

# Logistics and Land: the Changing Land Use Requirements of Logistical Activity

Professor Alan McKinnon  
Logistics Research Centre  
Heriot-Watt University  
EDINBURGH, UK

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# Government Foresight Programme

## *'Land Use Futures'*

*'To explore how land use in the UK could change over the next 50 years...examining society's future needs and values towards land use.'*



## Outline

Classify of logistics-related land uses

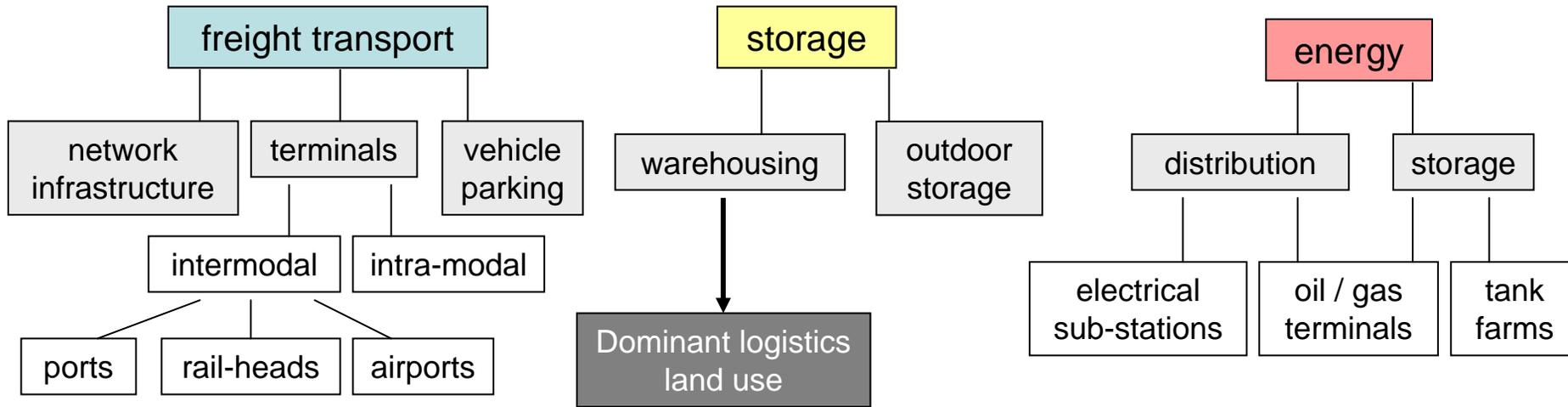
Examine the recent growth of warehousing in UK

Review GVA-based forecasts of future warehouse growth trends

Consider of other factors likely to affect this trend

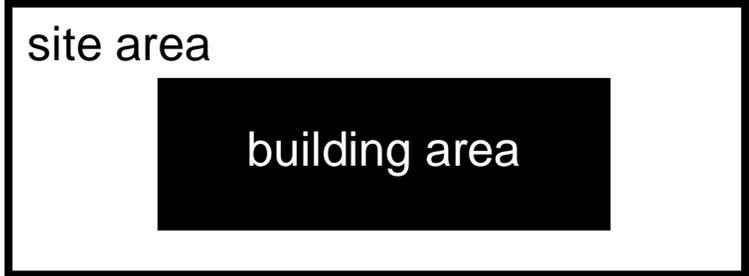
Present a model for assessing future logistics land requirements

