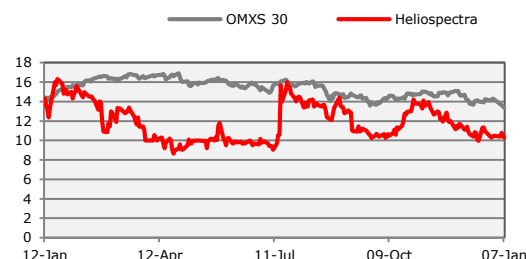


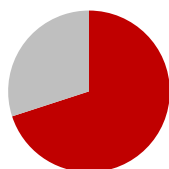
Summary
Heliospectra (HELIO:ST)
LED lighting strikes growers

- Heliospectra specializes in intelligent lighting systems for plant research, greenhouse cultivation and controlled environment agriculture. The company is a global leader in LED grow lights for advanced research applications and has patented technology.
- With an updated product portfolio and strengthened organization, Heliospectra is well positioned to rapidly grow sales in the booming medical plant segment and the greenhouse cultivation segment.
- We believe Heliospectra's efforts will pay off and expect sales of SEK 55 million in 2016 and continued strong growth going forward. For 2018, we expect sales to reach 120 million and EBIT to be positive for the first time in the company's history.
- The fair value in our base case is SEK 13.7 per share. In our bull and bear case the fair value is SEK 28.4 and SEK 6.9 respectively.

List: Nasdaq First North
 Market Cap: 196 MSEK
 Industry: Industrial Goods & Services
 CEO: Staffan Hillberg
 Chairman: Jan Tufvesson

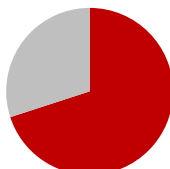

Redeye Rating (0 – 10 points)

Management



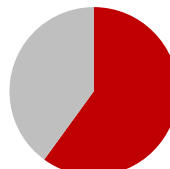
7.0 points

Ownership



7.0 points

Profit outlook



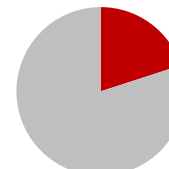
6.0 points

Profitability



0.0 points

Financial strength



2.0 points

Key Financials

	2013	2014	2015E	2016E	2017E	Share information	
Revenue, MSEK	0	3	13	55	84	Share price (SEK)	10.5
Growth	-18%	540%	318%	323%	53%	Number of shares (m)	18.6
EBITDA	-14	-29	-28	-12	-2	Market Cap (MSEK)	196
EBITDA margin	-2,974%	-942%	-213%	-21%	-3%	Net debt (MSEK)	-8
EBIT	-17	-33	-32	-16	-7	Free float (%)	40%
EBIT margin	-3,527%	-1,058%	-243%	-28%	-8%	Daily turnover ('000)	19
Pre-tax earnings	-17	-34	-32	-16	-9	Analysts: Joel Westerström joel.westerstrom@redeye.se Viktor Westman viktor.westman@redeye.se	
Net earnings	-17	-34	-32	-16	-9		
Net margin	-3,522%	-1,083%	-246%	-30%	-10%		
Dividend/Share	0.00	0.00	0.00	0.00	0.00		
EPS adj.	-0.92	-1.81	-1.72	-0.88	-0.46		
P/E adj.	-3.7	-6.1	-6.1	-11.9	-22.7		
EV/S	144.5	66.8	14.4	3.9	2.7		
EV/EBITDA	-4.9	-7.1	-6.8	-18.2	-100.0		

Important information: All information regarding limitation of liability and potential conflicts of interest can be found at the end of the report.

Redeye Rating: Background and definitions

The aim of a Redeye Rating is to help investors identify high-quality companies with attractive valuation.

Company Qualities

The aim of Company Qualities is to provide a well-structured and clear profile of a company's qualities (or operating risk) – its chances of surviving and its potential for achieving long-term stable profit growth.

We categorize a company's qualities on a ten-point scale based on five valuation keys; 1 – Management, 2 – Ownership, 3 – Profit Outlook, 4 – Profitability and 5 – Financial Strength.

Each valuation key is assessed based a number of quantitative and qualitative key factors that are weighted differently according to how important they are deemed to be. Each key factor is allocated a number of points based on its rating. The assessment of each valuation key is based on the total number of points for these individual factors. The rating scale ranges from 0 to +10 points.

The overall rating for each valuation key is indicated by the size of the bar shown in the chart. The relative size of the bars therefore reflects the rating distribution between the different valuation keys.

Management

Our Management rating represents an assessment of the ability of the board of directors and management to manage the company in the best interests of the shareholders. A good board and management can make a mediocre business concept profitable, while a poor board and management can even lead a strong company into crisis. The factors used to assess a company's management are: 1 – Execution, 2 – Capital allocation, 3 – Communication, 4 – Experience, 5 – Leadership and 6 – Integrity.

Ownership

Our Ownership rating represents an assessment of the ownership exercised for longer-term value creation. Owner commitment and expertise are key to a company's stability and the board's ability to take action. Companies with a dispersed ownership structure without a clear controlling shareholder have historically performed worse than the market index over time. The factors used to assess Ownership are: 1 – Ownership structure, 2 – Owner commitment, 3 – Institutional ownership, 4 – Abuse of power, 5 – Reputation, and 6 – Financial sustainability.

Profit Outlook

Our Profit Outlook rating represents an assessment of a company's potential to achieve long-term stable profit growth. Over the long-term, the share price roughly mirrors the company's earnings trend. A company that does not grow may be a good short-term investment, but is usually unwise in the long term. The factors used to assess Profit Outlook are: 1 – Business model, 2 – Sale potential, 3 – Market growth, 4 – Market position, and 5 – Competitiveness.

Profitability

Our Profitability rating represents an assessment of how effective a company has historically utilised its capital to generate profit. Companies cannot survive if they are not profitable. The assessment of how profitable a company has been is based on a number of key ratios and criteria over a period of up to the past five years: 1 – Return on total assets (ROA), 2 – Return on equity (ROE), 3 – Net profit margin, 4 – Free cash flow, and 5 – Operating profit margin or EBIT.

Financial Strength

Our Financial Strength rating represents an assessment of a company's ability to pay in the short and long term. The core of a company's financial strength is its balance sheet and cash flow. Even the greatest potential is of no benefit unless the balance sheet can cope with funding growth. The assessment of a company's financial strength is based on a number of key ratios and criteria: 1 – Times-interest-coverage ratio, 2 – Debt-to-equity ratio, 3 – Quick ratio, 4 – Current ratio, 5 – Sales turnover, 6 – Capital needs, 7 – Cyclicity, and 8 – Forthcoming binary events.

Table of contents

Table of contents	3
Glossary: Understanding the buzz.....	4
Investment case.....	7
Company description	10
Technology and products: Adding value with proprietary software and sensors.....	14
Strategy, operations and business model: Striving to be the brain of the greenhouse	26
Market: Addressing a global and fast-growing market	35
Competition: The battle has begun.....	50
Risks and opportunities: What can obscure the shining light?	58
Financial estimates	62
Valuation	74
Appendix I: Management and owners.....	79
Summary Redeye Rating.....	82

Glossary: Understanding the buzz

ADR	American Depositary Receipts
AgTech	Refers to precision agriculture industry, equipment or practices
API	Application Programming Interface
bn	Billion
Cannabis	Any of the various parts of the plant from which hashish, marijuana, bhang and similar drugs are prepared
CAGR	Compound Annual Growth Rate
CAPEX	Capital expenditure
CBD	Cannabidiol, one of at least 85 active cannabinoids identified in cannabis, considered to have a wider scope of medical applications than THC, such as pain relief
COGS	Cost of Goods Sold
COTS	Commercially Off the Shelf
FY	Full Year
HID	High Intensity Discharge
Horticulture	The science and art of growing fruits, vegetables, flowers, or ornamental plant

HPS	High Pressure Sodium
Incandescence	The emission of visible light by a body, caused by its high temperature
IoP	Internet of Plants
k	Thousand
LED	A semiconductor diode that emits light when a voltage is applied to it and that is used especially in electronic devices
Luminescence	The emission of light not caused by incandescence and occurring at a temperature below that of incandescent bodies
m	Million
Marijuana	The dried leaves and female flowers of the hemp plant, used in cigarette form as a narcotic or hallucinogen
MH	Metal Halide
Q(1,2, ...)	Quarter (1, 2, ...)
R&D	Research & Development
SaaS	Software as a Service
SEK	Swedish Krona; 1 SEK ~ USD 0.118 on average in 2015

Strain	Variant of plants
THC	Tetrahydrocannabinol, the principal psychoactive constituent of cannabis
USD	US Dollar
Vertical farming	A system for growing crops in urban areas making use of the three dimensional space by growing on vertical surfaces as well as in multiple layers
Vertical growing	The practice of cultivating food within a skyscraper greenhouse or on vertically inclined surfaces, also see above
YoY	Year-over-year (compared to previous year)

Investment case

We believe the current price of Heliospectra's stock presents a good investment opportunity with a favorable risk/reward profile. The stock market is not fully discounting the potential for Heliospectra to rapidly increase sales and turn EBIT-positive in the next three years.

Inflection point ahead as sales focus starts paying-off

Heliospectra is in the middle of a transition from a research company with little focus on sales to a leading global player in the rapidly growing market for intelligent LED grow light solutions. With a strong position in the research market and several important contracts and partnerships in the medical plant segment and research segment we believe Heliospectra is on the verge of its big market breakthrough.

In 2015 several important contracts have been won. The most notable order came in the medical plant segment and was the largest order for LED grow lights from a grower of medical marijuana to date at SEK 5.7 million. We see Heliospectra as well positioned to sustain its strong position in the research segment and establish itself as a leading player in the fast growing medical plant/legal marijuana segment as well as in the commercial greenhouse segment.

Rapid market growth driven by global trends

The global market for LED grow lights is expected to grow at a CAGR above thirty percent from 2014 – 2020. The use of LED grow lights address global issues of environmental impact from agriculture and fresh food supply for the urban population.

LED grow lights are more energy efficient than traditional HIS/HPS lamps traditionally used in greenhouses and growers increasingly replace traditional lighting solutions in commercial greenhouse operations in Europe, North America and Asia. Heliospectra's intelligent lighting systems also provide growers benefits of increased automation and higher plant quality thus making the incentives to switch from HID/HPS even higher.

Medical plant segment booming thanks to legalization

Heliospectra has increased its focus on sales and marketing to target growers of legal marijuana in North America. The market is still very much in its infancy in the US and rapid growth is expected as legalization continues. As the market matures competencies in the industry increase with the inflow of skilled people with ability to make sound financial analysis. LED grow lights provide short payback times on investment for growers of marijuana who can drastically reduce their high electricity costs and increase productivity and quality.

Heliospectra is establishing itself as a well renowned player in the legal marijuana segment and will benefit from the ongoing legalization movement in the US as well as in other countries.

We expect continued losses in 2016-2017 ...

The sales processes in the B2B segment often take over a year, with customers testing the equipment for up to nine months before making a decision. The ramp up of production, building of a stronger organization, sales, marketing and PR efforts have been costly and we expect Heliospectra to report net sales of SEK 13.0 million and a negative EBIT of SEK -31.6 million for 2015. We also believe Heliospectra will need to raise additional capital before reaching break-even in 2018.

... but investors should look at 2018 and beyond

The market is focusing on the losses Heliospectra is showing and on the prospect of additional rights issues. We believe the price-value gap will gradually shrink during 2016 driven by an increased focus on the company's rapidly growing sales and the strong position Heliospectra has in the booming medical marijuana segment in North America.

We see several catalysts for the stock in the next year:

- Large (over SEK 2 million) order from a larger AgTech player
- Major (over SEK 4 million) follow up and/or major new order from greenhouse cultivator and/or marijuana grower
- Proof-of-concept of partnership with player in agricultural automation through sales success
- Successful commercialization with break-through order on the much anticipated biofeedback system incorporating sensors, software and LED grow lights
- California releases the ban on recreational marijuana leading to an increased interest in suppliers of ancillary products to the industry

Proprietary technology strengthens case

Heliospectra is in the final stages of the development of a biofeedback system allowing autonomous plant growth. The system incorporating LED grow lights, proprietary software and sensors is patented and it will be hard for competitors to offer growers the same benefits.

Heliospectra's patented bio-feedback system and the company's software solutions will be possible to integrate with the lights from competitors. This is an opportunity for Heliospectra to capitalize on its IP. We also see Heliospectra as a potential acquisition target for larger players who wish to strengthen their market position and get access to Heliospectra's IP.

Attractive investment despite risks

Heliospectra is still at an early stage of its development and going forward there will be both successes and setbacks – very seldom do things go as planned. The major risks associated with an investment in Heliospectra is the company's ability to:

- Rapidly grow sales in a competitive market
- Ramp up its organization to handle growth
- Improve gross margins as volumes grow
- Successfully finance its growth
- Protect and capitalize on its IP-portfolio

Given the risk factors, we have used an elevated discount rate of 15.1 percent and conservative estimates in our valuation.

In our base case scenario we see a potential upside of 30 percent from the current share price of SEK 10.5 to our base case valuation of SEK 13.7 per share. In our more optimistic bull case scenario, our fair value per share is SEK 28.4 and in our more pessimistic bear case scenario our fair value per share is SEK 6.9.

Company description

*High-tech Company
founded in 2006
specializing in intelligent
lighting solutions for
plant research, green
house cultivation and
indoor farming*

*Went public in June 2014
and is listed on Nasdaq
First North in Stockholm,
Sweden and traded in the
US via ADR*

*Deeply rooted in research
in plant physiology*

Heliospectra is a high-tech company specializing in intelligent lighting solutions for plant research, greenhouse cultivation and indoor farming. The company has been recognized by media as well as organizations, resulting in several awards for its innovative and environmentally friendly lighting solutions.

After several years of research and 65.6 million SEK invested in the development of the company, Heliospectra went public in June 2014. Heliospectra is listed on Nasdaq First North in Stockholm, Sweden. The company's shares are also traded on the OTC market in USA through American Depositary Receipts, ADRs.

History in brief: From invention to innovation

Heliospectra was founded in 2006. The company has its roots in research in plant physiology and specifically on how light in different wavelengths affects plant growth. The idea was to develop a system incorporating LED grow lights, software and sensors to provide an intelligent lighting system for greenhouses.

Until 2009 Heliospectra was part of the incubator Inkubatorn i Borås AB. After receiving a SEK 4 million research grant, and starting a pilot study with Swedeponic, a leading European company in the production and sales of fresh herbs, Heliospectra left the incubator and started to prepare for commercialization of its intelligent lighting system for greenhouses. Although the idea and technology behind Heliospectra's system received attention from media and organizations in the green-tech community, the company was far from a commercial break-through. Heliospectra was deeply rooted in research but lacked a clear strategy on how to commercialize its invention, thus turning it into an innovation – a change that adds value.

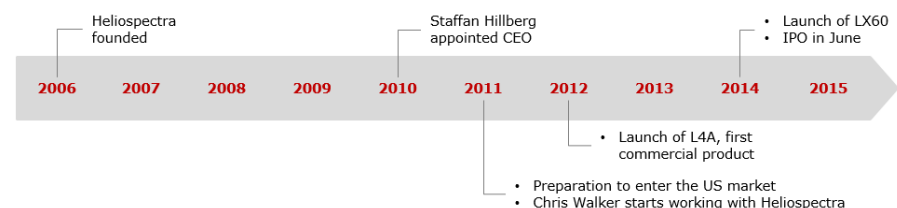


Figure 1: Heliospectra's history 2006-2015

*In 2010 Staffan Hillberg
was appointed CEO of
Heliospectra*

In 2010 Staffan Hillberg was appointed CEO of Heliospectra. Hillberg's mission was to shift focus from research and technology development to product development and business development. Besides the substantial greenhouse cultivation market, the US market for medical marijuana was identified as a market where Heliospectra could add significant value and preparations to enter the market began in late 2011.

Launch of first commercial product, the L4A for research segment, in 2012

In 2012 the first commercial product, the L4A was launched and marketed towards research institutions. By working with well renowned research institutions Heliospectra received the benefit of both credibility and customer driven product development. At the same time sensor development was carried out with Chalmers University of Technology.

In 2014 Heliospectra went public and launched the LX60 to address market segments other than research. Following the IPO sales and marketing efforts were intensified in Europe as well as in the US.

Position of today: Towards crossing the chasm

During the first year as a listed company Heliospectra had net sales of SEK 3.1 million and EBIT amounted to SEK -32.9 million. For the nine months ended September 30, 2015, net sales reached 6.1 million, up 139% compared to the same period 2014. EBIT for the first nine months of 2015 was SEK -22.4 million. Despite the continued losses we see positive signs and expect significant growth ahead.

Heliospectra has established the organizational foundation for further growth

During the spring 2014 Heliospectra's management had to devote a significant part of their time to the IPO. After the IPO the focus has been on sales and marketing as well as establishing the organizational foundation for further growth. At the end of 2014 Heliospectra had 19 employees, an increase of five during the year. In 2015 the organization has continued to strengthen both in Sweden and the US. As of today Heliospectra has approximately 25 employees according to the company.

In 2015 sales and marketing efforts have started to pay off with two major orders

In 2015 the sales and marketing efforts have started to pay off with several large orders, additions to the products portfolio and increased brand recognition. The largest order to date with a value of 5.7 million SEK was received from a Las Vegas grower of medical plants. The order was announced in July and is expected to be delivered in the fourth quarter this year. The greenhouse cultivation segment has also seen positive developments with a recent SEK 1.8 million order from a European grower.

We believe Heliospectra is about to cross the chasm – that is, successfully moving from the early adopters and technology enthusiasts to the more pragmatic early majority. The failure to cross the chasm is often where high tech companies fail. Crossing the chasm typically requires the company to:

- Position and market the product/service
- Choosing a target market
- Understanding the whole product concept
- Choosing the appropriate distribution channel and pricing

The above is what Heliospectra, under the leadership of Hillberg, has done over the past few years and the company is now ready to reap the rewards.

Management and active owners have been key factors in taking Heliospectra to where it is today and will be key success factors going forward

Management and owners: Strong management and active owners

Since its inception in Borås 2006 Heliospectra underwent organizational changes and ownership changes to transition from a research organization to a research-based company capable of entering the global market. Management and ownership have been key factors in taking Heliospectra to where it is today. Good management and strong owners will also be key for Heliospectra going forward.

Active shareholders with financial strength

In 2011 Industrifonden and Midroc New Technology invested a total of SEK 30 million and today each hold 10.9% of the capital and votes. Industrifonden and Midroc New Technology, number two and three on the list of largest shareholders, are both active investors. They support their portfolio companies with both knowledge and capital. The largest shareholder is Gösta Welandson who holds 37.0% of the capital and votes through Weland Värdepapper AB and Weland Stål AB. Gösta Welandson increased his investment in Heliospectra by 21%, 1,000,000 shares, during Q3 2015 and also exercised options of series TO1 during Q3 2015.

Major shareholders are financially strong and provide both knowledge, strong networks and financial backing

The three major shareholders with 58.8% of the capital and votes have financial strength to support Heliospectra should additional funding be needed. Furthermore, both Industrifonden and Midroc New Technology have a vast network that can be leveraged to support Heliospectra's entry into new markets and commercial partnerships. The ownership structure of Heliospectra is what many growing technology companies can only dream of and strengthens our view of Heliospectra as an investment.

Committed senior management with a business mindset

Heliospectra has evolved from a research organization to a research based company with a global presence.

Since Staffan Hillberg took over as CEO of Heliospectra in 2010, the company has evolved from a research organization to a company selling its products globally. Hillberg brings experience from investing in, and working for, start-ups as well as successful growth companies. Hillberg began his career at Apple after which he joined Swedish media house Bonnier to take the company into the digital age. After Bonnier Hillberg worked as CEO of several startups as well as consultant and investor, mainly within the VC-industry. It was through his role as CEO and co-founder of investment company Wood & Hill Investments that Hillberg joined Heliospectra. Wood & Hill was amongst the early investors in Heliospectra, and when the company needed a CEO with increased commercial focus Hillberg joined as CEO. Hillberg holds an MBA from Insead and an MSc from Chalmers University of Technology.

We believe that Staffan Hillberg's professional background combined with a strong professional network makes him well suited to lead Heliospectra in

The establishment of a strong organization in the US to address the booming legal marijuana market was a wise move

the company's current expansion phase. Hillberg has also shown leadership qualities in the way he has built the organization during the past few years.

