



Energy research Centre of the Netherlands

Sustainable transport: technology, policy and behaviour

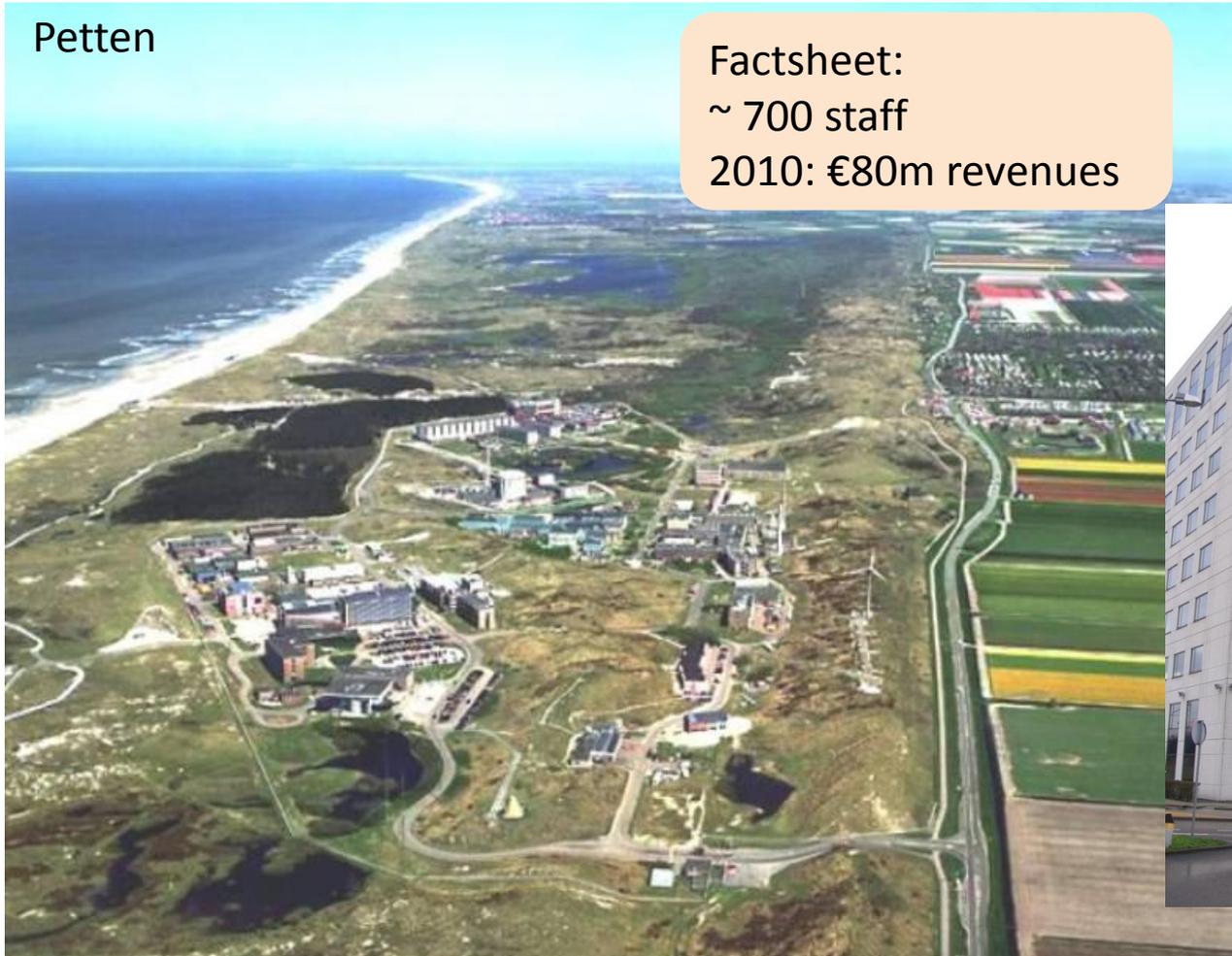
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Petten

