

Light Science Technologies Holdings

Helping grow more with less

Light Science Technologies Holdings (LSTH) has built on its established UK-based contract electronic manufacturing (CEM) business by launching highly innovative products for the controlled environment agriculture (CEA) market. This market is growing rapidly as farmers address the issues of climate breakdown and food security. Although most of the group's revenues are currently attributable to the CEM division, our note focuses on the CEA activity because of its superior growth prospects.

First CEA products launched

The group launched its first CEA products in July 2021. These LED horticultural lights for glasshouse and polytunnel growers save significant amounts of energy compared with traditional horticultural lights and are probably unique in being reusable and recyclable. A slimline variant for vertical farms followed in June 2022. That month also saw the launch of the group's smart sensor system with associated software for use in outdoor agricultural environments, vertical farms, polytunnels and glasshouses. The system is potentially unique in combining sensors measuring several parameters in a single compact product. In addition, the group is working with major UK salad grower Zenith Nurseries on a novel system combining crop monitoring and production. This could potentially be deployed in the majority of Zenith's nurseries by 2026 and generate up to £13m in sales.

Customer pipeline strengthening

The CEA division has recently started work on several paid-for customer trials, including one at a vertical farm R&D facility and one with a major UK manufacturer of preserves, marmalades and associated products. These could potentially result in product orders collectively worth c £3m over the next 12 months, which contribute to a sales pipeline of quoted work across both divisions of over £61m.

Valuation: Dependent on CEA product roll-out

Our scenario analysis shows that converting 60% of the existing CEA pipeline and delivering on the Zenith contract could generate annual CEA revenues of £31.4m and £4.6m group EBITDA. This is only a small proportion of the global market, which we calculate could be worth c £2.9bn in the UK alone. Announcements about new contract awards are therefore catalysts to crystallise shareholder value.

Historical performance

Year end	Revenue (£m)	EBITDA (£m)	PBT* (£m)	PAT (£m)	DPS** (p)
11/18	5.6	0.5	0.2	0.4	0.00
11/19	5.6	0.5	0.1	0.1	0.00
11/20***	6.9	0.5	0.2	0.2	0.00
11/21	7.4	(1.1)	(1.6)	(2.1)	0.00

Source: Company data. Note: *PBT is normalised, excluding amortisation of acquired intangibles, exceptional items and share-based payments. **Excluding payments pre-IPO. ***Restated for predecessor method of merger accounting.

Tech hardware and equipment

22 September 2022

Price 7.65p
Market cap £13m

Share price graph



Share details

Code	LST
Listing	AIM
Shares in issue	174.2m
Net cash (£m) at end May 2022 (excluding lease liabilities)	0.1

Business description

Light Science Technologies Holdings offers a range of products and services for improving productivity in controlled environment agriculture. It also offers an end-to-end, full-service contract electronic manufacturing (CEM) capability (UK Circuits) based in the UK.

Bull

- Demand for food grown in controlled environments being driven by concerns about food security and climate breakdown.
- LST's solutions help growers reduce energy and other input costs.
- UK Circuits is growing and profitable and provides design and manufacturing support for CEA activity.

Bear

- Growers are delaying making capital investments because of high energy costs
- SensorGROW product was only launched in June 2022.
- advanceGROW is still under development.

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Company overview

Light Science Technologies Holdings (LSTH) has two complementary divisions: Light Science Technologies (LST), which is developing products for the CEA market, and UK Circuits (UKC), which is an established contract electronics manufacturer.

LST was founded in 2019 to exploit the opportunities for technology products and solutions in the CEA market. It launched its reusable, recyclable luminaires in July 2021 and its smart sensor system for use in outdoor agricultural environments as well as vertical farms, polytunnels and glasshouses in June 2022. It is working with major UK salad grower Zenith Nurseries on an intelligent crop production and management system, which could potentially be deployed in the majority of Zenith's nurseries by 2026. LST is located in Derbyshire, England, where it designs and tests equipment for the CEA market and carries out trials for customers to determine the optimal growing conditions for specific crops. Together with the holding company, which is also located at the Derbyshire site, it employs around 20 people. Revenues are still modest (£33k in FY21), but LST intends to grow revenues through a combination of non-recurring sales relating to horticultural light installations and recurring revenues from replacement luminaires and a combined sensor and software package which is being sold on a three-year subscription basis.

