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IMPACTS OF DEMAND MANAGEMENT AND PRICING POLICIES ON URBAN TRAVEL DEMAND AND CO2 EMISSIONS

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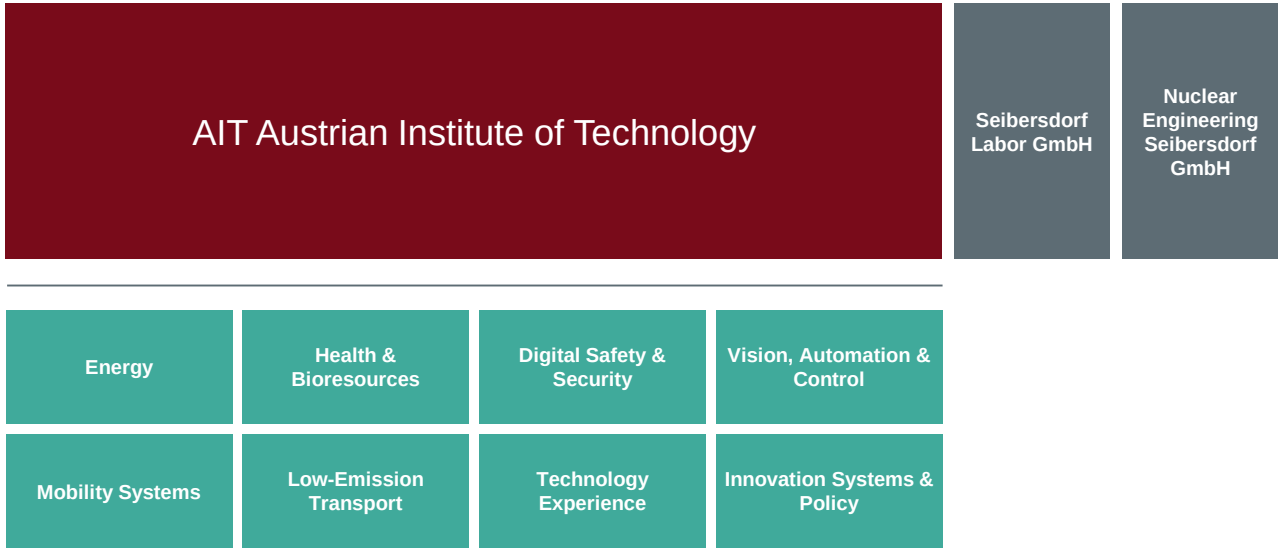

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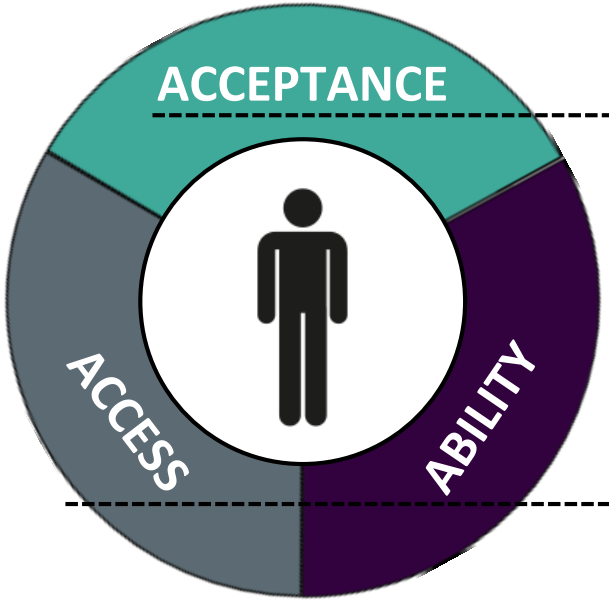
DEMAND MANAGEMENT

