

Transformation towards light electric mobility: Past dynamics and current challenges

Side event session by the Trafo 3.0 project at the IST Conference 2016

Introduction & facilitation:
Dirk A. Heyen, Oeko-Institut



Session context

- Session is part of a side-event of the Trafo 3.0 project...
- on three different transformation processes
- Overall 3 sessions today:
 - 10:30 – 12:00 Sustainable meat production & consumption
 - 12:45 – 14:15 Paperless book publishing & reading
 - 14:30 – 16:00 Light electric mobility (e-bikes)
- You are very welcome to participate in the other sessions!



Session program

- 14:30 Short introduction into the Trafo 3.0 project and its conceptual framework (Dirk A. Heyen, Oeko-Institut)
- 14:40 **„Past dynamics & current challenges in the transformation towards light electric mobility”** (Ruth Blanck, Oeko-Institut)
followed by 5 min. Q&A
- 15:00 **“Policy measures for the use of e-bikes and their environmental potential”** (Dr. Frederic Rudolph, Wuppertal Institute)
followed by 5 min. Q&A
- 15:15 **“Infrastructure for e-bikes: the case of the Cycle-Highway RS 1”** (Frank Joneit, Regional Association Ruhr (RVR))
followed by 5 min. Q&A
- 15:30 Discussion with audience and all presenters
- 16:00 The end