# Classification of Land Requirements by Logistical Activity

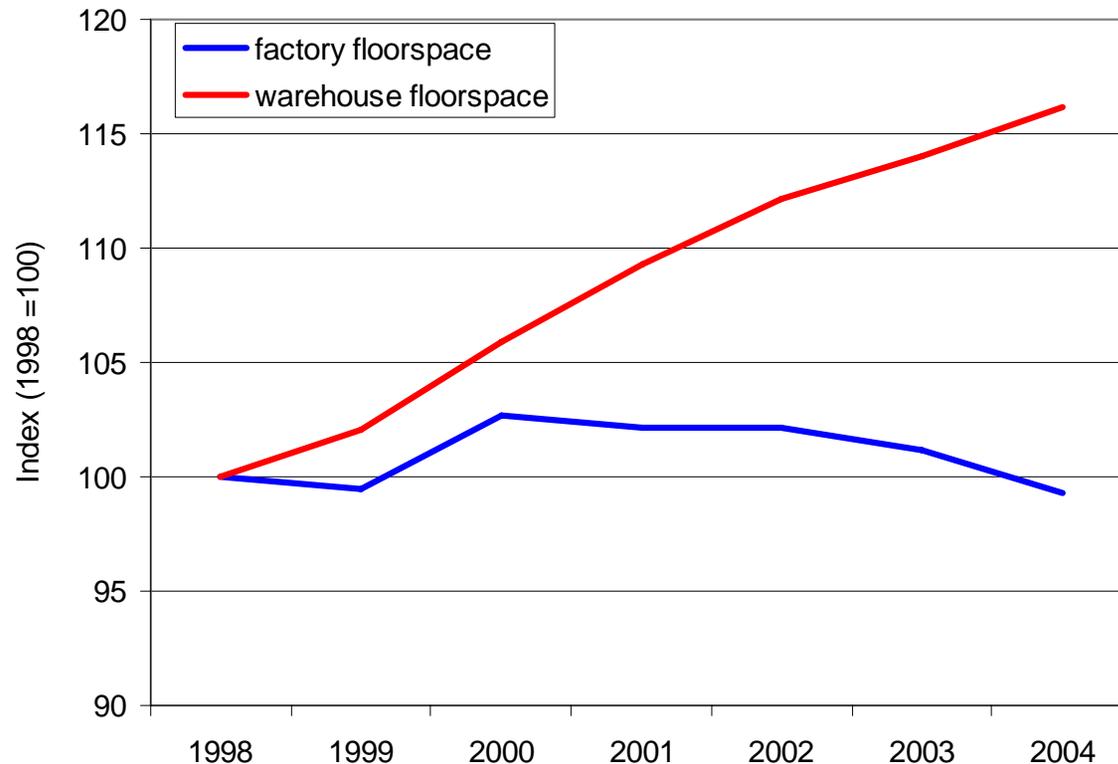


151 million square metres in England and Wales (2006)  
 45% plot ratio → 23,500 hectares  
 1% of non-agricultural and non-forestry land

Plot ratio = building floor area : total site area



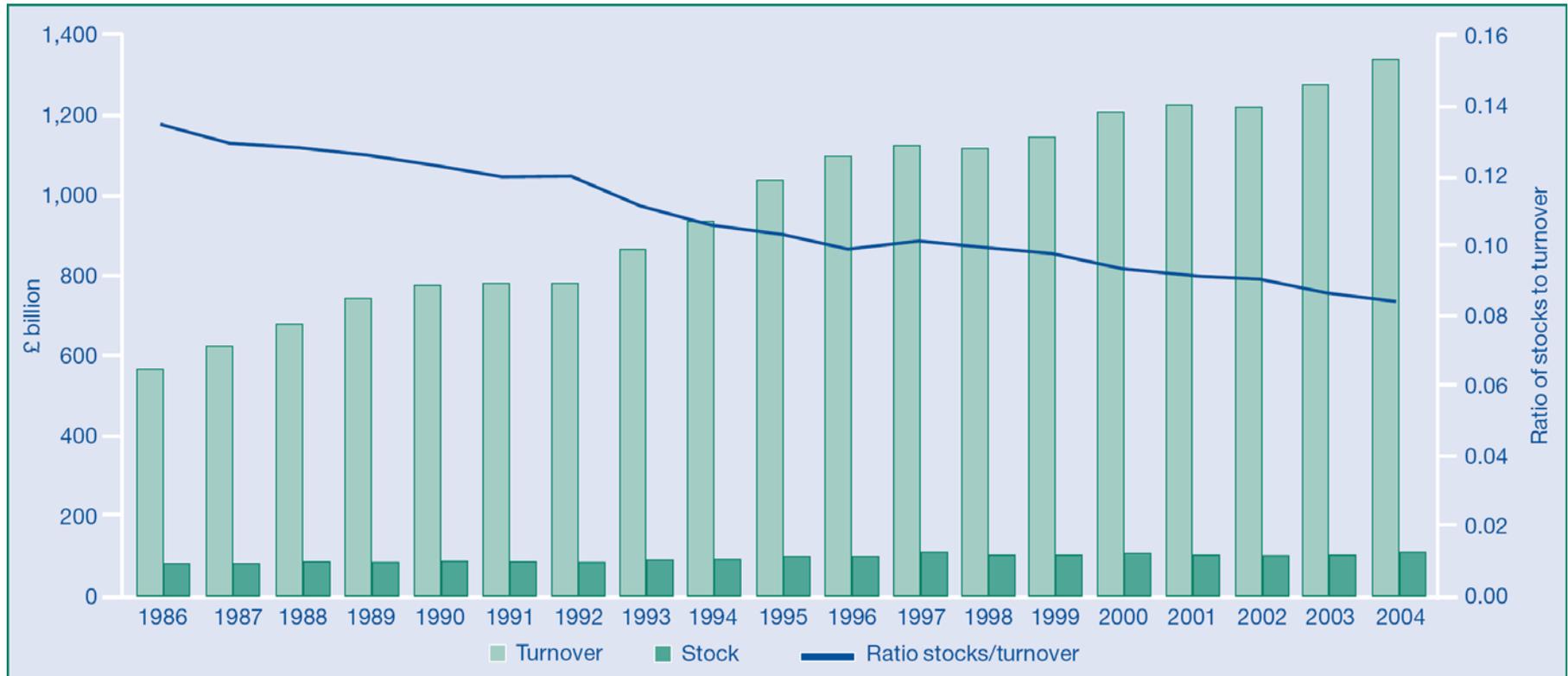
# Comparison of Warehouse and Factory Growth Rates