Where mobility demand originates and how it can be influenced

DEMAND FOR MOBILITY OPTIONS



„WANT“

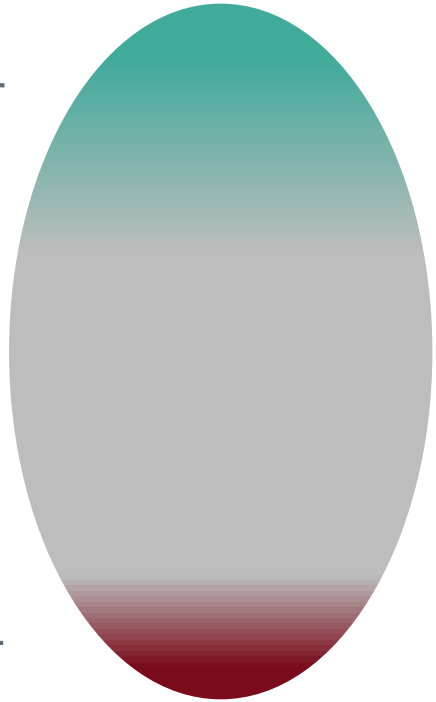
… but lacking access or ability

„CAN“

… but lacking acceptance

CHANGE POTENTIAL

high willingness to change (~20%)



no willingness to change (~10%)

Population

„WANT“ *… but lacking access or ability*

„CAN“ *… but lacking acceptance*

[project „pro:motion“, representative survey in Austria]

CHANGE STRATEGIES

FACILITATE

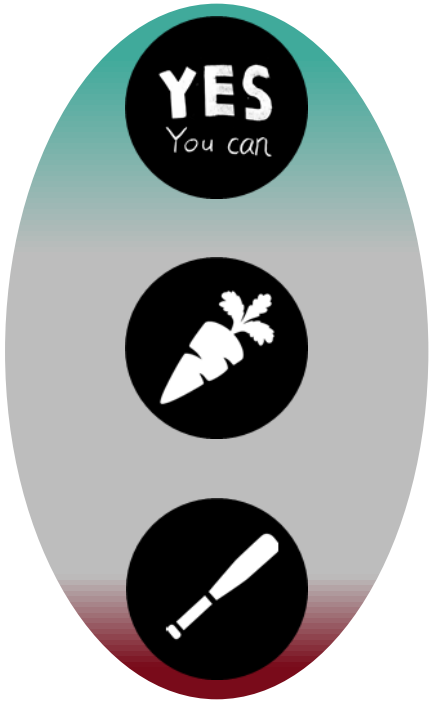
improve access
strengthen ability

PERSUADE

motivate
incentivise

FORCE

coerce
penalise



Population

„WANT“

… but lacking access or ability

„CAN“

… but lacking acceptance

PRICING POLICIES

How to use monetary measures to steer demand

ROAD PRICING SCHEMES

Category	Primary goal	Financial benefits	Reduction congestion	Reduction pollution
Road Tolls	Increase revenues	***	**	*
Value pricing	Increase revenues and reduce congestion	**	***	**
High Occupancy Toll	Increase revenues	*	**	*
Travel distance based charging	Increase revenues, improve the equilibrium between demand and supply of mobility	***	**	**
Travel time based charging	Increase revenues, improve the equilibrium between demand and supply of mobility	***	**	**
Road Space Rationing	Reduce congestion within the urban area	-	***	*
Cordon-based charging/ Zonal Schemes/ Satellite-based road pricing schemes	Reduce congestion within the urban area	**	***	*

[Gervasoni and Sartori, 2007]

CONGESTION CHARGING SINGAPORE

- Area Licensing Scheme (ALS) introduced 1975
- paper system of daily licenses for vehicles entering the central zone during peak traffic periods
- Electronic Road Pricing (ERP) since 1998
- Peak fee (each entry) S$ 4 (€ 2,5)
- Aim: reduce traffic during peak hours

[DOT - FHWA, 2017]