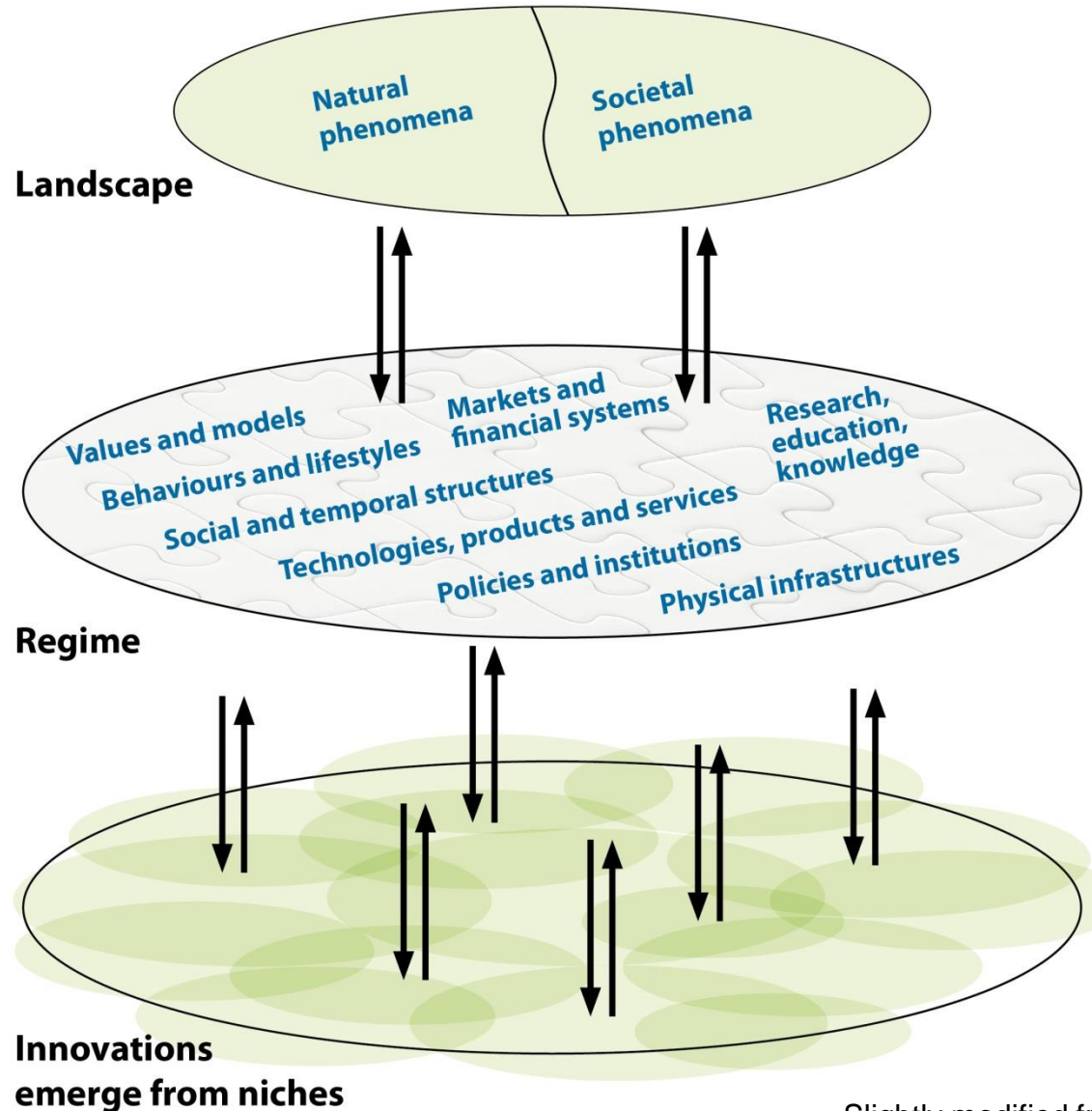


The Trafo 3.0 project

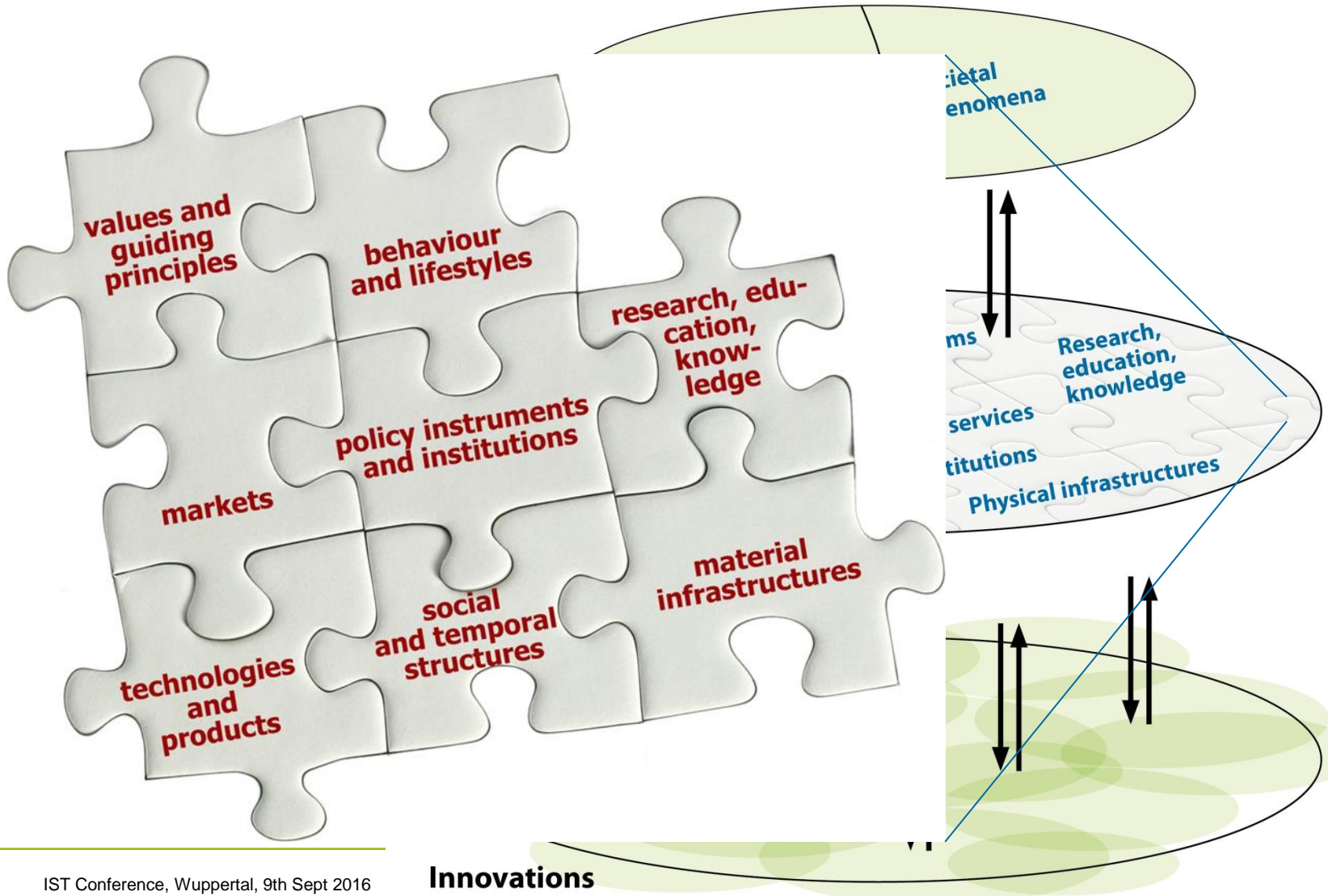
- Trafo 3.0 is a current research project
 - Conducted by Oeko-Institut & various stakeholders
 - Funded by German Ministry for Education and Research (BMBF)
 - April 2015 – March 2018
 - Website: www.trafo-3-0.de (German language only)
- Research question: (How) can societal transformation processes be initiated, supported and governed towards sustainability?
- Understanding of transformations:
 - Comprehensive (long-term) change of socio-technical (sub-) systems
 - Not only technological change but systemic, co-evolutionary change
 - Multi-level-perspective



