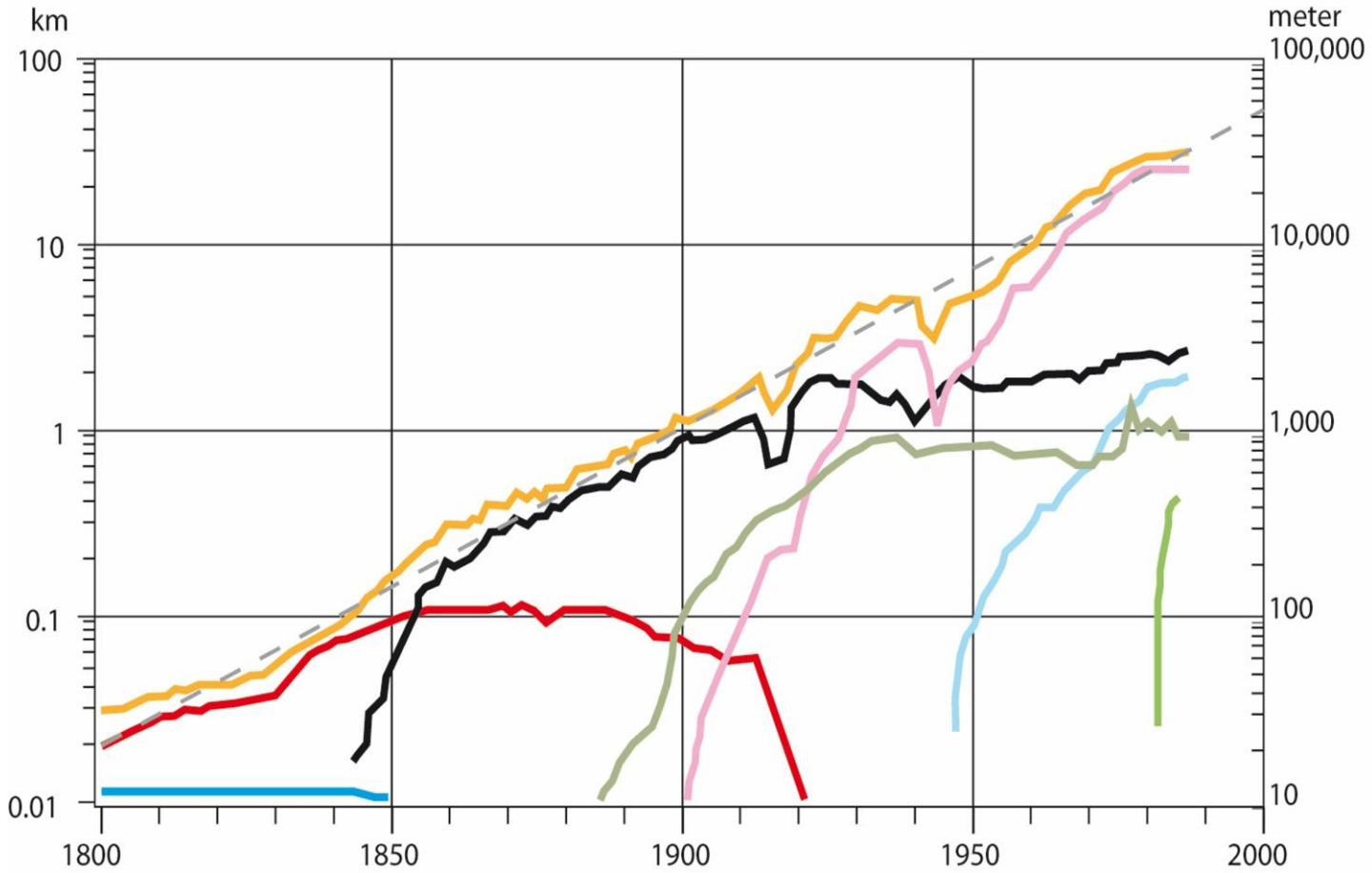
The Fundamentals of Transport Growth

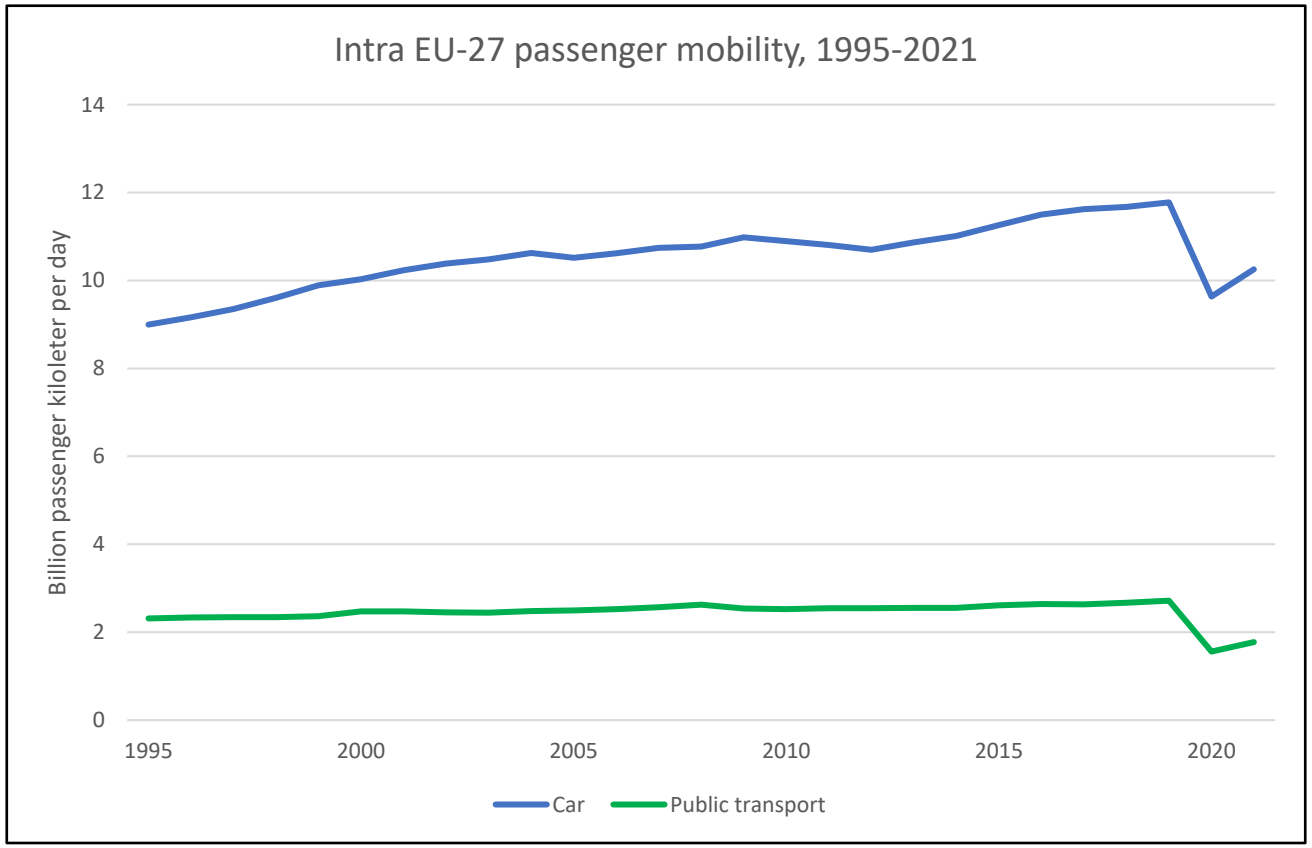


TRANSPORT & ENVIRONMENT

Trends and Analysis team
Online, 12 June 2025

Arie Bleijenberg

Passenger mobility in the EU, 1995-2021



EU Transport in Figures 2023

Explaining the volume of passenger mobility

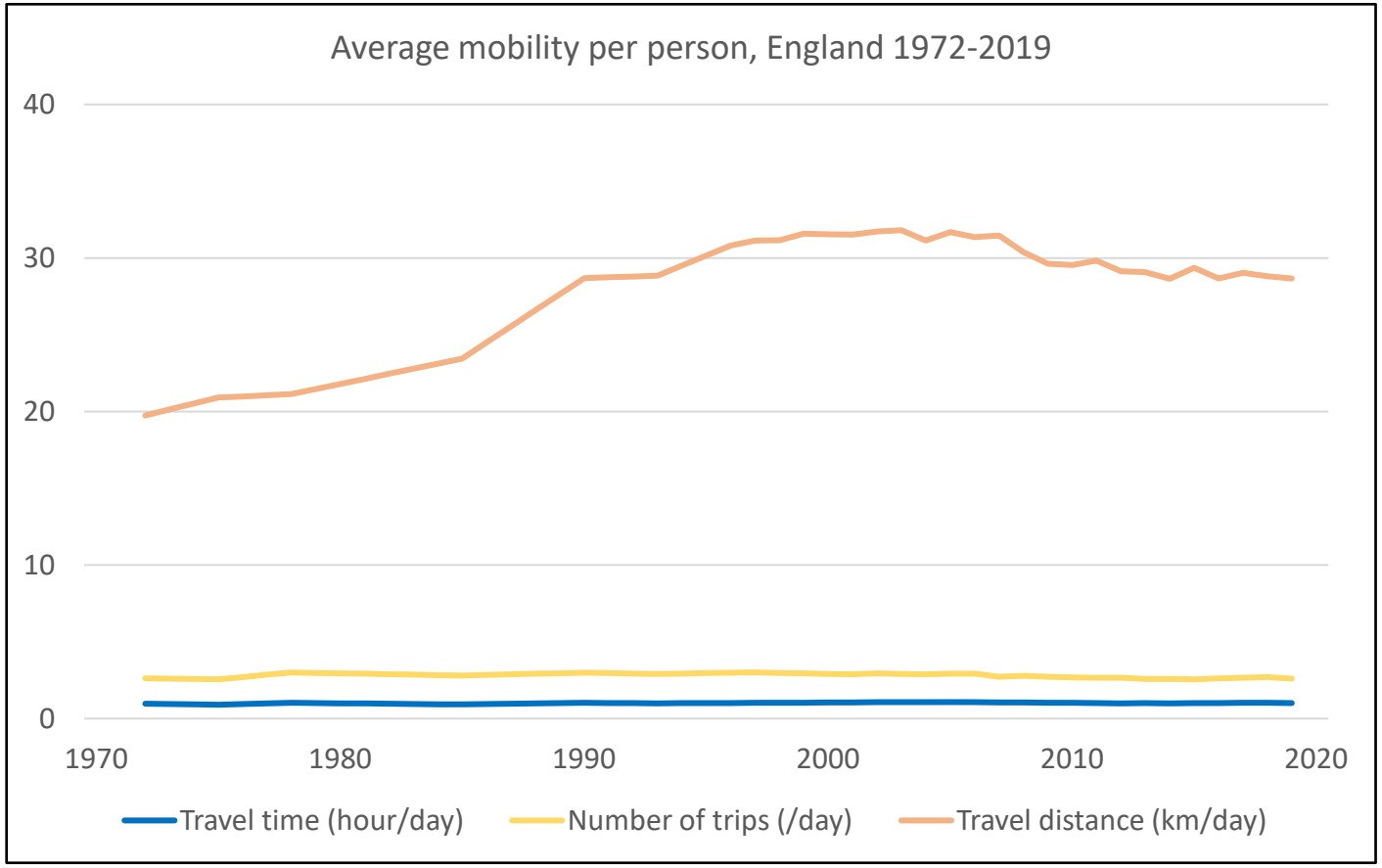
$$\boldsymbol{Mobility}\left[\frac{km}{day}\right] = \boldsymbol{Population}[number]$$

$$\boldsymbol{x\ Average\ travel\ time}\left[\frac{hour}{person.day}\right]\boldsymbol{x\ Average\ speed}\left[\frac{km}{hour}\right]$$