CONGESTION CHARGING SINGAPORE - EFFECTS

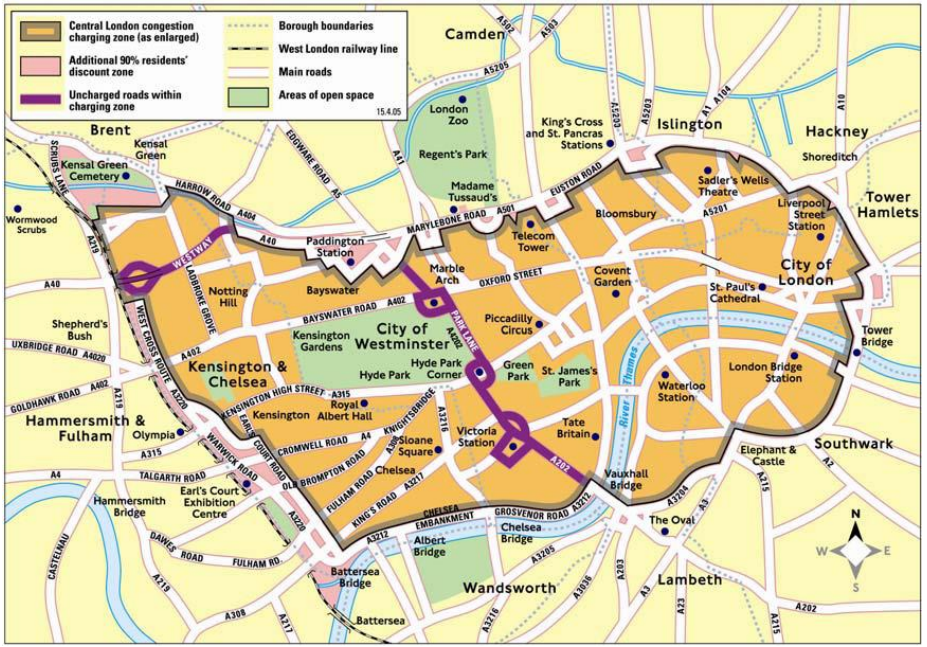
- Traffic reduction:
  - ALS: reduction of entering cars: - 73% (vehicles: -44%)
  - Shift to public transit and shift in trip departure times
  - Speed in area increased by 20% or more during morning peak, speed on bypass route dropped by 20%

- Environment and emissions
  - Drop in CO levels during morning peak below previous noon level
  - NOx decreased in monthly average values

[DOT - FHWA, 2017]

CONGESTION CHARGING LONDON

- Introduced 2003, extended 2007
- 170 camera-equipped access points
- Daily charge for driving or parking a vehicle on public roads in the zone (fee: £ 5, currently £ 11,50 - € 14,50)
- Between 07:00 and 18:00, Monday to Friday
- Only 50% of cars get fully charged
- Aim: to reduce traffic and to raise revenues for re-investment in transport



[Croci and Douvan, 2016]

CONGESTION CHARGING LONDON - EFFECTS

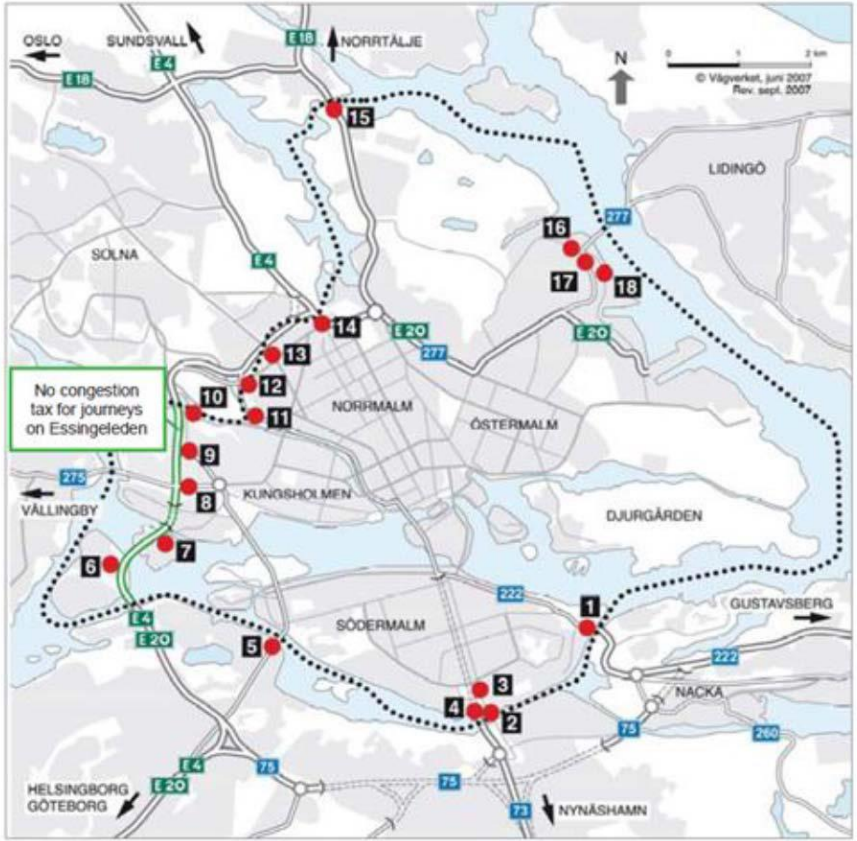
- Traffic reduction:
  - Reduction of vehicle movements (2002 – 2006: -21%, trend ongoing)
  - Reduction of congestion -30% after introduction, meanwhile back on pre-charging levels
  - Increase in public transport and bicycle usage
  - Bus speed increased only in the first year

