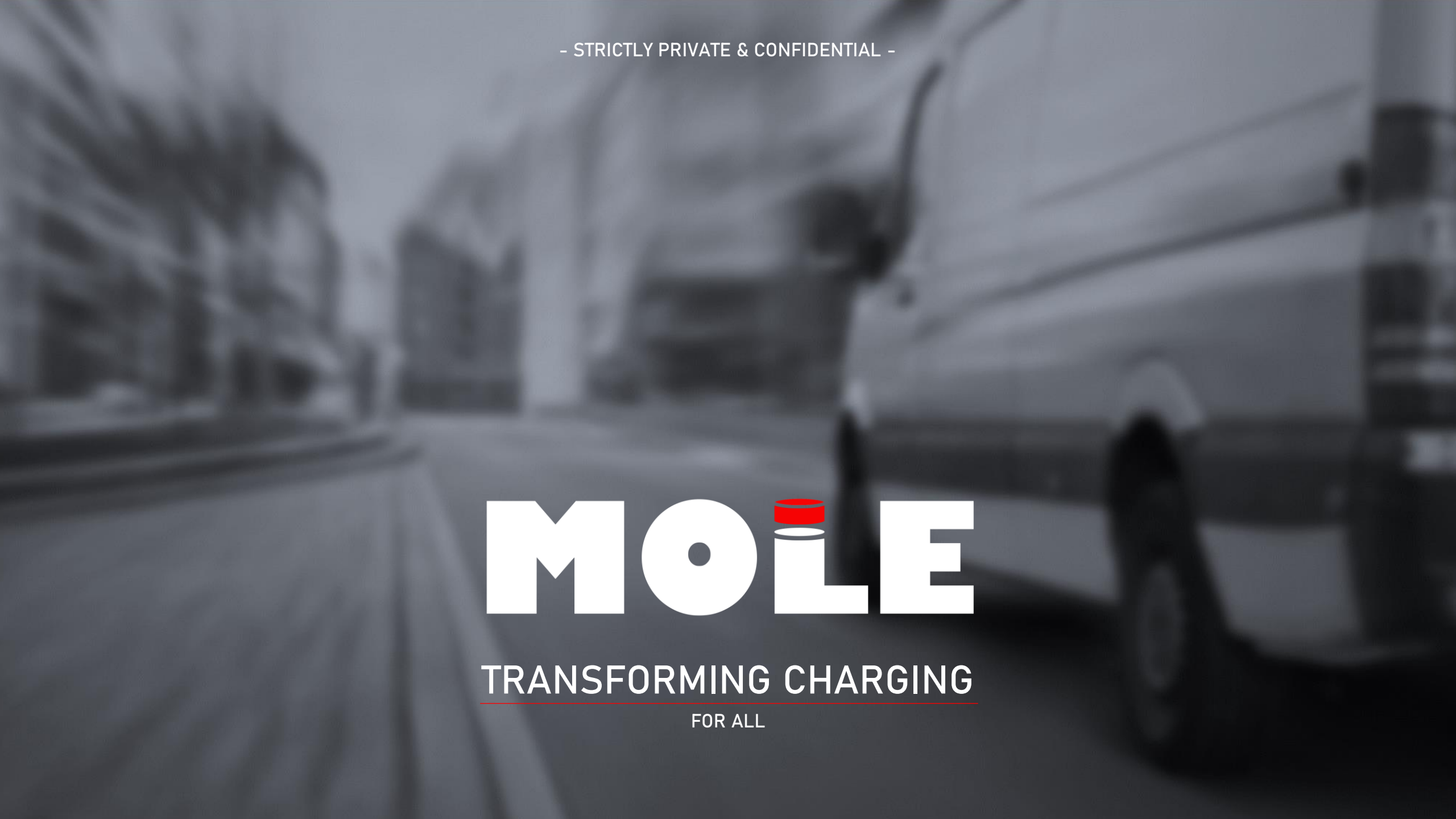


MOLE

TRANSFORMING CHARGING

FOR ALL

About us | British start-up developing autonomous charging

MOLE

AIRBUS

Letter of support

ocado

Indoor trials

ThamesWey

enterprise

Outdoor trials

Devon County Council

RUSHMOOR BOROUGH COUNCIL

Hampshire County Council

SURREY COUNTY COUNCIL

Closed and open trials

Department for Transport

UKRI Innovate UK

Funding and support

enterprise M3

Funding and growth services

TRL

Safety assessment partner

MARKEL

Grant bidding support

SETsquared PARTNERSHIP

Universities of Bath, Bristol, Exeter, Southampton & Surrey

Business and technical support

CARDIFF UNIVERSITY

Electric Vehicles Centre for Excellence

WMG

THE UNIVERSITY OF WARWICK

Intelligent Vehicles Lab

UNIVERSITY OF SURREY

Centre for Automotive Engineering, Global Centre for Clean Air Research, Department of Tourism and Transport

