UCC typologies
& good practice assessment

Jacques Leonardi
Transport for London
University of Westminster

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Review objectives

- To review existing literature on urban consolidation centres (UCCs)
- To investigate different types of consolidation practice, considering both the business and environmental case
- To obtain the views of a sample of relevant parties on the appropriateness of different types of UCC and their impacts
- To carry out a preliminary evaluation of the situations in which each type of UCC is likely to be most appropriate

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Good practice assessment (case study) objectives

- Evaluate the previously existing Office Depot deliveries to postcodes EC 1 - 4 (City of London) using diesel vans
- Compare this with the new Gnewt Cargo logistics system implemented using electric tricycles and electric vans for final delivery
- Evaluate the impacts
- Develop a concept model to trial a network of micro-consolidation centres in the Clear Zone area based on the segment analysis.
- Assuming the operation of the concept model, analyse the benefits of replacing current deliveries with micro-consolidation vehicles.

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Methodology

- Comprehensive review of literature:
  - Identification of schemes
  - Details of scheme evaluation
  - General discussion/evaluation of UCCs
- Interviews with selection of relevant parties
- UCC evaluation:
  - Success/failure factors
  - Recommendations for evaluation

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Terminology

- Range of concepts/terminology, including:
  - Consolidation centres
  - Transhipment centres
  - Public logistics terminals
  - Urban platforms
  - Off-site stock room/logistics support centre
  - Collection points
- All above involve a physical centre, but boundaries are blurred
- Also other forms of consolidation

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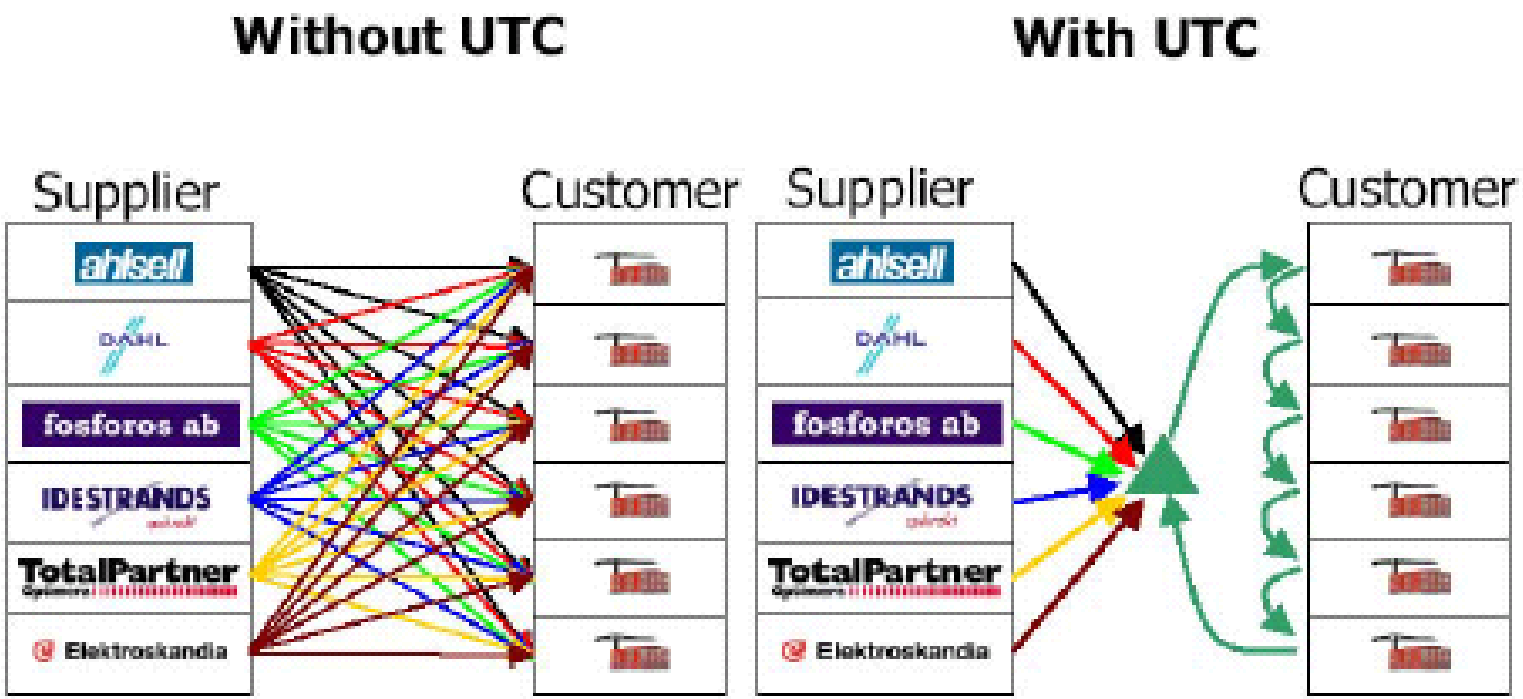
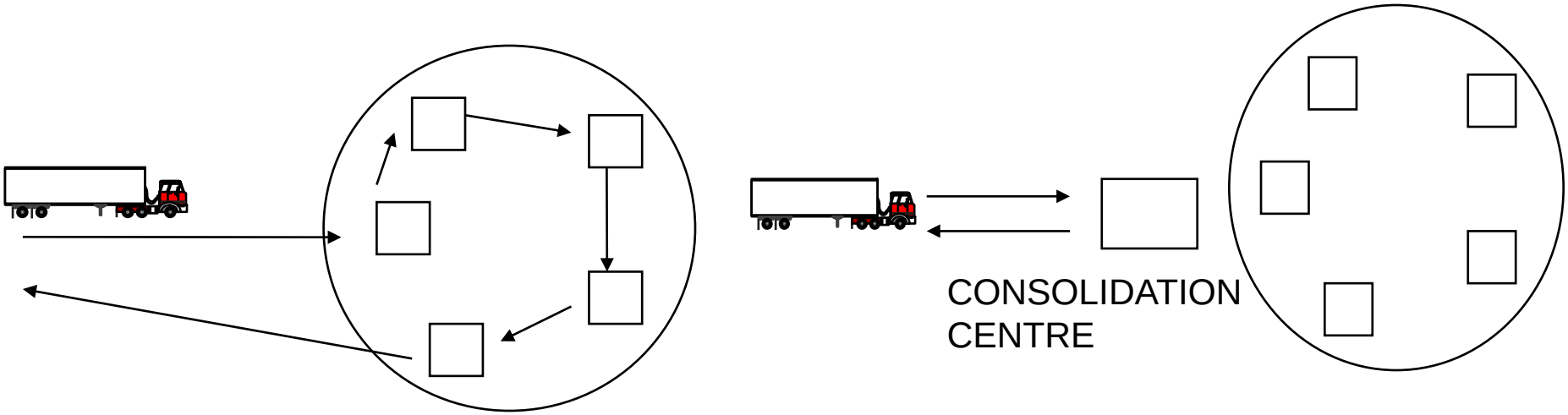
How does a UCC work?



