

Shared electric vehicles for all, globally, now!

ASIA CLEAN ENERGY FORUM 2020

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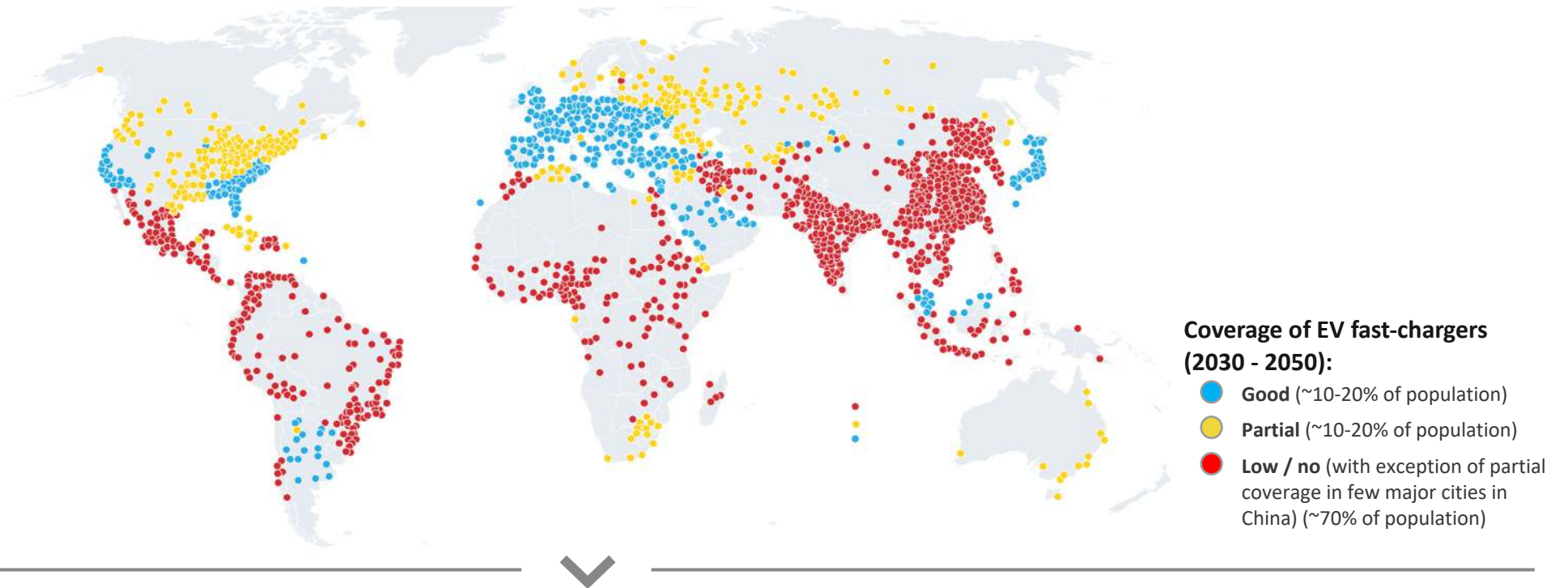


**UNEP Emissions** Gap Report and recent Intergovernmental Panel on **Climate Change** (IPCC) reports show that “**without a worldwide switch to a zero-emissions electric fleet, we will not meet the Paris climate targets.**”

