VOLVO SUSTAINABILITY VISON

Stefan Widlund, City Mobility Director, Volvo Buses

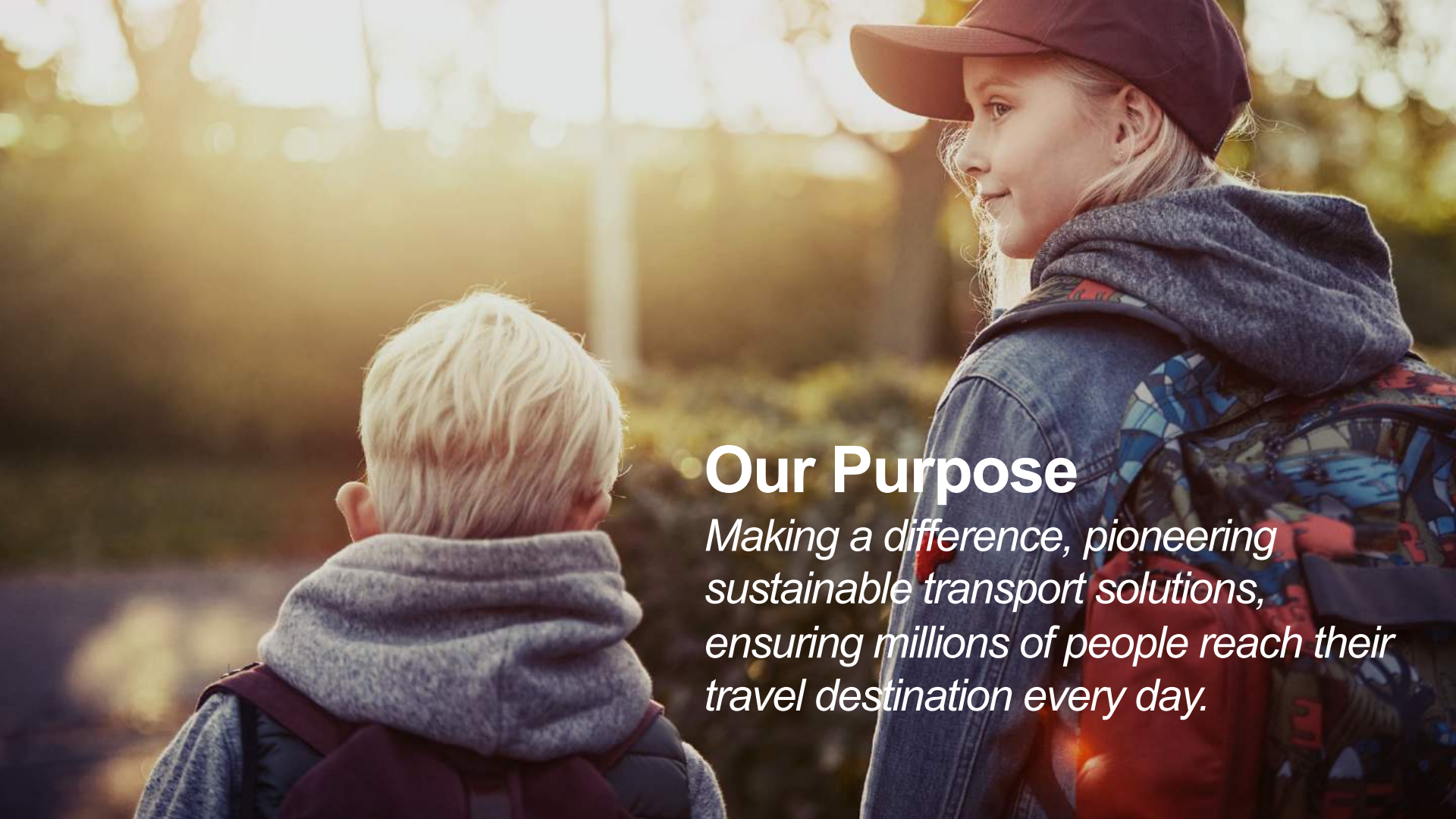
What we do in the Volvo Group

ON THE ROAD
Our products help ensure that people have food on the table, can travel to their destination and roads to drive on.

