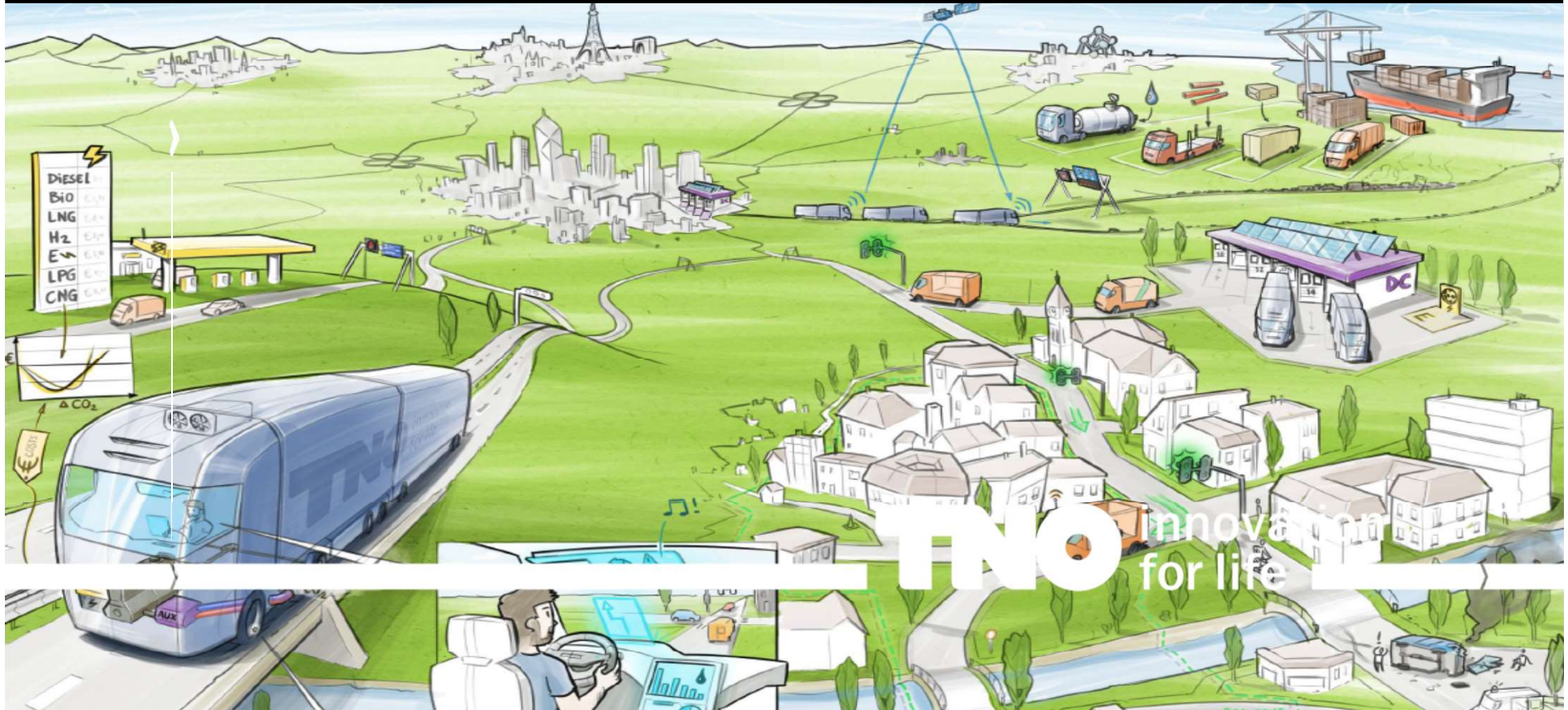


A logistics decarbonisation agenda: state of practice in the Netherlands



Hans Quak

9 March, 2018

Brussels: Logistics Emissions Reduction Paths

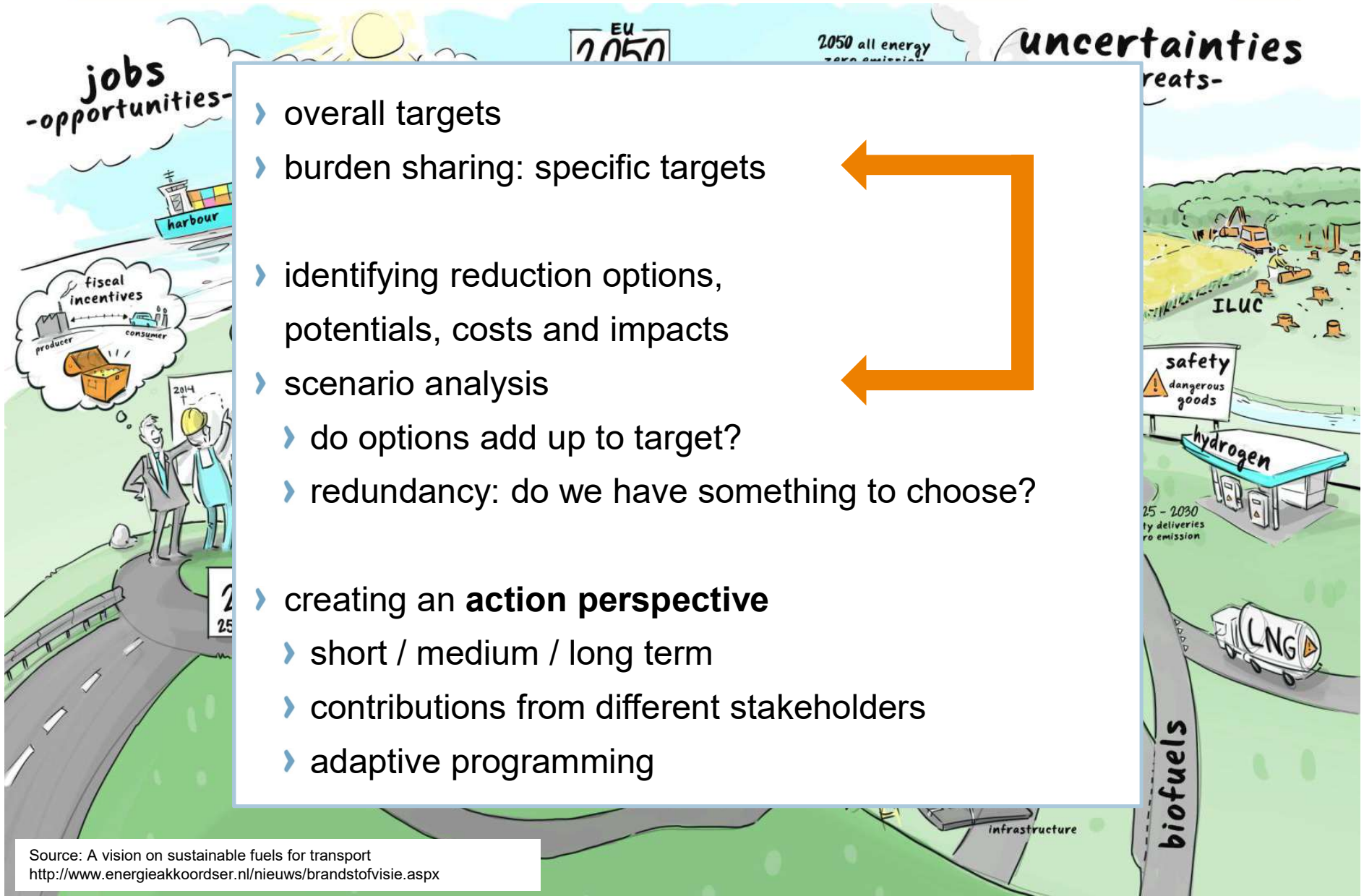
Agenda

A logistics decarbonisation agenda: state of practice in the Netherlands

- 1 Factor 6 – CO₂ reduction targets (NL)
- 2 A system approach – do measures add up?
- 3 Reduction potential
- 4 Perspective for action?
- 5 **Example:** annual outlook city logistics
 - methodology and set-up
 - trends and developments
 - segments in city logistics system
 - reference paths and conclusions



