norms, emotions, and trust. Transportation Research Part D: Transport and Environment. Advance online publication. https://doi.org/10.1016/j.trd.2021.102814

Other lessons learned from Clean Air Asia's work with governme in the development and implementation of transport policies

- The **main determinant is leadership/ political will/ governance/ legislation** as this also influences the financing (which also supports technology needs)
  - **Capacity building** is crucial for leaders and involved personnel to ensure sustainability of the process

- **Partnerships of governments with private, academic, NGO sectors** can provide opportunities to address barriers
  - Academic and NGO sector can provide **technical** and **technological** support
  - Private sector can support/complement **financial** aspect

- There is a **need for co-learning avenues to discuss best practices** from first-hand experiences especially from neighboring countries
  - This increases **higher chances of applicability** in the local (or sub-regional context) and confidence that it can work

Clean Air Asia (2023). Transport policies to reduce air quality and climate pollutants: Insights on monitoring and implementation

Thank you!

For questions, please email: raymund.abad@cleanairasia.org