Deliveries to store versus deliveries to consolidation centre



- Fewer vehicle kilometres
- Less time spent making deliveries
- Less time in congested traffic

Analysis of UCCs by country and category

Country	Special project (construction)	Shopping centre	Town/city		Total
			Specific district	Town/city-wide	
Austria	-	-	1	-	1
Belgium	-	-	-	1	1
Canada	-	-	-	1	1
France	-	-	3	5	8
Germany	1	-	4	9	14
Italy	-	-	3	2	5
Japan	-	1	2	-	3
Monaco	-	-	-	1	1
Netherlands	-	-	6	1	7
Portugal	-	-	1	-	1
Spain	-	-	1	-	1
Sweden	1	1	2	-	4
Switzerland	-	-	-	2	2
United Kingdom	1	3	7	6	17
U.S.A.	-	-	-	1	1
Total	3	5	30	29	67

Note:

Site Specific = UCC scheme serves a single site or commercial unit (of which three – Hammerby, Potsdamer Platz in Berlin, and Heathrow Airport are construction consolidation centres, the other five are shopping centres)

District = UCC scheme serves part of a town/city - usually historic centre

Town-wide = UCC scheme serves the whole town

UCCs by status

Research/ Feasibility	Pilot/Trial	Operational	Total
26	13	28	67

Analysis of UCCs by date of investigation / start-up

1970-1975	1976-1990	1991-1995	1996-2000	2001+	Total
6	9	19	17	15	66

Classification of UCCs

- Special project UCCs:
  - Construction sites
  - Permanent or fixed period
- UCCs on single site with one landlord:
  - Airports
  - Shopping centres
- UCCs serving a town/city (or district of):
  - Geographical area: large or small
  - No. of companies: single or several

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Construction Consolidation Centre Heathrow

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Logistics Consolidation Centre
Stockholm, Sweden

Freight Consolidation Scheme

SUGAR

Target Area - Broadmead

- Broadmead, Bristol's core retail area
- Approx 324 retail units
- Air Quality Management Area
- Clear Zones Strategy
- Broadmead Expansion

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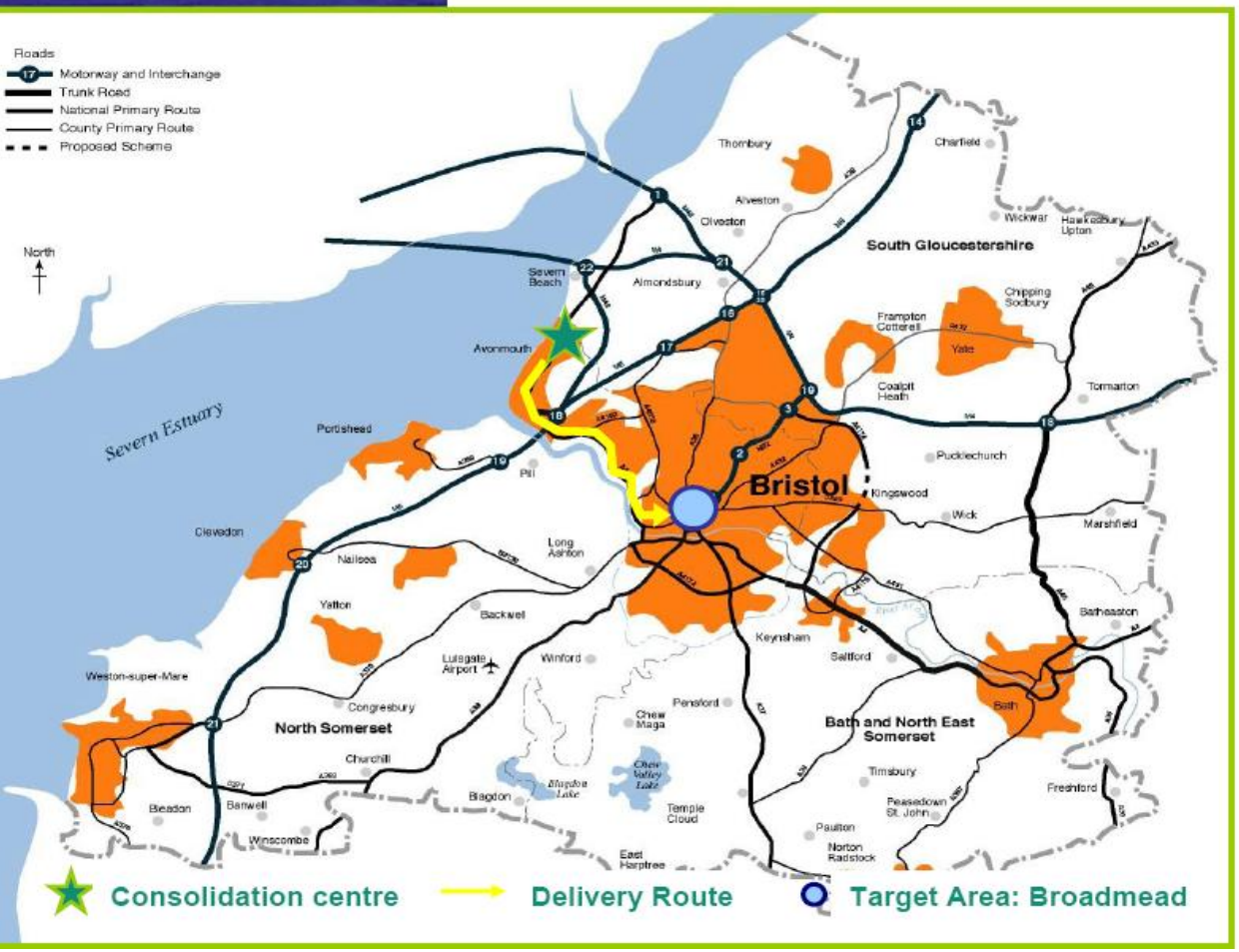
START

