E-Mobility with “green” Electricity from Renewable Energy in Austria

Peter Wiederkehr, Dr.sc., Senior Policy Advisor
Division of Transport, Mobility, Human Settlement and Noise
Federal Ministry of Agriculture and Forestry, Environment and Water Management
Pioneers of e-mobility in Austria

<table>
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<tr>
<th>Lohner-Porsche, Vienna 1899</th>
<th>E-parcel lorries - Postal Service 1983</th>
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<td>© Technisches Museum Wien</td>
<td>© Österreichische Post AG</td>
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<th>Werfenweng, Salzburg e-mobility in tourism 1998</th>
<th>Pilot regions: Vorarlberg 2009</th>
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<td>© TVB Werfenweng</td>
<td>© illwerke vkw</td>
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E-mobility is more than just e-cars!

... intelligent combination of electric transport modes!

electric public transport
- e-railway
- subway and tram
- e- bus, trolley bus

electric road vehicles
- e-bicycle, e-scooter
- e-car
- light-duty e-vehicle
- e-mini-bus and e-taxi

battery electric and solar-powered boat
Opportunities and chances of e-mobility with „green“ electricity from renewable energy

1. Use of fuel- and energy-efficient vehicles due to higher engine efficiency (>90%) and WTW energy efficiency (> 61%); recuperation of braking energy.

2. **No local emissions:** no air pollutants, no CO2, very little noise emissions; 80% CO2 reduction due to use of electricity from renewable energy sources compared to conventionally fuelled vehicles

3. **100% electricity from renewables;** broadening of resource base by electricity, significant reduction of oil dependence of transportation and energy use.

4. **Combination with public transport,** e.g. for commuters using railway (e-commuters); e-bike and e-scooter users that drive to PT stations

5. **Car usage as needed:** cost-efficient options with carsharing, in particular for commuters (avg. max daily trip distances 58 km); thus suitable for e-cars

..... but current short-falls regarding limited range, higher purchase prices (thus, supports are needed), few vehicle models available, regular battery charging needed and charging infrastructure.
Results from Life-Cycle Analysis: e-mobility vs. other transportation modes

energy consumption (kWh) and CO2 emissions per pkm

EU Context - Drivers for e-Mobility
EU Climate and Energy Package Goals and targets for Austria

<table>
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<th>EU 2020 Targets (base year 2005)</th>
<th>EU</th>
<th>Austria</th>
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<tr>
<td>Reduction of GHG emissions:</td>
<td>-20 %</td>
<td>-16 % (Non-ETS)</td>
</tr>
<tr>
<td>Share of renewable energy:</td>
<td>20 %</td>
<td>34 %</td>
</tr>
<tr>
<td>in transport (biofuels &amp; e-mobility):</td>
<td>10 %</td>
<td>10 %</td>
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Austrian 2020 e-mobility target: 250’000 e-cars; 6% of “green” electricity; reduction of 430’000 t CO2 emissions

EU CO2 Regulation for New Cars: fleet average targets
- **2015**: 120 g CO2/km fleet average; (actually in 2011: 139 g CO2/km)
  - supercredits for cars with CO2 emissions <50 g/km: (hybrid and electric cars)
- **2020**: 95 g CO2/km (with higher fuel efficiency, hybridisation, electrification)

EU Low Carbon Economy Roadmap 2050; goal of -79% to -82% GHG emission reductions (base year 1990); for transport -54% to -67%; this will require zero emission vehicles; thus, massive electrification of road vehicles
GHG Emissions in Transport:
Trend breach since 2005 – measures are effective!

2005 until 2009: -13%

Measures of the Climate und Energy Strategies:

- 5,75% biofuels (-1,7 Mio t CO2)
- klima:aktiv mobil (-0,45 Mio t CO2)
- mobility management, forcing of alternative vehicles (EVs)
- Purchase tax credit for alternative vehicles (hybrid, E85, biogas, biodiesel; EVs are exempted from purchase tax);
- tax credits for cars with CO2 emissions < 120 g/km: 22% of new car registrations

Quellen: UMWELTBUNDESAMT (2011a), LEBENSMINISTERIUM (2007a)
Ministry of Environment supports alternative vehicles, especially e-mobility with 100% renewable energy

Three pillars of the strategy of the Ministry of Environment to reduce GHG emissions from Transport:

1. Forcing of alternative vehicles, preferably powered by 100% renewable energy
2. Financial support for mobility management towards environmentally friendly and energy efficient transport
3. Information and awareness raising for environmentally friendly mobility (cycling; ecodriving)

The action program klima:aktiv mobil supports measures to reduce CO2 emissions from transport.

E-mobility with electricity from renewable energy sources facilitates the transition towards an environmentally friendly transport system.
National e-mobility initiatives in Austria

- National Energy Strategy 2010: mobility strategy
  e-mobility goal: 250’000 EVs; 430’000 tonnes CO2 reduction

- National Implementation Plan for e-Mobility in Austria by Ministry of Economy, Environment and Transport
  more than 50 individual measures (energy, charging, vehicles, research, training)

- Ministry of Environment
  Financial support for e-mobility (powered by renewables) by the klima:aktiv mobil support program (consulting and financial support for alternative vehicles)

- Ministry of Transport, Innovation & Technology
  • RT&D, technological programs (A3plus, “New energies 2020“)
  • Introduction plan for e-mobility