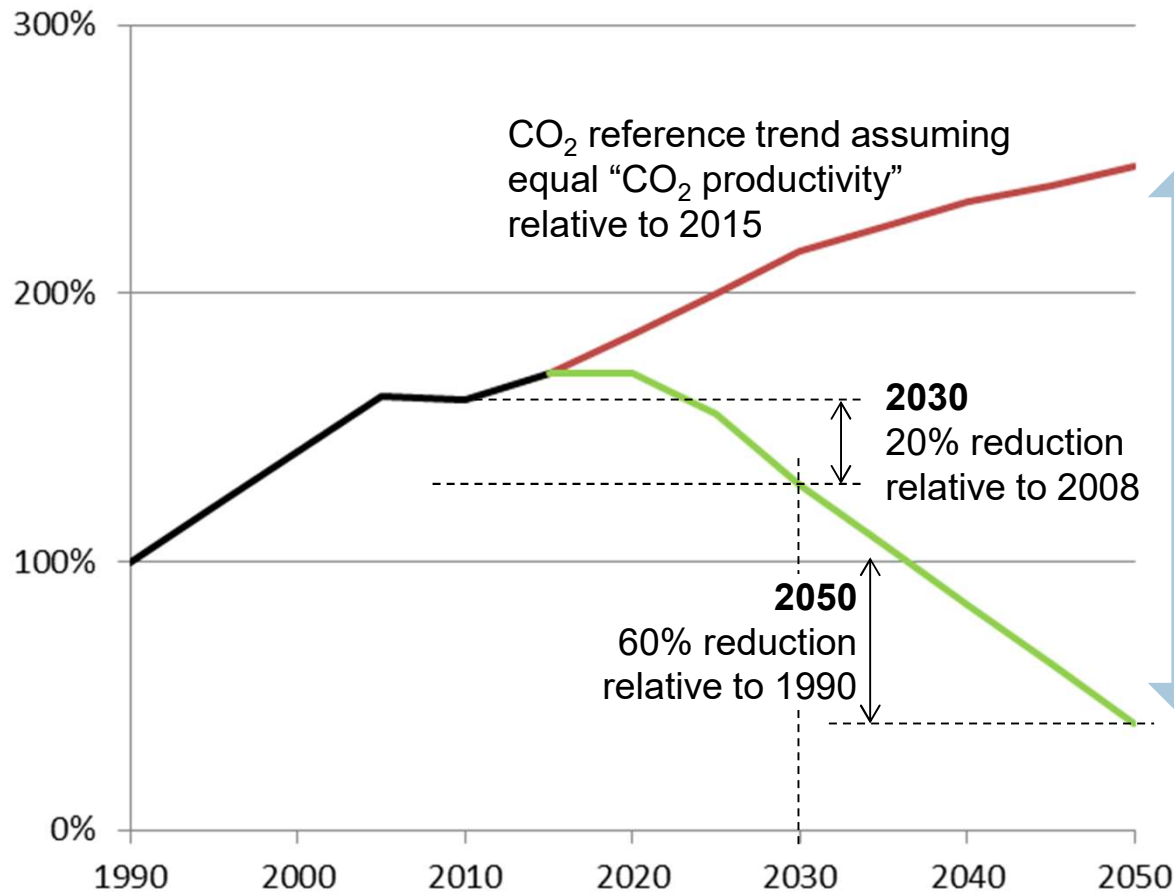
TIME FOR A ROADMAP



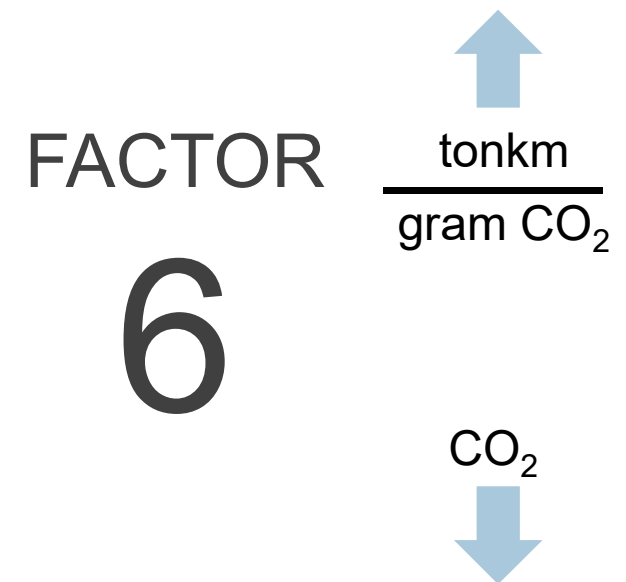
- › overall targets
- › burden sharing: specific targets
- › identifying reduction options, potentials, costs and impacts
- › scenario analysis
 - › do options add up to target?
 - › redundancy: do we have something to choose?
- › creating an **action perspective**
 - › short / medium / long term
 - › contributions from different stakeholders
 - › adaptive programming

REDUCTION GOAL FOR FREIGHT TRANSPORT

CO₂ emissions freight transport in EU

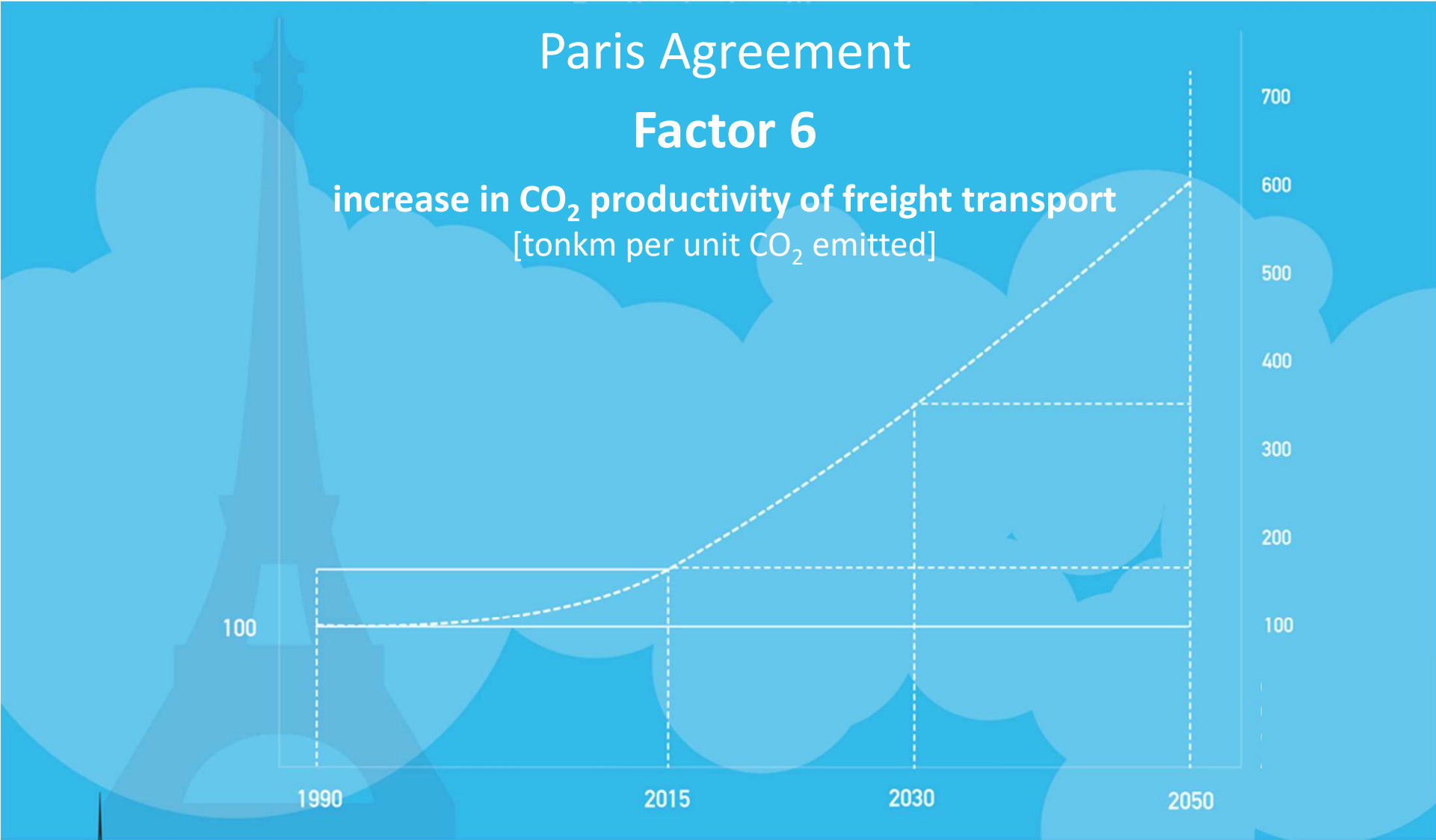


Indicative graph, based on:
"EU Energy, transport and GHG emissions, Trends to 2050",
European Commission 2013



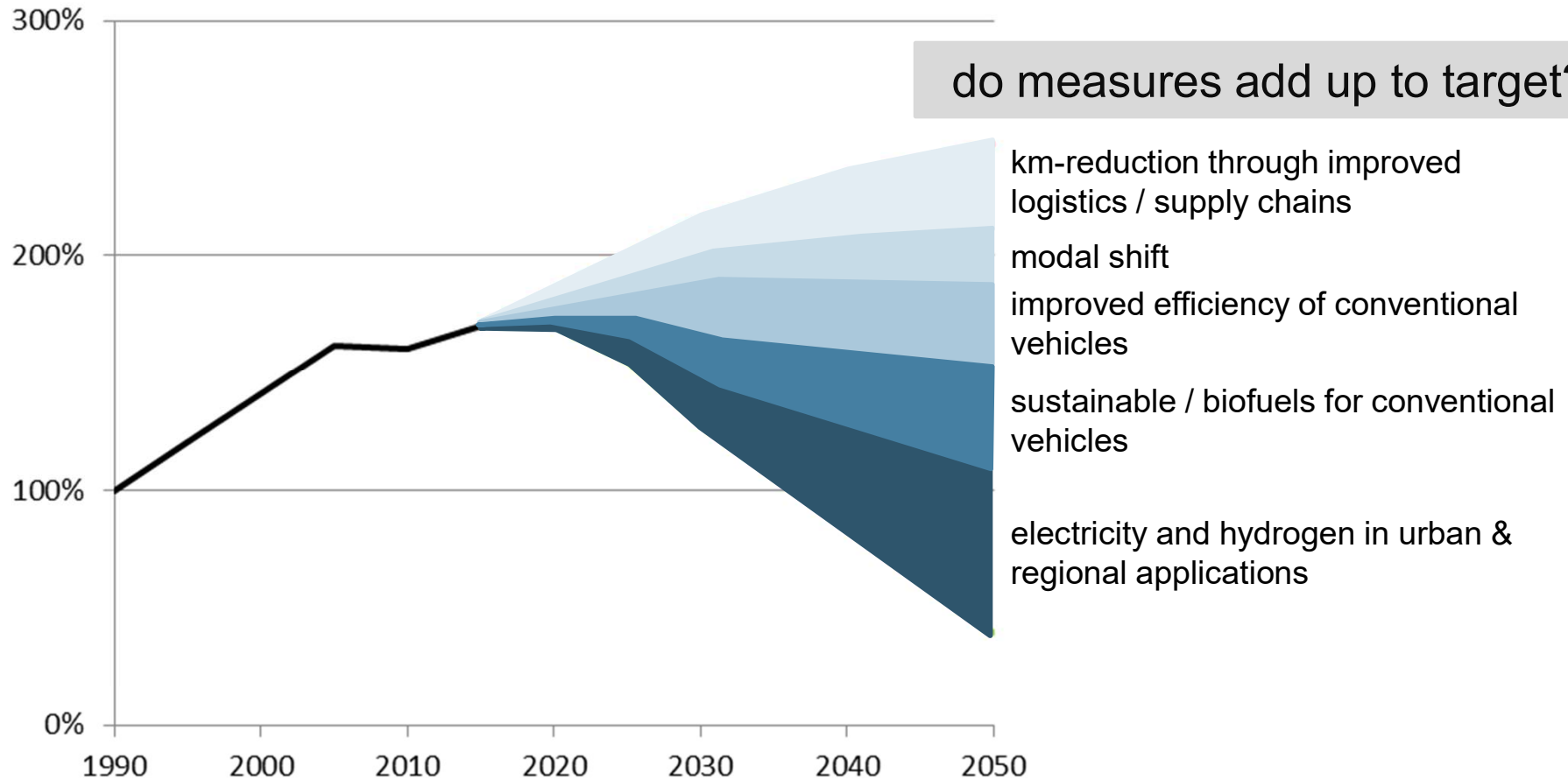
Note: Reduction goal freight transport assumed equal to overall 60% reduction goal for transport sector in EU Whitepaper (2011)

