Date
09 March 2017

Theme
Initiating Coverage

Company
BluGlass (BLG)

New BUY: Looking through BluGlass to Blue Sky

BLG has developed an innovative technology used to improve the performance and efficiency of LED & component manufacturing. The market opportunity is significant with the global LED lighting market size at USD 30.5bn - expected to grow significantly at 28% CAGR 2016-24. BLG is on track to commercialisation through collaborations with key flagship partners such as Lumileds and IQE. BLG should be able to generate revenue from FY18E through retro-fitting existing LED equipment and royalty agreements. Our checks with Lumileds and IP lawyers add credibility to the investment case. Our valuation relies on a scenario based approach hinged on various gross margin uplifts in production. Initiating at a BUY with a scenario-based TP of $0.90 implying significant upside.

Key points

Innovative LED production technology: BLG has spent years developing a strong technology offering that has advantages over the current industry process. BLG's solution enables LED manufacturers to achieve superior brightness using a more efficient production method. BLG's technology has a wide-range of applications outside of LEDs including power electronics and solar cells. Crucially, the IP is well-protected with 47 patents globally across key markets.

Large scale market opportunity: The global LED lighting market is sized at around USD 30.5bn and is expected to grow significantly at a 28% CAGR to USD 216bn by 2024. The power electronics market is expected to reach USD 2.5bn by 2023, from USD 210m in 2015 representing a CAGR of 36%.

Collaborations with key partners: BLG has entered into collaborations with Lumileds, a leading producer of LED and automotive lighting products, Chinese LED chip supplier HC SemiTek and IQE, a semiconductor producer for electronics. BLG is progressing with its evaluation by leading LED equipment producer Veeco. These collaborations vindicate the strong potential for BLG.

Channel checks validate positive view: Checks with Lumileds and IP lawyers have provided further confidence in the strength of the technology and the legal protection around the technology solution that BLG has developed.

Current valuation underestimates the growth potential: Valuing BLG is challenging and a scenario approach seems appropriate. We assume BLG retro-fits up to 5% of the global LED machines by 2021E, and earns a 5% royalty from Lumileds and IQE from FY18E-19E respectively based on various gross margin uplifts. This scenario approach implies significant upside for investors. Clearly, BLG has a much higher risk level given it is yet to fully commercialise the technology in relation to our existing technology coverage base.

Risks and catalysts

Risks: Collaborations may not result in a viable commercialisation opportunity, delays in achieving milestones, and RPCVD could face competition from other LED technologies. **Catalysts**: Successful commercialisation of BLG's technology.

Earnings forecasts					
Year-end June (AUD)	**FY15A**	**FY16A**	**FY17F**	**FY18F**	**FY19F**
NPAT rep ($m)	-3.2	-3.4	-3.8	-1.2	6.7
NPAT norm ($m)	-2.7	-3.0	-3.2	0.5	10.2
EPS norm (cps)	-0.9	-0.9	-0.9	0.1	2.7
EPS growth (%)	-14.5	1.1	6.6	114.3	2074.4
P/E norm (x)	-26.3	-26.7	-28.5	199.1	9.2
EV/EBITDA (x)	-43.4	-34.0	-30.9	88.1	7.7
FCF yield (%)	-1.8	-2.6	-2.3	-2.9	9.6
DPS (cps)	0.0	0.0	0.0	0.0	0.0
Dividend yield (%)	0.0	0.0	0.0	0.0	0.0

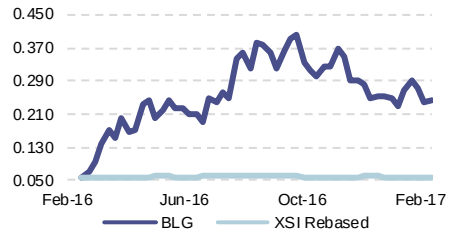
Source: Company data, Wilsons estimates, S&P Capital IQ

Recommendation	**BUY**
12-mth target price (AUD)	**$0.90**
Share price @ 09-Mar-17 (AUD)	$0.25
Forecast 12-mth capital return	268.7%
Forecast 12-mth dividend yield	0.0%
12-mth total shareholder return	**268.7%**
Market cap	$94m
Enterprise value	$83m
Shares on issue	382m
Sold short	
ASX 300 weight	n/a
Median turnover/day	$0.1m

Mark Bryan
mark.bryan@wilsonsadvisory.com.au
Tel. +61 2 8247 6609

Wilson Wong
wilson.wong@wilsonsadvisory.com.au
Tel. +61 2 8247 3173

12-mth price performance ($)



	1-mth	6-mth	12-mth
Abs return (%)	-7.5	-38.8	345.5
Rel return (%)	-8.1	-34.1	341.0

Price target

	Valuation	Price target
WACC (%)	17.2	
Terminal growth rate (%)	3.0	
PV of FCF ($m)	131.9	
PV of TV ($m)	210.9	
Enterprise value ($m)	**342.8**	
Net debt (cash) ($m)	-10.5	
Equity value ($m)	**353.3**	
Shares on issue (m)	391.2	
TOTAL ($/share)	**0.90**	**0.90**

Key assumptions

Year-end June (AUD)	FY14A	FY15A	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F
Revenue growth (%)		-14.1	-17.6	1.6	323.3	116.5	34.0	37.1
EBITDA growth (%)		7.0	27.8	10.0	-135.1	1,048.9	82.4	54.2
NPAT growth (%)		15.7	13.3	3.7	-114.9	2,074.4	86.7	8.9
EPS growth (%)		14.5	-1.1	-6.6	-114.3	2,074.4	86.7	8.9
EBITDA/sales (%)	-43.5	-54.2	-84.1	-91.0	7.5	40.0	54.5	61.2
ROA (%)	-18.5	-21.5	-22.6	-19.3	-6.3	21.4	28.3	32.1
ROE (%)	-19.6	-22.8	-24.1	-20.3	-6.2	23.2	29.9	20.8

Interims ($m)

Half-year (AUD)	Dec 15	Jun 16	Dec 16	Jun 17
	1HA	2HA	1HA	2HE
Sales revenue	1.5	1.5	1.3	1.7
EBITDA	-1.2	-1.3	-1.5	-1.1
EBIT	-1.5	-1.6	-1.8	-1.4
Net profit	**-1.5**	**-1.6**	**-1.8**	**-1.4**
Norm EPS	**-0.5**	**-0.5**	**-0.5**	**-0.4**
EBIT/sales (%)	-102.7	-106.9	-142.7	-85.1
Dividend (c)	0.0	0.0	0.0	0.0
Franking (%)	0.0	0.0	0.0	0.0

Financial stability

Year-end June (AUD)	FY16A	FY17F	FY18F
Net debt	-3.4	-8.8	-5.7
Net debt/equity (%)	<0	<0	<0
Net debt/EV (%)	**<0**	**<0**	**<0**
Current ratio (x)	33.0	41.6	27.4
Interest cover (x)	>99	41.7	<0
Adj cash int cover (x)	**>99**	**28.3**	**22.9**
Debt/cash flow (x)	0.0	0.0	0.0
Net debt (cash)/share ($)	<0	<0	<0
NTA/share ($)	0.0	0.1	0.1
Book value/share ($)	0.0	0.1	0.1
Payout ratio (%)	0	0	0
Adj payout ratio (%)	0	0	0