Intelligent Energy Europe

Bristol Consolidation Centre

Consolidation Centre Location



- Located on western fringe of Bristol on established industrial estate;
- Close to strategic road network (M5, M4);
- Approx 3000 sq ft warehousing space;
- 10 miles from city centre target area;
- Approx 25 mins journey time to target area;
- Operates using a 9 tonne electric vehicle and an 18 tonne Euro 4 vehicle;
- All drivers are SAFED trained;

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Gestion de la Plate-forme

La Rochelle city centre consolidation and use of electric vehicles for final delivery, managed by the provider Elcidis

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Key evaluation issues

- Lack of rigorous (published) assessment of previous schemes:
  - Little quantification of impacts
  - No standardised methodology for assessment
  - Issues of confidentiality
- Little or no prior knowledge of UCC concept amongst certain “interested parties”

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Impacts included in UCC scheme evaluations identified

Impacts of UCCs	Number of the UCC studies quantifying this (out of the 14 studies identified)
Changes in the number of vehicle trips	7
Changes in total fuel consumed	6
Changes in vehicle emissions	5
Changes in the number of vehicle kilometres	4
Changes in the number of vehicles	4
Vehicle load factor	4
Changes in parking time and frequency	4
Changes in operating costs	2
Changes in travel time	1
Goods delivered per delivery point	1

Evidence of transport impacts

- Claimed reductions in key measures (e.g. vehicles, trips, kms, utilisation):
  - Little rigorous analysis
  - High localised savings, limited overall impact
- Ability to separate trunk and local movements:
  - Alternative modes or vehicle types
  - Focus on improving “last mile”

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Wider supply chain impacts

- Many potential benefits,
  limited documented evidence
- Improved management and visibility of supply chain
- Specific benefits can include:
  - Local stockholding, with pre-retailing and quick response
  - More productive floorspace use at destination
  - Fewer deliveries (and disruption) at destination
  - Returns and recycling

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Success factors

- Availability of funding
- Strong public and private sector involvement
- Bottom-up pressure from local interests
- Supporting regulatory framework
- Significant existing transport problems in local area
- Ability to resolve wider logistics problems
- Single manager/coordinator

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Recommendations

- Allow time to establish scheme viability
- Public funding needed for “pump priming”
- Ensure big role for private sector
- Raised awareness and guidance needed (esp. for public sector)
- Consider wider logistics impacts (esp. costs)
- Firmly establish “before” situation to allow proper evaluation

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Variables and indicators to be included in a comprehensive UCC evaluation

Broad Indicators	Narrow Indicators
1) Logistics and supply chain changes - Efficiency at receiving premises due to fewer, more reliable deliveries - Efficiency/sales at receiving premises due to stockholding & value added services - On-time delivery (punctuality) - Change in order cycle time - Effect of greater reliability on stockholding strategy - Change in total handling costs - Change in total freight transport costs **2) Social/environmental impact of UCC vehicle activity** - Fossil fuel consumption - Emissions - Congestion	**3) Goods vehicle activity** - Vehicle kms - Vehicle trips - Vehicle load factor **4) Loading/unloading activity** - Space utilisation - Time

General conclusions

- Lack of rigorous evaluation of scheme impacts – more needed
- “New generation” schemes seem to offer potential
- Further work needed on allocation of costs and benefits
- UCC concept seems to be viable given certain pre-conditions

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Good practice assessment:
Office Depot
Consolidation Centre and Electric Vehicles
Part 1