Systemic and multi-level perspective



Systemic and multi-level perspective



The Trafo 3.0 project

- Conceptual framework on analysis & governance of transformations
 - based on literature, earlier projects + 2 case studies of past niche-to-mainstream developments of renewable energy and organic farming/food in Germany
- Analytical & action-oriented research in 3 areas, based on framework
 - Status quo analysis of system elements, their interlinkages and effects
 - Analysis of sustainability effects / potentials of a transformation
 - Working with real-world initiatives and dialogue with further stakeholders
 - Recommendations for supporting and governing the transformation
- Lessons learnt across case studies and “historical cases”
- Overall objective: further development and field-testing of a heuristic and the drafting of a manual to support politicians and practitioners for analyzing and identifying governance options for transformations



Past dynamics and current challenges in the transformation towards light electric mobility

Insights from the Trafo 3.0 project

Ruth Blanck, Oeko-Institut



Background: mobility & sustainability

Mobility is vital for the quality of life of citizen.

“Curbing mobility is not an option” (EU White Paper)

But the transport sector in Germany is not sustainable:

- High dependence on fossil fuels in the transport sector
- Little to no progress over the last years - GHG emissions have not decreased since 1990
- Environmental challenges: Noise, pollution, limited space especially in urban areas
- 95% reduction of GHG over all sectors until 2050 require a full decarbonisation of the transport sector

=> Sustainable transport is a big challenge



The electric bike: A new „player“

Compared to conventional bikes, electric bicycles increase mobility options in various dimensions:

- New users (e.g. elderly people),
- More applications (e.g. transport of children, goods transport)
- Wider radius (longer distances)
- Any topography (e.g. hilly areas)

=> electric bikes offer a much higher potential for modal shift than conventional bikes!



Why could e-bikes be part of a future sustainable transport?

Modal shift from car to e-bike occurs (some empirical evidence).