The establishment of a strong organization in the US to address the booming legal marijuana market looks like a wise move. Chris Walker, GM of Heliospectra's North American operations with offices in California and Colorado, has been instrumental in gaining market traction. Chris Walker started working as a consultant with Heliospectra in 2011 and became GM of the North American Subsidiary after it was founded in 2013. Walker sits on the board of The Hemp Industrial Innovation Institute, a non-profit organization founded for the purpose of coordinating industrial hemp research for the advancement of the hemp industry worldwide. Walker has previously held senior sales and marketing positions at Fortune 500 companies and has also been involved in several start-ups that have later been sold.

We believe Walker's strong network within the Cannabis industry and his previous experience makes him ideally suited to lead Heliospectra's continued growth in the North American Cannabis market.

The reader can find a more detailed description of Heliospectra's organization and other key personnel in Appendix I.

Management and the board hold a decent amount of shares

Senior management and the board together hold a little over 2% of the shares. CEO Staffan Hillberg owns 138,437 stocks and Chairman of the Board Jan Tufvesson owns 126,500 stocks corresponding to 0.74% and 0.68% respectively. Furthermore, there is an options scheme with 770,000 options with exercise period in and strike price of SEK 12 for key employees of Heliospectra. We believe a high percentage, around 30%, of the options are allotted to CEO Staffan Hillberg. Permission to launch another options scheme comprising 400,000 shares was decided upon during the AGM (Annual General Meeting) in June 2015.

Although we would like to see senior management and the board holding more shares in Heliospectra, our judgement is that Heliospectra has the right management and board in place. We believe management and the board have suitable experience and incentives to lead Heliospectra's continued expansion in a shareholder-friendly way.

Technology and products: Adding value with proprietary software and sensors

Heliospectra's core competencies lie in the integration and design of software, hardware and sensors to offer state-of-the-art intelligent lighting systems.

Heliospectra's core competence lies not within the production of LED grow lights but in the integration and design of software, hardware and sensors to offer state-of-the-art intelligent lighting systems. Heliospectra's lighting systems are based on extensive research and delivers benefits for the growers as well as for the society.

- Increase the quality of the produce
- Achieve OPEX savings for growers
- Allows for increased automation and higher degree of control
- Addresses global environmental and resource scarcity issues

The current product portfolio consist of a range of intelligent LED grow lights and software. With the planned introduction of sensors, Heliospectra will be able to offer its customers a complete bio-feedback system as well as add on services utilizing data from the feedback system and other sources.

Technology: Increasing efficiency with LED grow lights

LED stands for light-emitting diode and is a semiconductor device that emits light when an electric current passes through it. The output from the single LED can have varying brightness and in most LEDs it occurs at a single wavelength – it is monochromatic. The output from LEDs range from red to blue-violet. If the LED emits infrared it is called infrared-emitting diode or IRED.

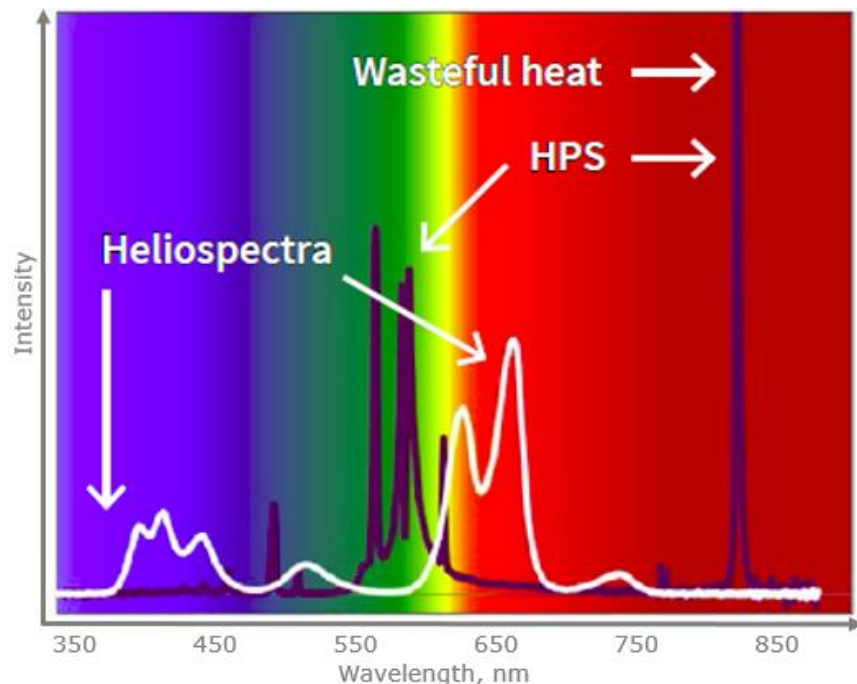


Figure 2: The visible spectrum, intensity of Heliospectra LED vs HPS

LED lights are more efficient and last longer than traditional lighting technologies

LED lights have several benefits compared with incandescent lights, fluorescent lights and high intensity discharge (HID) lamps like high pressure sodium (HPS) lamps and metal halide (MH) lamps. Benefits include:

- Lower power requirements
- Higher efficiency
- Longer life

The higher efficiency of LED lights means that more of the power supplied will be converted into the desired radiation, or when talking about LEDs for grow light applications, the desired spectrum. This can be seen in Figure 2 where a Heliospectra LED grow light is compared to an HPS light. The Heliospectra grow light converts the energy supplied to the desired spectrum to enhance plant growth, whereas the HPS lamp converts a high percentage of the power supplied into heat.

Optimizing growth and quality with the right spectrum

With LED grow lights from Heliospectra the grower achieves lower OPEX and higher quality

Can basil taste salty? Do plants have a memory? Is it possible to grow a tomato in your basement and have it taste just like the one you had in Provence last summer? Those are the type of questions the researchers at Heliospectra asked themselves when studying the effects of the spectral composition on plant physiology and photosynthesis. The answer? Yes, yes and yes.

By combining LEDs with different wavelengths into one LED grow lamp the individual LEDs in the lamp can be controlled to vary the intensity and spectrum of the lamp. Alteration of the spectrum the plant receives allows for customization of several of its properties. The spectrum is changed according to the desired properties of the species grown. Furthermore, the spectrum can also be changed during the different growth phase of the plant, for example to promote flowering and branching.

IoP merging control engineering, sensors and algorithms

IoP, a phrase coined here and now, stands for Internet of Plants and that is what Heliospectra is aiming for with the integration of sensors, LED grow lights, software and data.

Heliospectra is bringing big data, sensors and IoT to the agricultural sector

Heliospectra is developing sensors in cooperation with the control engineering department at Chalmers University of Technology, a leading Swedish University. The sensors will provide feedback on the growing environment and the plant itself. The feedback can then be used to control the LED grow lights according to predefined algorithms, thus enabling further automation for the grower.

Products: Lighting systems for a brighter future

Heliospectra's product and service portfolio reflects the experience and competencies of the Heliospectra team. With a team comprised of plant researchers, entrepreneurs, marketers, business developers, engineers and experts in computer science it is not surprising that Heliospectra's plans for the future are ambitious. The company has plans to add both products and services to its intelligent lighting system. As of now the company have a product portfolio comprising LED grow lights, software and services.

LED grow lights: From small batch for niche market towards volume products

Heliospectra has broadened its product portfolio to better cater to customer needs. In 2012 the L4A was launched at a retail price of \$7500. The product was not designed for serial production and was sold mainly to research institutions. Today Heliospectra has a product range that caters for the needs of research institutions, the medical plant segment and the greenhouse sector. The current product portfolio is designed for volume production and prices are lower making the products affordable to a broader customer base.

New product launches have opened up new market segments



Figure 3: Evolution of Heliospectra's product portfolio 2012-2015

A broadening of the product portfolio has been carried out in the past two years

Heliospectra's first product in serial production was the L4A variable LED-light that was introduced in 2012 and followed by L1, a smaller version of L4A. The product was not designed for volume production and sold mainly to research institutions around the world. Heliospectra also designed a smaller version of the L4A, the L1 that was sold in small numbers to research institutions.

Even though the L4A and L1 were, and still are, great lamps, their price tags are too high for the broader commercial market. Heliospectra developed the LX60 for volume production. With the launch of the LX60 in 2014

Heliospectra had a product with which to address the greenhouse market as well as the medical plant market.

LED grow lights tailored for each market segment

In 2015 Heliospectra has distinguished between the different versions of the LX60 by introducing the LX601 and LX602. The changed names should be seen as an effort to help the customer choose the right version of the LX60.

The LX601 is designed to sit closer to the plant, typically 0.5 meters, which makes it suited for indoor growing where the plants require all the light from the lamp. The LX602 is designed to sit further from the plant, typically 2.0 meters, and is well suited for greenhouse growing where it can be used to supplement the natural sunlight and still achieve the desired results from varying the spectrum. The LX60-series have a variable spectrum, however not with as many different wavelengths as the RX30 and its predecessor L4A designed to provide extreme versatility for researchers.

The RX30 series, launched during second half of 2014, is designed to replace the L4A and L1 for research applications. The design of the RX30 is similar to that of the LX601/2 but comes with additional features that are sought after by researchers. While the RX30 series maintains the versatility offered by the L4A, with up to nine individually adjustable wave lengths, the RX30 is smaller and considerably cheaper at a retail price of \$2,799. Two RX30 effectively replaces one L4A when it comes to total light output as it comes with fewer LEDs.

The current product portfolio consist of the RX30 for research, LX60-series for medical plants and greenhouse cultivation, E60 for greenhouse cultivation and the LightBar for vertical farming

The two latest additions to Heliospectra's product portfolio are the E60 and the LightBar. The products have been developed in close cooperation with one of Heliospectra's customers in the greenhouse cultivation segment who wanted a volume product especially suited for herbs and leafy greens (also called leafy vegetables, for example spinach, salad and endive). The E60 and LightBar come at a retail price of \$999 and have a fixed spectrum. The fixed spectrum means that the lights are not as well suited for blooming crops, such as cannabis, who have a longer growth period and demand different spectrums throughout the different growth phases. The E60's casing looks similar to the LX60-series and is mounted the same way as the LX60-series. The LightBar is shaped like a bar and is developed for vertical farming.

The LX60-series, RX30 and E60-series share a common mechanical platform

The LX60-series, RX30 and E60-series all share a common mechanical platform taking advantage of the combined volume in order to improve margins for all products. They also use common components such as the same LEDs, optics and power supplies allowing for modularization in the design and production.

In the memorandum presented prior to the initial public offering last year, Heliospectra presented its plans to launch products for consumers. This is still in the plans for the future, but not something that is a top priority for Heliospectra right now.

Casing, optics, LEDs and mounting provide additional value

As mentioned before, the production of LED grow lights is not the core competence of Heliospectra but the design is. Heliospectra adds design elements that increase the usability, flexibility and decrease the operating costs of the lamps.



Figure 4: Component break-down of Heliospectra LED grow light (LX60 pictured)

All Heliospectra lamps, apart from the LightBar, use the same basic design. The design incorporates flexibility in mounting options as well as optional couplings between the lamps to contain the outflow from the fans. The couplings are suitable for closed environment cultivation.

The LEDs used in the lamps are of high quality and come from either Philips or Osram. Not only what LEDs are used is important to get the right light. The optic plates come from a world leader in optics and are designed to enhance the light distribution and allow maximum photon flux versus energy consumption. This means more light hits the plants more uniformly while light loss is minimized. The plates come in different versions customized for the growing environment and the type of plant.

The casing is designed to make the lamp durable and easy to clean. The assembly of all lamps sharing the basic design with the LX60 series are done by Heliospectra's partner Aluwave. Aluwave is a specialist in heat dissipation technology and has a proprietary solution to enhance LED

luminaires. Even though LEDs do not get as hot as HPS lamps, there is still a need for cooling the lamps. If the LEDs get too hot their lifetime as well as efficiency decrease. Aluwave's proprietary technology to dissipate heat away from the LEDs, as well as efficient sealing of the electronics used for controlling the lamps, make Heliospectra's LED grow lights more energy efficient and longer lasting than most other LED grow lights.

Built-in intelligent software enables control via an HTTP web interface

Connectivity and proprietary software to add intelligence

All Heliospectra LED grow lights, except for the E60 and LightBar, come with built-in intelligent software that enables control via an HTTP web interface. The lamps include a 32-bit microprocessor and networking over Ethernet and Wi-Fi. Furthermore, the API is open to allow for programming and integration to third party systems.

The grower can control the wavelength and intensity of the individual lamps from the web-based interface. The web interface works on PC/Mac, IOS and Android and most likely there will be IOS and Android apps in the future. The web-interface also receives firmware and other software updates from the Heliospectra database and implements those in the LED grow lights.

From the many years of research Heliospectra has developed light recipes or light regimes for several different crops. The light recipes are algorithms that are accessible and downloaded from the web user interface. Each recipe functions like a manual that tells the lamps what spectrum distribution will give a certain type of crop/plant certain characteristics, for example taste. Heliospectra has light recipes for over ten crops ready for delivery to growers and are continuously adding new recipes as more data is gathered from Heliospectra's own research facility as well as partner research facilities.

Development of bio-feedback system with Chalmers University of Technology will enable automated plant growth

Taking full control via sensors

It is possible to develop clever software but if you want full adaptability and automation you need a feedback loop. Together with a team at the Control Engineering department at Chalmers University of Technology, a top-ranked Swedish University for Science and Engineering, Heliospectra is running a project to develop an advanced bio feedback system. In Figure 5 below, a schematic overview of the bio-feedback system including the controls is shown.



The first sensor, conveniently called Sensor 1, is designed to sit at the plant level in greenhouses where there is a combination of natural light and light from Heliospectra's LED grow lights. Sensor 1 will register the spectrum and the intensity at the plant and continuously send the data back to the control system. The control system will then alter the light intensity and spectrum according to the light regime applied or the settings chosen by the grower. Sensor 1 is currently being tested by customers and Heliospectra plans for full commercial launch during 2016.

Sensor 2 is the sensor depicted in Figure 6 and will sit at the lamp level. The sensor is an essential component in the patented bio-feedback system and will monitor the fluorescence and reflected light from the plant. The fluorescence and reflected light from the plant change according to how the plant is doing. It will be possible to detect pests, diseases and other adverse conditions earlier. Furthermore, continuous optimization of the spectrum

and intensity based on the health of the plant will be possible. Heliospectra is planning to incorporate additional advanced sensors at the lamp level, one example is a development project where a camera sensor that can measure the volume of the plant is developed. The launch date for Sensor 2 has not yet been set, but development is ongoing.

Extension of service offering: Software as a service, big data, consulting, financing ...

Several opportunities to provide additional services have been identified by Heliospectra

With a connected LED grow lights, software and sensors Heliospectra's system will be at the core of the cultivation facility. Heliospectra has identified several opportunities to provide additional services to growers.

Software as a service (SaaS) and big data

Software as a Service

Heliospectra plans to aggregate and analyze sensor data from all installations. The data will then be packaged and sold to growers as light regimes for specific crops. The system will be cloud based and the data located at Heliospectra's data centers. Test with the SaaS concept to supply light regimes are carried out with Chalmers University of Technology.

Purchasing assistance for growers – utilities first

Help growers optimize electricity usage by adjusting the usage to the spot price of electricity

There are plans to extend the SaaS concept to also include external data such as weather data and electricity prices. The weather data would be used to calculate what amounts of supplemental lighting will be needed in a greenhouse during a certain day. The calculation would take into account the light regime for the crop grown and the amount of natural light that will be available based on the weather forecast as well as the sensor data. The sensor data from Sensor 1 will measure how much light actually hits the plant, and the weather forecast will make a prediction on what amount of light will be available later during the day. Based on the need for supplemental lighting the LED grow lights could then be turned on when electricity is cheapest during the day – the electricity prices will be available from live market data on electricity prices.

Managed growing

The electricity purchasing concept describes as well as the SaaS concept Heliospectra is planning are elements of a complete managed growing offering. By integrating other critical systems and data, for example watering, Heliospectra could offer a managed growing service similar to the managed network services provided to telecom operators by telecom equipment vendors like Ericsson and Huawei. This would place Heliospectra in a favorable position in the value chain with a close relationship with the professional grower.

A managed grow service would also open up for coordinating other parts of the value chain vis-à-vis the grower , for example pest control companies, security companies and fertilizer suppliers, especially with the introduction

of Sensor 2 and camera technology. Heliospectra would then be able to charge a commission for the services the sub-contractor provides for the grower and function as a procurement function for the grower.

Provide financing solutions for legal marijuana growers

Partnerships to give growers access to financing

Financing is often a problem for growers, especially in the marijuana industry. The initial investment, even though the payback time is short, can be too high for growers wishing to replace their current lighting system as well as for those looking to set up a new facility. As a result Heliospectra is planning to provide financing for growers when bank financing is hard to get. Heliospectra is currently looking into what financing partners are suitable to work with.

Another way to decrease the initial investment needed for new or retrofit installations of LED grow lights is to use the incentives and rebates increasingly offered by power utility companies. The reason is the power utility companies are forced to actively work to reduce energy consumption, and the cannabis industry consumes a lot of energy. Heliospectra has recently hired a consultant to help growers navigate the process as well as to help utility companies understand the benefits of LED grow lights over HID lights.

Consultancy services for marijuana growers

Consulting services

Heliospectra has plans to increase its consultancy services offering directed mainly towards marijuana growers. Today Heliospectra offer the growers support in how to operate the systems as part of the sales process. Heliospectra has realized that although there are many consultancies specializing in the marijuana industry, the competencies that Heliospectra has in how lighting affects plant biology and physiology, what lighting regimes works best for specific strains, and how to increase the automation in marijuana production, are not readily available services. From that realization a plan to build up a consultancy section has emerged. This would allow Heliospectra to make money whilst also promoting the company's products. Heliospectra expects to launch consultancy services where the grower pays Heliospectra to analyze their operations during 2016.

Value proposition: What are the benefits for growers?

Heliospectra's value proposition to growers concerns both the top and bottom line. With Heliospectra's intelligent lighting system growers can lower their OPEX, but also increase revenues. With the introduction of sensors the growers will also be able to reduce, or even avoid, costs associated with pests, disease and theft.

Some of the benefits are already available to growers with the current product portfolio of Heliospectra. Other benefits will only be possible for growers to realize with the introduction of sensors and an augmented

software offering. The benefits for growers from the current product portfolio are presented below.

OPEX savings from increased efficiency and automation

The increased efficiency of LED grow lights over HID lights allows the growers to reduce their energy costs with up to 60% compared to HPS lights and MH lights.

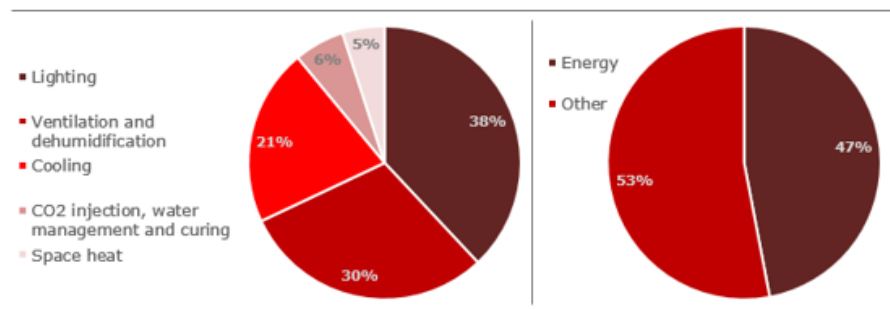


Figure 7: Energy usage of a cultivation facility (left) and energy usage as a percentage of wholesale price of marijuana (right) Source: Energy Policy v46 2012

Heliospectra's lighting system help growers achieve substantial savings

As can be seen in Figure 7, the energy costs make up a high percentage of the costs for growers, the example above concerns marijuana, but the energy costs are high also for other crops.

The initial investment required for a 1,000 watt HID/HPS setup including ballast, reflector and lamp, plus five years of bulb replacements are estimated at about \$500 and one Heliospectra LX60-series light will replace one HID/HPS lamp. Even though the initial investment required for a LED grow light from Heliospectra, compared to an HID/HPS lamp, the payback time is expected to range from 12-18 months for marijuana growers and 36-48 months for commercial greenhouse operators.

Heliospectra's intelligent lighting system allow increased automation that leads to lower staff related OPEX. Although there is a certain learning period in the beginning, when the grower might have to increase staff, after learning how to operate the system it will allow more automated processes that will allow the grower to have less staff. The benefits from automation will increase with the introduction of sensors.