Britain has evolved from '*workshop of the world*' to the '*warehouse of the world*' '*..mushrooming acreage of mega-sheds and depot centres undermining civic life and our manufacturing base*'. '*....the liberalisation of world trade and the influx of manufactured goods from India and China mean that Britain has no option but to erect ever larger warehouses*'. (Hunt, 2006)

# Growth of Warehouse Floorspace

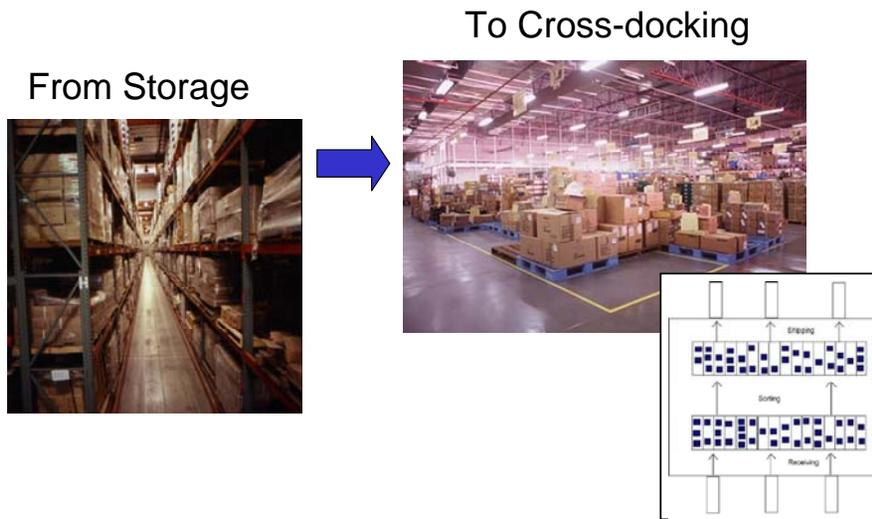
- 2.4% growth between 1998 and 2004 – in line with GDP
- complex underlying relationship
- total value of inventory in UK economy has remained fairly stable
- ratio of inventory to GDP has steadily dropped



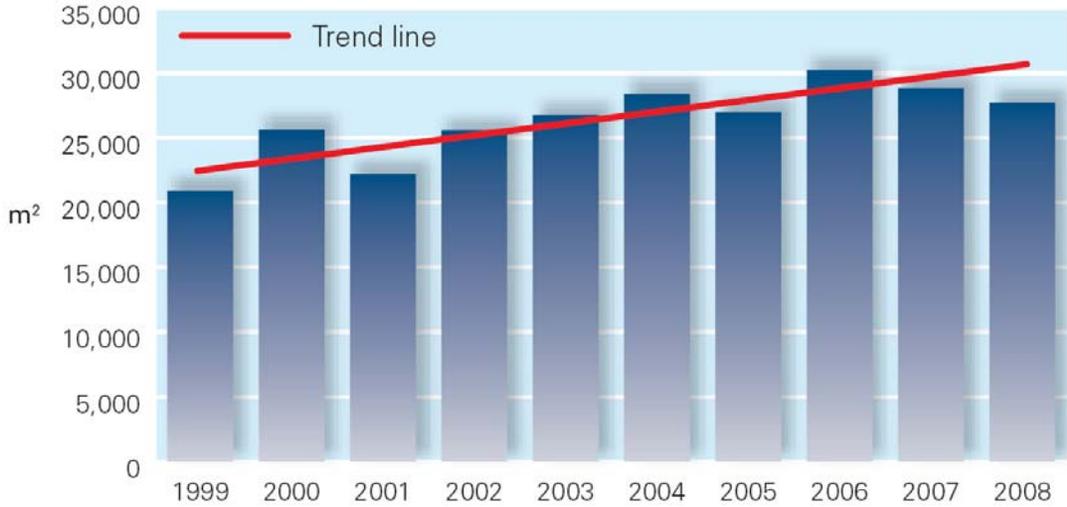
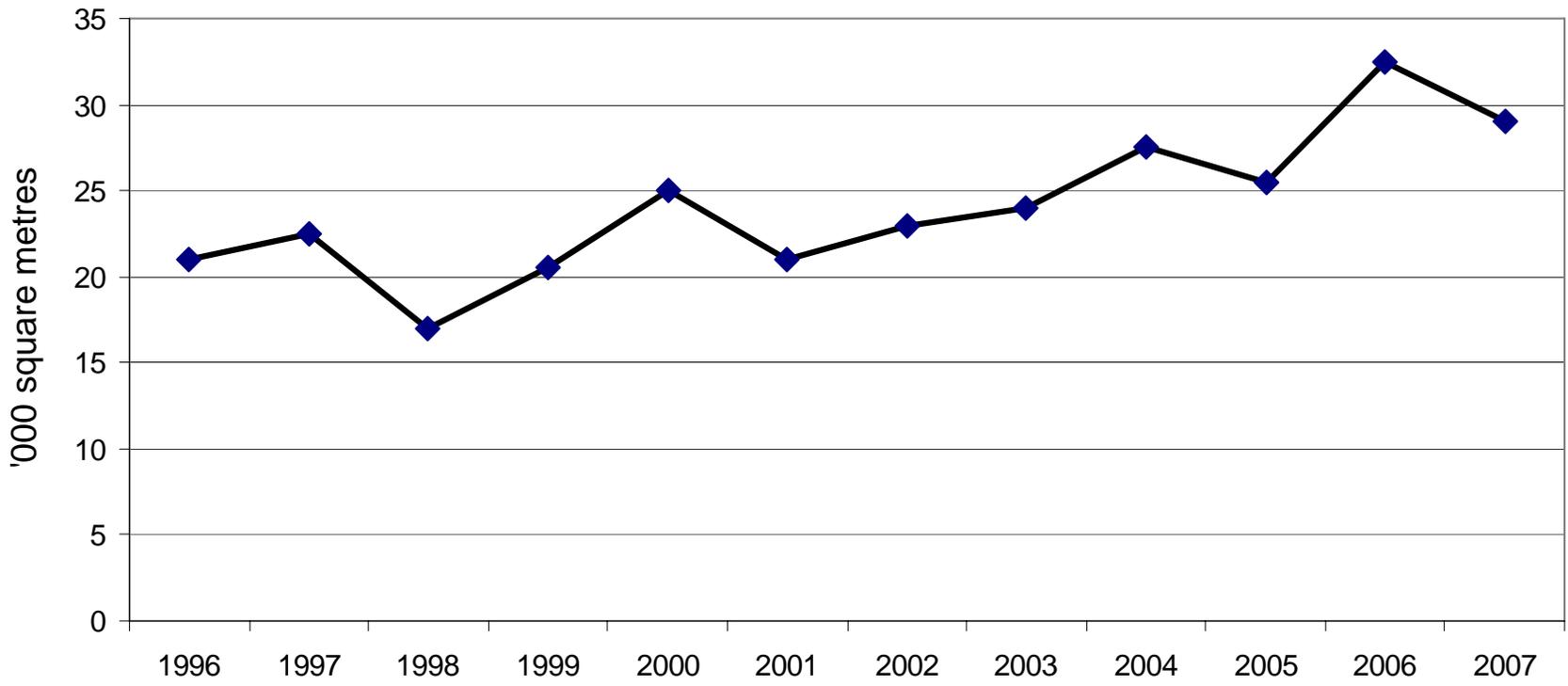
# Changing Ratio of Warehouse Floorspace to Value of Inventory