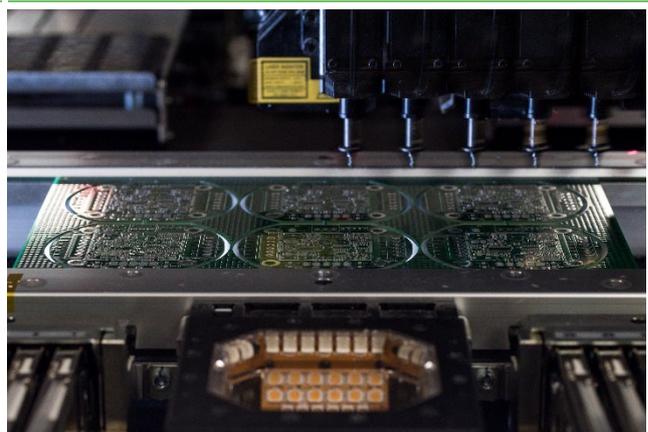
UKC was founded in 1997. It is a contract electronics manufacturer with a 20,000 sq ft facility located in Manchester, England. It has more than 50 employees servicing over 70 clients in the UK and elsewhere, including Rentokil Pest Control, Cloud Electronics, Calex Electronics and Sensonics. The company serves a wide range of markets including audio, lighting, automotive, rail, aerospace, telecoms, industrial sensors, CEA and defence. It provides a complete package including the design of products and circuit boards, prototyping, component procurement, circuit board population, placing the populated board in an enclosure, optionally with a control panel, connecting the board to the enclosure, testing, packing and shipping. From a strategic viewpoint, UKC is important because as well as being a profitable (£7.4m revenues and £0.9m EBIT excluding management charges in FY21) and growing business in its own right, it designs and manufactures the electronics for the group's CEA products.

Exhibit 1: LST staff conducting trial to determine optimal growing conditions for strawberries



Source: Light Science Technologies

Exhibit 2: Automatic population of printed circuit board at UK Circuits



Source: Light Science Technologies

LSTH listed on AIM in October 2021. At the time it raised £3.9m (net) at 10p/share. The group employs around 80 people. The funds raised are being used to accelerate the group's growth, primarily its CEA operations, by expanding the laboratory facilities and investing in marketing campaigns, product design, tooling and development. Part of the proceeds have been used to increase the manufacturing capacity at UKC.

CEA commercialisation

LST has three products at different stages of commercial readiness. It is currently engaged with growers based in the UK, mainland Europe and North America. In addition to working directly with growers, it partners with the companies that manage the construction of CEA farms to growers, for example the electrical contractors who install horticultural lights for growers.

Product portfolio

Exhibit 3: Spectrum analysis		
Wavelength	Colour	Function
700–800nm	Far-red	Increases the rate of photosynthesis and can promote extension growth
610–700nm	Yellow-red	Ideal for chlorophyll absorption, germination, flower and bud development
510–610nm	Green	Helps with photosynthesis and the size and weight of plants
440–500nm	Blue	Used in conjunction with other wavelengths to ensure plant roots develop correctly, growth is managed correctly and chlorophyll absorption is optimised
315–400nm	UVA ultra-violet and near ultra-violet	Can enhance plant pigmentation and thicken leaves. Potentially helps manage insect populations
280–315nm	UVB ultra-violet	Negative impact on plant growth and plant colour.
280nm	UVC ultra-violet	Can be toxic to plants but if used at the right levels can minimise the growth of bacteria or mould and manage the growth and development of different parts of the plant, thus controlling height and amount of branching

Source: Light Science Technologies

nurturGROW: LST's initial product for the CEA market is the nurturGROW range of reusable luminaires incorporating LEDs. These luminaires are suitable for use in vertical farms and glasshouses and for medicinal horticulture. LED lights have become the most popular type of horticultural lights over the past few years because they are more efficient than high-pressure sodium (HPS) lights with regards to the percentage of electrical energy that is converted to light energy. The company estimates that a grower replacing HPS lights in a greenhouse with LST luminaires would save over 40% of their ongoing energy costs, giving a payback period of less than 2.9 years at the current market price of electricity. Given the expected increase in energy costs for businesses over the next 12 months, this payback period should reduce.

LED lights produce much less heat than HPS lights so they can be placed closer to plants and can therefore be used in smaller spaces. Moreover, the light produced by LEDs can be tuned so that the wavelengths emitted match the requirements of specific types of plants (see Exhibit 3). Tuning is not possible with HPS lights, which only emit fixed wavelength light. Moreover, the wavelengths that HPS lights emit are restricted to the yellow (570–590nm), orange (590–630nm) and red (630–750nm) part of the colour spectrum. LED lights can emit a much wider range of wavelengths.

LST has designed its patented luminaires so that a single platform design can be tailored to output more than 1,000 spectral variations. A luminaire can be configured to emit either a single or multiple wavelengths. The company works with customers to choose which wavelength will optimise plant growth, as well as advising on how much light is needed, which will determine how many lights are required and where they should be placed. Once a lighting plan has been agreed with a grower, LST can also install and maintain the complete lighting system.

LST's lighting products are unusual because the luminaires are available in a very wide range of lengths, which means that the area in a greenhouse or other installation that is in shadow is minimised. Typically, each LED luminaire requires its own driver, but LST's luminaires are designed so that up to eight lights may be used with a single driver, giving a significant reduction in capital equipment costs.

LST's lighting products are also highly unusual in that 90% of the components forming the luminaires are recyclable. In addition, the patent pending, modular design enables users to easily replace and upgrade the electronics inside the luminaire. This means that only the electronics inside the luminaires need to be changed if the grower decides to change to crops preferring a

different spectrum of light or if the LEDs wear out or are replaced by next-generation, more efficient variants. This is significant because the mechanical part of the products is designed to last for 25 years, while the LED board typically lasts at least five years. LST expects to generate a recurring revenue stream from supplying replacement electronics. Being able to replace just one part saves on both material and labour costs. LST estimates that replacing just the internal electronics results in up to a 33% saving in capital expenditure for a grower over the lifetime of the luminaire. LST was awarded the ‘Best Sustainability Initiative’ at the 2021 Vertical Farming World Awards for the product range.