Further OPEX savings will come from the more efficient cooling that the Heliospectra LED grow lights offer. The lights are air-cooled and minimizes the need for additional HVAC systems. The HVAC systems require significant CAPEX, but also use a lot of energy to operate.

Higher asset productivity

With customized light regimes growers can shorten the growth cycles of their crops. This means that the yield/grow area ratio is increased. This is

especially important for indoor farming in general and the marijuana industry in particular where there is often space constraints.

Increased quality, differentiation and customization

With Heliospectra's variable LED grow lights, the growers can control the spectrum and intensity of the light to facilitate photosynthesis. The grower can either use available light regimes for specific plant species or experiment to achieve the desired results.

Third party testing has confirmed that Heliospectra's grow lights increase the quality of plants in terms of look, taste and shelf life. Specific light regimes can also promote branching, flowering and thicker leaves.

Growers might also want to replicate a certain taste, let's say the taste the tomatoes have in the south of France. By mimicking the light conditions that produce the qualities sought after, it is possible to replicate the look and taste even if the tomatoes are grown in the warehouse area of a supermarket in Tokyo.

*Heliospectra's products
allows growers to
increase the quality of
their produce*

Food is a commodity, and an important way to add additional value is through differentiation. Taste, looks and shelf life are important aspects, but also the nutritional content in the plant grown. In the marijuana industry this is especially important as marijuana is becoming increasingly commoditized.

Growers who can differentiate their marijuana will get better paid. With branded cannabis derived products and specific marijuana strains that command higher prices, it is important for the growers to have a uniform product over time. With Heliospectra's LED grow lights differentiation becomes easier as the grower can control the spectrum and intensity.

Another special case that is important to understand in connection to marijuana, and in particular medical marijuana is the amount of cannabinoids. There are many types of cannabinoids, however the two types most commonly talked about are THC and CBD. THC is the major psychoactive ingredient whereas CBD is the cannabinoid shown to possess many properties making it a suitable medication. In medical marijuana growers want more CBD and less THC, this is achieved from growing certain strains, but the light regimes also affect the amounts of CBD and THC in the plants.

Better planning and less waste

To be able to run a profitable business planning is essential. Sales and operations planning is the process where the production is matched to the market demand. By controlling the light regime the grower can control the length of the growth cycles of the plants/crops. This allows the grower to

align production with demand and ultimately getting better paid for the produce.

Heliospectra's LED grow lights allow the grower to grow more robust plants that are less sensitive to handling/transportation and have a longer shelf life. This leads to more flexibility in planning as well as less waste throughout the value chain – from the cultivation facility to the end consumer. Ultimately it translates into higher value of the products and higher profit for the growers.

With Heliospectra's lights the environmental impact is decreased compared to traditional lighting technologies

Minimized environmental impact

With Heliospectra's lights the environmental impact is decreased both from a micro and macro perspective. The lower energy consumption compared to HID lights is one contributor, but also decreased use of Mercury from replacing HID/HPS bulbs with LED lights.

Benefits for the local environment include less light pollution, and decreased risk of fires. The risk of fires is decreased as LED lights do not get as hot as traditional HID/HPS lights.

Future proofing of lighting system

Even though not all the benefits that will eventually be available for growers can be realized with Heliospectra's current product portfolio the benefit of having a future proofed system is available to growers as of today.

As Heliospectra releases new software it is instantly available for the growers to download and use. Upgrades are currently offered for free as new versions of the software is being deployed. When sensors are launched it will be possible to integrate them to the existing system, the same goes for the different models of LED grow lights.

The future-proofing of the system is a key selling point for Heliospectra as growers can start with what is available today and then expand the system to get the additional benefits once the products and services are available.

Strategy, operations and business model: Striving to be the brain of the greenhouse

Heliospectra's strategy revolves around utilizing the core competencies and the intellectual property to achieve the vision of becoming the leader in intelligent lighting solutions for plant research, greenhouse cultivation and indoor farming. Currently the company's focus is on increased market penetration and building the internal capabilities to support growth.

Business model: Building an installed base of intelligent lighting systems that can be capitalized on

Heliospectra's business model is to sell intelligent lighting systems incorporating hardware, software, sensors and services

Heliospectra's business model is to sell intelligent lighting systems incorporating hardware, software, sensors and services. Initially, the company aims at building an installed base from which it can have recurring revenues and add-on sales.

The lighting systems will both be retrofitted in grow facilities currently using HID/HPS lamps and installed in new cultivation facilities.

Add on sales will come from additional LED grow lights, spare parts, new software such as light recipes. As the sensors are introduced the sensors will provide a good opportunity for add-on sales to the installed base.

Recurring revenues will come subscription fees for software updates and the company has plans to add additional recurring revenue sources.

As mentioned before Heliospectra is planning to offer consulting services, managed grow services, utility procurement services, financing solutions and preventive management of risks such as pests, disease and theft.

New potential revenue streams from software, services and sensors

Currently, all of Heliospectra's sales come from LED grow lights, in the future however, Heliospectra could very well have other revenue streams that surpasses the hardware sales. Heliospectra has designed its system to be compatible with other lighting systems. The compatibility is ensured by having open APIs, light recipes that could be implemented for other variable LED grow lights and sensors that could be used for other systems than Heliospectra's own. The compatibility opens up for offering software, services and also sensors to growers with other LED grow lights than Heliospectra or licensing out the technology to competitors. A further discussion on the prospects of the respective revenue streams can be found under financial estimates.

Go to market strategy

From its inception in 2006 until 2010, Heliospectra's focus was to develop a complete biofeedback system before entering the market. The strategy was then changed and Heliospectra decided to go to market with a minimum viable product (MVP) to position the company and to build an installed base. The decision became easier when research institutions showed interest in buying Heliospectra's lamps also without the complete biofeedback system.

Heliospectra focuses on the market segments with the greatest potential in terms of sales and customer utility

Despite the complete biofeedback system not being available it is a selling point for Heliospectra. The LED grow lights Heliospectra has in its product portfolio are future-proofed in the sense that they are forward-compatible with Heliospectra's sensors, and also possible to integrate to other greenhouse automation systems. This allows Heliospectra to sell on future as well as the currently available benefits. The customers can upgrade instead of waiting for the next version and they do not lock themselves into a single supplier as is otherwise often the case.

As the installed base grows there are network effects as growers can share experiences and data on optimal lighting – the network effects will be even greater with the introduction of additional software offerings where data is gathered and analysed to help growers optimize their yield. Software upgrades currently come for free and the same goes for the light recipes. Going forward Heliospectra plans to establish a business model with recurring revenues that includes software upgrades, light recipes and sometimes financing of hardware.

Heliospectra is gaining traction in the market and speed up the market introduction by communication the benefits as well as helping the customers overcome barriers to investing in Heliospectra's lighting system by helping out with financing and initial support.

Heliospectra's strategy is to initially focus on the market segments with the greatest potential both in terms of sales and customer utility. The Geographic markets that are the primary focus are North America, England, Holland, Germany, Poland and Scandinavia.

Marketing and PR

The first customers for Heliospectra were research institutions and AgTech companies buying the L4A. Heliospectra seized the opportunity to use the prominent customers to validate the products, build its brand and communicate the benefits to a broader audience.

Participation in high profile research projects with leading institutions sparks media attention and has also led to several awards

Heliospectra is positioning itself as a leader in horticultural innovation. Participation in high profile research projects with leading institutions sparks media attention and has also led to several awards. One good example is how Heliospectra's lights are used by the German Space Agency in the EDEN project aiming at coming up with ways to grow food in space. As a part of the EDEN-project tests with Heliospectra's LED lights will be carried out at the South Pole. These types of projects gives excellent PR and helps position Heliospectra as an innovative high-tech company.

Heliospectra reaches its target audience of professional growers and researchers through several channels:

- Participation in green initiatives/interest groups
- Scientific publications
- Trade fairs and other events
- Through print and online media
- Press releases

A lot of resources are devoted to PR and marketing towards the legal marijuana industry

However, the most important channel might very well be word of mouth as the global research and grower community keeps itself up-to-date on what is going on and also has close ties to the greenhouse cultivation industry.

In the marijuana industry word of mouth is perhaps even more important as the community is rather small and members often seek advice and share insights with each other. Brand management is therefore essential in the marijuana industry and Heliospectra devotes a lot of resources to PR and marketing towards the legal marijuana industry.

Marketing and PR efforts to strengthen the position within the marijuana industry includes:

- Active participation in interest groups seeking to educate and promote the medical marijuana industry through lobbying and raising public awareness
- Videos and blogs on social media sites including Facebook, LinkedIn, Twitter, Instagram and Youtube
- Participation in industry specific events and fairs both on- and offline
- Co-marketing with partners active in other part of the legal marijuana value chain
- Spreading the findings from research initiatives conducted on marijuana
- Referencing existing customers' installations

The marketing efforts towards the legal marijuana industry are handled primarily by CEO Staffan Hillberg, GM of North America Chris Walker and head of medical plant research Dr Sue Sisley. Sisley, a medical doctor advocating legalization of medical marijuana on a federal level based on the positive effects seen in pain relief for US veterans, is well known throughout the industry and is a great asset for Heliospectra.

Apart from internal resources Heliospectra works with sector specific media to create editorial material and has hired PR consultants to promote the company. Thus far it seems to be working great judging by the attention created. Googling Heliospectra quickly shows the company also have put some thinking into search engine optimization – the interested reader is encouraged to try.

Targeting customers via multiple distribution channels

Sales and distribution: Educating the customers

Heliospectra has multiple distribution channels to be able to target the different segments and apply a multi-channel strategy for the respective segment.

- Direct sales
 - Dedicated sales people for major geographic and customer segments, for example greenhouse cultivation in Europe and legal marijuana in the Americas
 - Employ sales people with strong network in the respective segment, for example Chris Walker for legal marijuana
 - Close cooperation with several customers for example Spisa (formerly Swedeponic)
 - Direct sales and quotations through Heliospectra's web shop
 - Meet prospective customers at trade fairs
 - Participation in research projects, for example at DLR (the German Space Agency), NASA and MIT
- Sales through partners and agents
 - American Cannabis Company, Heliospectra and Dixie Brands, a company selling marijuana infused edibles and drinks, have partnership where Heliospectra's lights will be used to ensure high and uniform quality of Dixie's products
 - Solutions sales planned with Hoogendorn
- On- and offline distributors
 - Growers House for the legal marijuana and hobby gardener segment primarily in the US
 - Conviron
 - Wexthuset in Sweden for horticulture enthusiasts, hydroponic growing and small scale greenhouses

Heliospectra currently has a limited number of distributors and partners for each segment. The reason is Heliospectra wants to be able to have control over where the products end up and how they are used. It is important to make sure the installations are successful by providing the customer with the understanding of how to operate the system to get the best results. That said, Heliospectra is in talks with several potential distributors and partners to speed up market penetration and is also hiring additional sales people in the US as well as in Europe.

Heliospectra actively educates customers to help them get the most out of the products

Several staff members at Growers House have been given the opportunity to test Heliospectra products in their own homes provided they take notes on how their plants develop given the chosen intensity and spectrum. This further emphasizes Heliospectra's strategy to educate their customers and gain product ambassadors amongst end-customers and sales people at their distributors.

For large scale legal marijuana cultivation facilities Heliospectra have offered discounts to growers in exchange for co-marketing and demonstration of the lighting system to other prospective customers. Having existing growers speak to new growers leads to more effective sales.

Large orders are shipped directly from the factories in the US and Sweden respectively. In addition Growers House in the US manages inventory not only for their store sales and online sales, but also for Heliospectra's smaller orders and US online sales.

Operations and organization

~25 employees at beginning of 2016

Despite having a rather small organization with about 25 employees, Heliospectra sits on cutting-edge research in plant physiology and greenhouse automation. The company also manages to develop innovative products and services for a global market. The key enabler to make it possible is partnering with research institutions, customers and other players in the industry. Heliospectra outsources its hardware production and conducts R&D in collaboration with partners.

R&D: Joint Ventures an integral part of Heliospectra's strategy

Heliospectra has state-of-the-art facilities for plant research at its Gothenburg HQ. Apart from the in-house research Heliospectra participates in several research programs and has collaborations with both research institutions and AgTech companies.

Heliospectra has formed several important partnerships with research institutions, companies providing environmental control systems and leaders in the legal marijuana market

With research staff comprised of plant scientists and computer scientist Heliospectra develops most of its software to control its lighting system in-house. The in-house research and development is important, however it is in an open innovation environment where numerous partners and customers are taking part that the majority of research is carried out.

Thanks to the research projects Heliospectra gets a large part of its R&D paid for by third parties.

The project where a complete biofeedback system, incorporating hardware, software and optical sensors, is developed and tested is conducted in collaboration with Chalmers University of Technology in Gothenburg. Several of Heliospectra's staff, including CEO Staffan Hillberg, are former Chalmers students and the collaborations with Chalmers also functions as a good recruiting channel for Heliospectra. Apart from the development of advanced control systems, Heliospectra has worked with design students at Chalmers to design products and conceptualize a product range for consumers.

Much research and development is also carried out by, or in collaborations with, customers, some of the more noteworthy ones include:

- MIT Media Lab where Heliospectra was the chosen supplier of LED grow lights for a project on urban farming of the future
- NASA where Heliospectra participated in a project on how to grow food in habitats on Mars
- Spisa, Europe's leading producer of fresh herbs, where Heliospectra developed the E60 LED grow light to accommodate Spisa's needs
- DLR, the German Space Agency, where Heliospectra has been part of the EDEN project aiming at finding efficient ways to grow food in space

Other important development partnerships include the integrations of Heliospectra's lighting systems with Hoogendoorn's horticultural automation system. Hoogendoorn is a leader in horticultural automation and the integration of Heliospectra's and Hoogendoorn's systems provide both co-marketing opportunities and external validation for Heliospectra. Heliospectra has a similar arrangement with Argus which has more of a focus on the North American market.

Research and development aimed at the legal marijuana market, and especially the medical marijuana segment is carried out together with leading producers and cannabis brands in the US. The research on how medical marijuana can help veterans helps changing the public opinion on marijuana whilst also gaining a lot of recognition for Heliospectra.

New development projects are often carried out as pilots to validate the idea. Heliospectra is involved in a number of pilot projects in various stages that can potentially open up new opportunities.

- Demonstration facility in Qatar Science and Technology Park where Heliospectra will supply LED grow lights in an initiative to

demonstrate environmentally friendly and sustainable solutions for the Gulf region. The project is a cooperation between one of Heliospectra's largest shareholders, Midroc New Technology, and Gulf Organisation for Research and Development (GORD).

- Participation in the Swedish project The Warm and the Clean City aiming at improving waste water treatment and energy recovery using algae. Heliospectra will provide its intelligent lighting system to offer optimal living conditions for the algae. The project is run by Lund Municipality and is carried out in cooperation with The Swedish University of Agricultural Sciences (SLU), the European Spallation Source (ESS), Lund University's Faculty of Engineering (LTH), and industry-leading companies such as Alfa Laval and AnoxKaldnes.

Both the Qatar project and the algae project highlights the importance of the strong network Heliospectra possesses through its owners and staff.

Supply chain strategy: Outsourcing and partnerships

As previously mentioned, Heliospectra's core competence is not the production of the LED grow lights and it should come as no surprise that Heliospectra has opted to outsource the production of hardware.

The LEDs that make up about a third of the cost of the finished LED grow light are sourced from either Philips or Osram, both of which supply high quality LEDs. Other components included in the lights are standard components available COTS (commercially off the shelf).

Heliospectra's production partner Aluwave is a specialist in heat dissipation technology

The final assembly of the LED grow lights is done by Heliospectra's production partner Aluwave, a high-tech company specializing in heat dissipation for LED lighting solutions. Aluwave has production facilities in Gothenburg, Sweden as well as in China. Aluwave produces the E60, the RX30 and the LX60-series and currently has capacity to produce up to 10,000 units/year. Heliospectra has initiated a project in order to secure increased capacity and expects that by mid-2016 additional production capacity that allows production of several ten thousands additional units/year will have been secured.

The recently introduced LightBar is manufactured in the US, and hence is the only LED grow light not manufactured in Sweden. Both Aluwave and the US production partner hold all necessary permits and all Heliospectra products are certified according to both European and American standards.

Currently the production of LED grow lights is mainly made to order. As sales increase and the demand become less versatile Heliospectra is planning to start producing more against forecasts. Heliospectra is also

working on improving its procurement and logistics to cut product costs substantially.

Heliospectra only holds a small inventory of LED grow lights. As previously mentioned, the stock keeping is handled by Heliospectra's distributor Growers House at their facility in Arizona.

IP Strategy: Time to market, Secrecy and Patents

Heliospectra has a thoroughly thought through strategy on how to protect and capture the value from its intellectual property (IP)

Heliospectra has a thoroughly thought through strategy on how to protect and capture the value from its intellectual property (IP). The strategy has been developed in cooperation with leading IP strategy consultants and patent attorneys, for example Awapatent.

Patents: Patented biofeedback system

Patent approved in China, Hong Kong, Russia, Europe, South Korea, Canada and the US

Heliospectra applied for its first patent in 2007. The patent can be described as a pioneering patent, it is rather short, broad and general. Typically this is the kind of patents used in absence of previous work. The patent is called "System For Modulating Plant Growth or Attributes" and concerns Heliospectra's biofeedback system and the use of Sensor 2 in order to sense how the plants are doing and controlling the spectrum and intensity according to the sensor feedback. The patent is currently approved in China, Hong Kong, Russia, Europe, South Korea, Canada and the US.

In order to achieve a more favorable patent protection Heliospectra has sent in an additional six patent applications covering spectrum optimization, stress detection, recording and control of plant growth, system integration and support. The patents are what is usually referred to as improvement patents. The improvement patents are more detailed and specific than pioneering patents and strengthens and complements the pioneering patent.

In essence it is the more advanced functions of Heliospectra's lighting system that are patented. Those functions are built upon integration to external data as well as Sensor 2 and other more advanced sensors that are either planned or under development. Sensor 1, the sensor at plant level, is not possible to patent as it is not something unique, nor extremely advanced. The same goes for the LED grow lights themselves. To provide a better IP protection also for the products, services and processes that are not novel or advanced enough to patent Heliospectra is employing other strategies.

Industrial design and trademark: Additional IP protection

Strong brand despite low sales figures

Apart from the patent protection Heliospectra has protected the design of its LX60-series. As the LX60-series share the same basic design with the RX30 and E60 the protection of the industrial design covers the majority of Heliospectra's portfolio of LED grow lights.

With all the PR, marketing and media attention Heliospectra is becoming a well-known trademark with considerable brand equity. Heliospectra has protected its brand to avoid copycats and others piggybacking on its reputation.

Trade secrets

Although Heliospectra is very active in protecting its brand and technology it is not possible to protect everything. When it is not possible to protect the IP through patents, trademarks and designs, Heliospectra protects its IP through keeping certain key features of its intelligent lighting system secret – for example the light recipes. The light recipes are implemented from the Heliospectra database, but are not divulged to customers but instead implemented directly in the LED grow lights. The same goes for the source code and algorithms of the control software and feedback systems.

Market: Addressing a global and fast-growing market

Heliospectra addresses the global LED grow light market. The LED grow light market is still in its early stages in terms of adoption. Environmental concerns, growing population and regulation are key trends driving an increased need for more intelligent and energy efficient lighting solutions. As volume products enter the market and the LED lighting technology matures the LED grow light market is expected to experience high growth across geographies and segments.

The LED grow light market is still in its early stages and is expected to grow at a CAGR of 31.6% from 2014-2020

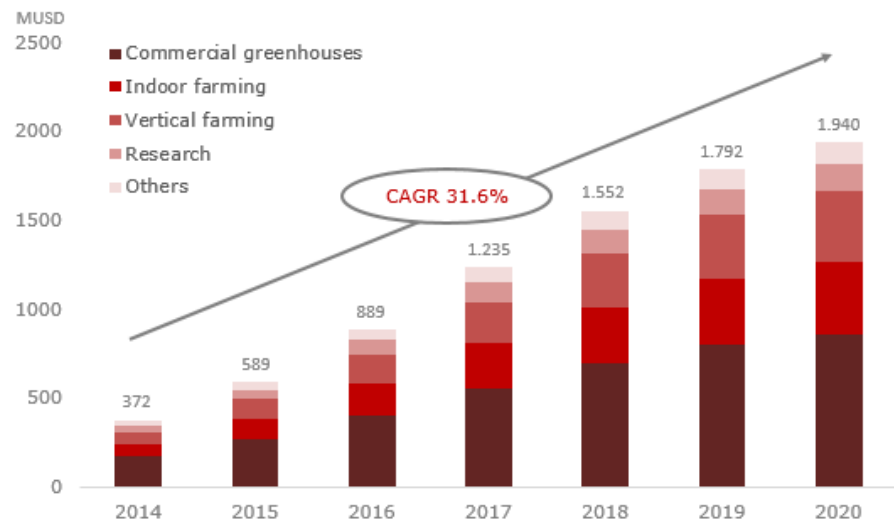


Figure 8: Global LED grow light market forecast, Source: MarketsandMarkets

Heliospectra's segments:

- Medical plants
- Greenhouse cultivation
- Research

Heliospectra divides the LED grow light market into three segments, greenhouse cultivation, medical plants and research.

