GLOBAL
NEW MOBILITY
COALITION

Zero Emission Area Handbook

Global New Mobility Coalition

May 2021

with knowledge support from McKinsey & Company and
in collaboration with the World Economic Forum

About us – Introducing the Global New Mobility Coalition

The Global New Mobility Coalition

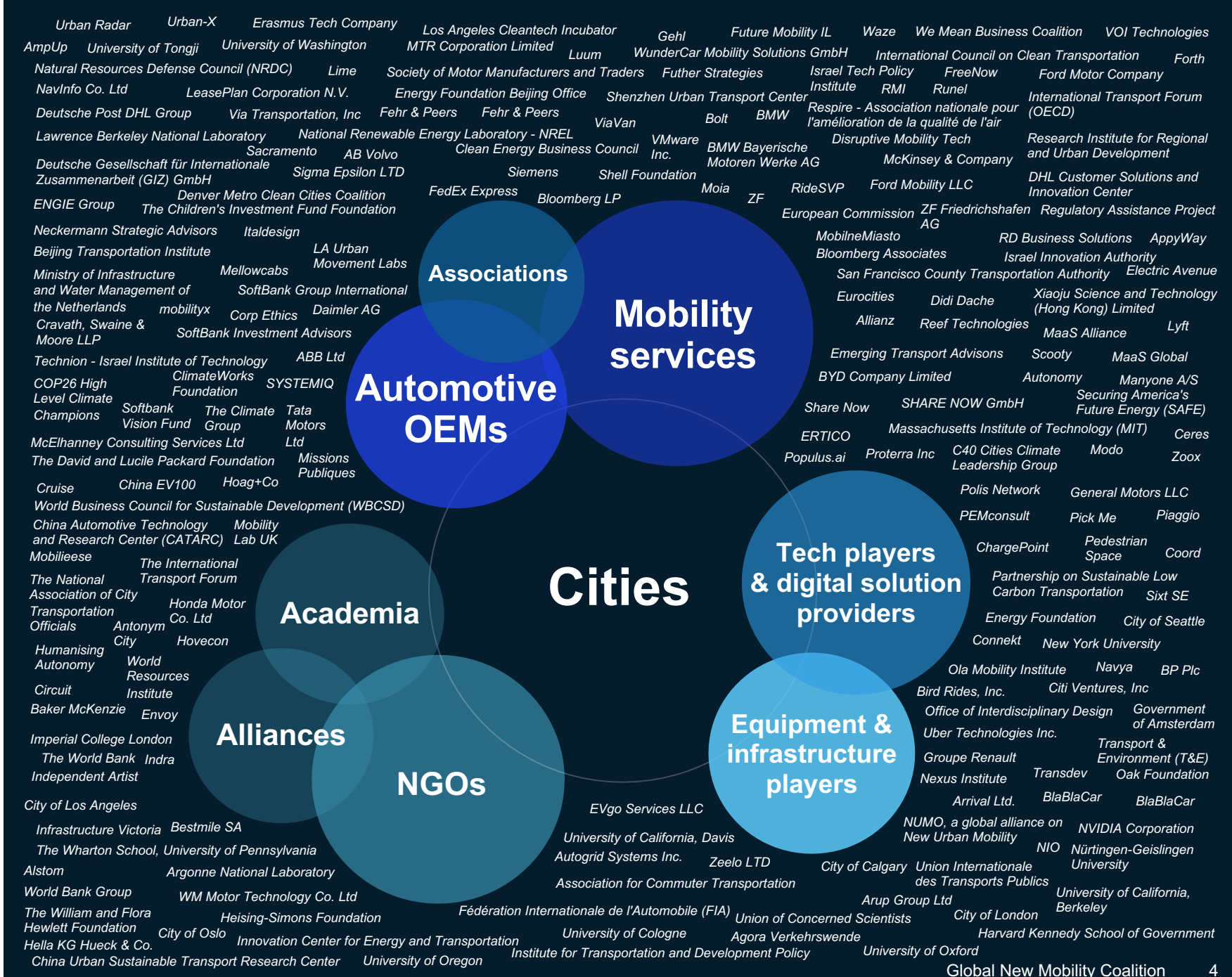
The Global New Mobility Coalition (GNMC), curated by the World Economic Forum with knowledge and analytical support from McKinsey & Company, is an active and diverse community of over 200 globally renowned experts, NGOs and companies for accelerating the shift to a synced Shared, Electric, Connected and Autonomous Mobility (SEAM) system that provides for healthier cities, reduces carbon emissions improves mobility efficiency, and decreases commuting costs, while tapping into a 600 billion-dollar business. This work is independent and has not been commissioned by any business, government, or other institution. The conclusions in this document do not necessarily reflect the views of individual coalition members.

Our Mission

GNMC co-develops, pilots and scales awareness building and policy initiatives that enable sustainable mobility, and scale the benefits of SEAM for the environment, society and the economy.

Read more on GNMC →

We are a network of 200+ globally renowned experts, NGOs and companies



We address key challenges in urban sustainable mobility

Urbanization & Accessibility

60%

people living in cities in 2030

Congestion

20-35%

increase globally since 2010

Emissions

1.5°C

pathway requires commitment to decarbonization

Shared rides

80%

of rides with one occupant: increasing shared rides can cut costs and emissions

E-mobility

2.5%

global share of EVs in 2019, with over 20 long e-range models

Autonomy

~2025

launch year of L4/5, requiring shared and electric infrastructure for positive impact

Health & safety

~1.35mn

people die in road crashes every year

Connectivity

95%

penetration of in-vehicle connectivity

Deliveries

78%

growth in last-mile delivery

Zero emission urban mobility is a game changer in realizing the social and sustainable city of the future

Human-centred urban mobility design, liveable spaces, mobility hubs, 15-min city

Tech enabled holistic solution for entire **ecosystems**

Equity and access

Multistakeholder approach

Transformation of **street as a common good, mobility as a service**

Recently we have seen governments declare new ambitions for CO2 reductions, driving the uptake of electric vehicles

Sep '20
55%
Proposal to increase the bloc's 2030 climate target to "at least 55 percent" within the Green Deal

Sep '20
2035
California to phase out sales of new gas-powered cars and trucks by 2035

Sep '20
2060
Xi Jinping made a surprise commitment to drastically reduce emissions and become carbon free by 2060

Quelle: McKinsey Center for Future Mobility; desk research

Potential new EU 2030 targets for automotive sales

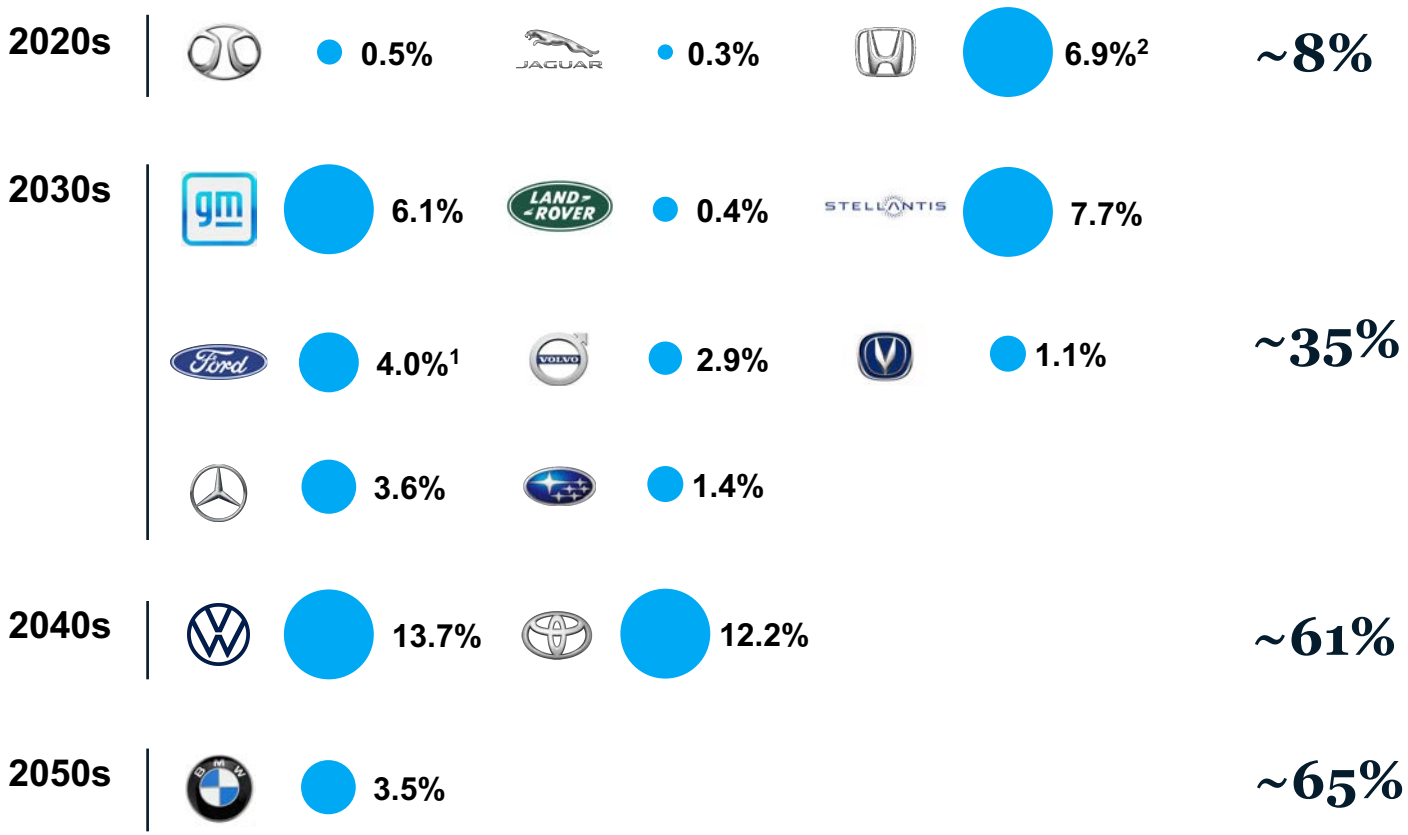
Scenario	CO2 reductions from new sales (2021-2030)	CO2 targets for 2030 sales (g/km CO2)	Required 2030 sales powertrain mix (% of new car sales) BEV	PHEV
1 *Current regulation*	37,5%	59	36%	11% 47%
2 *Conservative new regulation*	50%	48	48%	12% 60%
3 *EU climate target scenario*	90%	10	86%	6% 92%

16 OEMs with 65% market share have already announced exit dates for ICE

GNMC perspectives are technology agnostic – BEV, fuel cell and other drivetrain options are in scope

Announced ICE sales bans

X 2019 PC sales market share (in %)



