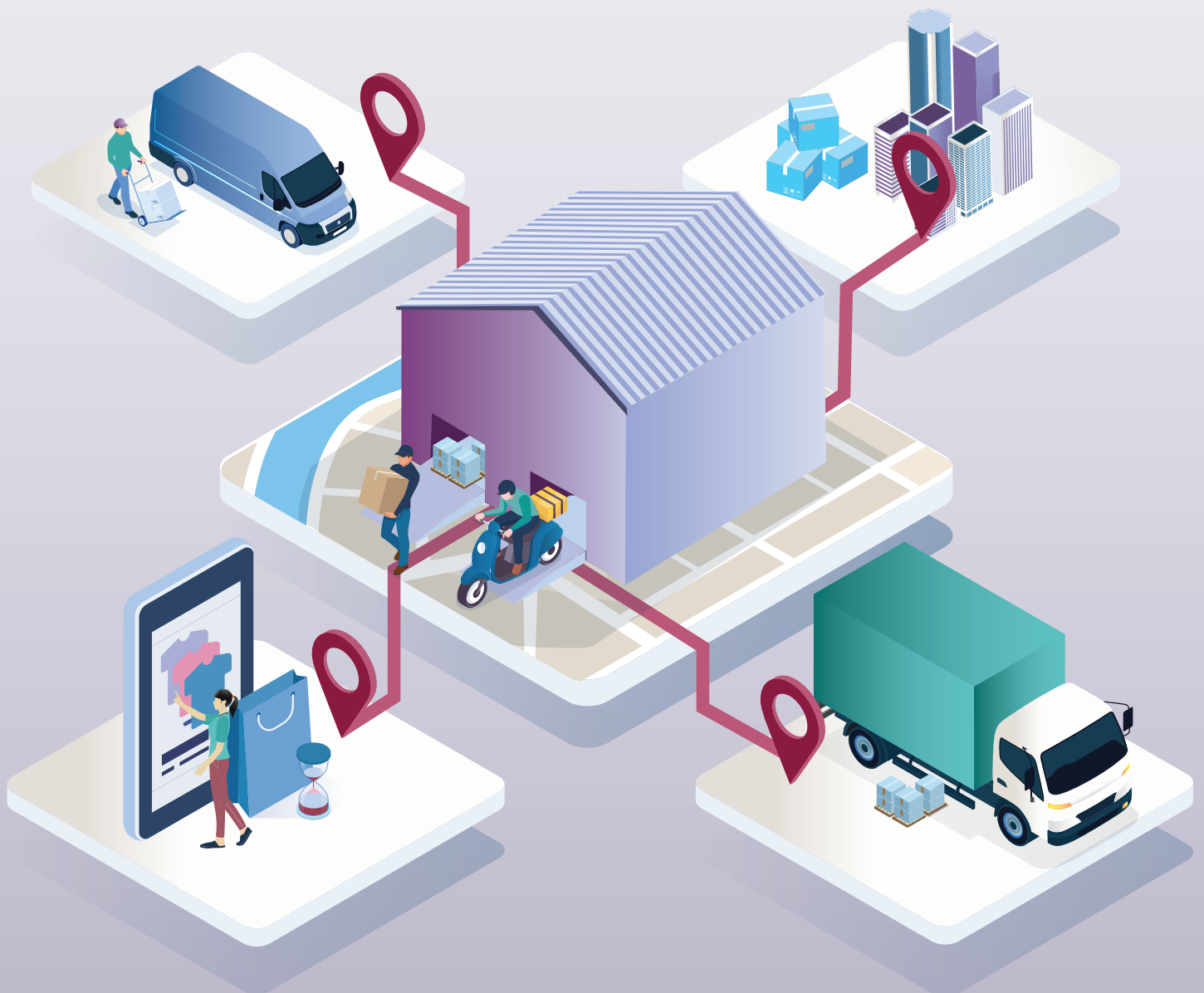


Europe's last mile

European Logistics Report 2022

knightfrank.com/research



INTRODUCTION

With urban populations growing and those populations spending more online and demanding goods ever faster, the demand for urban logistics and last mile facilities has expanded rapidly. But how much space do we need to service Europe's last mile? How will this evolve? And where will demand be greatest?