EPS reconciliation ($m)

	FY16A		FY17F	
	Rep	Norm	Rep	Norm
Sales revenue	3	3	3	3
EBIT	-3.4	-3.0	-3.8	-3.2
Net profit	**-3.4**	**-3.0**	**-3.7**	**-3.2**
Notional earn	0.0	0.0	0.0	0.0
Pref/conv div	0.0	0.0	0.0	0.0
Profit for EPS	**-3.4**	**-3.0**	**-3.7**	**-3.2**
Diluted shrs (m)	332	341	375	377
Diluted EPS (c)	**-1.0**	**-0.9**	**-1.0**	**-0.9**

Returns

	FY16A	FY17F	FY18F	FY19F
ROE (%)	-22	-19	3	43
ROIC (%)	-19	-23	2	50
Incremental ROE	127	-5	161	182
Incremental ROIC	33	14	222	246

Profit and loss ($m)

Year-end June (AUD)	FY14A	FY15A	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F
Sales revenue	4.1	3.5	2.9	3.0	12.5	27.1	36.3	49.8
EBITDA	-1.8	-1.9	-2.4	-2.7	0.9	10.8	19.8	30.5
Depn & amort	0.5	0.8	0.6	0.6	0.6	0.7	0.9	1.3
EBIT	**-2.3**	**-2.7**	**-3.0**	**-3.3**	**0.3**	**10.1**	**18.8**	**29.2**
Net interest expense	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.3	-0.5
Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9
Minorities/pref divs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity accounted NPAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net profit (pre-sig items)	**-2.3**	**-2.7**	**-3.0**	**-3.2**	**0.5**	**10.2**	**19.1**	**20.8**
Abns/exts/signif	-0.6	-0.5	-0.4	-0.6	-1.6	-3.5	-4.7	-6.5
Reported net profit	**-2.9**	**-3.2**	**-3.4**	**-3.8**	**-1.2**	**6.7**	**14.4**	**14.4**

Cash flow ($m)

Year-end June (AUD)	FY14A	FY15A	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F
EBITDA	-1.8	-1.9	-2.4	-2.7	0.9	10.8	19.8	30.5
Interest & tax	0.0	0.0	0.0	0.1	0.1	0.1	0.3	-8.4
Working cap/other	0.0	0.2	0.0	0.5	-3.6	-1.8	-2.6	-3.7
Operating cash flow	**-1.8**	**-1.7**	**-2.5**	**-2.1**	**-2.6**	**9.1**	**17.5**	**18.4**
Maintenance capex	-0.3	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.3
Free cash flow	**-2.1**	**-1.7**	**-2.5**	**-2.2**	**-2.7**	**9.0**	**17.3**	**18.1**
Dividends paid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth capex	-1.1	0.0	0.0	-0.1	-0.5	-0.7	-0.9	-1.2
Invest/disposals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other inv flows	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cash flow pre-financing	**-3.1**	**-1.8**	**-2.5**	**-2.3**	**-3.2**	**8.3**	**16.4**	**16.9**
Funded by equity	0.0	1.8	3.3	7.7	0.0	0.0	0.0	0.0
Funded by debt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Funded by cash	3.1	-0.1	-0.9	-5.4	3.2	-8.3	-16.4	-16.9

Balance sheet summary ($m)

Year-end June (AUD)	FY14A	FY15A	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F
Cash	2.4	2.5	3.4	8.8	5.7	14.0	30.4	47.3
Current receivables	2.3	2.1	2.1	1.6	5.1	6.7	9.0	12.3
Current inventories	0.1	0.1	0.1	0.1	0.4	0.9	1.3	1.7
Net PPE	2.1	1.4	0.8	0.4	0.4	0.5	0.6	0.8
Investments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intangibles/capitalised	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7
Other	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total assets	**15.7**	**14.8**	**15.1**	**19.7**	**20.4**	**30.9**	**50.0**	**70.9**
Current payables	0.4	0.2	0.2	0.3	0.5	0.7	0.8	0.9
Total debt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other liabilities	0.5	0.6	0.7	1.1	1.1	1.1	1.1	1.1
Total liabilities	**0.9**	**0.8**	**0.9**	**1.4**	**1.6**	**1.9**	**1.9**	**2.0**
Minorities/convertibles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shareholder equity	**14.8**	**14.0**	**14.2**	**18.3**	**18.8**	**29.0**	**48.1**	**68.9**
Total funds employed	**14.8**	**14.0**	**14.2**	**18.3**	**18.8**	**29.0**	**48.1**	**68.9**

Table of contents

Investment thesis

Initiating BluGlass (BLG) at a BUY with a scenario-based TP of $0.90:

- BLG is focused on commercialising breakthrough semiconductor technology. BLG was founded in 2005 following 15 years of development within Sydney's Macquarie University and listed on the ASX in 2006.
- BLG has developed a technology known as 'remote plasma chemical vapour deposition' (RPCVD), which offers key advantages over the incumbent LED manufacturing process (MOCVD). RPCVD has applications in other markets such as power electronics and solar cells.
- The LED lighting market is set to grow significantly, at a 28% CAGR to USD 216bn by 2024, from 30.5bn in 2016 [*according to Navigant Research*] – providing a significant industry tailwind for BLG.
- BLG has entered into collaborations with leading players in the global LED manufacturing market including Lumileds and HC SemiTek. It has also made progress with its evaluation by Veeco, one of the largest LED equipment manufacturers globally. Further, collaboration with IQE to apply the technology to non-LED electronic devices is also gaining traction.
- We expect BLG to be able to monetise these collaborations from FY18 through retro-fitting LED machines and charging royalties for the use of their technology. Our discussions with IP lawyers have confirmed this will be the most likely revenue model.
- Our channel check with Lumileds validated our view that BluGlass' technology is unique, has minimal competition and no equally viable alternatives are available in the industry.
- The IP is well-protected with 47 patents and contact with IP lawyers suggested BLG has adequately ring-fenced the core technology from competitive threat.
- BLG has invested around $65m on R&D spend in the last decade sourced from R&D grants and capital raises. This is in addition to the value created prior to the business being spun out of Macquarie University. Hence, BLG barely trades above the implied invested R&D to date further supporting the view that the stock could be significantly undervalued.
- Valuing BLG at the pre-commercialisation stage is an inexact science. We have opted for a scenario approach toggled around the gross margin uplift achieved with their two leading industry partners (Lumileds and IQE). These scenarios point to significant upside potential.

