

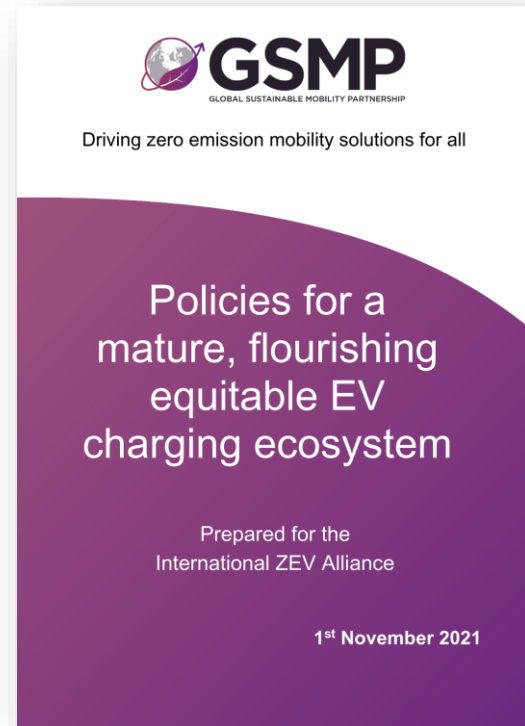
Policies for a mature, flourishing, equitable EV charging ecosystem

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Arnold Clark Innovation Centre, Glasgow

We are pleased to present our report

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- Jeff Allen
 - Executive Director, Forth
- Robert Evans
 - CEO, Cenex
- There will be time for questions at the end as well as over refreshments



GSMP was commissioned by ICCT

- International Council on Clean Transportation
 - Secretariat for the International Zero-Emission Vehicle Alliance
- GSMP



Scope:

- Provide an update on charging deployments and the development of users' needs;
- Describe how different types of chargers can serve the full ZEV market;
- Review charging needs and equity challenges in urban and rural areas;
- Analyse the financial viability of public charging in major markets; and
- Examine emerging solutions for commercial vehicles.

➤ The report recommends possible policies and best-practice for governments

What maturity looks like to users

- The most mature EV charging ecosystems carefully match user segments with charging locations and serve them with appropriate charger types

- Charging locations are private or public

Location	Private		Public			
	Residential	Commercial	Roadside	Destination	Hub	Travel Corridor
Segment	Private vehicles	Fleets & staff	Private vehicles, high mileage local	Private vehicle, rural Long haul	Fleets & staff, high mileage local	Fleets & staff Rural Long haul

	Slow ⚡	Standard ⚡⚡	Fast ⚡⚡⚡	Rapid ⚡⚡⚡⚡	Ultra-Rapid ⚡⚡⚡⚡⚡
Location	Private residential Public roadside	Private residential Private commercial Public roadside	Private commercial Public destination	Private commercial Public destination Public hub	Public hub Public travel corridor

Note for US readers:

- Slow = Level 1
- Standard & Fast = Level 2
- Rapid & Ultra-Rapid =DC Fast Charge

Maturity is supported by key common factors

Maturity is more likely with:

1. Specific government focus in the form of a dedicated Transport or Energy brief;
2. An infrastructure strategy that gives direction and shapes business investment;
3. Targets that flexibly adapt to local nuances to determine charger numbers, types, standards and availability; and
4. Formal consumer representation to ensure advocacy and drivers' voices are heard.

Examples:

1. Transport Canada, Dutch Ministry of Economic Affairs and Climate, Norwegian Ministry of Transport, ...
2. German Programme for Electric Mobility, UK Transport Decarbonisation Plan, ...
3. Ratio of chargers to vehicles, density of chargers, distance between charger on strategically important routes, ...
4. Norwegian EV Association, Electric Vehicle Association Scotland, ...

Policies to ensure mature ecosystems flourish

Barrier:	Policy Targets:
Public charger (un)reliability	Must be guaranteed through technical and contractual means, and be visible to users to build up confidence in the network
Interoperability	Protocols, payment, pricing structures and access must be harmonised within jurisdictions as well as allowing cross-border travel
Lack of coordinated policy	Best-practice must be shared between and across different government levels with clear national expectations for the roles of each party
Electricity network constraints	Significant work must be done to share data, deploy innovative storage technologies, build EV expertise in the network operators, mandate proactive investment to increase capacity, and fund upgrades
Poor business case	Targeted and more consistent funding must be made available to ensure a just and swift transition

- In countries where these are not currently present, these high-level points should be formulated into a policy agenda to underpin the flourishing of the charging ecosystem