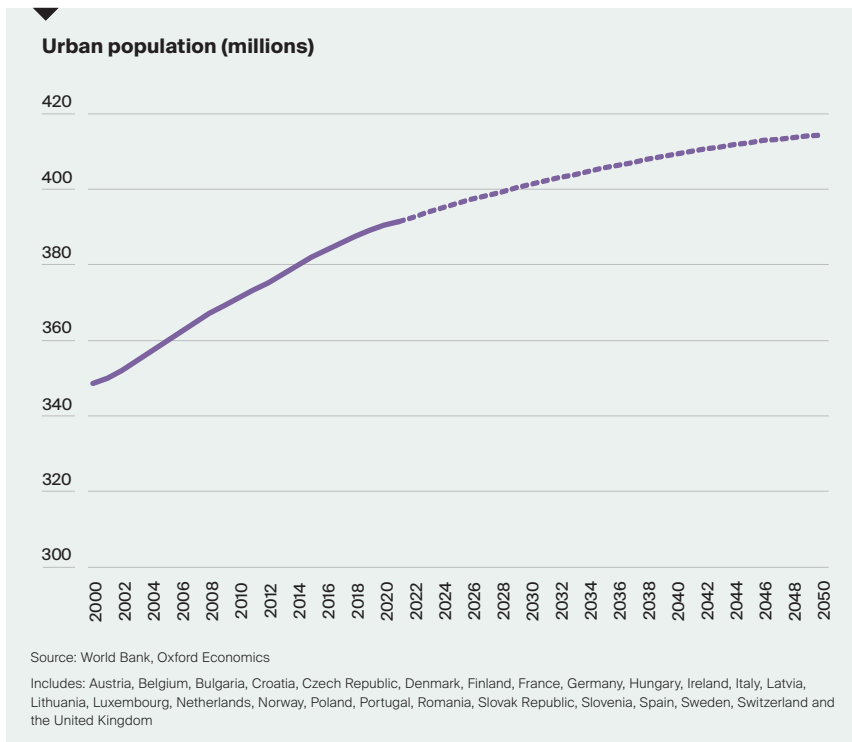
Europe's urban population has grown significantly over the past twenty years. Across the 26 countries considered for this study, the population of cities has increased 11.8%, with an additional 41 million residents

in 2021 compared with ten years ago (Source: World Bank).

Europe's urban populations are forecast to continue growing. There are 391 million people, or 76% of the population

currently living in the cities of these 26 countries and Oxford Economics forecast this to rise to 414 million, or 80% of the population by 2050.

As urban populations across these countries grow, shopping habits evolve and more sales take place online, the need for logistics space in cities will rise.



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Across the 26 countries considered for this study, the population of cities has increased 11.8%, with an additional 41 million residents in 2021 compared with ten years ago.

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10 KEY POINTS

1

Last-mile accounts for 20-25% of online distribution space

Analysis of hub and spoke distribution networks across the UK and mainland Europe revealed that 20-25% of space was allocated to “spoke”, or last-mile type facilities.

2

Demand for urban logistics space

Each €1 billion of online retail spend requires around 24,000 sq m of urban logistics space.

3

Online sales set to rise

Across the top seven e-commerce markets of mainland Europe (France, Germany, Italy, Spain, Netherlands, Sweden and Poland), online penetration rates currently average 15.6% and are forecast to reach 19.3% by 2026.

4

Growth in online sales to drive additional last-mile requirements

Across these seven markets, online retail sales are forecast to rise by €142 billion or a 48% increase over the

next five years. This could drive additional requirements for last-mile logistics space totalling 3.5 million sq metres.

5

Germany needs the most space

The largest requirement is expected in Germany, where an estimated 1.37 million sq metres of last-mile space could be needed over the next five years.

6

Paris and German cities are top spots for online retail

Paris sub-markets and the main German cities dominate the top locations for e-commerce and demand for last-mile facilities. Three of the four areas of Greater Paris are within the top ten locations and there are four German cities within the top ten.

7

Paris ranks top for online spend

Paris ranks top due to high population density (and thus retail spend per sq km). Berlin is densely populated and this, combined with favourable demographics has put it in second place.

8

Poland and Spain fastest growing economies

Of the seven countries we have examined in our forecast, Poland and Spain are expected to be the fastest growing economies over the next five years, this is leading to higher levels of consumer spending and retail sales growth. This will drive increased demand for urban logistics.

9

Warsaw expecting strong growth in online retail

Warsaw is expected to see the sixth largest rise in total online spend over the next five years. Strong growth is also anticipated for Madrid (which ranks eighth for growth out of the 800 markets over the seven countries).

10

Strong growth prospects for e-commerce in German cities

The German cities make up six of the top ten markets for e-commerce growth in absolute terms (over the next five years). This is due to the size of these markets, the large volumes of retail spend and the increasing online penetration rates.

HOW MUCH SPACE IS NEEDED TO SERVICE EUROPE'S LAST-MILE?

E-commerce and demand for last-mile logistics

Consumer demand and online spend are the key factors determining the amount of space required to service last-mile delivery for e-commerce. Other factors include the distribution model and inventory levels, the fleet vehicles used for delivery and how efficiently space is used. Different fleet vehicles may have a different range for deliveries and some distribution models will have a greater focus on urban logistics space as opposed to large, centralised distribution centres.

Based on our analysis of e-commerce operators in the UK, and across mainland Europe (typically utilising a hub and spoke distribution model) we found that 20-25% of total warehouse space was located in "spoke" facilities, that are servicing last mile delivery. The proportion of space allocated for last-mile has been increasing with (urban)

consumers increasingly demanding faster deliveries and on-demand services. However, this could change as fulfilment models evolve, or efficiency gains improve capacity utilisation in urban facilities and thus reduce the amount of space needed.

Our previous analysis found that, for each € billion of online retail sales, a total of 108,000 sq m of warehouse space is required (Future Gazing). Combining this data with the data above, we can determine that, based on a hub and spoke model and at current capacity utilisation rates, each €1 billion requires around 24,000 sq m of urban logistics space (or space in "spoke" facilities).