FACTOR 6



CONTRIBUTIONS FROM DIFFERENT REDUCTION OPTIONS

CO₂ emissions freight transport in EU

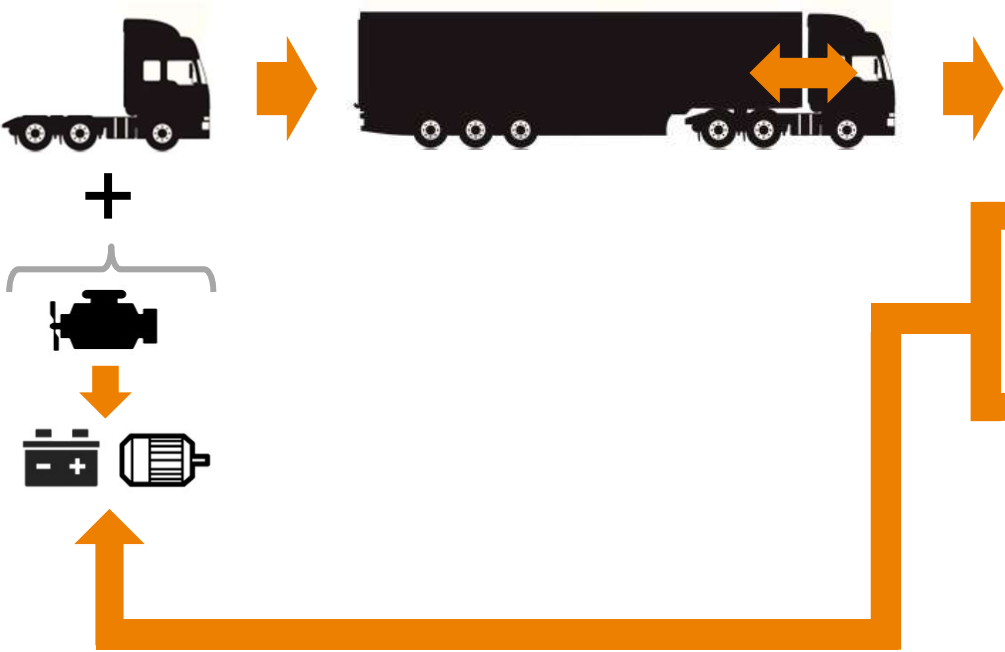


hypothetical illustration

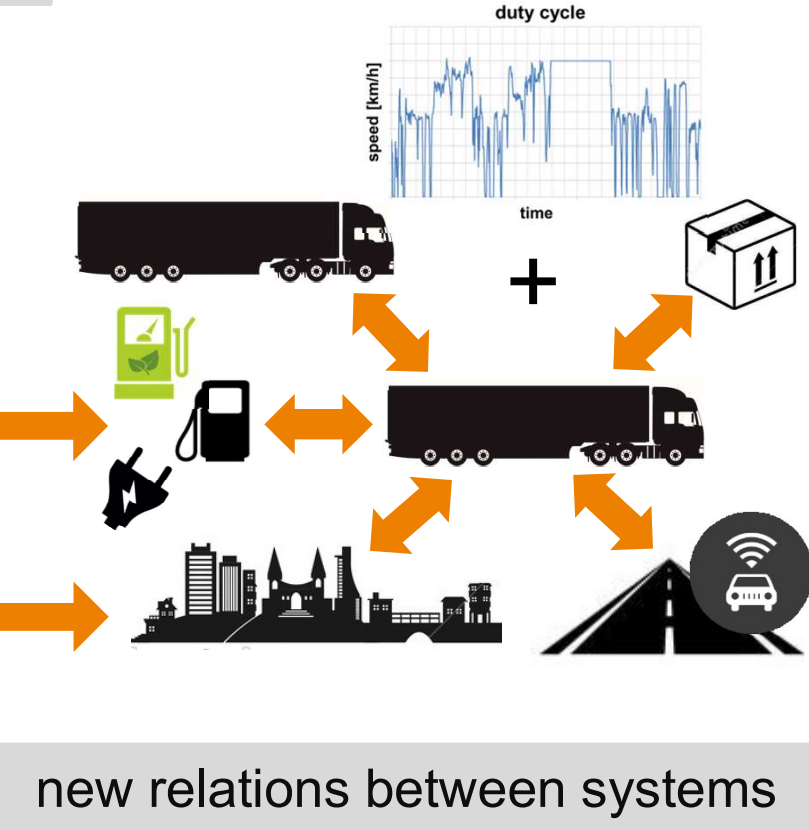
NEED FOR A SYSTEMS APPROACH

wider optimisation area

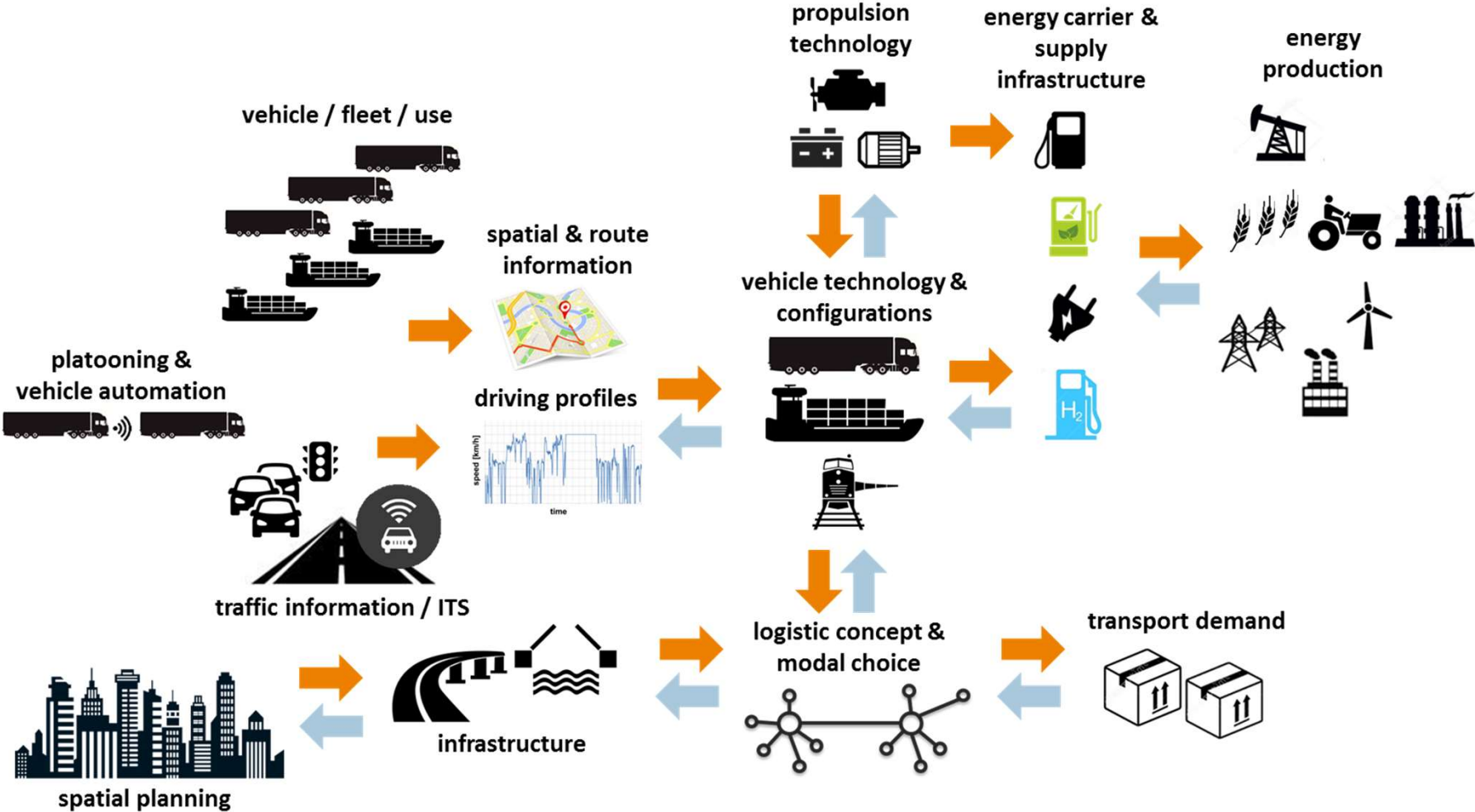
whole vehicle approach



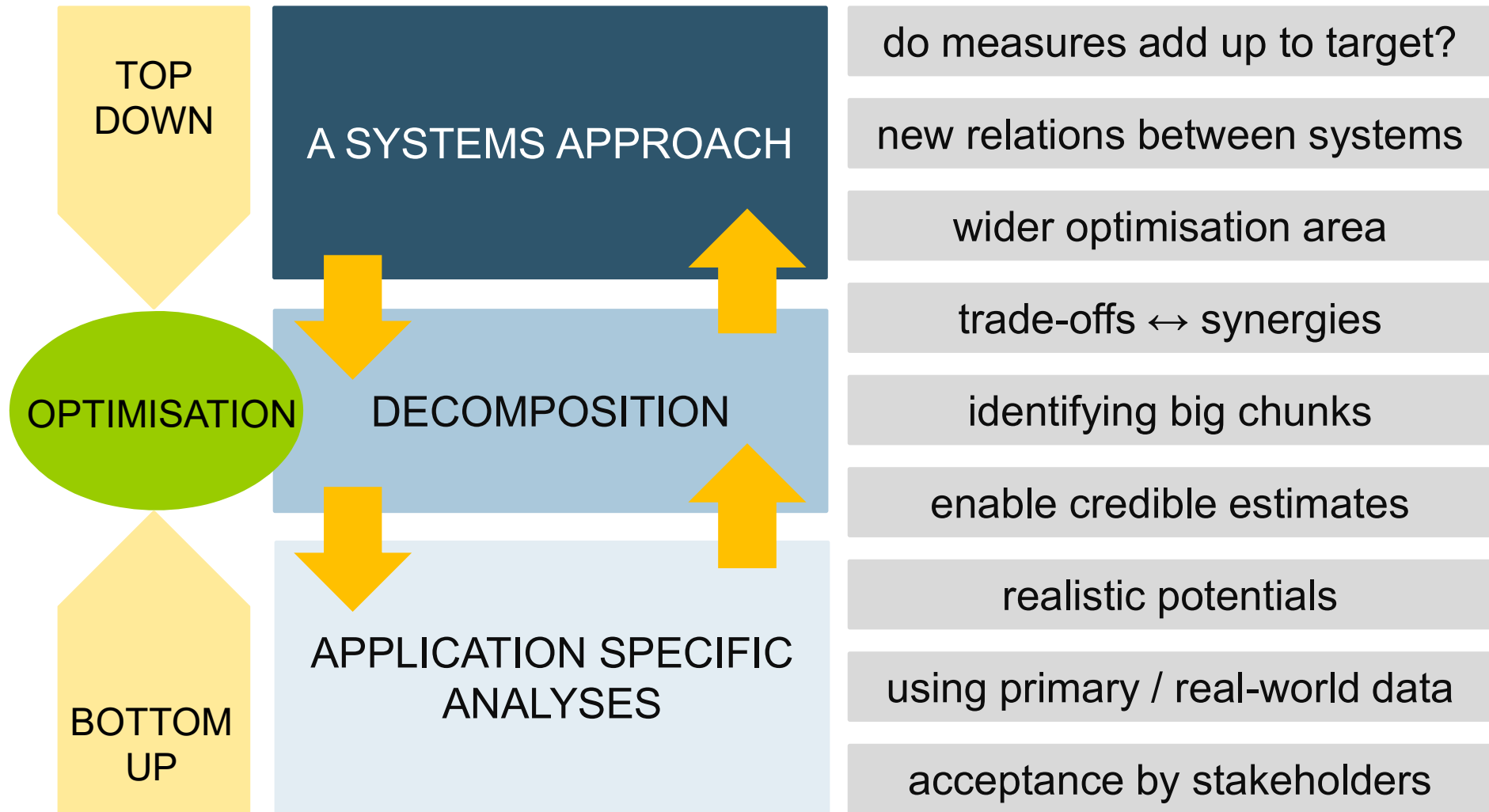
systems approach



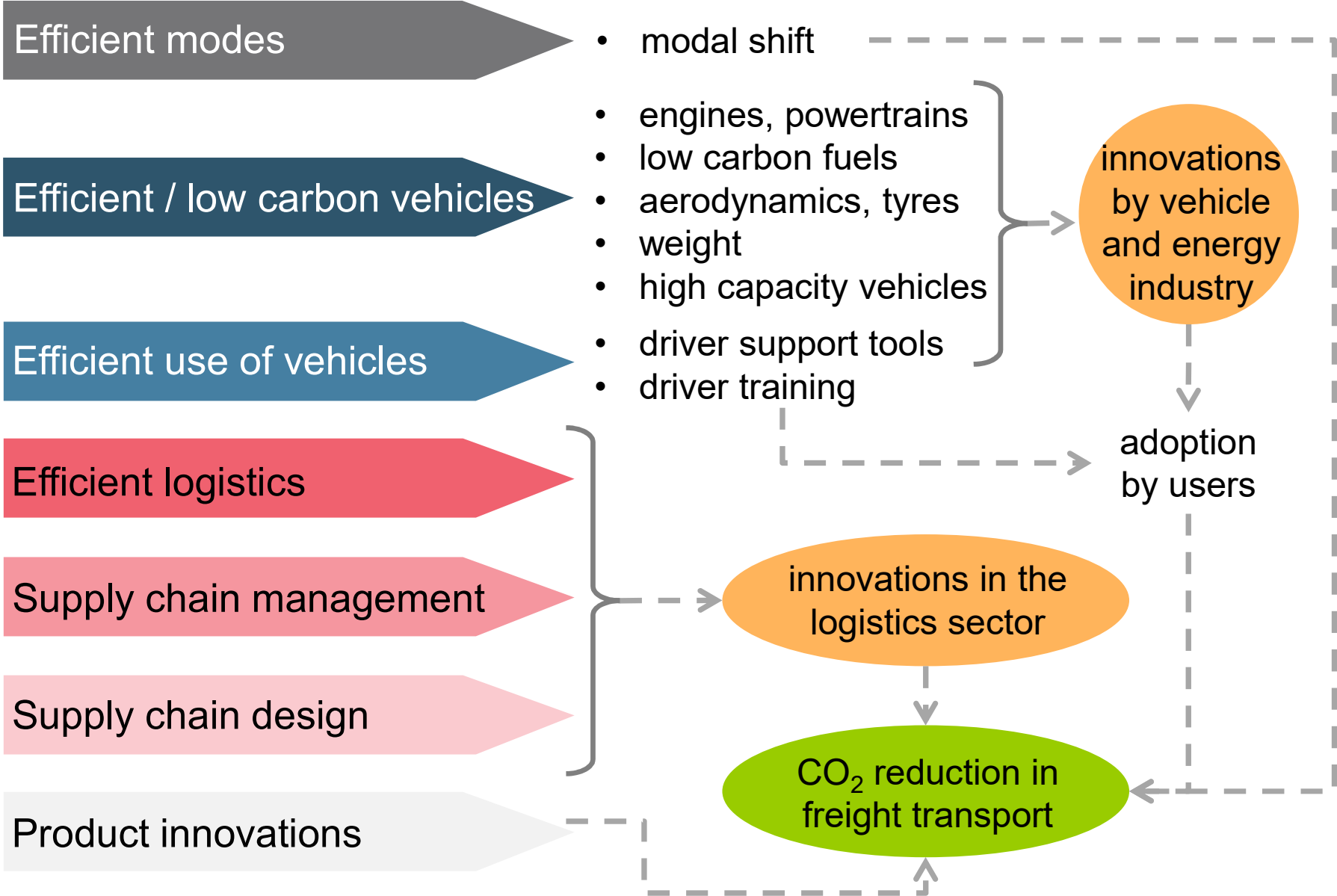
NEED FOR A SYSTEMS APPROACH



A SYSTEMS APPROACH



SUSTAINABLE LOGISTICS



DECOMPOSITION

identifying big chunks

enable credible estimates