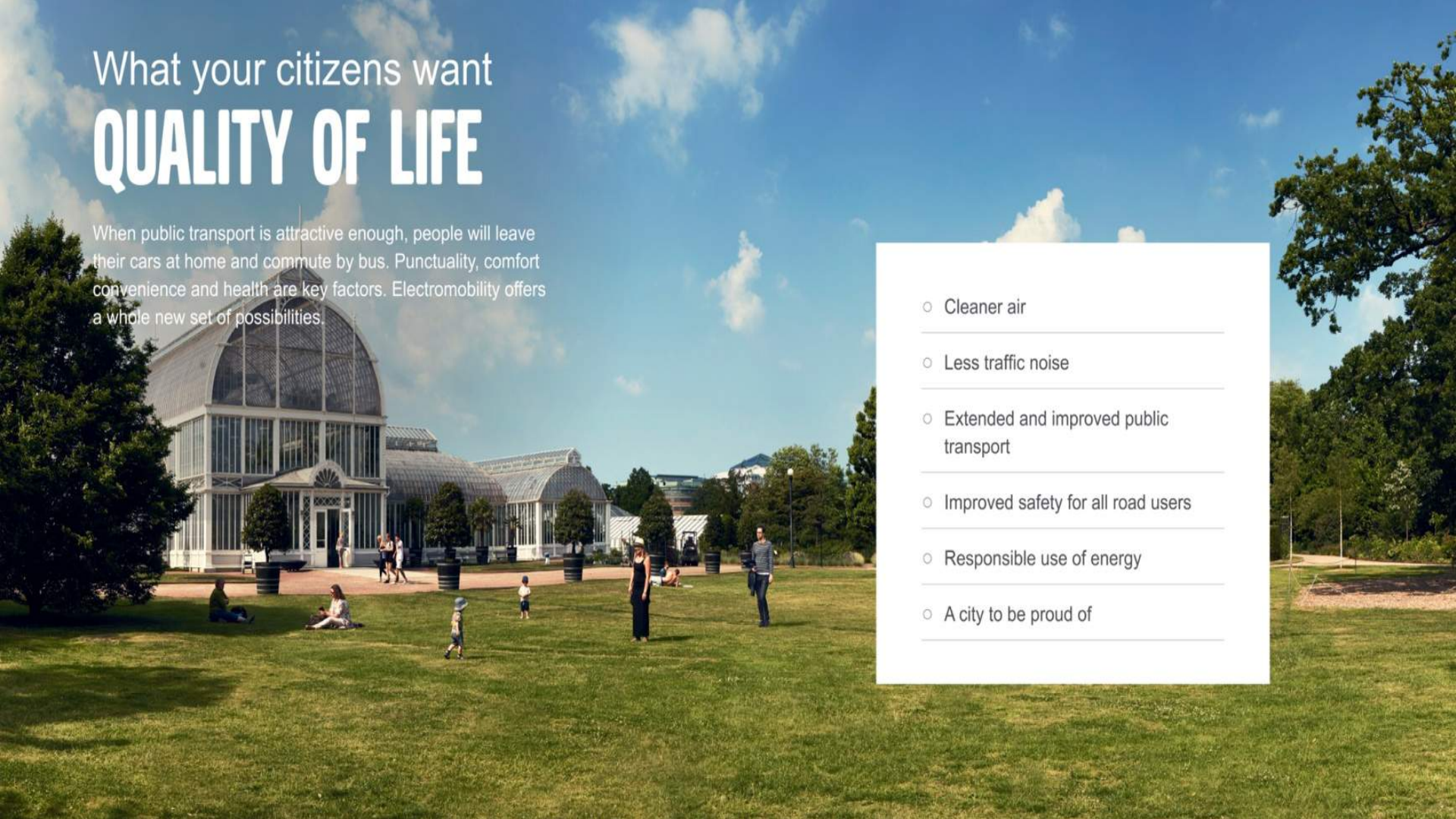
IN THE CITY
Our products are part of the daily life. They take people to work, distribute goods and collect garbage. We are developing tomorrow's public transport solutions.