On a country-by-country basis, we can observe some variations in the relationship between online retail sales and total warehouse space across Europe. Taking the example of Germany, the *total* amount of space (within Germany) per

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online spend in the country is lower, this is because some fulfilment operations servicing the German market are taking place outside of Germany. However, the ratio of space allocated to last-mile is higher as it is not possible to relocate this. The relationship between online sales and last-mile requirements holds firm (each €1 billion requires around 24,000 sq m of urban logistics space).

Across the top seven e-commerce markets of mainland Europe (includes France, Germany, Italy, Spain, Netherlands, Sweden and Poland), online retail totalled around €293 billion in 2021, with an online penetration rate of 15.6%. Penetration rates are expected to increase across all of these markets over the next five years, to average 19.3% by 2026. Retail sales are also forecast to rise over the next five years and these factors combined, could drive online retail sales to a total



of €434 billion, a rise of €142 billion or a 48% increase.

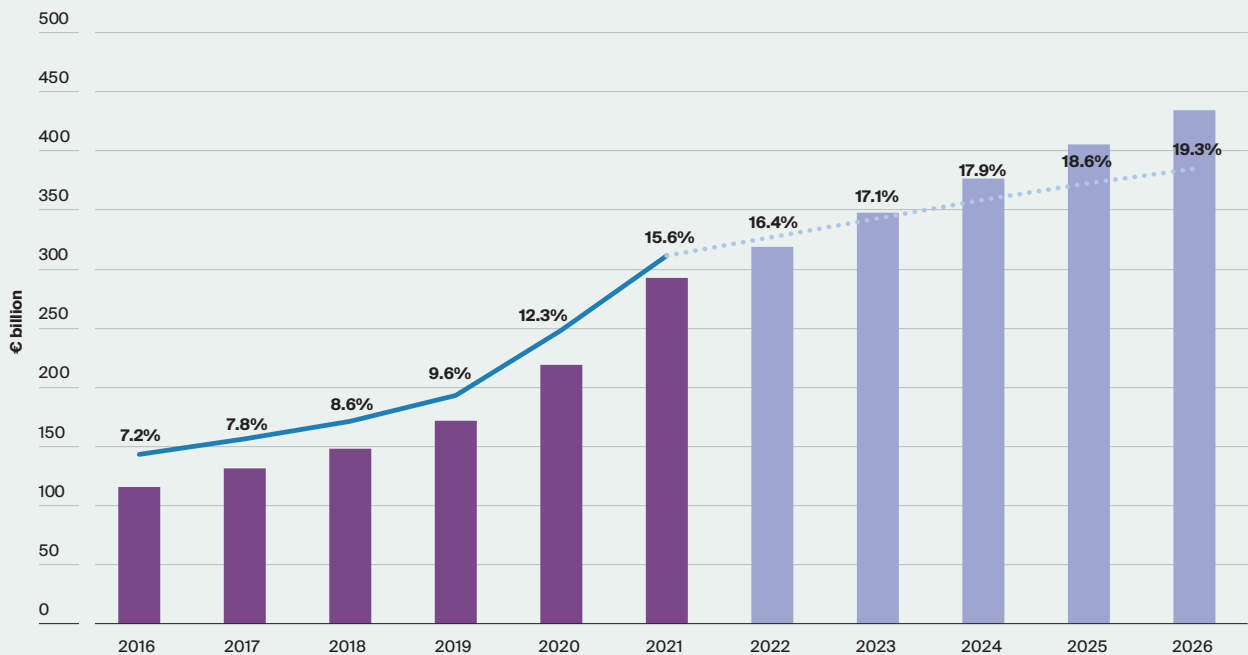
According to our analysis, the additional e-commerce sales expected in these markets over the next five years could require an additional 3.5 million sq m of last-mile logistics space.

The largest requirement is in Germany, where an estimated 1.37 million sq metres of last mile space could be needed over the next five years. France could require an additional 639,000 sq metres, Poland an additional 536,000 sq metres, and Spain a further 378,000 sq metres.

However, populations in urban areas are growing and consumers are getting more demanding, while fulfilment models are evolving, and how efficiently operators use space is improving. These factors are likely to impact the amount of space

