

8. Our Strategic Objectives: Maximising Efficiency

Operational Efficiency

Our proprietary technology and infrastructure have been developed in-house over many years for the sole purpose of running and optimising the efficiency of our online businesses. This spans the entire shopping and delivery life cycle from customer facing interfaces which power our webshop, mobile and tablet applications to our optimised delivery routing for the final mile service.

The core design principles that drive efficiency throughout our business are automation, use of proprietary technology and aggregation of scale via the use of our large CFCs. By combining these attributes we have been able to develop the most sophisticated and operationally efficient grocery shopping and delivery solution in the world.

We face the unique challenge that around half of our sales lie within fresh and chilled categories and as a delivery operation we have to ensure this freshness is preserved right up to our customer's front doors. To enable this we operate a shelf life promise whereby a minimum of approximately two thirds of the total life of the product is guaranteed by the time it reaches the customer. In traditional store-based competitors this is difficult for a number of reasons including additional human touchpoints and disrupted stock rotation due to manual customer intervention as they personally handle the products. Our model enables us to carry lower inventory levels and to operate a perfect "first in first out" stock rotation dependent on shelf life. This allows us to operate with what we believe to be the lowest product waste in the industry at 0.7% of sales across our CFCs and underlines the sustainability benefits of our operating model.

All of our delivery routes are optimised in real time using our proprietary software; this enables operationally efficient delivery routes to be calculated taking into account our customer one-hour delivery slots, house locations and order volumes. By carefully modelling these attributes it increases the likelihood our drivers can successfully deliver orders on time, maintaining our high customer service metrics.

Progress

As we continue to expand existing and open new CFC sites we expect to harness our experience and learning to improve our operational efficiency – quantified by units processed end-to-end per labour hour – even further. Ocado Smart Platform will provide a service offering for our operational capabilities to be packaged and replicated to provide these high service metrics to other retail partners.

Alongside our proprietary software and algorithms we have continued to develop our best in class physical infrastructure solution. The first utilisation of this has been in our Andover CFC and we expect it to demonstrate the power of utilising and integrating our proprietary software and algorithms with our physical solutions to provide the end-to-end solution for our customers.

 **Read more in the Andover and New Technologies case study on page 19**

We complete the final mile of our grocery deliveries through our CFC and spoke network. All stock is currently stored and picked in our three operational CFCs in Hatfield, Dordon and Andover or in our General Merchandise warehouse in Welwyn Garden City. Around one third of orders are then delivered directly from these CFCs to customer homes in the CFC catchment areas and the remainder are "trunked" in larger vehicles to one of our 17 spoke sites, from where local delivery in one of our delivery vans takes place. The opening of CFCs enables a rebalancing of spoke facilities to lower trunking costs, for example upon opening Andover we were able to transfer capacity from the Southampton spoke to Andover and improve operational costs.

Due to increased demand from existing catchments, we opened two additional spokes during 2016 in Peterborough and Crawley. This will enable us to further develop and optimise our delivery network to drive efficiency in the long-term.

Future Focus

We built our latest solutions with the future in mind, and have developed our physical infrastructure solution in such a way that any manual touchpoints within the densely packed fulfilment infrastructure are located on the periphery of the structure so that they can be retrofitted with robotics and automated technology as and when these are appropriately developed. This ensures that we are able to improve our economics as we can efficiently adapt to the technology of the future using existing core infrastructure.

As our customer base expands we will continually look to innovate and improve our technology and infrastructure solutions to ensure operational excellence in every aspect of the fulfilment and delivery life cycle.

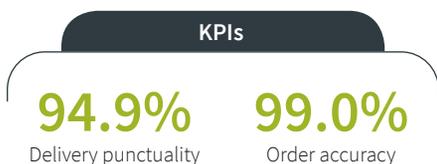
Capital Efficiency

We currently operate three CFCs in Hatfield, Dordon and Andover, which opened in 2002, 2013 and 2016 respectively. Our CFCs constitute what we believe to be the world's largest, most sophisticated and most efficient single pick grocery warehouses. Combined with our extensive spoke network, they form a critical part of our unique online grocery operating model.

Progress

During the period, we made several changes to Hatfield CFC and Dordon CFC with limited capital expenditure, to enable additional capacity from these sites - now totalling over 20,000 OPW additional order capacity for Ocado. We commenced operations in our Andover CFC in November 2016. This houses our new MHE solution. Our solution is modular (can be built to different sizes), scalable (can be increased in size) and we expect future iterations to be faster to deploy (shorter build and commissioning lead times) allowing for reduced up front capital commitment.

