



Dopravní podnik hl. m. Prahy,
akciová společnost

Prague Public Transit Co., Inc.

Prague E-bus Projects and Strategy of Renewal Bus Fleet



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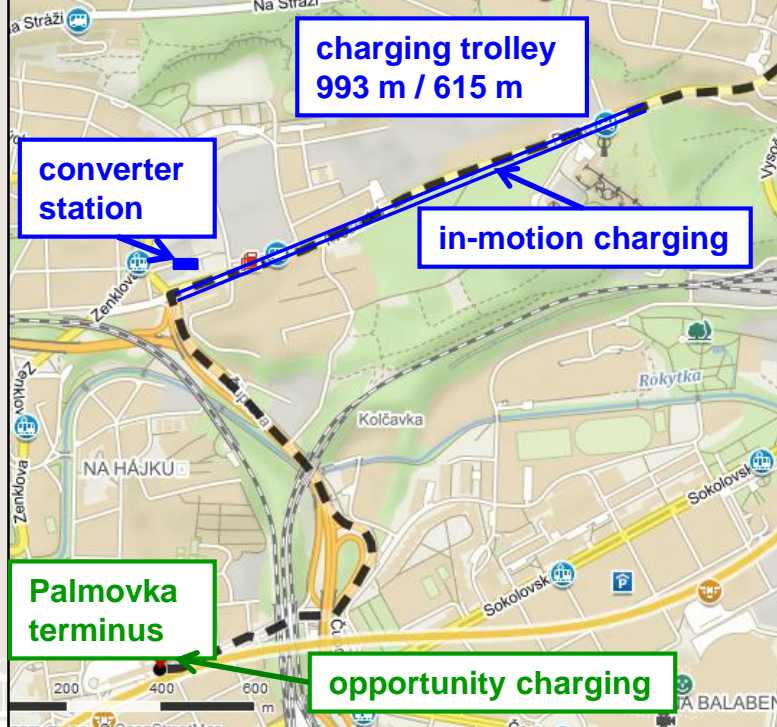
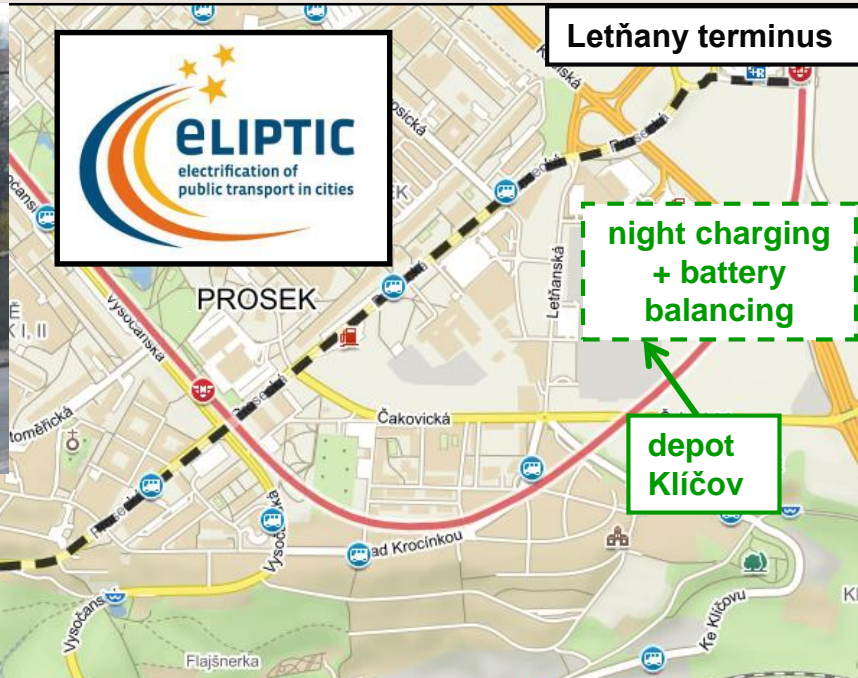


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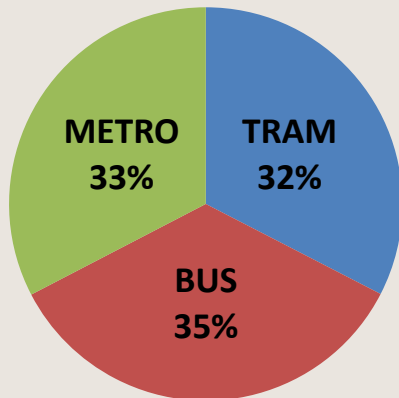
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In-motion charging – pilot (since 10/2017)