Examples

- “VW will introduce last ICE platform in 2026 and manufacture only all electric cars by 2040”
- “Toyota will be phasing out gas engines from their line-up, […] ending production of ICE engines by 2040”
- “BAIC Motor looks to phase out conventional fuel cars by 2025”
- “All new Volvo cars to be electric or hybrid from 2019 onwards”

1. Target only for EU

Source: McKinsey Electrification Model, MCFM, IHS, Press research

Regional and national action may support city action – City alliances can be helpful in guiding local action

47

C40 Cities and additional partner cities are actively pursuing mobility related initiatives

Source: https://www.c40.org/

Cities are emerging as drivers of global surge in launch or announcement of zero emission areas

Seattle
Permanent closure of 30 km residential road network, all ride-hailing trips emission-free by 2030, one third of deliveries emission free

Montreal
Planned addition of over 320 km new pedestrian and bicycle lanes

Portland
Temporary reduction of fees for e-scooters and bike sharing

Sacramento
Initiatives: Climate Action Plan and the Transportation Priorities Plan

Austin
40% of vehicle miles travelled electrified by 2030

Santa Monica
Introduction of voluntary „zero-emission" delivery zones for commercial vehicles in 2021

Paris
"15min city"; Investment of over 300 Mio. EUR into both modernization and expansion of 650 km cycleways

Amsterdam
And 13 other Dutch cities will move to purely electric delivery from 2025

London
Buying only zero-emission buses from 2025, expansion of ZEA to HDT

Madrid
4,5 km^2 zone allowing only public transport and zero-emission vehicles

Barcelona
Expanding low emission zones with restricted access and speed limits

Stockholm
Imposing inner city tolls from 6:30h to 18:30h (up to ~6 EUR)

Berlin
Repurposing of 18 roads into slow streets during certain hours

Brussels
Transformation of 40 km traffic roads into bike lanes

Milan
Increase of bike-sharing fleet to 8.000 bikes and addition of 3.500 new e-scooters; free access for electric delivery vehicles into congestion charge area

150+

Cities worldwide have planned or initiated ideas to reduce mobility related emissions

Quelle: McKinsey Center for Future Mobility; Online-Recherche

In response to the global movement towards sustainable mobility we have launched a digital Zero Emission Area Handbook

Laying the foundation

- Establish work principles
- Set an ambitious vision
- Define performance metrics to measure impact

Defining a winning ZEA concept

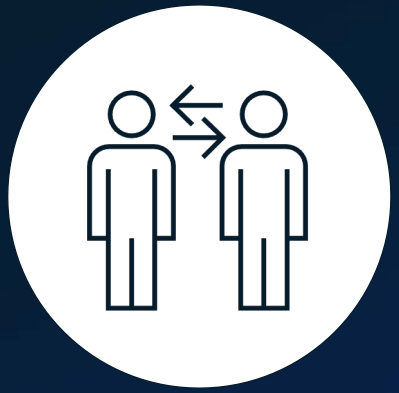
- Define a winning pilot format
- Prioritize asset classes and measures
- Close legal, financial & tech-nological implementation gaps

Quantitative ZEA modeling

- Quantify direct impact (emissions, cost etc.)
- Quantify and manage externalities
- Plan transition and timing for each measure

Activating and connecting with the ecosystem

- Learn from city case studies
- Learn from GNMC businesses
- Ensure community dialogue & buy-in



#1
Establish work principles

Establishing work principles for all stakeholders up front is critical

Work principles for public and private sector stakeholders

Engage external stakeholders
Including the public sector, businesses, academia, residents and commuters

Greenfield Labs

Align on language and information sharing
by, for example, forming a clear terminology glossary to facilitate smooth communications. Revisit the glossary periodically to account for new and evolving socio-technological configurations

Standard taxonomy and definitions

Ensure agile governance
that minimizes regulatory patchwork, is focused on a clear vision, and continuously improves and adapts to changing context

World Economic Forum

Create an environment for open collective data usage
in order to allow for maximum innovation and synergies between different players in the ecosystem (eg, mobility innovators, tech firms)

Keep track
by forming efficient, transparent, and authoritative management; evaluation; and enforcement capacities

Avoid or break down internal silos
by engaging with all stakeholders and seeking cross-ministerial participation to enable action that builds on multiple perspectives and experiences. This should include but not be limited to, legal, financing, monitoring, and enforcing entities.

World Economic Forum's Agile Cities

Establish performance indices & risk guidelines
in advance to efficiently solve technical, organizational, and operational issues, including prior alignment on how to address issues

World Economic Forum's Drones & Tomorrow's Air Space

Source: GNMC, Shared, Electric and Automated Mobility (SEAM) Governance Framework: Prototype for North America and Europe (World Economic Forum, 2019)

#2
Set an ambitious vision

Mobility ecosystems are at a major inflection point – There is a window of opportunity now for cities to shape the "Next Normal"

Over a century, Paris' Rue de Rivoli has transformed from…

1900s

A dirt road full of horses…

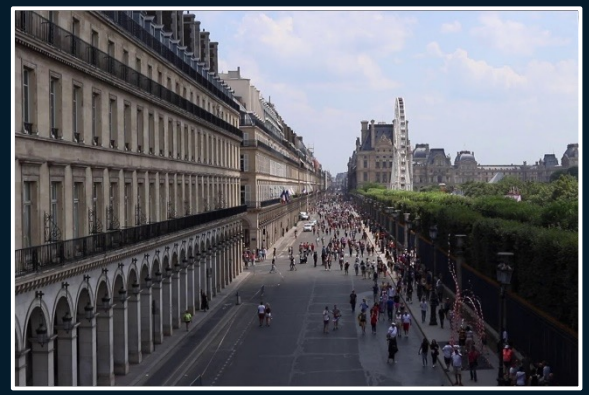
1920s

To a paved road full of cars and pedestrians…

1970s

To a 6-lane, one-way car-only arterial…

2020



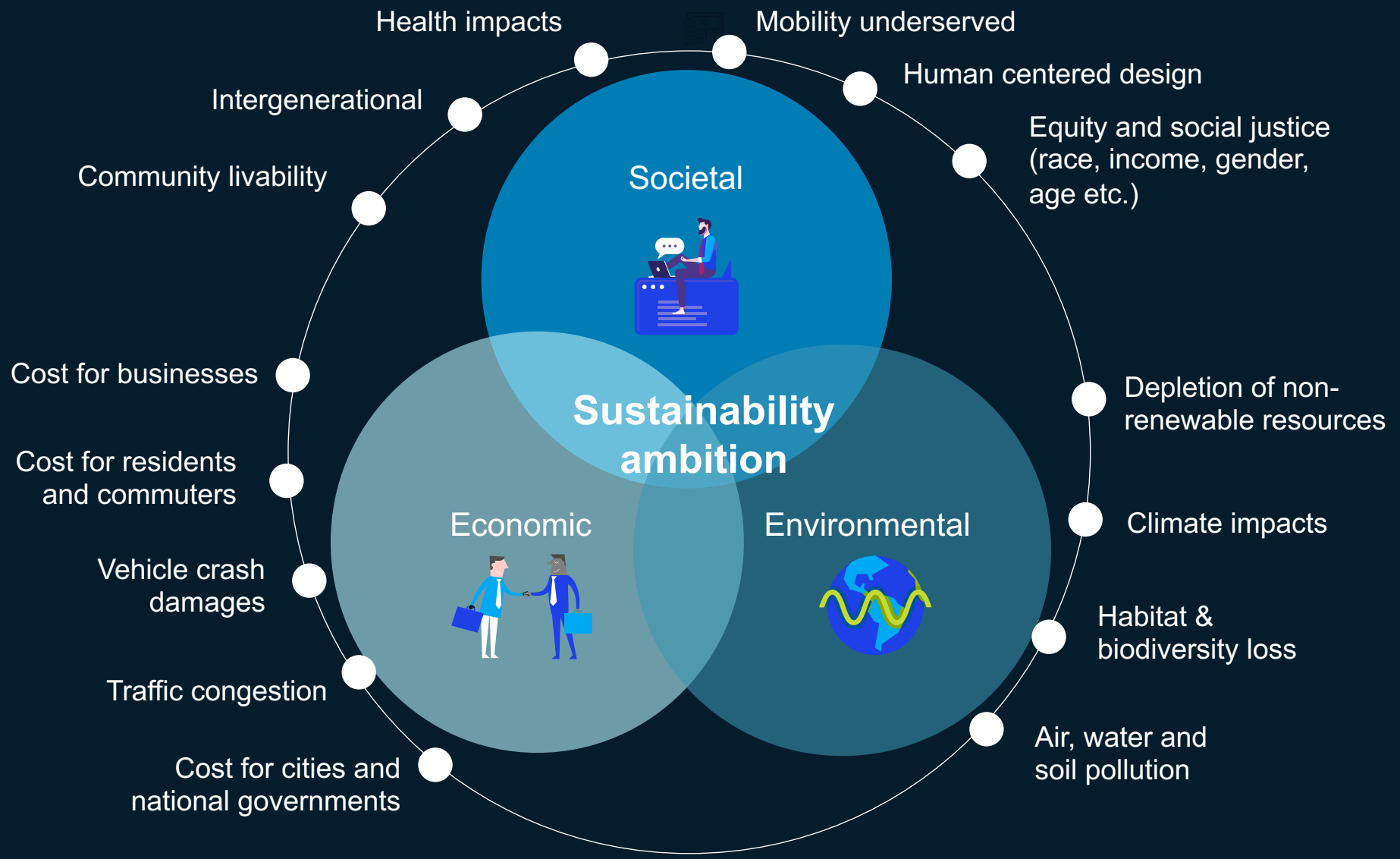
To a bike and pedestrian-only street…

…to?

Cities and businesses are starting to rethink urban space and mobility costs – Defining an ambitious vision is the basis for success

From…	… to
Transport	Accessibility focused on equity and fairness
Traffic focus, motorized with emphasis on automobile	Human-centred urban design incl. bike, foot and rolling
Large in scale	Local in scale based on a multistakeholder approach
Street as a road, physical dimensions	Street as a space with social and environmental dimensions
Reactive and static traffic management	Real-time, tech enabled holistic solution for entire ecosystems
Economic evaluation	Multi-criteria evaluation (including social, environmental)
Travel as derived demand	Travel as a valued activity and derived demand
Demand based (speeding up traffic)	Management based (slowing movement down)
Minimizing travel time	Reasonable travel time, travel time reliability
Separating people and traffic	Transformation of street as a common good, clean mobility as a service

Societal, economic and environmental considerations are crucial



An ambitious vision for zero-emission areas recognizes and integrates economic, societal and environmental needs.

When defining a vision, it is important to include not only direct effects (e.g., reduced emissions within the area), but also indirect effects (e.g., additional congestion in the surrounding areas, impact on stakeholders like residents and local retail).

Some of these impacts can be quantified (e.g., traffic volume), some will be more qualitative and will only emerge over time (e.g., perceived quality of living).