## Possible reasons

- Value density of the inventory is increasing
- Inventory is also stored in other types of building (shops, factories etc)
- Warehouse floorspace is a 2-dimensional measure: *average height of warehouses is increasing storage capacity per square metre*
- Amount of vacant warehousing varies through time: *in relation to economic activity and the property cycle.*
- Warehouse space used for purposes other than storage: *change in the nature and range of activities performed in warehouses*



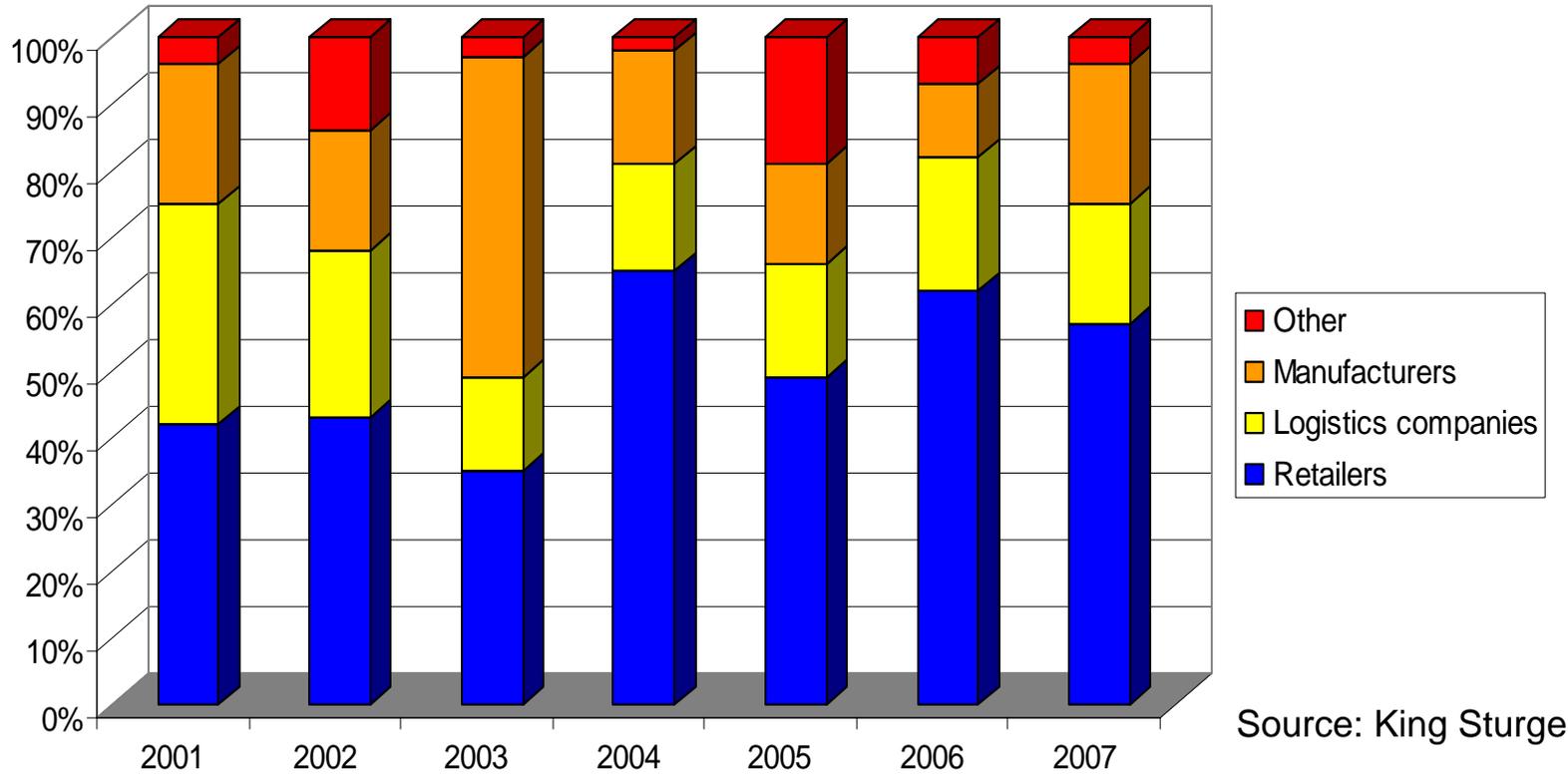
# New Floorspace in Distribution Centres of over 10,000 square metres