- Trial description
- Impact evaluation survey

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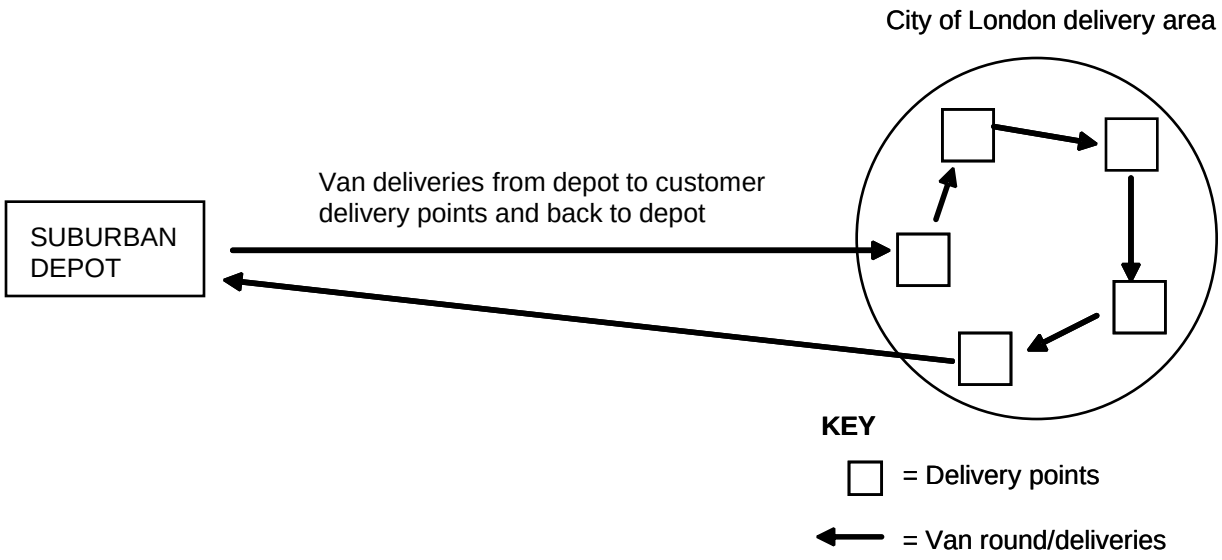
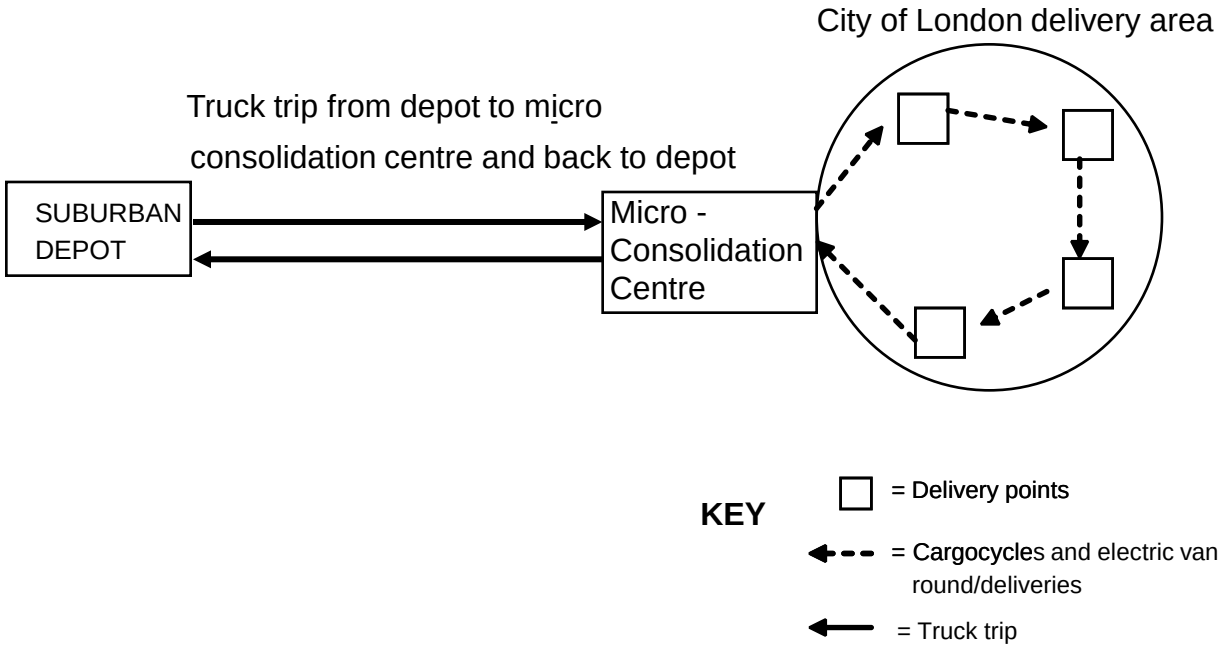
“Before” and “after” delivery system

- Original diesel van delivery system studied Feb–March 2009 – with updated information provided before the trial went live. In the original system diesel vans departed from a suburban depot to make deliveries to postcodes in central London (EC1, EC2, EC3 & EC4)
- New Cargocycle® and electric van delivery system studied in Nov 2009 – May 2010
- New delivery system was implemented incrementally:
  - Initially an intermediate system was used which involved Cargocycles®, electric and diesel vans (Nov 2009-March 2010)
  - The new system using only Cargocycles® and electric vans was fully implemented in May 2010
- In the new system a diesel truck is used to transport goods from the suburban depot to the City of London microconsolidation centre for onward delivery by Cargocycles® and electric vans



Logistics system for deliveries by diesel vans



Logistics system for deliveries by Cargocycles® and electric vans

Standard 3.5t diesel van: Capacity of 1270 kg and 9 m³

Electrically assisted tricycle capacity of 180 kg and 1.5 m³

Electric van: Capacity of 445 kg and 3 m^3

Impact of changes on distance driven in London, and CO_2

	BEFORE	Intermediate	AFTER	% change After-Before
Time	October 2009	March 2010	May 2010	
Fleet change	7 vans, no cycles	4 vans, 6 cycles, 1 elec van, 1 truck	0 van, 6 cycles, 3 elec vans, 1 truck	
All diesel vans miles/day	322	184	0	
Truck miles/day	0	34	34	
Cargocycles + elec van miles / day	0	63	81	
Total miles in Greater London / day	322	281	115	-64%
Miles within the City of London / day	42	89	83	+98%(+350?)
Miles outside the City of London / day	280	192	32	-89%
$kgCO_2e$/ parcel	0.155	0.134	0.058	-62%
Total miles / parcel	0.282	0.244	0.130	-54%

