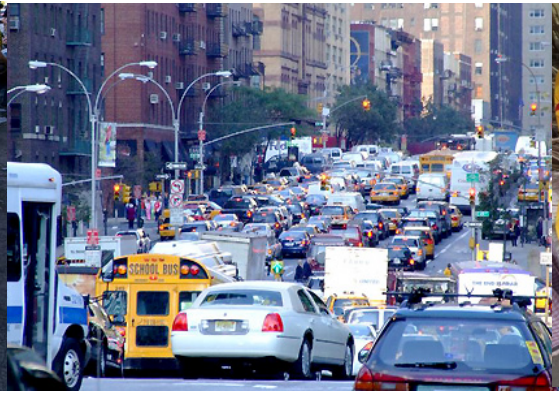
KTH ROYAL INSTITUTE
OF TECHNOLOGY

Towards a sustainable urban mobility

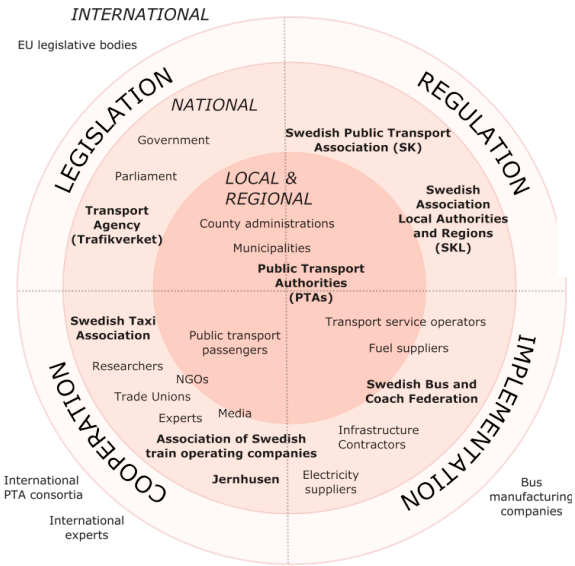
Semida Silveira, Professor Energy Systems Planning

Energy Dialogue 14 Nov 2019

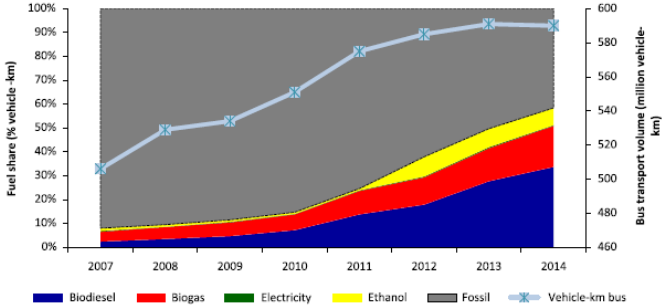
Energy systems must be understood in the context of demand for infrastructure and services

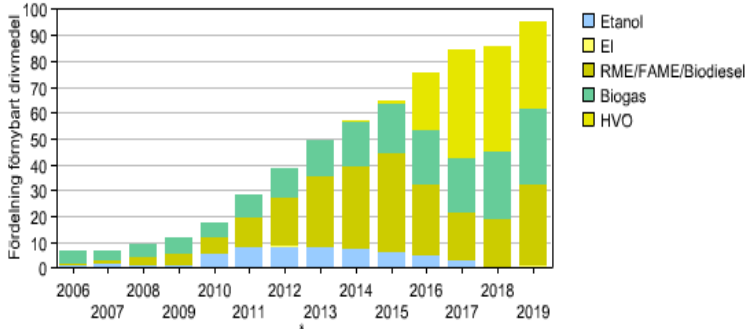


Stakeholders in Swedish Public Transport



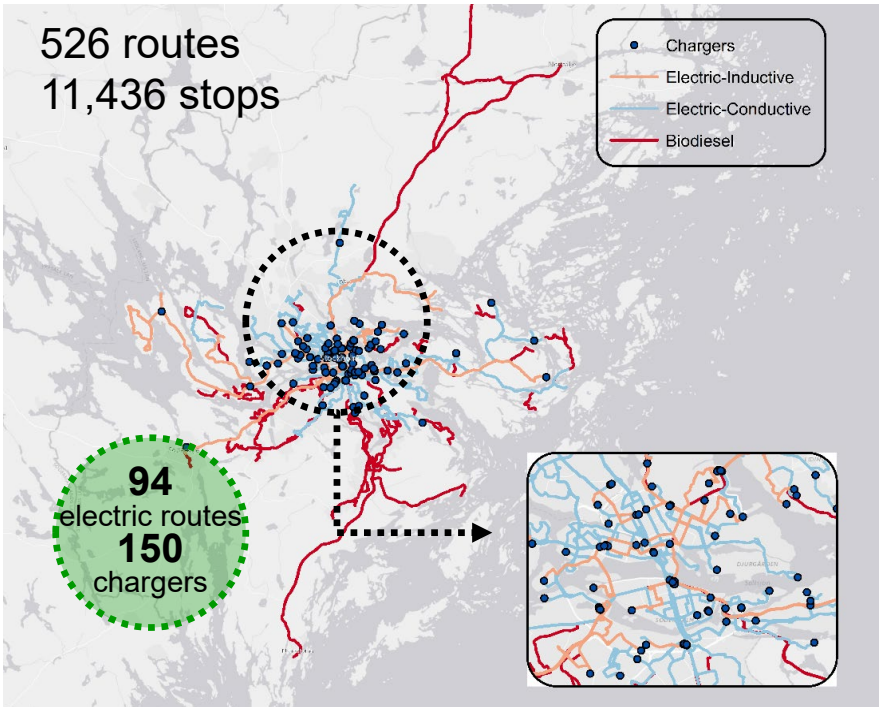
Source: Xylia, M. Towards electrified public bus transport, KTH PhD thesis 2018