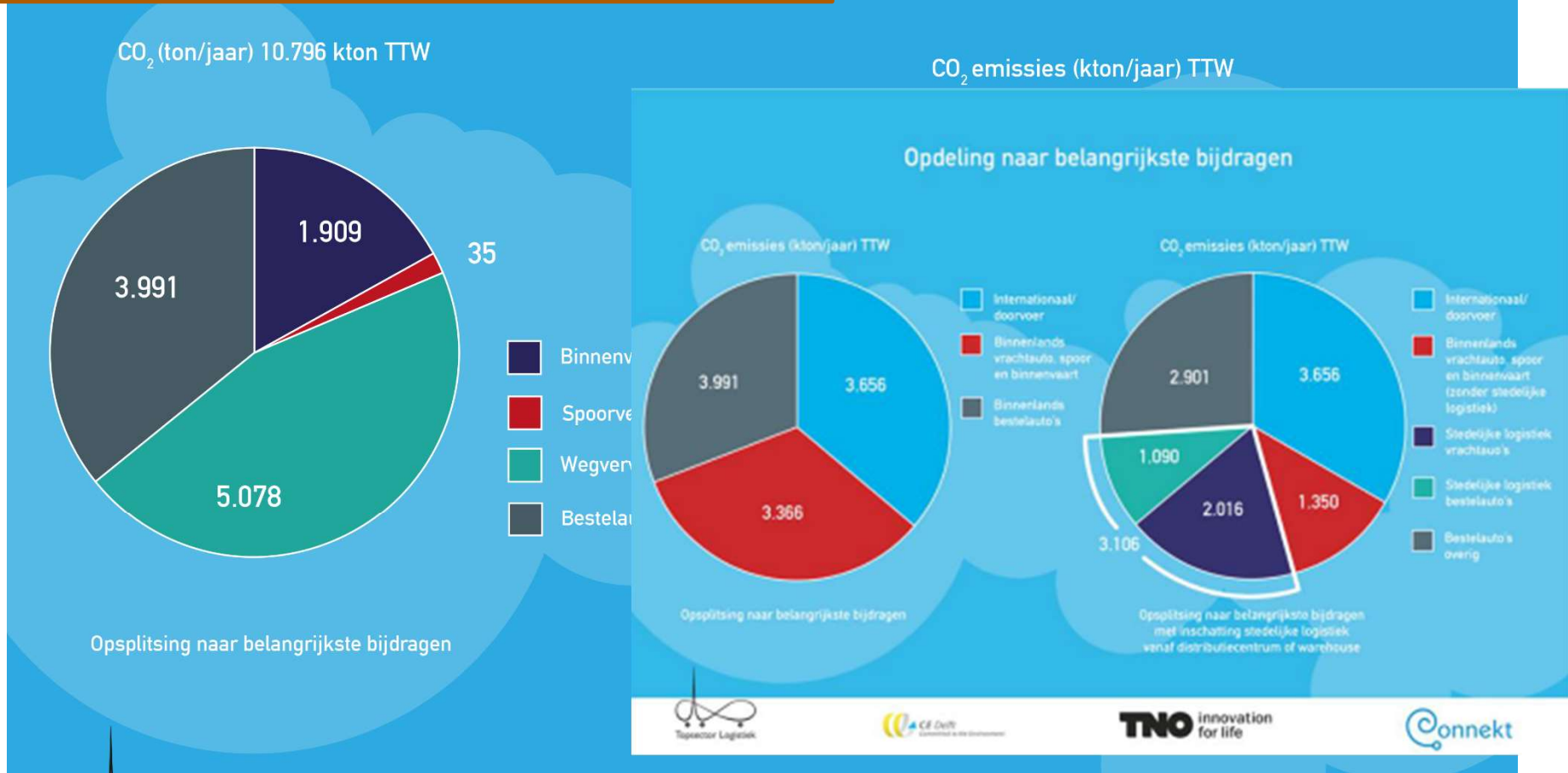
acceptance by stakeholders

Emissions [ktCO2]	Mission profile						Total
Vehicle category	Service delivery	City distribution	Regional delivery	Long haul	Bus	Coach	Total
Light commercial vehicle	2,665						2,665
Rigid Truck (light)		26	26	26			78
Rigid Truck (medium)		109	115	238			460
Rigid Truck (heavy)		62	66	198			326
Articulated Truck (light)		34	35	59			128
Articulated Truck (heavy)		115	123	368			604
Tractor and trailer (light)		127	187	1,596			1,911
Tractor and trailer (heavy)		108	157	1,243			1,508
Bus					368	118	485
Total	2,665	580	707	3,728	368	118	8,166