Figure 1: BLG scenario-based price target

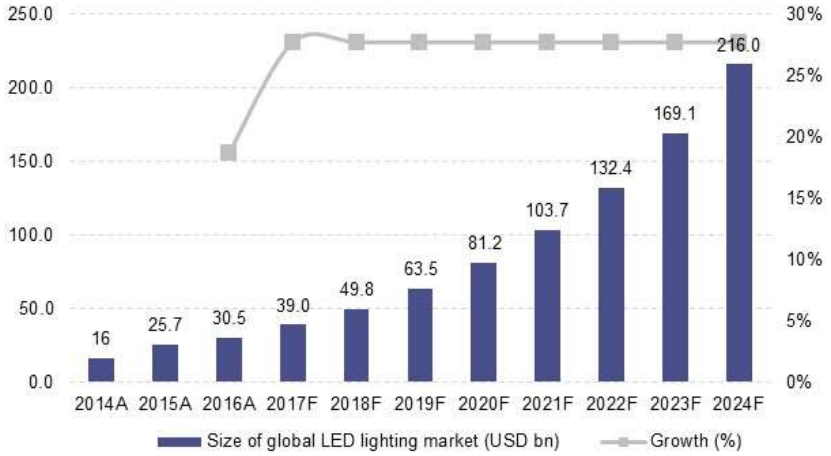
Price Objective Methodology	**Value per share**	**% weight**
DCF - Scenario 1 (royalty - 15% gross margin uplift)	$0.86	33.3%
DCF - Scenario 2 (royalty - 20% gross margin uplift)	$0.90	33.3%
DCF - Scenario 3 (royalty - 25% gross margin uplift)	$0.95	33.3%
Target price	**$0.90**	

Source: Wilsons estimates

Large scale market opportunity

- **Disruptive technology**: RPCVD is expected to increase the efficiency in LED devices produced and lower the manufacturing costs. The technology changes a key component of the incumbent MOCVD process using plasma. This enables the fabrication of LED chips at a much lower temperature than currently required, producing the material quality necessary for high performance devices, whilst being more environmentally friendly.
- **Gaining traction with LED manufacturers**: In 2016, BLG signed collaboration agreements with a leading LED developer Lumileds for the application of RPCVD, and HC SemiTek, the largest Chinese LED chip manufacturer. In November 2016, the company entered into a collaboration with IQE, a leading manufacturer of semiconductor products for electronic devices. These collaborations indicate that key players in the industry see the potential for the commercialisation of RPCVD.
- **Rapidly growing LED lighting market**: BLG is targeting a largely untapped industry with the potential to grow exponentially over the next few years. Recent studies point to the LED lighting market growing at a 28% CAGR to USD 216bn by 2024, from 30.5bn in 2016. Global shipments of LED modules and lamps are expected to grow at a 19% CAGR over 2015–24 to 4.1bn units by 2024, presenting strong industry tailwinds for commercialisation.
- **Non-LED market presents an opportunity**: BLG's technology is also applicable to the power electronics and solar industries. The collaboration with IQE presents an opportunity to tap into the large and growing power electronics market, which is expected to grow at a 36% CAGR to USD 2.5bn by 2023, from USD 210m in 2015.
- **Steady decline in LED prices should spur demand**: The global average price for LED lamps has declined 60–70% in the last five years due to increasing competition and new market entrants, as well as incremental efficiency in the manufacturing process. These factors are expected to motivate more LED manufacturers to trial BLG's RPCVD technology to lower their production costs.

Figure 2: Size of the global LED lighting market



Source: LEDinside, Navigant Research

Scenario based valuation points to significant upside

- Given the uncertainty and risks associated with the commercialisation of BLG's technology, we believe a scenario based approach is the most sensible way of valuing the company.
- We expect BLG's value to rise by multiples of the current share price if the following conditions are met:
  - Commercialisation of RPCVD proves successful. Lumileds and IQE collaboration agreements transition into commercial agreements following the end of their existing terms.
  - A meaningful gross margin uplift is achieved by Lumileds and IQE using the technology, through improved device performance, production efficiency and marginal cost savings; and BluGlass is able to charge a royalty for this improvement.
  - BLG is able to retro-fit up to 5% of global MOCVD machines for sale by 2021E.
- We recognise there is a high risk attached to this investment proposition. However, if BLG reaches commercialisation and is able to scale up through a retro-fit and royalty revenue model, their revenues would likely rise at an exponential rate over the next few years.
- Our scenario based DCF is based on three scenarios of gross margin uplift, stemming from **BLG's green LED study in May 2015 showing an improvement in light output of about 10%** using RPCVD. Lighting manufacturer Osram claims that for each 1% improvement in light output, this results in a 3-4% gross margin uplift for LED manufacturers. Our base case of a 20% margin uplift is on the conservative side.
- We expect BLG would be able to charge a c5% royalty rate (high tech median) on the revenue plus gross profit uplift from Lumileds and IQE.
- Given the performance and efficiency benefits from BLG's technology, we have reason to believe that partnerships with other major LED manufacturers could follow, leading to sustained revenue growth. This potential has not been captured in our numbers.

We believe BluGlass is a solid speculative growth company which services a clear market need and is showing strong traction towards the commercialisation of its technology.

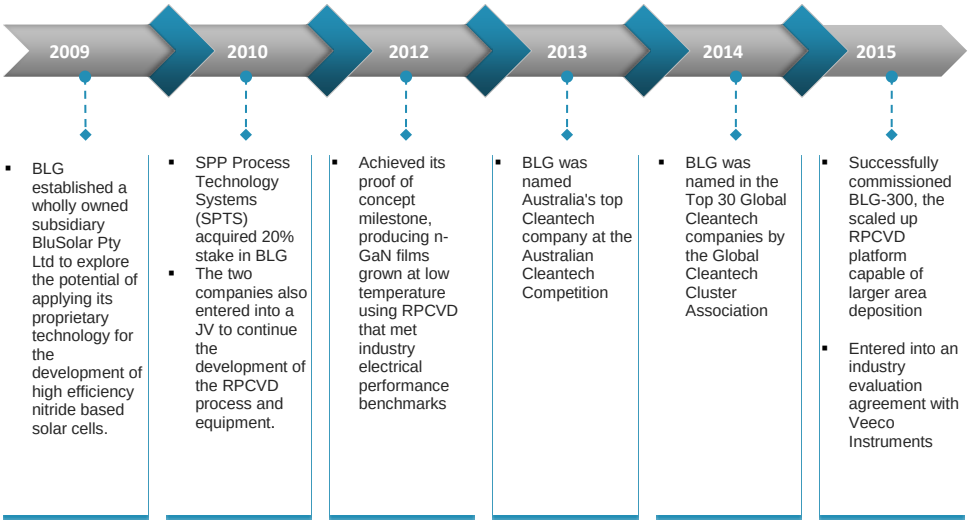
Our TP of $0.90 is derived from our scenario-based DCF which suggests close to 270% TSR, contingent on successful commercialisation of its RPCVD technology.

BluGlass: Company overview

BluGlass (BLG) is an Australian technology company developing and commercialising a breakthrough, innovative semiconductor technology – RPCVD – to produce light-emitting diodes (LEDs). The technology has the potential to increase device performance whilst lowering the cost of LED manufacturing compared to the incumbent method.

BLG was founded in 2005 after more than 15 years research at Sydney's Macquarie University and listed on the ASX in September 2006.

The following chart illustrates BLG's progress in prior years:



The following chart illustrates BLG's recent progress:

Source: BluGlass Investor Presentation, March 2017

For the commercialisation of RPCVD, apart from LEDs, BLG is also targeting rapidly growing markets such as power electronics, solar cells, and photo and laser diodes. The company currently holds 47 patents on the technology in countries such as the US, Europe, Japan, China, Taiwan and Korea.