$$\boldsymbol{Average\ travel\ time} \sim \boldsymbol{Constant}$$

Bleijenberg 2021

Average transport time is constant ~ 1.1 hour/day

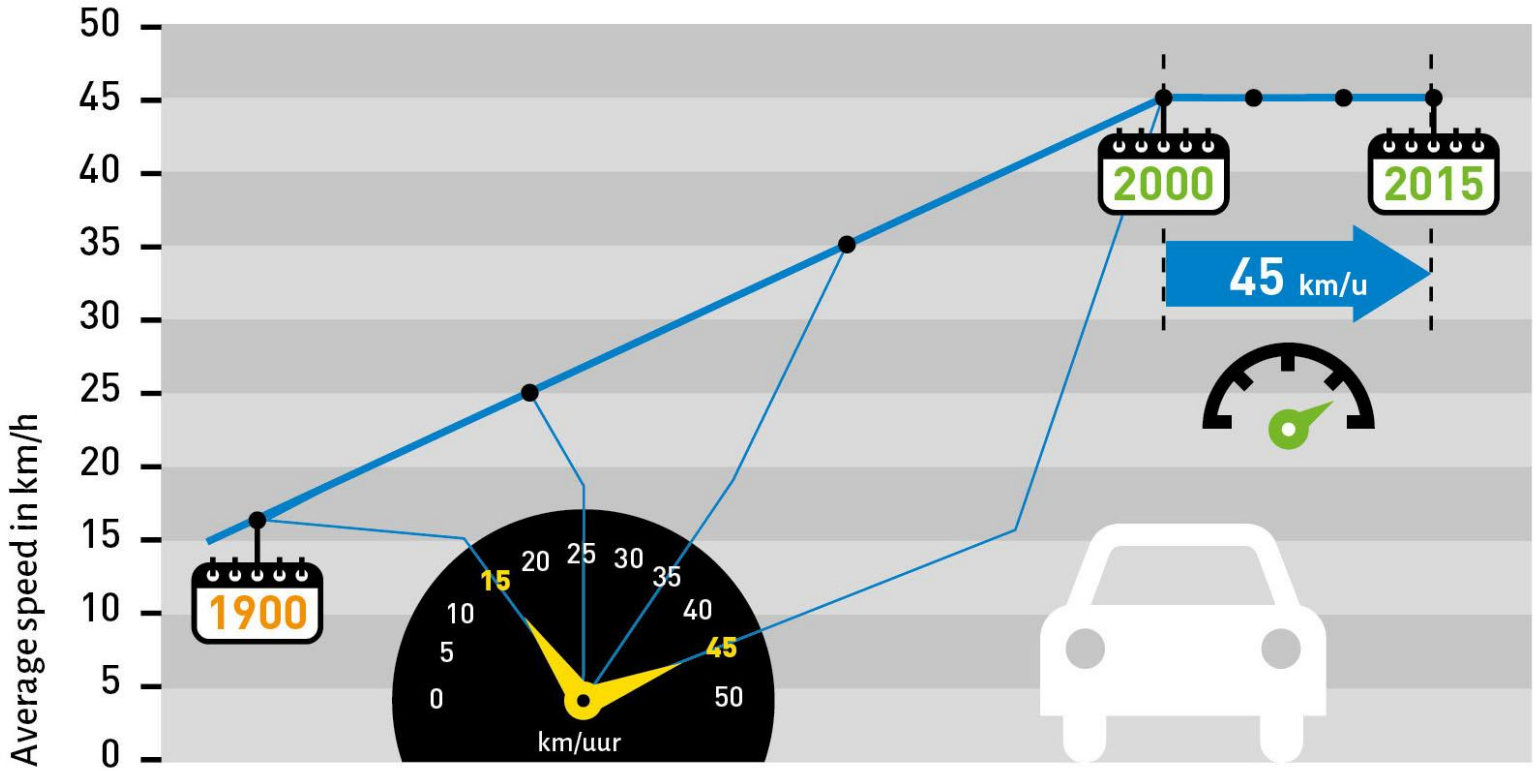


References on constant travel time:

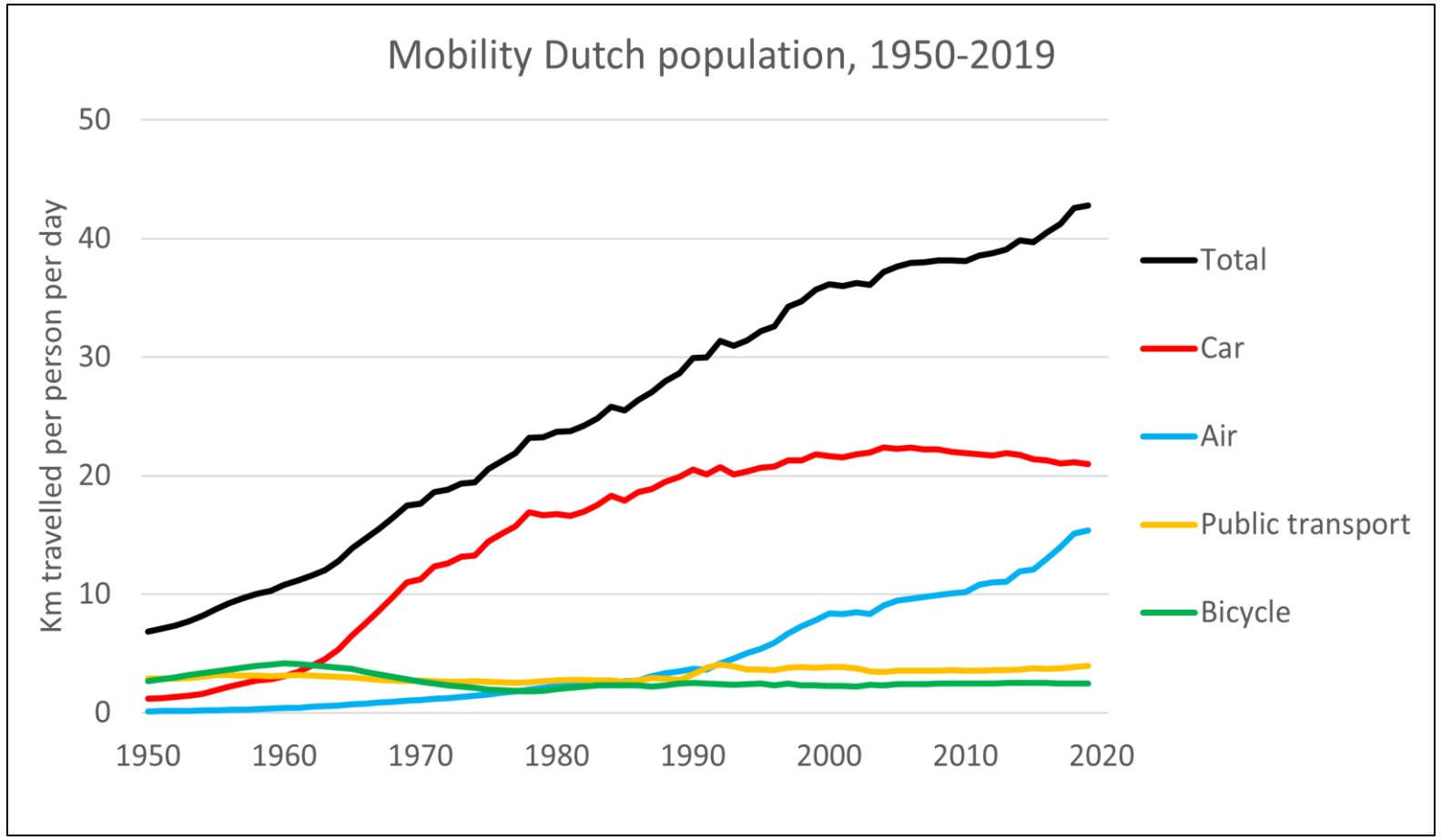
[People do not want to get from A to B]

