Environmental urban shipping

Photo: Anders Rosén
Waterway – a key for intermodal transport?

Classification of Swedish inland waterways into navigational zones

- Zone 1
- Zone 2
- Zone 3

Map of Sweden showing navigational zones:
- Red: Zone 1
- Blue: Zone 2
- Green: Zone 3

KTH/GU Handels/Trafikanalys/Trafikverket/Vättenbussen/Avatar Logistics

LIGHTHOUSE
SWEDISH MARITIME COMPETENCE CENTRE
Questions...

- How can the waterways add and improve the infrastructure for urban and regional freight?
- Which are the key values in waterborne transport?
City logistics
- Accessibility, floating depot, last-mile, cargo handling,...
City logistics
Demo, DenCity spring 2017...
City logistics
Urban WaterTruck, Södahl & Partner, GU, Rise Viktoria, KTH & Vinnova

c: P Gyllenspetz, B Södahl, 2013
Container Shuttle: Göteborg-Vännersborg

- Need for sustainable logistics
- Barge container service – Göta Älv
- Integrated Logistics concept
- Potential in the area - 20,000 teu:s
- Göteborg – Vännersborg
- Demo – January 2017
Demo, Avatar Logistics spring 2017...
Next demo, EU-interreg project EMMA
-Recyclables, boards, planks, rebar, ...

- Push barge system
- Berths needed in Stockholm & Bålsta
- Possible to add on more barges & expand the system

- Recycling
- Containers
- 40 empty
- 40 loaded
- 1 voyage/day

Bålsta

Norr Mälarstrand
Building sights produce excavation materials, lots of...
How can the waterways add and improve the infrastructure for urban and regional freight?

Which are the key values in waterborne transport?

- Cheep and flexible infrastructure
- Energy efficiency
- Transport system redundancy
- Added capacity
- Free road capacity
- City development
- ...

Questions…
Potentially energy efficient!

**Pac-car**

30kg+förare @ 30km/h
500 mil på 1 liter bensin
3 milliliter / (ton·km)

**Jahre Viking**

560.000 ton olja @ 24km/h*
5 meter/liter olja (120 ton/24h)
0.3 milliliter / (ton·km)

:: Båten är ca 10ggr effektivare i bränsle/(ton·km)
The waterway carries 90% of the transport work emitting 11% CO₂ i.e. 60 times more transport / CO₂.

**Shares of transported weight**
- Sea transport (89.6%)
- Air transport (0.3%)
- Land transport (10.1%)

**Shares of CO₂-emissions**
- Sea (11%)
- Air (11%)
- Road (73%)
- Rail (2%)
- Other (3%)

Data from Kommerskollegium’s report 2012:3 *Handel, transporter och konsumtion*
**Sources to external costs**

![Graph showing sources to external costs]

- **Tung lastbil med släp**
- **Godståg**
- **Sjöfart**

Environmental urban shipping
Modal shift 😊!
A safe operating space for humanity?
Rockström et al. NATURE | Vol 461 | 24 September 2009
Slow speed, even transport flow, moderate size (a few hundred lorries), strategic logistic centres...

... and perhaps are ships, a part of the infrastructure!?
City logistics
Urban WaterTruck, Södahl & Partner, GU, Rise Viktoria, KTH & Vinnova

Parcel sorting under way

c: P Gyllenspetz, B Södahl, 2013
How the Ferry Is Changing the Brooklyn-Queens Waterfront

By STEFANOS CHEN  DEC. 1, 2017

The New York Times
The idea of the City Shuttle is to transport people shorter distances with a high departure frequency. This enable shortcuts by travelling on water, either within the city or further out in the archipelago. The City Shuttle connects to other means of transportation, such as the Suburban Shuttle, Bus Ferry, subway, buses or biking lanes.

The City Shuttle is designed for year round operability, high departure frequency, high capacity and fast embarking/disembarking. The City shuttle has a mono hull and two thrusters for fast and accurate docking. It also has a capacity of 15 bikes.

### TECHNICAL DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Designed speed (kph)</td>
<td>9</td>
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<tr>
<td>Typical distance (NM)</td>
<td>0.5-2</td>
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<tr>
<td>Installed power (kW)</td>
<td>60</td>
</tr>
<tr>
<td>Energy consumption, 50% passengers (kWh/personkm)</td>
<td>72</td>
</tr>
<tr>
<td>Displacement (tonnes)</td>
<td>30</td>
</tr>
</tbody>
</table>
The Suburban Shuttle is designed to be an efficient and convenient way to transport commuters a longer distance. The wifi, cafe, bike stands, and comfortable seats make it possible for the commuter to make the most out of the journey.

To be able to have a year-round operability and still achieve a fast and convenient transportation, the trimaran hull is designed with a hydrofoil solution during the ice-free season. The hydrofoils minimize the swell and the energy consumption. During winter, the hydrofoils are removed and the trimaran hull have ice going capacity.
Now!

- Modular ship design & Lightweight hull design for Nordic conditions
- Simulation-based strategic planning tool for multi-modal (rail-road-sea) public transport systems
The project will contribute to the knowledge in ice loads and suitable hull design in terms of hull shape hull material, material concepts & structure arrangements.