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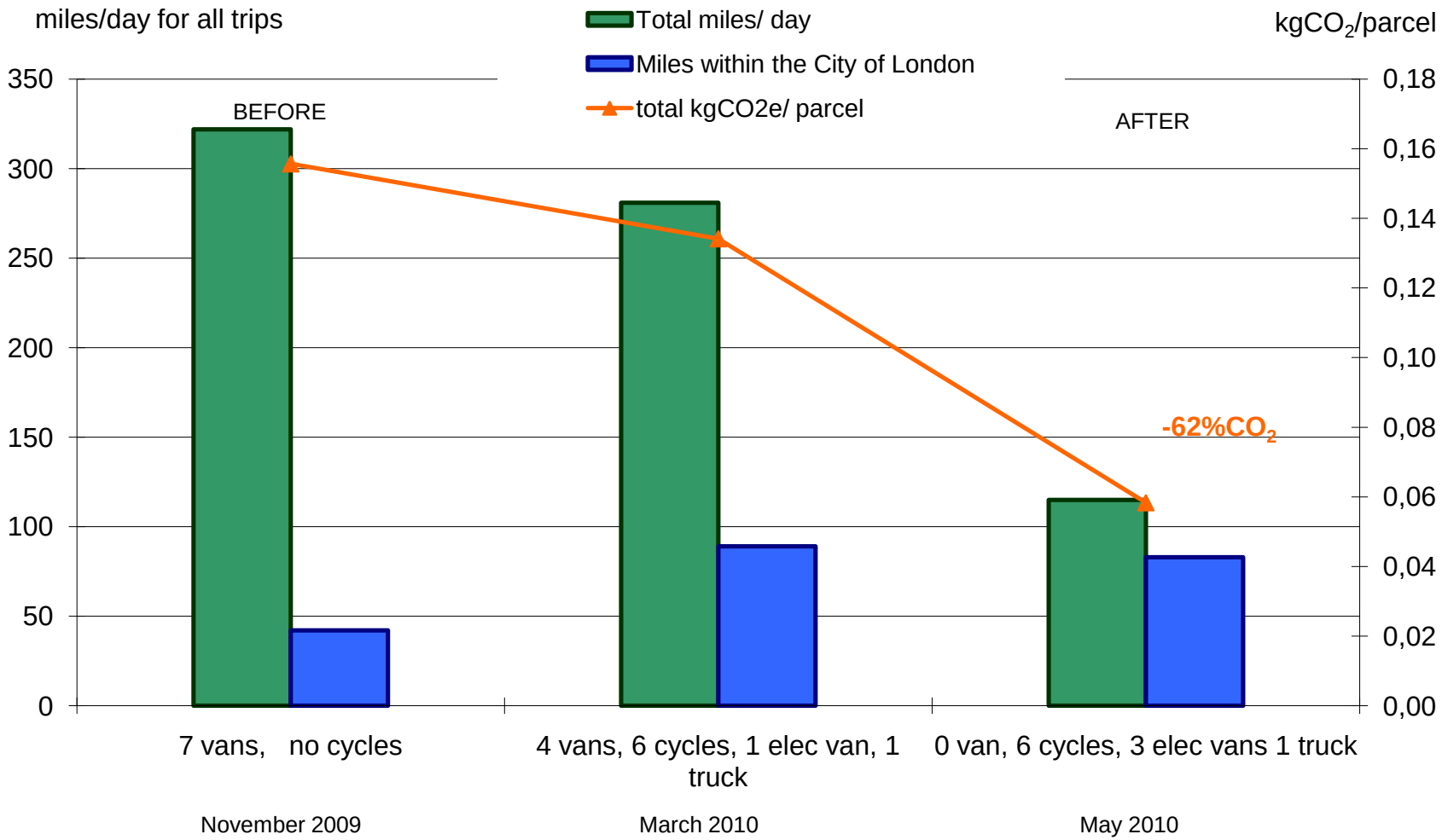
Progressive impacts of fleet replacement by Cargocycles® and electric vans



Impact of vehicle length on kerbside parking occupancy during one day

	BEFORE 7 vans, no cycle	AFTER 6 cycles, 3 elec vans
All diesel vans stops/day	140	0
All Cargocycles stops/day	0	80
All electric vans stops/day	0	60
Parking length requirement: Metres for all diesel vans/day	799	0
Parking length requirement: Metres for all Cargocycles/day	0	188
Parking length requirement: Metres for all electric vans/day	0	199
Parking length requirement: Total metres for all vehicles/day	799	387
Parking length requirement index of all vehicles/day	100	48
Reduction Parking length requirement for all vehicles/day		- 52%

Vehicle length: Diesel van: 5.71m; Electric van: 3.32m, Cargocycle: 2.35m

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Consolidation centre close to the City of London

Summary of trial evaluation, part 1 results and impacts

- Mileage is increased in City of London but reduced elsewhere in London
- Confirmed reduction in overall greenhouse gas emissions
- Electric vans are used in addition to Cargocycles for transport of parcels with slight bigger volume
- The trial specific conditions:
  - The type of business is suitable for Cargocycles (parcels, not pallets)
  - Size and weight of parcels are rather small
  - Delivery area in City Centre has a high density of clients
  - A small consolidation centre is available close to the delivery area

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Good practice assessment
Part 2

- The consolidation network impact model
- Scenario and analysis
- Recommendations

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Modeling the impacts of a network of consolidation centres

- Calculate the before-after impacts using real case data for about 80 variables
- For 18 scenarios, only one variable is assumed to change at a time Each change corresponds to the question: what would happen if another company would join the network, and the variable changed would be the single difference from the real case of Gnewt
- For 2 network scenarios, the changes are calculated for adding 4 companies and 4 centres. Scenario A: 4 identical, scenario B 4 different companies