Department for Transport 2023

Average car speed ~ constant since 2000



Car mobility per person constant since ~ 2000



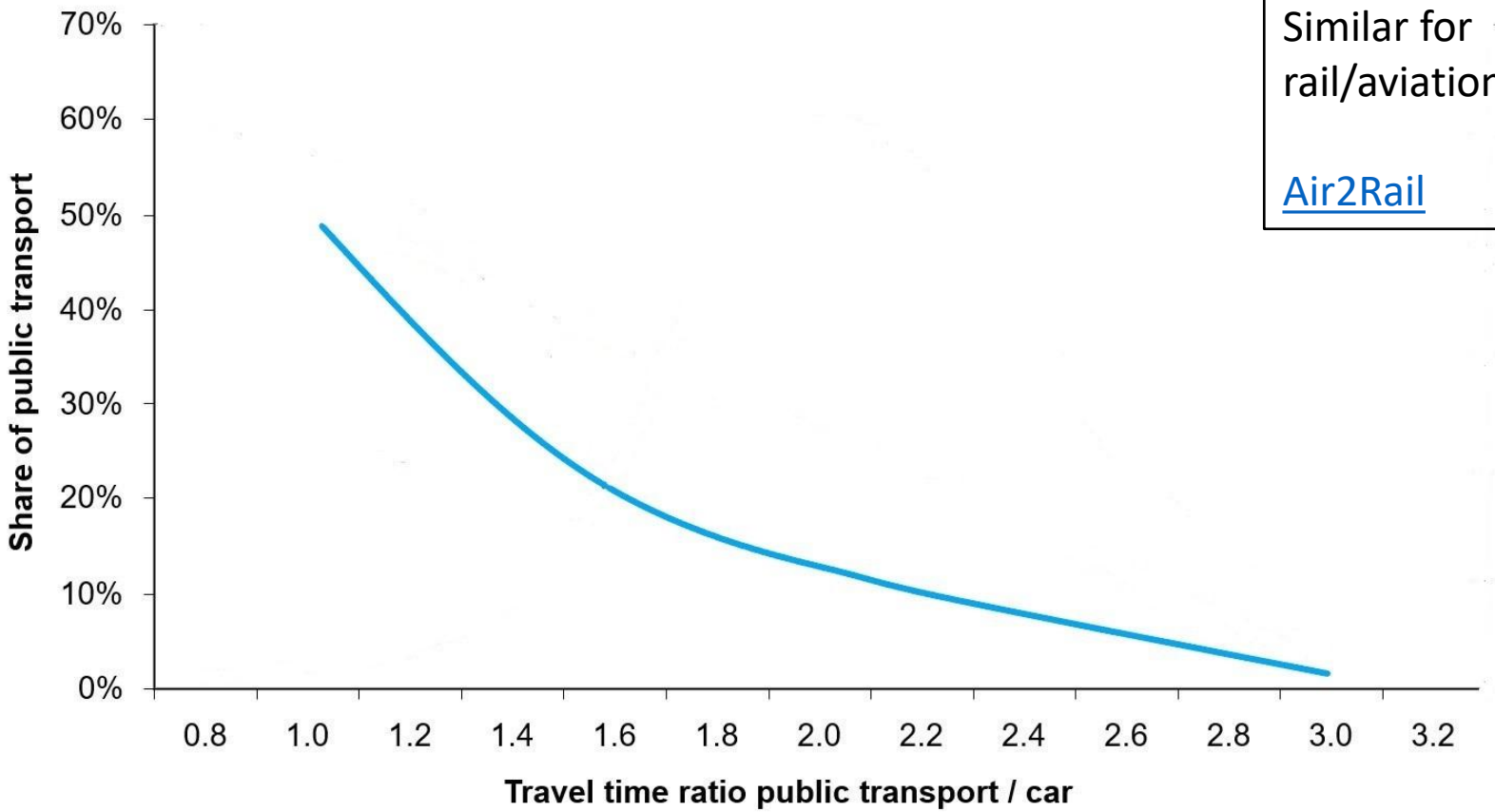
Dutch statistics

Urbanisation determines mobility behaviour

	METROPOLIS	MAJOR CITY	RURAL AREAS	COUNTRY AVERAGE
Trip distance	5 km	10 km	15 km	10 km
Commuting distance	10 km	15 km	20 km	15 km
Speed	15 km/h	25 km/h	35 km/h	30 km/h
Car speed	20 km/h	35 km/h	50 km/h	45 km/h
Trip share of car	15%	50%	70%	60%
Car-kilometres	10 km/day	25 km/day	35 km/day	25 km/day