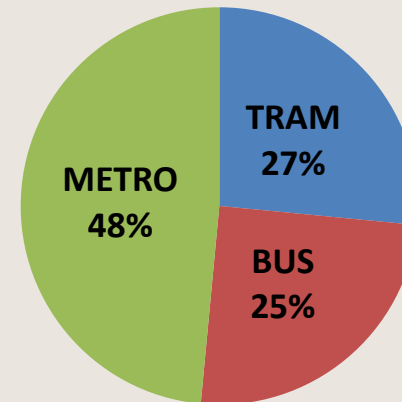


Prague public transport modal share

178 million
vehicle km / year



1,3 billion
passengers / year



e-mobility today (metro + tram)

65% vehicle km / 75% passengers

1.200 bus challenge

62 million km / 30 million liters diesel

Prague emission requirements

- **Clean Vehicles Directive (2009/33/EU) revision 2019** – requires purchase clean vehicles and zero emission vehicles (following limits of EU member countries) – *trolleybuses must be included as ZEV*
- **Climatic Commitment of Prague** – requires in 2030 reduction CO₂ emissions at least by 45% (compared to the year 2010)



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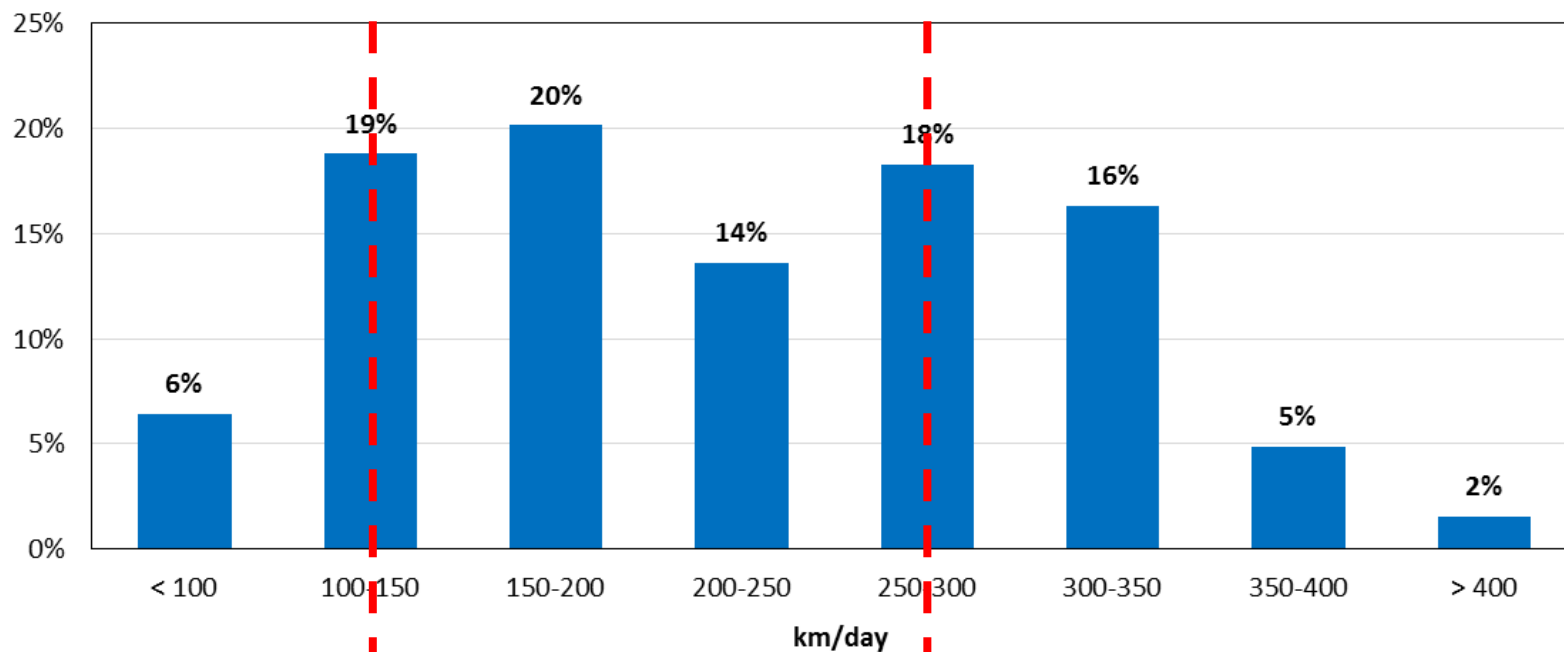
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Prague Strategy of Renewal Bus Fleet