Create action perspective:

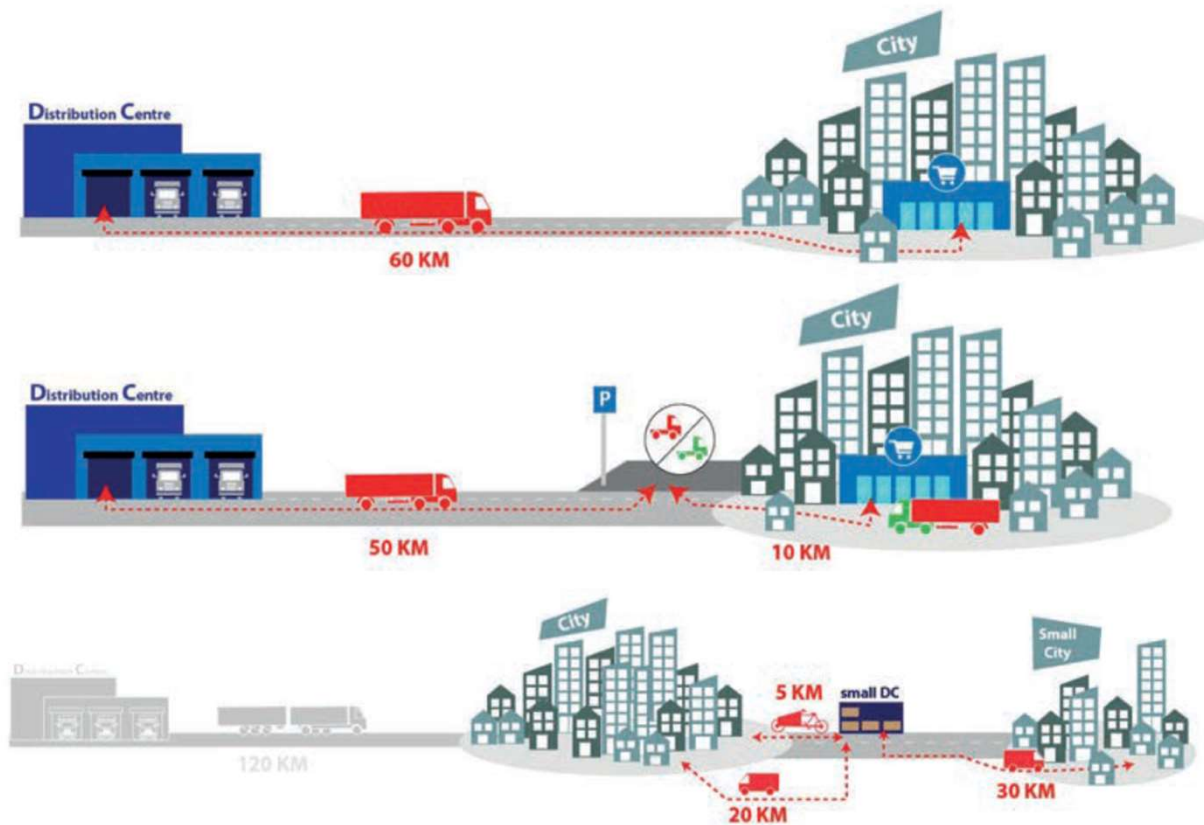
Application specific analyses needed to identify potentials and most (cost) effective solutions for different transport segments

CO₂ emissies transport in land and naar vervoerswijze en opsplitsing binnenlands, en internationaal/doorvoer



Scope Outlook City Logistics

- › City Logistics is defined as follows: *'the last leg in a supply chain to a customer location in a city, or the first leg from a customer location in a city back into the supply chain'*



Action perspective? *GHG emission reduction target*

- › The city logistics system faces serious challenges for the near future
 - *Serious share in transport's GHG emissions*
 - *The carbon productivity challenge*
 - *What is the perspective for action?*

- › The city logistics system faces serious challenges for the near future
 - *No single solution / no silver bullet*
 - *System is very divers and difficult to change*



Annual Outlook City Logistics

www.topsectorlogistiek.nl/download-nu-outlook-city-logistics/

- › develops a set of feasible paths (reference views) to decarbonize specific city logistics segments (decomposition)
- › *not* a prediction of the future, nor a prescription of actions and tasks
- › As such the first version is an invitation to contribute, an invitation to add improvements and an invitation to share it widely
- › goal is to provide a baseline which can be shared and debated and improved, to structure discussions among stakeholders
- › backcasting from GHG target
- › following existing primary external drivers

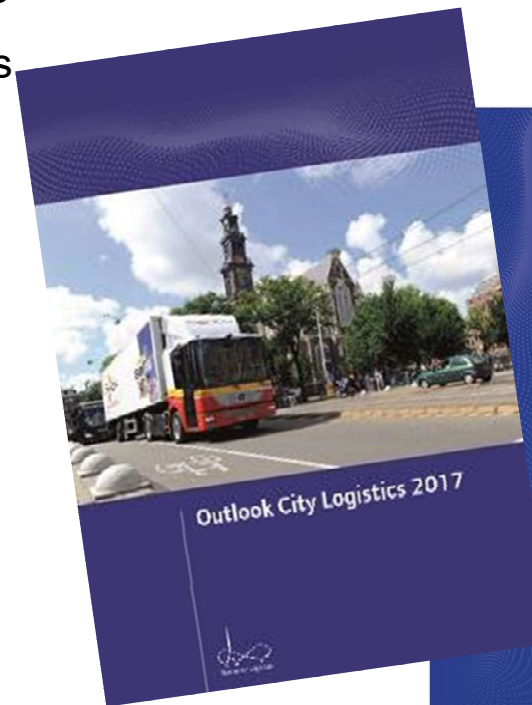


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Definition and development

› **Main questions outlook:**

- › What measures and steps are required to secure the Factor 6 target?
- › What actions need to be taken, in what sequence, when and by whom?
- › How are the uncertainties in developments over the coming decades to be taken into account?
- › What decisions need to be taken and by whom?

› **Assumptions and principles:**

- › Backcasting from factor 6
- › Following existing primary external drivers
- › Observing internal consistency

Annual Outlook City Logistics: methodology and set-up

- › aims at iteratively developing a reference view per city logistics segment on one or more feasible paths to de-carbonize city logistics
- › to deal with the inertia we start with identifying existing trends and developments: by identifying where external drivers force the city logistics system to change, it is expected to be easier to actually get innovations implemented, as these follow either market-requirements or business opportunities.

Annual Outlook City Logistics: methodology and set-up

- › Therefore, we started identifying trends and developments using the DESTEP model identifying the demographic, economic, social, technological, ecological, political developments influencing the city environment in which city logistics operations take place.
- › From long list to primary drivers
- › This analysis is based on desk research, expert interviews, expert sessions and round table sessions
- › The Outlook has a Dutch perspective. Some parts can be generalized to other areas, however, there might be some differences due to e.g. differences in logistics structure and urbanisation.

Annual Outlook City Logistics: methodology and set-up

Primary External Drivers

Society

- A More demanding customers
- B Increasing political and societal pressure to reduce GHG emissions
- C Increased political and societal pressure for improved livability of cities
- D Increased political and societal pressure to reduce footprints, by means of a circular economy

Technology

- A Connecting the physical world
- B Robotizing and automation
- C Vehicle drive technology and energy source adoption driven by scale

Logistics

- A Towards omnichannel
 - B Physical internet and universal labelling
- Performance Based Regulation

Trends and developments

Societal and political pressure

- › Increasing pressure for reduction of GHG emissions
- › Increased pressure for liveability of cities
- › Circular economy



Trends and developments

Changes due to information technology

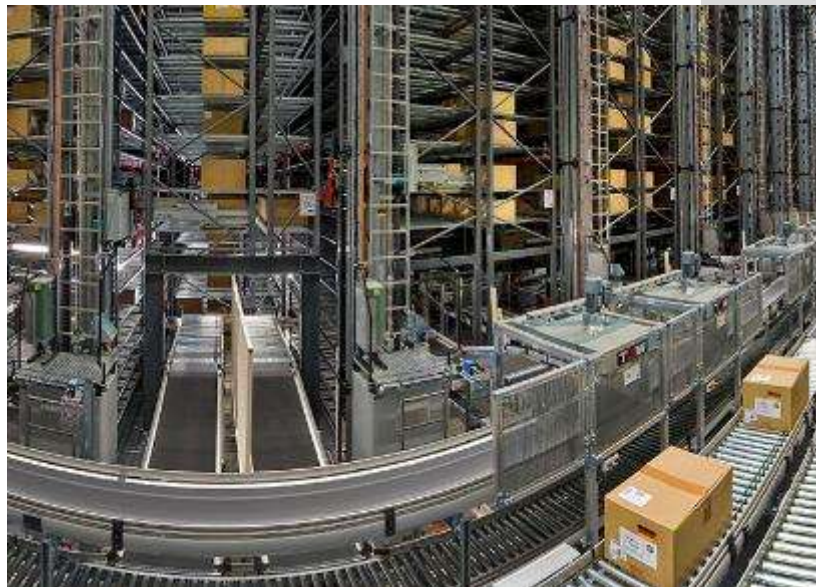
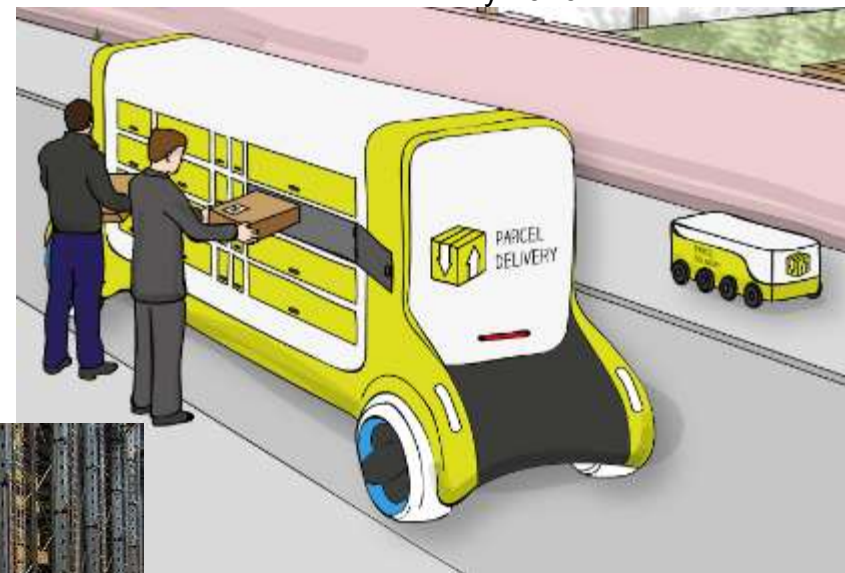
- › More demanding customer
recent mobile IT developments allow for more customer intimacy
- › Connecting the physical world
IoT applications, transparency and vehicle-connections
- › Physical Internet and universal labelling
easier connections between networks