Source: www.frida.por.se

Optimizing energy use while electrifying bus lines in Stockholm



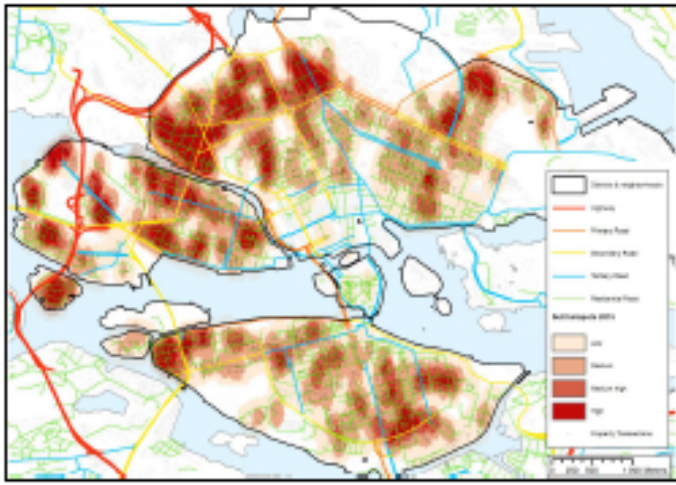
-34%
Energy consumption

-51%
CO_2 emissions

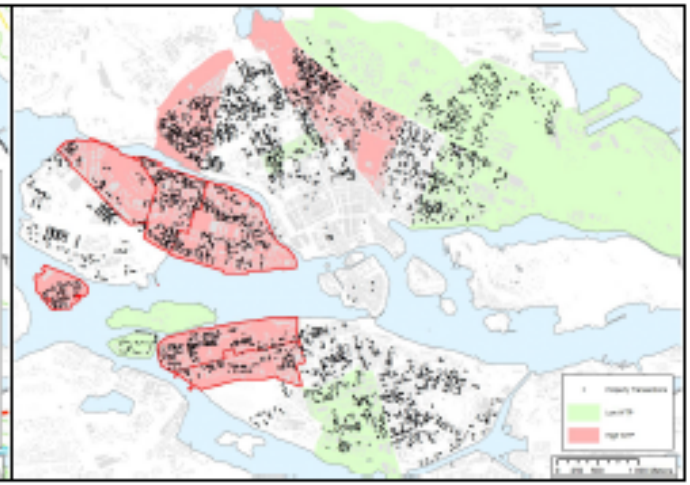
47 MSEK
Infrastructure costs
annualized

Source: Xylia, M., Leduc, S., Patrizio, P., Laurent, A-B, Patrizio, P., van der Mer, Y., Kraxner, F., Silveira, S. Impact of bus electrification on carbon emissions, the case of Stockholm. Journal of Cleaner Production, vol 209, pp.74-87, 2019.

Impacts of traffic related air and noise pollution on property prices



Stockholm road network is intertwined with residential zones representing transaction hotspots.



Reason to prioritize particular areas with high WTP for improved environmental conditions related to emissions

Source: De Lange, M. and Silveira, S. The impact of noise and air pollution on property prices in Stockholm. 8th Int Sustainability Transitions Conference, 19-21 Jun 2017, Sweden.

Smart City Concepts in Curitiba

Innovation for sustainable mobility and energy efficiency

how can ELECTRO-MOBILITY be used as a vector to improve ENERGY EFFICIENCY, enhance CONNECTIVITY, create new URBAN PATTERNS, and promote INNOVATION?

Two hybrid buses tested in Curitiba

Volvo 7900 Hybrid Articulated in Curitiba, operations started on 18th Mar 2016

INTERBAIRROS II ROUTE – counter clockwise (021)

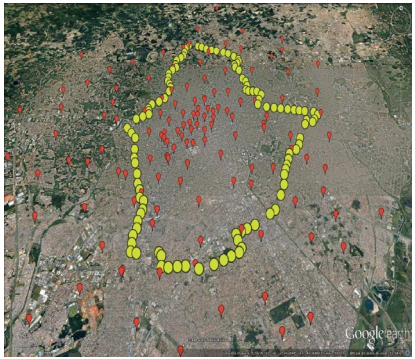
- GTA classification: Rough / Pred. Flat
- Length: 42,3 km
- Max grade: +9,1%
- Average grade: +2,2%
- Passengers per day: 33.000
- Bus stops: 52
- Total fleet: 19 vehicles
- Pick hours: 07:00 / 12:00 / 16:00 / 21:00
- Operation time: Mar. 25th until Nov. 14th, 2016

Volvo 7900 Electric Hybrid in Curitiba, operations started on 29th Jun 2016

JUVEVÊ-ÁGUA VERDE ROUTE (285)

- GTA classification: Smooth / Flat
- Length: 22,5km
- Max grade: +11,0%
- Average grade: +2,2%
- Passengers per day: 2.200
- Bus stops: 40
- Total fleet: 3 vehicles
- Pick hours: 07:00 / 13:00 / 17:00
- Operation time: Aug. 15th until Dec. 24th, 2016

Evaluation of connectivity for provision of Wi-Fi on board of electric buses in Curitiba



Base stations along the route

Quality of signal received inside the bus

Quality of signal received inside the bus in a specific sample

Semida.Silveira@energy,.kth.se

Urban areas are central to the transition towards a low-carbon economy

- ***System shift*** with innovation of systems and products
- ***Synchronization*** of sectors and actions is needed
- **Multiple stakeholders** have to be engaged
- **Energy** and **digitalization** can catalyze resource efficiency, emissions reductions and other benefits
- A **transdisciplinary approach** for co-creation and support of transformational change

The city as arena for transformational change

Urban areas are living spaces where innovative solutions can be engineered