BLG has successfully retrofitted MOCVD equipment from the two largest companies in the LED-equipment-manufacturing business: Aixtron and Veeco with its RPCVD technology. Also, the company has recently signed collaboration agreements with a number of companies such as Lumileds, a global market leader in LEDs; HC SemiTek, the largest LED chip manufacturer in China; and IQE, a leading manufacturer of advanced semiconductor products.

Under-penetrated LED market for lighting purposes

Over the last few years, there has been significant growth in LED application in TVs, cell phones, cars, signage, and technologies such as optical fibre. LEDs produce light using semiconductors as opposed to incandescent light bulbs that use a filament wire, or fluorescent lights, which use mercury vapour. LEDs provide important advantages when it comes to lighting.

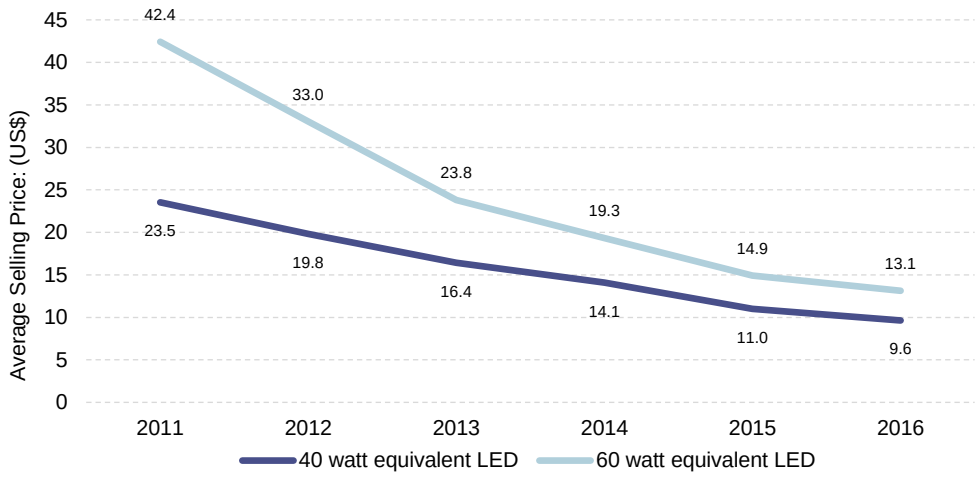
- They consume up to 85% less energy to produce the same brightness as alternatives.
- They have operating lives 3–6 times longer than fluorescent lights.
- They do not contain mercury, which is poisonous and causes environmental degradation.
- They are easier to control electronically and do not heat up as much.

Despite these key advantages and the stellar growth in applications such as mobile phones, when it comes to the general lighting market (i.e., residential and commercial lighting), LED usage remains underpenetrated.

According to the *IHS Lighting Intelligence Service*, the penetration rate of LEDs in the general lighting market was below 10% in 2015. This is due to the fact that although LEDs are more energy-efficient, their cost of production is significantly higher than that of other light bulbs offering the same brightness. Thus, it takes a considerably long usage time for LEDs to fully realise the advantages listed above.

In the past few years, prices of LED bulbs have fallen significantly due to increasing competition and new market entrants, as well as incremental efficiency in the manufacturing process. For LED manufacturers, improving on costs is crucial to drive increased market share.

Figure 3: LED price trend over past 5 years (global average prices)



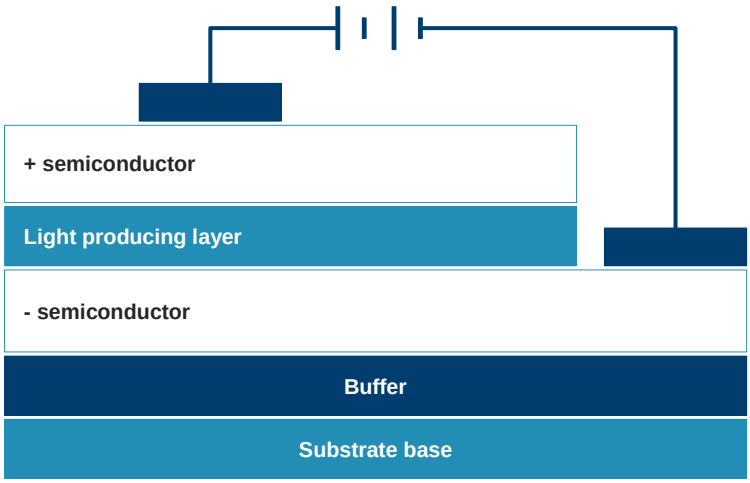
Source: LEDinside

BluGlass' proposed solution to the LED problem: RPCVD

BLG aims to address the structural issue of declining LED prices by developing a new lower temperature plasma-based production method for LEDs. This has the potential to significantly increase device performance and production efficiency with marginal cost savings, whilst improving the light output of LEDs. To understand this new technology, we first need to understand the basic structure and manufacturing process of LEDs.

Structure of LEDs

Figure 4: Basic Structure of LED *(simplified representation)*



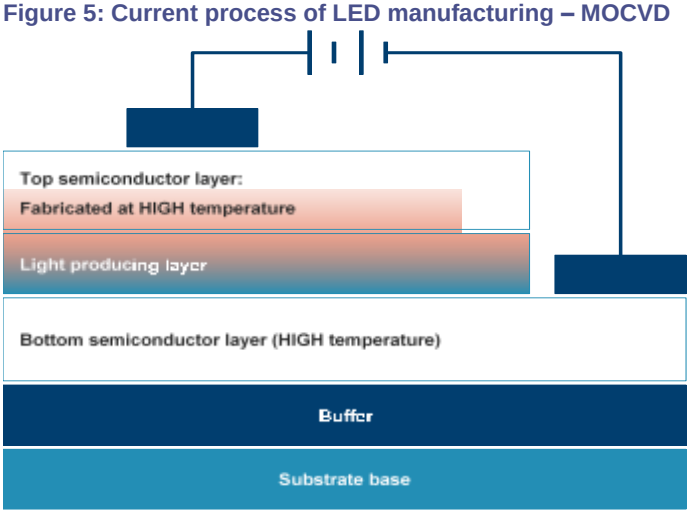
Source: Wilsons

Technical description

LEDs use junction diodes, which produce light using the movement of electrons within two oppositely charged layers of semiconductors. An LED bulb essentially contains five layers inside a rounded transparent plastic shell. The top three layers are the light-producing parts: a positively charged semiconductor (P-type GaN), a negatively charged semiconductor (N-type GaN), and an active layer sandwiched in the middle, which produces light due to the interaction of electrons between the two aforementioned layers.