Trends and developments

Changes due to technology

- › Robotization and automation
 - › Autonomous vehicle technology
 - › Automated warehouse

McKinsey 2016: the future of last mile

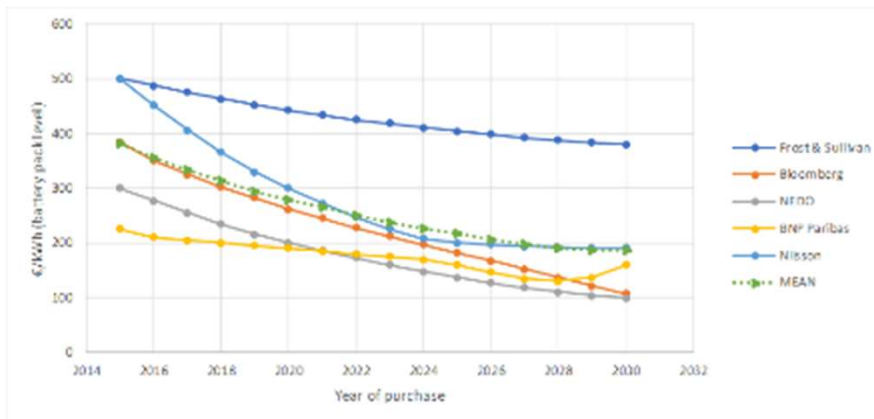


Automated warehouse: picture JOC.com (2016)

Trends and developments







Changes due to technology

- › Vehicle drivetrain technology
 - › Improve ICEVs
 - › Electric vehicles
 - › BEV / PHEVs



Updated battery pack price projections

Feasible business case at this moment?

< 3.5 ton OEM: Nissan eNV200, Renault Kangoo ZE	3.5 ton – 12 ton: small manufacturers (retrofit, e.g. Innamo e-Ducato)	> 12 ton: Small manufacturers (retrofit e.g. EMOSS, Ginef)
		
		

Figures and analyses: TNO in FREVUE (2017)

The role of sustainable transport fuels and energy technologies

- › There is still significant potential for improving the energy efficiency of conventional vehicles
- › (Battery) Electric vehicles and LEVs are the most likely option for transport in *urban areas*
- › Hydrogen is a significantly less efficient route for using renewable energy in transport, but is a relevant option for light-, medium- and certain heavy-duty applications for more demanding applications
- › Due to limited availability of sustainably produced biomass, the use of biofuels will be limited to long-haul applications in road freight, shipping and aviation
- › The role of natural gas, in the form of CNG or LNG, as a transition fuel should not be overestimated (in *urban areas*)

Trends and developments

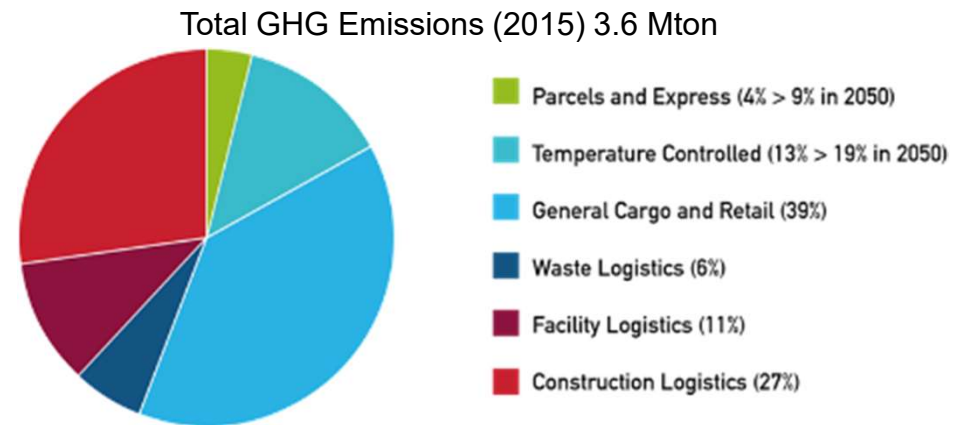
Required policy developments

- › Develop and introduce common IT and control systems facilitating easy-to-use customized and individualized access to sensitive city centres, based on connected vehicles that are traceable, i.e. performance based regulation
 - › Flexible and customizable regulation
 - › Differentiating for logistics activities and environmental performance
 - › Standard regimes, but local application of zones
- › Mandate and implement green tendering for construction projects.
- › Mandate and implement bundled deliveries for facility logistics.
- › Ensure efficiency improvements through implementation of policies at the national and international level.
- › Create scale: incentivize supply and demand for large volumes of zero-emission vehicles and prevent fragmentation.
- › Urban planning: separate the flow of traffic from areas where pedestrians and cyclists dominate

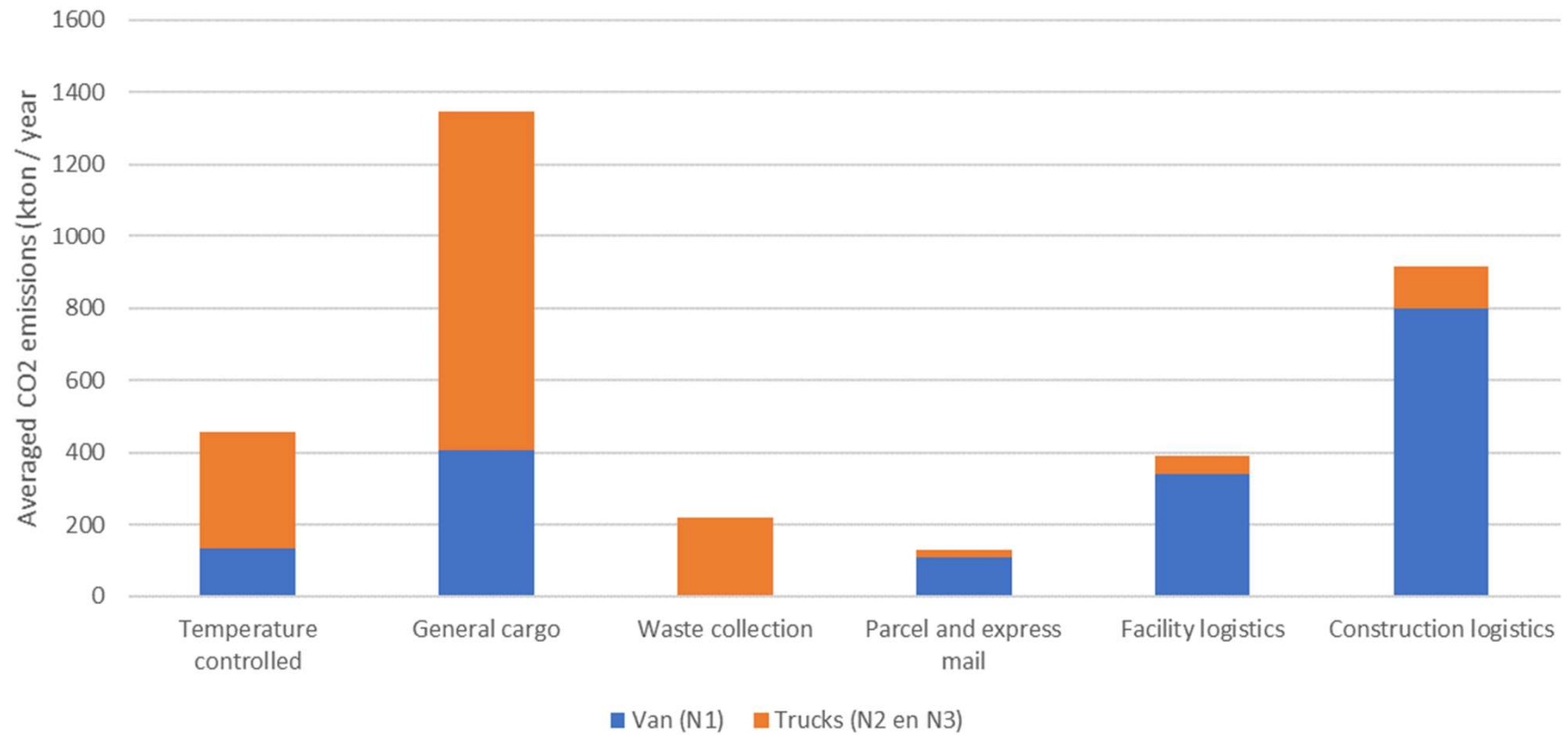
City logistics unraveled

Classification in (sub)segments

- › **General cargo**
Large retail, partial deliveries and home deliveries (big)
- › **Temperature controlled logistics**
Large retail, wholesale, small specialist and home delivery groceries
- › **Parcel and express**
B2C and B2B
- › **Facility logistics**
Services and goods deliveries to public and commercial buildings
- › **Construction logistics**
Infrastructure, buildings (preparation, structure, fit-out) for large construction companies, SME/Self-employed, building materials supply
- › **Waste collection**
Households (collectively organised) and businesses (individually organized)