#3
Define performance metrics to measure impact

Performance metrics should cover not only emissions, but also measure across societal, economic and environmental considerations

Illustrative

Societal

Equity, accessibility & convenience

- Multi-modal ticketing
- Share of direct trips / point-to-point
- Share of residents within 1 mile of public transit
- Access to affordable, efficient modes

Health and safety

- Number of crashes
- Indirect health related impact based on surveys (quality of living, perceived stress etc.)

Economic

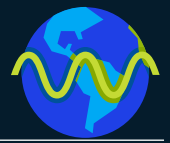
Cost/revenues for all ecosystem stakeholders

- Cost per commute/trip
- Cost and revenues for cities and governments, businesses, residents
- New jobs created

Efficiency / congestion

- Congestion / hours lost in traffic
- Average trip time or commute time

Environmental



Emissions

- CO2/NOx emissions per km travelled
- Noise emissions
- PM emissions

Political feasibility & acceptance

- Acceptance by all stakeholders
- Likelihood of implementation considering local context (culture, current state etc.)

Time to implementation

- Year of implementation
- Year in which impact can be measured

Scalability

- Ability to scale solutions from a single street to a larger district or even to the state/country level

The best 'impact dashboard' is simple and measures impact across societal, economic and environmental areas.

Some of these metrics will be directly linked to the implementation of ZEAs (like emissions), some of them will be more qualitative and look at externalities as well as macro-level effects (e.g., DP gains) of ZEAs.

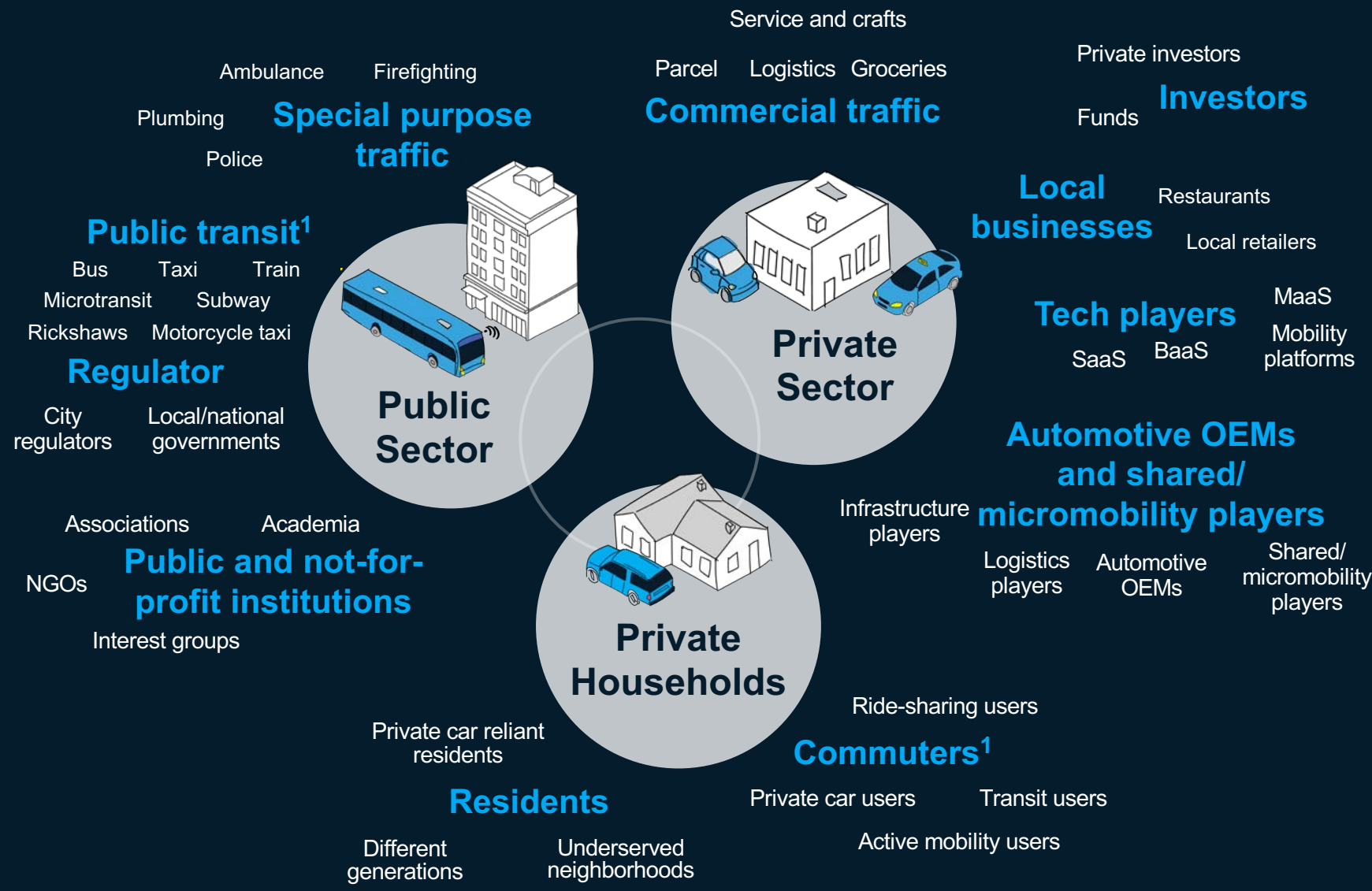
Taking into consideration resident needs, political feasibility, required time for impact as well as scalability (e.g., from street-level ZEA to more holistic district-level ZEA) is critical.

#4
Define a winning pilot format

A wide variety of stakeholders has to be taken into consider-ation in the design of a ZEA

Zero Emission Area

Not comprehensive

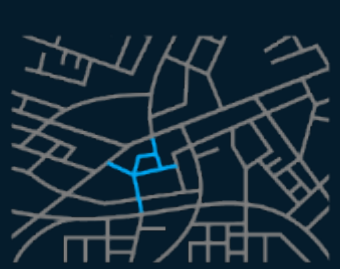


1. Including informal mobility networks

Different formats for zero-emission areas exist, ranging from street-focused ZEAs to more holistic concepts covering entire districts

Level of complexity

Lower — Higher



Managed street

Single or several inner-city streets; either complete access restriction or allow-ance for certain vehicles with toll

Barcelona

Oxford

Managed corridor plus mobility enhancement

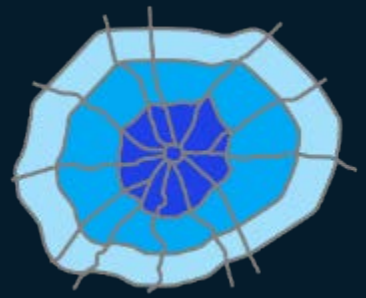
Single tolled commuter lane or EV/high-occupancy lanes

Los Angeles

Managed network

Multiple coordinated managed lanes along the same congestion corridor

Santiago de Chile



Managed cordon

Multiple coordinated managed lanes as an integrated program – stricter policies in the center

Amsterdam

London

Managed district

Comprehensive ZEA concept for large areas which includes not only traffic but also urban redesign

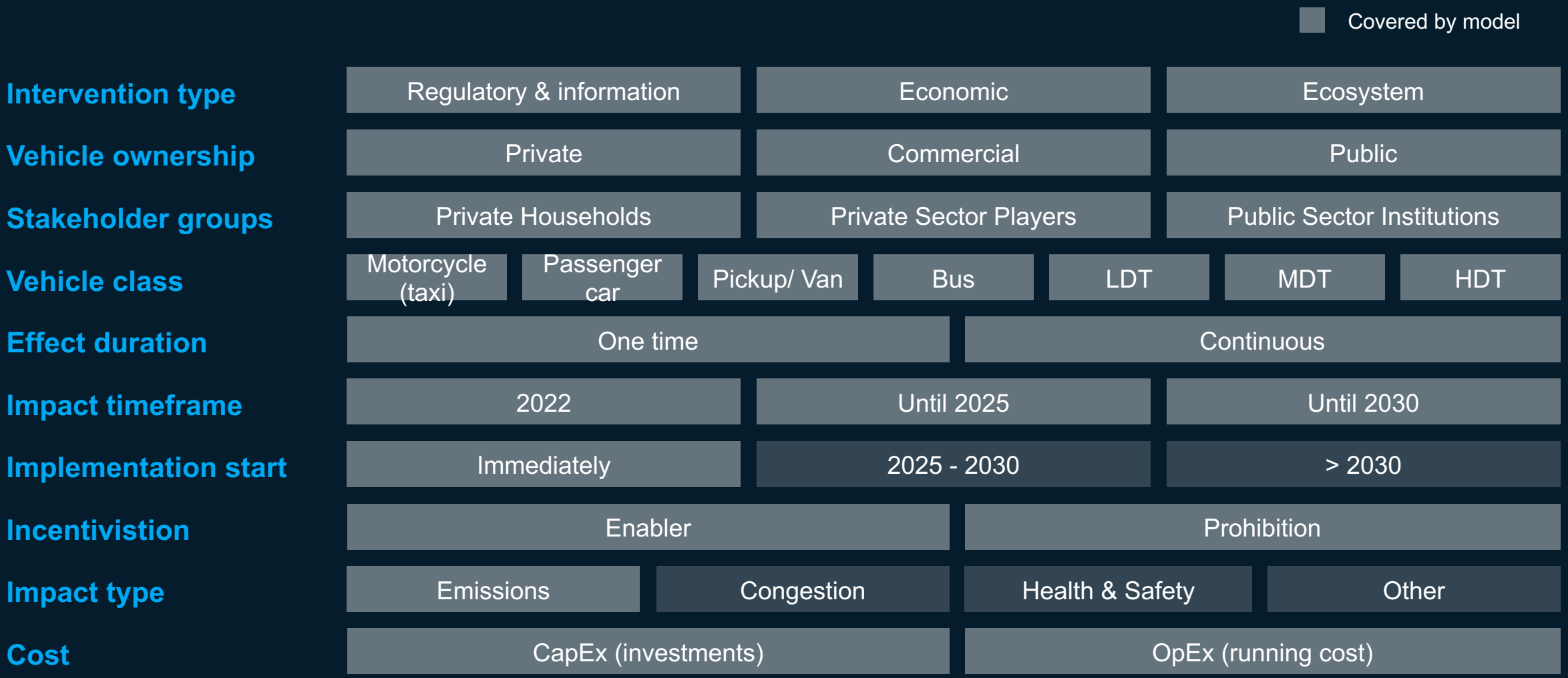
Oslo

Additional city examples: Urbanaccessregulation.eu

#5
Prioritize asset classes and measures

Measures to move to zero emission are manifold and can be described along different criteria for design and scope

Not comprehensive – additional modes exist



Collection of potential actions facilitating reduction in emissions, congestion and other targets, thereby leading to more livable cities