LST does not appear to have sacrificed performance to achieve these sustainability credentials. Results from an in-house trial (see Exhibit 4) show that one of LST’s mid-power luminaires produces a higher light output and is more efficient and longer-lasting than a comparable product from a key competitor.

Exhibit 4: Competitive performance of LST mid-power luminaire

Parameter	Competitor A	nurturGROW	Comparison	Summary
Power consumption	69W	67W	-2.90%	Less power
Light output	118 $\mu\text{mol/s}^{**}$	185 $\mu\text{mol/s}$	+56.78%	Higher light output
Efficiency	1.7 $\mu\text{mol/J}$	2.7 $\mu\text{mol/J}$	+58.82%	More efficient
PPFD* – 0.3m from crop	490 $\mu\text{mol/m}^2/\text{s}$	540 $\mu\text{mol/m}^2/\text{s}$	+10.20%	More effective
PPFD* – 0.3m from crop	122 $\mu\text{mol/m}^2/\text{s}$	135 $\mu\text{mol/m}^2/\text{s}$	+10.66%	More effective
Rated average lifetime	36,000 hours	50,000 hours	+38.89%	Lasts longer

Source: Light Science Technologies. Note: *Photosynthetic photon flux density. ** $\mu\text{mol/J}$ or micromole per joule is the industry standard for measuring grow light efficiency and measures the amount of light produced for each unit of energy input.

LST launched its standard luminaire range, which is more suitable for glasshouse and polytunnel growers, in July 2021. It launched a slimline tuneable version, which is more suitable for vertical farms, in June 2022. Management believes that this is unique. Being tuneable means that growers can use different light wavelengths at different stages of plant growth. There were no luminaire sales during H221 so the group could qualify for Enterprise Investment Scheme tax relief.

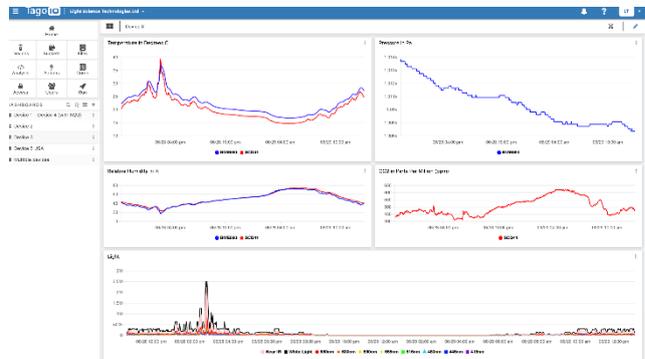
SensorGROW SaaS: LST’s sensor system enables farmers to monitor the nine cardinals of plant life: air speed, carbon dioxide levels, humidity, light, oxygen, air pressure, soil, temperature and water pH levels in real time. Data gathered by the sensor are relayed to LST’s associated software application, giving the grower detailed information about the environment in which their crops are growing and enabling them to make adjustments before there is any adverse impact on crop development. The software also detects any significant variations in cardinals and alerts the grower and LST’s maintenance team if this occurs. In the medium term, the software will incorporate artificial intelligence (AI) techniques to anticipate what adjustments to specific cardinals are required to optimise the growing environment.

Exhibit 5: nurturGROW luminaires being used in a crop trial



Source: Light Science Technologies

Exhibit 6: Proprietary software incorporated into SensorGrow SaaS (software as a service) package



Source: Light Science Technologies

The sensor and associated software are provided on a subscription model, creating a recurring revenue stream. LST was awarded a £0.2m grant from the UK Research and Innovation (UKRI) agency to assess the viability of the device. LST has submitted patent applications relating to the sensor product.

SensorGROW was launched in June 2022 and is intended for use outdoors in fields as well as vertical farms, polytunnels and glasshouses. LST has signed contracts with a number of growers to deploy the product on a three-month trial basis. These contracts provide for an automatic roll into a three-year subscription on successful completion of the trial.

advanceGROW: in June 2021, LST was awarded a contract potentially worth up to £13.8m with major UK salad grower Zenith Nurseries to develop an intelligent crop production and management system that integrates nurturGROW lighting and sensorGROW sensor technology with semi-automatic crop husbandry equipment from third parties for sowing and harvesting crops and tilling the soil. The new system, which is called advanceGROW, is designed for soil-based growing inside polytunnels and glasshouses. It fits across a standard sized glasshouse and moves above the crops providing supplementary lighting and collecting actionable data. The project is being supported by a £0.6m grant from UKRI.

The initial phase was completed successfully in September 2022, triggering milestone revenue of £51k. This phase included the development of the advanceGROW cloche lighting and sensor system, the delivery of three rolling cloches to Zenith Nurseries and a demonstration that yields can be increased to 18 cuts/annum.

Since starting on the project, Zenith Nurseries has decided to grow a higher proportion of its crops in polytunnels, where they can be protected during very hot summers like the one experienced in CY22. As a result, rather than wait for a complete system including semi-automatic husbandry equipment to be available before rolling out the cloche, Zenith is to install rolling cloches with just the lighting and sensor functionality in some new polytunnels. This phase is scheduled to start in H1 CY23 and generate potential revenues of c £1.9m.