- Rob de Jong, UNEP Head of Air Quality and Mobility

# Limited or no grid for electric vehicle fast-chargers worldwide

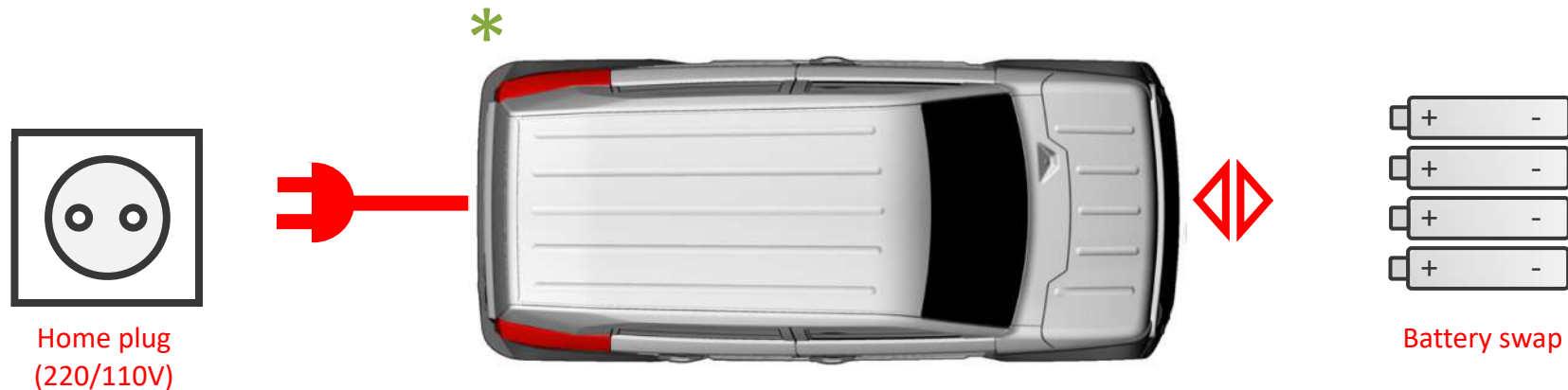
Expected coverage of EV fast-chargers between 2030 and 2050



- **Large-scale buildout of fast-chargers takes minimum 10-30 years and is economically and technically not viable in most parts of the world**
  - ~70% of the world population without access to EV fast-chargers in the next decades
  - Only industrialized countries and few major cities in China will have a decent fast-charger network
- **Due to the limited or missing grid for fast-chargers, there are strong limitations to the roll-out of electric vehicles**

\* Final series vehicle design (preview here) will be presented in August 2020

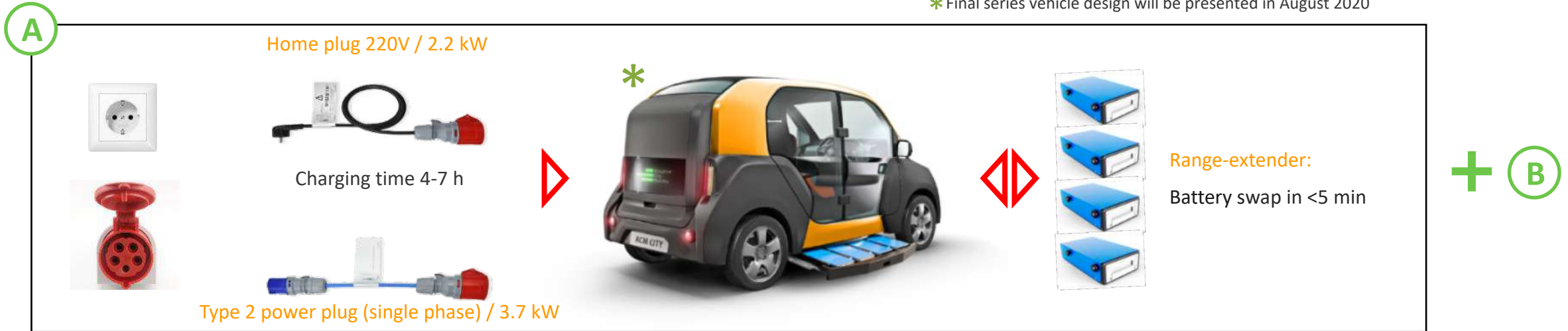
A multi-purpose, connected, electric vehicle that works with the existing energy infrastructure (+ range-extender batteries) to solve the problems of limited range, range anxiety and charging time



ALWAYS CHARGED

# ACM developed a breakthrough solution for mass adoption of EVs using the existing 220/110V energy infrastructure + range-extender batteries