Long list of initiatives	Residents & commuters (Pass. car)	Private sector (Com. Veh., Taxis, Shared)	Public sector (Pass. car, Bus)
Regulatory measures	Phase out of all **non-EVs**		
	Phase out of all **non-EV passenger cars**	Phase out of all **non-EV commercial vehicles**	
	Speed reduction in inner-city areas		
	Order to install **charging stations** in all (new) buildings		
Incentivisation measures	Highway/inner-city **tolls for all non-EVs**		
	Subsidies for **EV charging, parking, lanes and loading areas**		City invest: **replace all non-EVs**
	Subsidies for **car/ride sharing, micromobility**	Subsidies for & **financing of EV fleets**	
	Subsidies for **public transport**		
	Reward system to use mobility alternatives		
Infrastructure measures	Prominent **visuals to encourage ZEA** (voluntary)		High-frequency **public EV shuttles**
	More public **charging stations**		
		Subsidized **parcel lockers** for delivery	
		Emissions-optimized route planning as SaaS	
Urban redesign measures	**Replacement of parking spaces** with public areas/bike lanes		
	Dedicated lanes for **high-occupancy mobility**	Dedicated **EV loading zones**	
	Extension of **bike and micromobility lanes**	**Goods tram** for delivery	
	Closure and **repurposing of roads and curb space** (temporary/ permanent) (e.g. pedestrian zone, shopping area, park)		
	Create **limited traffic zones** (e.g. only for public transport, shared mobility)		

1. For each intervention a city-specific implementation timeline must be determined

Example: London has 18+ years of experience with congestion charges

Congestion pricing

Program overview

- Flat charge on entering 21 km^2 cordoned zone containing 200K residents/1M jobs
- Residents within zone receive 90% discount on daily charge.
- Charge applies to vehicles parked or driving within the zone (except for residents' off-street parking)
- Flat charge (originally £5 weekdays 7a-6:30p – increased to £8 in 2005 and £10 in 2013)
- Enforcement by camera at zone entry/exit
- Online billing/payment
- Electric/low-emission vehicles exempt
- Initial investment of $214M
- Capita Group won £230M, 5 yr contract to manage the system. IBM & Siemens operating the scheme since '09

Factors contributing to success or failure

+ **Political support**: Mayor's (Livingstone) election platform included congestion pricing
+ **Enabling legislation**: Greater London Authority Act ('99) enabled London Mayors to introduce road user charging. Previous legislation ('97) required local authorities to study and reduce traffic volumes
+ **Bundling**: Political support gained by bundling congestion charge with other initiatives, including mass transit improvements (e.g. increased bus service, lengthened bus lanes, smart cards, introducing out-of-bus ticket sales and banning driver ticket sales)
+ **Strong policy communications:** London widely conveyed the program's benefits
+ **Public support:** 90% of residents believed there was too much traffic and were concerned about travel times and air pollution
+ **Reinvestment:** Revenues in excess of expenses were dedicated to improving transportation
- **Consensus-building**: Westminster council, ruled by opposition and responsible for governing the borough restricted by the system, challenged the legality and environmental impact of the policy. British High Court rejected the claim
- **Risk transfer, performance levels, & contract negotiations**: After several initial hiccups (incl. 100K+ unpaid notices) Capita was criticized for cost-effectiveness & service levels, leading to renegotiations. Capita took on greater revenue risk & customer service KPIs and in return was awarded additional revenue (up to £31M)

Impact

30% decrease in peak period congestion

50% decline in bus congestion

20% decline in auto traffic

-2% auto mode share shift

14% increase in bus ridership;

Tri-State Transportation Campaign, "Road Pricing in London, Stockholm, & Singapore" (2018); Auckland Council & MoT, "The Congestion Question" (2019)

#6
Close legal, financial & technological implementation gaps

Addressing legal, financial and technological challenges can only be done through a multistakeholder systems approach

Legal & political challenges

Political acceptance can vary significantly depending on the cost and benefits to different stakeholders

Political willingness for bold decision making is often limited regarding regulatory interventions and street-redesign due to fears of public reactions and future electability

Bureaucratic approach and slow decision making – often ambitious projects get struck in "business as usual" political processes/mindsets, particularly when adapting legal framework is required

Regulation addressing data standards and privacy concerns for sensors and cameras, enabling occupancy control and street charging

Financial challenges

Comprehensive business case, quantifying costs and benefits for a wide range of stakeholders (incl. residents, local retail etc.)

Transition financing, e.g., large-scale investments in EV infrastructure to accelerate transition to emission-free transport

Cross-subsidizing success cases, e.g., revenues from roach charging re-invested in EV infrastructure

City budget for comprehensive ZEA implementation, e.g., trade-off between significant investments in street/ZEA re-design in the short-term versus incremental improvements in infrastructure over the years

Technological challenges

Sensors and street cameras at scale (e.g., standard solutions) to ensure critical mass for occupancy control, congestion charging and real-time curb management

Open-source data and data platforms, e.g., detailed data on traffic flow, volume for effective traffic modeling and simulation

Convenient apps and platforms for users – currently there are many different multi-model and micromobility apps and offerings each with its own ticketing system

Technological advancement – some technological solutions might not yet be available or financially viable

Other challenges

Scaling of innovative formats, e.g., urban consolidation centers, multi-modal hubs

Community buy-in, e.g., local and regional public acceptance and support

Time and funds required for implementation and sustaining the change

Source: Workshop series with GNMC members

#7
Quantify direct impact

The partnership between the World Economic Forum's GNMC, the city of Sacramento and McKinsey helps solve mobility related climate change challenges

Goals of the partnership

The World Economic Forum's GNMC, the city of Sacramento and McKinsey aim to **inform policy makers and private stakeholders** on **future mobility challenges**.

The findings are supposed to **guide decisions** on strategies regarding the decarbonization of mobility in urban areas to be utilized in initiatives such as the Mayors' Commission on Climate Change[1] in the city of Sacramento.

Results of this partnership **are not ready-to-implement mobility policies** but rather **food for thought in developing these policies**.

Data sources utilized

The data for the quantitative modelling was provided by the **city of Sacramento** including traffic flow, parking, EV charging infrastructure data, etc.

McKinsey complemented this by providing detailed figures on investment cost, utilization projections, emissions, etc.

Further data was provided by existing **GMNC partners** including mobility cost data and existing case studies of new mobility approaches.

Expert interviews completed the qualitative findings presented.

1. https://www.lgc.org/climatecommission/

The results do not constitute policies to be implemented in the city of Sacramento

What this report IS

Real-world simulation

Long list of potential interventions

Insights from Sacramento modeling as enabler to inform other city's ZEA considerations

Case study to guide expectations

Neutral perspective of quantified impact

What this report IS NOT

Commitment of any GNMC partner

Single approach that fits all municipalities

General plan for the city of Sacramento or the residential area shown

Lobbying paper to encourage certain policies

Concrete recommendation for implementation

The World Economic Forum's GNMC and McKinsey are partnering with the City of Sacramento to model a digital ZEA

9.3 square miles
121.000 daily commuters
9.400 residents
260 businesses

Regional Transit · Lime · GIG CAR SHARE · zipcar

1. snapshot of point in time

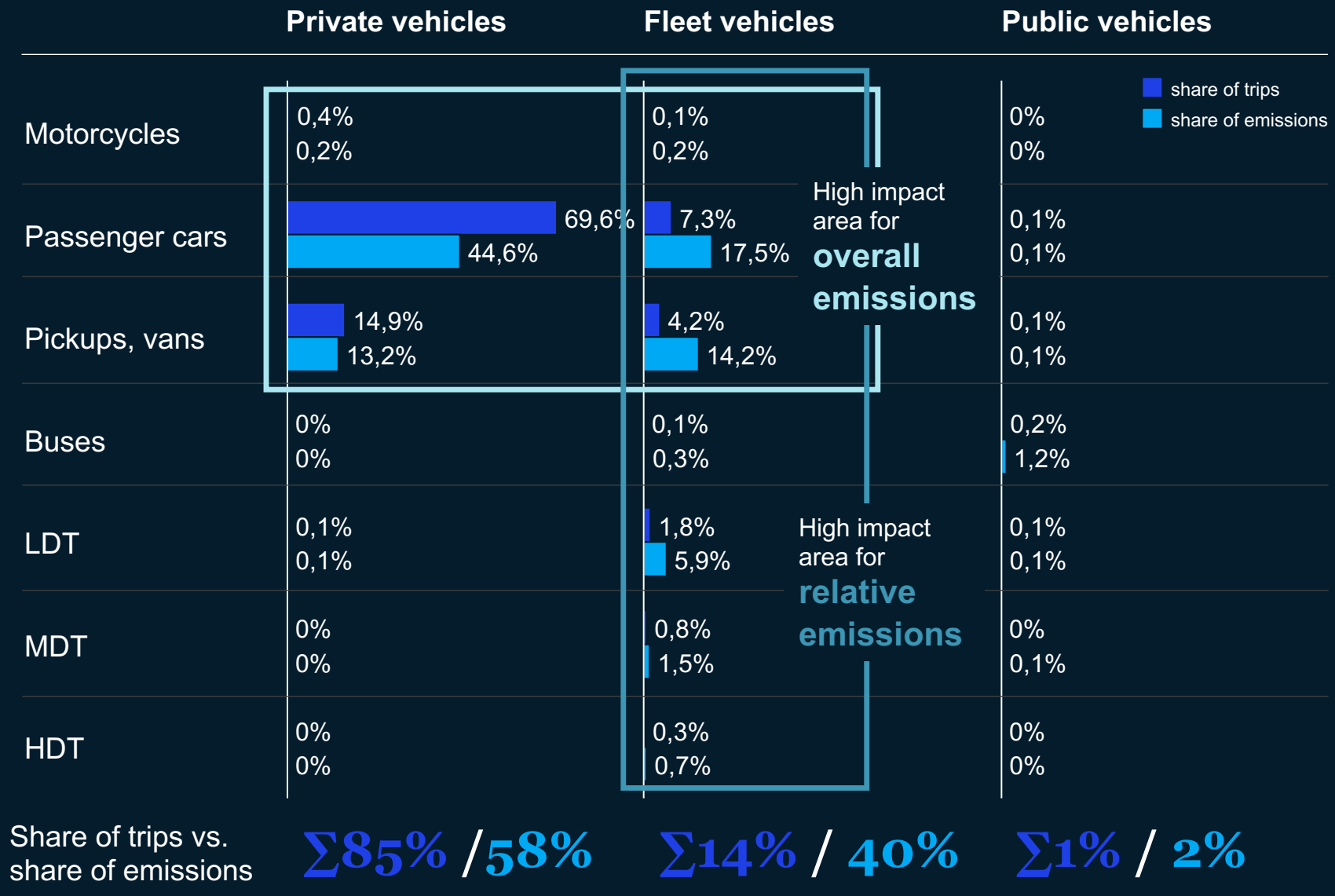
Considerations for selecting area to model a digital ZEA

- **Heterogenous, urban area –** Areal with combination of residential and commercial buildings and traffic, located near the city center
- **Broad set of mobility modes –** Opportunity to analyze data from public transit, individual/commercial vehicle traffic, infrastructure, micro-mobility etc.
- **Diverse types of routes –** Area which includes residential housing, urban retail as well as 2 bordering highways
- **Data availability –** Area for which both the city of Sacramento as well as GNMC businesses could contribute with real-world data
- **Existing ZEA / seamless mobility efforts –** Location is already used for future mobility pilots by the city of Sacramento (e.g., charging, sharing etc.)