Market segment 1: Medical plants

The Medical plants market segment has one sub-segment that is attributable for close to all the turnover and growth in the segment – namely the marijuana market.

Marijuana is the largest cash crop in the US, yearly domestic marijuana production is valued at \$40 billion

Many might associate American farming with wheat, cotton and corn rather than marijuana. It might then come as a surprise that marijuana is the largest cash crop in the US and conservative estimates made a few years back valued the domestic marijuana production at \$40 billion. A lot of the marijuana is grown illegally either for private use or on a larger scale. Heliospectra is not targeting the illegal growers but the fast growing legal marijuana industry that is small compared to the illegal market, but growing rapidly.

The growth in the legal marijuana market comes from an ongoing proliferation of the regulation surrounding the use of marijuana for

recreational and medical purposes in the US. Currently 23 states and Washington DC have passed state laws legalizing production and use of medical marijuana. In addition, recreational marijuana is legal in Alaska, Colorado, Oregon, Washington and Washington DC. Advocates of legalization of recreational marijuana are now targeting Arizona, California, Maine, Massachusetts and Nevada to be next in line for legalization in 2016.

Currently 23 states and Washington DC have passed state laws legalizing production and use of medical marijuana

In the 23 states and Washington DC where it has become legal to grow marijuana for medical and/or recreational purposes the industry is booming. In 2014 sales of legal marijuana in the US amounted to \$2.7 billion, up 80% from the \$1.5 recorded in 2013. If all US states were to legalize recreational and medical marijuana independent research firm GreenWave Advisers estimates legal marijuana sales could exceed \$35 billion by 2020.

The US market is the largest market in the world for legal marijuana, though the trend towards legalization of marijuana can be seen all over the world. The degree of legalization varies from country to country, with Uruguay being the extreme with full legalization of marijuana. Countries that have, or are expected to take steps toward legalization of medical and/or recreational marijuana include Argentina, Australia (vary by territory), Bangladesh, Cambodia, Canada, Chile, Colombia, Czech Republic, Ecuador, India, Jamaica, Macedonia, Mexico, North Korea, Spain, The Netherlands, Uruguay, and the list keeps on growing.

Medications based on marijuana are used to treat MS patients in Europe

Furthermore, prescribed medications based on marijuana is a growing industry and medications are available and legal in most western countries, including Sweden. A good example of this is UK based firm GW Pharma that is growing marijuana and processing it in order to make the drug Sativex. Sativex is approved for use with MS patients across Europe and FDA approvals are submitted for the US. GW Pharma is also investigating the use of marijuana for ailments such as cancer, glaucoma, diabetes type-2 and several others.

The use of marijuana for medical purposes is a first step towards increased acceptance from the public and regulators. A recent example is how a regional court in Sweden freed a Swedish man who had grown marijuana to ease his pain from a car accident he suffered in the nineties. The court's motivation was that the man was in a state of emergency as the healthcare system had failed to provide him pain relief.

As the legalization is making the legal marijuana industry boom, the industry dynamics are changing. In the US the industry has begun to mature. As more companies enter the market the price of marijuana has dropped effectively erasing the profit margins for the high-cost marijuana producers. This has led to an increased focus on new business models, innovation and operational efficiency in the sector.

Market drivers and trends: The perfect storm

The cannabis industry is undergoing structural changes at a pace that makes Usain Bolt look like he belongs to a herd of turtles. The rapidly changing landscape is driven by several factors that give rise to new trends in the market that will affect the adoption of LED grow lights and biofeedback systems.

Commoditization of marijuana - price pressure hits growers

- In states where marijuana is legal prices for standard marijuana have plummeted from \$2500-\$3000/pound at the end of 2013 to today's prices of \$2000/pound
- Price pressure is expected to continue and many growers go bankrupt already at the current price levels

Need for differentiation – controlling quality becomes more important

- To command premium prices for their products and thus combating the price pressure, growers differentiate their marijuana, this is especially important for smaller growers
- Aroma, flavor and marketing is what determines if the marijuana commands a price of \$3000/pound or \$1500/pound
- The market for marijuana infused drinks and edibles is rapidly growing and to ensure the quality of the products increased control over the growing of the marijuana is needed

As a consequence of the price pressure and the increased focus on quality the production methods are shifting. Labor intensive growing facilities with high input costs become uncompetitive. Growers focus more on operational efficiency leading to a rapid adoption of new and innovative technology like LED grow lights, remote monitoring, process automation and use of control engineering.

*1-2 percent of US
electricity is used for
growing marijuana*

The operational expenditures for marijuana growers are to a large part made up of energy. It is estimated that 1-2 percent of US electricity is used for marijuana growing. Not only is the high energy consumption a problem for the growers, it has increasingly come up on the agenda as an environmental issue. In Colorado, where the marijuana industry is booming after the legalization, frequent power outages are blamed on the marijuana industry as the usage makes the grid overloaded.

At the same time the utility companies are obliged to minimize consumption. To solve the problem several utility companies are raising the electricity prices for marijuana growers in an effort to make them more energy efficient. Some utility companies also pay part of the investment for marijuana growers who replace HID/HPS grow lights with more energy efficient lamps.

The high energy consumption from HID/HPS lamps in general, and the marijuana industry in particular, promotes the use of more energy efficient technologies, thus acting as a driver for increased adoption of LED grow lights.

Indoors marijuana growing is not always taking place in facilities well-suited for the cultivation environment. One problem that can arise is that of pests and diseases. The cultivation can also damage the buildings. Combined with increasing rising prices for leasing indoor growing space in the states where marijuana has been legalized this creates a shift towards growing marijuana in greenhouses. Some people in the industry envisage that in just a few years greenhouse growing will have taken over, though not everyone agree that the shift will be that dramatic. Many see greenhouse growing more as a complement to indoor growing as it's easier to control light and dark periods indoor than in greenhouses.

For greenhouse growing the market for systems that adapt the supplemental light according to the natural light will be in demand. Furthermore, the LED grow lights need to be designed to work well in a greenhouse environment where they are used for supplemental rather than sole-source lighting. Heliospectra's LX602 is specifically designed for this purpose and the market for Heliospectra's biofeedback system will benefit from more marijuana being grown in greenhouses.

Even though there is a need for CAPEX investments in the legal marijuana industry the access to capital is still an issue. In the states where marijuana has been legalized, the industry is still tightly regulated by authorities. Furthermore, as long as the marijuana industry is illegal on a federal level many banks and other financial institutions are reluctant to engage in the industry. The situation makes access to capital a constraint for CAPEX investments in the marijuana industry, even though the investments may have a very short pay-off time.

Market size and growth: LED grow lights outpaces other lighting options for the marijuana industry

The market for LED grow lights for the legal marijuana industry is growing rapidly. MarketsandMarkets estimates the indoor farming segment of the LED grow light market to grow at a CAGR of 33.3 percent from 2014 to 2020.

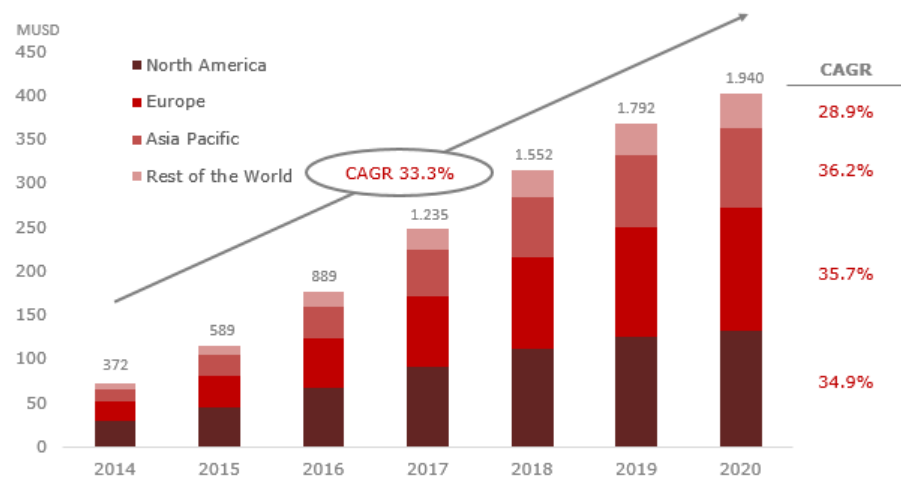


Figure 9: Global LED grow light market for indoor farming 2014-2020, Source: MarketsandMarkets

In North America LED grow lights for indoor farming are mainly used for growing marijuana and should serve as a good, albeit somewhat conservative, proxy for the market size for the indoor medical plant segment. The US is the largest market in North America for LED grow lights, whereas Mexico is expected to show the highest growth rate.

What is not included in the above market estimate is the LED grow light market for medical plants cultivated in greenhouses, instead, that market is included in the market estimates for the greenhouse cultivation segment.

Another way to look at the market is to look at the number of units. Heliospectra's own research that is based on the number of HPS lamps used for marijuana growing indicate a potential market size of 1.1 million LED grow lights/year in the USA, of which 40 percent in California. Heliospectra assumes 3.4 million HPS lamps are used for marijuana growing in the US, and that they are replaced on average every three years. Assuming an average price of \$1300/LED grow light, it would put only the replacement market at a value of \$1.43 billion/year. Heliospectra's own numbers is a good indication of the addressable market, but not the actual market size, as it assumes replacement of all HPS lamps with LED grow lights – something that is unlikely to happen in the near future. Improved access to capital, further legalization and increased adoption of modern production methods has the potential to lead to a higher growth than the somewhat conservative estimates by MarketsandMarkets.

The customers: Professional growers taking over

There are essentially three customer sub-segments within the medicinal plant segment.

1. The professional legal marijuana grower
2. The private individual growing his/her own marijuana

3. Pharmaceutical marijuana companies

With the increased professionalization of the legal marijuana market, the typical customer is also changing. Today the typical customer of Heliospectra is a professional marijuana grower that has the skillset needed to carry out financial analysis and understands the importance of operational efficiency.

Customers belonging to the professional legal marijuana grower sub-category are for example Pink-House Blooms, and the undisclosed customer in Las Vegas who placed a record order at a value of SEK 5.7 million in July 2015. A typical professional grower has anywhere from a few hundred lamps up to ten thousand lamps. The trend is for larger facilities. As the market matures scale becomes more important and M&A activity is rising creating larger players.

The lighting system and the accompanying HVAC system typically represents the single largest investment for a marijuana grower. The initial investment for LED grow lights are higher than HID/HPS lights, even though the difference is partially offset as LED grow lights require less investments in HVAC systems for cooling.

As mentioned previously, lighting typically stands for 35-40 percent of the energy usage for a marijuana cultivation and HVAC stands for another 25-35 percent of the energy usage. Given that energy makes up almost 50 percent of the wholesale price of marijuana, lighting, ventilation and dehumidification make up 30-40 percent of the wholesale price.

With the huge impact on the cost structure of the growing facility, and also the effect on quality of the produce, growth cycles, chemical composition etc, it is not surprising that the professional growers want to thoroughly review lighting systems before investment.

Heliospectra allows professional growers to test a smaller amount of LED grow lights for up to three grow cycles/nine months with a full return policy. Discounts are offered for larger growers who agree to act as demonstration facilities and co-market themselves with Heliospectra.

The professional legal marijuana growers are targeted via partners like American Cannabis Company, directly via Heliospectra's dedicated sales people and via trade fairs. Growers can also request quotations via Heliospectra's homepage.

The second type of customers are the tech-savvy and innovative home growers who like to experiment and use top-of the line products for their marijuana cultivation. The home growers order their products either from

distributors like Growers House or directly through Heliospectra's web shop. Sales to this sub segment is rising as Heliospectra is becoming better known in the industry as they discuss the lamps with others, get educated by the staff at Growers House and Heliospectra's own staff and when they see comparisons to other lamps posted online.

The third type of customers are the pharmaceutical companies using LED grow lights to grow medicinal plants. The most prominent example is GW pharma, a UK company with large cultivations of marijuana. The marijuana is then processed and used in their drug Sativex used for MS patients in Sweden and the rest of Europe. There are similar companies elsewhere and the market is rapidly growing. The customers are similar to those in the research segment in the demands the place on suppliers and the way they operate their facilities. Process automation and use of the latest technology is a must to ensure quality and control in the production process. Financing is not an issue. Sales are carried out directly by Heliospectra's own staff or through partners like Conviron.

A market that is not currently addressed by Heliospectra is the Asian market for medicinal plants. Traditional Chinese and Korean medicine use a lot of medicinal plants, for example ginseng. In Korea ginseng is grown in greenhouses and the market could potentially be lucrative both in terms of margins and value.

Market segment 2: The greenhouse cultivation market

With an ever increasing population the need for arable land to supply food is increasing. WHO, the World Health Organization, estimates that world population will reach nine billion by 2050. With 80 percent of the land suitable for growing food already cultivated global food supply will be a pressing issue, especially when taking the effects of global warming into account. Large areas of arable land risk being turned into deserts or flooded and further deforestation is not a good option to increase arable land.

Worldwide there are in excess of 55 million lamps installed in greenhouses around the world, excluding China. The market is growing as consumers demand fresh products produced locally. This leads to an increasing share of vegetables, herbs and plants being produced in greenhouses as the local climate often is not suitable for outdoors growing.

The majority of lighting solutions installed in greenhouses today are HPS lamps that are cheap to buy but have to be replaced often and use about twice as much electricity as LED grow lights. The use of grow lights in greenhouses vary in different parts of the world and is highest in the Northern Hemisphere where natural light is a scarce resource during the winter months.

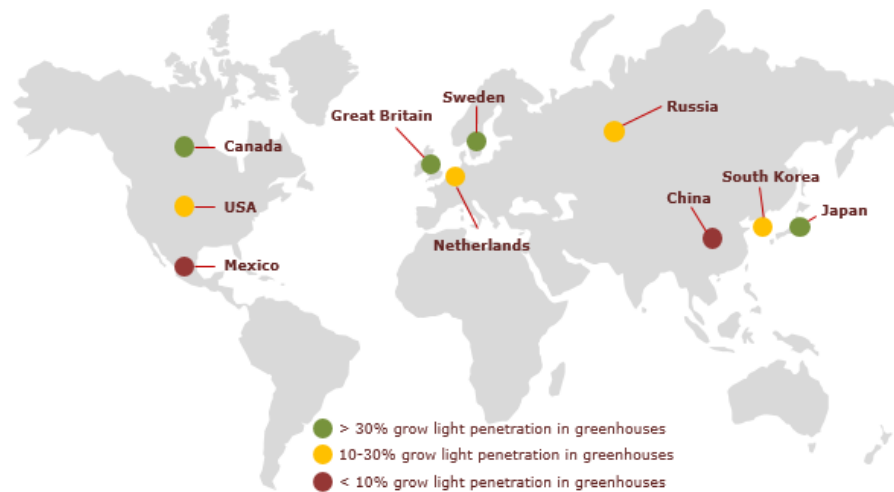


Figure 10: Use of grow lights in greenhouses per country, Source: Company material

Given the penetration of grow lights in greenhouses, Heliospectra is initially focusing on partnering with local distributors in North America, Great Britain, The Netherlands, Germany, Poland and Scandinavia.

Market drivers and trends: Growing population and scarcity of resources makes new cultivation methods a necessity

There are several fundamental drivers that promote increased adoption of LED grow lighting for greenhouse cultivation and vertical farming.

- Demographics
- Customer demands
- Scarcity of resources
- Climate change
- Decreasing cost of semi-conductors
- Public policy

As earlier described, world population is growing whilst arable land is declining rather than growing. At the same time urbanization increases and by 2050 70 percent of the world population is expected to live in urban areas. To be able to feed the growing urban population the global agricultural industry is looking at ways to improve efficiency and grow food in a more environmentally conscious way. Increased automation and more efficient lighting will be key in meeting the challenge. This will promote the use of LED grow lights as well as intelligent control systems.

As customers become more environmentally and health conscious and income levels rise their preferences change. Consumers increasingly demand food that is fresher, more nutritious, environmentally friendly and locally grown. With LED grow lights food can be produced locally without pesticides and chemical fertilizers all year round in greenhouses or indoors.

Research has shown that adjusting the spectrum and intensity give more nutritious and better tasting plants.

Resource scarcity is a major driver for the adoption of new methods in agriculture in general, and LED grow lights in particular. Arable land, fresh water supplies and energy will all be scarce resources and with intelligent lighting systems yields can be increased without increasing the resources used. LED grow lights and intelligent control systems will increasingly replace HID/HPS lighting to increase yields and decrease resource consumption in traditional greenhouses. Furthermore, to be able to produce food locally for the growing urban population vertical farming using LED grow lights will increasingly be seen in urban areas.

Climate change leads to more extreme weather that risk the food supply for millions of people. Controlled environment agriculture makes it possible to grow food in harsh environments, cold climates and warm climates irrespective of the season. Limiting the dependency on favorable weather conditions will be a driver for the adoption of new technology in agriculture.

LED grow lights has been used in agricultural research for over 20 years. Even though many positive aspects have been seen when using LED grow lights the commercial breakthrough has not materialized – until now that is. As the LED technology has matured and prices for semiconductors have come down LED grow lights have become commercially viable. A clear sign is how major companies like Philips have decided to endorse LED technology and enter the market.

Public policy decisions could drastically change the grow light market. There is already legislation in place in Europe that bans the sale of incandescent lights for home illumination. If the EU and other markets would impose corresponding legislation demanding HPS lamps to be replaced by more energy effective lighting solutions the LED grow light market would benefit. Subsidies for LED grow lights installed in new and retrofit facilities are available in certain geographies which also acts to promote the adoption LED grow lights in commercial greenhouse operations and vertical farming.

Market size and growth: Vertical farming applications grows at the highest pace while greenhouses will be the largest market

There are at least 55 million inefficient HID/HPS lamps installed in greenhouses around the world and the number of new greenhouses and vertical farms being built is on the rise. HPS lamps must be replaced every 3-4 years. The need to replace old HPS lamps and the construction of new greenhouses and vertical farms equates to a growing market for LED grow lights for replacement of old lamps as well as for new construction.

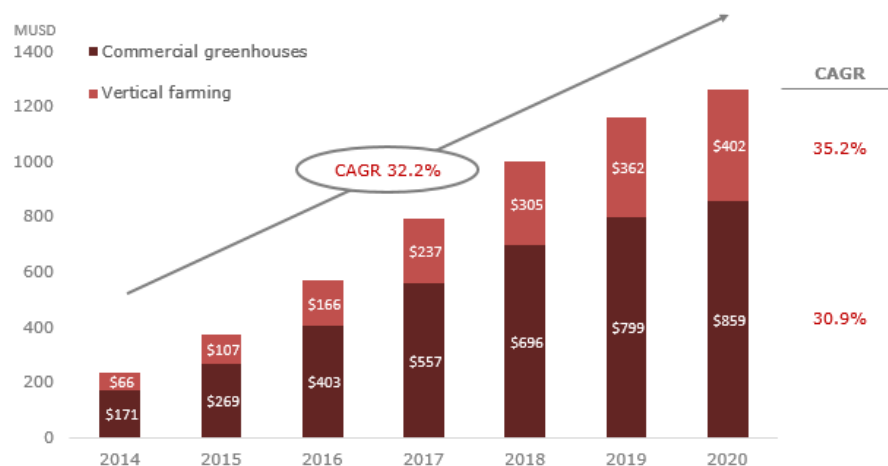


Figure 11: Heliospectra's greenhouse cultivation segment divided in sub-segments, market size and growth 2014-2020, Source: MarketsandMarkets

The market for vertical farming and commercial greenhouses is expected to grow with a combined CAGR of 32.2 percent from \$236 million in 2014 to \$1,261 million in 2020.