Megatrends | transforming the transport sector

Autonomy

Sustainability

Digitization

Changing consumer behaviours

Refuelling | past and present

The future | A trial by the market

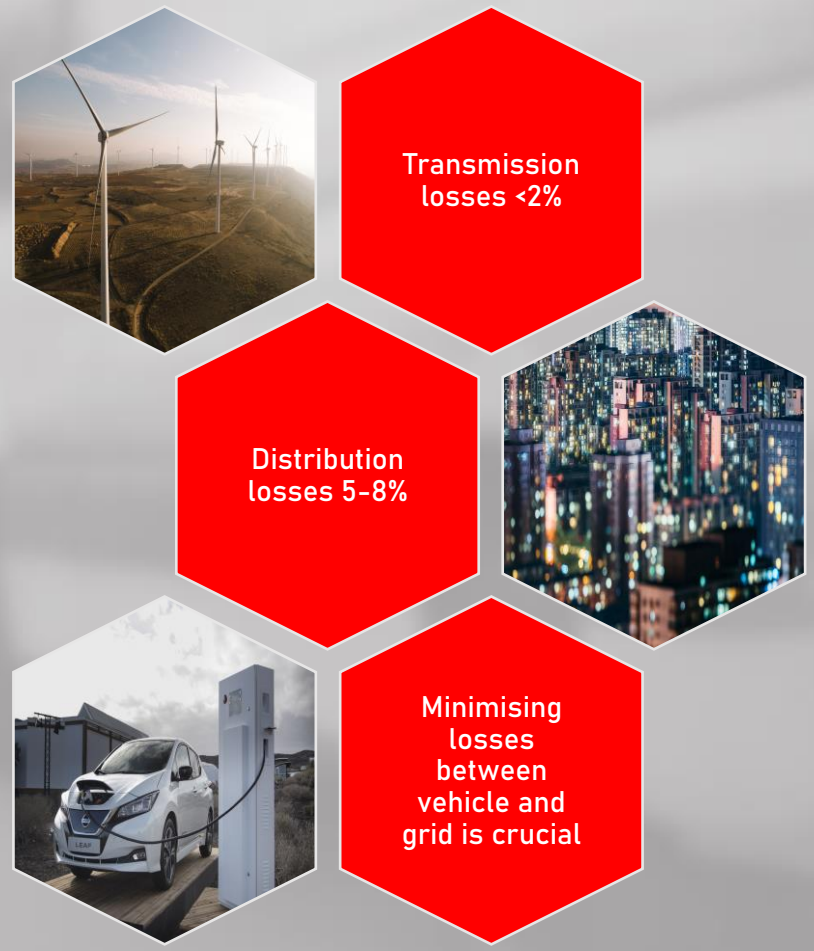
Other disruptors e.g. H2, micro mobility, self-charging, solar vehicles, hyper batteries, UAVs

Opportunities for early movers come with a high risk of investment in obsolescence

Optimal charging | what should it achieve?

Operator Economics | and efficiency

- The CPO business profile has low margins, large and risky investments, little and uncertain demand in the short run
- Infrastructure technology needs to be efficient and scalable to minimise early losses and support rapid scale up
- Inefficient power transfers can erode the economic gains from V2G and positive carbon impacts of decarbonisation through electrification.



Scalability | with minimal obsolescence

- Rapid growth of charging infrastructure needed to support net zero ambitions
- Network constraints mean, capital deployment needs to be tactical
- Overinvesting too early in obsolescent technology will create stranded assets
- Optimal technology will be retrofittable for improvements and new standards, universal compatibility, and be able to support increased demand and supply.

Lamp post charging effective to kick start a network...

...but limited to slow charging, while fast chargers

are hard to deploy at scale without clutter

Reliability | means different things to different users…

- Must run fleets have high costs attached to downtimes
- E.g. vehicle rental fleets, logistics and delivery fleets, emergency service fleets
- Sub optimal infrastructure can cause human errors and operations drag with expensive and risky consequences
- Clutter in these busy, congested and streamlined operating environments is costly

Safety | concerns are greater than range anxiety

- Charging infrastructure and micro mobility encroach walkability in town centres
- Sidewalk clutter affects vulnerable users the most and trip hazards peak during overnight sidewalk charging
- In the work place and for public use greater charging speeds (heavier and hotter connectors) will demand safety measures and costs

Users | come first!

- Automation removes manual involvement in the charging operation
- Taking charging out of a user's responsibility creates an unmatched user experience, and
- Minimal friction to fleet operations
- Minimal spatial impact can be achieved
- Conduction is the most efficient and scalable means of power transfer

The best experience

is no experience!