AT THE SITE
We contribute to the extraction of some of the world's most important raw materials. Our engines, machines and vehicles can be found at mining and construction sites and in the middle of forests.

AT SEA
Our products and services are with you, regardless of whether you are at work on a ship or on holiday in your pleasure boat.


Our Purpose
Making a difference, pioneering sustainable transport solutions, ensuring millions of people reach their travel destination every day.


GLOBAL CHALLENGES CHANGING PUBLIC TRANSPORT AND URBAN PLANNING
Demographic growth
Urbanisation
Local conditions of air quality, noise, traffic congestion and road safety
Climate change
Resource scarcity



What your citizens want

QUALITY OF LIFE

When public transport is attractive enough, people will leave their cars at home and commute by bus. Punctuality, comfort convenience and health are key factors. Electromobility offers a whole new set of possibilities.

- Cleaner air
- Less traffic noise
- Extended and improved public transport
- Improved safety for all road users
- Responsible use of energy
- A city to be proud of

Three disruptive technologies

Impacting urban planning and public transport

Electromobility

- Superior energy efficiency
- Reducing CO_2 emissions
- Significantly improved air quality
- Reducing noise
- Public transport closer to people, around the clock and indoors

Connectivity

- Zone Management for safety and environment
- Pedestrian warning system
- Preventive maintenance

Autonomous

- Driver Support Systems
- Cost-efficient Depot Operations
- Safety improvements from Bus Stop Docking
- Productivity increase from Platooning
- Research tests and Demos in Gothenburg and Singapore

Pioneering sustainable transport solutions

Electromobility proposition

A complete offering with flexibility and range

FULL HYBRID BUSES

- 30-40% Fuel reduction
- Silent take-off
- 40% lower on road emissions
- Improved passenger capacity

* With CO_2 neutral electricity

ELECTRIC HYBRID BUSES

- 75% fuel & 60% energy reduction
- Electrical drive 70% of route = silent
- 75% CO_2 reduction*
- Charging 3-6 min at end stations

ELECTRIC BUSES

- 80% energy reduction
- Electrical drive 100% of route = silent
- No local exhaust emissions
- 99% CO_2 reduction*
- Charging 3-6 min at end stations

COMPLETE TURN-KEY SYSTEM

- Buses
- Depot charging (CCS)
- Fast charging (OppCharge)
- Premium services
- Battery charged by km
- Competitive Life Cycle Cost

Moderate growth of electricity consumption

Electric buses in perspective

1 windmill

Energy for 250 electric buses*

* 1 Windmill @ 5 MW and 4.000 h/yr => 20 000 MWh/yr
1 Bus á 60.000 km/yr och 1,2 kWh/km = 250 busses/windmill

Holistic lifecycle perspective on batteries with a second life and recycling

- Batterier from buses on route 55 are used for storing electricity from solar power in housing blocks
- 130 apartments in a sustainable living program (Viva) with builder Riksbyggen, inaugurated 2018
- Battery storage with a 200 KWh electricity capacity
- Reaserach program with local power utility Göteborg Energi, Riksbyggen, Volvo and Johanneberg Science Park

Making the city quieter

Source: Sustainable city – open to the world, Trafikkontoret, Göteborgs Stad

Connectivity for enhanced safety

Innovative technology applications

- Zone Management for speed limitation etc.
- Sensoring with pedestrian and cyclist detection warning
- Safety systems for driver assist, such as Volvo Dynamic Steering (VDS)