Real-life traffic data shows that private trans-port comprises ~85% of urban traffic, while light vehicles cause ~90% of CO2 emissions

Overview of trips in area

Illustrative example – Traffic in analyzed area



Source: Sacramento, afdc.energy.gov, www.epa.gov

Prioritized interventions modeled for Sacramento

Illustrative example

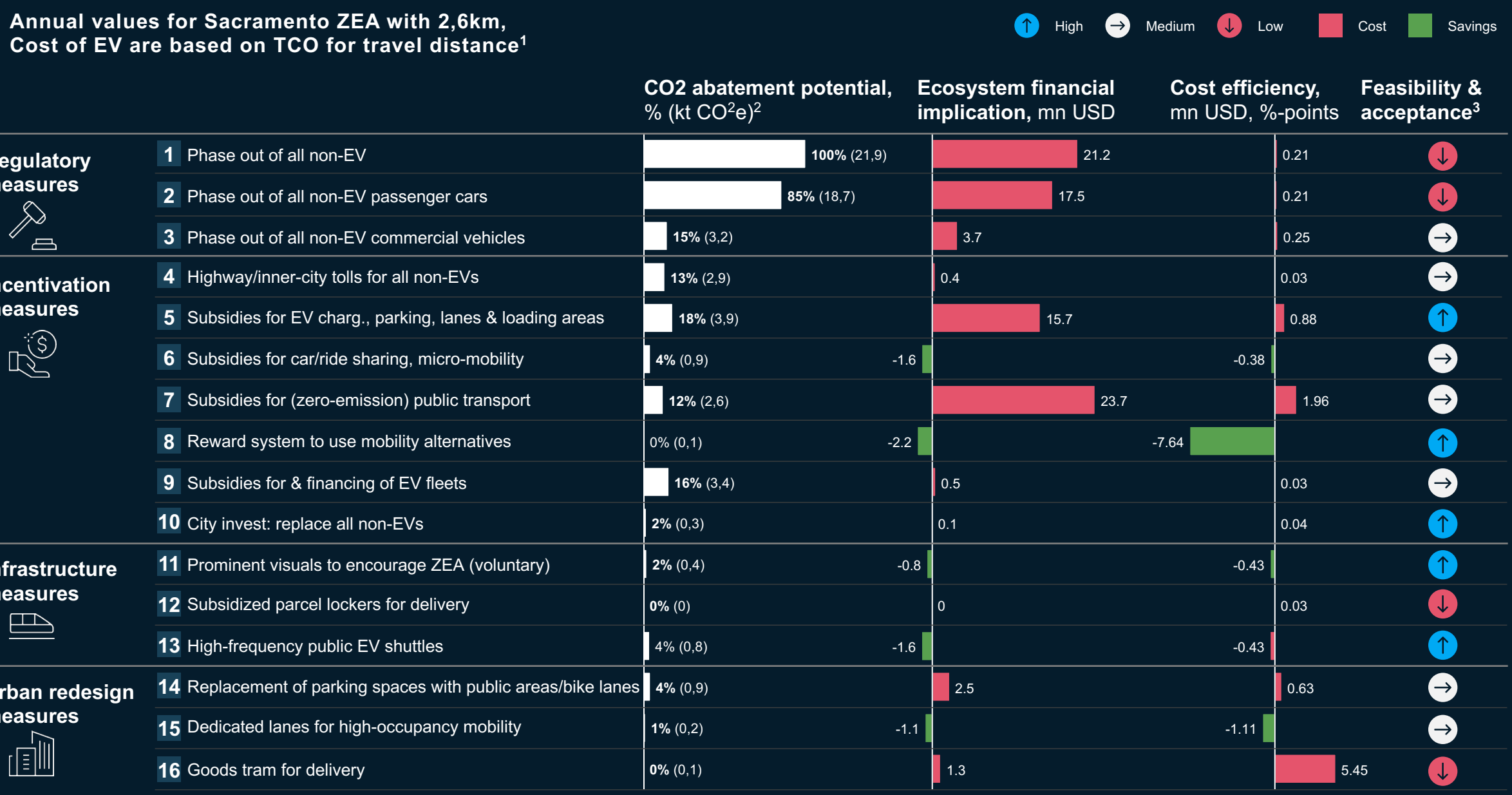
	Residents & commuters (Pass car)	Private sector (Com. Veh., Taxis, Shared)	Public sector (Pass car, Bus)
Regulatory measures	1 Phase out of all **non-EVs** 2 Phase out of all **non-EV passenger cars**	3 Phase out of all **non-EV commercial vehicles**	
Incentivisation measures	4 Highway/inner-city **tolls for all non-EVs** 5 Subsidies for **EV charging, parking, lanes and loading areas** 6 Subsidies for **car/ride sharing, micromobility** 7 Subsidies for (zero-emission) **public transport** 8 **Reward system** to use mobility alternatives	9 Subsidies for & **financing of EV fleets**	10 City invest: **replace all non-EVs**
Infrastructure measures	11 Prominent **street signs and road markings** to encourage ZEA (voluntary)	12 Subsidized **parcel lockers** for delivery	13 High-frequency **public EV shuttles**
Urban redesign measures	14 **Replacement of parking spaces** with public areas/bike lanes 15 Dedicated lanes for **high-occupancy mobility**	16 **Goods tram** for urban delivery	

1. For each measure a city-specific implementation timeline must be determined

Sacramento specific ZEA interventions grid based on real-world data

Annual values for Sacramento ZEA with 2,6km, Cost of EV are based on TCO for travel distance[1]

High · Medium · Low · Cost · Savings



1. Total cost of ownership (TCO) compared to current internal combustion alternatives for average travel distances within the fictive Sacramento ZEO
2. Tonnes of CO2 equivalent
3. Based on general political climate in Europe and North America

Sacramento specific ZEA interventions grid based on real-world data

Annual values for Sacramento ZEA with 2,6km, Cost of EV are based on TCO for travel distance[1]

Cost | CO2 savings >15% | CO2 savings <15%

		Residents & commuters		Private sector		Public sector	
		Cost of measure, Mn USD	Emissions reduction, %	Cost of measure, Mn USD	Emissions reduction, %	Cost of measure, Mn USD	Emissions reduction, %
Regulatory measures	1 Phase out of all non-EV	16.93	78.1%	4.07	20.2%	0.18	1.7%
	2 Phase out of all non-EV passenger cars	16.84	77.8%	0.64	6.4%	0.03	1.1%
	3 Phase out of all non-EV commercial vehicles	0.09	0.3%	3.43	13.8%	0.15	0.5%
Incentivisation measures	4 Highway/inner-city tolls for all non-EVs[2]	52.32	11.4%	9.05	2.5%	-60.94	-0.8%
	5 Subsidies for EV charg., parking, lanes & loading areas	3.88	16.0%	0.45	1.9%	11.41	0.0%
	6 Subsidies for car/ride sharing, micro-mobility	-1.85	4.1%	-0.03	0.0%	0.33	0.0%
	7 Subsidies for (zero-emission) public transport	-18.71	34.1%	0	0.0%	42.38	-22.0%
	8 Reward system to use mobility alternatives	-2.98	6.6%	-0.78	0.0%	1.56	-6.3%
	9 Subsidies for & financing of EV fleets	0	0.0%	0	14.3%	0.50	1.2%
	10 City invest: replace all non-EVs	0	0.0%	0	0.0%	0.06	1.6%
Infrastructure measures	11 Prominent visuals to encourage ZEA (voluntary)	-0.54	4.3%	-0.27	0.0%	0	-2.4%
	12 Subsidized parcel lockers for delivery	0.20	1.3%	-0.11	0.0%	-0.09	0.0%
	13 High-frequency public EV shuttles	-1.54	3.1%	0	0.0%	-0.02	0.6%
Urban redesign measures	14 Replacement of parking spaces with public areas/bike lanes	-4.70	3.5%	-1.16	0.5%	8.39	0.0%
	15 Dedicated lanes for high-occupancy mobility	-1.04	1.0%	-0.14	0.0%	0.11	0.0%
	16 Goods tram for delivery	0	0.0%	0.17	0.2%	1.09	0.0%

1. Total cost of ownership (TCO) compared to current internal combustion alternatives for average travel distances within the fictive Sacramento ZEO
2. Best practice would be to use public sector profits to fund other environmental efforts such as the subsidy measure outline here

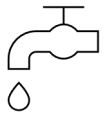
We identified three archetypes of city transition roadmaps, based on regulatory, political context and ambition level

Transition scenarios

A **Top-down regulatory push**

Mostly city/government-led top-down approach via regulatory interventions, leveraging increasing TCO advantage of BEV vs. ICE.

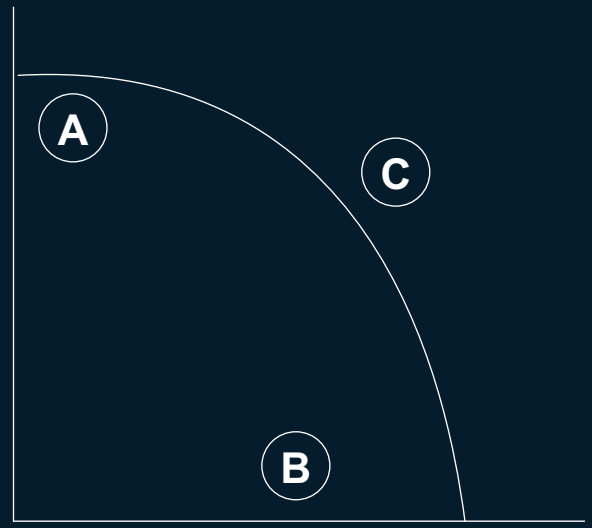
B **Pick-and-choose incremental improvement**