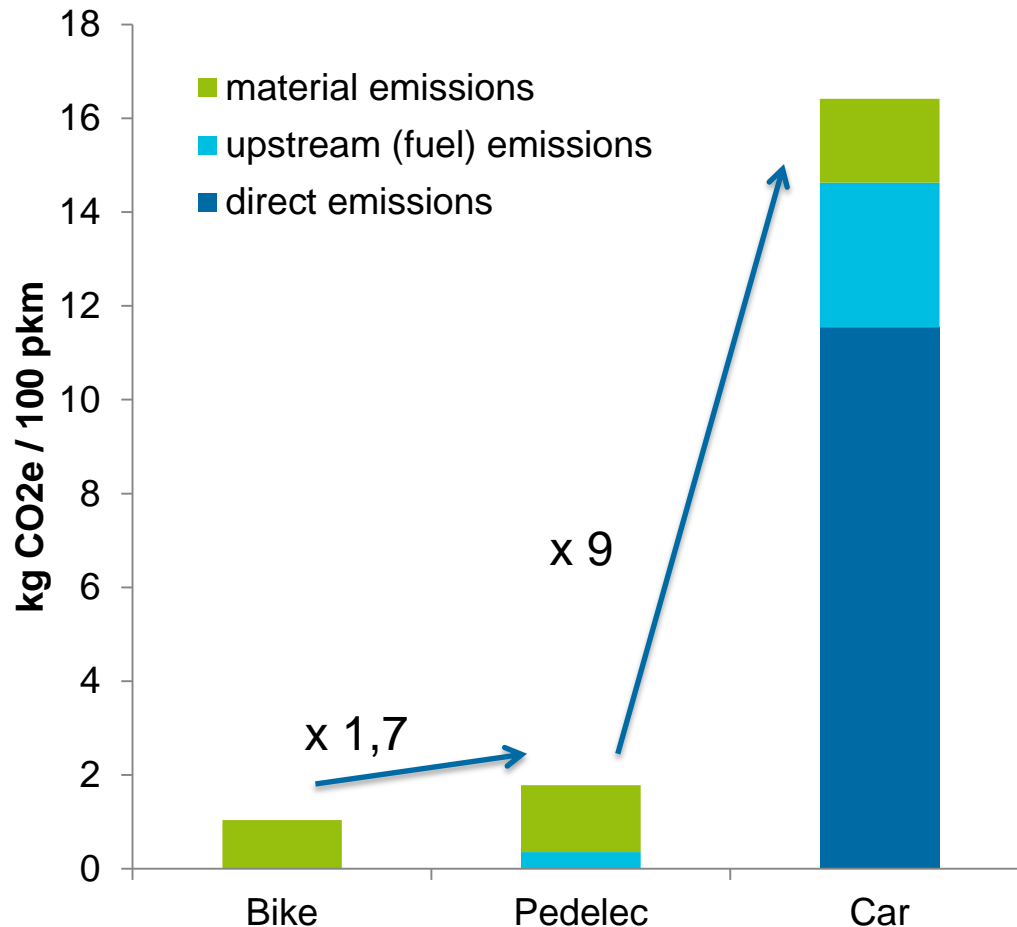
E-Bikes may reduce car ownership (but: few to no empirical evidence)

Benefits of e-bikes vs. cars:

- Less GHG emissions
- Less noise and pollution
- Less public space for parking (1 car ⇔ approx. 10 bikes)
- Social benefits: no driving license needed (for pedelecs), additional mobility option
- Health benefits



GHG-emissions of electric bikes



E-bikes have higher GHG emissions than conventional bikes

But: A minor modal shift from cars to e-bikes compensates for this → positive net effect