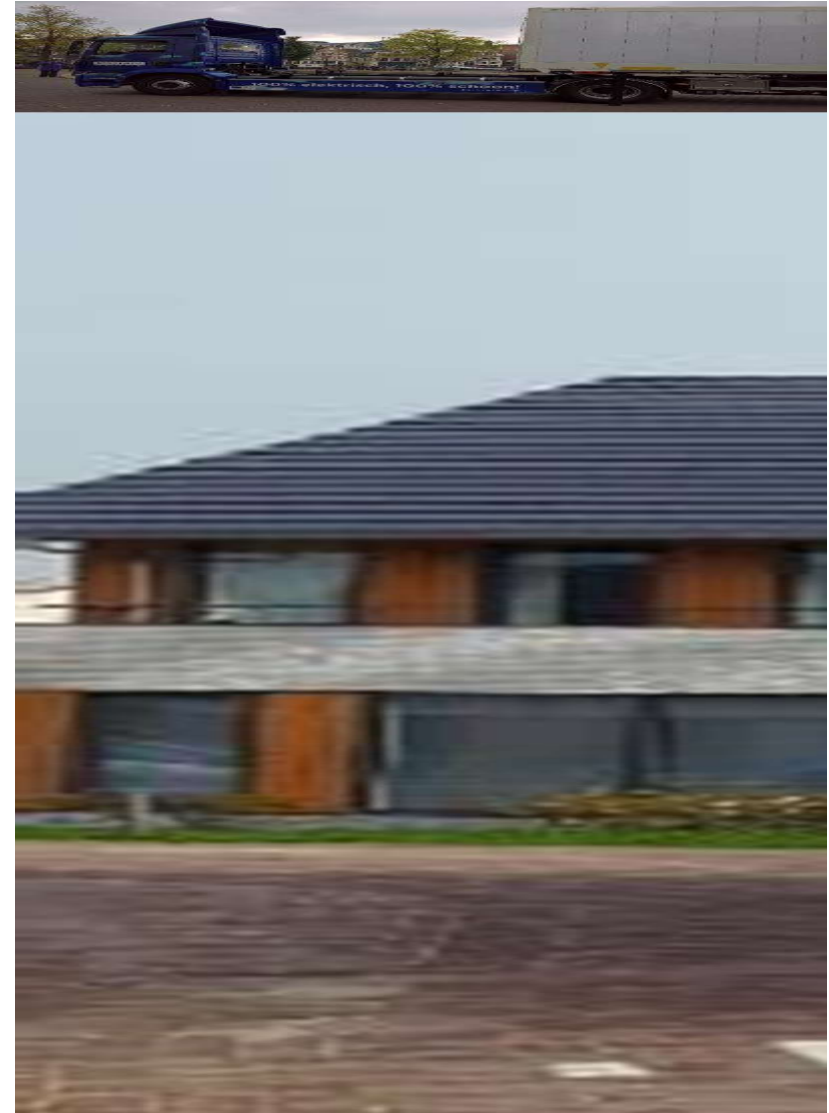
Estimated CO2 emissions city logistics per segment in the Netherlands



Developments in city logistics

General cargo

- › Large Retail (FTL)
Already efficient logistics: decoupling or PHEV for ZE-city logistics
- › Partial Delivery
Regulation (and PI & universal labeling) results in shift to parcel-network, LSPs act more as regional specialist (using their hub as UCC) > electrification
- › Home Delivery (heavy / requirements)



Developments in city logistics

General cargo

› Large retail

*Figure 9
Towards zero-emissions
logistics in grocery and
general retail and large
retail chains*



Developments in city logistics

Temperature controlled logistics

- › Large Retail (FTL)
*Already efficient logistics: decoupling
or PHEV for ZE-city logistics*
- › Wholesale
*Wholesaler becomes regional LSP
(also for specialists) following IoT
developments*
- › Small specialists
- › Home delivery groceries
Fast ZE adaptation

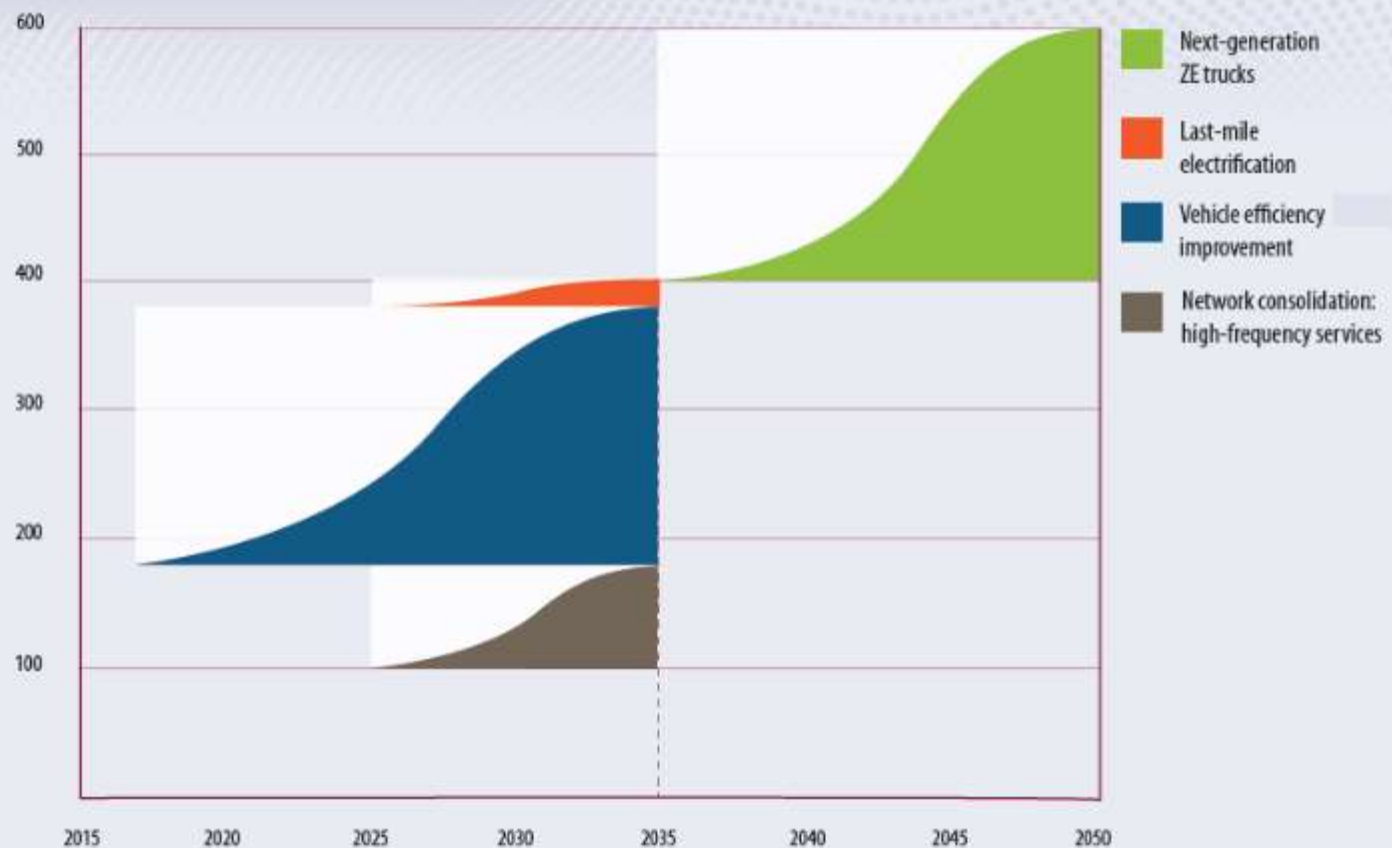


Developments in city logistics

Temperature controlled logistics

- › Small specialists

*Figure 14
Towards zero-emissions
logistics for temperature-
controlled specialists*

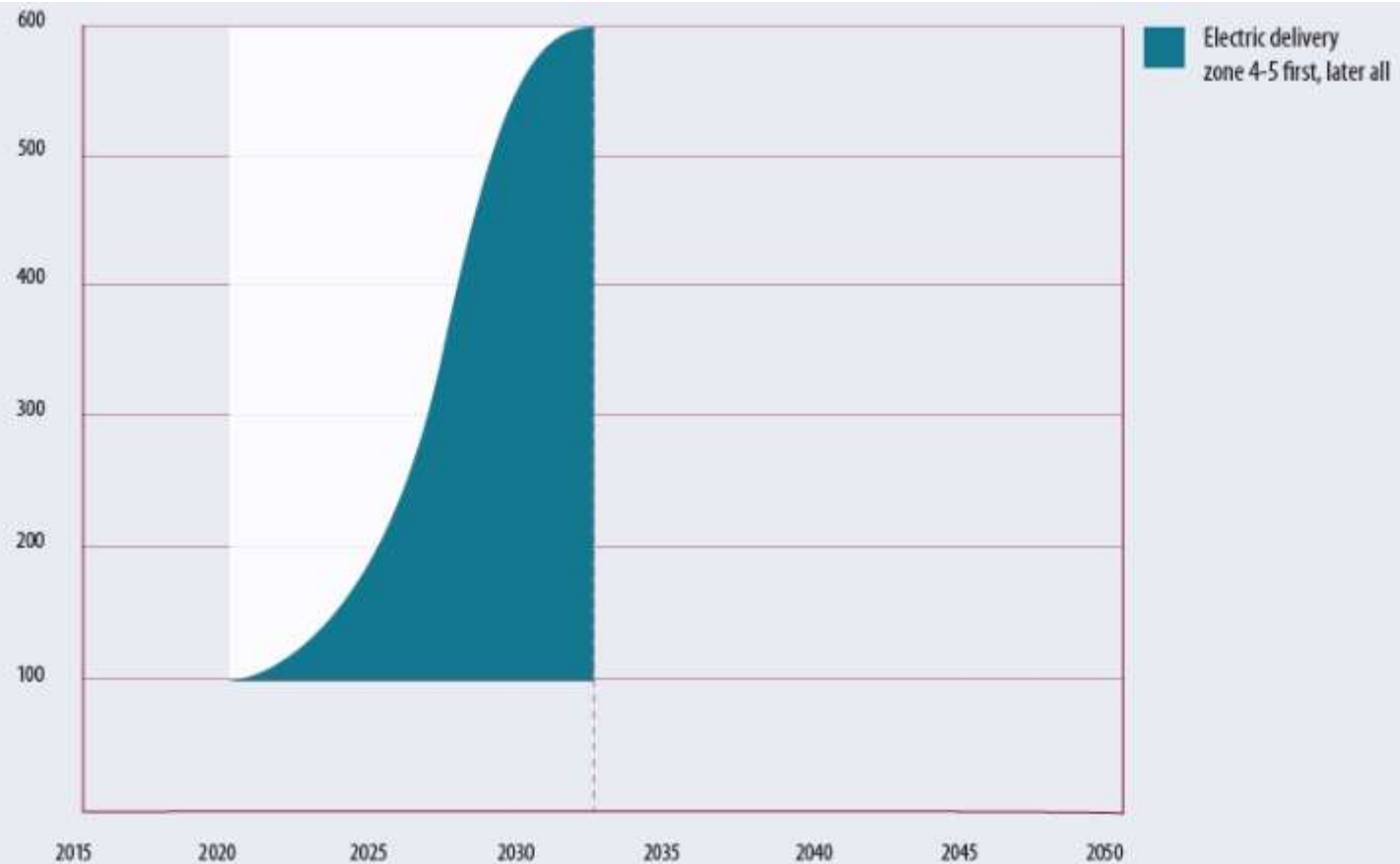


Developments in city logistics

Temperature controlled logistics

› Home deliveries

*Figure 15
Towards zero-emissions
logistics for home
deliveries*



Developments in city logistics

Parcel and express mail

- › B2C (and B2B follows)
 - *Early adaptor for ZE > hub locations close to cities*
 - *Drive for lower cost > automation and robotization*
 - *Provides ZE and high quality service solution also for other segments*
 - *Better / direct connection to final receivers*
 - *Networks for home-deliveries more integrated (PI)*