Europe is the largest market for LED grow lights in the two sub-segments vertical farming and commercial greenhouses. With a CAGR of 35.3 percent for the vertical farming sub-segment and 31.8 percent for the commercial greenhouse sub-segment, Europe will remain the largest market in 2020. APAC (Asia-Pacific), the second largest market in both sub-segment, is projected to present the highest growth rates with CAGRs of 36.6 percent for vertical farming and 33.6 percent for commercial greenhouses.

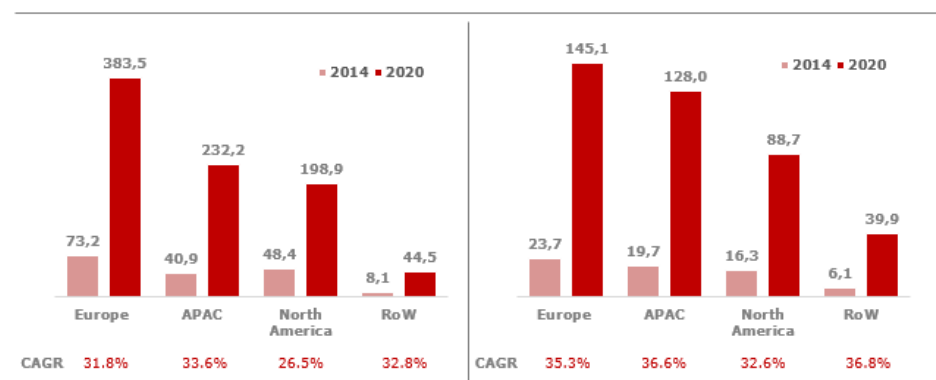


Figure 12: Geographic split, value and growth of the commercial greenhouse segment and the vertical farming segment 2014-2020
Source: MarketsandMarkets

The high growth rates in Asia reflects the high population and lack of arable land. The large European market reflects the cold climate and the need for supplementary lighting to produce fresh food all year round.

The market for LED grow lights can also be split according to the wattage of the lights and the spectrum. Lights with wattage over 300 present the

largest market in terms of value and will also show a higher growth rate. The same is true for full spectrum lights compared to partial spectrum lights. Heliospectra's LED grow lights are full spectrum with wattage over 300.

With anticipated growth rates of several hundred percent until 2020 the numbers are of course highly uncertain. The growth could be further fueled should legislation come in place that restricts the use of HID/HPS lamps in agriculture.

The uncertainty is seen in how the estimates differ between research firms, MarketsandMarkets estimates are more conservative than competing research firm ReportsnReports. ReportsnReports estimates the market for LED grow lights to reach \$3.6 billion by 2020 with the home and restaurant market as key drivers behind the growth. In such a scenario it is reasonable to assume that the vertical farming market would show an even higher growth as restaurants would grow plants vertically to fully utilize available space.

An even more aggressive prediction regarding the adoption LED grow lights was shared by a senior executive from a major producer of herbs who envisaged a future where greenhouse cultivation will be replaced by indoor cultivation, especially vertical farming, and that LED grow lights will be the dominant lighting solution. The person further stated that LED grow light-technology has now matured enough and come down in price to make it commercially viable.

The customers: Traditional growers ready for change

The customers in the segment Heliospectra calls greenhouse cultivation, are made up of customers in the two sub-segments vertical farming and commercial greenhouses.

The commercial greenhouse segment is the largest sub-segment, however, the adoption of LED grow lights has been somewhat slow in the industry even though several research studies have pointed out the economic and environmental benefits of substituting HPS lamps for LED grow lights. A standard size greenhouse with a cultivation area of 3,000-5,000 square meters require 700-1,200 lamps given that a typical HPS lamp of 400-600 watt covers an area of approximately 4 square meters. With many farmers operating several greenhouses a single customer can place orders of several million SEK even if they chose to retrofit one greenhouse at a time.

Heliospectra's most important customer in the commercial greenhouse segment is Spisa. Spisa and Heliospectra have a close relationship and Spisa has been active in development projects with Heliospectra for many years. A few years ago Spisa bought a relatively large installation of LED grow

lights from Danish competitor Fionia Lighting. This was at a time when Heliospectra lacked a commercially viable product suitable for greenhouses. Currently the relationship with Spisa seems strong and Heliospectra is the preferred partner to Spisa going forward.

Other customers in the commercial greenhouse sub-segment include a handful of undisclosed customers in Sweden and UK. Potential customers apart from growers of vegetables, herbs and fruits are flower producers, forestry companies and plant nurseries.

Heliospectra has sales personnel to work with key accounts such as Spisa. For smaller greenhouse operators Heliospectra works with local distributors such as Wexthuset and Growershouse.

In terms of geographies Europe is the most important market for commercial greenhouses. Germany is the single largest market followed by The Netherlands. Apart from working with local distributors, Heliospectra has participated in several trade fairs and also get good PR and marketing from the research collaborations with for example the German Space Agency, research collaborations at well renowned universities and Dutch agricultural automation company Hoogendorn. Hoogendorn and Heliospectra also plan to cross-sell their solutions. Currently Heliospectra's geographic focus is Europe and North America, when and how to enter the market in Asia and Middle East more aggressively is a strategic question that has not been decided upon as of now.

For vertical farming there are several good opportunities for Heliospectra, especially with the recent introduction of the Heliospectra LightBar. LightBar was developed in collaboration with an undisclosed customer in Europe. It would not be surprising if the customer turned out to be Spisa.

Heliospectra is in talks with several prospective customers looking to construct vertical farming facilities or extending their existing facilities. In the US there are large vertical farms/food factories set up that produce herbs and vegetables. In South Korea several large grocery stores have installed semi-automatic vertical farms that produce herbs and vegetables.

Sales to the vertical farming segment are carried out directly by Heliospectra's sales people, through partners and through distributors. The customers in the segment Heliospectra calls greenhouse cultivation segment differ from the medical plant segment in that they are typically more professional and have better access to capital. However, the pay-back time (36-48 months) is not as quick as for marijuana growers (12-18 months) and therefore it is a rather big decision to start replacing the HPS lamps most of the prospective customers currently use.

Market segment 3: Research

The research segment is the segment where Heliospectra started out and the company has an impressive customer base with leading companies in both of the two sub-segments research institutions and AgTech companies.

Market value drivers and trends: Research leads the way

The global challenges of resource scarcity, climate change and rising population are key drivers for the increasing use of LED grow lights in the research market segment. Researchers and Ag-Tech companies are at the forefront of development and adopt new technologies earlier than other markets. Researchers have used LED grow lights since the nineties for small scale experiments and research. Today larger installations are increasingly set up.

Possible new applications often emerge out of research. A driver for the market growth is how LED grow lights and control systems are used for applications outside of traditional plant research directed towards the agricultural industry. One such example is how Heliospectra is involved in a project to grow algae more efficiently. Research on growing food in extreme environments is also an important driver, the best example is perhaps the efforts put into being able to grow food in space.

Market size and growth: Leaving the face of earth

The research market is expected to show a strong growth from an estimated value of \$34.7 million in 2014 to a projected value of \$152.0 million in 2020. This translates into a CAGR of 27.9 percent from 2014 to 2020.

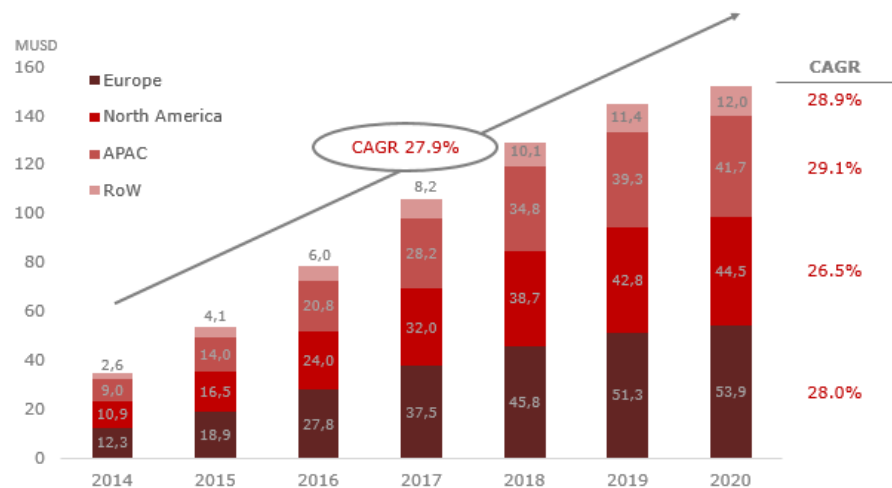


Figure 13: Geographic split, value and growth of the research segment 2014-2020, Source: MarketsandMarkets

Looking at the geographic split of the research market segment Europe is the largest market followed by North America, APAC and the Rest of the World. Europe is expected to grow in line with the total market at a CAGR of 28.0 percent whilst North America is expected to grow slightly less than

the total research market at a CAGR of 26.5 percent. APAC is expected to have the highest growth rate at a CAGR of 29.1 percent and could very well overtake North America as the second largest market a few years into the 2020'ies.

MarketsandMarkets further divides the research market into wattage and spectrum. Lights with wattage over 300 make up about 70 percent of the research market and will show a higher growth rate than lights with less than 300 watts. Researchers typically want maximum flexibility and it comes as no surprise that the full spectrum LED grow lights make up the largest share of the segment, \$29.7 million compared to only \$5.0 million for partial spectrum. The full spectrum lights are expected to continue to dominate the research market segment and will show higher growth rates than partial spectrum lights. This is beneficial for Heliospectra, who offers 600 watts full spectrum lights that are also adjustable.

The customers: Top institutions and AgTech companies

The list of customers Heliospectra can boost in the research segment is impressive. The customers can be split into research institutions and ag-tech companies and Heliospectra has a strong position in both sub-segments. The customers are less price sensitive than customers in other segments instead, they make their purchasing decisions based on who has the most technologically advanced products that provides the greatest flexibility.

Examples of customers in the different sub-segments can be seen in Figure 14 below.



Figure 14: Logotypes of some of Heliospectra's customers in the research segment

The sales and distribution is handled either directly by Heliospectra or through distributors like Conviron.

The size of a single installation usually range from a few lights to hundreds of lights. AgTech companies often have large growing facilities and orders from the major AgTech companies could potentially be for hundreds, even thousands of units.

Competition: The battle has begun

The projected growth in the LED grow light market makes the market attractive for new players as well as incumbent players providing other lighting solutions, like HID/HPS. The market presents attractive opportunities but the competition is tough and will likely increase further before a consolidation takes place and the long-term winners emerge.

The competitive landscape

The competitive landscape is typical for an industry going through technological change. Incumbents and new players compete for market shares in the fast growing market for LED grow lights. LED grow lights also compete against alternative technologies. The competitive situation looks different in the respective market segments of Heliospectra. The competitive landscape is also undergoing rapid changes and is expected to continue to do so.

All of Heliospectra's sales come from LED grow lights, and as a consequence the focus when describing the competition will be on the LED grow light suppliers and suppliers of competing lighting technologies. What can be said though, is that the competitive landscape is changing fast also for the other business opportunities that Heliospectra aims to pursue.

In the market for greenhouse automation there are established players as well as new players entering the market and forming alliances with LED grow light manufacturers and sensor technology companies.

In the legal marijuana market there are numerous companies offering consulting services, control systems and financing solutions to growers of legal marijuana.

Medical plants: Niche players and competing technologies

The LED grow light market for medical plants consists mainly of LED grow lights for the legal marijuana industry in North America.

Several of the incumbent players in the lighting industry and in the market for other types of ancillary equipment and software are cautious about explicitly targeting the market as marijuana is still illegal on a federal level in the US. The hesitance to enter the legal marijuana industry by established players leaves room for niche players. The competitive landscape is fragmented with many players in the market and an inflow of new entrants.

There are at least twenty suppliers of LED grow lights that directly targets the marijuana industry. The competitors differ, amongst other things, in

terms of their size, market focus, product portfolio and how technologically advanced they are.

There are three main categories of competitors offering LED grow lights for the marijuana industry:

- Low-tech, low-cost LED grow light suppliers
- Medium-tech niche players focusing on the marijuana industry
- Medium-tech to high-tech players targeting the legal marijuana industry and other segments

Low-tech, low-cost suppliers are targeting home growers and smaller, many times illegal, professional growers. The customers cannot invest heavily in CAPEX and buy LED grow lights with limited versatility and functionality. The competitors are not targeting the larger scale grow facilities.

The medium-tech niche players focusing on the marijuana industry compete fiercely on price and devote a lot of resources to marketing their products. They are in one way harmful for the market as the limited functionality of the LED grow lights risks leaving marijuana growers unsatisfied with the products and extending their negative experience to all LED grow lights. Several of the companies are likely to face financial problems unless they can achieve economies of scale in their operations as the price pressure erodes their margins. The medium-tech players also face challenges as the professionalism in the marijuana industry increases and customers increasingly are willing to invest in state-of-the-art facilities to lower their OPEX despite a somewhat higher initial CAPEX.

The medium-tech to high-tech players are mainly targeting the professional growers and several of them are also active in other segments of the LED grow light industry. The companies are direct competitors to Heliospectra but also partners in increasing the adoption of LED grow lights and communicating the benefits of LED grow lights over competing lighting technologies.

The greatest competition from other lighting technologies comes from the HID/HPS lamps as they offer the benefit of low initial CAPEX. The HID/HPS lighting suppliers are much more consolidated and a few large suppliers dominate the market for the light bulbs and luminaires. Dutch company Gavita is a market leader and uses light bulbs from Philips.

The competitive dynamics in the LED grow light market for the marijuana industry are characterized by intense battle for market shares through campaigns and discounts, partnerships with growers and other industry players, PR and marketing and new product launches. Tactics at times involves discrediting competitors and other questionable business tactics.

Greenhouse cultivation: Incumbents start moving

In the greenhouse cultivation segment, which also includes vertical farming applications, several of the incumbent lighting manufacturers have begun providing LED grow lights as technology has matured enough to provide a commercially viable alternative to HID/HPS lamps.

Global blue chip companies such as General Electric, Philips and Osram have all entered the market for LED grow lights. They benefit from having strong distribution networks, capital strength and strong brand names.

There are also several smaller players in the market such as Fionia, Valoya, Illumitex and Lumigrow.

Low-cost, low-quality competitors are not a viable option for the commercial greenhouse industry. Rather those players target the home growers who are not willing to spend a lot of money and who have limited technical knowledge.

Competitors in the greenhouse cultivation segment employ both organic and inorganic growth strategies. The strategies most frequently employed, according to MarketsandMarkets are:

Agreements, contracts and collaboration

- Large scale reference installations for well-known growers/food producers
- Distribution partnerships
- Partnerships with suppliers of agricultural automation
- According to MarketsandMarkets, 57 percent of the strategic development in the LED grow light market comes from agreements, contracts and collaboration

New product launches

- LED grow lights for vertical farming applications
- Broadening of product portfolio to cater for a wide variety of customer needs
- MarketsandMarkets report that 38 percent of the strategic development in the LED grow light market is related to new product launches

What can also be seen is how competitors closely watch each other's strategic moves and are sometimes quick to follow. One such example is how several competitors of Heliospectra have, or are developing, smartphone apps to monitor the lighting system.

In terms of competing technologies HPS is the dominant technology against which LED competes.

Research: Not everyone makes the cut

The research market is the most demanding segment of the LED grow light market as far as what product features they demand. On the other hand, price is not as big of an issue for the research market.

There are only a few companies that supply products with the technical sophistication the research market demands, Heliospectra being one. Lumigrow, Illumitex and niche player Orbitech are other companies targeting the research market.

As previously mentioned, partaking in high-profile projects is a key strategy to succeed in the research market segment.

Competitors

Heliospectra's competitors can be divided into several groups of companies depending on their size, products portfolio and business model.

First we have the large incumbent lighting manufacturers that today hold a large share of the market for grow lights. Several of the incumbent players have started to embrace LED technology for grow lights as the technology has matured over the last couple of years. Major contributors to the maturity of LED technology have been the decreasing cost of semi-conductors and improvements in heat dissipation.

The incumbent players' LED grow lights are cannibalizing on their grow lights based on HPS/HID technology. Several of the incumbent players are also vertically integrated in that they are supplier of the LED components as well as the LED grow lights. The fact that several of the incumbent players are embracing LED grow lights poses a threat to smaller players in that they have more resources for marketing and economies of scale in their operations. At the same time, the entrance of several major players contributes to a higher growth in the market and increased acceptance.

The second group of competitors are companies specializing in LED grow lights for agriculture. Some of the companies also supply control systems and software. Some of the companies in this group target several market segments and geographies within the LED grow light market and some also supply LED lighting for other lighting markets. Other companies have a more narrow focus in terms of geographic market and what market segments they address.

Some of the more noteworthy competitors are listed below.

Incumbent lighting suppliers offering LED grow lights:

- Royal Philips Electronics, major listed Dutch electronics company that is the leader in the global LED grow light market, distribution and sales all across the globe, large product portfolio addressing greenhouse cultivation, vertical farming and research. Vertically integrated with production of LED components. Does not have a strong presence within medical plants. Products less advanced than many competitor's products still rather expensive.
- GE Lighting, major US conglomerate with a lighting division, is active in several large scale projects but have a rather limited product portfolio, strong capabilities in R&D and industrialization on a big scale
- Osram, major German listed lighting and semiconductor company, global distribution and sales, large supplier of LED components, sells LED grow lights under its own brand and under subsidiary Sylvania's brand, focusing on broadening its product portfolio, strong player in Europe with a reputation for quality and innovation, does not directly target the legal marijuana market

Suppliers specializing in LED grow lights:

- Lumigrow, Venture Capital backed supplier of LED grow lights for the research market, legal marijuana market and greenhouse cultivation. Has introduced control software and supply variable LED grow lights. Strong market position in the North American market, particularly the US. Sales estimated at \$4 million in 2014.
- Illumitex, Experienced management team, CEO and CFO from Philips, Targets research, greenhouse, legal marijuana but also other applications than LED grow lights such as architectural lighting and lighting for swim centers, supplies light bars as well as grow lights with optional wireless control options that allows dimming, setting light schedules and on/off switch from smart phone and computer, not as versatile as Heliospectra's lights, sales for 2014 amounted to about \$18 million
- Orbitech, US company focused on space technology, subsidiary of Sierra Nevada Corporation, have worked closely with NASA on LED grow lights and is very much focused on the research segment, customized solutions at high prices
- Fionia, Danish LED lighting company sprung out of university research, owned by agricultural automation company Senmatic, integration and cross selling with Senmatic's automation products, strong player in Europe, does not directly target the marijuana market as of now

Other competitors specializing in LED grow lights include Valoya, Apache, California Lightworks, Bios Lighting and Fluence (formerly BML).

Competitors offering alternative lighting technologies are for example Gavita, Ushio and Eye, all of which are major suppliers of HID/HPS lights for agriculture.

Competitive advantages

Heliospectra's competitive advantages stem from the company's system focus, organizational capabilities and patented technology. The company is a leader in the development of new and innovative solutions. Several of Heliospectra's competitors closely follow Heliospectra's moves and follow in its footsteps.

Although Heliospectra is far behind many of its major competitors in terms of sales, MarketsandMarkets ranked Heliospectra as number four in the global LED grow light market in their report "LED grow light market – Forecast to 2020" published in spring 2015. The ranking was based on recent developments of the respective company, products offered and the geographical presence of the companies. The companies ranked in front of Heliospectra were Philips, Lumigrow and Osram in falling order. GE ranked as number five behind Heliospectra.

Heliospectra themselves points out the higher user benefit per capex as a key competitive advantage. Figure 15 shows how Heliospectra see their position relative to some of its competitors on technology level and user benefit/CAPEX.