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Examples: extension of the area and extension of the number of vehicles

Objective of this family of scenario: understanding how singular changes in the system of cargocycle introduction influence the whole impacts

REAL CASE

Real case observations and calculations

Real case: B2B parcels deliveries in the City of London

REAL CASE	Fleet						Ratio			Rounds/day		Capacity by weight in kg				
	% of fleet replacement	Fleet change	Number of vans	Number of cycles	Number of electric vans	Number of trucks	Cycle per diesel van		Elec van per diesel van	Rounds/ cycle/ day	Rounds/ elec van/ day	Total van capacity in kg	Total cycle capacity in kg	Total elec van capacity in kg	Truck capacity in kg	Total van+cycle+elec van capacity by weight
BEFORE REAL	0	7 vans, no cycles	7	0	0	0				0	0	8890	0	0	0	8890
AFTER REAL	100	0 vans, 6 cycles, 3 elec vans	0	6	3	1	0.8571		0.4286	2	2	0	2400	2670	10263	5070

1

Extension scenario 1: delivery area extended from the City of London to the whole Clear Zone

Scenario 1: All conditions of business and before-after changes are set identical with Real Case, except for mileage and number of vans, with 784 miles for 16

SCENARIO 1	Fleet						Ratio			Rounds/day		Capacity by weight in kg				
	% of fleet replacement	Fleet change	Number of vans	Number of cycles	Number of electric vans	Number of trucks	Cycle per diesel van	% change from real case ratio	Elec van per diesel van	Rounds/ cycle/ day	Rounds/ elec van/ day	Total van capacity in kg	Total cycle capacity in kg	Total elec van capacity in kg	Truck capacity in kg	Total van+cycle+elec van capacity by weight
BEFORE	0	16 vans, no cycles	16	0	0	0				0	0	20320	0	0	0	20320
AFTER	100	0 vans, 14 cycles, 7 elec vans, 2 trucks	0	14	7	2	0.875	2	0.4375	2	2	0	5600	6230	20526	11830

2

Extension scenario 2: 200 vehicles through additional identical business in City of London

Scenario 2: All conditions of business and before-after changes are set identical with Real Case, except 200 diesel vans instead of 7 for BEFORE. Same rate

SCENARIO 2	Fleet						Ratio			Rounds/day		Capacity by weight in kg				
	% of fleet replacement	Fleet change	Number of vans	Number of cycles	Number of electric vans	Number of trucks	Cycle per diesel van	% change from real case ratio	Elec van per diesel van	Rounds/ cycle/ day	Rounds/ elec van/ day	Total van capacity in kg	Total cycle capacity in kg	Total elec van capacity in kg	Truck capacity in kg	Total van+cycle+elec van capacity by weight
BEFORE	0	200 vans, no cycles	200	0	0	0				0	0	254000	0	0	0	254000
AFTER	100	0 vans, 168 cycles, 85 elec vans, 18 trucks	0	168	85	18	0.84	-2	0.425	2	2	0	67200	75650	184734	142850

Example distance

- The total distance driven by all vehicles in Greater London before and after the introduction of the new fleet and consolidation centre network
- Impacts of further scenarios after changes are calculated in % change, compared to real case before

					Distance	Scenario
Total distance in miles per day						
Distance all diesel vans (46 mi/round)	Distance all cycles (4.5 mi/round)	Distance all elec vans (4.5mi/round)	Truck distance	Total distance vans+ clean vehicles+ truck	% change in total distance	
322				322	0	
0	54	27	38	119	-63	Real

Changes are expressed as % of before

$$C = \left(\frac{A \times 100}{B} \right) - 100$$

with:

C = % change between before and after expressed as % of before

B = before: with 100% diesel vans

A = after: with 100% electric vans and micro-consolidation centre(s)

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Total distance in London

Total distance in miles per day						
Distance all diesel vans (46 miles/round)	Distance all cycles (4.5 mi/round)	Distance all elec vans (4.5mi/round)	Truck distance	Total distance vans+ clean vehicles+ truck	% change in total distance	
784				784	0	
0	126	63	76	265	-66	Clear Zone

Total distance in miles per day						
Distance all diesel vans (46 mi/round)	Distance all cycles (4.5 mi/round)	Distance all elec vans (4.5mi/round)	Truck distance	Total distance vans+ clean vehicles+ truck	% change in total distance	
9200				9200	0	
0	1512	765	684	2961	-68	200 veh