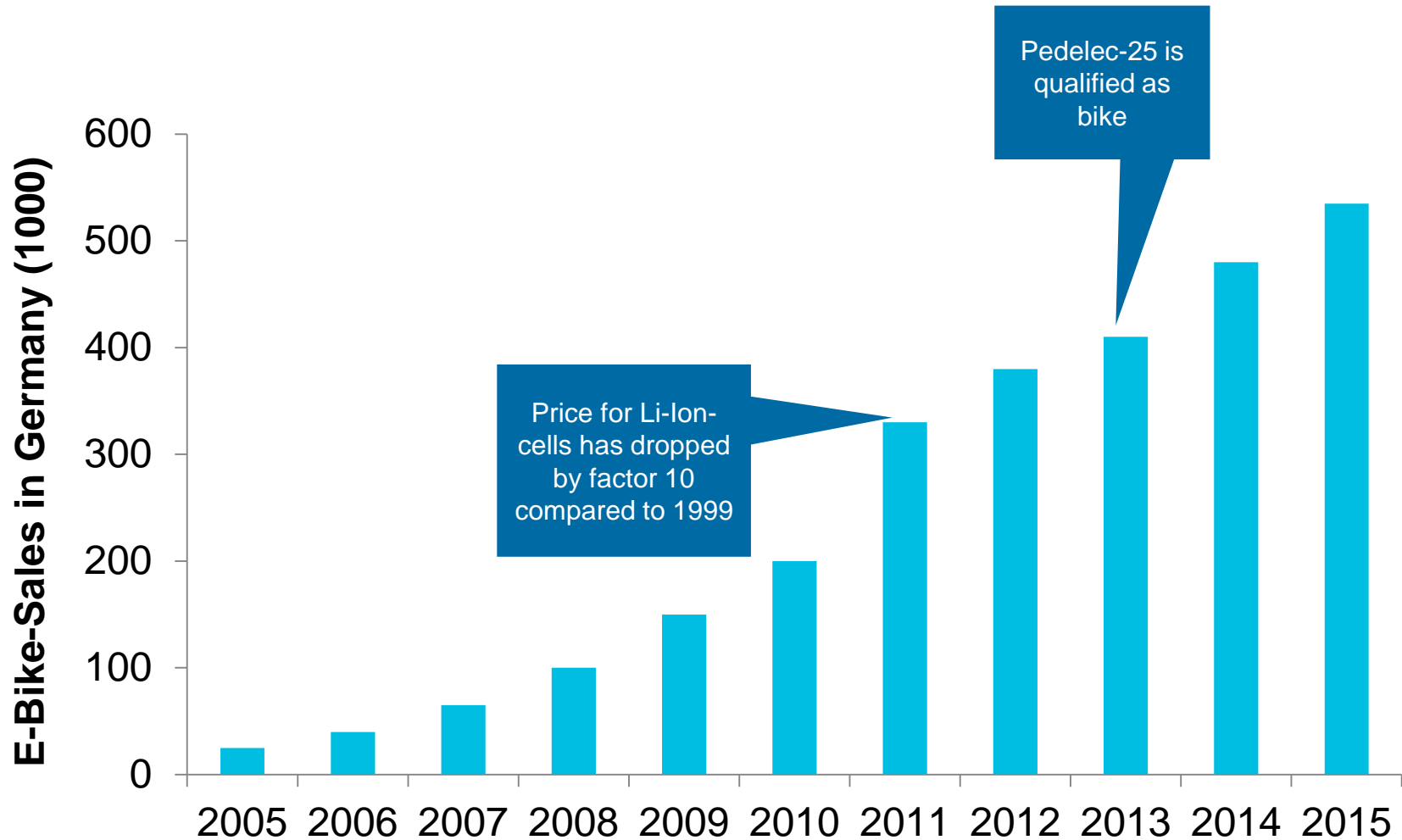


Past dynamics: A short history

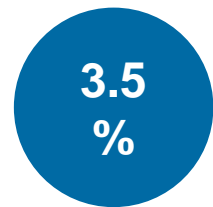
- 19th century: first patents for electric bikes
- Oil-crisis 1973 and 1986
- 1989: first "Pedelec" (Michael Kutter)
- 1993 (Japan): Yamaha produces e-bike-series, used by many commuters
- Late 1990's: First e-Bikes in Germany and Europe suffer from a negative image (e-bike riders are called "*Alter Opa*", "*Warmduscher*")
- Beginning of 21st century: Important technology developments and cost reductions (lithium-ion-batteries, neodymium-iron-boron magnets) thanks to computer and telecommunication industries