Given this change in Zenith's priorities, the phasing of further trials, including those incorporating semi-automated crop husbandry tools on the same tracks as the lighting system, is likely to be different from the original plan. However, the total potential value of the project and completion date are unchanged, with Zenith rolling out the system, assuming the development is successful, to the majority of its nurseries by the end of CY26. This would involve the delivery of 806 rolling cloches and six semi-automated crop husbandry devices.

advanceGROW is intended to improve grower productivity by increasing the number of times salad crops can be harvested in a year and enabling plants to be grown on the soil areas which would otherwise be taken up by the tracks of harvesting vehicles or picker paths. Management estimates that this increases the amount of productive area in a polytunnel by 28%. In addition, the new product potentially provides a way of mitigating labour shortages, cutting the number of pathogens accidentally brought into polytunnels on workers' clothing and footwear and reducing exports by extending the growing period in the UK. It also provides an opportunity for using UVC lighting to control pests. Management estimates that the technology gives access to 4,000 industrial growers in the UK with more than 300 types of vegetable and salad crops.

Laboratory support

LST's laboratory facilities in Derbyshire, England, were opened in 2021. The laboratory has reach-in grow chambers so that it can run up to 12 concurrent trials in which plants are grown in an environment where temperature, humidity and carbon dioxide levels are carefully controlled, as well as equipment for determining the exact wavelength and intensity requirements for optimal plant growth, measuring the rate of plant photosynthesis and identifying macronutrients and contaminants in plants. It enables LST's scientists not only to make recommendations on specific

spectral requirements when selling luminaires, which strengthens customer relationships, but also to provide recommendations on other growing parameters as a monetisable consultancy service. The laboratory also has equipment such as a 22-metre-long light tunnel housing a spectral photo goniometer for testing the specification of its luminaires.

Exhibit 7: Trial at LST facility in Derbyshire



Source: Light Science Technologies

Exhibit 8: Goniometer in use



Source: Light Science Technologies

Addressing UN sustainable development goals

Food technology analysts Forward Fooding included LST in its 2021 list of the top 500 companies in food technology, awarding the company a sustainability score of 87.7 out of 100. We note that LST meets three of the United Nations' Sustainable Development Goals: ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture; protecting, restoring and promoting sustainable use of terrestrial ecosystems; and taking urgent action to combat climate change and its impacts.

Design and manufacturing in house

Being in the same group as UKC is a key differentiator for LST. UKC has been working with lighting manufacturers for around 20 years, and designed and manufactured the group's first LED horticultural lights in response to a customer commission four years ago. It now designs and manufactures the electronics for the luminaires and assembles the complete lights for LST. Since it has been involved in the assembly of LEDs since the very first high-power LEDs were produced by Lumileds, it is very familiar with the assembly and handling techniques required. Three of its surface mount technology (SMT) placement machines are unusual in being able to process circuit boards up to 1.2 metres long, covering the full range of luminaire lengths that LST supplies. It also has considerable experience in designing circuit boards and assembling sensor technology from servicing several markets, including advanced pest control products for Rentokil. This expertise is being built on in the development of LST's sensorGROW and nurturGROW products, the electronics for which will initially be manufactured by UKC.

Serving growth markets

CEA market growing rapidly

LST's technology is suitable for all types of controlled agricultural environments from high-tech vertical farming to advanced glasshouses and outdoor applications such as polytunnels. The CEA market is growing rapidly, being driven by concerns about food security linked to the effects of climate change and stretched logistics chains; concerns about food miles; scarcity of arable land in western Europe; young, affluent consumers switching away from processed foods to diets rich in

fruit and vegetables; and governments subsidising a shift to more automated methods of food production through initiatives such as the UK's Farming Transformation Fund (see below).

According to a report published by Market Data Forecast in January 2022, the European vertical farming market is predicted to grow from US\$0.85bn in 2021 to US\$2.31bn in 2026, a CAGR of 22%. Another report published by Market Data Forecast in January 2022 predicted that the European grow light market would rise from US\$0.78bn in 2021 to US\$1.17bn in 2026, a CAGR of 8.5%. A report from Mordor Intelligence predicts that the global horticultural lights market would climb from US\$2.7bn in 2020 to US\$7.6bn by 2026 (ie a CAGR of 19.5% over the forecast period). The vertical farming market is a subset of the larger indoor farming market. A report published by ResearchandMarkets in October 2021 predicted that Europe's indoor farming market would increase to US\$23.26bn by 2028 (ie a CAGR of 10.4% from 2021 to 2028).