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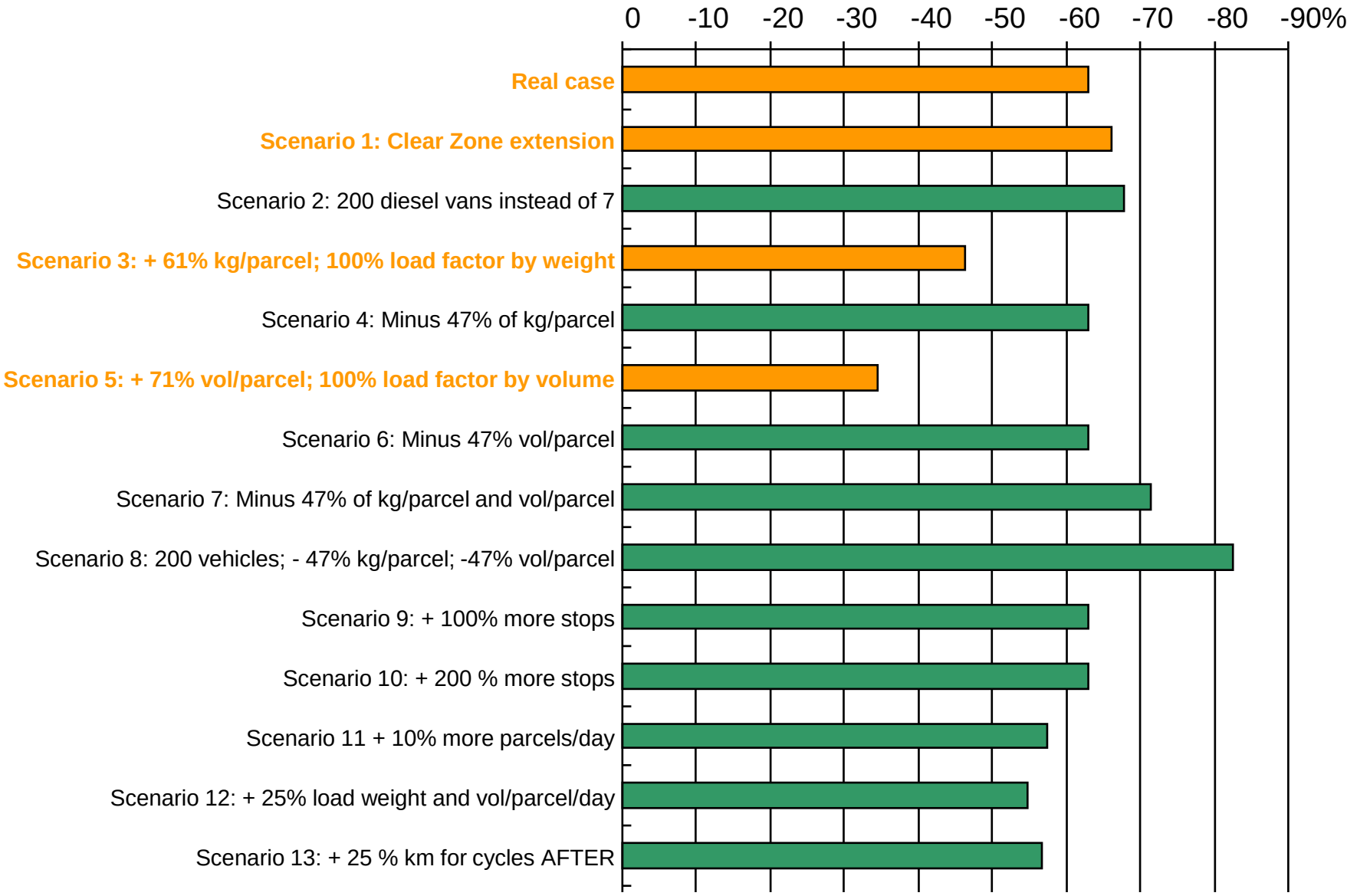
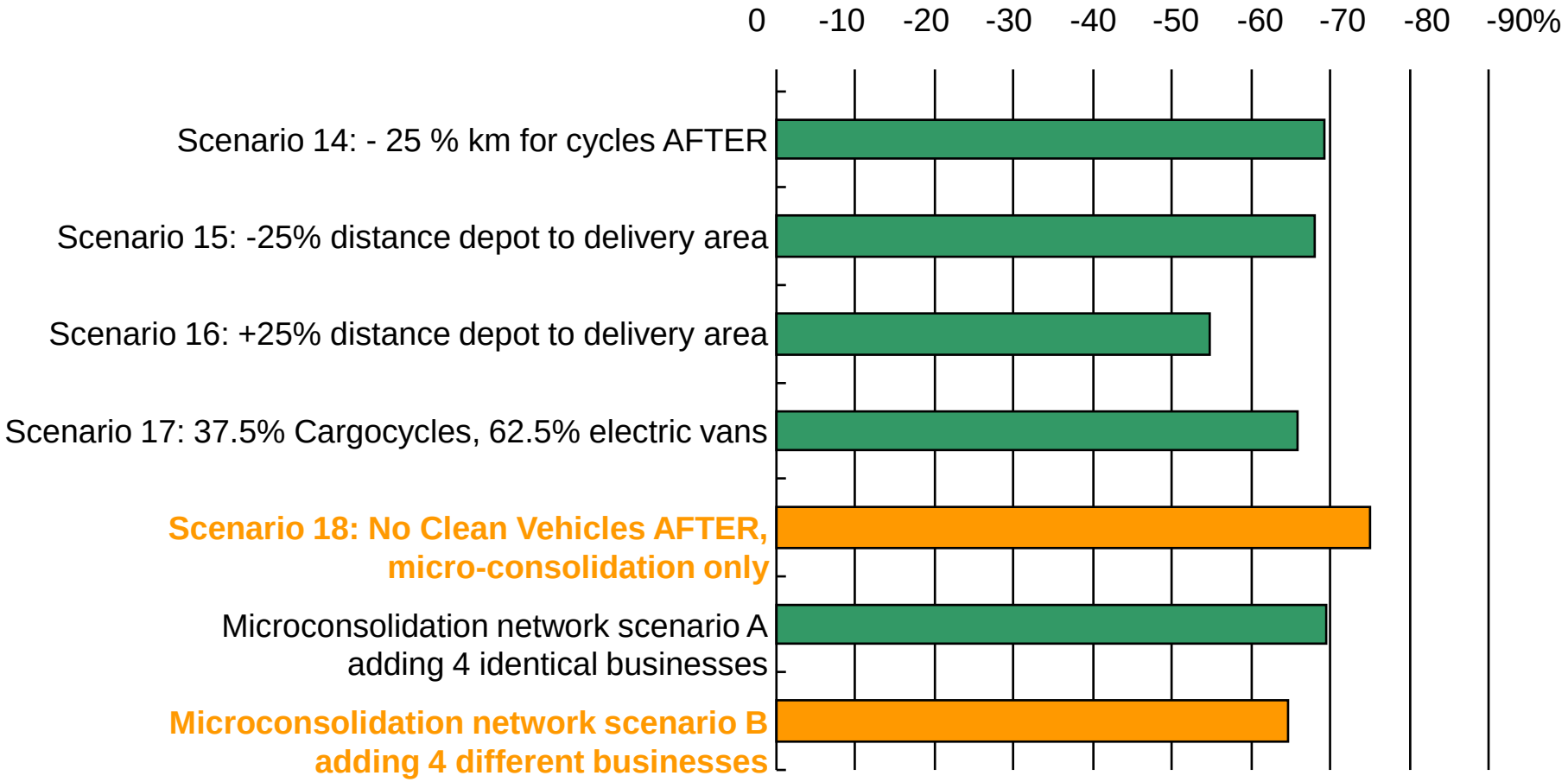
Total distance driven in London