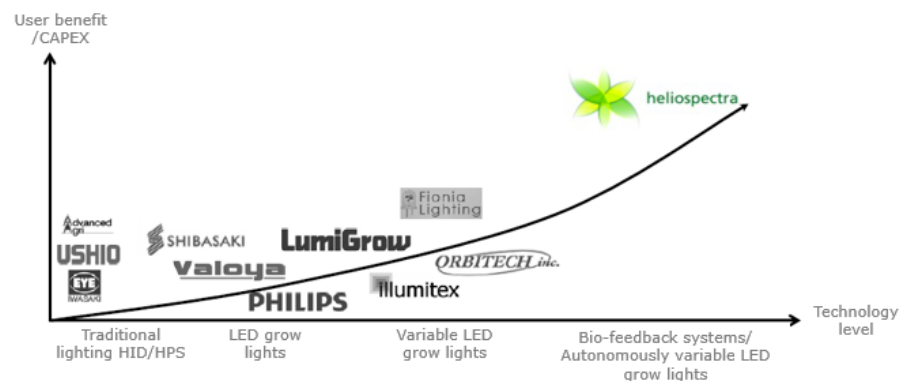


Figure 15: Heliospectra's positioning against competitors according to the company, Source: Company material

System focus

Heliospectra's intelligent lighting systems offer the benefit of being compatible with other systems with its open API. This differentiates Heliospectra from many competitors whose aim is to lock the customer into their system. If the customer then wants to upgrade or switch the system the only option will in many cases be to replace the entire system: the lights, the controls, the sensors, the software and the fittings. With Heliospectra's system the customer have the opportunity to upgrade later and also mix lights, sensors and controls from different suppliers into one

system as Heliospectra has an open API. This makes it easier for Heliospectra to partner and cross-sell with other companies, for example providers of environmental control systems such as Hoogendorn, Priva and Argus.

Products and patents

With the RX30, LX60-series, the E60 and the recently introduced LightBar, Heliospectra has a product portfolio that caters to the needs of all the professional segments in the LED grow light market. Key differentiating factors of Heliospectra's products include:

- **Ruggedness** – Heliospectra's products are built to withstand water, sun, humidity and dirt which differentiates them from many competing products that places higher demand on the operating environment
- **Controllability** – All of Heliospectra's lights can be connected to the remote control web-interface or the smartphone app, and apart from the E60 and LightBar, they can be controlled and programmed individually
- **Optics** – Heliospectra works with world-leading optics companies to ensure optimal light distribution and minimal light loss
- **Heat dissipation** – With better heat dissipation than most, if not all competitors, and a built-in fan, Heliospectra minimizes the need for HVAC systems and thus provides further energy savings and avoidance of the CAPEX associated with the HVAC system normally needed for cooling
- **Versatility** – Heliospectra's advanced lights provides more versatility in how they can be used, where they can be used and what light spectrum they can provide than all other lights we have seen in the market
- **Size and weight** – Many lights in the market weigh up to 20 kilograms and are bulky thus being hard to handle and blocking a lot of the natural sun in greenhouses. Heliospectra's lights are lighter, the LX60, RX30 and E60 weigh about 8 kilograms, and block less sun in greenhouses

Although not yet commercially launched, Heliospectra's patented biofeedback system based on advanced algorithms and sensor feedback is an important competitive advantage. Customers like Spisa already choose Heliospectra anticipating the feedback system that will provide them with additional benefits like increased automation and better control over the quality of the produce.

Large customer Spisa sees great potential in Heliospectra's biofeedback system

Several competitors, for example Illumitex, have either developed or plan to develop control systems incorporating sensor feedback on light intensity and spectrum. The lights will then be able to automatically adjust spectrum

and or intensity, similar to the function of Heliospectra's Sensor 1 at plant level. However Heliospectra's Sensor 2, the lamp mounted sensor, is what truly makes Heliospectra unique.

Whereas Sensor 1 is neither patentable nor the result of rocket science, Sensor 2 is a different story. Sensor 2 provides feedback from the plants themselves, for example fluorescence and signs of disease - that is, it provides biofeedback. Heliospectra has several patents protecting its biofeedback system and hence it will be hard for competitors to provide similar benefits.

Research

Having a strong position in the research segment that gives Heliospectra credibility and recognition. The position in the research community that is nearly impossible for competitors to achieve is the result of many years of research collaborations and internal research resulting in several academic papers. Heliospectra has its own research facility in connection to the Gothenburg headquarter and has several employees with advanced degrees in plant science and related fields. The research has also given Heliospectra a wealth of data and light regimes for specific plants that are not easily copied

Early mover within marijuana

As several of Heliospectra's competitors have been reluctant to target the marijuana growers Heliospectra has taken the opportunity to get a head start building both credibility and competencies to capture the huge market opportunity in the fast growing marijuana market.

Global sales and distribution

Although a small company Heliospectra has invested a lot of time and resources to build a global presence, with a strong brand awareness in both Europe and Asia that can only be matched by the major players in the LED grow light market.

*The booming market
presents both
opportunities and risks*

Risks and opportunities: What can obscure the shining light?

As always, in times of technological change there will be both opportunities and risks for incumbents as well as new entrants. The creative destruction happening when archaic technologies reach the top of the S-curve and new technologies makes them obsolete has been the birthplace as well as the cemetery for companies many times before. What is happening in the lighting market, and specifically for agricultural lighting, could very well be a revolution in the making where HID/HPS lights are becoming obsolete in favor of LED lights.

The ability to mitigate risks and seize the opportunities largely depends on the company's internal capabilities.

Main risks

There are several risks facing Heliospectra, several of them have to do with the small size of the company.

IP related risks

Even though Heliospectra has several patents to protect its lighting system, there is a risk that competitors infringe or invent around its patents. There is also a risk that the patents are not strong enough. Heliospectra's ability to uphold its patents is vital to keep its competitive advantages. Taking legal and other actions to defend patents and protect other IP can be both costly and tie up resources. A successful outcome is never a guaranteed.

Risk relating to the ability to scale up operations

Heliospectra will need to scale up its operations to keep up with competition. Whilst the market grows, companies that scale up their operations and start benefitting from their scale in production, sales, R&D, and other areas will outcompete smaller players, at least in the large market segments.

Increasing production capacity, whether with Aluwave or other partner(s) is associated with several risks, quality problems, delays and budget overruns to name a few. The same goes for the introduction of new suppliers.

Keeping control of critical factors whilst growing rapidly is not a task that should be underestimated. Staffan Hillberg has done his best to secure a strong team to help him grow the company. There is however always a risk that people leave when companies undergo rapid changes. A small organization like Heliospectra will be vulnerable should key employees chose to leave.

Scaling up operations also means taking on higher costs and Heliospectra will most likely need additional funding to execute on its plans. Should additional funding not be available if and when Heliospectra needs it, it would have an adverse impact on Heliospectra's ability to grow.

Risks relating to competition, customers and the market

Although Heliospectra has products that, according to the company, offers the most advantageous ratio of benefits per CAPEX, it is no guarantee for market success.

- Competitors are not standing still but are also developing their products and technology and to sustain the lead Heliospectra will have to continuously improve its products and services
- Even if Heliospectra has better products, customers perceived value is many times as important. Heliospectra's advanced products require educated sales people and ambassadors that can explain the benefits over competing products or else the customers is likely to choose a competitors product
- Larger competitors could try to bleed out smaller competitors by dropping prices

Heliospectra will have to depend more and more on partners to handle first line support and sales, keeping control over distribution and the education of customers will be key to mitigate the above risks. Educating the customers and marketing the products will also cost money and again, access to financing is critical.

Main growth opportunities ahead

With the global market for LED grow lights expected to grow at a CAGR of 31.6 percent from 2014 – 2020, discussing main growth opportunities is a bit like stating the obvious. As we have seen Heliospectra is well positioned to reach a commercial breakthrough with a strong product portfolio and increased focus on sales. Nonetheless we believe some of the growth opportunities are worth highlighting.

- **Legal Marijuana market** - Further legalization of marijuana in the US and in other countries along with an increased acceptance from the general public will present significant opportunities for Heliospectra. In states where marijuana has become legalized, professionalism in the industry has increased with the inflow of competent people. Financing conditions improve and will improve further as legalization continues, especially if marijuana is legalized on federal level. Access to capital and competence will lead to CAPEX investments in systems like Heliospectra's will boom. Increased legalization could however also open up for some of

Heliospectra's competitors to increasingly focus on the marijuana market. Worth pointing out is also that increased legalization could prompt some of Heliospectra's competitors to increasingly focus on the marijuana market.

- **Restrictions on the use of archaic lighting in agriculture** – In the EU there is a discussion on restricting the use of HID/HPS lamps as the environmental impact of agriculture is a hot topic. Should restrictions on the use of HPS lamps and/or increased subsidies for replacing HPS lamps with LED lights come in place, it would be highly beneficial for Heliospectra as it would speed up market adoption in the greenhouse cultivation segment.
- **Urban farming and vertical farming** – with the recently introduced LightBar Heliospectra stands well equipped to benefit from the trend of vertical farming and urban farming.
- **Middle East opportunity** – Qatar's supply of fresh food only lasts a couple of days. In Qatar, as well as in other states in the Middle East, food supply is a strategic priority. With major shareholder's Midroc New Technology's connections to the Middle East Heliospectra has excellent opportunities to enter the market. Projects such as the project planned in collaboration with other Midroc Group companies in Qatar are subject to uncertainty, if they materialize the opportunity is however great.
- **Green tech applications** – Automated algae factories using Heliospectra's intelligent lighting system are being tested and should the project turn out well the market holds great potential.
- **Software and service offering** – As mentioned Heliospectra is planning to capitalize on its software and extend its service offering. We see a great potential for Heliospectra to offer software as a service, big data analytics, custom light recipes, energy optimization services and consulting services. Software and services can be offered both by Heliospectra themselves and in collaboration with partners to customers using Heliospectra's lights and customers using other LED grow lights. Combining Heliospectra's products and services opens up for offering managed grow solutions where the grower basically leases an automated and cost efficient plant factory.

With the introduction of Heliospectra's biofeedback system competitors could very well become customers or partners

Although not a growth opportunity per se, the IP of Heliospectra positions the company in a favourable situation as the value of the IP increases with the increased focus on automation within agriculture. Swedish company Husqvarna, a major player in gardening and landscaping, recently announced the acquisition of Swiss AgTech start-up Koubachi for an undisclosed amount. We believe other companies will follow suit. Rather than developing a solution in-house acquiring a company like Heliospectra could be an attractive option to secure IP, know-how and market access.

SWOT analysis

A useful way to depict the company's internal capabilities and the external environment is to summarize the strengths, weaknesses, opportunities and threats in a SWOT-diagram. SWOT is an abbreviation for Strengths, Weaknesses, Opportunities and Threats.

Internal	Strengths <ul style="list-style-type: none"> • Strong in R&D • Partnerships • System integration capabilities • IP protected biofeedback system • Partnerships with research institutions 	Weaknesses <ul style="list-style-type: none"> • Small player • Products require competent customers and/or education of the customers • Small organization and dependency on key personnel • Limited number of distributors
	Opportunities <ul style="list-style-type: none"> • Add-on services for existing segments, for example financing, consulting and managed grow • Well-positioned in fast growing legal marijuana market and research segment • Replacement of HID/HPS lamps in commercial greenhouses 	Threats <ul style="list-style-type: none"> • Larger players can price smaller companies out of the market • Regulatory issues • Tradition amongst growers to use HPS • New technologies and improvements in archaic lighting technologies

Figure 16: Redeye's SWOT-analysis of Heliospectra

Financial estimates

Heliospectra is on the verge of a potential market breakthrough. Several important orders have been won throughout the year, the most notable ones being the SEK 5.7 million order to an undisclosed legal marijuana cultivation in Las Vegas and the SEK 1.8 million order for the Heliospectra LightBar from an undisclosed European producer of fresh herbs.

Sales and marketing activity is prioritized by Heliospectra and we expect the efforts to start paying off in the coming quarters. However, the ramp up of the organization, securing of additional production capacity and investments in sales and marketing will increase the costs and we expect additional funding will be required in 2016.

For Q4 2015, we expect gross margin to have suffered from a general price pressure in the market as well as from discounts offered to larger growers in exchange for demonstrating the installation for other prospective customers and for co-marketing. As the need to discount installations to break into the market goes down and as economies of scale from larger production volumes decreases the cost of goods sold, we believe Heliospectra's gross margins will gradually improve and reach 36 percent for FY 2016. In the long term we see potential for further improvement in margins as sales of software, sensors and services start accounting for an increasing share of sales. In our base case we believe Heliospectra will achieve gross margins at or above 40 percent from 2018 and onwards.

Furthermore, we expect Heliospectra to turn EBIT-positive in 2018 and achieve a long-term sustainable EBIT-margin of 22 percent in 2021. We expect Heliospectra to be cash flow positive from 2019.

Sales assumptions

We have made sales estimates for the three different market segments. That said, our sales estimates are associated with a high degree of uncertainty at this point. Heliospectra has a pipeline of prospective customers, but if and when they will place a larger order is hard to know, especially given the limited history of such larger orders.

Heliospectra does not provide any guidance on sales and earnings – nonetheless we have tried to put the bits and pieces of available information together, but want to make it clear that the investor should expect swings between quarters although we are convinced the sales trend is very positive.

Furthermore, our sales estimates are based on the following assumptions:

- For 2016 all sales are assumed to come from the current product portfolio. From 2017 and onwards we expect sales of sensors, software and services to start. The share of sales from sensors, software and services will gradually increase going forward leading to higher gross margins.
- Heliospectra has indicated that it expects other operating income also going forward. Other operating income consist of research grants and similar income and is dependent on Heliospectra's participation in research programs. We assume the level of other operating income to stay rather constant until 2018 at SEK 0.5 million per quarter and then drop to SEK 0.375 million per quarter from Q1 2019 and onwards. Other operating income is not included in the net sales figures presented in our analysis, instead, they go into EBIT by cancelling out costs.
- Heliospectra's lights are well positioned with higher wattage. Except for the LightBar all have wattage over 300 and both RX30 and LX60-series offer variable spectrum. As discussed previously lights with higher wattage and variable lights are expected to show sales growth higher than the total market. Due to the well positioned product portfolio, the recent product launches and the increased focus on sales and marketing, we expect Heliospectra to show sales growth well above the total growth in the market for 2016-2020 thus gaining market shares in all of its segments.
- After our estimate period we assume an eternal sales growth of 3.5 percent per annum for 2024 forward. We argue that fundamental market drivers will still be in place for many years to come and sadly the necessity of Heliospectra's products are more likely to increase than decrease given the development of the world.
- Sales from potential new opportunities such as IP-licensing and managed grow services are not specifically accounted for in our projections.
- In our sales estimates we have taken a conservative approach as delays and unforeseen problems tend to frequently arise for fast growing companies as they ramp up operations and sales.

Medical plants segment sales

We estimate medical plant segment will account for at least 40 percent of Heliospectra's sales in 2016. Virtually all sales will come from the North American legal marijuana market. The most important product in the segment will be the LX60-series, but some growers might also opt for the E60.

As partner American Cannabis is specifying more systems with Heliospectra's lights included, several customers have tested the LX60-series for over six months already and should be ready to place orders soon and as Heliospectra gains more and more recognition in the marijuana industry, we estimate sales to significantly increase in 2016. One single

order of 250 LX60 at an estimated selling price of about \$1,000-1,100 will be worth in excess of SEK 2 million. As mentioned, we see potential for multiple orders from existing as well as new customers and in 2016 we estimate medical plant segment sales to reach at least SEK 22 million.

For 2017-2020 we expect roughly 40 percent of Heliospectra's sales to come from the medical plant segments, with other countries than the US representing an increasing share. In 2020 we estimate sales of about SEK 90 million in the medical plant segment.

Greenhouse segment sales

We estimate greenhouse cultivation segment sales to account for approximately 40 percent of Heliospectra's sales in 2016 driven by the introduction of the LightBar, expected follow-up orders from major customer Spisa and a strong underlying trend of replacement of HID/HPS lamps in commercial greenhouse operations. We see Europe as the geographical market that will have the largest sales, followed by North America. In 2016 we estimate the greenhouse segment sales to reach SEK 22 million.

We expect the share of sales from the greenhouse cultivation segment to stay at about 40 percent for 2017-2020 and expect Europe to be the most important geographical market also going forward, accounting for above 50 percent of the sales in the segment.

Demand will come from both replacement of HID/HPS lamps and for new installations and we expect the ratio will be about 50 percent retrofit and 50 percent new installations.

We expect the highest volume product will be the LightBar, followed by the E60 and LX60-series. In terms of value we expect it will be a rather even distribution between the three products.

Research segment sales

We expect sales to the research segment to account for about 20 percent of Heliospectra's sales in 2016 with Europe and North America as the most important geographic markets.

We expect sales will come from several smaller orders from research institutions and universities and from one to three larger orders from AgTech companies. In total we expect research segment sales to amount to SEK 11 million in 2016. The RX30 and LX60 will account for the vast majority of the sales.

Total sales

In total we estimate sales in 2016 to amount to SEK 55 million and to reach close to SEK 400 million in 2024. We will come back with more detailed estimates on sales to the respective segments and what development we envisage going forward, however, at this point the uncertainty as to the sales mix between segments, geographies, customers and products are so high that detailed estimates are not mandated.

For the full year 2015 we expect Heliospectra to report sales of SEK 13 million.

In the below graph our estimates for net sales and net sales growth for the period 2015-2024 are presented.

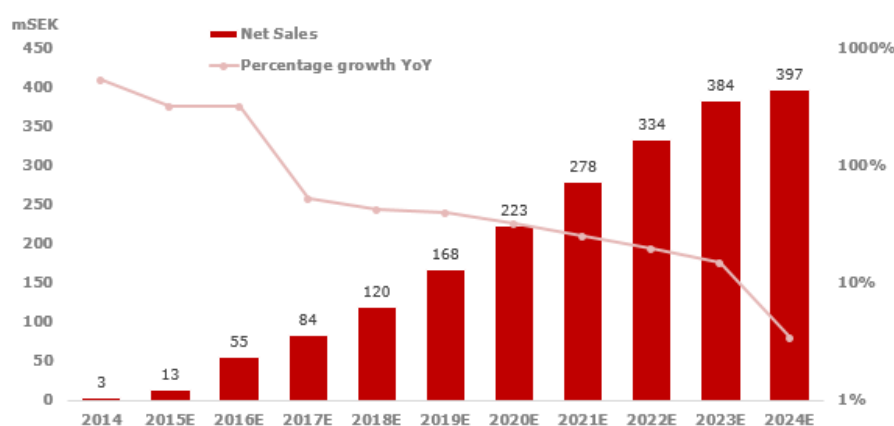


Figure 17: Estimated net sales and net sales growth for Heliospectra 2015-2024

Our estimates translates into net sales growth at a CAGR of 76.5 percent from 2015-2020 and 46.2 percent from 2015-2024.

Earnings and cost estimates

As for the other financial estimates, earnings and costs are hard to estimate as Heliospectra provides very limited guidance and as the information in the financial reports are rather sparse. Nonetheless we have estimated Heliospectra's cost going forward using reasonable assumptions.

COGS: Picture likely blurred by discounts

Heliospectra's COGS (Cost of Goods Sold) has shown an upward trend from 61.9 percent of net sales in 2013 to 79.9 percent in 2014. For the first nine months of 2015 COGS came in at SEK 5.1 million or 84.6 percent of the SEK 6.1 million in net sales.

The current level of COGS in relation to net sales is far from the company's own goals of 40 percent gross margin on hardware, translating into COGS

at 60 percent of net sales. The reason for the high COGS as a percentage of net sales seen in 2015 can be attributed to several factors:

- Discounts to growers in exchange for co-marketing and demonstration to other prospective customers – we expect Heliospectra to sell the LX60-series lights for as low as \$900-1,000 to select reference customers in the legal marijuana segment and that the resulting gross margin is somewhere around 15-20 percent at those price levels.
- Low production volumes – the small batches Heliospectra has ordered have left no room for negotiating better terms with suppliers and driving down production costs in collaboration with partner Aluwave

We expect COGS as a percentage of net sales will come in at 80.8 percent for 2015 and then gradually start improving as production volumes increase and the ongoing initiatives aimed at decreasing product cost yield results.

Further improvements in gross margins are expected from:

- Fewer discounted installations to reference customers going forward as Heliospectra has established a stronger market position
- Increasing share of sales from software and sensors that have higher margins
- More favorable contracts with distributors as the Heliospectra brand becomes better known and as sales volumes increase

We expect to see Heliospectra's gross margins to show a positive trend and expect the company to be able to achieve gross margins in excess of 40 percent from 2021 going forward. That said, margins can differ between quarters depending on customer mix, product mix and exchange rates amongst other factors.

In terms of segments we expect gross margin to be higher in the research segments as the products are more complex, the competitive rivalry is not as intense and the customers are less price sensitive than in the greenhouse cultivation segment and medical plant segment.