Despite the additional fixed costs associated with opening a new CFC, the new solution together with its innovative design means that the "economic drag" of opening is minimised. As a new CFC increases its operational throughput, the improved efficiency benefits increase.



Future Focus

We have been developing our largest and, we expect, most capital efficient warehouse in Erith, South London since 2015. We expect first orders from this CFC to initiate in financial year 2018. Like Andover, this CFC will utilise both our proprietary software and physical solutions and we expect it will be capable of handling over 200,000 orders per week, equivalent to around £1.2 billion of sales when operating at full capacity. This is larger than our existing CFCs, and will demonstrate the scalability of our end-to-end solution. As we develop and learn through our CFC roll-out plan we expect to be able to continuously advance our CFC capital efficiency increasing the benefits of operating our centralised model in comparison to alternative ways. Through our model we can deliver attractive economics in a difficult retail environment where we see enhanced competition and continued margin pressure.

New equipment solution

Online grocery shopping faces pressures not seen in other online retail segments – such as different temperature regimes, volume of items, multiple product lines and irregular demand patterns for different users. Our new proprietary solution is specifically designed to tackle this as its framework offers very dense and efficient storage through the use of a three dimensional grid, or “hive”, to stack and store products and transport them within the facility.

Automated inbound and outbound processes are utilised to move products and completed orders into and out of the hive. This flow is enabled by our proprietary communications system which controls and coordinates thousands of fast, space efficient, densely located robotic devices that each roam and occupy a single location on the surface of the hive. A proprietary system allows communication between the robotic devices which enables efficient and flexible item retrieval of any product, in any order, stored in the hive. The flow of information is constantly being updated and refined based on real time information of incoming customer orders and product locations.

The challenge surrounding the vast variety of product characteristics associated with grocery shopping such as size, density, crushability and shape means that the final pick from our solution is conducted by hand – this ensures wastage is kept to a minimum and products remain undamaged. To ensure this operates in the most operationally efficient way this ultimate part of the pick-process into customer baskets follows a one-to-one goods-to-man approach where relevant stock items are presented to the picker at the same time as the order tote. This enhances the quality of the picking and packing of customer orders as whole totes can be picked and packed by the same person. This mechanism also makes the entire process extremely efficient and accurate and would allow the picking of an entire customer order to be completed in under five minutes, significantly shortening lead times for ordering and delivery.

Resilience and reliability

Our proprietary solution operates in a centralised manner, with all processes being fed into our densely packed hive. This allows parallel processing to operate within the grid, limiting upstream/downstream dependencies and therefore minimising bottlenecks and disruptions in the end-to-end process.

Flexibility

The three dimensional hive can be constructed to varying scales; for example our next CFC which is due to open in 2018 in Erith, South London will have capacity to hold over three times the tote holding locations we have in our Andover CFC, across chilled and ambient temperature zones ready for single item picking. The design allows this flexibility due to its modular nature, which means the solution can be built to accommodate the size and shape of the designated warehouse. This demonstrates the power of the Ocado Smart Platform, which packages our solution and illustrates the value it can have to a wide array of retail partners.

IP Protection

To safeguard our competitive advantage our MHE solution is now the subject of filed and planned patent applications and other intellectual property rights.

 **Read about Ocado Smart Platform on pages 12 and 13**

Case Study

Andover CFC and New Technologies

In November 2016, we commenced operations at our latest CFC in Andover, Hampshire. This site houses the first implementation of our new, internally developed, integrated MHE and associated software. Due to the scalable nature of the solution, the MHE and other automation such as picking stations can be continually added in line with sales growth of our business. At maturity, the solution will, we believe, be capable of driving significant productivity and fulfilment benefits in a highly modular and flexible fashion, and we expect it will increase our fulfilment capacity by around 65,000 orders per week, or approximately £350 million in sales value. We expect Andover and future CFCs using our new solutions to provide efficiencies both in capital costs and operating expenses. We will continue the process of value engineering to further improve capital efficiency in our CFCs, reflected by the capital ratio expected in our Erith CFC. Below we indicate the anticipated improvements in our mature CFCs.

CFC	Commenced operations in	Capital efficiency ¹	Operational efficiency (UPH) ²
Hatfield	2002	NA	-150
Dordon	2013	16%	175+
Andover	2016	13%	180+
Erith	2018	11%	200+

1. Ratio of MHE infrastructure cost to sales capacity
 2. Target UPH figures expected 3-4 years after CFC opening

CFC Sites

1. CFC 1 – Hatfield
2. CFC 2 – Dordon
3. CFC 3 – Andover
4. CFC 4 – Erith (planned to open 2018)