according to various scenarios



Total distance driven in London

Impacts of scenarios, after changes, in % compared to real case BEFORE changes = e.g. adding other types of businesses



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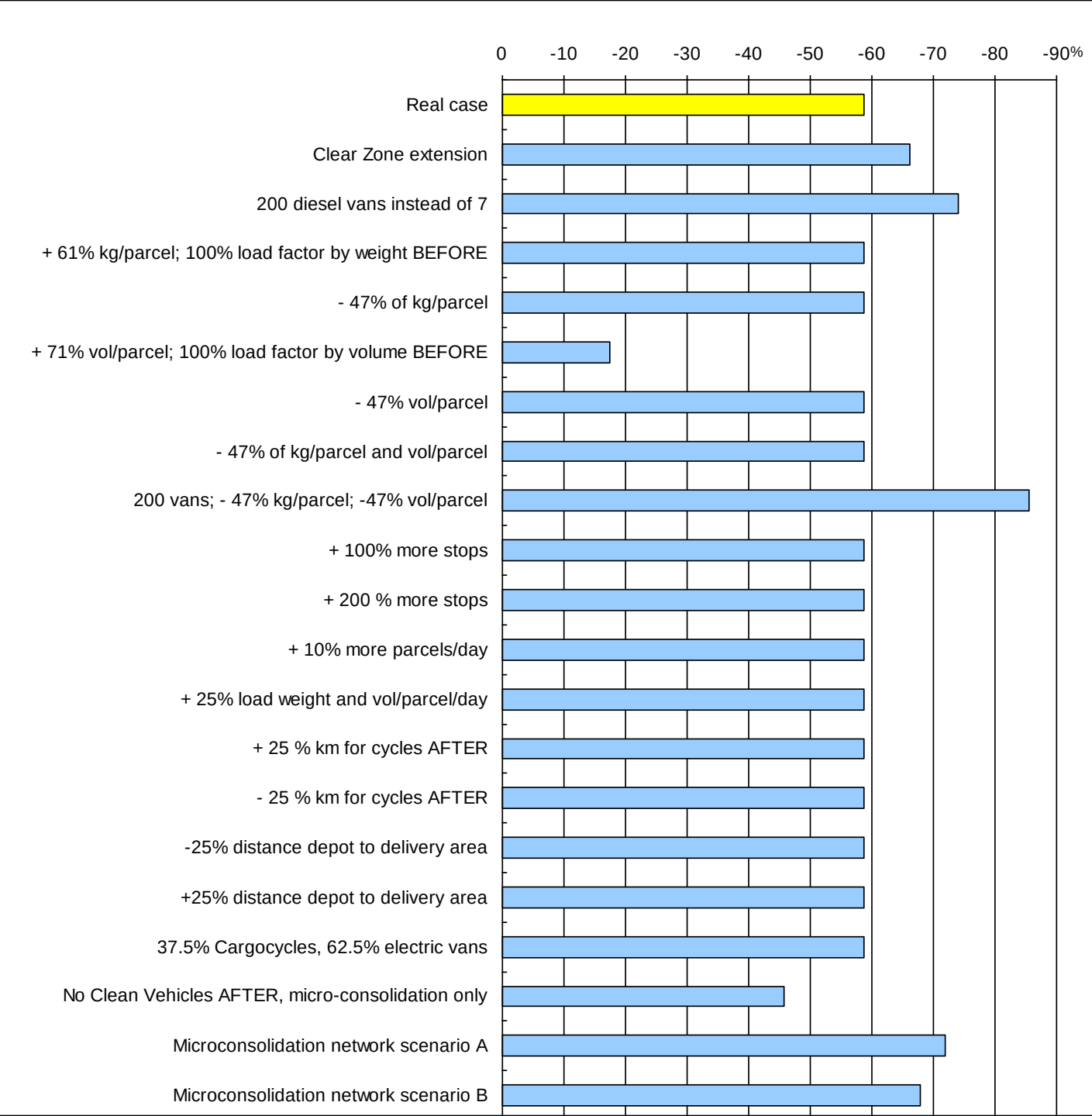

Change in total CO_2 emissions in London

Potential sectors (scenario B)

- Parcel services in B2B and B2C business, home deliveries to households
- General cargo logistics
- Stationery
- Clothes
- Fruit and vegetables
- Restaurants, pubs, and bars
- Administration and service offices

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Recommendations

1. Facilitate a higher market share for electric freight vehicles
2. Test new loading space
3. Avoid PCNs for clean vehicles
4. Observe and monitor changes
5. Improve coordination
6. Authorities should not take operating responsibility for a consolidation centre
7. Cooperate with research and maintain expert knowledge on clean vehicles and consolidation

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Concluding remarks

- Most scenarios show reductions in:
  - overall distance travelled
  - emissions
  - Kerbspace (loading) requirements.
- Challenge: growth in distance in inner-city area
- Private benefits for the company:
  - ability to react more quickly to customer requests
  - more targeted approach to certain delivery areas
  - improved image and positive public relation effects

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