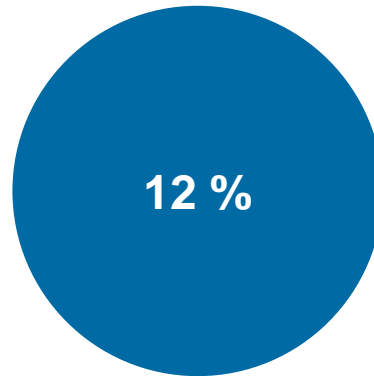
Recent dynamics in Germany: From a niche market to a mass market



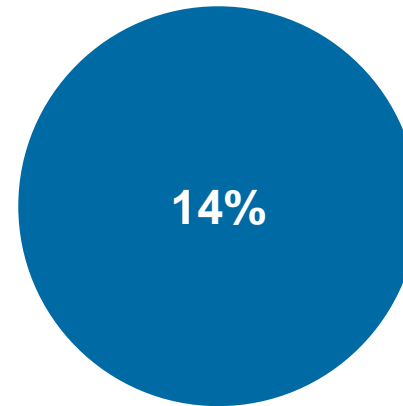
The role of e-bikes in Germany today: Some numbers



3.5% of
bicycle
stock



12% of
bicycle sales



14% of total
bike travel
(estimated*)



0.4% of total
passenger
transport
(estimated*)



Future dynamics

Technology & Market Developments

- Increasing level of connectivity (e.g. smartphone application)
- Outlook: from parallel hybrid to serial hybrid powertrain concepts ("digital e-bike")