\* Final series vehicle design will be presented in August 2020



## Innovative vehicle design

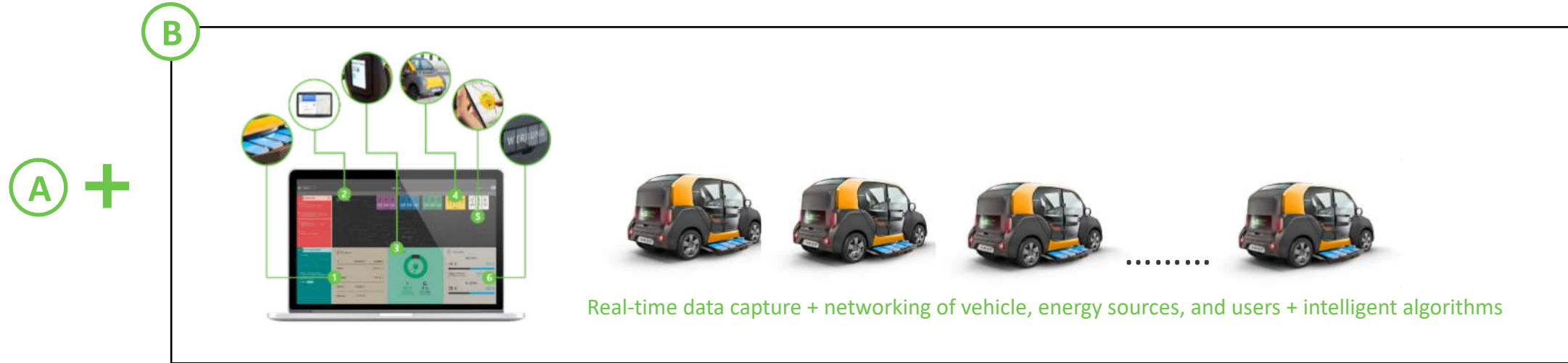
- **Lightweight** vehicle with low power requirement
- **Pure electric multipurpose city vehicle** :  
Passenger-to-cargo conversion, enabling a wide range of use cases like ride-hailing, carsharing and logistics

## Revolutionary energy solution

- Charge with **existing energy infrastructure** (220/110V) in 4-7 h for 200 km+ range
- Manually **swappable batteries to refuel** in < 5 min and extend range by > 100 km
- Operate globally **without fast-chargers**

THE CITY-EV **ALWAYS CHARGED**

ACM developed a fleet data platform that enables fast scaling of fleets, 24/7 energy supply, higher fleet utilization, and value-added services



#### Fleet data platform that enables

- Fast **scaling** of fleets -> Connectivity of vehicles
- 24/7 **energy** supply -> Battery management
- Higher fleet **utilization** -> Fleet management
- **Value-added services** -> Vehicle management, digital advertisement

THE CITY-FLEET **ALWAYS CHARGED**



# ACM offers the cheapest and cleanest km, increased utilization, value-added services, and fast scaling of fleets

## Cheapest km



### Up to 36% reduction of TCO

- Vehicle purchase price
- Operations/maintenance costs
- Energy/fuel costs
- CO<sub>2</sub> certificates costs

## Cleanest km



### 70% reduction of CO<sub>2</sub> emission / zero CO<sub>2</sub> possible

- Compliance with regulations
- “Green” image

## Increased utilization



### Reliable energy supply

- 17–20 h operations without charging
- 24/7 operations possible with battery swap solutions

### Multipurpose vehicle

- Passenger-to-cargo conversion
- Fleet sharing among operators

## Value-added services



### Additional revenues through digital real-time advertisement

- On-board interactive infotainment screen
- Exterior electronic advertisement screen

### Fleet operations cost savings

- Negotiation of preferred rates e.g. repair, insurance, data for connected vehicles

## Fast scaling of fleets

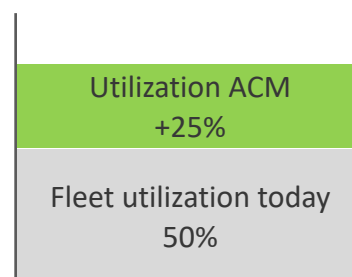
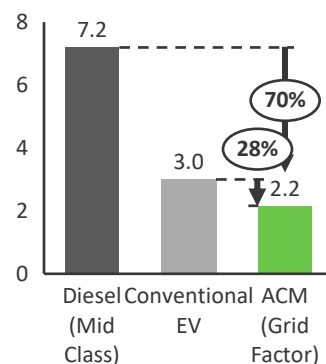
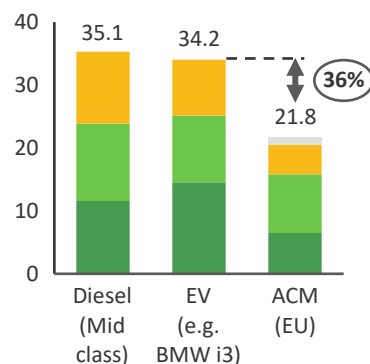