Europe - 7 key markets

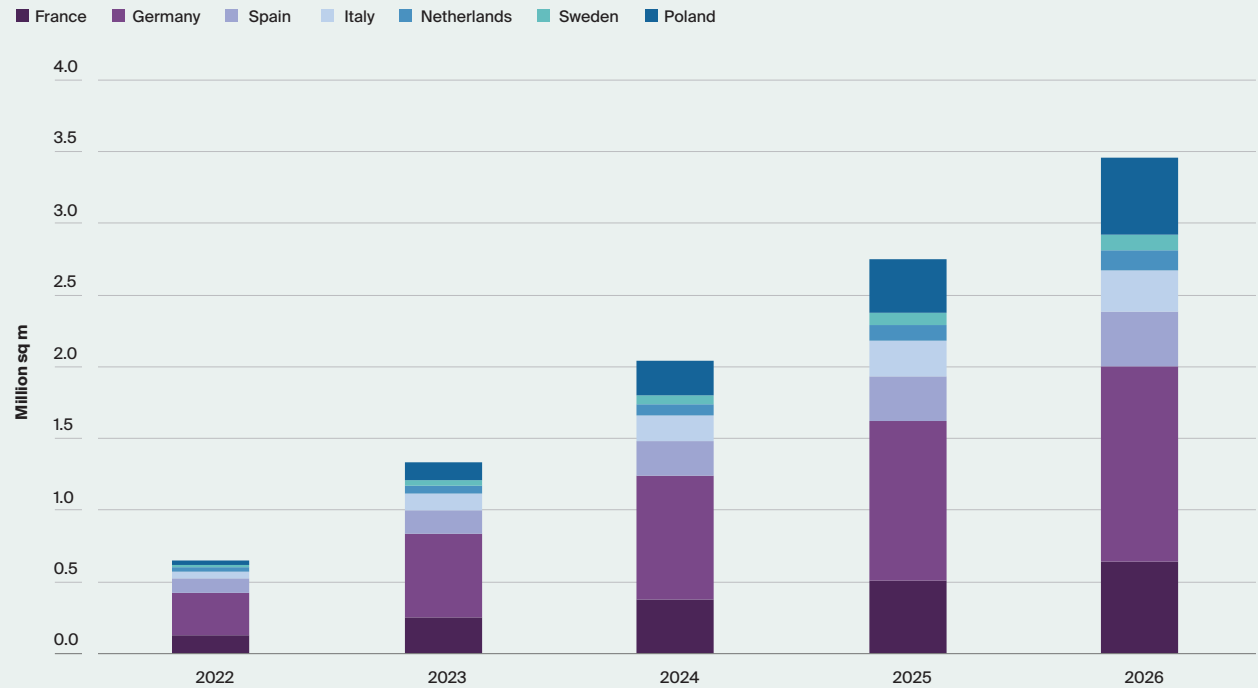
Online sales volume and % of total retail spend



Source: Knight Frank Research, ONS, Oxford Economics, Centre for Retail Research, Mintel
(Includes France, Germany, Spain, Italy, Netherlands, Sweden and Poland)

Projections for e-commerce driven demand for last-mile facilities

2022-2026 (cumulative)



Source: Knight Frank Research

required to service last-mile deliveries. Shifts in distribution models or a move away from the traditional hub-and-spoke network could alter the ratio of space allocated to last-mile or spoke facilities. Furthermore, the adoption of new and emerging technologies is enabling more efficient use of space and this may lessen the total amount of space needed per the amount of online spend.

Assessing how the distribution of space between the large centralised fulfilment centres and last-mile facilities has changed over the past few years, we can observe that the ratio of space allocated to last-mile has been growing rapidly. Urban consumers have been increasingly demanding and retailers are competing for market share by offering faster deliveries and trackable or on demand services. Whether this trend will

continue, or whether there will be in a shift in direction remains to be seen.

Constrained supply

In general, there has been a reduction in the availability of land zoned for industrial use, particularly around major urban centres in Europe, with developers preferring to convert aging industrial properties to higher land value uses such as residential.

For instance, the vacancy rate in Barcelona was just 3% (at the end of 2021) compared with 5.4% across Spain as a whole. With vacancy rates in urban locations currently at historic lows, and development activity highly constrained in these markets, demand is likely to continue to outpace supply and this is expected to sustain rental growth in these markets.

3.5 sq m

According to our analysis, the additional e-commerce sales expected in these markets over the next five years could require an additional 3.5 million sq m of last-mile logistics space.

HOTSPOTS OF DEMAND FOR LAST MILE DELIVERIES

Where will we need this additional last-mile logistics space?

To answer this, we assessed the distribution of online spend, across the core European markets, at a NUTS III* geographic level. Our online consumer spend model looks at geographic area, population, demographics, retail spend and online penetration rates to determine the *total* online retail spend and *density* of online spend for each of the NUTS III areas across the 27 countries and over 1,300 NUTS III regions.

By targeting the locations where total online spending is greatest, retailers and last-mile operators can seek to maximise their exposure to the households with the highest online expenditure.

Factors that determine the demand for last-mile logistics:

- Population density.
- Levels of household income and the propensity of the household to consume/spend on retail.
- Online penetration rates – which are influenced by both local demographics as well as broader, national consumer habits.

Population density

More chimney pots within close proximity offer clear opportunity. Shorter delivery routes, with more stops and shorter

distances mean that firms should be able to operate a relatively cost-effective distribution in these locations.



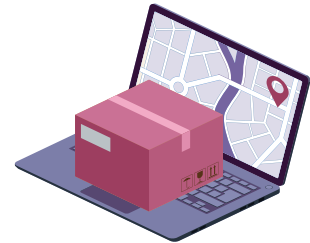
Retail spend

Retail spend is driven by income levels and propensity to consume (or spend) which is influenced by living costs, consumer confidence and interest rates. As income levels rise, retail spend rises though the relationship is not linear, higher income households spend a smaller proportion of their income compared with lower income households.



Online retail penetration rates

Online penetration rates vary by country, location and by demographic group. Countries in Western Europe have some of



the highest online penetration rates, with 23.9% of retail spend in the Netherlands taking place online in 2021 and 21.9% in Germany. The UK has the highest online penetration rate, with 28.9% of retail sales taking place online last year.