Bleijenberg 2017

Travel time ratio determines mode choice

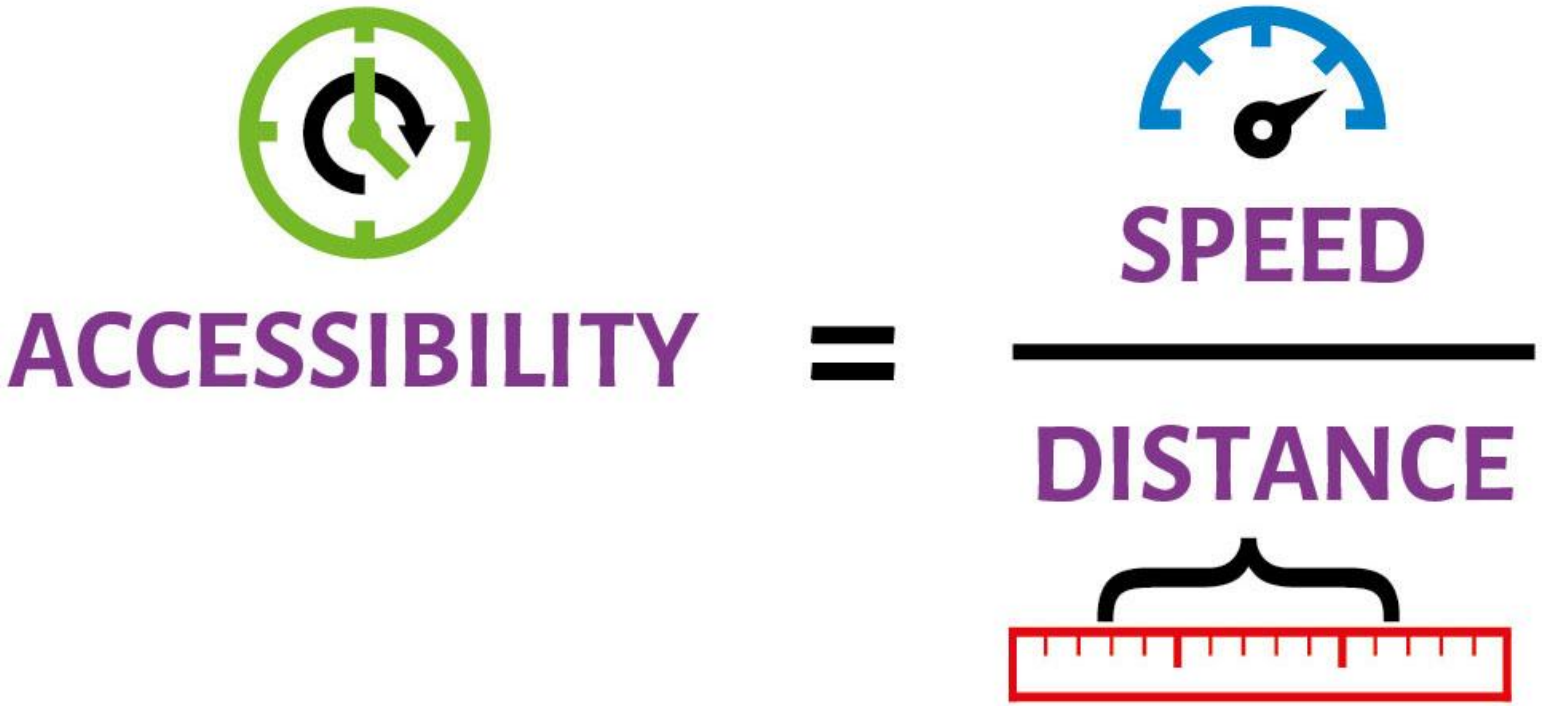


Similar for rail/aviation:

Air2Rail

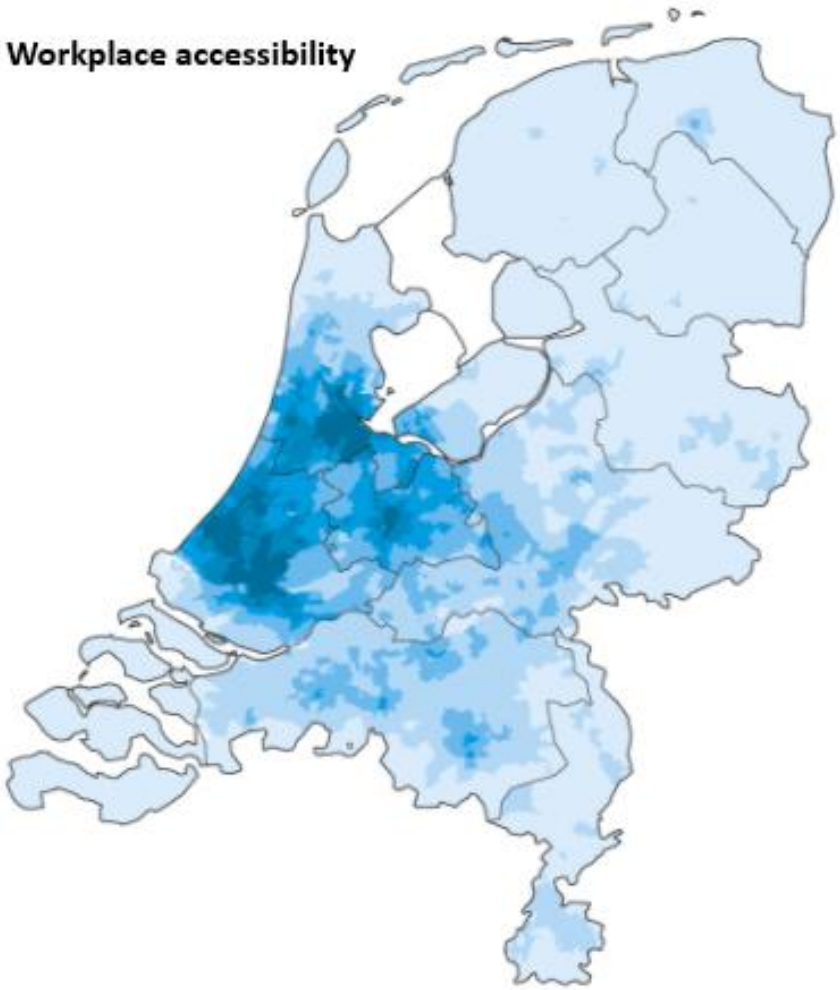
Van den Heuvel 1997

Accessibility is the aim, not mobility



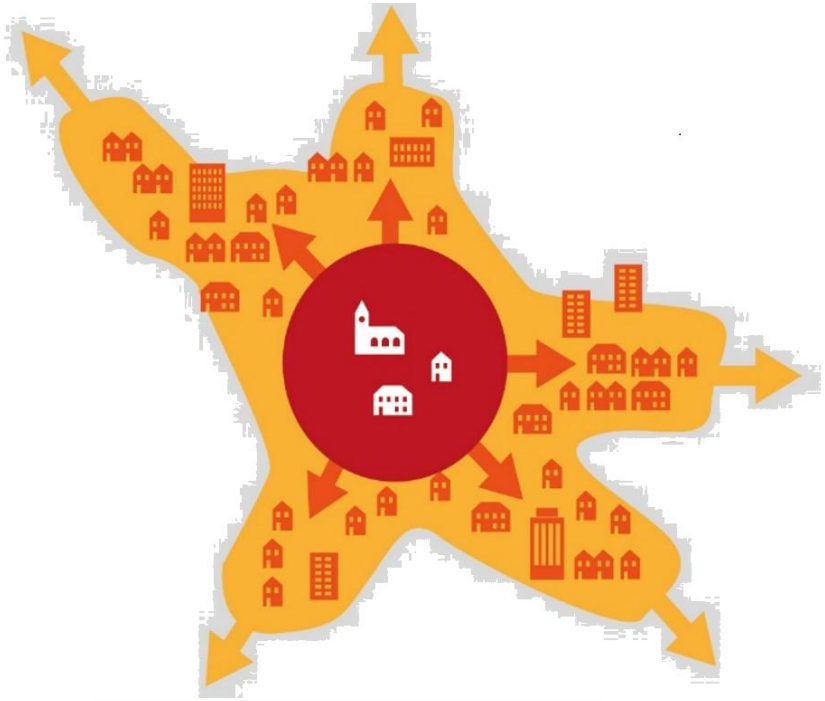
Bleijenberg 2017

Urbanisation creates accessibility

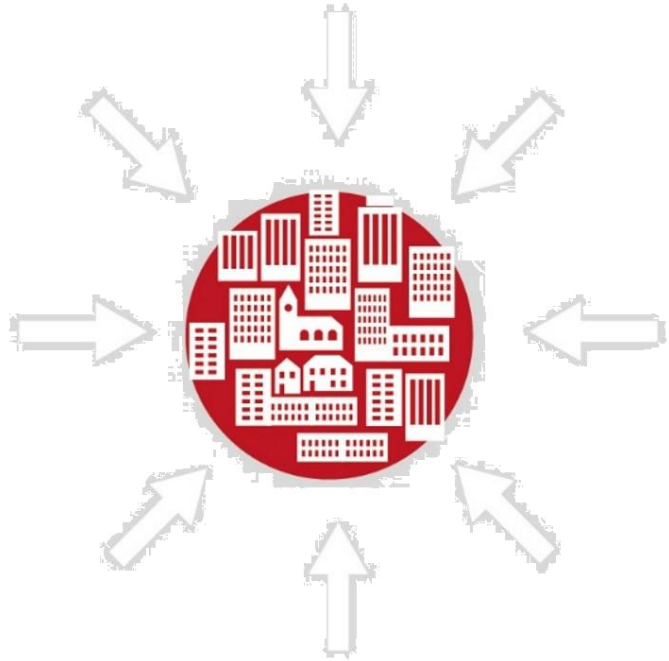


PBL Netherlands Environmental Assessment Agency 2014

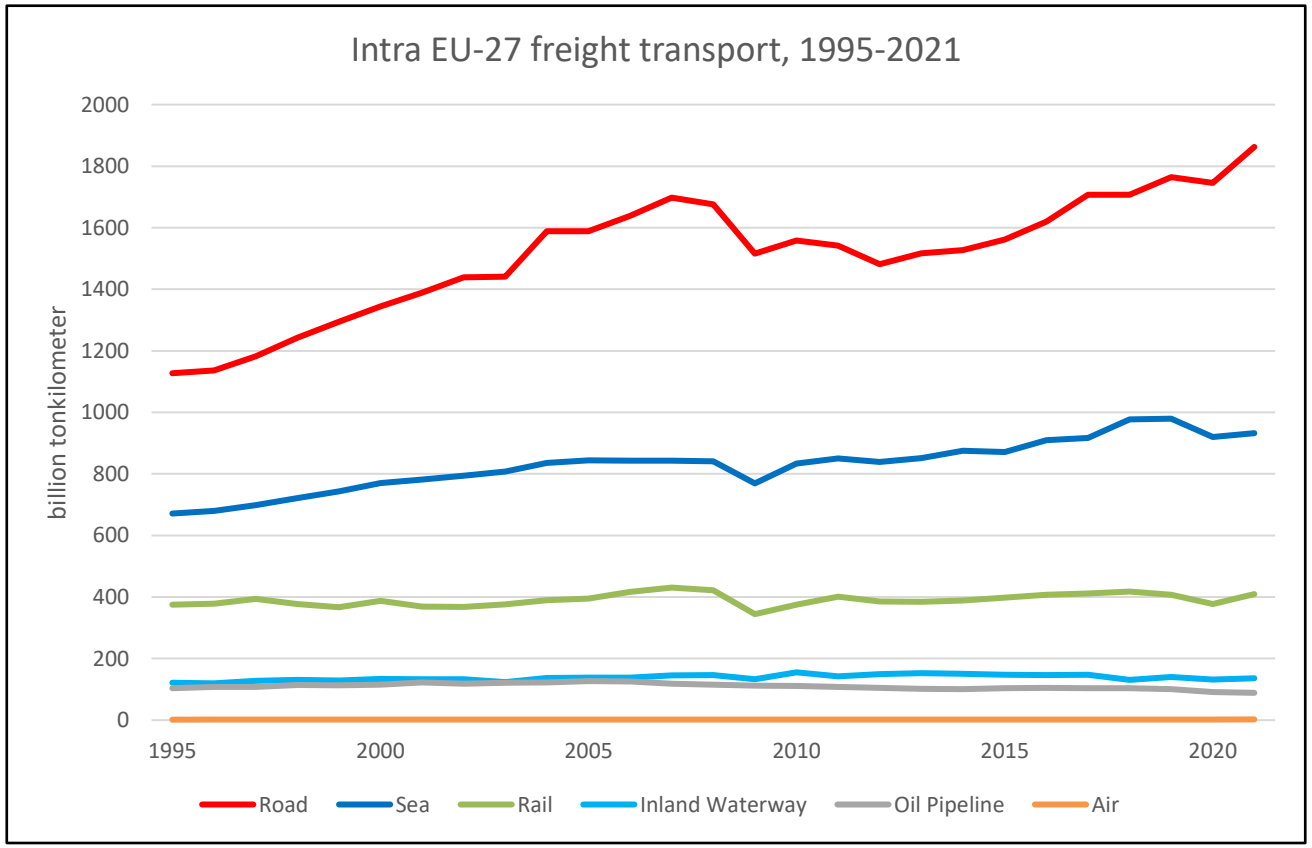
Urbanisation, accessibility and mobility