Manufacturing process

Figure 5: Current process of LED manufacturing – MOCVD



Source: Wilsons

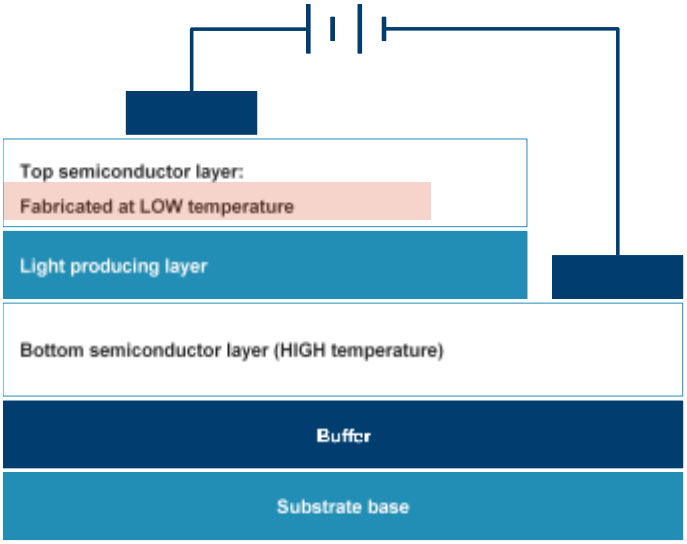
Currently, LEDs are manufactured using a method called metal-organic chemical vapour deposition (MOCVD). It uses the deposition of chemical vapour to create thin layers of semiconductors. This method requires each layer to be fabricated individually and placed above the other, starting from the base and ending at the top. Thus, after fabricating the light producing layers, the final step is to place a positive semiconductor layer on top of it. The top layer needs to be fabricated at a high temperature (up to 1,000° C), to achieve the desired chemical reaction.

MOCVD faces the following key issues, which reduce the efficiency of the process.

- The high temperature required to fabricate the top semiconductor layer degrades the light-producing layer below it, causing LEDs to produce less light than they would have in the absence of the degradation of the light-producing layer.
- Conversely, if less heat is applied in fabricating the top semiconductor layer, the result is a layer of inferior quality that would not conduct electricity as efficiently.
- The amount of energy required to create high temperatures adds to the cost of production.
- The chemical reaction required in this uses toxic inputs such as ammonia gas. The cost of treating these, and their environmental impact, contributes to the overall cost.

BLG's existing solution to the problem is eliminating the requirement of excessive heat to create the top layer using plasma. Plasma is the fourth state of matter (the other three being solid, liquid and gas). BLG is currently working on further developments with BLG's collaborators which could see manufacturing improvements extend to the other layers of the LED structure. This could in turn result in further device performance improvements in the future.

Figure 6: BluGlass' RPCVD method



Source: Wilsons

BLG proposes the use of a technology called RPCVD, which currently involves using plasma to fabricate the top semiconductor layer at a low temperature. This technology has evolved from over 15 years of research.

The proposed advantages of this method are as follows:

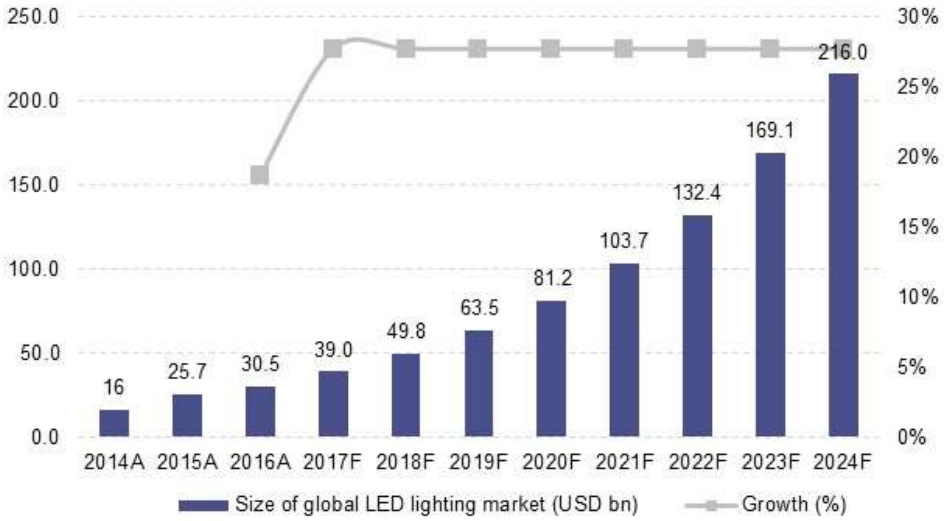
- The top semiconductor layer is not damaged by excessive heat as in MOCVD, which results in improved brightness of LED bulbs.
- The lower temperature increases the performance and efficiency of production.
- The method uses plasma instead of ammonia for its active nitrogen source, which is less costly and more environment-friendly.

Scope and size of the market opportunity

Global LED lighting market is growing rapidly

According to a 2016 *Global LED Lighting Market Trends Report* by LEDinside, it is estimated that the size of the LED lighting market reached USD 25.7bn in 2015 and grew to USD 30.5bn in 2016. Navigant Research highlighted in their recently released *LED Lighting: Global Outlook* report that they forecast global revenues from LED lighting systems e.g. lamps and modules to reach USD 216bn by 2024, a material 27.7% CAGR from 2016-24.

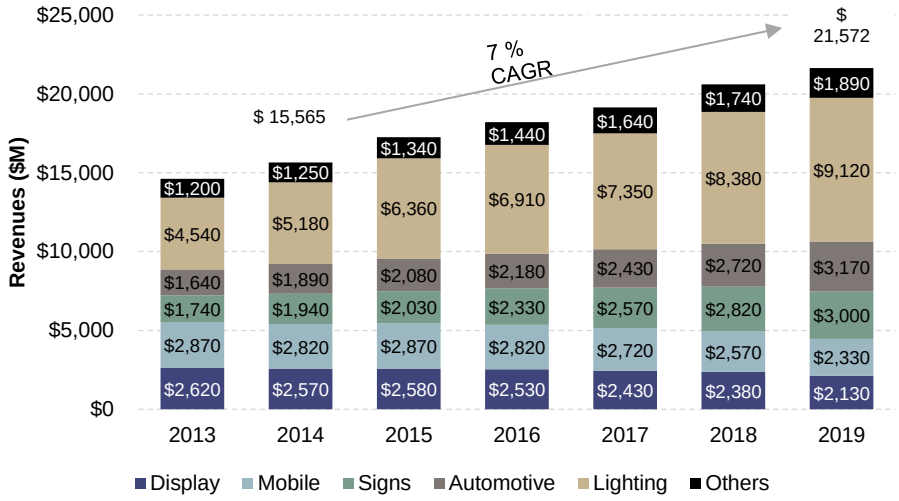
Figure 7: Global LED lighting market size



Source: Navigant Research

Drilling down into the 'packaged' LED market which accounts for automotive lighting, a segment that Lumileds has dominance in, we see steady growth. According to a leading LED market research company *Strategies Unlimited*, global revenues for 'packaged' LEDs reached USD 15.6bn in 2014 and are expected to increase at a 7% CAGR to USD 21.6bn by 2019. The Automotive and Lighting segments are expected to have comprised half of the total packaged LED market, i.e., USD 9.1bn, in 2016. This share is expected to reach 57% by 2019, growing at a forecasted 10.6% CAGR from 2016-19.