The Covid-19 pandemic had a dramatic impact on online penetration rates. Lockdown measures imposed in countries across Europe meant restrictions on in-person shopping, with many counties forcing non-essential shops to close. This led to a rise in online shopping, across all demographic cohorts. While younger shoppers were already shopping more online, the pandemic and associated lockdown measures served to accelerate the adoption of these platforms amongst older age groups.

Although demographics do play a role in the adoption of online retail, the impact has lessened as online usage amongst late-adopters, and particularly older people has risen. This is likely to continue.

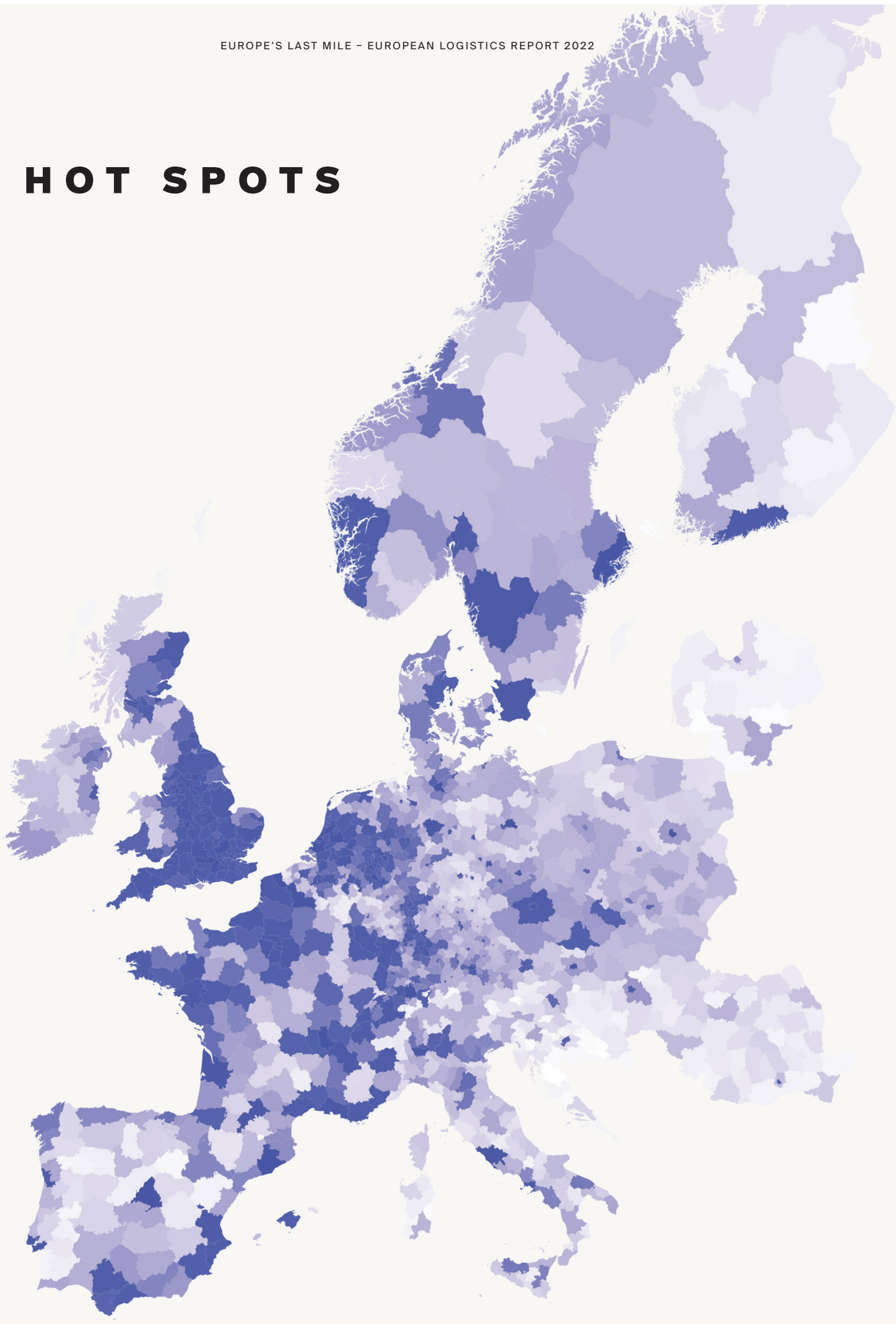
*The Nomenclature of Territorial Units for Statistics (NUTS) is a hierarchical classification of administrative areas, used across the European Union (EU) for statistical purposes. The classification system exists for EU countries as well as EFTA countries, EU candidate countries and former EU states. The three hierarchical levels are known as NUTS-1, NUTS-2 and NUTS-3. This classification enables cross-border statistical comparisons at various regional levels. NUTS III corresponds to sub-regional level. NUT III geographies have a population between 150,000 and 800,000.

