Making Urban Transport Sustainable: Insights from Germany

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Outline

- Background Germany
- Sustainability of the Urban Transport System
- Determinants of Travel Behavior
- Transport Policies in Germany
  - Federal Level
  - Local Level – Case Study of Freiburg
- Conclusion/Lessons
Some Context About Germany

- Federal system of government, tradition of local self-government
- Strong economy, high standard of living
- Important automobile industry
- Highest level of car ownership in the world
- Most adults have a driver’s license
- Extensive road network
- Much urban & suburban (re)development since World War II

Autobahn (A-5) in 2010.

First “Autobahn”, 1931, (Source: BMVBS, 2007)

Cycling, walking, and public transport share of trips in Europe and USA 1999-2008

Source: Data collected by author from recent national travel surveys.
Relationship between Share of Urban Trips by Transit, Bicycle, and Foot and Per Capita Annual CO₂ Emissions from Road and Rail Transport in Australia, Canada, the USA and EU Countries, 2000-08

R² = 0.74

More sustainable ground passenger transportation in Germany than USA

- ~3 times more CO$_2$ emissions per capita in USA
- ~3 times more energy use per capita in USA
- 2.3 times higher traffic fatalities per capita in USA
- U.S. households spend more for transport (19% vs. 14%)
- Higher annual per capita government expenditures for roads and public transport ($625 vs. $460)
- Over two times larger share of U.S. population considered obese

Trends in Population Proportions of Walking and Cycling 30 Minutes per Day in the USA and Germany


* statistically significant change within the country during the period 2001/2002 to 2008/2009 (P<0.05)

Note. Respondents 5 years and older

Determinants of travel behavior

- Socioeconomic and demographic factors
- Land use/spatial development patterns
- Transportation policies
- Land-use planning and policy
- Culture/preferences
At all income levels Germans drive for a lower share of trips than Americans.

Americans with limited car access drive as much as Germans with easy car access.
Americans drive more than Germans at every population density

Americans drive for most short trips

Individuals make the travel choices that ultimately determine the sustainability of transport

Governments provide the crucial policy framework that influences travel choices
Framework: Federal Policies in Germany

- **Taxes and regulation** make car use more expensive
- **Flexible funds** for walking and cycling
- **Dedicated funding for transit investments**
- **Regulations** that **guide land-use planning** and require cooperation among levels of government
- **Strategic leadership** in transport and land-use planning
- **Most policies** that make transport more sustainable are developed on the **local level**
- In the following: **Federal framework plus local policy examples from Freiburg, Germany’s Environmental Capital**
Case Study Freiburg

- 220,000 inhabitants, 120,000 jobs, 30,000 students
- Gateway to Black Forest Region (620,000 pop.)
- Economy and population have grown faster than German average

- Strong environmental policy since 1970s
- Germany’s *Environmental Capital*
- Important Eco-Industry (10,000 jobs, €500m GDP)
- *Green Party* mayor

Thanks to Bernhard Gutzmer, Uwe Schade, Wulf Daseking (all city of Freiburg), Andreas Hildebrandt (VAG Freiburg)
Stagnating levels of motorization in Freiburg (cars & light trucks per 1,000)

Sources: (BMVBS, 1991-2008; City of Freiburg, 2009b; FHWA, 1990-2008)

Declining share of trips by car

Freiburg: sustainability trends

- VKT Car use declined by 7% from 1990 to 2005
  - local roads only: -13%
- Per-capita CO₂ emissions from transport: -13%
  - to a level that is only 29% of U.S. average
- Bicycle safety: Freiburg: 1.2; Germany: 1.7, USA: 5.8 fatalities per 10 million km cycled
- Transit operating budget subsidy per year: Freiburg 10%, Germany 25%, USA 65%

COST OF AUTOMOBILE OWNERSHIP AND USE
Unleaded Gasoline Prices per Liter in the USA and Germany, 1990 - 2007 (in U.S. dollars, using PPP)

Environmental tax reform in Germany, 1999-2003

Gasoline tax increased by 75 U.S. cents per gallon over 5 years

Highway user taxes and fees as share of road expenditures by all levels of government in Germany and the United States