Competitive position in CEA market

Major lighting manufacturer Signify (LIGHT.AS), which was formed through the spin-off of Philips' (PHIA.EN) lighting division, offers a range of LED lights under the Philips brand for use in vertical farms and glasshouses. The lights may be combined with a control system that enables growers to create and run custom light recipes on dimmable and colour-controllable modules and can be linked to a climate control or greenhouse management system. Signify can also provide growers with light recipes for specific crops. GE Lighting, which was acquired by Savant Systems in May 2020, also offers ranges of LED horticultural lights. These larger, generalised commercial and domestic lighting manufacturers do not complement equipment sales with laboratory or on-site services. In contrast, pure-play LED grow light manufacturer Valoya provides customers with light plans, while Heliospectra (HELIO.STO), which is also focused on the CEA market, backs up its range of grow lights and integrated control system with crop trials, light planning services, installation, cultivation training and lab services. This is similar to LST but focused on the Scandinavian region rather than the UK. Unlike LST, Heliospectra does not have any in-house manufacturing capability. None of the competitors mentioned offer luminaires which are recyclable and reusable.

As noted above, having design and manufacturing capability within the group is a key differentiator. Otherwise, since the CEA division is still small, it would probably struggle to get third parties to turn around design iterations and manufacture product for it in a timely fashion. For example, it makes it more practical to offer such a comprehensive range of lights of differing lengths.

UKRI invested in the development of LST's sensorGROW product because it identified a gap in the market. SensorGROW is different from other products because it integrates sensors measuring several parameters in a single compact product. We have identified a potential competitor to sensorGROW, the Grow Sensor, which allegedly measures carbon dioxide, humidity, temperature, light and vapour pressure differentials, and is paired with a probe measuring soil moisture, temperature and electrical conductivity. However, it is not clear what level of commercial readiness this product is at.

UK electronic contract manufacturing market benefiting from reshoring

According to Grand View Research, the UK electronic contract manufacturing and design services market was worth \$5.9bn in 2019 and is predicted to grow with a CAGR of 7.7% between 2021 and 2028.

Competitive position

The UK electronic contract manufacturing and design market is highly fragmented with few obvious differentiators between competitors. UKC is considering expanding into the medical and defence markets by extending its services to additional markets by securing the additional quality-related accreditations required in each market. The ongoing investment in automation, which includes an

additional two SMT machines to bring the total to eight, and in-line optical test equipment for improving efficiency and enhancing yield, is intended to help the company gain these accreditations.

Management and shareholders

Management

CEO Simon Deacon has founded and grown several businesses in the lighting, electronics and display manufacture markets including Advance LED Solutions, which makes lighting for the retail, point-of-sale, commercial and refrigeration sectors where he was director from 1998 to 2018. He became executive chairman of UKC in 2016 and founded Light Science Technologies in 2019. Simon was also a co-founder of a retail consultancy, Design Conformity, which created a working standard for retail sustainability that has been adopted by numerous global retailers and brands.

CFO Jim Snooks has held a number of finance director positions including group financial controller of bed manufacturer Breasley Group, finance director of furniture wholesaler Furntec and financial controller of GLW Feeds. He became CFO of LSTH in October 2021.

COO Andrew Hemsall has significant operational leadership experience, with roles including operations director of arken P-O-P, which designs and manufactures point-of-purchase displays and operations director/general manager of Bezier's site in Leicester.

Non-executive chairman Myles Halley worked for KPMG for over 30 years until 2009, culminating with a position on the UK board. Between 2003 and 2009 he was head of UK national restructuring, where he was responsible for more than 500 staff. He was chairman of private equity firm Rcapital Partners between 2011 and 2019. He is also chairman of home builder William Davis and motorhome distributor Brownhills. He became chairman of LSTH in October 2021.

Shareholders

Exhibit 9: Principal shareholders	
Name	Shareholding
Simon Deacon (CEO)	46.3%
Intuitive Investments Group	7.6%
David Evans (founder and significant shareholder of Intuitive Investments Group)	5.7%
Herald Investment Management	5.7%
LSTH Employee Benefit Trust	5.1%
Source: Refinitiv	

Financials

Investment in CEA division puts group in the red

Group sales rose by 4.2% year-on-year in H122 to £3.6m. Almost all of the revenues were attributable to the CEM division, where sales grew by 3.8% year-on-year. While CEM revenue and total revenue declined compared with H221, this is a typical seasonal pattern for the group because December, which has fewer sales days, falls in the first half. Group gross profit margin declined by 2.6pp year-on-year to 20.9%, as the CEM division incurred additional costs related to general input price inflation and the forced use of alternative supply sources for materials which it was not able to pass on in full to customers. Although the CEM division generated £0.3m EBIT during H122 (£0.4m in H121), investment in the CEA division on both product research and development and marketing resulted in a £0.4m year-on-year rise in administrative costs (excluding one-off items related to the IPO, share-based payments and depreciation) to £1.6m, which was slightly less than H221. Marketing initiatives included working with Crop Health and Protection, which is one of the four

centres for agricultural innovation funded by the UK government, on trials using nurturGROW for tomato plants being grown in greenhouses. Reported EBIT losses widened by £0.4m to £1.2m, which was a modest improvement on H221.