Urbanisation or sprawl?		
-	Proximity	+
+	Speed	-
-	Accessibility	+
-	Affordability	+
-	Economy	+
-	Spatial quality	+



Freight transport in the EU, 1995-2011



EU Transport in Figures 2023

Explaining the volume of freight transport

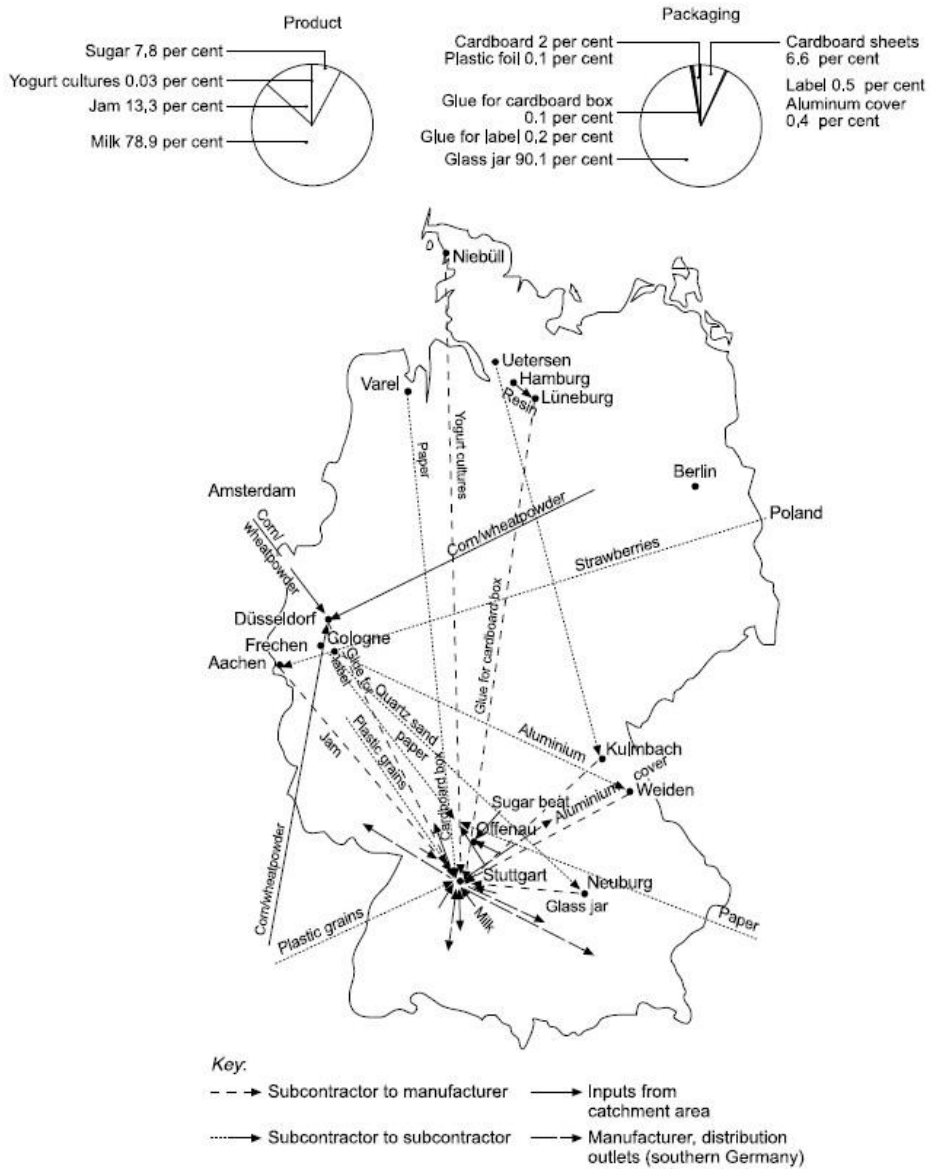
$$\boldsymbol{Freight\ volume}\ \left[\frac{tonne\ km}{year}\right] = \boldsymbol{Consumption\ volume\ (kg\ or\ l)}$$