### Operation of large EV fleets through fleet data platform

- Connectivity of vehicles
- Battery management
- Fleet management
- Vehicle management

### Using existing energy infrastructure

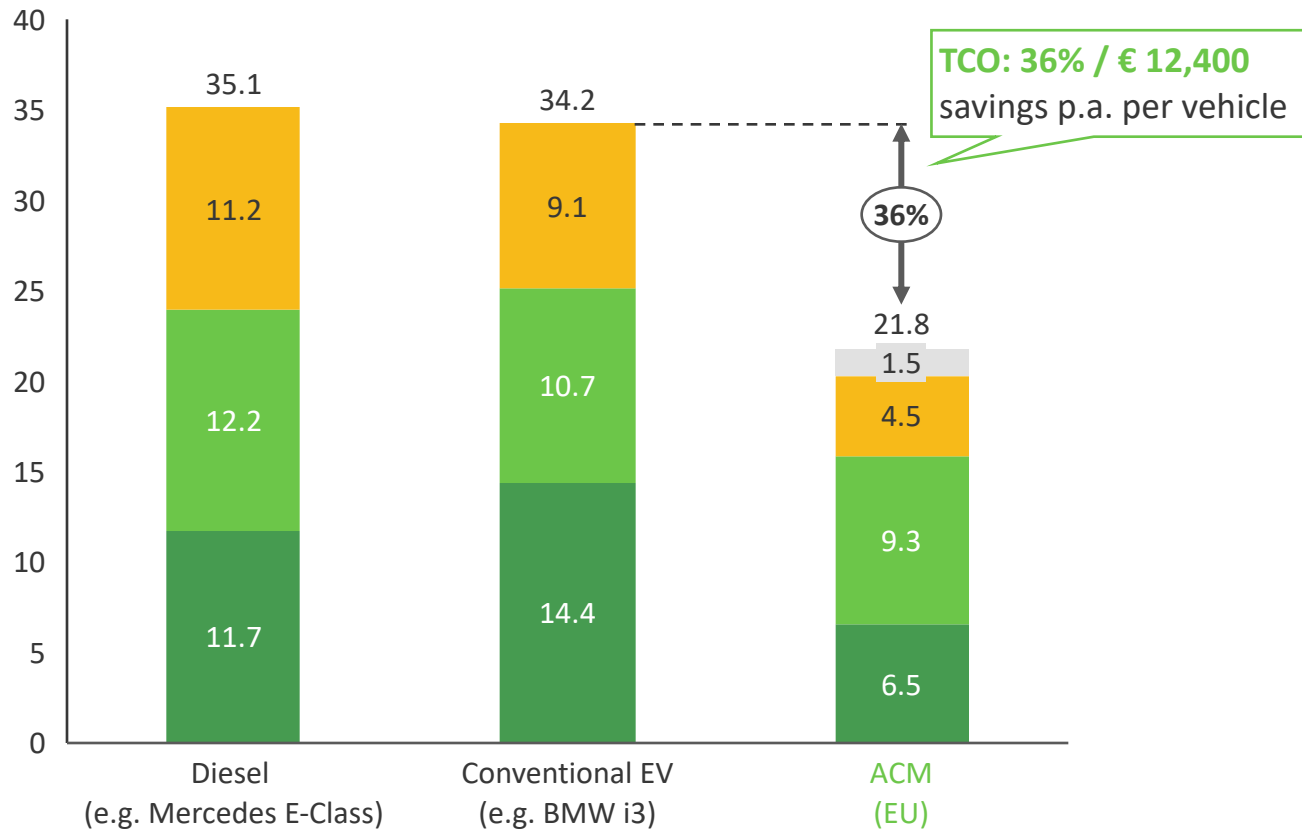
- No range limitations / anxiety
- <5 min charging time with range-extender batteries



# ACM offers the cheapest km: Up to 36% reduction of total cost of ownership (TCO)



Total cost of ownership p.a. (€ T)



## Cost saving potential of ACM vs. conventional EVs

### Charging infrastructure costs

- Conservatively included for ACM (not for conventional EVs)
- Driven by costs for battery swapping