Exhibit 10: H121, H221 and H122 financial performance compared

Metric	H121	H221	H122	Notes
CEA revenues (£'000s)	0	33	13	
CEM revenues (£'000s)	3,417	3,944	3,547	
Group revenues (£'000s)	3,417	3,977	3,561	
Gross profit (£'000s)	806	837	746	
Gross margin	23.6%	21.0%	20.9%	
Administrative expenses excluding exceptionals, share-based payments, depreciation and amortisation	(1,175)	(1,638)	(1,592)	
Exceptional items	(367)	(145)	0	Costs associated with listing
Share-based payments	0	(220)	(289)	
Depreciation and amortisation	(77)	(155)	(156)	
Other operating income	27	23	105	Mainly grants
Reported operating loss	(786)	(1,298)	(1,187)	
Finance costs	(95)	(167)	(91)	H122 and H222 include costs attributable to the issue of convertible loan notes prior to the IPO which were converted at the time of the IPO
Reported loss before tax	(881)	(1,465)	(1,278)	
Tax	36	166	86	Tax credits
Reported loss after tax	(845)	(1,299)	(1,192)	

Source: Light Science Technologies Holdings data

IPO funds to accelerate CEA growth

Free cash outflow during H122 totalled £1.5m, £0.7m of which was attributable to an increase in inventory, most of which was allocated to specific customer orders that had been received.

Management continues to invest the £3.9m (net) raised from the placing in November 2021. £0.1m was invested in equipment to enhance productivity at UKC and some CEA laboratory equipment. £0.1m was invested in CEA-related development costs. The group had £0.1m net cash (excluding finance leases) and £1.8m cash and cash equivalents at the period end.

The group has a term loan provided by Close Brothers in October 2020 under the government-backed Coronavirus Business Interruption Loan Scheme, with principal of £975k payable in 54 equal instalments of £18.1k and interest payable at 5.5% plus base rate. The balance at end H122 was £722k. The group also has invoice discounting facility arrangements from Close Brothers with interest payable at 2% plus base rate. The balance of this was £912k at end H122.

Valuation centred on CEA roll-out

Exhibit 11: CEA pipeline – higher-value potential orders

Value	Project
£19.5m	UK-based agritech investment company building large greenhouses
£6.9m	Large glasshouse tomato grower in North America
£4m	Start-up UK-based vertical farming construction company with incorporated renewable energy solutions
£3m	Established UK-based vertical farmer
£2.0m	Start-up vertical farmer proposing two bio-halls and one propagation hall in the UK
£1.7m	UK-based wholesale distributor of installed CEA solutions
£1.7m	UK-based glasshouse grower
£1.4m	UK-based established soft fruit grower
£1.0m	UK manufacturer of preserves, marmalades and associated products which has commenced a 400 m ² six-month lighting trial using the nurturGROW slim lighting product, potentially leading to roll-out across one acre (c 4,000m ²).

Source: Light Science Technologies Holdings data

UKC is profitable as a standalone activity, with the £0.9m divisional EBIT (before deducting group costs) generated in FY21 indicating that the business on its own justifies a valuation which is a meaningful proportion of the group's current market capitalisation. However, although UKC should

benefit from any move to re-shore manufacturing to the UK, the opportunities for it to generate strong revenue growth by taking market share or expanding geographically are relatively limited compared with prospects for the CEA activity. Consequently, even though LST has yet to generate material revenues from sales of products to the CEA market, the potential for this division is such that we believe that the group's value resides primarily in the potential revenues and profits generated as LST converts its CEA product pipeline (Exhibit 11) totalling £40.6m (excluding the contract with Zenith Nurseries) to sales and takes meaningful market share. This means that our valuation discussion concentrates on the potential profits ascribable to the LST division and that announcements about new CEA contract awards are the key catalysts to crystallise shareholder value.

In Exhibit 12 we present a scenario analysis exploring potential revenues and EBIT for different levels of conversion of the CEA qualified pipeline. For simplicity, our analysis assumes that there is no improvement in CEM revenues or gross profit margin compared with H122 and flexes indirect costs at 10% of incremental revenues compared with the H122 cost base. We add a further £7m in revenue to represent annual sales from the blanket roll-out phase of the contract with Zenith Nurseries. We model a gross margin of 30%. This is an approximation which ignores the uplift on gross margin from including software that could achieve 60% gross margin in the SensorGROW subscription packages and the downwards effect of including sales of third-party equipment in the advanceGROW system.

Exhibit 12: Scenario analysis for different rates of CEA pipeline conversion

Value of qualified CEA pipeline (£m)	40.6				
Annual sales attributable to Zenith Nurseries contract (£m)	7.0				
Conversion rate	20%	40%	60%	80%	100%
Revenues from CEA pipeline conversion and Zenith Nurseries contract (£m)	15.1	23.2	31.4	39.5	47.6
Gross profit from CEA pipeline conversion and Zenith contract (£m)	4.5	7.0	9.4	11.8	14.3
Revenues from UKC at H122 levels (£m)	7.1	7.1	7.1	7.1	7.1
Gross profit from UKC at H122 levels (£m)	1.5	1.5	1.5	1.5	1.5
Group indirect costs at H122 levels (£m)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)
Incremental indirect costs (£m)	(1.5)	(2.3)	(3.1)	(3.9)	(4.8)
Group EBITDA (£m)	1.3	3.0	4.6	6.2	7.8

Source: Edison Investment Research

For example, converting 60% of the existing CEA pipeline and delivering on the Zenith contract could generate annual CEA revenues of £31.4m and £4.6m group EBITDA. Since there is no certainty as to when LST could achieve this revenue level, we are not attempting to derive an indicative share price from this analysis.