KEY FINDINGS FROM THE MODEL

- Paris ranks top due to high density of population (and thus retail spend per sq km).
- There are three German cities in the top five and four in the top 10 markets. Berlin is densely populated and this, combined with favourable demographics have put it in second place. While Munich, in third place, has a lower total population, but the highest population density in Germany along with robust household incomes and retail spend per household. Munich also has a highly favourable demographic profile which is strongly boosting online penetration rates.
- There are three of the four Greater Paris areas in the top 10 and seven of the eight Île-de-France statistical regions are within the top 50.
- The highest ranked Central and Eastern European (CEE) market is Prague, in 47th place.
- Most cities have higher populations of working professionals and younger adults (who tend to spend more online) and therefore online penetration rates tend to be higher compared with national figures in these top markets. In the markets of Munich, Berlin and Amsterdam, demographic profiles are having a positive impact on online spend. Though this is not the case for the markets of Barcelona, Milan and Rome.
- The Netherlands has a high online penetration rate nationally and Amsterdam's demographic profile also provides a significant boost to online penetration rates. However, the population density across the NUTS III region is relatively low and thus household incomes, retail spend and online retail spend on a per sq km basis are relatively low compared with some of the other top markets. Madrid and Stockholm (NUTS III geographies) are also spread over large geographic areas, thus weakening their positions in the rankings.
- Cities, particularly those located in Western Europe have higher household incomes and thus higher retail spend (per household). High income levels are having a positive impact in the Swiss cities of Basel and Zurich, though national penetration rates remain fairly low in Switzerland and the demographic profiles for these markets are not enough to make a significant difference to the results.
- In terms of online spend on a per household basis, the German cities score best. According to our model, Heilbronn, Stadtkreis ranks top with €5,493 spent online per household, Munich ranks second with €4,860 per household. However, a low population density means that Heilbronn, Stadtkreis does not enter the top rankings with just €3.33 million per sq km compared with Munich with €12.45 million per sq km. Paris has a much lower online spend per household, with just €2,950 according to our model. However, the high population density means that on a sq km basis, online spend totalled €31.77 million in 2021. This density of online spend offers clear opportunity for e-commerce retailers and distribution firms.
- Forecast data is not available for all countries. Our forward-looking analysis only considers France, Germany, Italy, Netherlands, Spain, Sweden and Poland. The top markets we have identified for future growth within these countries include Warsaw, Leipzig, Berlin, Dresden, and Offenbach am Main which is part of the Frankfurt urban area.
- Strong growth in retail spend (along with rising online penetration rates) are important in driving the growth in Warsaw. For the German cities, rising online penetration rates are the most important factor though retail spend is also expected to rise.
- The Dutch markets have comparatively weak growth in online penetration rates. However, Utrecht has quite a robust population growth forecast which is expected to boost online spend here.



HOT SPOTS



Top 50 Markets (excludes UK markets)

RANK	MARKET (NUTS III REGION)	COUNTRY
1	Paris	France
2	Berlin	Germany
3	München, Kreisfreie Stadt (Munich)	Germany
4	Hauts-de-Seine (Île-de-France region)	France
5	Hamburg	Germany
6	Groot-Amsterdam	Netherlands
7	Seine-Saint-Denis (Île-de-France region)	France
8	Madrid	Spain
9	Köln, Kreisfreie Stadt (Cologne)	Germany
10	Arr. de Bruxelles-Capitale (Brussels)	Belgium
11	Stockholms län	Sweden
12	Frankfurt am Main, Kreisfreie Stadt	Germany
13	Val-de-Marne (Île-de-France region)	France
14	Stuttgart, Stadtkreis	Germany
15	Agglomeratie 's-Gravenhage (The Hague)	Netherlands
16	Barcelona	Spain
17	Groot-Rijnmond (includes Rotterdam)	Netherlands
18	Wien (Vienna)	Austria
19	Utrecht	Netherlands
20	Nord (includes Lille)	France
21	Düsseldorf, Kreisfreie Stadt	Germany
22	Zürich	Switzerland
23	Basel-Stadt	Switzerland
24	Rhône (includes Lyon)	France
25	Oslo	Norway
26	Nürnberg, Kreisfreie Stadt (Nuremberg)	Germany
27	Bouches-du-Rhône (includes Marseille)	France
28	Byen København (Copenhagen)	Denmark
29	Roma	Italy
30	Milano	Italy
31	Region Hannover	Germany
32	Leipzig, Kreisfreie Stadt	Germany
33	Essen, Kreisfreie Stadt	Germany
34	Gironde (includes Bordeaux)	France
35	Área Metropolitana de Lisboa (includes Lisbon)	Portugal
36	Västra Götalands län (includes Gothenburg)	Sweden
37	Haute-Garonne (includes Toulouse)	France
38	Loire-Atlantique (includes Nantes)	France
39	Dortmund, Kreisfreie Stadt	Germany
40	Bonn, Kreisfreie Stadt	Germany
41	Dresden, Kreisfreie Stadt	Germany
42	Bremen, Kreisfreie Stadt	Germany
43	Mannheim, Stadtkreis	Germany
44	Yvelines (Île-de-France region)	France
45	Mainz, Kreisfreie Stadt	Germany
46	Essonne (Île-de-France region)	France
47	Hlavní mesto Praha (Prague)	Czech Republic
48	Arnhem/Nijmegen	Netherlands
49	Val-d'Oise (Île-de-France region)	France
50	Zuidoost-Noord-Brabant	Netherlands

Source: Knight Frank Research

GROWTH MARKETS

The following analysis focuses on the markets within France, Germany, Italy, Poland, Netherlands, Spain and Sweden.