Figure 8: Global packaged LED revenue growth forecast



Source: Strategies Unlimited

Figure 9: Lumileds' ranking among LED manufactuers

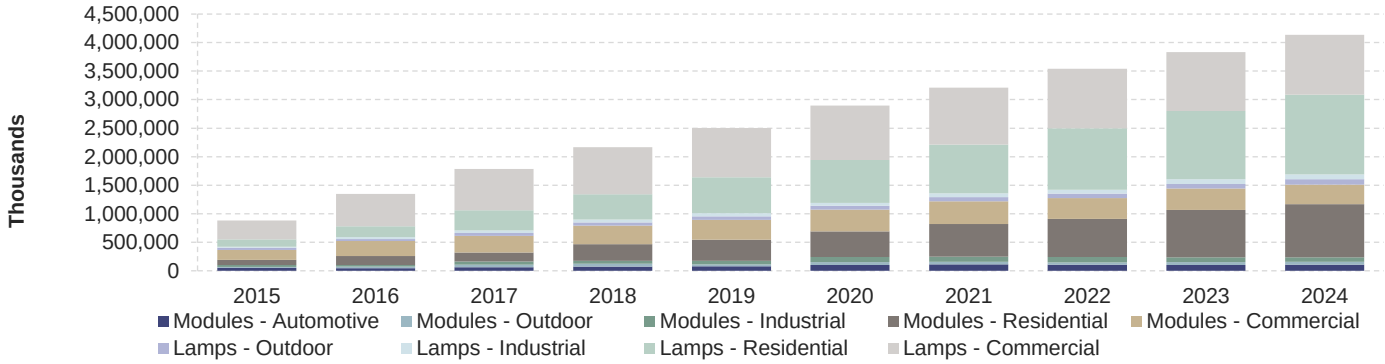
Packaged LEDs Revenues (GaN+AlInGaP+Standard)		
2015 Company Ranking		
Company Name	2014	2015
Nichia	1	1
Osram Opto	2	2
Lumileds	4	3
Samsung Electronics	3	4
Seoul Semiconductor	5	5
Everlight	7=	6
Cree	6	7
LG Innotek	7=	8
MLS	9	9
Lumens	10	10

Source: IHS

Key industry partner Lumileds is one of the leading LED manufacturers globally. This supports our view that there's strong revenue growth potential for BLG from their ongoing collaboration.

With the adoption of LEDs surging across all major end uses such as commercial and residential buildings, public infrastructure and vehicles, global unit shipments of LED lamps and modules are set to rise at a CAGR of 19% between 2015 and 2024. With the global average prices for LEDs declining at a compounded rate of 19% over 2011–16, LEDs are fast becoming the economical choice in almost every application.

Figure 10: Unit shipments of LED lamps & modules by end use, world markets: 2015–2024



Source: Navigant Research

Applications of LEDs

In recent years, LED applications have grown significantly in TVs, mobile phones, cars, signage, and technologies such as optical fibre.

The current LED applications market can be broadly classified into three categories:

- Low performance (e.g., mobile phone keypads)
- Medium-to-high performance (e.g., LCD backlights, car lighting)
- High power (i.e., general lighting)

The market can be further classified by type of use, as follows:

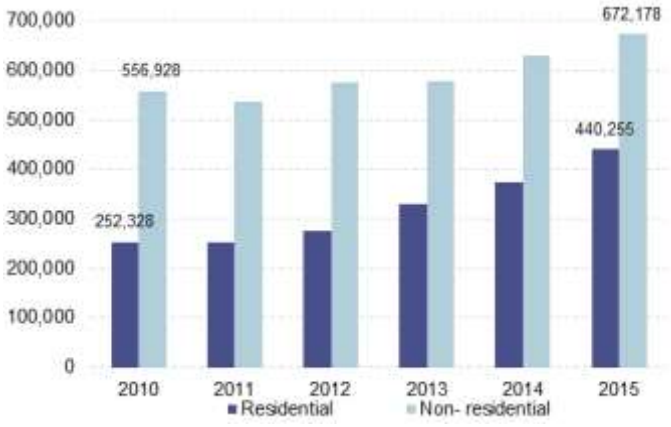
- **Buildings**: This market encompasses residential and non-residential buildings. Energy-efficient lamps and LEDs are much more common in non-residential settings than in residential due to more easily recognised cost savings. Lighting selection also varies by type of use. For example, an emphasis on aesthetics in hotels and restaurants makes the use of inefficient filament lamps common.
- **Outdoor lighting**: These applications include roadway lighting, parking lot illumination, and lighting for billboards and signs. Luminous efficacy and operating life are principal concerns in this market. LEDs are more efficient than lamp technologies, possess extremely long lives, and operate well at low temperatures, making them ideal for outdoor lighting applications.
- **Consumer products**: High-efficiency lighting is employed in a variety of household appliances including refrigerators, freezers, and cooking appliances such as ovens and microwaves. In appliances, lights are used as both indicators and to illuminate spaces. LEDs are used in mobile phones, for example, as notification lights and flashlights.
- **Automobiles**: This market uses a range of interior and exterior lighting in motor vehicles such as cars, light trucks, vans, heavy trucks, and buses. On average, approximately 60 original equipment manufacturer (OEM) light sources are used per motor vehicle. LEDs are one of the principal types of high-efficiency lighting used in the motor vehicle market.

Demand drivers

Construction activity:

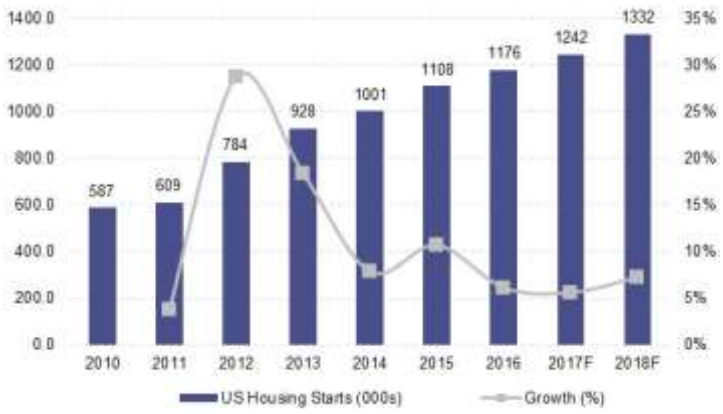
The key determinant of the demand for LEDs for lighting purposes is building construction. New construction activity directly affects the demand for lighting products as well as indirectly by increasing the number of households/establishments that would eventually generate replacement demand. Construction in turn depends on various macroeconomic and demographic factors such as economic growth, expected inflation, and interest rates.

Figure 11: US Construction Spending (US$m)



Source: Government Census, US

Figure 12: Annual US housing starts (000s)



Source: National Association of Home Builders

Automobiles and consumer electronics market:
LEDs have been increasingly prevalent for applications in cars and electronic devices. LEDs do not produce a lot of heat (unlike regular lights) and are small. LEDs can respond up to 10 times faster than traditional incandescent bulbs. The ease of control makes them a natural selection for intelligent lighting systems that can be adjusted based on inputs by vehicle sensors.

