SOLUTIONS webinar:
Light Electric Vehicles for Cleaner Cities
Webinar Content

- Introduction
- What are Light Electric Vehicles (LEVs)?
- What can LEVs do for sustainable transport?
- How to integrate LEVs into urban transport?
- What are the main hurdles?
- How to stimulate their market uptake?
- Success stories
Introduction
The SOLUTIONS project

- SOLUTIONS – Sharing Opportunities for Low carbon Urban transport
- Funded under the Seventh Framework Programme (FP7) of the European Commission.
- Consortium Partners: 27 Partners from 18 countries in Europe, Asia, Latin America and Africa
- Duration: May 2013 – April 2016
- Regional focus: Europe, Asia, Latin America, Mediterranean
Who is presenting this Webinar?

Annick Roetynck

- in the twowheel business since 1987
- AVERE Light Electric Vehicle Policy Manager
- expert in EU regulations governing light electric vehicles
- involved in several projects which include light electric vehicles

AVERE
The European Association for Electromobility

- founded in 1978
- to promote the use of electric vehicles for a more sustainable mobility
- European network of 17 national associations/+ 1,000 members
- established a LEV Task Force
What are Light Electric Vehicles (LEV$s$)?
What are LEVS?

- The term Light Electric Vehicle covers a wide range of very different vehicles: powered bicycles, mopeds, motorcycles, tricycles, quads, quadri-mobiles, self-balancing vehicles, vehicles without a seating position, ...

- They are exclusively battery powered. In Europe, their weight is limited to maximum 600 kg.
What are LEVS?

- In some cases **muscular power** is added to the battery power, for instance on electric bicycles, electric recumbent bikes, velomobiles, electric handbikes, ...
What are LEVS?

Light Electric Vehicles are used for different purposes:

- Public services: fire brigades, police, emergency services
What are LEVS?

Light Electric Vehicles are used for different purposes:

Public services: garbage collection, public gardens’ departments, street cleaning
What are LEVS?

Light Electric Vehicles are used for different purposes:

• Commuting, shopping, transport of children
What are LEVS?

Light Electric Vehicles are used for different purposes:

- Commercial services: taxi/rickshaw services
What are LEVS?

Light Electric Vehicles are used for **different purposes**:

- Commercial services: home delivery, courier services, ...

![Image of Domino's delivery with a LEV and a LEV carrying packages](image_url)
What are LEVS?

Light Electric Vehicles are used for **different purposes:**

- Recreation, tourism: sports, touring, city trips, ...
What can LEVs do for sustainable transport?
What can LEVS do for sustainable transport?

Light Electric Vehicles are able to provide a very considerable contribution to making transport more sustainable.

LEV transport is:

- clean and quiet, thus
  - reducing emissions
  - contributing to fighting climate change
  - avoiding premature deaths resulting from pollution and noise
- energy-saving and energy-efficient, thus
  - decreasing oil dependency
- very cost-effective and cost-efficient, thus
  - accessible to most, if not all social groups in society
  - contributing to social inclusion
What can LEVS do for sustainable transport?

Light Electric Vehicles are able to provide a very considerable contribution to making transport more sustainable.

LEV transport is:

- a way to combat congestion, thus
  - reducing the external costs resulting from congestion
- contributing to public health
  - by not producing emissions
  - by inciting citizens to more physical exercise
  - by preserving the mobility of elderly people, people with health problems and of the physically impaired
- contributing to the economy
  - by creating green jobs
  - by reducing costs from oil imports and pollution
  - By stimulating innovation
- contributing to the overall improvement of quality of life
How to integrate LEVs into urban transport?
How to integrate LEVS into urban transport?

Key = creating space and adapted facilities for safe and comfortable LEV use.

A rapidly growing number of cities is pushing back/out internal combustion engine (ICE) vehicles.

The European White Paper on Transport sets clear targets:
- halving the number of ICE vehicles in urban areas by 2030 and
- fully eliminating them by 2050

Motorcycles banned in more than 90 major Chinese cities, mainly replaced by electric bikes,

Policies to reduce ICE vehicles create space that should partly be used for LEVs.
However, more needs to be done:

Å Essential measure = general application of 30 km/h speed limit in urban areas:
  - limited difference in speed between road users
  - one safe flow of mixed mobility
  - segregation of road users not needed
How to integrate LEVS into urban transport?