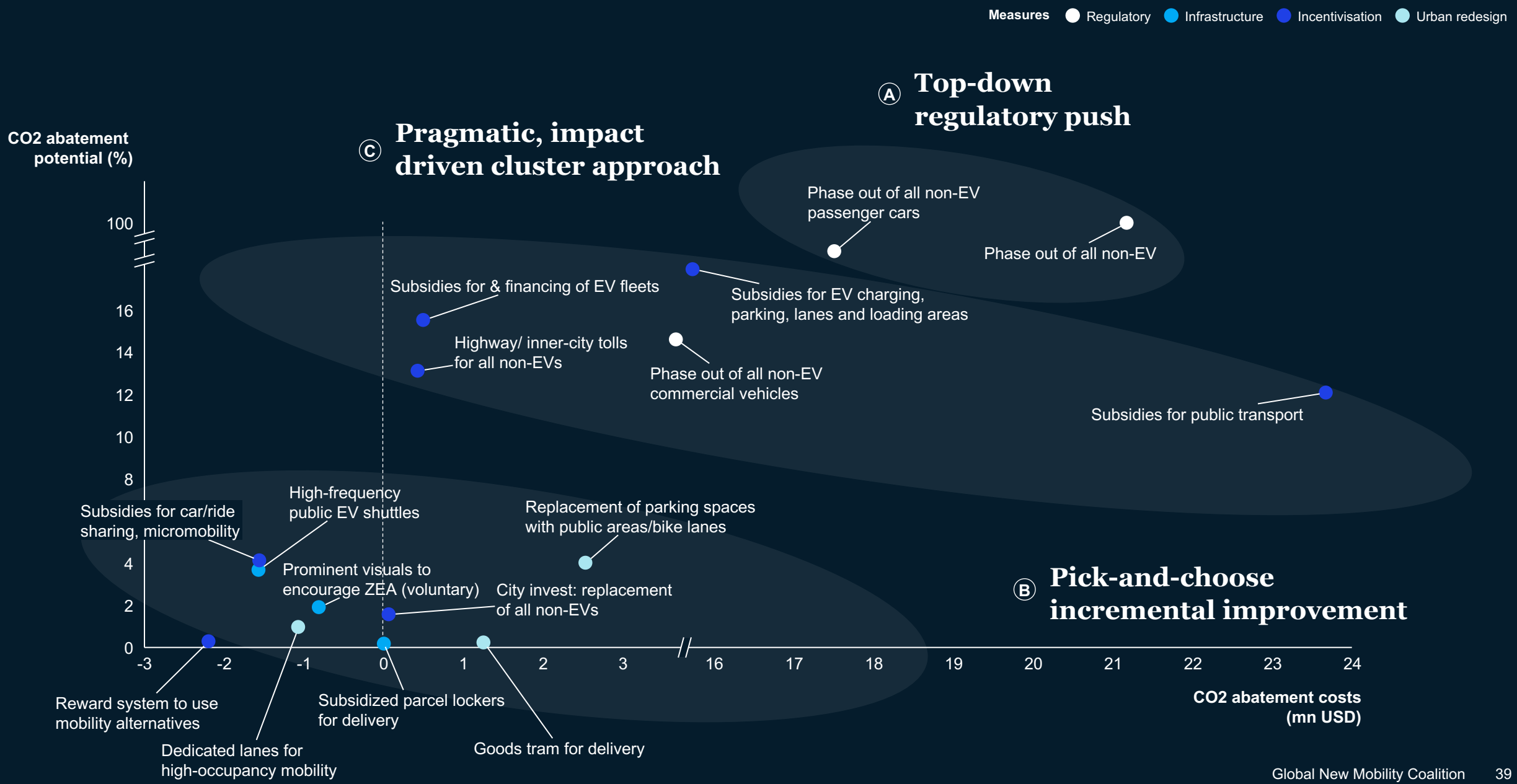
Incremental improvements with a selection of single interventions, focusing on cost positive, no-regret moves. Trying to maximize acceptance by all ecosystem stakeholders as perceived cost and behavioral change are limited.

C **Pragmatic, impact driven cluster approach**

Combination of various measures that have a high probability of implementation and provide significant emission reduction in their combination.



Sacramento specific ZEA interventions grid based on real-world data



A pragmatic, impact driven strategy will focus on high overall CO2 reduction potential at a high probability for implementation

Cost for CO2 abatement potential

Probability for implementation

Regulatory measures

Show the highest overall CO2 abatement potential at low cost per unit of CO2 avoided

Likely meet the strongest resistance from political, residential and private sector stakeholders

Highway & inner city tolls

Still significant CO2 abatement potential at low overall cost for the ecosystem

Might meet resistance due to high reallocation of funds from residents/ commuters and the private sector to the public sector, especially if these funds are not used appropriately

Subsidies

The subsidy-based initiatives have a CO2 abatement impact only slightly lower than tolls

In combination with the tolls, all subsidies could be financed and provide an appropriate measure to relieve travellers willing so adopt low/zero emissions travelling

1

Phase out of all non-EVs

Description

The city to determine a fixed deadline/year for when all emitting vehicles traveling in the selected area have to be replaced by zero-emission transport modes. Post deadline non-EVs will be prohibited from accessing the area (excluding crucial public service vehicles, such as ambulance, fire trucks etc.).

Responsibility for transition and cost coverage lies with all stakeholders and vehicle owners, supported by funding schemes to provide for an equitable transition. City to ensure adequate charging infrastructure and regulatory framework.

Traffic and radar controls to secure adherence.

Type of measure

- [x] Regulatory
- [ ] Incentivization
- [ ] Infrastructure
- [ ] Urban redesign

Duration of implementation

- [ ] <1 year
- [ ] 1-2 years
- [ ] 2-5 years
- [x] >5 years

Political feasibility & ease of implementation

Implementation requires strong political advocacy and prior buy-in from key stakeholder groups as some stakeholders may object due to projected losses in the immediate term. Furthermore, economic feasibility is necessary as large investments will be needed.

2

Phase out of all non-EV passenger cars

Description

The city to determine a deadline/year by when all emitting passenger vehicles traveling in the selected area have to be replaced by EVs. This only applies for privately owned vehicles, not fleets. Post deadline non-EV private vehicles will be prohibited from access.

Responsibility for transition and cost coverage lies with all stakeholders and vehicle owners, supported by funding schemes to provide for an equitable transition. City to ensure adequate charging infrastructure and regulatory framework.

Traffic and radar controls to secure adherence.

Type of measure

- [x] Regulatory
- [ ] Incentivization
- [ ] Infrastructure
- [ ] Urban redesign

Duration of implementation

- [ ] <1 year
- [ ] 1-2 years
- [ ] 2-5 years
- [x] >5 years

Political feasibility & ease of implementation

Implementation requires strong political advocacy and prior buy-in from key stakeholder groups since road users depend on ICE at the time of implementation. Furthermore economic feasibility is necessary as large investments will be needed.

3

Phase out of all non-EV commercial vehicles

Description

The city to determine a fixed deadline/year by when all emitting fleet vehicles traveling in the selected area have to be replaced by EVs. This only applies for commercially owned vehicles. Post deadline non-EV fleet vehicles will be prohibited from access.

Responsibility for transition and cost coverage lies with all stakeholders and vehicle owners. City to ensure adequate charging infrastructure and regulatory framework.

Traffic and radar controls to secure adherence.

Type of measure

- [x] Regulatory
- [ ] Incentivization
- [ ] Infrastructure
- [ ] Urban redesign

Duration of implementation

- [ ] <1 year
- [ ] 1-2 years
- [ ] 2-5 years
- [x] >5 years

Political feasibility & ease of implementation

Implementation requires strong political advocacy since certain stakeholders (e.g. delivery players) may object due to projected losses in the immediate term. Furthermore economic feasibility is necessary as large investments will be needed. Technological advancements and new business models important for commercial trucking.

4

Highway/inner-city tolls for all non-EVs

Description

All non-EVs to pay tolls for driving in the ZEA, applicable to all private, commercial and public vehicles. Drivers must pay each time entering the area.

To collect tolls, city needs to install camera-equipped stations at all entrance intersections to capture vehicles. Payment via „EZ pass“ or electronic invoice.

Price of tolls is city and case specific. Cost need to be high enough to incentivize commuters to move to alternative transport modes and potentially encourage commercial vehicle owners to electrify fleets in the mid-term.

Type of measure

☐ Regulatory ☑ Incentivization ☐ Infrastructure ☐ Urban redesign

Duration of implementation

☐ <1 year ☑ 1-2 years ☐ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

Political feasibility but low acceptance as additional cost to many stakeholder groups. Considerable implementation efforts due to technological development and installation of physical infrastructure.

5

Subsidies for EV charging, parking, lanes and loading areas

Description

Government-funded free parking and charging for all EVs driving in the ZEA at public parking locations (e.g. metered curbside parking). Applicable for all privately, commercially and publicly owned EVs. Repurposing of existing parking space for expansion of charging infrastructure/EV parking spaces.

Cost for charging at both public as well as private company owned stations directly paid for by the city. No subsidies for installation of charging stations themselves.

Possibly limit subsidy to certain timeframe to drive early adoption of EVs. Potentially increase public parking cost to compensate for lost income from EV parking.

Type of measure

☐ Regulatory ☑ Incentivization ☐ Infrastructure ☐ Urban redesign

Duration of implementation

☑ <1 year ☐ 1-2 years ☐ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

Requirement to get approval for public funds to finance EV charging (and compensate lost parking fee income). Needs agreements with private charging providers to charge city directly.

6

Subsidies for car/ride sharing, micromobility

Description

City to develop and roll-out a concept to subsidize usage of (EV) car sharing as well as active and micromobility (mobility service offers to increase vehicle is utilization).

Possible funding schemes could be full cost coverage for a certain time period, e.g. free usage of all offers for one year via direct payment by the city. Or city issues vouchers for existing and new customers of shared zero-emission mobility providers.

Prominent financial support by the city as well as limited time period of subsidies will trigger mode shift amongst commuters. Offer must be long enough to achieve habituation effect and limit switch back to private non-EV post support.

Type of measure

☐ Regulatory ☑ Incentivization ☐ Infrastructure ☐ Urban redesign

Duration of implementation

☑ <1 year ☐ 1-2 years ☐ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

Requirement to get approval for public funds to finance subsidies. Needs agreements with shared mobility providers for funding schemes.

7

Subsidies for public (zero-emission) transport

Description

City to subsidize usage of public (zero-emission) transport (including busses, tram, subway etc.) for consumers.

Support can either be limited for a certain timeframe with up to 100% absorption of cost, incentivizing commuters to switch from private passenger car to public transport. Or perpetual co-funding, making public transport permanently cheaper and hence more affordable and attractive for consumers in the long run.

Type of measure

☐ Regulatory ☑ Incentivization ☐ Infrastructure ☐ Urban redesign

Duration of implementation

☑ <1 year ☐ 1-2 years ☐ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

Requirement to get approval for public funds to finance subsidies.

8

Reward system to use mobility alternatives

Description

The city to develop a tech-enabled reward system together with local retail in order to encourage consumers to switch to more environmentally friendly transport options.

A possible solution could be an app tracking and awarding points for the trips done with a zero or low emission transport means. The collected points could then for example be exchanged for free items or vouchers valid in local stores.

This approach should be combined with the matching communication campaign to encourage and support commuters to select the most environmentally friendly transport mode[1].