Exhibit 13: Potential UK market for CEA sensors and horticultural lights*

Environment	Hectares	Sensors/hectare	Total sensors	Annual fee/sensor	Potential market size
Polytunnels	7,900 ¹	20	158,000	£750	£118.5m/year
Glasshouses	2,911 ²	35	101,885	£750	£76.4m/year
Vertical farming	20	250	5,000	£750	£3.8m/year
Total potential sensor market size					£198.7m/year
Environment	Crop	Lighting type	Lights/hectare	Cost/light	Cost/hectare
Glasshouse	tomatoes	intercrop light	4,228	£335	-
Glasshouse	greens	top light	450	£647	-
Glasshouse	flowers	top light	424	£326	-
Glasshouse	strawberries	vertical farm light	4,492	£217	-
Average cost of lighting per hectare – glasshouse			2,398**	£386***	£926,717
Potential grow light market value glasshouses					£2,697.7m
Vertical farm	greens/strawberries	vertical farm light	1,729	£193	£333,562
Potential grow light market value vertical farms					£6.7m
Total potential UK market for CEA sensors and horticultural lights					£2,903.1m

Source: Light Science Technologies Holdings, (1) Ceres Agritech, (2) Department for Environment, Food & Rural Affairs. Note: *Based on current hectareage occupied by polytunnels, glasshouses and vertical farms. **Average number of lights/hectare. ***Average cost/light.

In Exhibit 14 we present a scenario analysis exploring potential revenues and EBIT achievable with different levels of market penetration. We split this analysis into the potential revenues attributable

to receiving annual subscriptions for sensors and software from a specified percentage of the UK indoor agriculture market and new sales of horticultural lights to a specified percentage of the market in a single year. Exhibit 13 shows how the market sizes have been calculated. We model a gross margin for sensor subscriptions of 46.7%, in line with management guidance, as the calculation only includes the sensor system part of any advanceGROW sales.

Exhibit 14: Scenario analysis based on different rates of market penetration

Potential size of UK CEA sensor market (£m)	198.7				
Proportion of potential UK sensor market equipped with LST sensors (%)	1.0	2.0	3.0	4.0	5.0
Additional annual revenues from sensor subscriptions (£m)	2.0	4.0	6.0	7.9	9.9
Incremental gross profit (£m)	0.9	1.9	2.8	3.7	4.6
Incremental indirect costs (£m)	(0.2)	(0.4)	(0.6)	(0.8)	(1.0)
Incremental EBIT (£m)	0.7	1.5	2.2	2.9	3.6
Potential size of UK grow light market – glasshouses only (£m)	2,697.7				
Proportion of potential UK grow light market equipped with LST lights in a year (%)	1.0	1.5	2.0	2.5	3.0
Additional revenues from grow light sales (£m)	27.0	40.5	54.0	67.4	80.9
Incremental gross profit (£m)	8.1	12.1	16.2	20.2	24.3
Incremental indirect costs (£m)	(2.7)	(4.1)	(5.4)	(6.7)	(8.1)
Incremental EBIT (£m)	5.4	8.1	10.8	13.5	16.2

Source: Edison Investment Research

Sensitivities

CEA products at relatively early stage of commercialisation: as of the end of FY21, LST had not generated any material revenues from product sales. There is therefore no certainty that the products will find favour with growers and LST will be able to increase sales in line with management expectations. In addition, while the nurturGROW range was launched in CY21, the sensorGROW product is currently undergoing trials with UK growers, and the light plus sensor part of the advanceGROW product has been trialled successfully, reducing execution risk, LST has not made any advanceGROW prototypes incorporating the semi-automatic crop husbandry equipment, so there remains significant development risk associated with that aspect of the project. We note that Zenith has started to roll-out the light plus sensor part of the system already, suggesting that LST could receive a significant proportion of the revenues attributable to the project even if the integration of the semi-automatic crop husbandry equipment does not go ahead.

Customer concentration: 55.4% of H122 revenue (61.6% in H121) was attributable to Rentokil Initial's pest control division. While UKC grew revenues by 4% during H122, demand from Rentokil also increased as it expanded its pest control services globally. Management expects a high proportion of segmental revenues to be attributable to Rentokil for the foreseeable future. It has recently signed a supply contract with Rentokil, which gives some level of reassurance over continuity of orders and payment terms.

Energy prices: the surging energy prices caused by the war in Ukraine are adversely affecting the cost base for CEA growers, resulting in them deferring investment decisions. Longer term, having energy prices settle at relatively high levels, which will also result in elevated fertiliser prices, will create a beneficial environment for LST, as growers will need to invest in solutions which make their use of energy and fertiliser more efficient. Higher energy prices also mean higher logistics costs, encouraging the cultivation of greenhouse crops in the UK rather than importing produce.

War in Ukraine: the group has not been directly affected by the war in Ukraine because UKC did not have any customers in either Russia or Ukraine and did not source any components or materials from either country.

Component shortages: so far UKC has been able to manage supply chain issues in the electronics industry by increasing inventory levels and working with customers and suppliers to adapt designs to use components which are available. This sets it apart from competitors that do not have a design capability. The issue has meant that its customers are keen to secure supply and

are consequently placing orders covering longer periods. It has not been able to pass on component and material price increases in full to customers.

