Increasing motorization in western countries, 1960-2008

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

Walking, cycling, and public transport contribute to reduced CO$_2$ emissions per capita

Source: Data collected by author from recent national travel surveys.

### More sustainable urban travel in Germany than in USA

- ~3 times more CO₂ emissions per capita in USA
- ~3 times more energy use per capita in USA
- 2.2 times more traffic fatalities per capita in USA
- U.S. households spend more for transport (17% vs. 14% or $2,500 per year)
- Higher annual per capita government expenditures for roads and public transport in the USA ($625 vs. $460)
- Obesity rate more than twice as high in USA

### Similarities between Germany and the USA

- Federal systems of government, local self-government
- Strong economies, high standards of living
- Important automobile industry
- Highest levels of car ownership in the world
- Most adults have a driver’s license
- Extensive road networks
- Much urban & suburban (re)development since WWII
At all income levels Germans drive for a lower share of trips than Americans

![Bar chart showing share of all trips by income quartile for Germany and the USA.](source: Buehler, R. 2011. “Determinants of Mode Choice: A Comparison of Germany and the USA,” Transport Geography, in press.)

Americans with limited car access drive as much as Germans with easy car access

Americans drive more than Germans at every population density

Comparison of Car Use in Washington, DC and Stuttgart Regions

Americans drive for most short trips

Example Germany: Decreasing Car Use for Young Adults


Framework: federal policies in Germany

- Taxes and regulation make car use more expensive
- More funding for walking, cycling, and public transport
- Land-use planning is stricter and requires cooperation among levels of government
- Strategic leadership through national transport and land-use plans at the federal level
- Specific policies developed and implemented at the local level

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

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 population)

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


Declining share of trips by car

Sources: (City of Freiburg, 2007; University of Dortmund, 2004)

Sustainable Freiburg

- Car use declined by 7% from 1990 to 2005
  - On local roads: -13%
- Per-capita CO₂ emissions from transport: -13%
  - Only 29% of U.S. average
- Bicycle fatalities per 10 million km cycled:
  - Freiburg: 1.2; Germany: 1.7; USA: 5.8
- Subsidy share of public transport operating budget:
  - Freiburg: 10%; Germany: 25%; USA: 65%


Share of Trips by public transport, cycling, and walking in Freiburg and cities of comparable population size (~200,000) in Europe and North America, 2006/2007

POLICIES THAT RESTRICT CAR USE
Prices per gallon of unleaded gasoline in the USA and Germany, 1990 - 2010 (in U.S. dollars, using PPP)


Environmental tax reform in Germany, 1999-2003

Gasoline tax revenues quadrupled over 5 years.

Increased gasoline tax revenues used to reduce social security taxes

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

![Graph showing road expenditure compared to highway user taxes and fees for Germany and the USA from 1975 to 2009.](Source: Buehler, R., Pucher, J., Kunert, U. 2009. “Making Transportation Sustainable: Insights from Germany.” Washington, DC: The Brookings Institution, Metropolitan Policy Program.)

Freiburg: Traffic calming of neighborhoods

![Map of Freiburg showing traffic calming measures.](Source: City of Freiburg)
Typical residential street in Freiburg BEFORE traffic calming reforms

Traffic calming in Freiburg suburbs

(Source: Pucher)
City center pedestrian zone since 1973

Muensterplatz 1960s

(Source: City of Freiburg & own pictures)
Muensterplatz 2000

Source: City of Freiburg

Car-free Broadway in New York City

Times Square
Herald Square
‘Pedestrian scramble’ in Toronto

High Line in New York City

…from an abandoned freight line to a popular promenade…
IMPROVING PUBLIC TRANSPORT

Number of annual public transport trips per capita in Europe and North America, 2005-2010

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
- 29-37 Euros for up to 5 people for entire day, local and regional trains

Regional public transport authorities

Freiburg:
Regional coordination of services and ticketing

Transferable “environmental” ticket since 1984
Regional monthly ticket since 1991
Regional Public Transport Authority
- 75 towns, 17 operators, 3050km of routes
Annual ticket: 450 Euros
Students pay 69 Euros for 6 months
RegioMobil Card includes car sharing
Financial efficiency increased

(Source: City of Freiburg)
Passenger revenue as share of public transport operating expenditure in Germany and the USA, 1992-2007


Freiburg: Expanding light rail

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

Source: City of Berlin

Multi-modal coordination

Source: Buehler, Pucher, Berkeley
Bike parking garages at Union Station in Toronto and Washington, DC

PROMOTING BICYCLING
Increasing bicycling levels in Germany since the 1970s

Federal involvement in bicycling

• 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)
Extensive, fully-integrated bikeway network in Freiburg

Bicycle Infrastructure: Lanes, Streets, Paths, Boxes

(Source: City of Freiburg, Swearingen White, and own pictures)
Most German children take cycling lessons by the 3rd or 4th grade and must pass a police-administered cycling safety test!
German law favors pedestrians and cyclists over motorists

1,100 km of bicycling facilities in Berlin plus 3,800 km of traffic calmed streets = 10% bike share of all trips
Trend in bike paths and lanes per 100,000 population in nine large North American cities, 2000-2010

- 250 mi of new bike lanes and paths since 2005
- Doubling in bike trips
- Halving of cyclist fatalities from 28 to 14

Traffic-protected cycle track on 9th Avenue, NYC
Multiuse pathways in Ottawa and Minneapolis

[Images of people cycling and walking on pathways]

Source: Buehle

Photo: Hans Moor

Stone Arch Bridge in Minneapolis

[Image of Stone Arch Bridge]

Cycle track on Pennsylvania Avenue in Washington, DC

[Image of cycle track with the U.S. Capitol in the background]

Connects the White House with U.S. Capitol
Nice Ride in Minneapolis

Over 20 bike sharing systems in North America

Hubway Bikeshare in Cambridge, Boston, Somerville, and Brookline

Bike training for children

Source: NJ Bike Walk Coalition
INTEGRATE TRANSPORT AND LAND-USE PLANNING

Freiburg: Complementary goals of most recent transport and land–use plans

- Goals of land-use planning:
  - Improve quality of life
  - Create a “City of Short Distances”
  - Strengthen Freiburg as regional center
  - Preserve city center as historical district

- Goals of transport planning
  - Minimize car travel
  - Shift car trips to other modes
  - Mitigate harmful impacts of cars

Freiburg: 80% of all residents live within 0.5 kilometers of light rail

Accommodating growth within city limits
Vauban & Rieselfeld Neighborhoods

Rosslyn-Ballston Corridor, Arlington (VA): Metrorail alignment and ‘bulls-eye’ concept 1972

Source: Arlington County
Rosslyn Ballston Corridor, Arlington (VA)
1970 and today

Lessons 1

- Policies should be multi-modal including both incentives and disincentives
- Crucial to restrict car use in cities
  - Traffic calming of residential neighborhoods
  - Car-free zones & limited parking in city centers
Lessons 2

- Support from higher levels of government
- Implement controversial policies in stages
- Policies must be long term for lasting impact
- Integrate transport and land-use planning

New book with MIT Press
http://citycyclingbook.wordpress.com

About the authors:
http://policy.rutgers.edu/faculty/pucher/
http://ralphbu.wordpress.com
Thank you!

Ralph Buehler, Assistant Professor
Urban Affairs and Planning
Virginia Tech, Alexandria Center
ralphbu@vt.edu
Phone: 703-706-8104
http://beta.spia.vt.edu/rbuehler/
http://ralphbu.wordpress.com/