### Energy / fuel costs

- 50% / € 4,600 savings p.a. per vehicle
- Driven by higher energy efficiency & lower cost of CO<sub>2</sub> certificates

### Operations / maintenance costs

- 13% / € 1,400 savings p.a. per vehicle
- Driven repair, maintenance, tax, insurance

### Vehicle purchase price

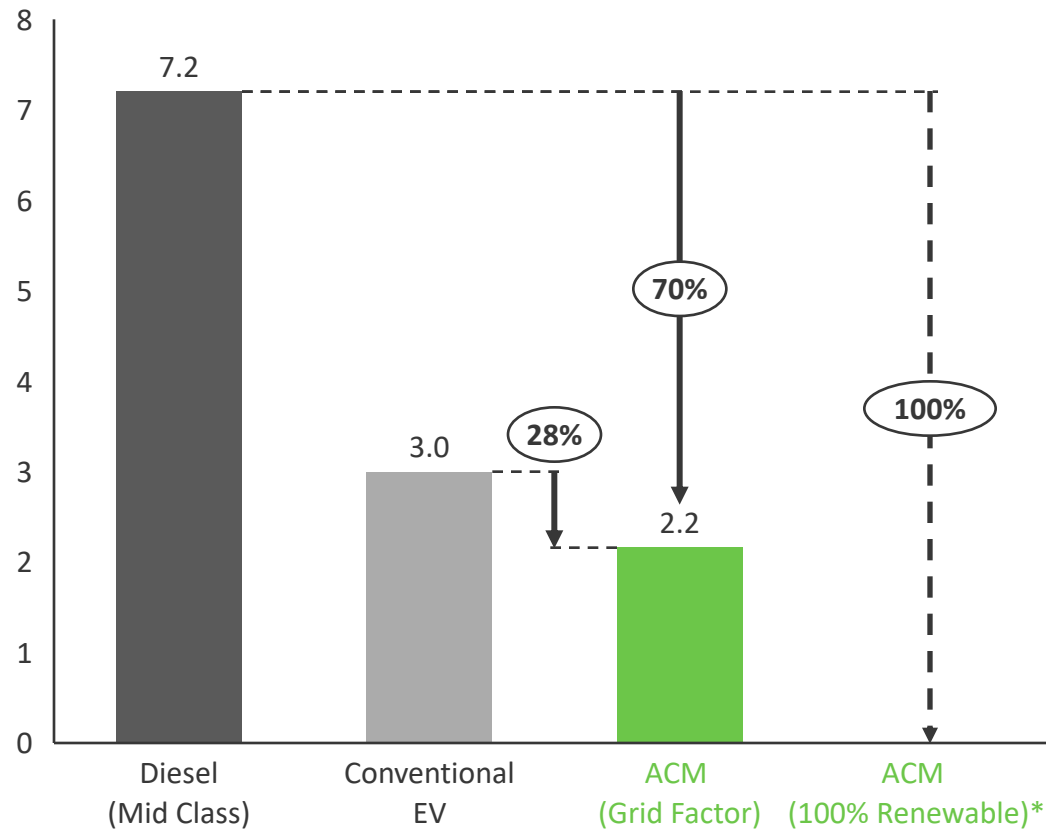
- 55% / € 23,700 savings per vehicle (3-year lifetime)
- Driven by simple product design and low cost production



# ACM offers the cleanest km: 70% reduction of CO<sub>2</sub>-emission / zero CO<sub>2</sub> possible



CO<sub>2</sub>-Emission p.a. per vehicle (t)



## CO<sub>2</sub>-emission reduction of ACM

- **70% / 5 Tonne yearly** vs. Diesel  
(assuming current global average grid factor)
- **28% / 1 Tonne yearly** vs. conventional EV  
(assuming grid factor), due to higher energy efficiency