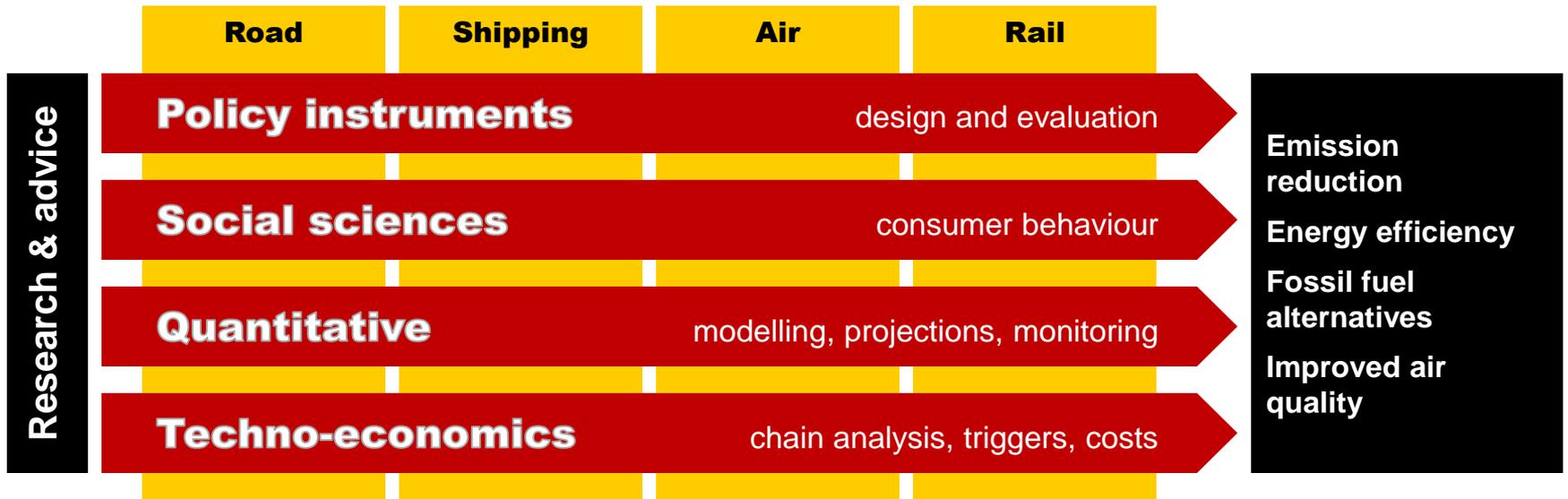
Factsheet:
~ 700 staff
2010: €80m revenues



