TRASHH: Opportunities for E-Cargo Bikes in Municipal Waste and Cleaning Services

The project is funded by the German Federal Ministry of Transport and Digital Infrastructure within the National Cycling Plan 2020 (NRVP)
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City of Hamburg

- officially the Free and Hanseatic City of Hamburg
- second-largest city with a population of 1.8 million
- one of the 16 federal states
- port city situated at the river Elbe
- main economic sectors: port, media, banking, tourism
- ranked 18th in the world for livability in 2016
City of Hamburg

- HafenCity: inner-city extension (40% or 157ha); 6,000 apartments for approximately 14,000 residents additionally up to 45,000 workplaces

15 June 2018

Velo-city: Cyclelogistics
Stadtreinigung Hamburg

- Public company (owner FHH) since 1994
- Tasks: According to SRH act / state law
  - Waste management
  - Energy production and distribution
  - Cleaning (streets, sidewalks, parks …)
  - Winter service and public toilettes
- Financing: ~ 380 Mio. € / a from fees, refunds (FHH) and other charges
- Employees: ~ 3,100 (3,500 in SRH-group)
- Vehicles: ~ 830 (own truck service stations)
- 30 company sites (incl. subsidiaries)

Freie und Hansestadt Hamburg (FHH)
755 km² with 1.8 Mio. inhabitants in 930,000 households
Research project

- Is it possible to conduct SRH work processes with e-cargo bikes?
- If so, which work processes, and will it be necessary to adapt the work flows?
- What are the advantages and disadvantages of e-cargo bikes?
- Is it possible to substitute diesel vehicles with e-cargo bikes and therewith save investment, running and maintenance costs?
- Are our employees ready to use e-cargo bikes? And finally, what are the overall ecological benefits?
Research project

- TRASHH: Technological and economic analysis of the application possibilities of cargo-bikes in communal companies through the example of Stadtreinigung Hamburg
- The project is funded by the German Federal Ministry of Transport and Digital Infrastructure within the National Cycling Plan 2020 (NRVP)
- Implemented in cooperation with the German Aerospace Centre’s (DLR) Institute of Transport Research
- Timeframe: 2016 to 2019
Research project

Pic 1: 5 km radius around depot centres. Source: DLR

Pic 2: Principal of adapted cleaning services. Quelle: DLR
### Work processes and potential for e-cargo bikes

<table>
<thead>
<tr>
<th>Work process</th>
<th># of cleaners</th>
<th># and type of vehicle</th>
<th>Travel distance and work equipment needed</th>
<th>Potential for e-cargo bikes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Street cleaning HafenCity</td>
<td>6</td>
<td>3 platform trucks</td>
<td>20 – 40 km; shovel, broom, bucket, waste picker, garbage bags</td>
<td>+++</td>
</tr>
<tr>
<td>2. Street Cleaning Neuer Wall</td>
<td>6</td>
<td>3 platform trucks</td>
<td>20 – 40 km; as above</td>
<td>+++</td>
</tr>
<tr>
<td>3. Cleaning services public toilets</td>
<td>4</td>
<td>4 light commercial vehicles</td>
<td>25 – 50 km; toilet paper, paper towels, soap, cleaning material and equipment, bucket, full garbage bins</td>
<td>+++</td>
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<tr>
<td>10. District care taker</td>
<td>14</td>
<td>14 light commercial vehicles and platform trucks</td>
<td>15 – 45 km; as #1</td>
<td></td>
</tr>
<tr>
<td>11. Facility manager</td>
<td>6</td>
<td>6 light commercial vehicles</td>
<td>35 – 70 km; consumables</td>
<td></td>
</tr>
<tr>
<td>12. Stilbruch (2nd Hand Department Store)</td>
<td>4</td>
<td>2 platform trucks</td>
<td>10 – 30 km; household ware, bicycles, Electronics</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>117</td>
<td>ca. 62</td>
<td>2,665 – 5,650 km/Tag</td>
<td></td>
</tr>
</tbody>
</table>

**Analysis of 23 work processes – 12 with high potential.**
Approx. 62 platform trucks could be substituted by e-cargo bikes.
## Research project

<table>
<thead>
<tr>
<th></th>
<th>PICKUP TRUCK (DEPRECIATION PERIOD: 10 YEARS)</th>
<th>CARGO TRICYCLE (DEPRECIATION PERIOD: 5 YEARS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF VEHICLES</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ANNUAL TOTAL COST OF OWNERSHIP [€/YEAR]</td>
<td>13,937</td>
<td>3,300</td>
</tr>
<tr>
<td>NO. OF SEATS</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>GROSS VEHICLE WEIGHT [KG]</td>
<td>3,190</td>
<td>n/a</td>
</tr>
<tr>
<td>LOADING CAPACITY:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERMISSIBLE LOADING CAPACITY IN KG</td>
<td>2,000</td>
<td>400</td>
</tr>
<tr>
<td>PERMISSIBLE LOADING CAPACITY IN M³</td>
<td>8.0</td>
<td>1.8</td>
</tr>
<tr>
<td>DAILY MILEAGE [KM/DAY]</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>DEGREE OF CAPACITY UTILIZATION (WEIGHT) [%]</td>
<td>35</td>
<td>60</td>
</tr>
<tr>
<td>AMOUNT OF TRANSPORTED RUBBISH (WEIGHT) [KG]</td>
<td>700</td>
<td>240</td>
</tr>
<tr>
<td>DEGREE OF CAPACITY UTILIZATION (VOLUME) [%]</td>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>AMOUNT OF TRANSPORTED RUBBISH (VOLUME) [M³]</td>
<td>4.80</td>
<td>1.62</td>
</tr>
</tbody>
</table>
Pilot testing

Selected work processes for pilot

| City Cleaner: street cleaning services in sensitive areas, such as CBD, Neuer Wall, HafenCity |
| District care taker: specialised cleaning services in areas with higher cleaning needs (e.g. subway stations) |
| Instant cleaning: removal of illegally dumped waste in cooperation with waste watcher team |
| Special cleaning services: Removal of illegally dumped waste reported through SRH hotline |
| Public space cleaning: emptying of trash bins and cleaning of green areas and playgrounds |
Pilot testing

Selection criteria for type of e-cargo bike
- cargo weight: 50 – 400 kg
- cargo volume: 0.5 - 1.5 m³
- Transportation distances: up to 80 km
- Additional equipment: garbage bins, garbage bags, broom, shovel, cleaning material and consumables, bag, phone, board computer, etc.
Pilot testing

15 June 2018

Velo-city: Cyclelogistics
Pilot testing

Knowledge exchange

- Round table discussion on the use of e-cargo bikes in communal cleaning services with representatives from cities in northern Germany
Lessons learned

- High visibility and publicity
- Increased presence, easier and more frequent contact to citizens
- Contribution to noise and environment protection, in particular in green spaces and playgrounds
- Street cleaners are used to work outdoor throughout the seasons
- Heavy-duty usage leads to increased requirements (f.i. maintenance)
- Status symbol truck
In memory of Christoph Hipp
† 23 May 2018
Thank you

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