Autonomous leadership

A game changer for bus operator efficiency

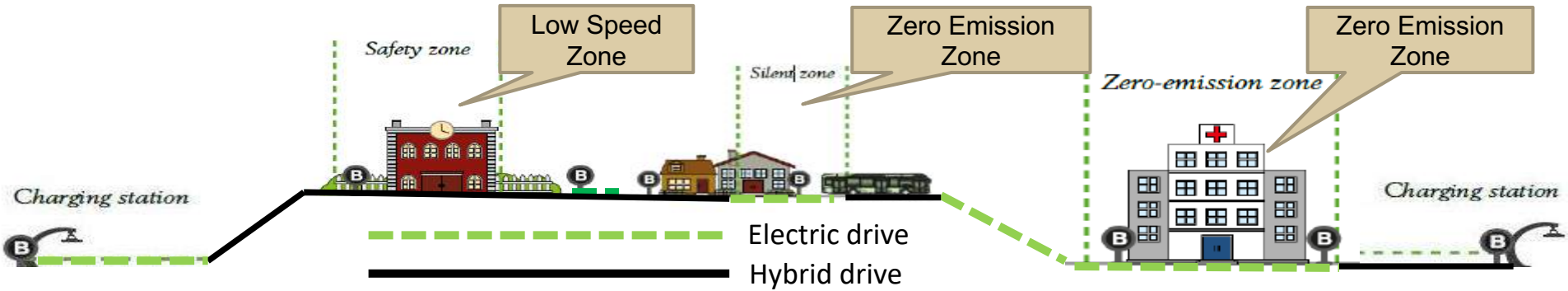
- Gothenburg autonomous electric 12m bus demo at Volvo Ocean Race
- Autonomous In-depot operations
- Autonomous driver assistance, bus stop docking
- Automomous driving in confined areas

Video

Electric buses enable smart City Zone Management

Terminal | **School** | **Residential Area** | **City Centre**



Creating new opportinities for urban planning

Indoor bus stops in public spaces

Volvo Buses

Providing significantly improved working environment for drivers

Electrification gives:

- Reduction of vibrations
- Reduction of noise

=>Decreasing tiredness of drivers and improved health

Volvo Dynamic Steering (VDS) gives:

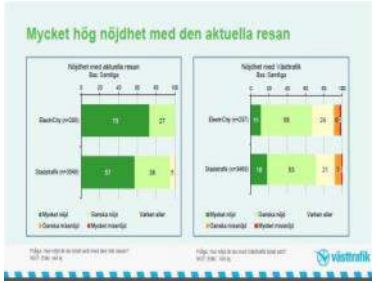
- Further reduction of vibrations
- Reduction of steering force

=>Decreasing tiredness of drivers and improved health

Electric buses are attractive

- **72% of passengers** says **renewable energy** and renewable diesel is a reason they choose route 55
- 80% of the passengers appreciate the **free wifi** on the buses and at bus stops
- 32% of passengers are **willing to pay a premium** fee for an electric bus
- 3 out of 4 passengers appreciate the **USB chargers** onboard
- 9 out of 10 passengers appreciate the **indoor bus stop** at Lindholmen

Västtrafik survey of route 55 in Gothenburg Q1 2016



A cooperative city mobility approach

Mayor offices, authorities, utilities, operators and bus system providers coming together

MAYOR OFFICES
Decide high level targets

Value less noise and emission free drive

PUBLIC TRANSPORT AUTHORITIES
Issue tenders

Value increased passenger volume and satisfaction

POWER UTILITIES
Provide electric infrastructure

Value stable power supply and return on capital

BUS SYSTEM PROVIDERS
Provide electromobility system solutions

Value driving prosperity and quality of life, while enabling mutual commercial success

BUS OPERATORS
Purchase buses, sometimes also maintain buses

Value reliability, low cost and low complexity

Leading the way in Bus Rapid Transit (BRT) systems

High-capacity buses running in dedicated lane systems

- Over 5,000 Volvo buses operate in BRT applications
- First systems in Curitiba at the end of the 1970s
- Now also including South America, Asia Pacific and Africa

Travelling into the future. Together


VOLVO