Amsterdam



Transport research at ECN Policy Studies

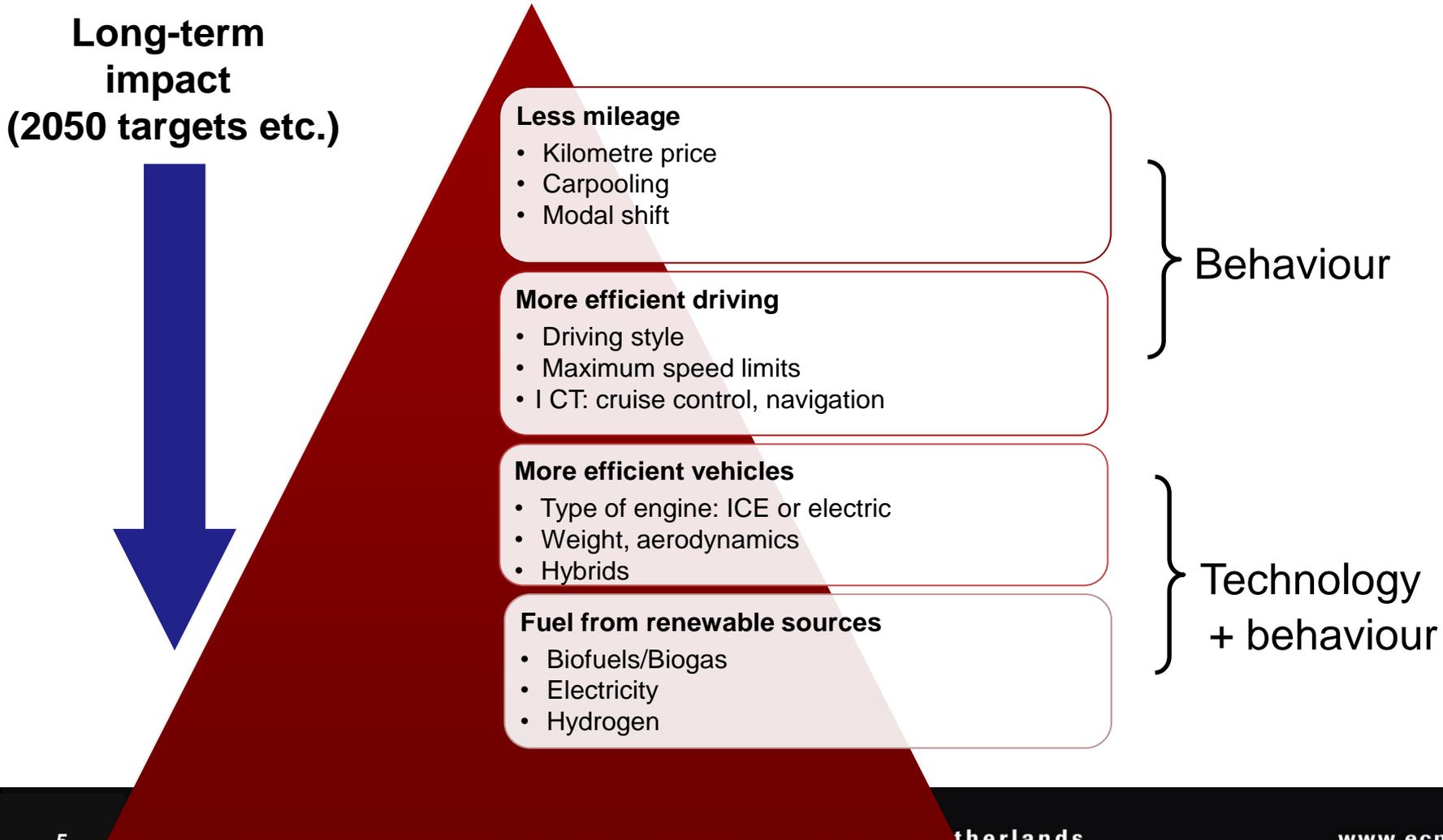


Clean transport: no easy solution

- Wide diversity of options, features and aspects to compete for
- Demand side (consumer) at least as important as supply side (technology)
- How does a consumer choose and how does that affect the competition between options?



The 4 ingredients for sustainable mobility



How does a consumer choose?

- Purchase of a car
 - Costs
 - Functionality
 - Appearance
- Refuelling
 - Coverage
 - Detours
- Driving behaviour
 - Efficient driving style
 - Choice of car, bicycle or train?



What is important to the consumer?

	Conventional (ICE) 	PHEV 	BEV 	FCEV 
Range (kilometres)	> 500	<ul style="list-style-type: none"> • Electric: < 60 • Fuel: > 500 	< 200	> 400
Refuel/ charge time (minutes)	1 - 2	<ul style="list-style-type: none"> • Electricity: ~ 200 • Fuel: 1 - 2 	10 - > 1400 Depends on type of charging and battery size	3 - 5
Safety	No discussion	Low noise level of car at low speed risk for cyclists and pedestrians		
Infrastructure	Filling station	<ul style="list-style-type: none"> • Electric: charging at home • Fuel: filling station 	<ul style="list-style-type: none"> • Charge at home; smart grid • Public charging points • Fast charging (filling station?) • Battery switch centre 	Filling stations: Integrate as much as possible in existing filling stations