Distribution channel and order size will also impact Heliospectra's gross margins. Larger orders will typically mean better margins, this might seem counterintuitive, but as long as Heliospectra produce to order larger orders result in lower prices from suppliers that offset the price discounts offered. Direct sales will have higher gross margins than other distribution channels, everything else equal, as the distributors takes a percentage of the sales price.

For our estimate period we expect COGS to gradually improve as:

- Heliospectra will increasingly benefit from economies of scale
- Sales and operations planning becomes more effective
- The need for discounts in exchange for co-marketing go down
- Sales of high-margin sensors and software make up a larger share of sales

That said, should Heliospectra decide to launch products for new segments and start new business areas, this could affect COGS – however, this is not something we have taken into account in our estimates of COGS and gross margin presented below for 2015-2018.

Year	2015 E	2016 E	2017 E	2018 E
Net sales (mSEK)	13.0	55.0	84.0	120.0
GOGS (mSEK)	10.5	35.2	51.7	72.0
Gross margin (%)	19.2%	36.0%	38.5%	40.0%

Figure 18: Estimated Net sales, COGS and Gross margin 2015-2018

Gross margin is calculated as net sales minus COGS divided by net sales, and hence does not include other operating income.

Heliospectra has a significant share of its costs in SEK and the majority of its sales in US dollars, hence, a strong dollar is positive for Heliospectra's gross margin. Going forward Heliospectra will grow sales in other geographies and with the LightBar being produced in the US, a larger share of costs will be in dollars. This will take down Heliospectra's sensitivity to exchange rates somewhat going forward.

Other external costs: Expected to go down in the coming years

Other external costs include consultants, rents, costs for raising capital, marketing and sales costs, travel costs, IT and telephony etc.

For 2014 other external costs came in at SEK 20.0 million of which at least SEK 5 million were connected to the IPO. For the first nine months of 2015 Heliospectra reported other external costs of SEK 13.9 million, SEK 1.7 million less than for the same period in 2014. For the full year 2015 we expect other external costs to come in at SEK 20.4 million.

Heliospectra does not provide a breakdown of its other external costs and hence we have to guess what they are made up of. We expect that a significant share of the costs are for consultants and marketing and sales, including travel costs in connection to events and meetings.

As Heliospectra expands its organization we expect cost for consultants will go down as competencies are brought in-house. We believe some of the new additions to Heliospectra's staff have previously been hired as consultants.

We expect costs for marketing and sales to increase going forward, however at a slower rate than growth in net sales.

Cost for office supplies, IT and telephony, utilities, rents and the like will grow with general inflation and with Heliospectra's growing organization, however at a much slower pace than net sales.

For the period 2015-2018 we expect Heliospectra to report external costs as per the below table.

Year	2015 E	2016 E	2017 E	2018 E
Net sales (mSEK)	13.0	55.0	84.0	120.0
Other external costs (mSEK)	20.4	18.5	19.9	20.1
As a percentage of net sales (%)	185.8%	46.2%	29.6%	20.9%

Figure 19: Estimated Net sales and other external costs 2015-2018

Beyond 2018 we expect other external costs to increase at high single digit percentages to low double digit percentages yearly.

Staff costs

Heliospectra's current business model does not require large additions in the number of staff as sales increase. With a staff count of about 25 people, we expect Heliospectra to have the organization in place to handle a strong growth in sales with only a moderate increase in staff.

- Corporate functions in place and will be able to handle growth
- Strong R&D team already in place
- US organization already in place
- Heliospectra does not want to handle first line support itself
- Hardware production outsourced
- R&D taking place in collaboration with research institutions and partners

We expect additions to Heliospectra's organization to come mainly within sales and marketing where new account managers will likely be needed to penetrate the European market more effectively.

We expect Heliospectra's staff and staff costs to grow as per the below table in the period 2015-2018. From 2019 and onwards we expect the number of full time equivalents (FTEs) to grow with 2-3 new staff members/year.

Year	2015 E	2016 E	2017 E	2018 E
Average number of FTEs	22	26	28	30
Staff costs (mSEK)	11.8	14.1	15.5	17.0

Figure 20: Estimated average number of FTEs and staff costs 2015-2018

This could of course change if Heliospectra decides to start offering consulting services at a bigger scale or makes other changes and additions to its current business model.

EBIT and net earnings

In 2014 Heliospectra reported EBIT of SEK -32.9 million and net earnings of SEK -33.7 million. We expect rock-bottom was reached in 2014 but expect only a small improvement in 2015 with EBIT of SEK -31.6 million and net earnings of SEK -32.0 million.

For 2016 and 2017 we expect a gradual improvement and in 2018 we expect Heliospectra to show positive EBIT for the first time in the company's history with EBIT of SEK 5.4 million giving an EBIT margin, calculated as EBIT/net sales, of 4.5 percent. For 2019-2021 we expect further improvement in EBIT margin and expect Heliospectra to report EBIT margin of 12 percent, 20 percent and 22 percent respectively. Even though Heliospectra's business model is scalable, we assume long term EBIT margin to stay at 22 percent - many unforeseen things can happen and we rather see Heliospectra show positive EBIT before we raise our long term estimates.

In the below graph our estimates for EBIT and Net Earnings for 2015-2024 is presented.

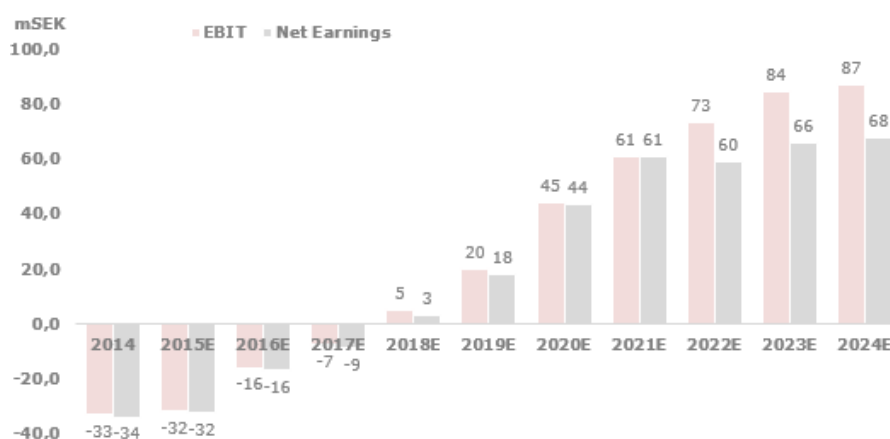


Figure 21: EBIT and Net Earnings for 2014 and estimates for 2015-2024

As per the end of 2014 Heliospectra had accumulated losses of SEK 79.6 million SEK. We expect the accumulated losses to amount to SEK -111.6 million and to top out at SEK -136.6 million in 2017. The accumulated

losses means that Heliospectra will not pay corporate taxes until 2022 should our estimates hold true.

In 2022 we expect Heliospectra to have an effective tax rate of 18.9 percent as the accumulated losses by year end 2021 lowers the tax rate by 3.1 percentage points. From 2023 and onwards we expect a corporate tax rate of 22 percent.

The difference between EBIT and Net Earnings in our estimate period up until 2021 stem from expected interest expenses incurred as Heliospectra takes on additional debt – more on that topic in our section on cash and burn rate assumptions.

Cash and burn rate: Positive cash flows at the horizon

We expect Heliospectra to have a few more years of negative free cash flows as the rapid growth ties up additional working capital and break-even will not be reached until 2018.

Additional financing expected in 2016

At the end of Q3 2015 Heliospectra held SEK 17.1 million in cash. In early Q4 2015, the outcome of subscription warrants TO1, with expiry September 30, was announced. About 90 percent of the subscription warrants were used resulting in Heliospectra receiving approximately SEK 22.5 million before transaction costs. SEK 15 million were to be used to pay back a bridge loan to major shareholder Gösta Welandson with expiry October 30, 2015.

With an expected free cash flow for 2015 of SEK -36.0 million, we expect Heliospectra to report a cash position of SEK 15.0 million for the quarter ended 31 December 2015. We further expect Heliospectra to report a free cash flow of SEK -23.4 million for 2016 and an additional SEK -15.7 million before turning cash flow positive in 2019. Hence, we expect Heliospectra to need additional financing already in 2016. To finance the company all the way to positive cash flows, we expect Heliospectra to be in need of SEK 40-50 million.

In our financial model, we have not assumed new rights issues, instead, we have assumed Heliospectra takes on additional long term debt at an interest rate of 5 percent. Major shareholder Gösta Welandson has previously lent Heliospectra money and might do so again – bank loans will likely be hard to get for Heliospectra though.

Another possible source of financing are the employee stock options. There are 770,000 options with a strike price of SEK 12. As the options are currently out of the money, we have assumed that they will not be exercised – this could of course prove a faulty assumption from our side.

Moderate increases in working capital going forward

With its current business model, Heliospectra mainly produces to order and has its production outsourced. This should in theory mean a low level of inventory if shipments to customers were made in smaller batches and the ownership passed over to customers upon delivery. Going forward we expect Heliospectra to hold a relatively limited inventory.

Currently the situation is somewhat different, what happens as Heliospectra allows prospective customers, mainly in the legal marijuana industry, to test the lights for up to nine months, is that inventory builds up. Prospective customers only test a limited number of lights, but with about ten prospective customers testing the lights at any given time, and as all units go into Heliospectra's inventory – the inventory makes up a high percentage of net sales.

Furthermore, inventory is also built up as Heliospectra prepares shipments of larger orders. Inventory levels can also go up as a consequence of customer returns, for example if a customer faces financial difficulties. We believe this could be a reason for the rather high inventory level of SEK 7.4 million at the end of the third quarter of 2015 – especially given that Heliospectra had a gross margin of minus 7.7 percent in the quarter.

It is not reasonable to assume that Heliospectra will be able to finance its growth from freeing up working capital, especially not with many customers in the important marijuana industry having trouble with financing. We expect a moderate yearly increase in working capital going forward. As sales grow and the need for allowing customers to test the lights for longer time periods goes down, we expect working capital as a percentage of net sales to decrease.

Year	2015 E	2016 E	2017 E	2018 E
Inventories (1)	5.9	8.3	10.1	12.0
Current receivables (2)	5.9	8.3	11.8	15.6
Subtotal (1+2)	11.7	16.5	21.8	27.6
Current liabilities (3)	7.3	8.7	11.3	12.9
Working capital (1+2-3)	4.4	7.8	10.5	14.7
<i>Working capital percentage of net sales</i>	34%	14%	13%	12%
Change in working capital	1.8	3.4	2.7	4.2

Figure 22: Estimates for working capital 2015-2018

In the longer term we expect Heliospectra's working capital given its current business model to make up on average 5-6 percent of net sales. In case Heliospectra were to change its business model we would have to revise our estimates.

Low investments in tangible assets ...

Heliospectra's investments in tangible assets have historically been low and we do not expect investments in tangible assets to increase substantially. Going into 2015 Heliospectra had SEK 2.0 million in tangible assets and by the end of the third quarter 2015 the corresponding figure was SEK 1.4 million. We expect tangible assets to have increased to 2.4 million by the end of 2018.

... but considerable investments in intangible assets

Heliospectra had SEK 15.1 million of intangible assets at the end of 2014. The intangible assets consist of capitalized development costs and patents. The capitalized development costs are written off over a maximum period of five years.

As Heliospectra continue to develop new products and solutions in the following years we expect considerable investments in intangible assets from capitalization of development costs. We expect gross investments in intangible assets of SEK 7 million in 2015, SEK 9 million in 2016 and SEK 8 million for 2017 and 2018 respectively. For 2019 and onwards we expect investments in other intangible rights of 6-8 million per year, thus making up a decreasing share of net sales.

Quarterly estimates Q4 2015 - Q4 2016

As a single order can have a large impact on the total sales at the level of sales we expect for 2015-2016, the quarterly estimates are to be taken as a best guesses given the available information.

Volatility between orders can be high and the distribution of sales between as well as margins can differ considerably. Our estimates will more likely than not have to be revised going forward though we are more confident about the overall direction of sales and margins. Our detailed estimates for net sales and EBIT are presented below.

SEK million, %	Q4'14	Q1'15	Q2'15	Q3'15	Q4'15E	Q1'16E	Q2'16E	Q3'16E	Q4'16E
Net sales	0.6	2.1	1.9	2.1	6.9	10.0	13.5	15.5	16.0
Net sales growth YoY	158%	57%	264%	207%	1121%	370%	629%	643%	131%
EBIT	-7.5	-6.1	-8.0	-8.3	-9.2	-5.4	-4.2	-2.6	-3.3
EBIT % of net sales	-1327%	-285%	-434%	-400%	-132%	-54%	-31%	-17%	-21%
Net earnings	-7.7	-6.1	-8.1	-8.4	-9.4	-5.6	-4.4	-2.8	-3.5
Gross margin	37%	29%	26%	-8%	23%	33%	35%	37%	38%

Figure 23: Quarterly estimates Q4 2015 – Q4 2016

In the last four reported quarters, Heliospectra has had a declining gross margin reaching minus 8 percent in the third quarter 2015. We expect the gross margin to come in at 23 percent for the third quarter of 2015 and then show further improvement in 2016.

The negative gross margin in the third quarter is not something we expect to see again. In connection to the shopping weekend starting with Black Friday and ending with Cyber Monday, Heliospectra sold reconditioned LX60-series lights at a 50 percent discount in their web shop – we suspect these lights have been used for testing or come from a customer that could not pay for ordered lights – something that regularly happens in the legal marijuana industry where many companies have limited access to credit. Our hypothesis is that a customer return could be the explanation for the negative gross margin in the third quarter.

In Q4 2015 we expect sales of the reconditioned lights mentioned above to have put pressure on the gross margins.

Overall, we expect a solid growth in sales throughout 2016 with increases quarter by quarter to reach SEK 16 million in Q4 2016.

Expanding production shifting suppliers and introducing new suppliers will likely be needed to meet demand and improve COGS. Even though we believe this will strengthen the company in the medium to long term, we expect this to cause delays and additional costs in the coming quarters. We expect EBIT to improve from 2015, but still come in negative in 2016 and 2017.

Valuation

In our valuation of Heliospectra we have used a discounted cash flow valuation (DCF).

DCF valuation

Apart from our fair value (Base case) we use a scenario analysis in order to determine how Heliospectra's valuation would evolve in a reasonably pessimistic scenario (Bear case) and an optimistic but still probable scenario (Bull case). In all scenarios we use a required rate of return of 15.1 percent based on our Redeye Rating of the company qualities.

Base case: Strong growth in competitive market

Our base case is based on the following assumptions:

- The medical plant segment takes off in 2016 with several of the ~10 growers currently running test installations placing orders
- Follow up orders from customers in the legal marijuana industry, for example the undisclosed Las Vegas medical marijuana facility, Pink House Blooms and the undisclosed Seattle marijuana grower
- Heliospectra wins several orders in the greenhouse cultivation segment, mainly in Europe, with orders from new customers as well as additional orders from Spisa for LightBar, E60 and/or LX60-series in 2016-2017
- Positive development in smaller orders through distributors like Wexthuset and Growershouse
- Several orders from research institutions in Europe and North America and one to three larger orders from AgTech companies in Europe or North America in 2016
- Positive EBIT from 2018 and positive cash flows from 2019
- Long term sustainable EBIT margin of 22 percent from 2021 onwards

These assumptions together translates into an expected sales growth at a CAGR of 62 percent from 2014-2024, or 46 percent from 2015-2024. From 2024 and onwards we assume a sales growth of 3.5 percent per year.

SEK million, %	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Net sales	13.0	55.0	84.0	120.0	168.0	222.6	278.3	333.9	384.0	397.4
EBIT	-31.6	-15.6	-7.1	5.4	20.2	44.5	61.2	73.5	84.5	87.4
EBIT % of net sales	-243.2%	-28.3%	-8.4 %	4.5 %	12.0 %	20.0 %	22.0 %	22.0 %	22.0 %	22.0 %

Figure 24: Net sales and EBIT estimates 2015-2024, base case

Our DCF valuation gives **a fair value of SEK 13.7 in our base case.**

Bear case: Margin pressure and slower sales growth delays break-even to 2019

The major differences in the assumptions for the bear case compared to the base case is the following:

- Slower sales growth in all segments
- Delayed commercialization of biofeedback system
- Heliospectra fails to mitigate price pressure on hardware by achieving economies of scale, thus resulting in lower gross margins
- Lower sales from SW and sensors resulting in lower gross margins
- Costs, apart from COGS, remain roughly the same as in base case even though sales are lower
- Long term sustainable EBIT margin of 16 percent

In our bear case net sales grow at a CAGR of 57 percent from 2014-2024, or 44 percent from 2015-2024, with net sales coming in at SEK 11 million in 2015. From 2024 and onwards we assume a sales growth of 3.5 percent per year.

SEK million, %	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Net sales	11.0	40.0	67.2	96.0	124.8	159.1	198.9	238.7	274.5	284.1
EBIT	-32.6	-21.0	-13.5	-4.2	5.0	15.9	27.8	38.2	43.9	45.5
EBIT % of net sales	-296.2%	-52.4%	-20.2%	-4.4%	4.0%	10.0%	14.0%	16.0%	16.0%	16.0%

Figure 25: Net sales and EBIT estimates 2015-2024, bear case

The assumptions above results in a **bear case valuation of SEK 6.9**. We estimate the probability of this outcome to 25 percent.

Bull case: Big break-through in 2016

Our optimistic scenario (bull case) is based on the following deviations from our base case assumptions:

- Faster sales growth in all segments from rapid adoption of LED lighting in the greenhouse cultivation segment and higher market shares in the medical plants segment and the research segment
- Successful commercialization of biofeedback system in 2016
- Higher gross margins from economies of scale, less discounts and favourable product mix with more software and sensors
- Major order in the research segment in 2016
- Costs, apart from COGS, remain roughly the same as in base case even though sales are lower
- EBIT turn positive in 2017
- Long term sustainable EBIT margin of 27 percent

In our bull case net sales grow at a CAGR of 70 percent from 2014-2024, or 52 percent from 2015-2024, with net sales coming in at SEK 15 million in

2015. From 2024 and onwards we assume a sales growth of 3.5 percent per year.

SEK million, %	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Net sales	15.0	71.5	109.2	156.0	226.2	316.7	427.5	534.4	614.6	636.1
EBIT	-30.6	-7.5	7.0	26.8	49.8	79.2	115.4	144.3	165.9	171.7
EBIT % of net sales	-203.9%	-10.5%	6.4%	17.2%	22.0%	25.0%	27.0%	27.0%	27.0%	27.0%

Figure 26: Net sales and EBIT estimates 2015-2024, bull case

We estimate the probability of our bull case scenario to 25 percent. **In our bull case scenario we arrive at a valuation of SEK 28.4 per share.**

Sensitivity analysis: Effect of WACC and EBIT-margin

We have used a WACC of 15.1 percent in our DCF valuation of Heliospectra. From 2021 and forward we have assumed an EBIT-margin of 22 percent. Assumptions have a large impact on the motivated value of a company, especially when a significant part of the present value comes from expected cash flows several years into the future.

In order to give the investor a better understanding of how our discount rate, the WACC, and Heliospectra's long term EBIT-margin affects our fair value in our base case scenario we have conducted a sensitivity analysis. In the table below our motivated value per share of Heliospectra at given combinations of WACC and EBIT-margin from 2021 and onwards is presented.

Fair value/share (SEK)	WACC used in DCF valuation (%)				
EBIT% 2021 onwards	19.0%	17.0%	15.1%	13.0%	11.0%
20%	7.8	9.8	12.4	16.7	23.1
21%	8.2	10.3	13.0	17.5	24.3
22%	8.6	10.8	13.7	18.3	25.4
23%	8.9	11.3	14.3	19.2	26.6
24%	9.3	11.7	14.9	20.0	27.8

Figure 27: Sensitivity analysis for the DCF-valuation of Heliospectra's share in our base case scenario

As can be seen, the WACC has a high impact on the fair value of Heliospectra's share. Our WACC is determined by our Redeye rating. The higher the combined rating the lower the WACC. We believe it makes sense to apply a higher discount rate since what you do is effectively demand a higher return for higher risk.

Should Heliospectra give us good grounds to adjust our rating going forward we will hence adjust our WACC accordingly. This, in turn, will affect our fair value of Heliospectra's share. More on our rating can be found at the end of the analysis under the heading Summary Redeye Rating.