### Example CO<sub>2</sub> reduction impact (ACM vs. Diesel):

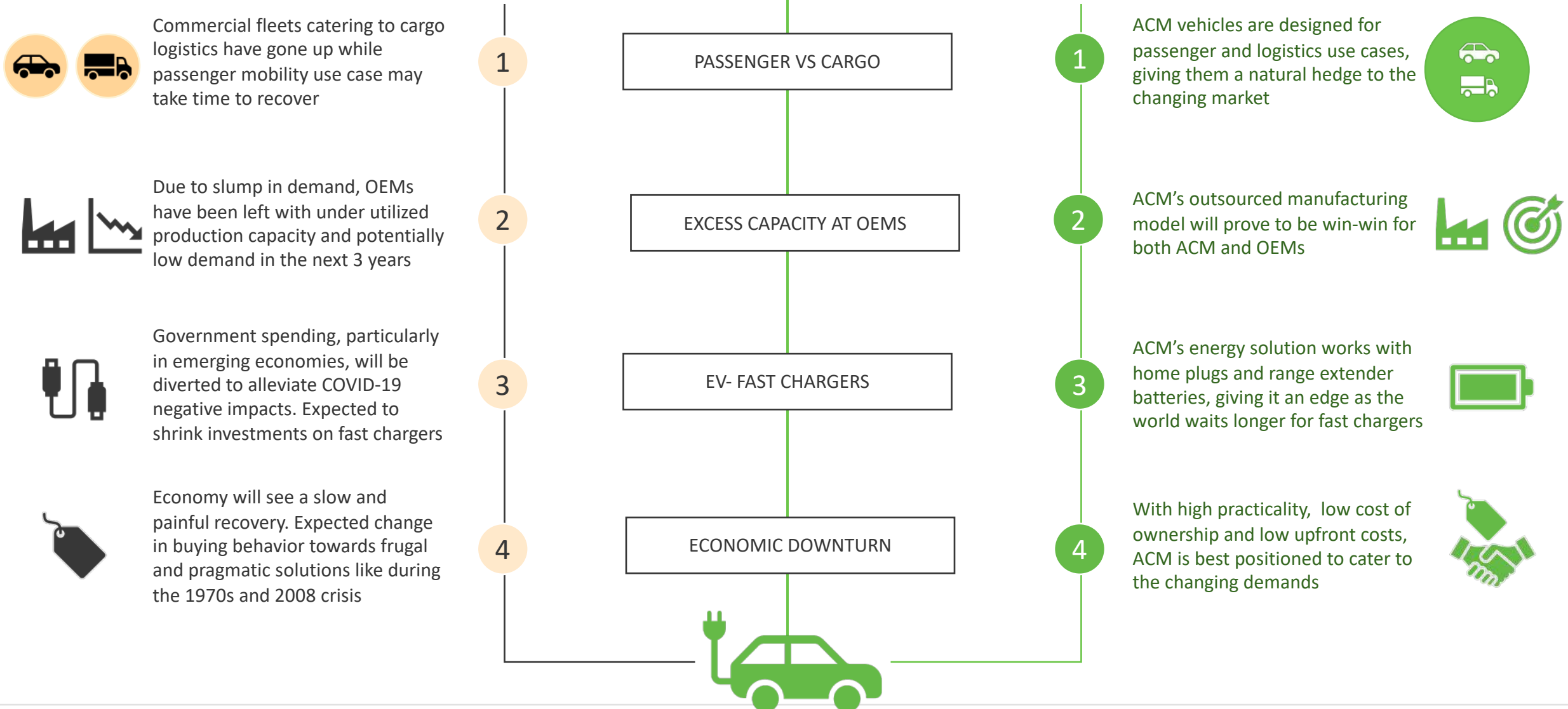
- @ 100,000 vehicles: 500,000 t CO<sub>2</sub>-emission reduction p.a.
- @ 1 vehicle: € 175 carbon savings p.a. (ca. € 35/ tCO<sub>2</sub>)
- Less than 50% embedded carbon/vehicle compared to conventional EVs

\* **Up to 100% reduction of CO<sub>2</sub>-emission possible if batteries charged with 100% renewable energy**

Source: Study "Wirtschaftlichkeit von Elektromobilität in gewerblichen Anwendungen" Öko-Institut, Dialoginstitut, VDE Feb. 2015

# Corona Impact

# ACM response



# Asia Case: India is one of the ideal markets for ACM, with the 10 most polluted cities worldwide

## Tata Motors' President: Bharat Stage 6 norms to make small diesel cars costly, sales to be affected

Posted on April 28, 2019 by CarToq Editor

## India's car sales decline 16% in April, the worst in eight years: Siam

The slowdown has prompted worries among auto dealers, which do not expect the market to improve soon and have called for leaner inventories

Arindam Majumder | New Delhi  
Last Updated at May 13, 2019 21:01 IST

## India has more e-rickshaws than China's e-vehicles fleet

The South Asian nation is home to about 1.5 million battery-powered, three-wheeled rickshaws – a fleet bigger than the total number of electric passenger cars sold in China since 2011.