Car purchase behaviour

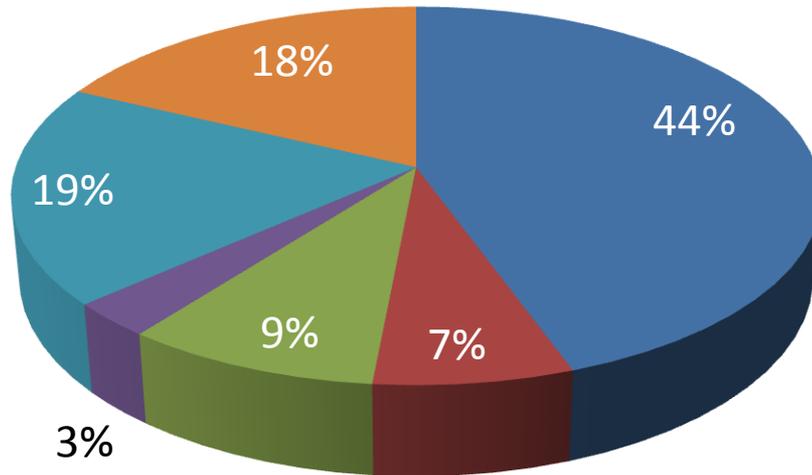
- Car : ‘a statement about me’
- Misinterpretation of information on efficient cars
 - Subsequent justification by comparison with even less efficient cars
- Mental accounting
 - Evaluate against *one reference* at a time: current (petrol or diesel) car
 - *Loss aversion*: additional costs weigh more than additional benefits
 - *Framing*: higher purchase price deters, even if the cost can be recovered



Refuelling behaviour – survey



When do you refuel?



- After leaving home on way to destination
- After leaving destination on the way home
- Halfway between home and destination
- Shortly before reaching the destination
- Shortly before coming back home
- Separate trip to refuel

Risk avoiding behaviour: car drivers prefer to refuel in the areas they know well

Source: TNS NIPO survey of 2900 households; THRIVE project

Survey refuelling behaviour

- Main considerations in choices with regard to refuelling behaviour are fuel price and location
- Motorists prefer a filling station along the route
 - Limited willingness to make a detour (low fuel price)
- Dutch motorists
 - Require high coverage rate (every second filling station)
 - Want to be able to refuel abroad
- Good distribution of filling stations at predictable locations may compensate for the limited coverage

Driving behaviour

- Little relationship between attitude and actual behaviour
 - Attitude is a prerequisite
- Routines are in the way of behavioural change
- Avoid development of undesired routines
 - For example building public transport facilities near new district
- Feedback tools as *reinforcing factors*

Charging behaviour



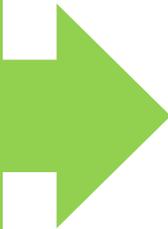
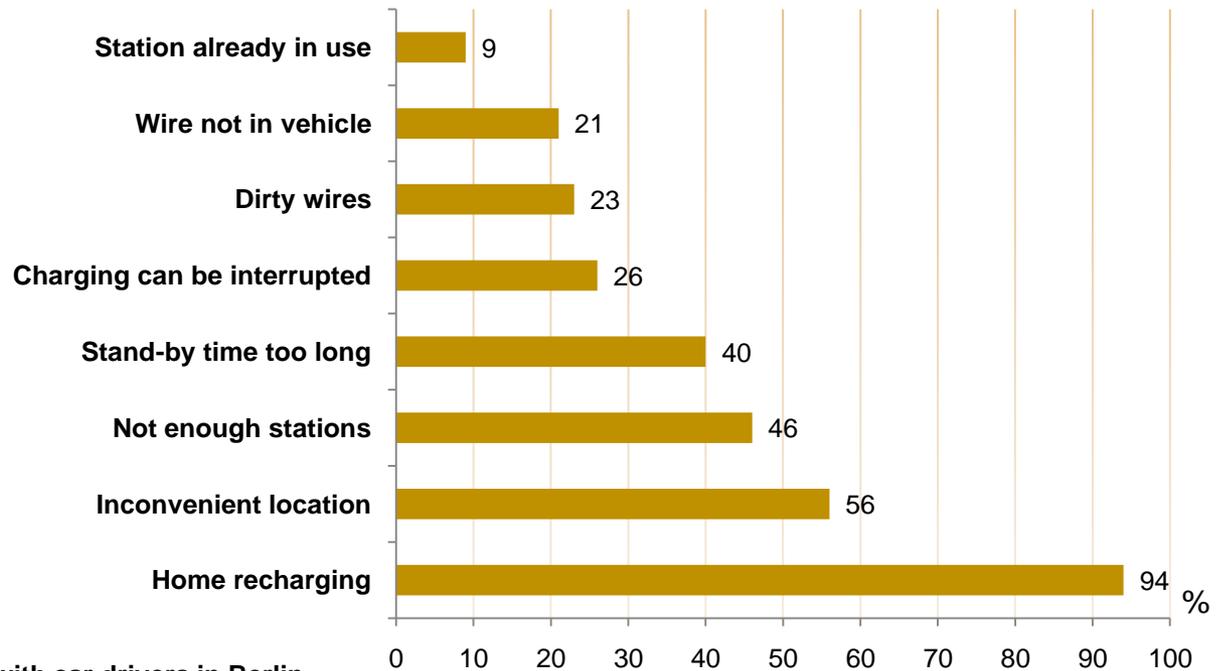
- Charging electric vehicles – it will be cheaper to charge outside peak hours (i.e. throughout the day or in the night) – delay of charging?
- When the vehicle is connected to the grid it could be used for V2G services (e.g. buffer renewable energy peaks in the grid)
- Will people accept delayed charging and access to their (expensive) batteries?
- ECN currently conducts a customer survey in eight EU countries to find out about acceptance