UK government farming policy: under the EU system, which ended in December 2020, the amount of subsidy a farmer received was based on the amount of land they farmed. These area-based subsidies will be halved by 2024 and abolished by 2028, with subsidies being distributed instead through a selection of new payment systems based on environmental outcomes and public good. The Farming Transformation Fund is giving out grants of £35–500k to provide up to 40% of the cost of robotic or autonomous equipment and systems to aid crop and livestock production. Eligible items include robotic harvesting, transplanting and weeding equipment and wavelength-specific LED lighting for horticultural crops. Any robotic systems must use information gathered from sensors to control that particular process, which is favourable for LST.

IP protection: LST has applied for patents for both its nurturGROW luminaires and sensorGROW intelligent plant sensors and intends to apply for further patents as appropriate. It already holds two registered trademarks in the EU (for nurturGROW and sensorGROW) and is in the process of extending the global territories of these. It is in the process of registering a third trademark (for advanceGROW) in the UK.

Exhibit 15: Financial summary

Year end 30 November, £'000s	2018	2019	2020	2021
INCOME STATEMENT				
	Not restated for predecessor method of merger accounting	Not restated for predecessor method of merger accounting	Restated for predecessor method of merger accounting	
Revenue	5,648	5,560	6,937	7,394
Cost of Sales	(4,368)	(4,256)	(5,388)	(5,751)
Gross Profit	1,280	1,304	1,550	1,643
EBITDA	535	516	458	(1,120)
Operating profit (before amort. and excepts.)	306	233	288	(1,351)
Amortisation of acquired intangibles	0	0	0	0
Exceptionals	81	0	(30)	(512)
Share-based payments	0	0	0	(220)
Reported operating profit	387	233	258	(2,084)
Net Interest	(155)	(139)	(110)	(263)
Exceptionals	(0)	0	0	0
Profit Before Tax (norm)	151	93	178	(1,614)
Profit Before Tax (reported)	232	93	148	(2,347)
Reported tax	131	16	36	202
Profit After Tax (norm)	253	92	180	(1,412)
Profit After Tax (reported)	362	110	184	(2,144)
Average Number of Shares Outstanding (m)	174*	174*	174*	174*
EPS - normalised (p)	0.15	0.05	0.10	(0.81)
EPS - diluted normalised (p)	0.15	0.05	0.10	(0.81)
EPS - reported PAT and number of shares on admission to AIM (p)	0.21	0.06	0.11	(1.23)
Dividend** (p)	0.00	0.00	0.00	0.00
Revenue growth (%)	N/A	-1.6%	24.8%	6.6%
Gross Margin (%)	22.7%	23.5%	22.3%	22.2%
EBITDA Margin (%)	9.5%	9.3%	6.6%	N/A
Normalised Operating Margin	5.4%	4.2%	4.1%	N/A
BALANCE SHEET				
Fixed Assets	2,816	2,536	1,442	1,589
Intangible Assets	1,479	1,395	78***	215
Tangible Assets	1,337	1,141	1,364	1,374
Investments & other	0	0	0	0
Current Assets	2,211	1,932	1,886	6,950
Stocks	551	648	589	1,200
Debtors	1,528	1,279	1,254	1,738
Cash & cash equivalents	132	4	42	3,860
Other	0	0	0	151
Current Liabilities	(3,337)	(3,061)	(2,332)	(3,618)
Creditors	(2,096)	(1,944)	(1,377)	(2,049)
Short term borrowings including lease liabilities	(1,241)	(1,117)	(915)	(1,568)
Other	0	0	(40)	0
Long Term Liabilities	(1,345)	(953)	(1,461)	(1,004)
Long term borrowings including lease liabilities	(1,197)	(870)	(1,459)	(940)
Other long-term liabilities	(147)	(83)	(1)	(64)
Net Assets	344	454	(465)	3,917
Minority interests	279	318	306	327
Shareholders' Equity	65	136	(771)***	3,590
CASH FLOW				
Op Cash Flow before WC and tax	535	516	458	(1,120)
Working capital	28	95	(46)	(362)
Exceptional & other	81	7	(28)	(525)
Tax	(28)	(19)	102	23
Operating Cash Flow	615	597	486	(1,984)
Capex (including capitalised R&D)	(10)	(10)	(474)	(305)
Acquisitions/disposals	(1,182)	(124)	(501)	0
Net interest	(134)	(99)	(111)	(182)
Equity financing	0	0	251	5,181
Dividends	0	0	0	0
Other	0	0	0	0
Net Cash Flow	(711)	365	(348)	2,710
Opening net debt/(cash)	1,575	2,307	1,983	2,333
FX	0	0	0	0
Other non-cash movements	(22)	(41)	128	974
Closing net debt/(cash) including lease liabilities	2,307	1,983	2,333	(1,352)
Lease liabilities	574	468	629	552
Closing net debt/(cash) excluding lease liabilities	1,733	1,515	1,704	(1,905)

Source: Company data. Note: *Number of shares on admission to AIM. **Excluding payments prior to admission to AIM. ***Year-on-year reduction caused by restatement and resultant reduction in value of intangibles.

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