Bloomberg | October 26, 2018, 10:34 IST

## India approves \$1.4 billion electric vehicle incentive scheme

Economy

Updated Mar 01, 2019 | 00:43 IST | Reuters



The government had set a target in 2017 for all new vehicles to be electric by 2030, but critics said the high cost of batteries and a lack of charging points were major obstacles.

- 10 most polluted cities worldwide in India
- Massive adoption of electric Tuk-Tuks in the past 3 years
  - New norms make diesel cars more costly
  - Lack of viable city cars pushing Tuk-Tuk form factor
  - 1.5 million, unregulated and often dirty-battery based, 3-wheel Tuk-Tuks sold (more than all EVs in operation in China)
- Demonstrated e-fleet demand
  - Fleet operators like OLA constituted e-fleet divisions, but awaiting viable 4-wheeler solutions
  - EV incentive scheme discounts battery costs by 50% (effectively 25% of costs of car + battery)
  - ACM's data platform can help with an integrated solution: Vehicles, energy sources, users/



# Strong political and financial support for ACM from governments and industry players in Germany and Asia



ACM was part of German chancellor's business delegation to India in 2019.....



THEHINDU.COM

**Germany to invest €1 billion for green urban mobility in India**

Germany would also put in €200 million to reform the bus sector in Tamil Nadu...

... where € 1 Bn German-Indian governmental fund for Green Urban Mobility was announced.



German Minister for Economy, Peter Altmaier, with ACM's research car.



eMobility lighthouse project of the German government. Awarded as best German mobility start-up in India in 2017.



ACM receives advice from Sir Ratan Tata, Chairman Emeritus of Tata Group, on optimizing the vehicle for the world market.



# Strong media coverage of ACM

**ET Energyworld.com**  
From The Economic Times

Home News International Economy & Policy Reports & Data Podcasts Webinars

## Germany ready to provide 1 billion Euros to India for green urban mobility

India and Germany on Friday agreed to provide financial support to climate initiatives aimed at reducing greenhouse gas emissions, with the latter expressing its readiness to provide one billion euros to India for green urban mobility.



**SPIEGEL ONLINE** SPIEGEL

Menü Politik Meinung Wirtschaft Panorama Sport Kultur

## Innovations from the first floor

[...] The ACM project includes **not only vehicle and charging technology, but also a communication platform** that enables the mobile to be shared. And it includes a sales concept that operates the ACM fleets, ensures a Co2-neutral energy supply as well as **maximum capacity utilization** through Car-Sharing. [...]

**WirtschaftsWoche**

## German consortium develops mini-taxi with replaceable battery

[...]The lightweight vehicle made of carbon is intended to **open up completely new avenues for competitive electric mobility**. The little speedster is to be used in urban areas. In a Car-Sharing fleet it will contribute to the **reduction of toxic car exhaust fumes** in inner cities and **fill the niche of urban and electrically powered lightweight vehicles** in the field between passenger cars and two-wheeled vehicles. [...]

**Auto Bild**

## SMARTE ALTERNATIVEN

WirtschaftsWoche

**Wechseln statt laden**

ACM steht für "Adaptive City Mobility", und "Adaptiv" ist ein Hinweis auf das Konzept der intelligenten, flexiblen und sich anpassenden Mobilität. Die Idee ist, dass die Fahrzeuge in der Stadt nicht nur als Transportmittel, sondern auch als Teil der urbanen Infrastruktur gesehen werden können. Die Fahrzeuge sind so konzipiert, dass sie in der Stadt nicht nur als Transportmittel, sondern auch als Teil der urbanen Infrastruktur gesehen werden können. Die Fahrzeuge sind so konzipiert, dass sie in der Stadt nicht nur als Transportmittel, sondern auch als Teil der urbanen Infrastruktur gesehen werden können.






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