Increase in average size of DCs of over 10,000 sq m

Source: King Sturge, 2009

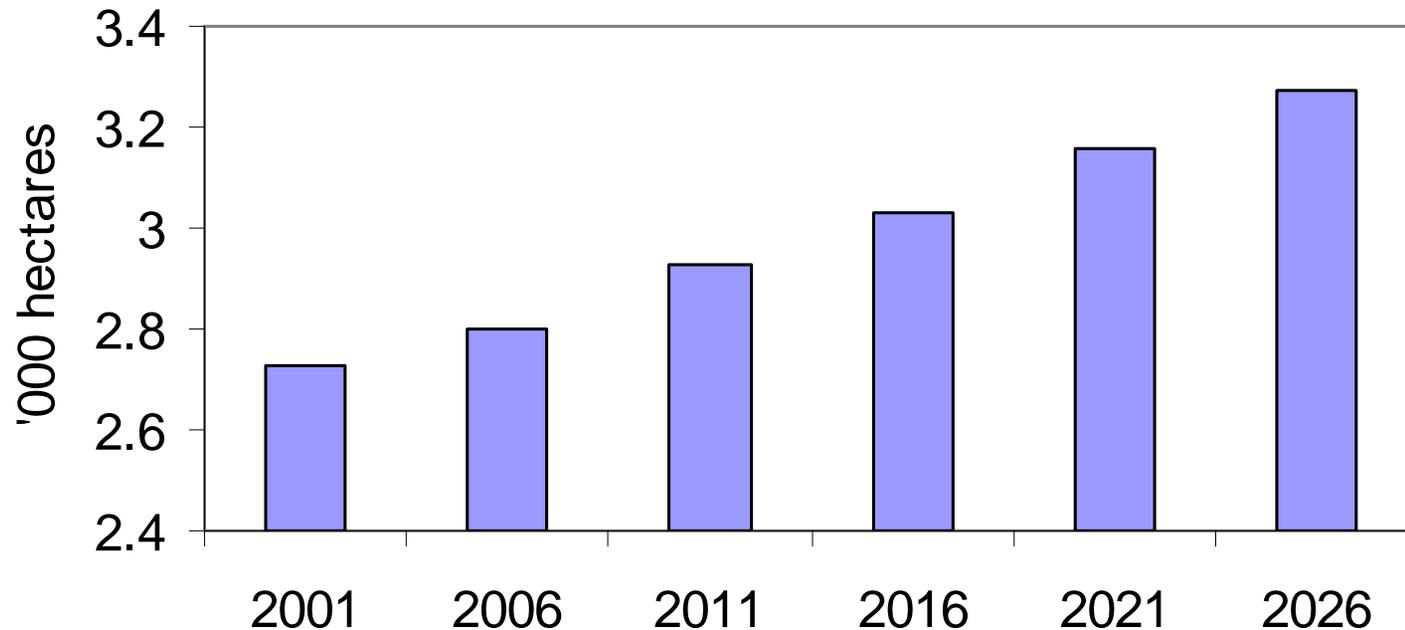
# Take-up of Large New DCs by Type of Organisation



# Forecasting Future Demand for Warehouse Land

## Assumptions:

- Close correlation between Gross Value Added (GVA) and warehouse floorspace  
(past correlations: UK  $r = 0.94$  London  $r = 0.96$ )
- GVA growth rate of 2.5-3%
- Stable plot ratios - around 45%