Of the seven countries we have examined in our forecast, Poland and Spain are expected to be the fastest growing economies over the next five years, with annual GDP growth forecasts of 3.1% and 2.8% respectively (Source: Oxford Economics, September 2022 forecast). This is leading to higher levels of consumer spending and retail sales growth. Poland, followed by Spain is forecast to see the strongest growth in retail sales over the next five years. This is likely to drive increased demand for urban logistics.

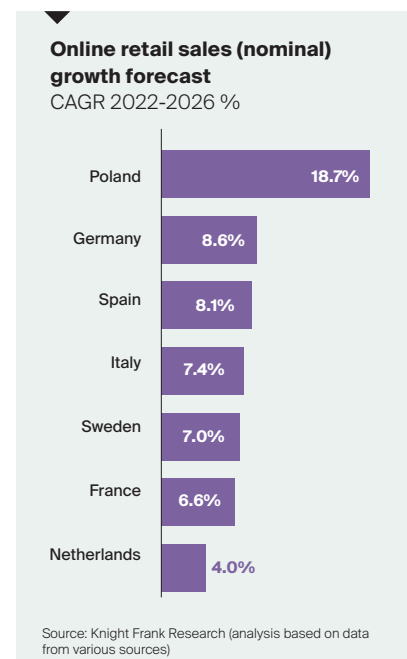
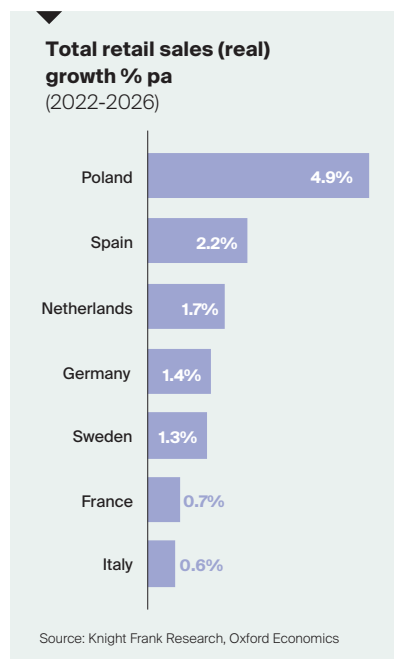
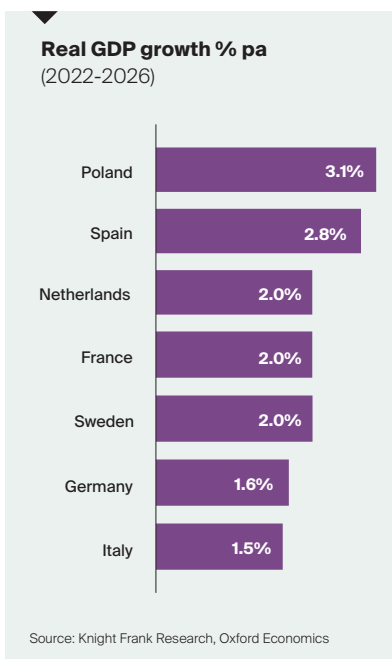
Online retail will continue to account for a growing share of the market across Europe. The fastest growth rate is forecast for Poland, with 18.7% annual growth in online retail sales (2022-2026). The combination of strong growth in both retail sales and online

penetration rates are expected to drive rapid expansion in the e-commerce market. However, the largest absolute increases in online sales (2022-2026) are forecast for the largest online retail markets (Germany and France).

In more mature markets such as the Netherlands where e-retailing is more established, growth is still positive, but slowing. While markets in Southern and Eastern Europe are catching-up as growth gains momentum. The Dutch online retail market is relatively mature, online penetration rates are already quite high at c.23.9% in 2021 and thus there is less scope for expansion. Despite ranking as Europe's sixth most important hotspot for online retail and last-mile logistics (based on 2021 figures), Amsterdam ranks just 19th in

terms of anticipated growth over the next five years.

Spain and Italy have been relatively late adopters of online shopping and e-commerce however the market is growing rapidly. The population is increasingly using the internet and shopping online. Growth of this market, coupled with increasing demand for last-minute delivery options, as we have seen in the UK and other European markets, is increasing the demand for both urban logistics and large fulfilment centres. Amazon has already established several large-scale distribution facilities in both Spain and Italy and is further expanding its southern European network further with express delivery centres in urban markets.





The market expected to see the largest growth (in absolute terms) is Berlin, followed by Paris and Munich.



Domestic economic growth and the expanding consumer class in the CEE markets is also driving growth in e-commerce and increasing demand for logistics property. Economic growth in these markets, particularly in Poland, is outpacing the rest of Europe, with GDP forecast to grow at an average of 3.1% per annum over the next five years.

Poland has the sixth largest population in Europe, and, although it currently has a relatively small e-commerce market, the trajectory of economic growth and the forecast for retail sales and online penetration rates are expected to drive rapid expansion. Poland is the largest market in the region and is recording high levels of new logistics development, mainly in response to growing demand from distribution companies and the e-commerce sector.

Hotspots for growth

The market expected to see the largest growth (in absolute terms) is Berlin, followed by Paris and Munich. Though greater growth is anticipated in Berlin, Paris is expected to retain its spot as the number one hotspot for last-mile distribution across mainland Europe.