Electric vehicle recharging

Percentage of users that never used public charging infrastructure



Reasons for non-use of public infrastructure

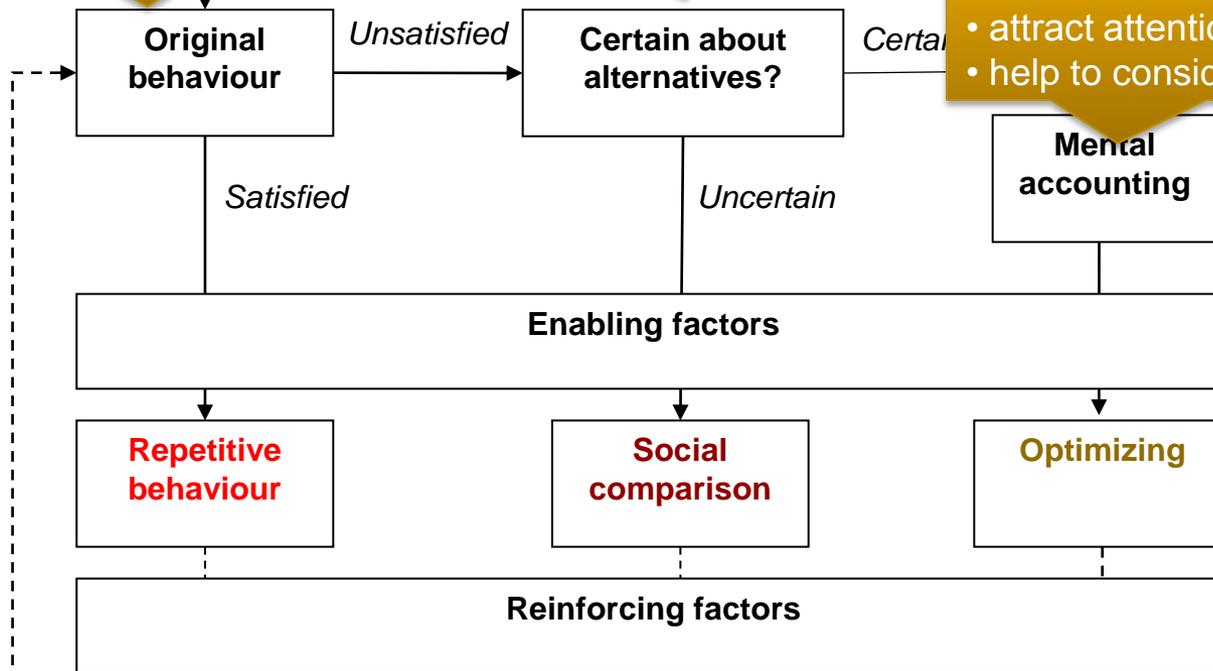
Source: BMW Mini E Field Trial, questionnaire with car drivers in Berlin