The Stock: Back at attractive levels

Heliospectra's share was listed at First North Stockholm in June 2014. The IPO price for a unit, consisting of one share in Heliospectra and two subscription warrants, was SEK 8. Each warrant gave the owner the right to subscribe to one share in Heliospectra for SEK 10 during September 2015.

Adjusted for rights issues and private placements, the Heliospectra share reached an all-time high of close to SEK 30 in September 2014. The share has since dropped 64 percent and is down close to 30 percent in the last twelve months.

The soaring of the share price in September 2014 came after Heliospectra announced that the company's shares would start trading in the US through an ADR program. Investments in the cannabis sector was a hot theme in 2014 but has since experienced a sharp drop. The negative sentiment towards investments in cannabis stocks has driven the valuations in the sector down, and even though Heliospectra is not to be seen as a cannabis company – the sentiment has affected the share price of Heliospectra.

The share soared again during the summer of 2015 as the large order from a Las Vegas grower was announced, only to fall back towards SEK 10 in early fall 2015 as the expiration of the subscription warrants put pressure on the share price. After another steep rise following a successful raise of capital through the subscription warrants and the announcement of a large order to a European greenhouse grower, Heliospectra's share price has yet again dropped.

As the share has come down in price, major shareholder Gösta Welandson has continued to increase his ownership and now holds 37 percent of the shares and votes of the company.

We believe the current share price of Heliospectra presents a good opportunity for investors as several catalysts in the coming six months could change the market's sentiment and lead to an appreciation of the share.

Key catalysts for the share

We see the following catalysts in particular that could move the share of Heliospectra in 2016.

- Large (over SEK 2 million) order from a larger AgTech player
- Investor sentiment towards the cannabis industry changes
- Major (over SEK 4 million) follow up and/or major new order from greenhouse cultivator and/or marijuana grower

- Proof-of-concept of partnership with player in agricultural automation through sales success
- Successful commercialization with break-through order on the much anticipated biofeedback system incorporating sensors, software and LED grow lights
- California releases the ban on recreational marijuana leading to an increased interest in suppliers of ancillary products to the industry

Peer valuation and recent transactions

Several of Heliospectra's competitors are listed companies, such as General Electric and Philips, however, comparing Heliospectra to those companies makes little sense given the difference in size and stage of the company's development. Furthermore, LED grow lights only make up a small fraction of the sales of General Electric and Philips.

The peer company that shares most similarities with Heliospectra is probably Illumitex. Illumitex is not listed but privately held and backed by venture capital. Unconfirmed sources point to a valuation of the company at \$57 million from a C-round financing in August 2015 when the company raised about \$15 million. With sales of about \$18 million in 2014, this would mean an EV/sales multiple of around 3 based on the 2014 sales figures.

Given the sales estimates in our base case, Heliospectra's EV/sales multiple for 2016 is 3.9 at a share price of SEK 10.5, for 2017 EV/sales is 2.7 and for 2018 and 2019 1.9 and 1.3 respectively.

It should be noted that the comparison is not taking the value of Heliospectra's intellectual property into account. The valuation of private companies also differ from listed companies, and the valuation of Illumitex is not for the entire company – the shareholders of Illumitex would be willing to give some ownership away to secure the funding needed for expansion – but would likely not be willing to sell the whole company at the \$57 million price tag. Also, venture capital firms demand high rates of return on their investments in exchange for the risk of investing in illiquid companies in early stages of development. Nonetheless, the interest from major VCs in the LED grow light industry is interesting in itself, and the valuation of Illumitex can serve as a rough benchmark or sanity-check when looking at the value of Heliospectra.

Appendix I: Management and owners

Management

Staffan Hillberg, CEO

Born: 1964

Education: MSc Chalmers University of Technology, MBA Insead

Employed: 2010

Shareholding: 138,437 shares and an undisclosed number of stock options

Anthony Gilley, CTO

Born: 1971

Education: MSc Chalmers University of Technology

Employed: 2010

Shareholding: 10,000 shares

Chris Walker, GM North America

Born: 1972

Education: BoA, University of Arizona

Employed: 2011

Shareholding:

Håkan Bengtsson, CFO (external)

Born: 1963

Education: MSc University of Gothenburg, School of Business Economics and Law

Employed: 2014

Shareholding: -

Christopher Steel, COO

Born: 1982

Education: MSc University of Gothenburg, BSB Indiana University

Employed: 2012

Shareholding: 1,200 shares, 1,200 stock options

Sue Sisley, Director of Medical Plant Research

Born: 1969

Education: Medical Doctor University of Arizona College of Medicine

Employed: 2015

Shareholding: N/A

Board

Jan Tufvesson, Chairman of the Board

Born: 1938

Elected: 2011

Education: MSc Royal Institute of Technology Stockholm, Business IMD

Other commitments: Chairman of the Board Optisting Technologies AB, HeatCore AB, Ekoproffsen i Norrort AB

Shareholding: 126,500 shares

Anders Ludvigson, Board Member (independent)

Born: 1970

Elected: 2007

Education: MSc Linköping University

Other commitments: Board Member Ludvigson Holding AB

Shareholding: -

Göran Linder, substitute Board Member CEO Midroc New Technology

Born: 1962

Elected: 2011

Education: MSc Royal Institute of Technology Stockholm

Other commitments: Board Member Airgrinder AB, Jensen Devices AB, Lamara AB, Midroc Invest AB, Crossborder Technologies AB, Minesto AB, Powercell Sweden AB, Pergamum AB, M&J by Malin & Johanna AB

Shareholding: -

Andreas Gunnarsson, Board Member representing Midroc

Born: 1974

Elected: 2011

Education: Studies at Jönköping International Business School

Other commitments: Board Member Solarwave AB, Chairman of the Board Air to Air Sweden AB, Substitute Board Member Lamara AB, Crossborder Technologies AB, Pergamum AB, Powercell AB, Minesto AB, Jensen Devices AB

Shareholding: 8,750 shares 8,750 stock options

Martin Skoglund, Board Member representing Wood & Hill Investment

Born: 1966

Elected: 2006

Education: MBA University of Gothenburg, School of Business Economics

Other commitments: Chairman of the Board Stallet Fastighets AB, East Village Trading AB, Board Member Haga Hem Holding AB, AB Blåbergsholmen, Ell Ess IPR AB, Wood & Hill Investment AB, M Teknik E-handel AB, Oakridge AB

Shareholding: 47,437 shares 65,100 stock options

List of major shareholders

Shareholder name	Share of capital/votes (%)
Weland Värdepapper AB	21.3%
Weland Stål AB	15.7%
Stiftelsen Industrifonden	10.9%
Midroc New Technology AB	10.9%
Försäkringsaktiebolaget Avanza Pension	4.2%
Magowny Invest AB	1.8%
Nordnet Pensionsförsäkring AB	1.8%
PIBA AB	1.7%
Kristian Wiman	1.5%
LMK Forward AB	1.5%

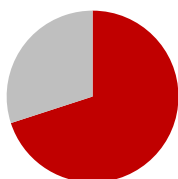
Summary Redeye Rating

The rating consists of five valuation keys, each constituting an overall assessment of several factors that are rated on a scale of 0 to 2 points. The maximum score for a valuation key is 10 points.

Rating changes in the report

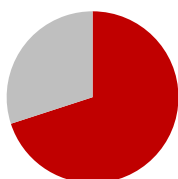
This is the first Redeye report on Heliospectra – hence not applicable

Management 7.0p



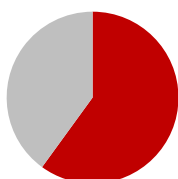
Heliospectra has an experienced management team led by CEO Staffan Hillberg who has held his position for 5+ years. Management has shown they have the ability to adapt Heliospectra's offering to match changes in customer demand and at the same time deliver on strategic initiatives. Heliospectra devotes significant time and resources to its investor communications and uses its funds in a responsible manner that promotes shareholder value. To mandate a higher rating Heliospectra's leadership should show it can consistently deliver on its strategic goals. Furthermore, even though Heliospectra's leadership is very active in its communication with investors, an increased transparency regarding the financial and strategic goals of the company should be a priority for management.

Ownership 7.0p



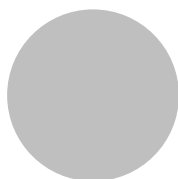
Heliospectra has a list of shareholders many small technology companies can only dream of. Heliospectra's largest shareholder is Gösta Welandson, a Swedish billionaire who has shown great commitment and engagement in supporting Heliospectra. Other major shareholders include the publicly funded VC Industrifonden and private venture investor Midroc New Ventures. The major shareholders provide support as well as capital and have a good reputation in the financial markets. The board and CEO hold a decent amount of shares, however, we would like to see top management, most notably CEO Staffan Hillberg, as well as the board showing more commitment in Heliospectra through increased shareholdings in the company. With a stronger commitment from senior management and the board a higher ownership rating would be given.

Profit outlook 6.0p



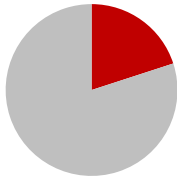
Heliospectra is active in a fast growing market and has secured important partnerships in all of its market segments. With a strong position in the research segment and a positive trend in the legal marijuana as well as the greenhouse cultivation segment Heliospectra is well poised for strong growth. Competitive advantages are secured by proprietary technology. Heliospectra has a business model that will provide significant leverage should the introduction of software, services and sensors succeed. To raise the rating we would like to see a successful introduction of sensors and an ability to charge customers for software. We would also like to see Heliospectra cement its position as a leader in the LED grow light industry through increased sales and a return on equity (ROIC) exceeding our discount rate for a prolonged time period.

Profitability 0.0p



Heliospectra is currently losing money and even though we envisage Heliospectra showing profits in the future we want to see money in the bank before we give any credit. An upgrade to our profitability rating would require the company to at least show positive EBIT on a rolling twelve months basis.

Financial strength 2.0p



Heliospectra currently has good liquidity after having successfully raised capital during the year. We do however expect that Heliospectra will have to raise additional capital to fund its growth. In order to raise Heliospectra's rating we want to see a situation where Heliospectra is no longer dependent on additional funding from its shareholders in order to fund its continued expansion.

Income statement	2013	2014	2015E	2016E	2017E
Net sales	0	3	13	55	84
Total operating costs	-15	-32	-41	-67	-86
EBITDA	-14	-29	-28	-12	-2

Depreciation	0	-1	0	0	0
Amortization	-3	-3	-4	-4	-4
Impairment charges	0	0	0	0	0
EBIT	-17	-33	-32	-16	-7

Share in profits	0	0	0	0	0
Net financial items	0	-1	0	-1	-2
Exchange rate dif.	0	0	0	0	0
Pre-tax profit	-17	-34	-32	-16	-9

Tax	0	0	0	0	0
Net earnings	-17	-34	-32	-16	-9

Balance	2013	2014	2015E	2016E	2017E
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Assets					
<i>Current assets</i>					
Cash in banks	4	6	15	6	8
Receivables	1	4	6	8	12
Inventories	2	4	6	8	10
Other current assets	0	0	0	0	0
Current assets	7	14	27	22	29

<i>Fixed assets</i>					
Tangible assets	2	2	1	2	2
Associated comp.	0	0	0	0	0
Investments	0	0	0	0	0
Goodwill	0	0	0	0	0
O intangible rights	13	15	18	22	26
O non-current assets	0	0	0	0	0
Total fixed assets	15	17	20	24	28
Deferred tax assets	0	0	0	0	0

Total (assets)	22	32	46	46	57
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Liabilities					
<i>Current liabilities</i>					
Short-term debt	0	0	0	0	0
Accounts payable	2	4	5	7	9
O current liabilities	1	2	2	2	2
Current liabilities	3	6	7	9	11

Long-term debt	10	10	7	22	39
O long-term liabilities	0	0	0	0	0
Convertibles	0	0	0	0	0
Total Liabilities	13	15	14	31	51
Deferred tax liab	0	0	0	0	0
Provisions	0	0	0	0	0

Shareholders' equity	9	16	32	15	7
Minority interest (BS)	0	0	0	0	0
Minority & equity	9	16	32	15	7

Total liab & SE	22	32	46	46	57
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Free cash flow	2013	2014	2015E	2016E	2017E
Net sales	0	3	13	55	84
Total operating costs	-15	-32	-41	-67	-86
Depreciations total	-3	-4	-4	-4	-5
EBIT	-17	-33	-32	-16	-7
Taxes on EBIT	0	0	0	0	0
NOPLAT	-17	-33	-32	-16	-7

Depreciation	3	4	4	4	5
Gross cash flow	-14	-29	-28	-12	-2
Change in WC	0	-2	-2	-3	-3
Gross CAPEX	-8	-6	-6	-8	-9

Free cash flow	-22	-38	-36	-23	-14
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Capital structure	2013	2014	2015E	2016E	2017E
Equity ratio	40%	51%	69%	33%	12%
Debt/equity ratio	112%	60%	23%	142%	577%
Net debt	6	4	-8	16	32
Capital employed	15	20	24	32	39
Capital turnover rate	0.0	0.1	0.3	1.2	1.5

Growth	2013	2014	2015E	2016E	2017E
Sales growth	-18%	540%	318%	323%	53%
EPS growth (adj)	N/A	N/A	N/A	N/A	N/A

DCF valuation		Cash flow, MSEK	
WACC (%)	15.1 %	NPV FCF (2016-2018)	-32
		NPV FCF (2019-2024)	113
		NPV FCF (2025-)	166
		Non-operating assets	15
		Interest-bearing debt	-7
		Fair value estimate MSEK	254

Assumptions 2015-2021 (%)		Fair value e. per share, SEK	13.7
Average sales growth	66.6%	Share price, SEK	10.5
EBIT margin 2021 -	22.0%		

Profitability	2013	2014	2015E	2016E	2017E
ROE	-234%	-271%	-134%	-69%	-77%
ROCE	-100%	-149%	-98%	-41%	-17%
ROIC	-175%	-220%	-161%	-65%	-22%
EBITDA margin	-2974%	-942%	-213%	-21%	-3%
EBIT margin	-3527%	-1058%	-243%	-28%	-8%
Net margin	-3522%	-1083%	-246%	-30%	-10%

Data per share	2013	2014	2015E	2016E	2017E
EPS	-0.92	-1.81	-1.72	-0.88	-0.46
EPS adj	-0.92	-1.81	-1.72	-0.88	-0.46
Dividend	0.00	0.00	0.00	0.00	0.00
Net debt	797.16	0.26	-0.42	0.88	1.70
Total shares	0.01	13.79	18.62	18.62	18.62

Valuation	2013	2014	2015E	2016E	2017E
EV	70.2	207.7	187.8	212.0	227.2
P/E	-3.7	-6.1	-6.1	-11.9	-22.7
P/E diluted	-3.7	-6.1	-6.1	-11.9	-22.7
P/Sales	131.7	65.6	15.0	3.6	2.3
EV/Sales	144.5	66.8	14.4	3.9	2.7
EV/EBITDA	-4.9	-7.1	-6.8	-18.2	-100.0
EV/EBIT	-4.1	-6.3	-5.9	-13.6	-32.1
P/BV	7.3	12.7	6.2	12.7	28.7

Share performance		Growth/year	13/15e
1 month	-3.7 %	Net sales	417.2 %
3 month	0.0 %	Operating profit adj	N/A
12 month	-27.8 %	EPS, just	N/A
Since start of the year	0.0 %	Equity	N/A

Shareholder structure %	Capital	Votes
Weland Värdepapper AB (Gösta Welandson)	21.3 %	21.3 %
Weland Stål AB (Gösta Welandson)	15.7 %	15.7 %
Stiftelsen Industrifonden	10.9 %	10.9 %
Midroc New Technology AB	10.9 %	10.9 %
Försäkringsaktiebolaget Avanza Pension	4.2 %	4.2 %
Magowny Invest AB	1.8 %	1.8 %
Nordnet Pensionsförsäkring AB	1.8 %	1.8 %
PIBA AB	1.7 %	1.7 %
Kristian Wiman	1.5 %	1.5 %
LMK Forward AB	1.5 %	1.5 %

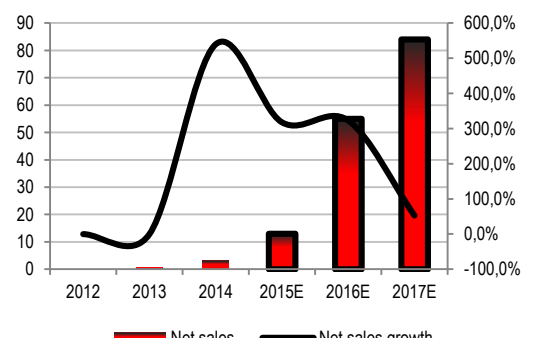
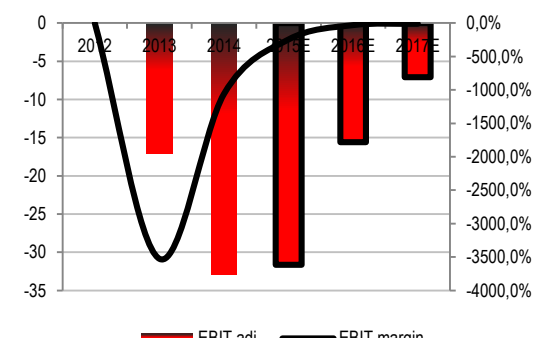
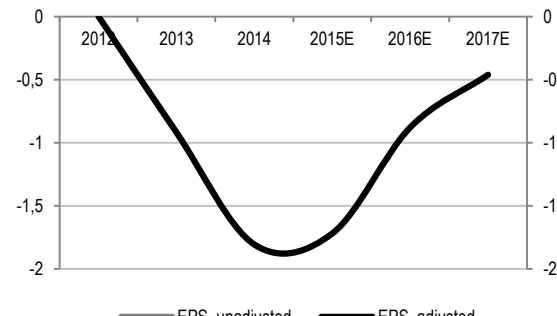
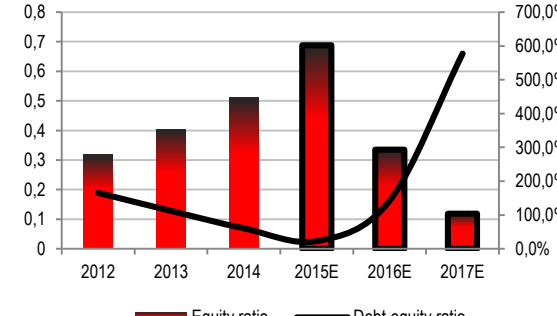
Share information	
Reuters code	HELIO.ST
List	Nasdaq First North
Share price	10.5
Total shares, million	18.6
Market Cap, MSEK	195.5

Management & board	
CEO	Staffan Hillberg
CFO	Håkan Bengtsson
IR	Staffan Hillberg
Chairman	Jan Tufvesson

Financial information	
FY 2015 Results	February 26, 2016

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Revenue & Growth (%)	EBIT (adjusted) & Margin (%)
 <p>Net sales (red bars) and Net sales growth (black line) from 2012 to 2017E. Net sales are in millions of SEK on the left axis (0-90), and growth is in percentage on the right axis (-100,0% to 600,0%).</p>	 <p>EBIT adj (red bars) and EBIT margin (black line) from 2012 to 2017E. EBIT adj is in millions of SEK on the left axis (-35 to 0), and EBIT margin is in percentage on the right axis (-4000,0% to 0,0%).</p>
Earnings per share	Equity & debt-equity ratio (%)
 <p>EPS, unadjusted (grey line) and EPS, adjusted (black line) from 2012 to 2017E. Both are in SEK on the left axis (-2 to 0).</p>	 <p>Equity ratio (red bars) and Debt-equity ratio (black line) from 2012 to 2017E. Equity ratio is on the left axis (0 to 0,8), and Debt-equity ratio is on the right axis (0,0% to 700,0%).</p>
Sales division	Geographical areas
Conflict of interests	Company description
<p>Joel Westerström owns shares in the company : Yes Viktor Westman owns shares in the company : No</p> <p>Redeye performs/have performed services for the Company and receives/have received compensation from the Company in connection with this.</p>	<p>Heliospectra specializes in intelligent lighting systems for plant research, greenhouse cultivation and controlled environment agriculture. The company is a global leader in LED grow lights for advanced research applications and has patented technology.</p>

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Redeye Rating (2016-01-12)

Rating	Management	Ownership	Profit outlook	Profitability	Financial Strength
7,5p - 10,0p	35	41	16	7	18
3,5p - 7,0p	64	50	83	33	36
0,0p - 3,0p	5	13	5	64	50
Company N	104	104	104	104	104

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