However, more needs to be done.

Â Grant **LEVs same privileges as cyclists**, e.g. allow them:
- to go through pedestrianized streets
- to use both directions in one-way-streets
- to use bus/taxi lanes
- to turn right on red at traffic lights
- to use the cyclists’ section at traffic lights to get ahead of other traffic
How to integrate LEVS into urban transport?

However, more needs to be done.

- Provide **quality parking** adapted to LEVs:
  - users should not be forced to tie their LEVs to street furniture
  - most bicycle parking racks not suitable for electric bikes & LEVs in general
- Promote **mixed mobility**, for instance through quality parking facilities at train stations, rental offers at car parkings on the fringe of town, ...
- Public **sharing systems** make LEVs more visible, incite people to use them and perhaps, eventually to purchase their own LEV.
- Charging infrastructure no real issue for LEVs, which have household plugs
What are the main hurdles?
Main Hurdles?

- Static consumer behaviour:
  - Unwilling to change their mobility habits
  - Unwilling to adopt new technology

- Lack of political will to restrict ICE vehicles
- Lack of political awareness and/or belief in LEV potential

Regulatory bottlenecks
Main Hurdles?

- Public perception of LEVs:
  - not safe, not comfortable, too slow, range anxiety
  - social status
  - more expensive and less effective

- Lack of knowledge among all LEV stakeholders on the vehicles, their advantages, rules and regulations, how and where to use them, ...

- Technical hurdles:
  - availability of vehicles, service and repair
  - recycling end-of-life batteries & vehicles
  - in a very heavily populated city it may be difficult to find space for parking and charging infrastructure

- NO hurdle: emissions from electricity production = negligible
How to stimulate the uptake of LEVs?
How to stimulate LEV uptake?

- First and foremost, **LEV**s need to be made visible. Different options:
  - Include LEVs in fleets for instance for local council services
  - LEV deployment at locations where large number of people gather, e.g. airports, educational institutions, exhibition centres, ...
  - Introduce public LEV sharing schemes or investigate adding LEVs to existing private sharing schemes

- Research suggests that LEV uptake requires restrictions on ICE vehicles.
How to stimulate LEV uptake?

- LEVs need to be tried out. Different options:
  - Organize demonstration events where people can also try the vehicles
  - Organize test events where people can use an LEV for a limited period of time
How to stimulate LEV uptake?

☐ If you are really serious about LEV’s go for the **comprehensive strategy**:

✓ Appoint an LEV project manager to develop a comprehensive, coherent strategy with clear targets
✓ Research what types of LEVs are most suitable for your community
✓ Create a network of engaged stakeholders
✓ Detect and solve potential/effective bottlenecks and barriers
✓ Monitor and assess the results with a view to adjusting the strategy
✓ Consider financial incentives and taxation measures carefully
How to stimulate LEV uptake?

- financial incentives:
  - very difficult to predict their success
  - instead perhaps subsidies for investment in infrastructure

- taxation can be used to reflect the environmental impact of vehicles
  - registration and purchase taxes
  - circulation taxes
  - fuel taxes
  - subsidies
  - tax on benefit in kind
  - in use and parking charges

- Market introduction takes time:
  - financial/fiscal incentives must be planned over sufficient period of time
  - incentive results must be measured and assessed
Success stories
## Success Stories