$$\boldsymbol{x\ Free\ trade\ factor\ \ x\ Assortment}\ \textbf{factor}$$

$$\boldsymbol{x}\ \left[\frac{\boldsymbol{Cost\ savings\ by\ transport\ (scale, comparative, logistics)}}{\boldsymbol{Cost\ of\ transport}}\right]$$

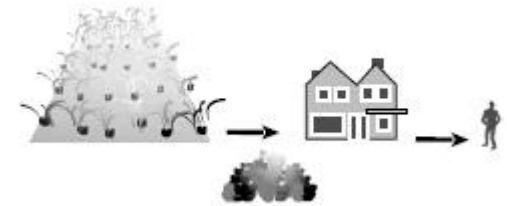
Bleijenberg 2008

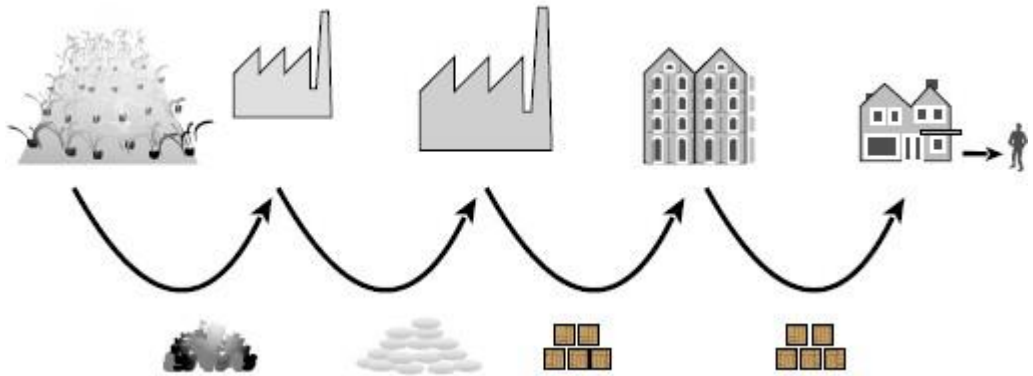
Logistics of a pot of strawberry yoghurt



Böge 1995

Changes in logistic of the UK food and drink sector, 1983-1991





Real value of product consumed and exported
+ 1.2% per year

Weight of product consumed and exported
– 0.3% per year

Handling factor
+ 1.5% per year

Road tonnes lifted
+ 1.2% per year

Average length of haul
+ 2.9% per year

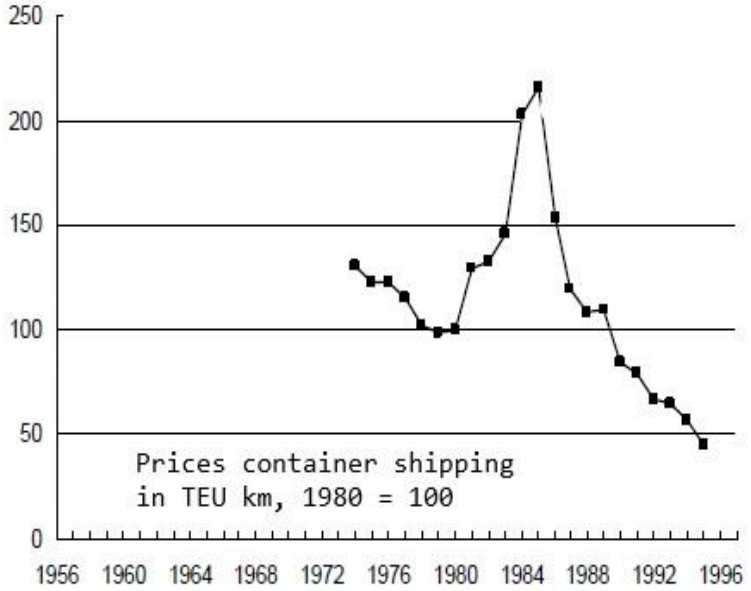
Tonnes-kilometres
+ 4.2% per year

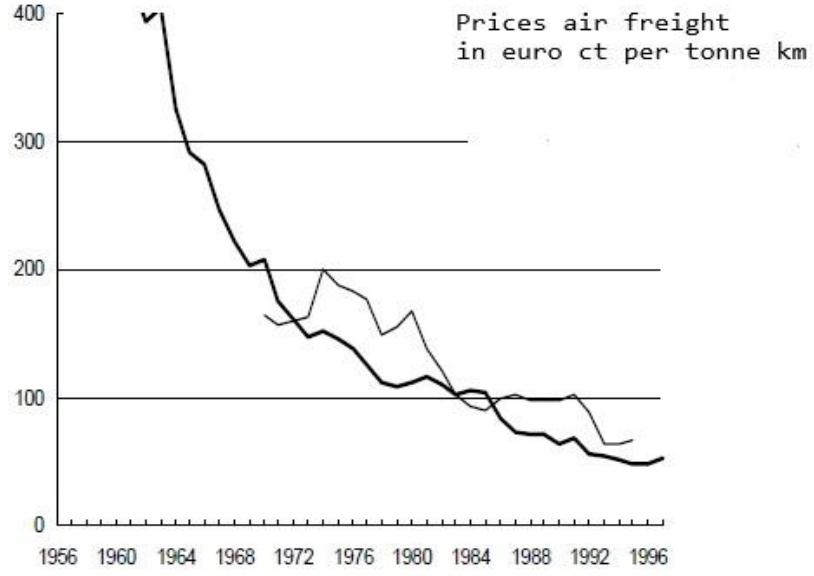
Average consignment size
+ 1.7% per year