Type of measure

☐ Regulatory ☑ Incentivization ☐ Infrastructure ☐ Urban redesign

Duration of implementation

☐ <1 year ☑ 1-2 years ☐ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

High buy-in from various stakeholders as positive incentive for both consumers as well as local retail. Requires efforts for establishment of collaborations and technical development of connected app.

1. See for example WA State Commute Trip Reduction Programs

9

Subsidies for & financing of EV fleets

Description

The city to provide subsidies or financing schemes to support fleet owners in replacing their ICEs with EVs. This applies to all commercially owned vehicles, e.g. delivery vans, taxis, ride hailing cars, buses, cargo bikes.

Common subsidizing schemes are fixed rate contributions of the government to cover a share of the purchase price per EV. Hight of subsidy is country/ city specific.

Type of measure

☐ Regulatory ☑ Incentivization ☐ Infrastructure ☐ Urban redesign

Duration of implementation

☐ <1 year ☐ 1-2 years ☑ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

High acceptancy amongst key stakeholders such as fleet operators and EV manufacturers. Large public funds required to finance subsidies.

10

City invest: replace all non-EVs

Description

The city to develop and conduct a long-term plan to replace all publicly owned non-EVs with zero-emission vehicles. This mainly applies for public transport, i.e. buses, as well as city-owned fleets of light duty vehicles. Within a case-specific determined timeframe the city will invest in acquisition of the EV fleets and installation of the required charging infrastructure.

Special purpose vehicles and class 6 to 8 trucks are exempt until further technological advancement.

Type of measure

- ☐ Regulatory
- ☑ Incentivization
- ☐ Infrastructure
- ☐ Urban redesign

Duration of implementation

- ☐ <1 year
- ☐ 1-2 years
- ☐ 2-5 years
- ☑ >5 years

Political feasibility & ease of implementation

Long-term and challenging endeavor as it requires very high funds, sound business models for turnover of fleets, extensive construction efforts, multiple stakeholder buy-in and further technological development.

11

Prominent street signs and road markings to encourage ZEA (voluntary)

Description

The city to develop a holistic concept encouraging drivers to support the ZEA voluntarily. Communication via public announcements and most importantly installation of visuals surrounding[1] and within the area. Elements can include street signs, road markings, colored pavements, a „green belt“ (trees and plants) around the area etc.

Encourage mode shift to alternative transport means (e.g., micro-mobility, EV car sharing and public transport), speed reduction, and bypassing of ZEA with non-EVs.

Type of measure

☐ Regulatory ☐ Incentivization ☑ Infrastructure ☐ Urban redesign

Duration of implementation

☑ <1 year ☐ 1-2 years ☐ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

High political acceptance since positive enabler. Fast realization of intervention possible, but lagged impact.

1. Compliance with state and federal regulation needs to be ensured

12

Subsidized parcel lockers for delivery

Description

Installation of parcel lockers across the ZEA by delivery players to reduce vehicle miles traveled of commercial fleets for last mile delivery. Parcels will be delivered to lockers and collected from recipients by foot or bike. Reduced ICE traffic will lead to emission reduction, less road congestion and savings in operating cost for delivery providers. Parcel lockers must be located strategically throughout the area considering case-specific reach of x meter per locker to serve as many customers as possible.

Cities to incentivize logistics firms to install lockers, e.g. by providing suitable locations, and consumers to utilize offer, e.g. via public communication and subsidizing schemes.

Type of measure

☐ Regulatory ☐ Incentivization ☑ Infrastructure ☐ Urban redesign

Duration of implementation

☐ <1 year ☑ 1-2 years ☐ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

Challenge to move delivery players to invest in and accept shared parcel lockers. Willingness to adopt by consumers to be clarified

13

High-frequency public EV shuttles

Description

The city to launch a shuttle service with a fleet of EV mini-vans servicing a large share of the road network within the ZEA. This should complement the public transport offering particularly in the areas currently low-serviced by bus and tram lines. This convenient almost door to door offer should provide an environmentally friendly transit alternative to commute by own car.

City must acquire EV fleet, install required charging infrastructure, plan routes, communicate service and operate shuttles. To promote the service and incentivize switch from individual to public transport the offer can be supported by subsidizing schemes particularly at the beginning.

Type of measure

☐ Regulatory ☐ Incentivization ☑ Infrastructure ☐ Urban redesign

Duration of implementation

☐ <1 year ☐ 1-2 years ☑ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

High acceptance amongst key stakeholders (i.e. consumers) as positive enabler. Large public funds required for both investment and operation.

14

Replacement of parking spaces with public areas/bike lanes

Description

Smart curb management and access granted for EVs to high occupancy lanes in order to incentivize EV transport.

Extension of high occupancy lanes, only on main roads (and freeways), not on smaller residential roads.

Identification and designation of suitable curb space for EV loading only (passenger and goods)

Type of measure

☐ Regulatory ☐ Incentivization ☐ Infrastructure ☑ Urban redesign

Duration of implementation

☐ <1 year ☑ 1-2 years ☐ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

High acceptance amongst key stakeholders (i.e. consumers) as positive enabler. Large public funds required for both investment and operation.

15

Dedicated lanes for high-occupancy mobility

Description

Dedicated high occupancy lanes on all main streets (in addition to freeway, not on residential roads). Measure mainly targeted at occupancy, not at emission reduction.

Allowance for 3 types of transport:

- Electric vehicles
- Ride hailing
- Ride sharing

Type of measure

☐ Regulatory ☐ Incentivization ☐ Infrastructure ☑ Urban redesign

Duration of implementation

☑ <1 year ☐ 1-2 years ☐ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

Neutral, and likely differing between countries and regions – for example, Los Angeles successfully using these types of lanes.

16

Goods tram for urban delivery

Description

Existing tram lines are used to bring packets to central storage location in ZEA from where electric delivery bike are used to perform last mile delivers, packages are included in trams with passengers for deliver during the day and in dedicated trains for bulk delivery overnight

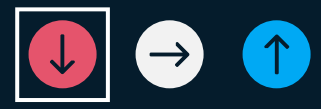
Type of measure

☐ Regulatory ☐ Incentivization ☐ Infrastructure ☑ Urban redesign

Duration of implementation

☑ <1 year ☐ 1-2 years ☐ 2-5 years ☐ >5 years

Political feasibility & ease of implementation

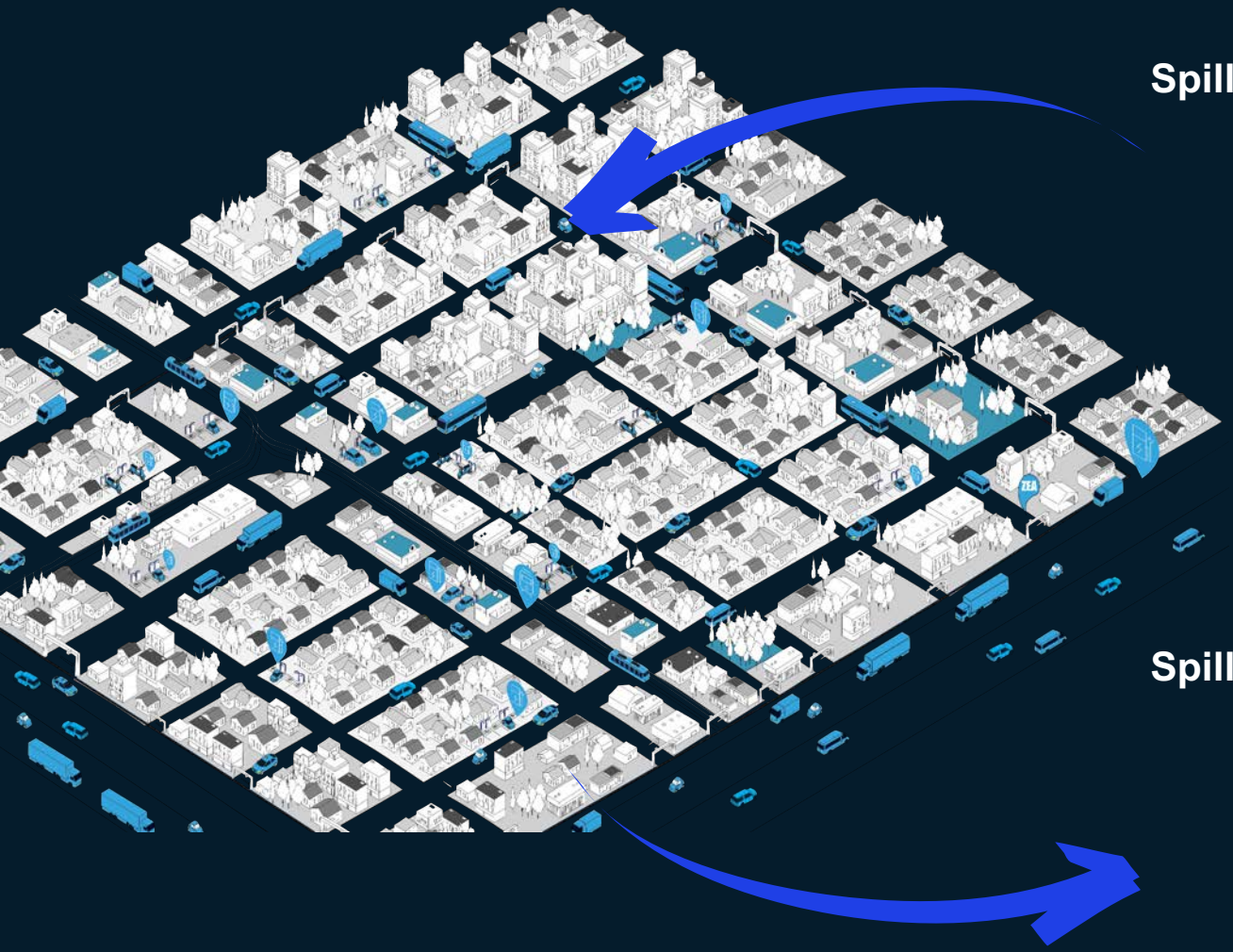


High acceptance among all stakeholder group, but very disruptive to already highly efficient delivery processes of logistics players – Deployment at scale not likely

#8
Quantify and manage externalities

Various potential positive and negative "spillover effects" need to be considered

Illustrative example



Spillover effects **inside** the zero-emission area

Potential gain of new business for local retail due to increased foot traffic vs. potential lost business from reduced commuter traffic

Pressure for automotive OEMs to offer cost competitive EVs but lower transportation cost and increased accessibility for consumers

Initially more complex commutes until efficient multi-modal offering is in place but less congestion once new infrastructure system runs smoothly

New revenue opportunities vs. unclear allocation of costs to different stakeholder groups

Increased quality of living from safer streets, health benefits and increased community life

...

Spillover effects **outside** the zero-emission area

Potentially more traffic and hence increased congestion, higher noise pollution and reduced value of private real estate in areas surrounding the zero-emission area

More affordable private and fleet vehicles from reduced EV prices

Easier extension of zero-emission area

...