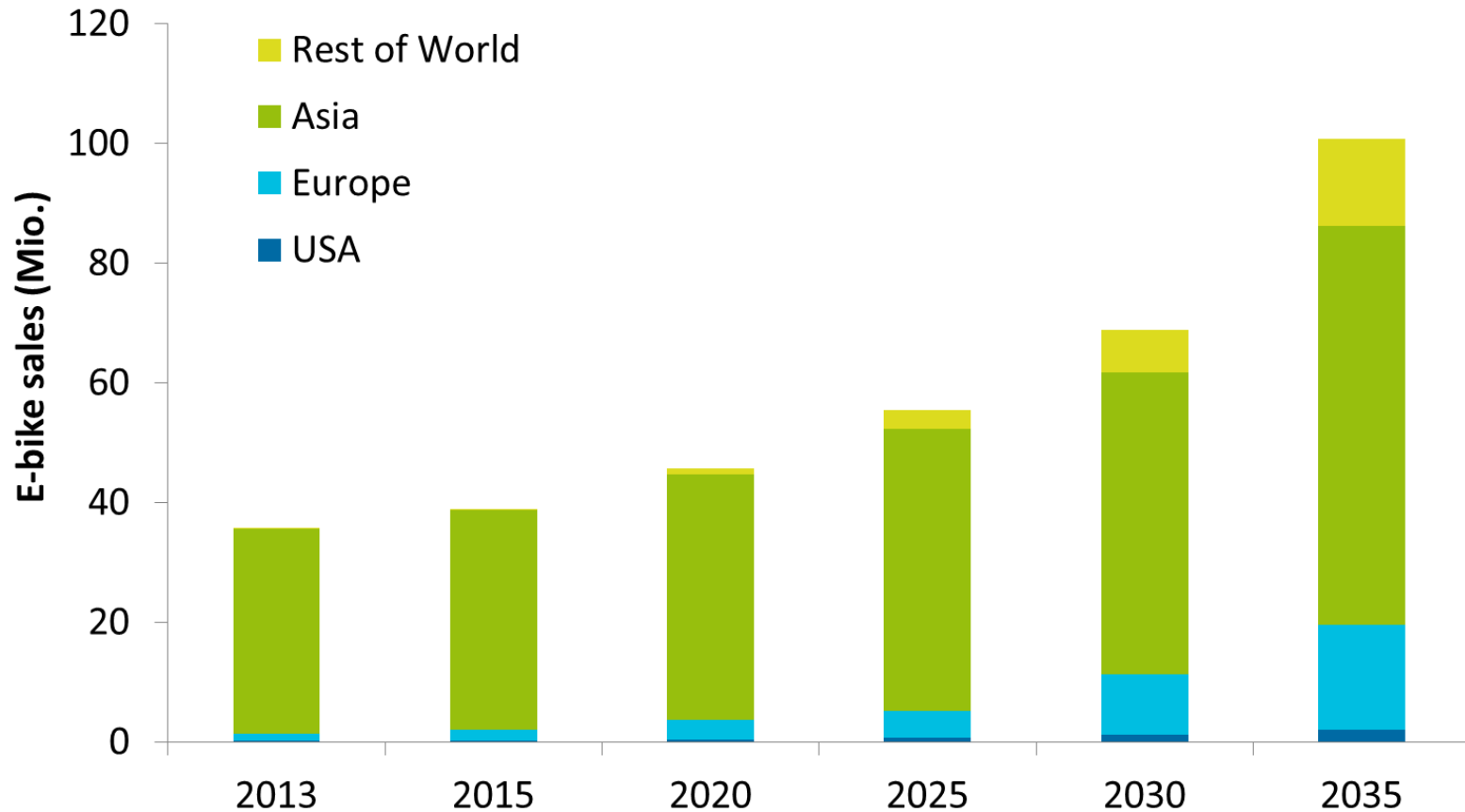


New User Groups

- First users: predominantly male (60-70%), older than average (>50)
- Some evidence suggests: Recently more female and younger e-bike users



Outlook: World-wide growing sales



E-bikes: Opportunities and barriers

	positive trends & opportunities	risks & barriers
Values and guiding principles	the vision of "liveable cities" replaces the car-oriented model	number of cars in Germany is still on the rise; SUVs are popular
Material infrastructures	some positive examples, e.g. bicycle highways (RS 1), citizen's initiatives	lack of adequate cycling infrastructure (bike lanes, parking..)
Markets	mass market (lower prices, increasing diversification of product spectrum) -> new user groups	
Technologies and products	high potential for future development (e.g. anti-lock braking systems, serial hybrid pedelecs, ...)	lack of standards for e-bike components and battery packs
Behaviour and lifestyles	Flexible, digital, healthy lifestyles and e-bikes are a perfect fit; "sharing economy" (e-bike-sharing)	safety concerns; image problem
Social and temporal structures	In many cases, e-bikes are the fastest and most reliable mode	
Research, education, knowledge		lack of knowledge and representative data on e-bike use and effects on car ownership; possibility of "bike as company car" is not well known
Policy instruments and institutions	EU regulation on air quality => support for locally emission-free transport options	lack of political support for E-Bikes (focus on electric cars), high regulative barriers for use of S-pedelecs; legislation is dominated by a car-oriented model



Practical Examples & Research within the TRAFO 3.0 Project

Within the TRAFO 3.0 Project, we accompany two practical examples:

- e-bikes for new citizens in the city of Munich
- e-bike-tourism in the region Dahme-Seen

Main research issues for the practical examples:

- How does the possibility to test an e-bike – as a new citizen or as a tourist – influence everyday mobility behaviour and e-bike and car ownership?
- What are the main barriers to e-bike use and ownership?



E-Bikes for new citizens in the city of Munich

Practical implementation

- 150 new citizens in Munich have the opportunity to use an e-bike for one week for free (Sep 2015 – Oct 2016)
- Integration into Munichs' established mobility marketing "Gscheid mobil"
- Telephone surveys of users (before use, after use, after one year) and non-users