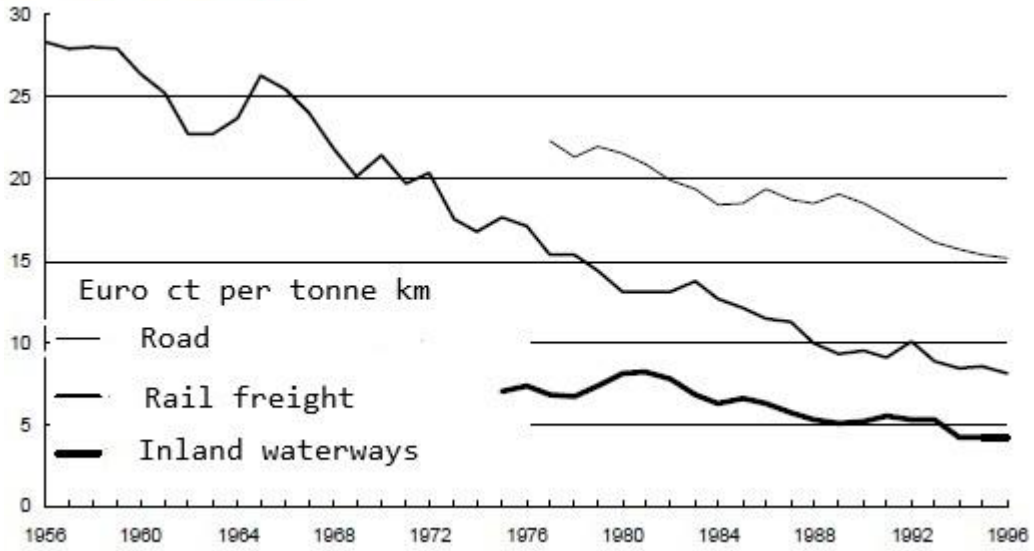
Vehicles-kilometres
+ 2.5% per year

McKinnon and Woodburn 1995, in: Bleijenberg 2003

Price decrease in freight transport







Dings et al 1999

Road freight price elasticities

Price change	Impact on		
	Fuel use	Vehicle kms	Tonne kms
Fuel price	- 0.3	- 0.2	- 0.1
Vehicle kilometre price		- 0.9	- 0.6
Tonne kilometre price			- 1.0

- The fuel price elasticity with regard to total fuel demand includes three behavioural responses: changes in fuel efficiency (-0.1), changes in transport efficiency (-0.1) and changes in road freight transport demand (-0.1).
- The vehicle price elasticities also consist of three effects: changes in mode (-0.3), changes in transport demand (-0.3) and changes in transport efficiency (-0.3).
- Finally, for the tonne kilometre price elasticity two effects can be distinguished: change in mode (-0.4) and change in transport demand (-0.6).

De Jong et al 2010

Social costs of continental freight transport

	Road freight	Rail freight	Inland waterways
Infrastructure costs	23 €/1000 tkm	30 €/1000 tkm	19 €/1000 tkm
External costs	35 €/1000 tkm	13 €/1000 tkm	19 €/1000 tkm
Taxes and charges paid	15 €/1000 tkm	7 €/1000 tkm	2 €/1000 tkm
Uncovered social costs	**43 €/1000 tkm**	**36 €/1000 tkm**	**34 €/1000 tkm**
Transport volume 2021	1,863 billion tkm	410 billion tkm	136 billion tkm
Uncovered social costs 2021	**80.1 billion euro**	**14.8 billion euro**	**4,6 billion euro**

European Commission 2019 and EU Transport in Figures 2023

Effective policies to reduce transport volume

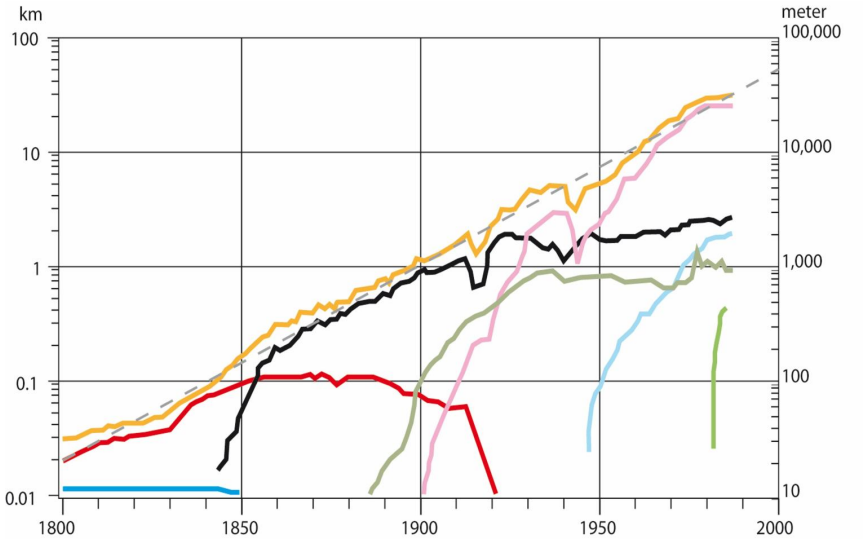
The Fundamentals of Transport Growth indicate as effective policies	
Cars	Urbanisation, urban density, spatial concentration Limited road capacity and parking places in cities Limited highway capacity *See Clean cars vs less traffic*
Air travel	Ticket taxes and VAT Blending mandates for clean and expensive e-fuels Limited airport capacity
Trucks	Kilometre charging Limited road capacity
Maritime shipping	Blending mandates for clean and expensive e-fuels Taxes and charges
Air freight	Blending mandates for clean and expensive e-fuels Fossil fuel taxes

Transport growth is framed by vested interests

	Conventional wisdom	In reality
Issue	Demand	Volume, activity (ITF), performance (EU)
Policy focus	Demand management	Quality and price of supply of transport
Impact	Modal shift	Shorter travel distances
Aim of passenger transport	Mobility	Accessibility
Causes growth of passenger	Economic growth	High speed and low prices
Aim of freight transport	Economic growth	Low prices consumer goods
Causes growth of freight	Economic growth	Low transport prices
Price sensitivity freight	Low	High

Thank you for your attention!

Questions?
Discussion!



More on www.ariebleijenberg.nl