Flourishing requires a strong business case

Operating model analysis:

- An Own and Operate approach is best for Roadside charging
- Destination charging works fairly well under any model
- The Concession approach fits best with travel corridors
- Hubs are best-served by a Lease model

NPV analysis:

- The business model improves with charging power but value to the landowner diminishes if Lease or Concession models are used
- Tariff levels have the strongest impact, followed by electricity costs and number of charging sessions
- NPV is least sensitive to number of chargers

Ownership Model	Public Charging Locations				Network Finance and Operation			
	Roadside	Destination	Travel corridor	Hub	Revenue	Risk	Service	Resource
Own & Operate	5	3	3	2	5	1	5	1
External Operator	4	3	3	2	4	2	4	3
Lease	1	4	2	5	1	5	1	5
Concession	1	3	5	3	3	3	3	3

Equality or Equity?

- *Equality* and *Equity* are often used interchangeably but are distinct
- An equity-focused approach aims to ensure people receive what they need to be successful
- This means different responses to different situations



- An equity-focused approach may be more difficult in the short-term but will yield better opportunities and outcomes in the long-term

How to flourish in an equitable manner?

Headlines:

- Expanding access to electric mobility has significant social and environmental benefits
- Chargers have so-far tended to be deployed in more affluent areas
 - For example, cities where EVs are 10%+ of the market are the wealthiest: Palo Alto, Los Altos, Saratoga
- Without public intervention, historically underserved neighbourhoods run the risk of being further excluded

Solutions:

- Community-based needs assessments
- Engaging the community in the development process
- Measure and analyse the results

Goal #1

Increase Access to Mobility

1. Affordability
2. Accessibility
3. Efficiency
4. Reliability
5. Safety

Goal #2

Reduce Air Pollution

6. Clean Air and Positive Health Benefits
7. Reduction in Greenhouse Gases
8. Reduction in Vehicle Miles Traveled

Goal #3

Enhance Economic Opportunity

9. Connectivity to Places of Employment, Education, Services, & Recreation
10. Fair Labor Practices
11. Transportation-Related Employment Opportunities
12. Inclusive Local Business & Economic Activity

Two priority areas to drive equity emerged

Urban Locations

- Private Residential Charging:
 - Focused incentive programmes
 - Provision of information
 - EV-readiness programmes
- Public Hubs:
 - Smoother permissions processes
 - Affordable charging plans for TNC and Taxi drivers
 - Careful location of hubs with subsidies for local residents
 - Co-location with battery swap stations for 2- and 3-wheelers

Rural Locations:

- Streamlined installation process
- Careful location of travel corridor charging to serve local communities
- Co-location of amenities with charging, especially at destinations or tourist attractions

In both cases:

- Accessibility considerations should be considered up-front to ensure all people can use all chargepoints

➤ These should be given particular policy focus in governmental programmes

Commercial Vehicles are a particular challenge

Big benefits to decarbonisation:

- CVs only a small proportion of the vehicle parc
- But emissions account a significant part of greenhouse gases
- Many journeys are urban or local, delivering air pollutants into densely populated areas

Big challenges:

- Commercial vehicles are by definition *commercial*
- If self-motivated, the transition must be economically attractive
- If driven by regulation, must be non-prohibitive in terms of
 - Capital expenditure
 - Operational expenditure
 - Whole-life costs

- Policy-formation will be more challenging in terms of utilising nudge economics to achieve impact when compared with other sectors

Charging barriers and potential policies

Barrier:	Policy Targets:
Low confidence in uptake	Policies must be set to signal the market more strongly about the decarbonisation of CVs, including combined measures on OEMs, utilities and operators to build compelling reasons to switch
Uncertainty in charging technology	Encourage research and development into emerging wireless and catenary solutions and define at a high level the potential role of each solution to give confidence into the market
High infrastructure costs	Ensure finance is available and equitably distributed through grants and investment in CV charging infrastructure
Electricity network constraints	Ensure the evolving role of the electricity network includes alignment with the public charger rollout so that supply is reinforced at key locations
New hidden costs	Consider promoting a parallel CV charging network, including for smaller vehicles that might otherwise be reliant on infrastructure for passenger cars
Lack of infrastructure coordination	Set strategic direction to incentivise the co-location of BET charging infrastructure with that for non-commercial vehicles, to make grid upgrades more cost-effective and enhance the business case

- It is recommended that these are added as a Commercial Vehicle-specific stream to the policy agenda noted before

Any Questions?

The Final Report can be downloaded today from the websites of all the participating organisations

Find out more about GSMP at: www.gsmp.world