Projected growth in demand for warehouse land in London

## Factors Likely to Distort the GVA – Warehouse Land Relationship

Off-shoring of manufacturing and upstream supply chains

Increase in the relative costs of freight transport, inventory and warehousing

Transfer of freight to more environmentally sustainable transport modes

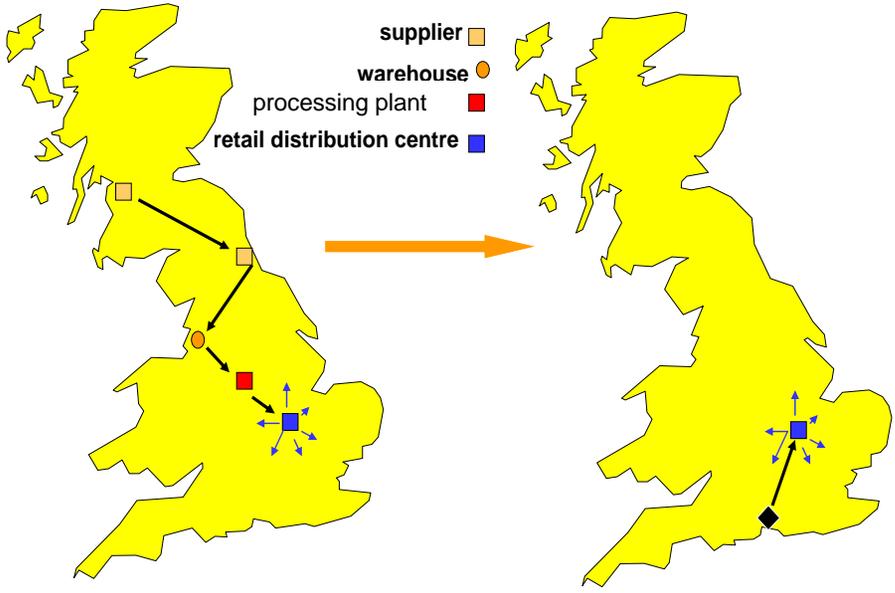
Growth of online retailing

Advances in warehouse technology

Restructuring of the waste supply chain

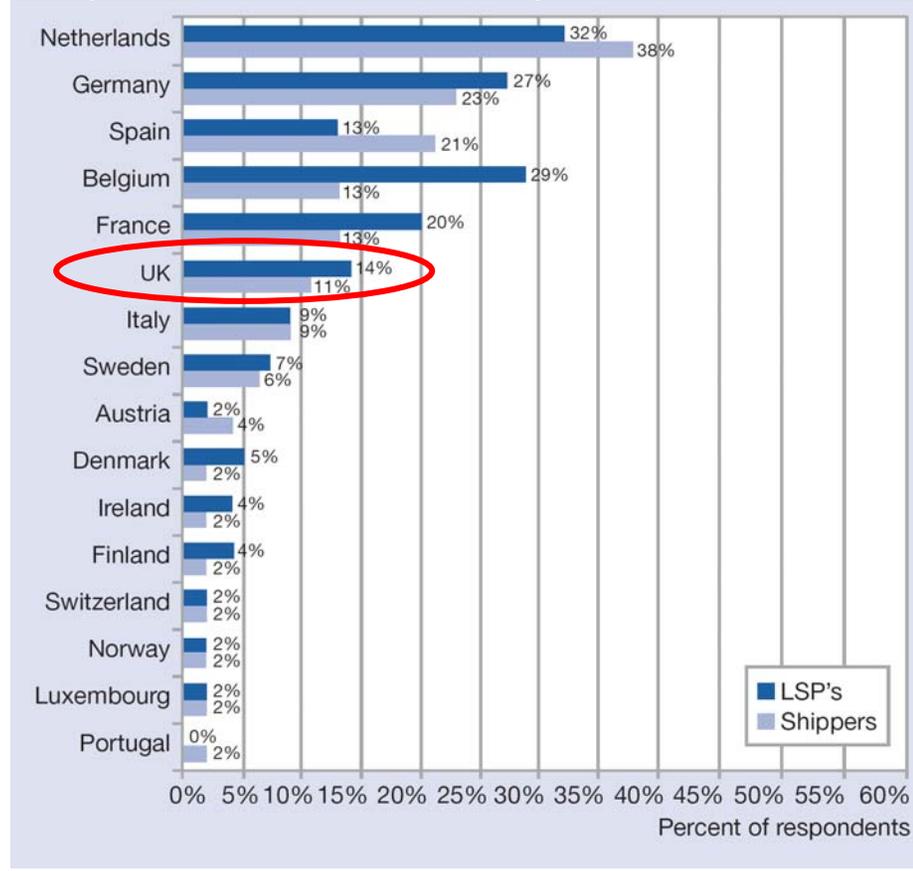
Adaptation of logistics systems to the effects of climate change