- Environment and emissions
  - NOx emissions: -13%
  - PM10 emissions: -15%
  - CO2 emissions: -16%

[Croci and Douvan, 2016]

CONGESTION CHARGING STOCKHOLM

- Toll cordon around inner city
- 18 camera-equipped control points
- Introduced 2006 as trial period
- Cost of passing the cordon between SEK 10 and 20 (€ 1-2), daily maximum charge SEK 60
- Fees vary according to peak hours
- Aim: to reduce congestion in the inner city especially during the peak hours, and to improve the environment



[Croci and Douvan, 2016]

CONGESTION CHARGING STOCKHOLM - EFFECTS

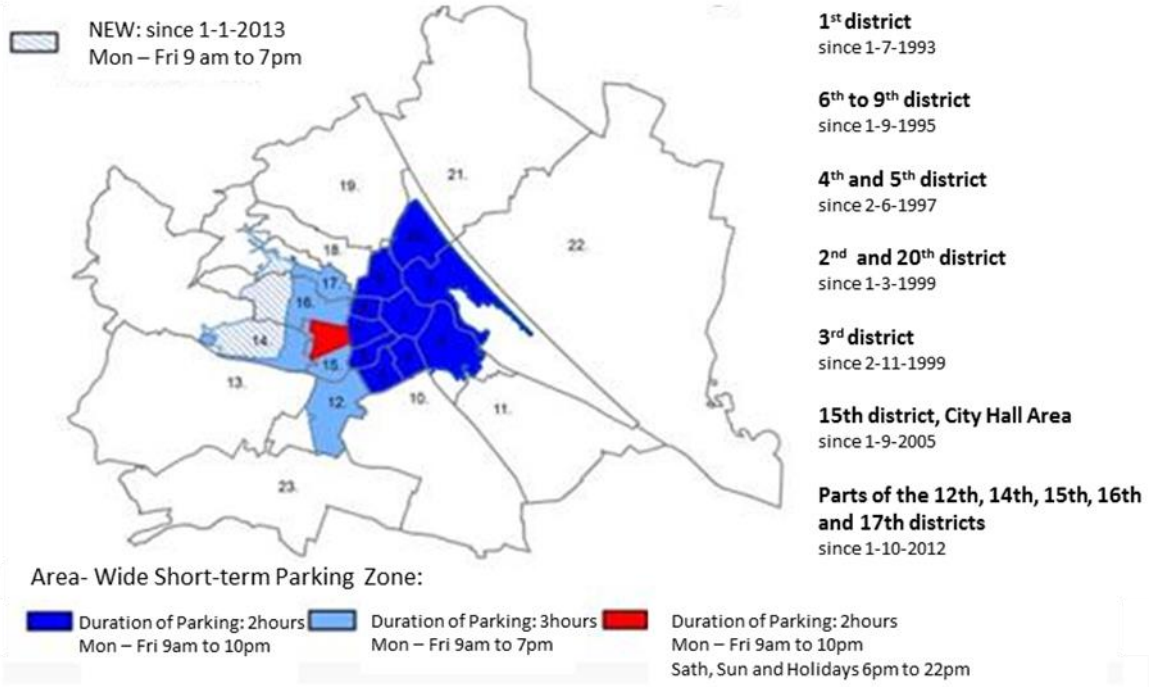
- Traffic reduction:
  - Reduction of passages across cordon: -28% following introduction, now -20% on average
  - Car commuting trips: -24% (99% switched to transit)
  - Non-commuting trips: -22%
  - Commercial traffic: -15%

- Environment and emissions
  - PM10 emissions: -15%
  - CO2 emissions: -14%

[Croci and Douvan, 2016]