Developments in city logistics

Facility logistics and waste collection

› Facility logistics

- *ZE stimulated via (public) procurement*
- *More via parcel network (due to regulation)*

› Waste collection

- *Household: dynamic planning based on fill rates*
- *Companies: cooperation in collection > collective system*

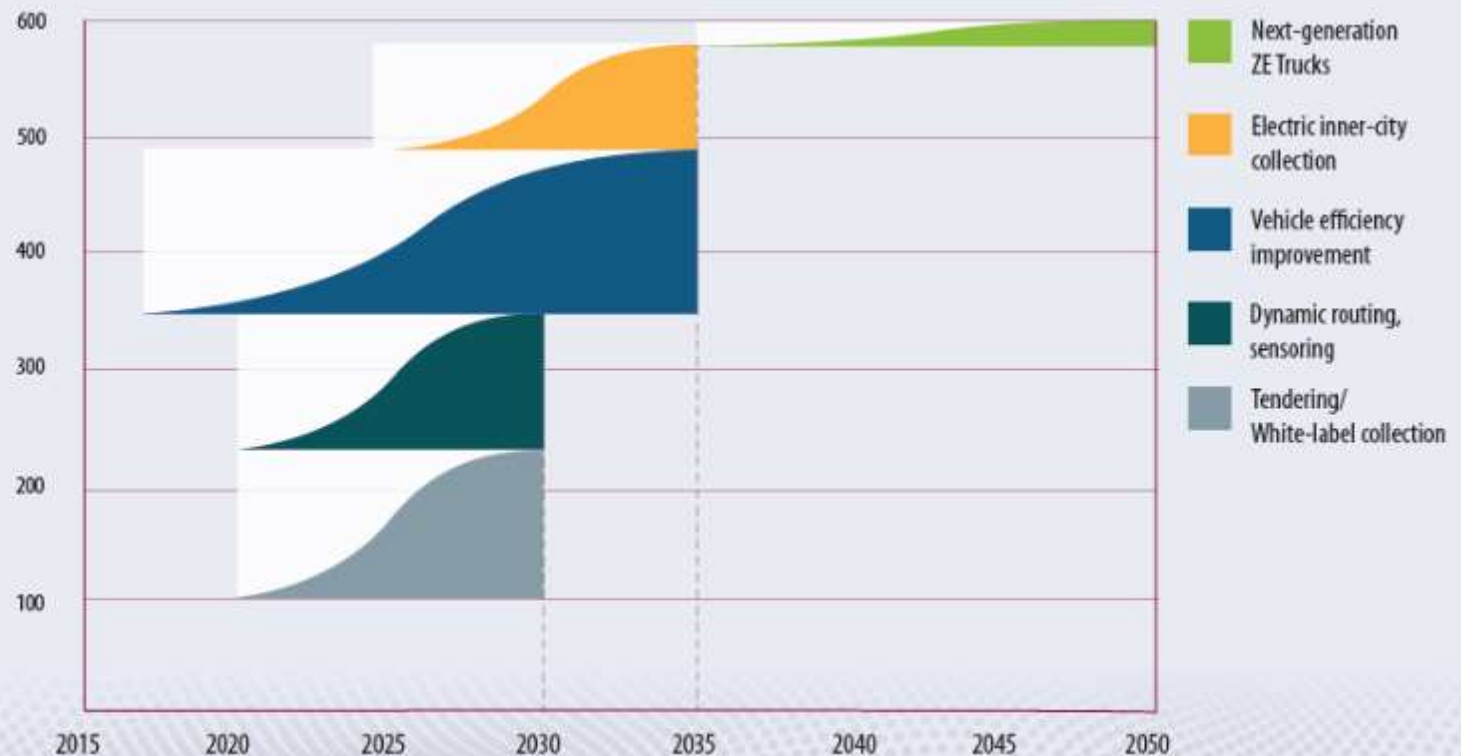


Developments in city logistics

Facility logistics and waste collection

› Waste collection - business

Figure 21
*Towards zero-emissions
logistics in waste
collection: businesses*



Developments in city logistics

Construction logistics

- › Large city construction site
 - *ZE via tendering (MEAT)*
 - *Better planning of flows via BIM*
 - *Traffic management and construction consolidation centres*

- › SME/Self-employed
 - *Space restrictions > minihubs (serviced by e.g. parcel network)*



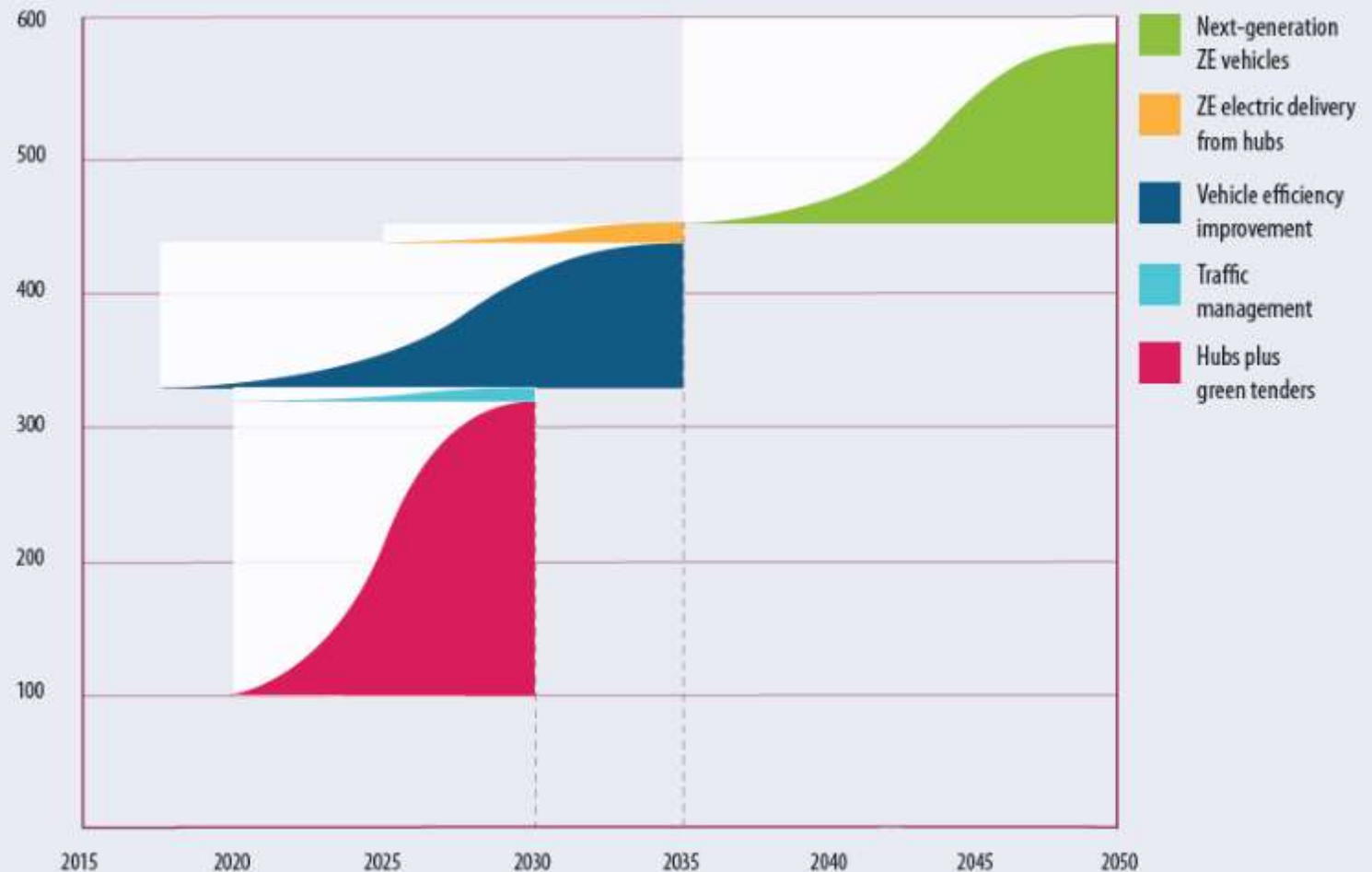
DEVELOPMENTS	SMALL COMPANIES	LARGE COMPANIES
More demanding customer	•	•••
Towards omnichannel	••	•
Connectivity and smart labelling	•	•••
Increasing political and societal pressure for sustainability	••	•••
Increased pressure for better liveability in cities	•••	•••
Vehicle development (from conventional fuels towards zero emission)	••	••
Automization and robotization	•	••
Circular economy	••	••

Developments in city logistics

Construction logistics

› Large city construction site

Figure 18
Towards zero-emissions
logistics in construction:
large companies



Conclusion

- › Logistics and freight transport faces serious challenges (factor 6),
but there are also many opportunities to deal with these challenges
- › Paths to decarbonize city logistics *differ* per (sub)segment
- › Existing trends and developments could lead to more sustainable (city) logistics organisation, however this does not occur automatically
- › The Outlook City Logistics 2017 provide a set of reference views of feasible paths to decarbonize the distribution of goods in cities
but this is only the first version: you are invited to contribute and add improvements (other Outlooks follow)

THANKS FOR YOUR ATTENTION

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TNO innovation
for life

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For more information:

- *Outlook City Logistics 2017* download via www.topsectorlogistiek.nl/download-nu-outlook-city-logistics/