The sixth largest rise in total online spend is expected in Warsaw, this is due to a strong forecast for household incomes and thus retail spend, as well as a significant rise in online penetration rates. This is the strongest rate of growth expected across any of the top 50 markets. Other Polish

Top locations for expected growth (five years to 2026)

RANK	MARKET (NUTS III REGION)	COUNTRY
1	Berlin	Germany
2	Paris	France
3	München, Kreisfreie Stadt (Munich)	Germany
4	Hamburg	Germany
5	Hauts-de-Seine (Île-de-France region)	France
6	Miasto Warszawa (Warsaw)	Poland
7	Köln, Kreisfreie Stadt (Cologne)	Germany
8	Madrid	Spain
9	Frankfurt am Main, Kreisfreie Stadt	Germany
10	Stuttgart, Stadtkreis	Germany
11	Seine-Saint-Denis (Île-de-France region)	France
12	Stockholms län	Sweden
13	Barcelona	Spain
14	Düsseldorf, Kreisfreie Stadt	Germany
15	Val-de-Marne (Île-de-France region)	France
16	Leipzig, Kreisfreie Stadt	Germany
17	Nürnberg, Kreisfreie Stadt (Nuremberg)	Germany
18	Nord (includes Lille)	France
19	Groot-Amsterdam	Netherlands
20	Rhône (includes Lyon)	France
21	Region Hannover	Germany
22	Roma	Italy
23	Milano	Italy
24	Essen, Kreisfreie Stadt	Germany
25	Dresden, Kreisfreie Stadt	Germany

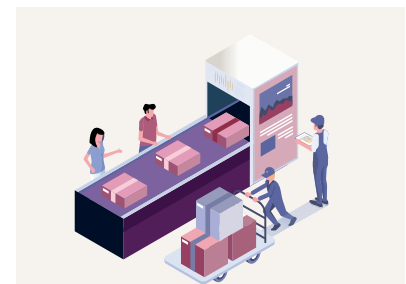
Source: Knight Frank Research
 * Rankings are based on absolute growth both on a total and on a sq km basis.

cities with strong growth prospects include Krakow, Wroclaw and Gdansk.

German cities make up six of the top ten markets. Online shopping is already popular in these top German markets and thus they already have strong demand for urban logistics. They are expected to see robust growth in disposable incomes which is driving growth in the amount each household spends on retail. Online retail penetration rates are also forecast to increase.

Madrid is anticipated to see the strongest growth of any of the markets across Southern Europe and ranks eighth out of the 800+ markets over the seven countries. Barcelona also ranks highly for growth, in 13th position. Both Madrid and Barcelona are expected to see their online retail markets expand by 59% over the five years. The Italian cities of Rome and Milan (ranked 22nd and 23rd in terms of

growth) are expected to see a similar pace of growth as the Spanish markets, though they are coming from a lower base and thus their absolute growth is lower.



8th

Madrid is anticipated to see the strongest growth of any of the markets across Southern Europe and ranks eighth out of the 800+ markets over seven countries.

CONCLUSION

As Europe's urban populous continues to swell, consumption in these centres will rise too. Increasing incomes for urban households and rising levels of internet usage are also helping to fuel growth in the online retail market.

This growth, along with consumers' rising desire for speed and convenience all point to a continued and expanding demand for urban logistics space across Europe. However, as our research has shown, there is great variation in the current levels of demand, as well as the amount, and rate of expected growth.

Through establishing a relationship between online retail sales and last-mile logistics, we have sought to understand the trajectory and quantify the level of demand for space over the next five years. Based on current forecasts for retail sales and online retail penetration rates, the seven countries that comprise our analysis will require 3.5 million sq metres of last-mile logistics space over the next five years (2022-26).

Yet, it is worth noting that retail spend forecasts may adjust as the economic climate changes and both distribution models and consumer preferences are in a state of flux, all of which casts a shadow of uncertainty over our projections.

Based on current forecasts for retail sales and online retail penetration rates, the seven countries that comprise our analysis will require 3.5 million sq metres of last-mile logistics space over the next five years (2022-26).

Identifying the hotspots of online consumer demand has enabled us to determine the markets with the greatest need for urban logistics; where demand is growing most, and why. Though retail sales volumes are expected to rise relatively modestly in France and Germany and the e-commerce markets are more mature (compared with cities in Southern or Eastern Europe), population density and high levels of affluence support the continued growth of the e-commerce markets in the

major cities. Thus, demand for last-mile fulfilment is expected to remain strong and continue expanding.

Strong growth is also anticipated in the major cities within Poland, Spain and Italy, particularly in Warsaw, Madrid and Barcelona. The e-commerce markets in these cities may be smaller than those of Paris, Berlin and Munich but they are growing rapidly and as the markets mature, this will drive increasing demand for last-mile fulfilment.

While this analysis looks at the demand for last-mile fulfilment space, the supply is also highly variable. The locations with the highest population densities, also tend to have the lowest levels of industrial and logistics floorspace available. Development is also more difficult in these locations, due to competition from other use classes. These dynamics are likely to support rents and growth prospects for urban logistics facilities across Europe, particularly within the locations identified as our top growth markets.

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