#9
Plan transition and timing for each measure

The possibility of implementing measures and transitioning to zero emission mobility needs to be mapped out by cities

Smaller-scale, street-level pilots for testing individual measures, generating quick-wins and generating community buy-in

Barcelona
Superblocks model

Oxford
Red Zone District

Larger-scale ZEAs, putting together individual building blocks of ZEAs, implementing learnings from street-level pilots and developing communities into catalysts and advocates for ZEAs

Amsterdam
Ringroad approach

Target state of comprehensive zero-emission city in which multiple measures are in place

Oslo
Inner city district

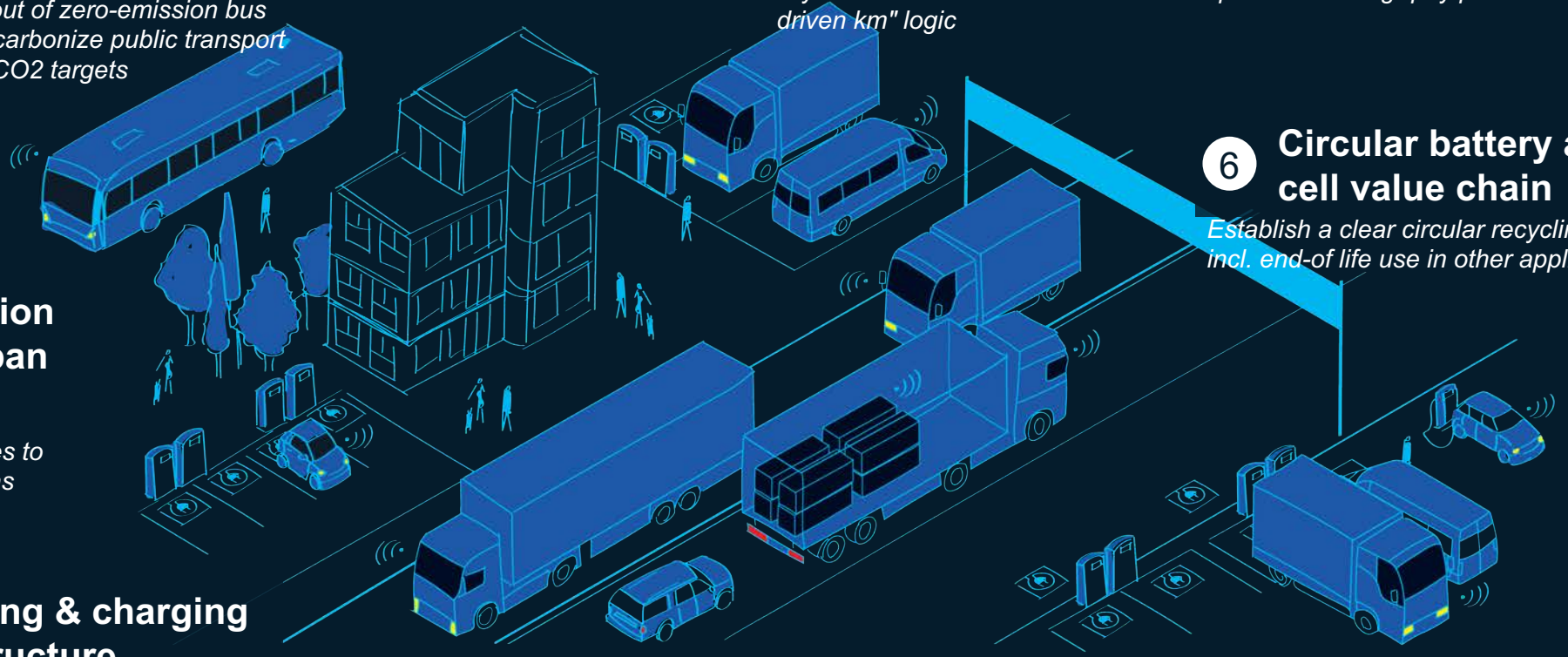
Zero-emission transition finance for different asset classes and zero-emission areas

1 Zero-emission bus fleets

Accelerate the roll-out of zero-emission bus fleets in cities to decarbonize public transport and achieve cities' CO2 targets

7 Zero-emission last mile delivery fleets

Fast-track decarbonizing in light of increased online retail and clean city momentum via new last mile concepts and utilizing "pay per driven km" logic



6 Circular battery and fuel cell value chain

Establish a clear circular recycling value chain incl. end-of life use in other applications

2 Zero-emission areas & urban redesign

Offer funds to allow cities to pilot zero-emission areas

3 Refueling & charging infrastructure

Enable financing of public refueling and charging stations to build the backbone for fast adoption of zero-emission vehicles

4 Zero-emission passenger car fleets

Drive guided adoption of urban zero-emission mobility to achieve faster decarbonization of passenger car fleets, espy. from fleet providers

5 Zero-emission Truck HD fleets

Enable vehicle financing by taking on large upfront invest, thereby pushing vehicles in the market to establish track record and resolve trust issues

#10
Learn from city case studies

With their C40 city affiliation, over 90 cities worldwide have committed to take action in cutting emissions and tackle climate change

47

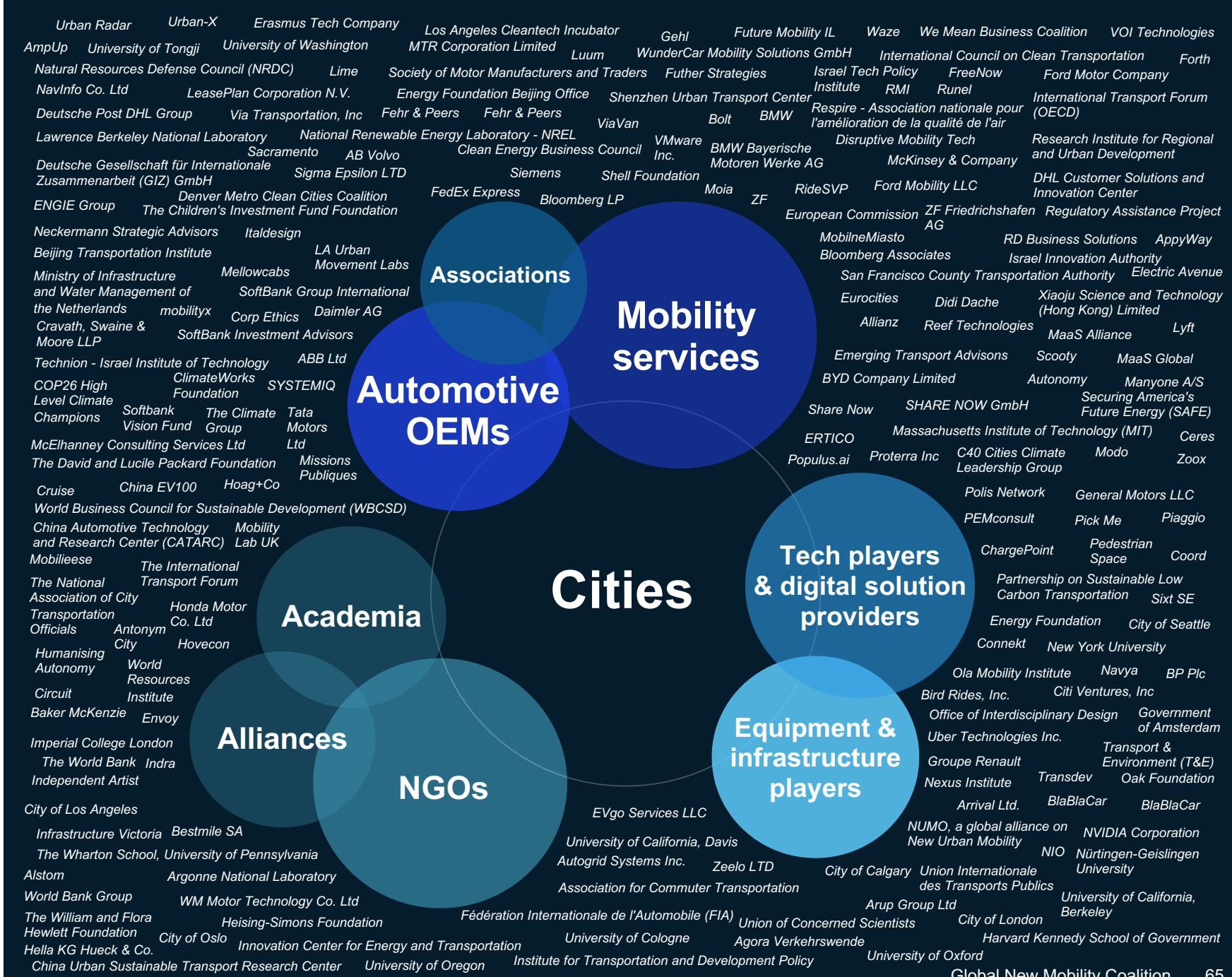
C40 Cities and additional partner cities are actively pursuing mobility related initiatives

C40 CITIES

More information on the C40 Green & Healthy Streets initiative

#11 Learn from GNMC members

Overview of GNMC members and knowledge partners



#12
Ensure community dialogue & buy-in

Community dialogue and support

Why is it important?

- Urban mobility is at a tipping point and is undergoing significant change
- Zero-emission areas are anticipated to be a revolution – not only on a technological level, but also on economic and social ones
- While both public and private stakeholders are preparing the future of mobility, one collective voice remains unheard: the public
- Their input is becoming increasingly essential for the creation of trust in our countries
- Platforms which encourage open dialogue with communities are mission-critical to the success of ZEAs

Examples of successful efforts to engage communities

	What they are	What they do
 MISSIONS PUBLIQUES Bringing citizens into policy	Social entrepreneur with the aim to engage citizens into public sector decision making, for example regarding the technology and safety challenges of autonomous driving and emission-free urban mobility	• Focus groups with community members • Reports to de-mystify techno-logies like autonomous driving and e-mobility • Participation on public dialogue
 SPUR	Nonprofit public policy organization in the San Francisco Bay Area, developing and advocating for ideas and reforms for systems change	• Research and advocacy in the areas of housing, transportation, sustainable mobility economic justice etc.
 FORTH	Nonprofit organization brining together communities, industry partners, utilities, and entrepreneurs to advance electric, smart and shared transportation	• Technology pilots to prove real-world impact and feasibility • Research and advocacy
 CILOLAB CITY LOGISTICS LAB	Dutch city-logistics living lab, focuses on how to achieve zero-emission city logistics through an increase in inner-city logistics efficiency	• Work with hub operators, logistics service providers, and knowledge institutions • Assess the market for urban logistics solutions

Gaining local business support through community reach out is essential for transition success

Source: https://themobilitydebate.net

GLOBAL
NEW MOBILITY
COALITION

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