# Off-shoring of Manufacturing and Upstream Supply Chains



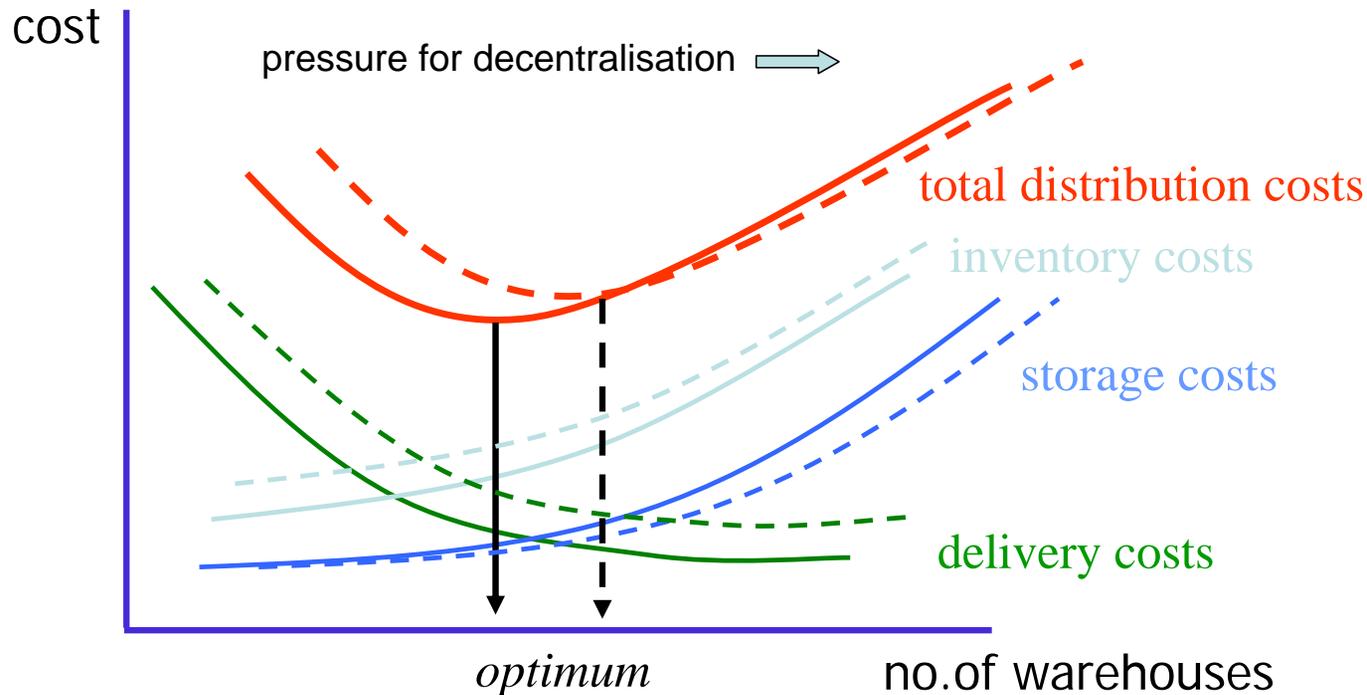
Some off-shoring of warehousing to more central European locations

Companies interested in developing DCs in particular Western European Countries



port-centric logistics

# Increase in Relative Cost of Freight Transport



Prospects of return to more decentralised warehousing likely to be limited

Modelling + company experience suggests that logistics trade-offs will be robust

Expansion of local transshipment operations relieves decentralisation pressures

Higher energy costs will promote modal shift to rail and water

# Transfer of Freight to more Environmentally-sustainable Transport Modes

*'...the challenge for the future is to integrate the land use and transport planning systems in order to continue to rework the freight railway into the country's industrial and commercial fabric.'* (Haywood, 1999)

## Forecasts of railfreight growth:

Network Rail: 26-28% increase in tonne-km between 2006 and 2015

FTA / RFG: 30% growth between 2006 and 2015 - doubling by 2030

intermodal – doubling by 2015 - 5-fold increase by 2030

## Conversion of rail-side brownfield land to non-freight-related uses

### New rail-connected property development:

Basic intermodal terminal



Rail-served distribution parks



Multi-modal logistics hubs: Güterverkehrszentrum  
Interporti



# Growth of Online Retailing

Online retail sales growing roughly 13 times faster than conventional retail sales



## Increased demand for:

DCs for online retailers and their logistics providers

Local fulfilment centres (only 2 so far for grocery online retailing)

Capacity in parcel hub / satellite networks

Collection points for online orders: *existing premises or new build*



# Advances in Warehouse Technology

Increasing the intensity with which warehouse land is used:

- stacking product to a greater height
- greater mechanisation and automation
- Improved warehouse management systems



Reduction in the plot ratio: (i.e. surrounding land required)

- some new DCs with plot ratios of 25-25%.
- increased throughput per 1000 sq.m – increased traffic generation
- need for larger yards around DCs for parking / manoeuvring
- land for outdoor storage of waste / material for recycling