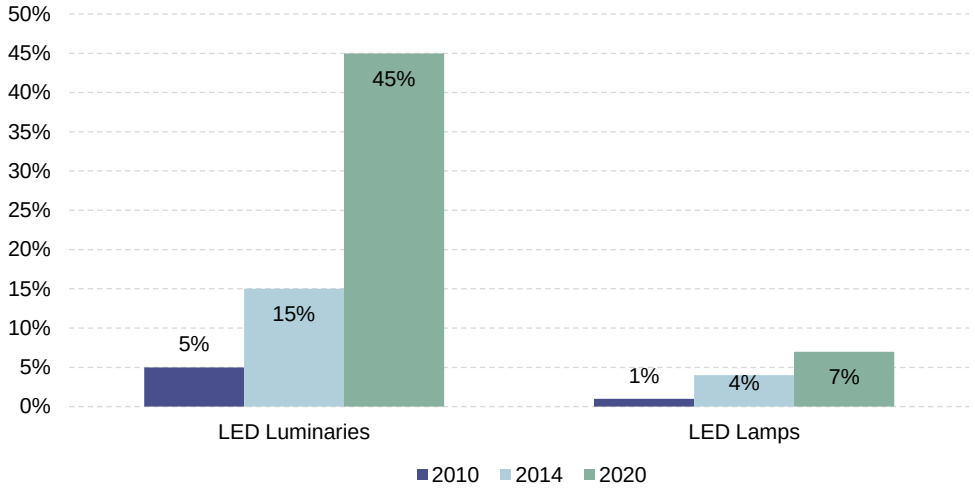
LEDs can be used in a variety of automobile applications like high- and low-beam headlights, turn signals, brake lights, and interior reading lights. Apart from functional advantages, LEDs offer versatility in design, which could help manufacturers differentiate themselves from the competition.

Government and regulatory factors:
Suppliers of high-efficiency lighting such as LEDs compete directly with manufacturers of conventional lighting products. Demand for high-efficiency lighting is positively affected by government regulations as well as consumer concerns on the environmental impact of lighting.

Recently, there has been an increased push for the use of LEDs in public infrastructure by various governments to increase energy efficiency. According to Philips, lighting currently accounts for 19% of the world's energy consumption. A 2012 study (called LightSavers) concluded that LED street lights, combined with adaptive controls such as motion sensors, could result in energy savings of 50%–70% compared with conventional technologies. In September 2015, the Government of India announced plans to replace all the streetlights in the country (c.35 m) with LED lights over the following two years.

Penetration of the LED market:
According to a BCG report, the total global lighting market is expected to increase to USD 134bn by 2020 from USD 99bn in 2010. This represents a CAGR of 3%. LED's share of the total lighting market is expected to increase significantly between 2014 and 2020. This change is attributable to the introduction and expected penetration of LEDs due to the advantages it offers over traditional lighting.

Figure 13: Share of LED luminaires and lamps in the lighting market

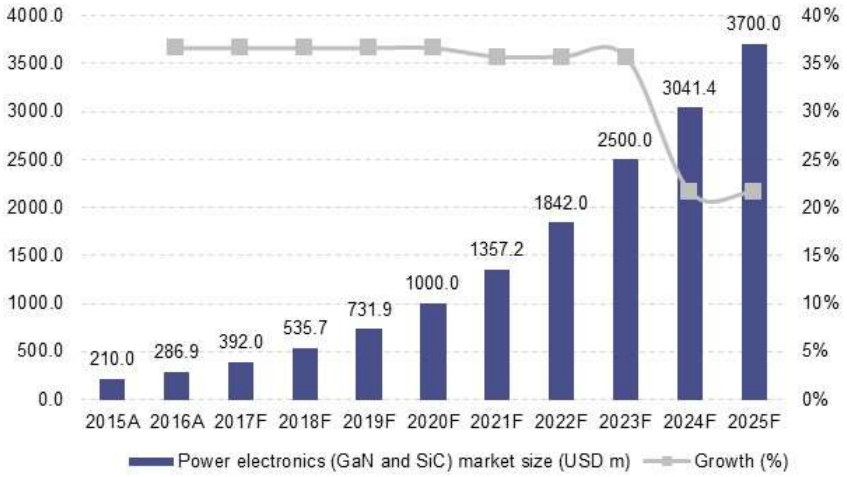


Source: BCG

Power electronics – another high growth industry vertical

According to a study conducted by IHS, the power electronics market for silicon carbide (SiC) and gallium nitride (GaN) semiconductors is expected to grow to USD 1bn by 2020, from USD 210m in 2015, representing a CAGR of 36.6%. This growth trajectory is forecast to continue till 2025, reaching 2.5bn by 2023 and 3.7bn by 2025. The key drivers include increased demand from hybrid and electric vehicles, power supplies and photovoltaic inverters.

Figure 14: Market size – power electronics (GaN & SiC) – 2015A-25F



Source: IHS forecasts

Existing and potential revenue streams for BluGlass

BLG is currently generating income by mainly providing foundry services on a small scale to various customers such as XVI Technologies, an integrated engineering firm. In addition to revenue, this also exposes the company to new and emerging applications that could benefit from RPCVD technology.

Potential revenue streams for RPCVD

Collaborations with LED equipment manufacturers:

A primary commercialisation opportunity for BLG would be with LED equipment manufacturers. The LED equipment manufacturing market is currently dominated by two large players, Veeco Instruments and Aixtron, which together hold about 90% of the market. Veeco is currently at the second phase of evaluating BLG's technology for its products.

Collaborations with LED manufacturers:

BLG may tie up with LED bulb manufacturers that produce and sell LEDs under their own brands.

The company has already entered into one such exclusive collaboration with LED market leader Lumileds, which was acquired in December 2016 by Apollo Global Management, a US private equity firm. Lumileds is a leader in the automotive LED market, accounting for roughly a third of the market. The collaboration moved to the second phase in October 2016, following successful results in the first phase. The second phase is expected to be completed by the end of FY17, before working out a final commercial agreement. We expect the commercialisation from the Lumileds deal to begin in H2'18E.

Our recent channel check with Lumileds revealed a solid commitment from management to the collaboration with BluGlass and that there is a lack of direct competitors or viable alternatives.

BLG has also signed a collaboration agreement with HC SemiTek, a leading Chinese LED chip manufacturer.