Which technologies | address the challenges?

Delivery method				
Power				
Clean?				
Reliable?				
Renewable?				
Energy efficient?				
Cost efficient?				
Scalable?				
Hands-free?				
Convenient?				
Safe?	 COVID-19	 COVID-19		
In a word:	Dirty	Clutter	Inefficient	Solution
Ranking:	4	2	3	1

The rise of touchless tech

Current electric chargers = too much clutter

1 In summary

The world's transport needs are changing

Clean air and Net-Zero-Targets now on centre stage

Electrification gathering momentum across the transport system

2 Charging, a major challenge

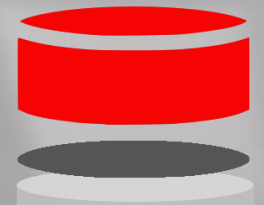
Solutions must be reliable, safe and convenient

Market needs scalable, cost effective and efficient technologies

Operator and consumer needs unmet by first generation manual chargers and wireless chargers

3 The future

of Transport is autonomous



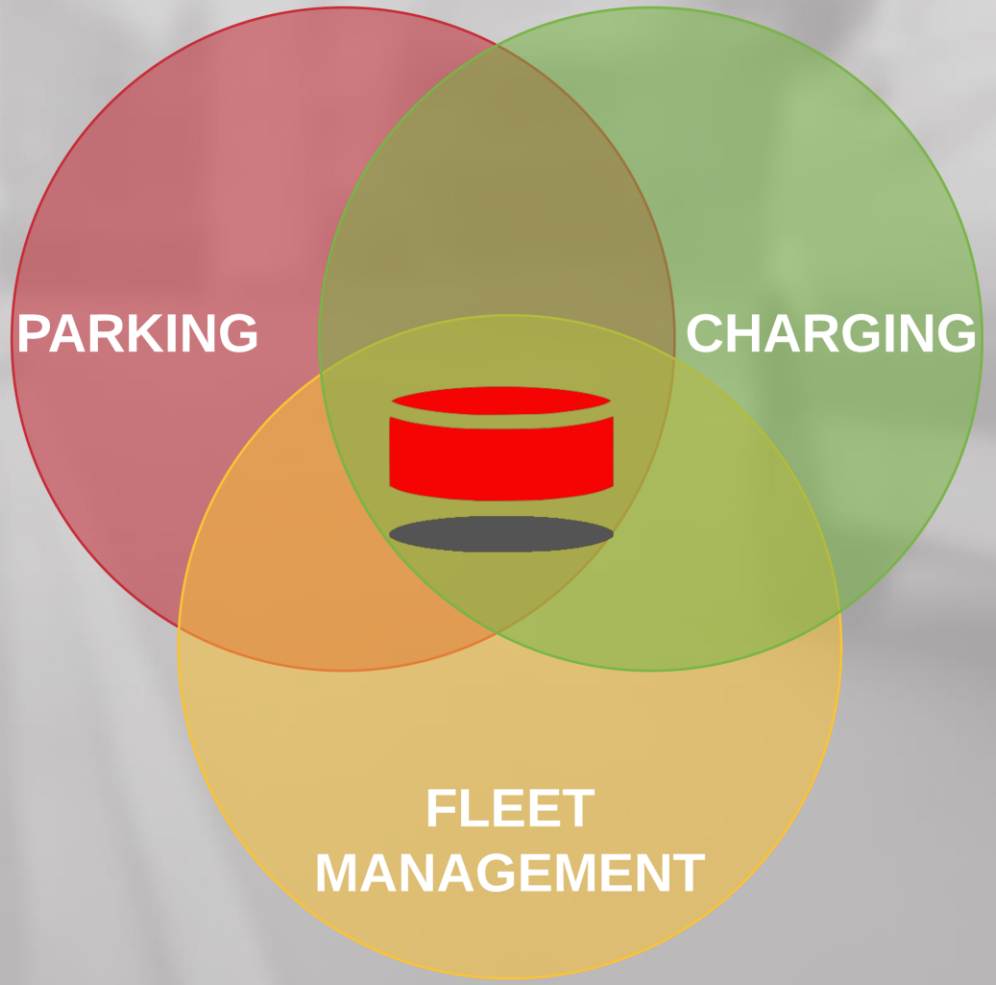
so is the future of charging

make safer,
more efficient,
more convenient,
more scalable

MOLE

enable sustainable mobility

zero emission vehicles,
fleets moving freight
and people,
mobility-as-a-service



MOLE | We would love to hear from and speak with

Early adopter fleets

Installers

Charge point operators

Thank you

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