Eco-template  
warehouse

# Restructuring the Waste Supply Chain

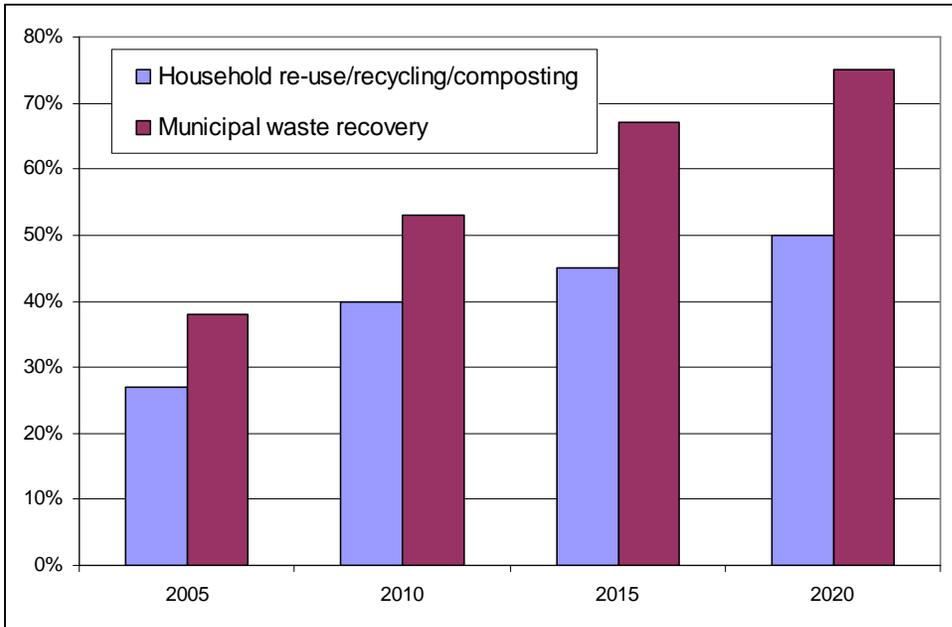
Less land required for land-fill sites

Growth in land required for:

Storage of materials for recycling / reuse

Waste reprocessing centres

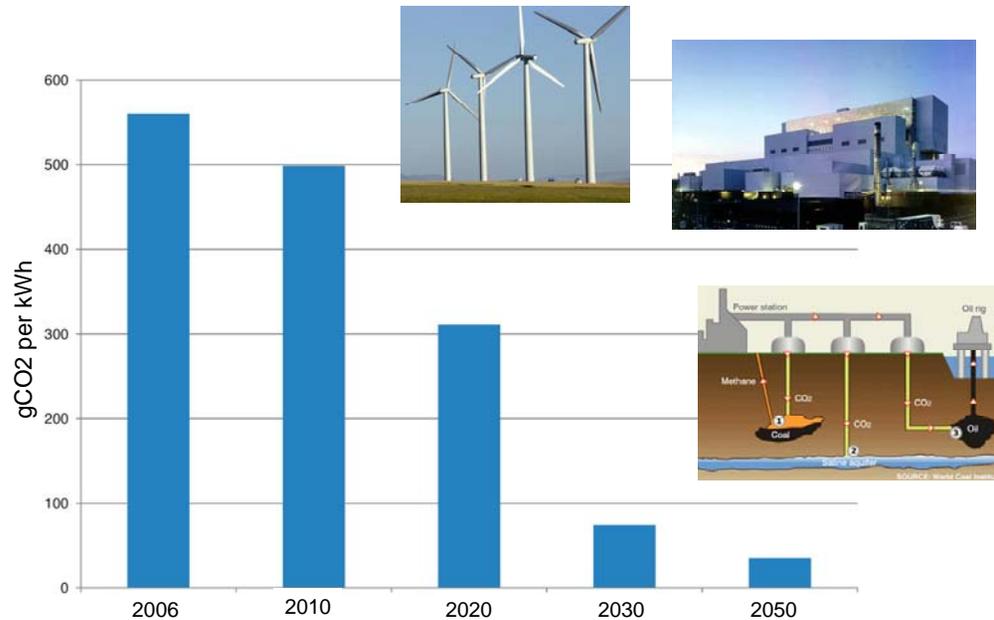
Resource recovery units at DC



# Adaptation of Logistics Systems to Climate Change



- Relocation of DCs from areas of high flood risk
- Rerouting of vulnerable transport infrastructure
- Construction of flood defences and new settlements will require extraction, movement and storage of vast amounts of building material
- Decarbonisation of electricity supply will alter land-use pattern



Source: Committee on Climate Change, 2008



# Conclusions

Lack of data on land requirements of logistical activities other than warehousing

Attempts to forecast the future demand for warehouse land over-dependent on simplistic modelling of relationship with GDP / GVA

Numerous factors likely to distort this relationship in the future

Need more research to model the impact of these factors individually and collectively on future logistics-related land use

# Contact details

Logistics Research Centre  
Heriot-Watt University  
EDINBURGH UK

[A.C.McKinnon@hw.ac.uk](mailto:A.C.McKinnon@hw.ac.uk)

<http://www.sml.hw.ac.uk/logistics>