Road Expenditure = Highway User Taxes and Fees

Freiburg: Traffic Calming of Neighborhoods

(Source: City of Freiburg)
City Center Pedestrian Zone since 1973

(Source: City of Freiburg & own pictures)
Freiburg: Parking Management

Current

Planned

(Source: City of Freiburg)
Muensterplatz 1960s

Source: City of Freiburg
Muensterplatz 2000

Source: City of Freiburg
MAKING PUBLIC TRANSPORT IRRESISTIBLE
Share of All Trips by Public Transport in Selected German Cities, 2003-2007

Note: city population size in 1,000 inhabitants in parenthesis

Integrate public transport fares and timetables

Seamless transfers across operators and public transport modes

Steep discounts for monthly/annual tickets; students and elderly

Goal: improving service and connectivity

State Wide public transport tickets
- About 30 Euros for up to 5 people

Source: http://www.oepnv-info.de/dkarte/index.php
Trend in Annual Transit Trips in Selected “Verkehrsverbunds" in Germany, 1991-2006 (in percent relative to 1991)*

*Note Verkehrsverbund Frankfurt relative to 1998 and Verkehrsverbund Berlin relative to 1992

Trend in Farebox Revenue as Share of Transit Operating Expenditure in Germany and the USA, 1992-2007

Freiburg: Regional coordination of services and ticketing

- Transferable “Environmental Protection” since 1984
- Regional monthly transit ticket since 1991
- Regional Transit Authority (75 towns, 187 operators, 3050km of routes)
- Annual ticket: 450 Euros
- Students pay 69 Euros for 6 months
- RegioMobilCard includes car sharing
- Signal priority for light rail
- Financial efficiency increased

(Source: City of Freiburg)
Freiburg: Expanding light rail

(Source: City of Freiburg)
Modern, attractive, convenient trams, buses, metros, and suburban rail trains

Source: City of Berlin

Source: author’s pictures if not indicated differently
Freiburg: Integration of modes

(Source: Google Maps)
Multi-modal coordination

Source: author’s picture, City of Muenster, Pucher
PROMOTING BICYCLING
German “cycling boom” since the 1970s

Federal involvement in bicycling

• Recent national bicycling plan (2002)

• Flexible funding mechanisms (GVFG)

• Construction of bike paths along federal roads
  • €1.1 billion to doubling the extent of bikeways along federal highways from 1980 to 2000

• Technical expertise (BAST)

(Source: BMVBS)
Most German children take cycling lessons by the 3rd or 4th grade and must pass a police-administered cycling safety test!

(Source: own pictures)
Freiburg: Regional Bike Network

(Source: City of Freiburg)
Freiburg: Bike Parking

(Source: Swearingen White and own pictures)
Bicycle Infrastructure: Lanes, Streets, Paths, Boxes

(Source: City of Freiburg, Swearingen White, and own pictures)
INTEGRATE TRANSPORT AND LAND USE PLANNING
Reciprocal land-use planning in Germany

Federal Level

State Level

Regional Level

Municipal Level

Specialized Planning (e.g. Transport, Energy, Water)

Freiburg: Complementary Goals of most Recent Transport and Land–Use Plans

- Goals of Transport Planning
  - Minimize car travel
  - Move car trips to other modes
  - Make car travel as environmentally friendly as possible

- Goals of Land-Use Planning:
  - Improve quality of life
  - “City of Short Distances”
  - Strengthening Freiburg as regional center
  - Preservation of City

Freiburg: Public Transport and Land Use

(Source: City of Freiburg)
Accommodating growth within the city limits

(Source: City of Freiburg)
Vauban & Rieselfeld Neighborhoods

(Source: Berkeley and own pictures)
Lessons for Implementing Sustainable Transport Policies

Integrated Land-Use and Transportation Planning

(Source: City of Freiburg)
Lessons from Germany and Freiburg

- Implement controversial policies in stages
- Plans should be adaptable over time to changing conditions
- Policies must be multi-modal and include both incentives and disincentives
- Fully integrate transport and land-use planning
- Local citizen involvement is an integral part of policy development and implementation
- Support from higher levels of government is crucial to making local policies work
- Sustainable transport policies must be long term, with policies sustained over time, for lasting impact
Thank you!

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