- **Alternative Propulsion Strategy for Bus Operation in DPP** – provides possible scenarios for purchase new buses (2020-2030)
- DPP bus fleet – 1200 buses, renewal plan – 120 buses / year
- Expected propulsion combination:
 - E-Bus (bipolar) – opportunity charging from tram or trolleybus energy supply network – approx. 13%
 - E-Bus (four-pole) – opportunity charging from public distribution network or metro network – approx. 4%
 - Battery T-Bus (in-motion charging) – new energy supply network, synergy with tram network – approx. 13%
 - Hybrid (1st step normal hybrid, 2nd step plug-in hybrid) – for normal hybrid no need of charging infrastructure and 20-25% CO₂ savings – approx. 25%
 - Diesel Euro 6 – remaining part of bus fleet renewal – approx. 45%
 - Other alternatives – possible test operation – H₂, BioCNG
- Target: satisfy emission requirements and optimize cost increase

Prague e-bus possibilities

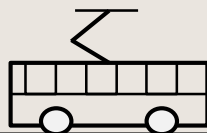
DPP bus operation - daily mileage variation



overnight
charging



opportunity
charging



in-motion
charging



Prague e-bus requirements

High energy demand

- full day operation (4:30 – 0:30)
- heavy passenger demand
- hilly landscape
- zero emission solution (electric heating, A/C)



Cost pressure (TCO)

- lack of additional funds
- competition in bus operation

- ➔ maximize performance
- ➔ minimize infrastructure costs



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Supply infrastructure – internal synergies

Synergies to tram / metro operation

- Multimodal energy purchase
- Share energy supply infrastructure
- Share energy management
- Recuperation energy from trams
(summer up to 25%, winter 2-5%)
- Share knowledge and experience



143 km tram network

41 substations (22kV->600V)

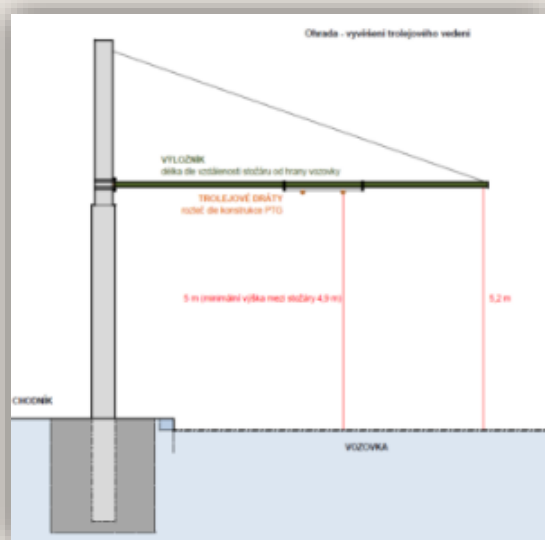
1623 km DC cables

122,75 MW reserved power
advanced e-management



E-Bus Projects

- **Purchase of 14 pieces bipolar E-bus (12 m)**, opportunity charging at metro station Strašnická and Želivského and night charging at bus-depot Vršovice – expected 2020
 - synergy to tram supply network



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E-Bus Projects

- **Purchase of 5 pieces four-pole articulated E-bus (18 m),** opportunity charging at metro station Nové Butovice and night charging at bus depot Řepy – expected 2021-2022
- synergy to metro supply network (pilot project)



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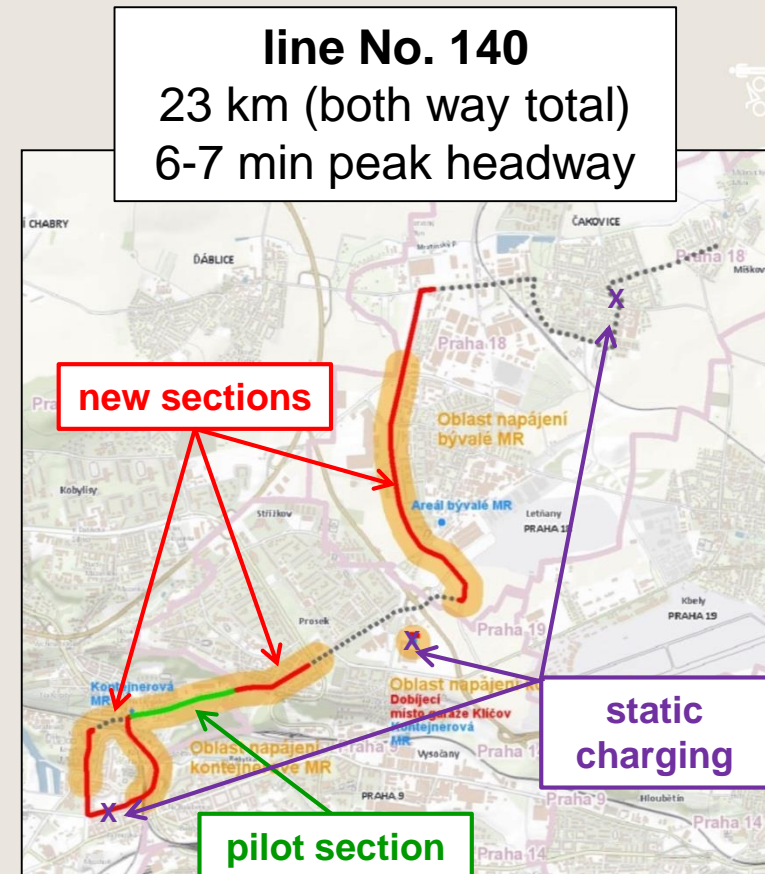
In-motion charging – bus line 140