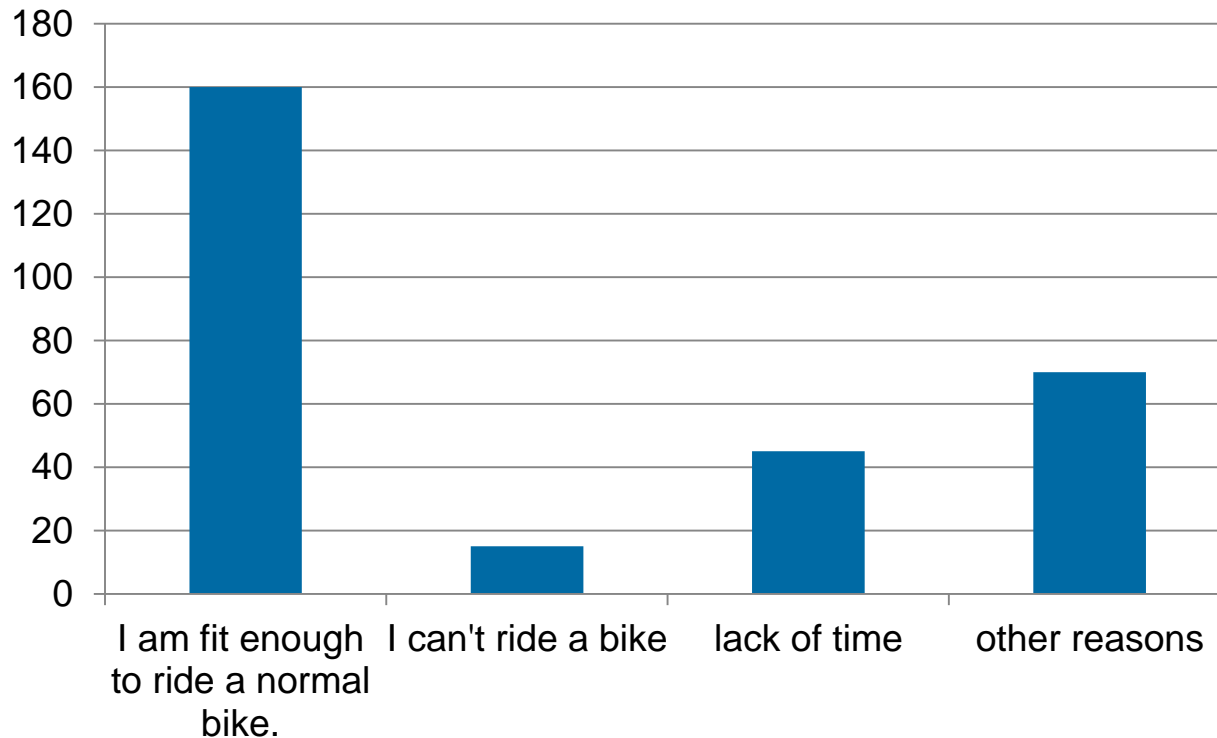
Preliminary findings

- New citizens might not be the optimal target group for e-bike tests: many citizens order a voucher but never borrow the e-bike



Non-Users: Preliminary findings

New citizens in Munich who were **not** interested in testing an e-bike were asked to explain their reasons.



- Study sample: 283
- Over 50% aged 26-35
- Average age 35



E-bike-tourism in the region Dahme-Spreewald

Practical Implementation

- Cooperation with the “Tourismusverband Dahme-Seen”
- E-bike rental stations in the region since 2011 (movelo and others)
- Online and written survey of e-bike-tourists (after use of e-bike, after one year) starting August 2016

Preliminary findings

- Challenges for e-bike-rental in the region Dahme-Spreewald (e.g. no hilly topography, mainly day-trip tourists from Berlin with low income, lack of e-bike transport for one-way-trips, ...)



Summary: Visions for sustainable transport and the role of e-bikes

- E-bikes can contribute to a sustainable development in transport.
- The number of e-bikes will probably increase, even without any political support.
- Action is needed to facilitate e-bike use and to take full advantage of their potential.
- The challenge is to convince policy-makers to take action. Political focus still lies mainly on strategies to decarbonise the current transport system (e.g. electric cars, powergenerated fuels).



Thank you for your attention!



Do you have any questions?



Discussion

- What are the main challenges for the transformation?
- What brings about (and brought in the past) (sustainability) changes in the sector?
- What role do different actors play for the transformation?
- How can state actors at different levels support & govern the transformation (towards sustainability)?
- What are experiences from other countries?
- ...