Policy implications

- break habits at life events
- make people unsatisfied

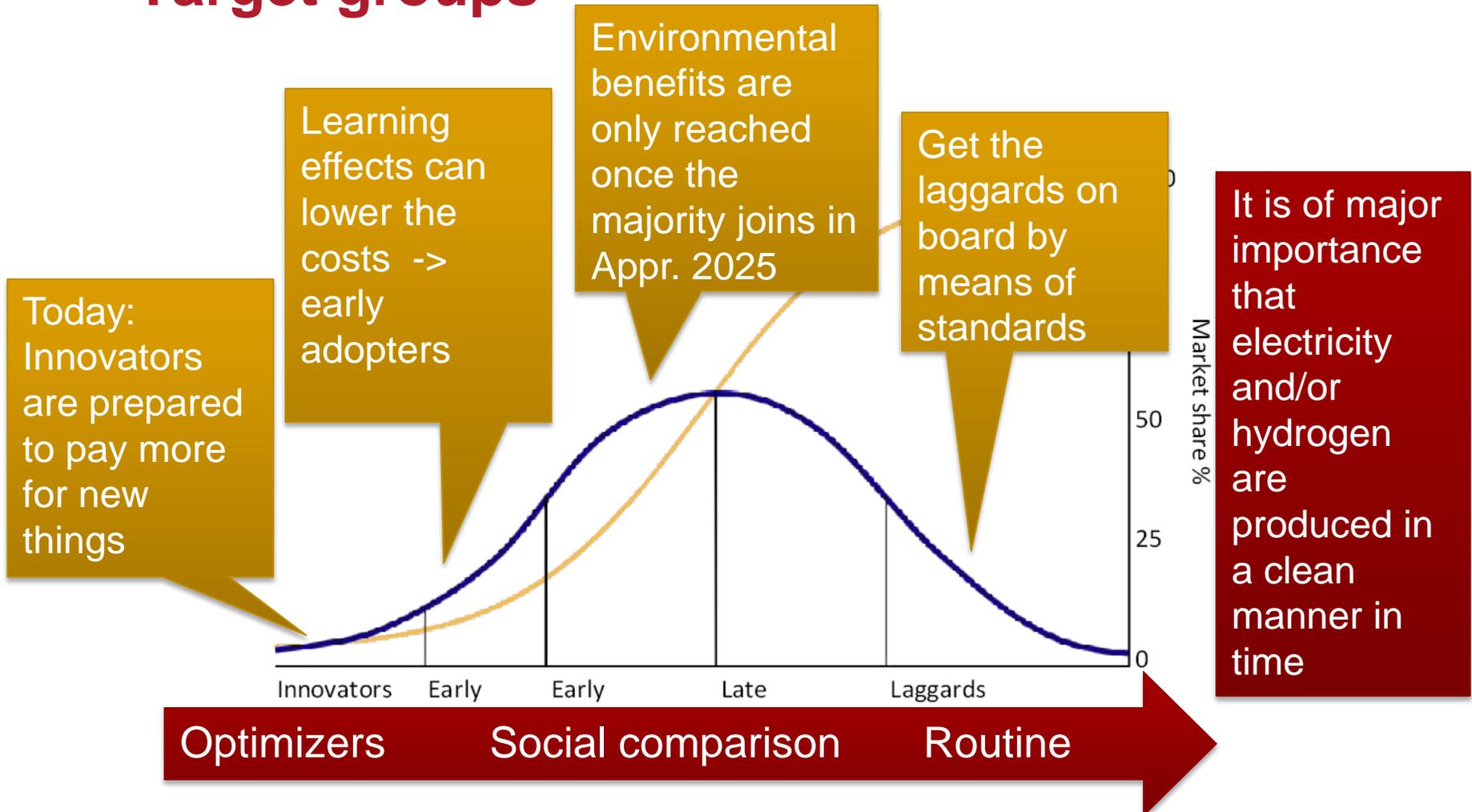
- information only doesn't work
- standard option = efficient model

- frame benefits as averted losses
- attract attention by 'for free'
- help to consider future costs



Segmentation: adjust approach to type of decision maker

Target groups



Conclusions

- Less and more efficient driving:
 - Requires behavioural change, supported by technology and policy
- Consumer decision-making key factor in policy effectiveness
- Take into account
 - dominance of routines
 - role of the social environment
 - difference between economic and mental accounting





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Thank you for your attention!

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