### Worldwide Electric Bicycle Sales

<table>
<thead>
<tr>
<th>Region</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>33,700,000</td>
<td>35,000,000</td>
<td>36,000,000</td>
<td>37,000,000</td>
<td>38,000,000</td>
</tr>
<tr>
<td>Europe</td>
<td>1,155,000</td>
<td>1,403,000</td>
<td>1,692,000</td>
<td>1,942,000</td>
<td>2,190,000</td>
</tr>
<tr>
<td>Japan</td>
<td>443,782</td>
<td>498,000</td>
<td>520,000</td>
<td>540,000</td>
<td>56,000</td>
</tr>
<tr>
<td>USA</td>
<td>174,000</td>
<td>198,000</td>
<td>250,000</td>
<td>300,000</td>
<td>350,000</td>
</tr>
<tr>
<td>SE Asia</td>
<td>75,000</td>
<td>98,000</td>
<td>140,000</td>
<td>180,000</td>
<td>220,000</td>
</tr>
<tr>
<td>Rest of the World</td>
<td>50,000</td>
<td>100,000</td>
<td>200,000</td>
<td>400,000</td>
<td>600,000</td>
</tr>
<tr>
<td>Taiwan</td>
<td>40,000</td>
<td>41,000</td>
<td>40,000</td>
<td>41,000</td>
<td>42,000</td>
</tr>
<tr>
<td>Australia</td>
<td>16,000</td>
<td>25,000</td>
<td>35,000</td>
<td>50,000</td>
<td>75,000</td>
</tr>
<tr>
<td>India</td>
<td>15,000</td>
<td>16,000</td>
<td>17,000</td>
<td>15,000</td>
<td>20,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35,225,000</strong></td>
<td><strong>36,881,000</strong></td>
<td><strong>38,374,000</strong></td>
<td><strong>39,928,000</strong></td>
<td><strong>41,497,000</strong></td>
</tr>
</tbody>
</table>

Source: EBWR 2015
## Success Stories

Source: EBWR 2015

<table>
<thead>
<tr>
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<td>China</td>
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<td>350,000</td>
<td>400,000</td>
<td>500,000</td>
<td>600,000</td>
</tr>
<tr>
<td>Rest of the World</td>
<td>50,000</td>
<td>100,000</td>
<td>200,000</td>
<td>400,000</td>
<td>600,000</td>
</tr>
<tr>
<td>SE Asia</td>
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<td>70,000</td>
<td>100,000</td>
<td>125,000</td>
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<tr>
<td>India</td>
<td>13,000</td>
<td>8,000</td>
<td>4,000</td>
<td>5,000</td>
<td>6,000</td>
</tr>
<tr>
<td>Europe</td>
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<td>13,000</td>
<td>17,000</td>
<td>21,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Taiwan</td>
<td>6,700</td>
<td>5,500</td>
<td>5,600</td>
<td>5,800</td>
<td>6,000</td>
</tr>
<tr>
<td>Japan</td>
<td>3,000</td>
<td>2,000</td>
<td>2,000</td>
<td>5,000</td>
<td>10,000</td>
</tr>
<tr>
<td>USA</td>
<td>600</td>
<td>700</td>
<td>800</td>
<td>1,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Australia</td>
<td>150</td>
<td>200</td>
<td>250</td>
<td>300</td>
<td>400</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>380,450</strong></td>
<td><strong>437,400</strong></td>
<td><strong>497,650</strong></td>
<td><strong>633,100</strong></td>
<td><strong>764,400</strong></td>
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</table>
## European Electric Bicycle Market

<table>
<thead>
<tr>
<th>Country</th>
<th>E-bikes sold in 2014</th>
<th>Change compared to 2013</th>
<th>Market share</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands</td>
<td>223,000</td>
<td>+16%</td>
<td>21 %</td>
</tr>
<tr>
<td>Germany</td>
<td>480,000</td>
<td>+17%</td>
<td>12%</td>
</tr>
<tr>
<td>Belgium</td>
<td>100,000</td>
<td>n.a.</td>
<td>23%</td>
</tr>
<tr>
<td>France</td>
<td>77,500</td>
<td>+37%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Italy</td>
<td>60,000</td>
<td>+12%</td>
<td>4%</td>
</tr>
<tr>
<td>Austria</td>
<td>50,000</td>
<td>+16%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Sweden</td>
<td>est. 20,000</td>
<td>n.a.</td>
<td>3.5%</td>
</tr>
<tr>
<td>Denmark</td>
<td>18,000</td>
<td>0%</td>
<td>4%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>(2013) 50,000</td>
<td>-5.5%</td>
<td>15%</td>
</tr>
<tr>
<td>Norway</td>
<td>est. 12 to 15,000</td>
<td>n.a.</td>
<td>3 to 3.75%</td>
</tr>
</tbody>
</table>
Success Stories

European Market Leaders:

- The Netherlands, Germany & Belgium = mature markets
- Market share electric bicycles > 10%
- Average electric bike price = + € 2,000
- Riders are getting younger
- Electric bike use becomes more diverse: commuters, service bikes, logistics, tourism, rental schemes, ...
- Success goes together with policies to push cars out of urban areas and growing traffic problems
Good Example: City of Aachen (D)

Aachen = German city, ± 235,000 inhabitants

Comprehensive electromobility policy inspired by White Paper Transport target

Website: http://www.emobil-aachen.de

Numerous initiatives to raise awareness on electromobility including LEVs
Good example: City of Aachen (D)

- City provides companies with electric bikes to allow their staff to testride for a week
- New inhabitants are welcomed with a welcome pack that includes a voucher for 1 day of free rent of an electric bike
- Aachen first to introduce ecall-a-bike
- Promotion of CLAC, courier service by electric (cargo)bike
- Listing of all e-bike shops
- Comprehensive brochure with advice on electric bicycles
- Development of electric bike rental system by students from local universities: test phase, final objective 100 stations, 1,000 electric bicycles
Good example: PRO-E-BIKE project

- The European PRO-E-BIKE project promotes clean and energy efficient vehicles, more specifically electric bicycles and electric scooters, for delivery of goods and passenger transport among private and public bodies such as delivery companies, public administration and citizens in European urban areas, as an alternative to “conventionally fossil fuelled” vehicles.

- The project actions are aimed at E-bike market uptake and promotion of policies that stimulate the usage of E-bikes in urban transport.

- As part of the project, a simple and easy-to-use E-bike simulation tool has been developed for companies and public bodies that have a fleet. The tool allows potential users to simulate the impact of swapping their ICE vehicle for an E-bike. The tool calculates the cost and emission benefits that can result from the change-over to E-bikes in their business.

- http://www.pro-e-bike.org/2015/06/01/e-bike-simulation-tool-available-for-download/
Good example: PRO-E-BIKE project

### Reference Data

<table>
<thead>
<tr>
<th></th>
<th>Input value</th>
<th>Reference value</th>
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</thead>
<tbody>
<tr>
<td>Days of annual use</td>
<td>247</td>
<td>247</td>
</tr>
</tbody>
</table>

### Alternative fleet

<table>
<thead>
<tr>
<th></th>
<th>e-bike/e-cargobike</th>
<th>e-scooter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy consumption [kWh/km]</td>
<td>0,0065</td>
<td>0,0512</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>e-bike/e-cargobike</th>
<th>e-scooter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average electricity cost [EUR/kWh]</td>
<td>0,211</td>
<td>0,211</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>e-Bike/e-Cargobike [kg]</th>
<th>e-Scooter [kg]</th>
<th>e-Bike/e-Cargobike [m³]</th>
<th>e-Scooter [m³]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum cargo capacity</td>
<td>100</td>
<td>25</td>
<td>0,5</td>
<td>0,2</td>
</tr>
<tr>
<td></td>
<td>100/250</td>
<td>100</td>
<td>0,5/1.5</td>
<td>0,2</td>
</tr>
</tbody>
</table>

### Current fleet

<table>
<thead>
<tr>
<th></th>
<th>200.000 - 250.000 km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational lifetime costs</td>
<td>Lifetime mileage</td>
</tr>
<tr>
<td>Average years of vehicle use</td>
<td>10 - 10 years</td>
</tr>
<tr>
<td>Number of years of leasing</td>
<td>4 - 4 years</td>
</tr>
<tr>
<td>Cost of CO₂</td>
<td>30 - 40 EUR/ton</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Average fuel Costs</td>
<td>1,244</td>
<td>1,352</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Diesel</th>
<th>Gasoline</th>
<th>Electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion factors</td>
<td>2,67</td>
<td>2,36</td>
<td>0,47</td>
</tr>
<tr>
<td></td>
<td>kg CO₂/l</td>
<td>kg CO₂/l</td>
<td>kg CO₂/kWh</td>
</tr>
</tbody>
</table>

Co-funded by the Intelligent Energy Europe Programme of the European Union
For any further details on Light Electric Vehicles, please contact:
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averelev.wordpress.com – www.avere.org

Thank you!