

# Introducing Bicycle Taxi Services in european cities



Opportunities, Innovations,  
Challenges and Constraints



Deutsche Gesellschaft für Sonnenenergie e.V.  
International Solar Energy Society, German Section

Velotaxi Nuernberg Germany

Solarinitiative Nuernberg, Michael Vogtmann



# Opportunities – Support by the local government

## Implementation of electricity in the traffic sector

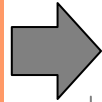
### E-mobility

- E-velos, e-rollers, e-bike taxis and e-cars in the city of Nuremberg;
- Loading stations in the city (regional energy supplier N-ERGIE) and loading systems in car parks to charge these vehicles

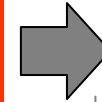


# Opportunities – Strategy of regional energy supplier N-ERGIE

**First step:  
Implementation of  
e-velos, trikes and others**



**Second step:  
Feasibility studies  
for further  
measures**



**Third step:  
Broad  
implementation**



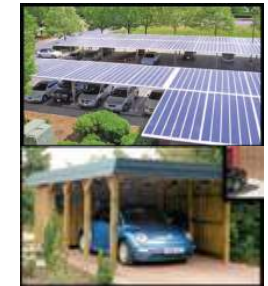
**2009 / 2010**

Focus:  
Implementation of sustainable  
technologies in the traffic sector



**2011 / 2012**

Focus:  
Focusing on the best strategy



**Starting 2015**

Focus:  
Improving air quality in the city  
and reducing CO2-emissions



## Opportunities – professional production by Veloform

# veloform

### A worldwide network

- Year by year more and more Velotaxi operations open across the world. Today, Veloform different advertising solutions are on all 5 continents, in 50 countries, more than 2000 velotaxis.



### Technical development

- Veloform is highly specialised in the development and production of innovative specific vehicles and urban furniture. The team is composed of engineers, designers and business economists, their expertise and know-how is unique and also include the areas of maintenance and practical operating experience.



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# Opportunities – combination advertising and taxiservice



A newly produced velotaxi costs up to 10.000 €.

Advertisement spaces, promotion bring 10.000 € per year.

Maintenance and repairing cost 3.000 € per year and velotaxi.

Self employed VeloTaxi drivers earn 20-100 € a day.



## Opportunities – promotions and special events



Velotaxis are often booked for promotions, cultural or eco events (here: day of emission free electromobility 09/2010).



Velotaxis are often booked for marriage celebrations.



# Opportunities – ecodriving in bicycle and pedestrian zones



Bicycle routes may be used generally, but must not be used. Some described parts of the pedestrian zones may be used, some not. That depends on particular aspects of the city government. In Frankfurt and Berlin e.g. pedestrian zones are nearly all „free“, but streets are much wider than in medieval nuernberg.



## challenges – how to move 400 kg and 5% slopes?

- Velotaxi net weight: 130 kg
- 1 driver and two passengers:  
200–270 kg > total weight up to 400 kg
- 14 gears Rohloff speed hub (1.000 EUR !)
- 250 Watt Electrical assist based on a  
36 Volt electric motor integrated in front  
wheel and a 20 kg lead acid batterie in the  
back with 0,6 kWh storage capacity
- up to 250 Watt human power and up to  
250 Watt electrical assist result in  
500 Watt Power = 0,7 PS = 1 pony power



# innovations – battery exchange system

When emptied up to 30% remaining capacity the batteries can be easily changed with freshly loaded batteries to double the average range up to 30 kilometers resp. the working hours up to 8 hours per day.



## innovations – solar panel and green energy loading



First solar velotaxi fleet in world. Specially produced half transparent solar panels 1 m x 0,75 m to charge the battery >> up to 30% higher range with one battery, dependent on the weather.



Night depot for the 5 velotaxis: In a modern garage of siemens company the batteries and the „push to talk mobiles“ for communication with and amongst the drivers are reloaded with „Pur Nature Current“ from regional energy supplier N-ERGIE AG (water turbines in regional rivers and lakes)



# innovations – variety of Products for specific markets



**CCI** (longer, wider) **CCII** (higher, suspension) new **eVelotaxi** 3600 Watt, 15% slopes  
(here with berlin`s mayor Klaus Wowereit)



## constraints – special use permission

### special use permission:

- Despite classification as real bicycles (with electrical assist system) without insurance indicator – according to EU directive 2002/24/EC - the velotaxis need in all european cities additional special use permissions, which differ from town to town a little bit.

### In Nuernberg this permission includes that

- Bicycle routes may be used but must not be used
- People over age of 7 are allowed to be transported
- Transport of persons shall be allowed as a service with payment



## constraints – limitation of speed and range, weather

- Velotaxi riding is not for people who are rushing or have to go on longer taxi distances than 5 Kilometer. Average speed is between 10 and 15 km/h.
- Battery capacity allows only between 20 and 50 km driving despite of battery changing system. However very dependent on the topography of the city (eg. in Berlin or Hamburg everything is flat, hardly no batteries are required, Nuernberg is quite hilly which results in higher battery use.
- The most customer demand in europe is when the weather is quite nice and not to cold (between 15° Celcius and 30° Celsius)  
Rain showers in summer are even good, but not constantly bad weather days.
- Whilst raining, the passengers are protected only „half-way“ against winds and rainfall



# Results of first year 2010 – oecological benefit

- 5 Velotaxis were running approx. 20.000 km
- They were transporting 5.000 Persons for touristic and ordinary transport use
- Battery recharging in total was 230 kWh („green“ current) > equivalent to 23 Liters fuel.
- Electricity consumption per km: equal to 1 ml = 0,1 Liter on 100 km
- Compared with fossile taxi cabs:  
1.500 Liter fuel could be mitigated > more than 3 tons of CO<sub>2</sub> (by only 5 Velotaxis!)



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Thank you very much for your attention.

I am waiting for your further questions.