Infrastructure (750 V DC)

- in-motion charging ratio 45%
- 3 changing stations
 - 2x sections + 1x depot
- opportunity (static) charging
 - 2x terminus
- depot charging and balancing
 - short wire sections on gate

Vehicles (articulated 18 m)

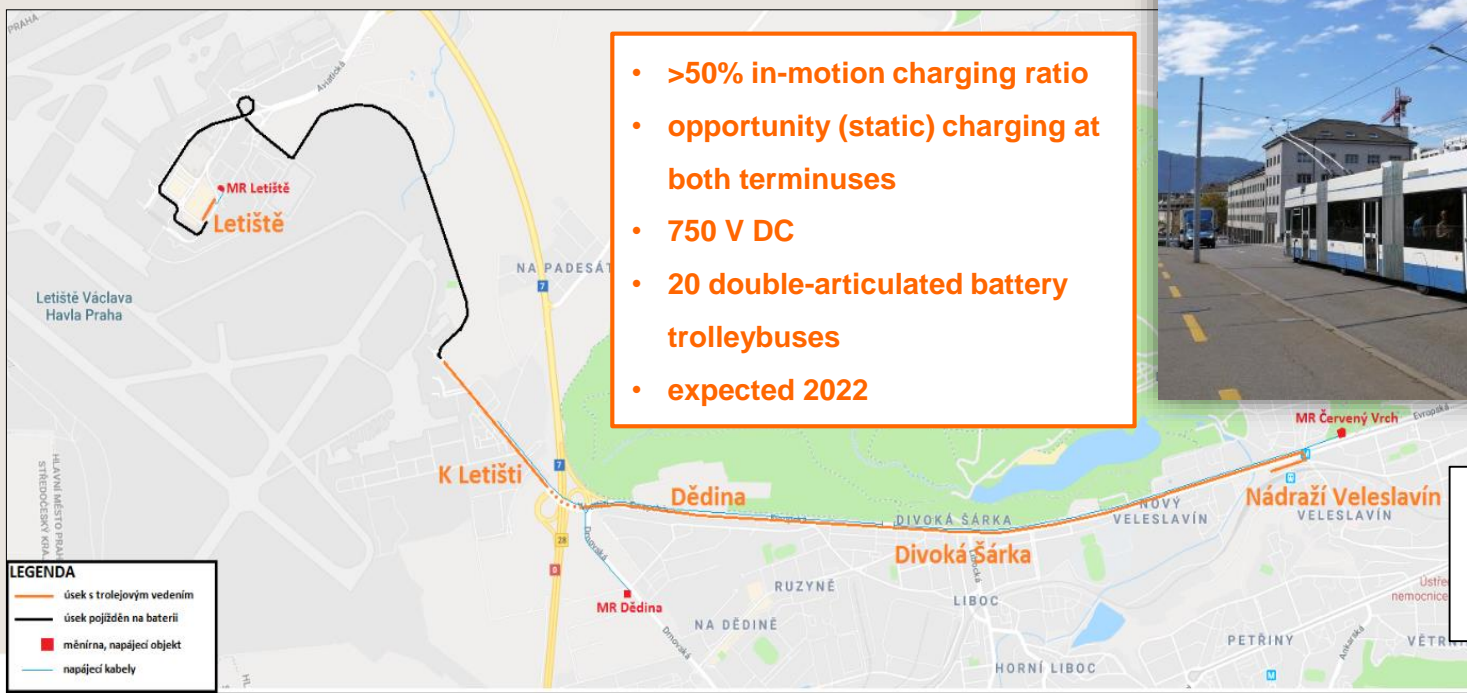
- 15 vehicles, battery parameters will depend on results of public tender for vehicles



in building permission process
operation expected 2022

In-motion charging – bus line 119 (airport)

- Prague Airport – continuing increase of passengers (2018: 16,7 mil. passengers)
- Rail connection – target solution, very long and complicated process with many changes in project (realization 10+ years)
- Bus connection (line 119) is extreme busy (peak headway 3 min, articulated buses) → more capacity required (double-articulated buses → IMC battery-trolleybuses)
- Temporary solution until rail connection opening – project included further infrastructure and vehicles use



line No. 119
18 km (both way total)
3 min peak headway



**Thank you for
your attention**

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