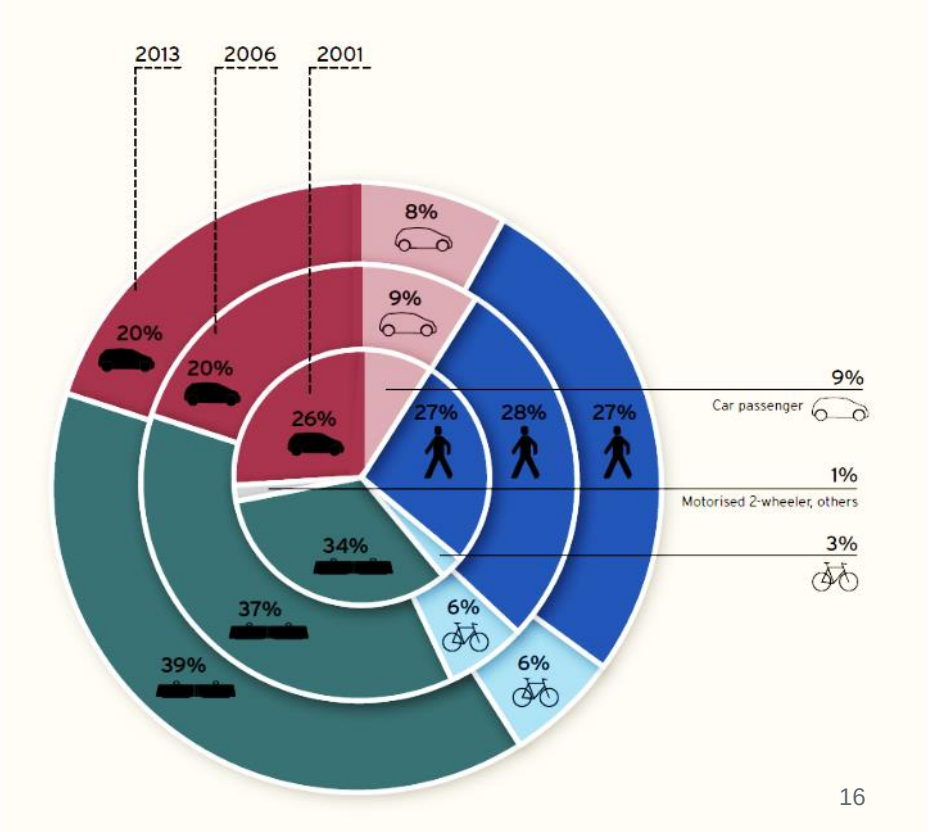
PARKING MANAGEMENT VIENNA

- Started 1993, 3 extension phases
- Entire districts or large connected parts thereof turned into short-term parking zones
- permanent parking permits for residents (annual fee € 90)
- Aim: reduction of car traffic and environmental pollution, improvement of public transit and overall parking situation, more space, higher traffic safety



PARKING MANAGEMENT VIENNA - EFFECTS

- Reduction in average parking spaces occupancy rates (morning: 109% to 71% at first extension phase)
- Reduction in unauthorized parking by 86% (morning) and 76% (evening)
- Reduction in non-residential parked cars by two thirds (morning)
- Spillover effects in adjacent districts
- Reduction in car traffic by 26%
- Modal shift to Public Transport (accompanied by other measures, e.g. introduction of annual public transit pass for € 365)



[ifmo, 2016; Vienncouver Smart.City.Lab]

LEARNINGS

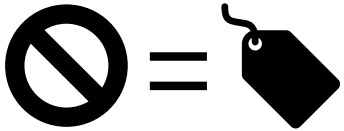
Which aspects improve or limit the effectiveness of pricing measures

SUPPORTIVE MEASURES

- Target „superusers“
  - San Francisco/Boston: only very few driver sources are main contributors to repeated congestion
  - Shifting about 25% from the 1.5 – 2% highest contributors can decrease congestion by 14 – 18%

- Improve alternatives
  - Singapore: incentivising off-peak public transit to compensate high shift in demand (gamification approach: lottery)
  - Vienna: improvement of qualitative and quantitative public transit plus cheap annual ticket

REBOUND EFFECTS AND COPING STRATEGIES



- Behavioural Economics
  - „Irrational“ reactions counteract desired effects
  - Fines become prices: setting a fine for an undesired behaviour may invite this behaviour (people „pay“ for it)

- Coping strategies
  - People become creative when avoiding barriers
  - Singapore: incentivising high occupancy vehicles has been ceased, as people hired passengers for their trips

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THANK YOU!

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