- Climate- and Energy Fund (Ministries of Environment & Transport)
  • Pilot regions for e-mobility with 100% renewable energy
  • Technological lighthouses on e-mobility
  • Information platform www.e-connected.at
Programs of the Ministry of Environment for e-mobility with electricity from renewable energy

**klima:aktiv mobil program for alternative vehicles, esp. electric vehicles**
- support for companies and municipalities for purchasing e-vehicles

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<tr>
<th>VEHICLE</th>
<th>SUPPORT</th>
<th>+ „GREEN“ ELECTRICITY</th>
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<tbody>
<tr>
<td>E-car</td>
<td>€ 2500</td>
<td>€ 5000</td>
</tr>
<tr>
<td>E-Scooter</td>
<td>€ 250</td>
<td>€ 500</td>
</tr>
<tr>
<td>E-Bicycle</td>
<td>€ 200</td>
<td>€ 400</td>
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- **900 projects with 7.000 e-vehicles supported with 5,6 Mio €**
- **special support action for the first 1000 charging stations with renewable energy**

**National Implementation Plan for e-Mobility in Austria. Measures of Ministry of Environment**
- **financial incentives** for e-vehicle purchase (in addition to tax credits)
- continue of funding support for **pilot regions** on e-mobility with renewable energy
- **promotion of e-vehicles** for market introduction (esp. cars) and **innovative financing schemes** (e.g. mobility services combined with vehicle leasing)
- promotion of development of **additional renewable energy** for e-mobility
- **user benefits**: exemptions from access bans to "environmental urban zones"
- information and education for e-mobility, especially technicians and repair staff
Pilot regions for e-mobility with electricity from renewable energy sources in Austria

Organisation and management: 8 individual operating agencies lead by electric utilities

2009: VLOTTE Vorarlberg
360 cars, 100 charging stations; mobility services card including vehicle leasing, public transport, free charging, PV and hydro-power. € 5.2 Mio financial support

2010: ElectroDrive Salzburg
100 e-cars (goal: 500), 500 e-bikes, 60 public charging points; e-mobility with monthly PT pass including vehicle leasing, public transport, free charging; PV and hydro-power. € 1.9 Mio financial support

2011: Vienna e-mobility on demand
Goal: 500 cars, 100 charging points Multi-modal mobility and PT pass with focus on commuters and fleet operators; renewable energy for 2000 e-cars € 1.3 Mio financial support

2011: Eisenstadt
e-busses and e-taxis for commuters, wind energy € 0.56 Mio financial support

2011: e-mobility Graz
Goal: 500 e-cars, 1200 e-bikes, 140 public charging points; e-mobility services packages for large fleet operators (vehicles, PT, charging) € 1.6 Mio financial support
3 new pilot regions 2012!

**Commuters Lower Austria:**
49 municipalities, use of electric vehicles by commuters, prove of last mile solutions,
€ 1,3 Mio financial support

**E-Log Klagenfurt:**
Prove of logistics solutions with 200 electric vehicles (goal) with focus on SME
€ 1,6 Mio financial support

**E-Mobility Post:**
Post delivery with 200 electric utility vehicles
€ 3,3 Mio financial support
Lessons learned from the pilot regions in Austria

- 120-150 km range of e-vehicles is sufficient for daily journeys (50% of car trips <5km); combined mobility services provide solutions for long distance.

- Environmental advantages of e-vehicles are important: no local pollutant emissions; no noise; no local CO2; use of “green” electricity from renewable energy sources; and much lower running costs are seen as prime assets of e-mobility.

- Preferential charging with green electricity from 100% renewable energy sources (photovoltaic, wind and water power, biomass) is favoured to ensure CO2 reduction. Energy consumption is 20 kWh/100km; battery capacity 25 kWh.
Lessons learned from the pilot regions in Austria

- 80% to 90% of charging is slow, home/office charging with ordinary power plugs (2.3 kW power). Re-charging of batteries is only needed every third day!

- Public charging stations are psychologically important (limited e-vehicle range), but little used, except for fast, high power (55kW) charging stations.

- Higher purchase prices of e-cars require some financial support at present.
Achievements of the support program

Since its inception in 2005 some 2750 projects from companies, municipalities and associations (like tourism and leisure activities), schools and youth mobility, and ecodriving supported with 33.7 Mio EUR from the budgets of the Ministry of Environment and the Austrian Climate and Energy Fund; it triggered investments of 207 Mio € and created 2000 “green jobs”. CO2 emission reductions of 533.000 t/p.a.

1.100 e-mobility projects with 7300 e-vehicles (primarily e-bikes/e-scooters and light-weight community e-vehicles) supported, as well as the setting-up of 220 charging stations. Overall support volume of 6,3 Mio EUR. triggered 41,4 Mio EUR of investments and generated and secured 320 new „green jobs“. Reduction of CO2 emissions of 8.800 tonnes/a.

European Public Service Award (EPSA) 2009 for klima:aktiv mobil as EU Best Practice.
klima:aktiv mobil program organisation

Strategy development and funding
Federal Ministry of Agriculture and Forestry, Environment and Water Management
Division of transport, mobility, human settlement and noise
Robert Thaler, Iris Ehrnleitner
e-mobility, alternative vehicles and ecodriving
Peter Wiederkehr
www.klimaaktivmobil.at

Operative management:
Austrian Energy Agency
Willy Raimund, Andrea Leindl, Nina Pickl
e-mobility, alternative vehicles and ecodriving
Robin Krutak
klimaaktivmobil@energyagency.at
klima:aktiv mobil

Support for e-mobility with renewable energy!

Thank you for your attention!