Figure 15: BLG's progress with the Lumileds collaboration

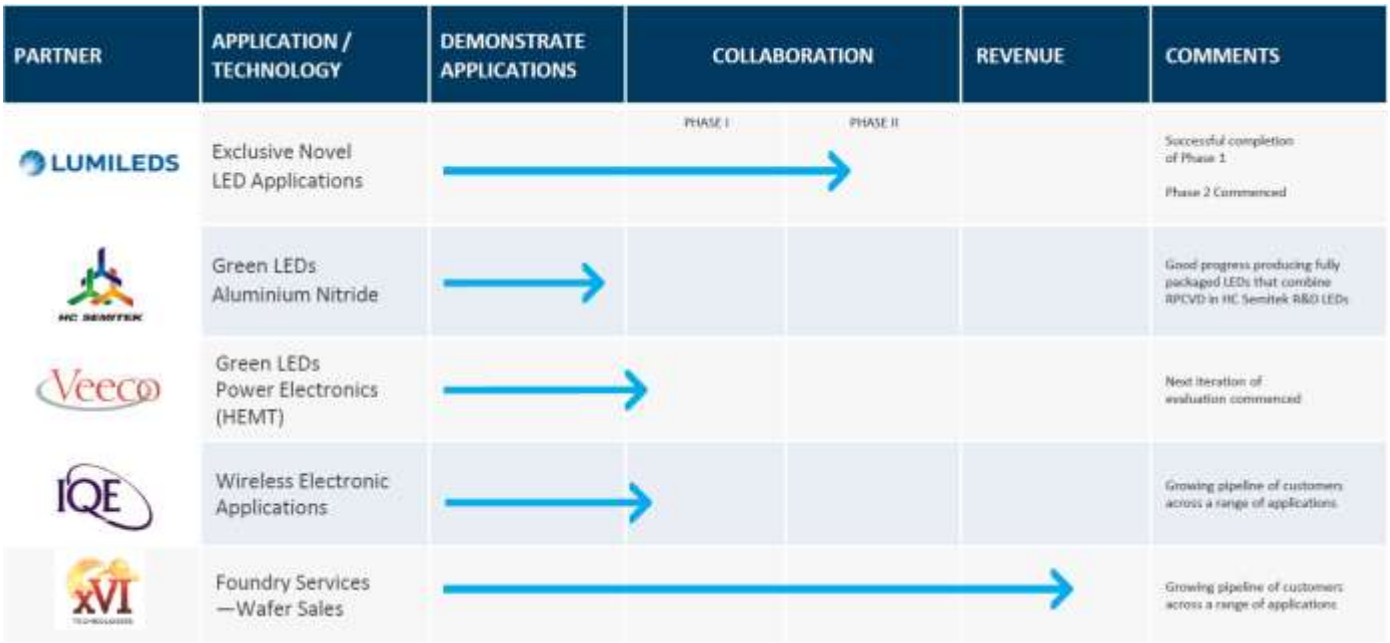
Source: BluGlass Investor Presentation, March 2017

Advanced semiconductor products and power electronics:

Apart from LED manufacturing, BLG's RPCVD technology can be used to develop and fabricate advanced semiconductor wafer products at a low temperature to increase device efficiency and lower production costs. In November 2016, IQE and BLG signed an exclusive collaboration agreement to co-develop nitride films for a range of electronic devices using RPCVD. Monetisation from the collaboration with IQE is expected to start from FY19E.

The chart below summarises BLG's efforts so far to commercialise RPCVD through various collaborations:

Figure 16: RPCVD commercialisation summary



Source: BluGlass Investor Presentation, March 2017

Valuation: BluGlass' path to commercialisation

Based on our discussions with BLG's management and channel checks with Lumileds' CTO and IP lawyers, we believe the company can monetise its RPCVD technology in two distinct ways:

1) Retro-fit upgrades to LED manufacturing equipment

BLG can sell hardware kits to be retrofitted on existing LED machines (MOCVD), primarily produced by Aixtron and Veeco. RPCVD is currently the only viable technology that can be retrofitted to improve the performance and efficiency of LED manufacturing.

- Our retro-fit revenue model is based on our estimation of the total number of MOCVD machines in the global market. We then applied a conservative estimate of the YoY growth in the number of machine sales, in line with the growth in the packaged LED market.
- Given BluGlass are in the process of determining the cost of retro-fitting MOCVD machines, we made a conservative conversion cost assumption of A$200,000 per machine. Management's rough preliminary estimates range up to A$500,000. The production and installation of these retro-fits is likely to be led by an outsourced third party manufacturer. We have assumed 25% GPM for BLG on the retro-fit opportunity (Aixtron's GPM was 29% in FY16).

Figure 17: BLG retro-fit DCF analysis

Retro-fit approach (LED equipment) - 31 Dec Y/E	2016E	2017E	2018E	2019E	2020E	2021E
Total global MOCVD machine sales (units)	**2,809**	**3,090**	**3,368**	**3,637**	**3,892**	**4,125**
Growth (%)		*10.0%*	*9.0%*	*8.0%*	*7.0%*	*6.0%*
BLG's penetration rate (%)			2.0%	3.0%	4.0%	5.0%
No. of RPCVD machines converted (units)			**67**	**109**	**156**	**206**
Growth (%)				*62.0%*	*42.7%*	*32.5%*
Incremental RPCVD machines converted (units)			**67**	**42**	**47**	**51**
Growth (%)				*-38.0%*	*11.5%*	*8.7%*
Conversion cost per machine (A$m)			0.2	0.2	0.2	0.2
Total retro-fit revenue (A$m)			**13.5**	**8.4**	**9.3**	**10.1**
Growth (%)				*-38.0%*	*11.5%*	*8.7%*

Source: Wilsons estimates

We expect the conversion rate of the MOCVD machines into RPCVD machines to initially sit at c2% which represents Lumileds' estimated proportion of machines in the market, with a gradual rise each year as the market increasingly adopts the RPCVD technology, up to about 5% market share by 2021E. Based on the conversion rate estimate, we estimated the incremental number of machines that will be converted.

BLG's total retro-fitting revenue is calculated by multiplying the conversion price of each machine by the incremental number of machines converted annually. We then expensed 75% of this revenue in our model to account for the costs paid to a third party LED manufacturer.

Whilst there's value in this one-off revenue stream per machine, we believe the greater potential lies in the additional potential recurring revenue from royalties.

2) Royalty stream from LED manufacturers

Based upon our discussions with IP lawyers, we believe BLG will be able to charge an ongoing royalty for the use of its RPCVD technology. This would ensure a steady and predictable cash inflow.

To derive our estimated royalty revenues, we obtained the revenues of Lumileds and IQE, and projected them forward using both consensus estimates and our conservative assumptions which are in line with the global automotive LED and electronic device industries, respectively.

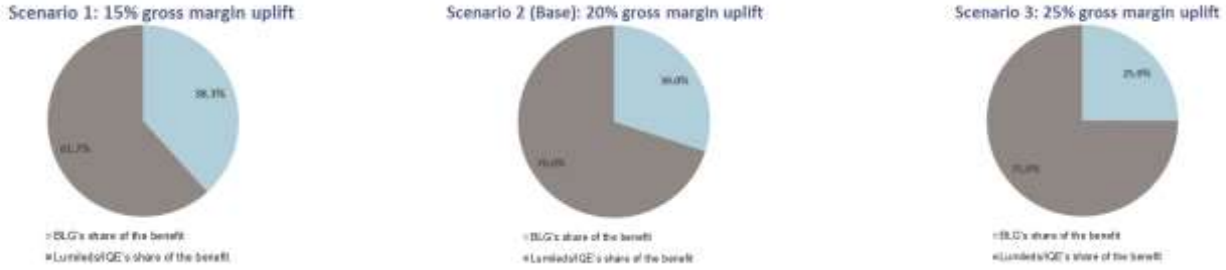
We looked at three scenarios of gross margin improvements, 15%, 20% (base case) and 25%, and applied the standard royalty rate for high technology of 5% to the forecast revenues plus gross profit uplift from Lumileds and IQE.

We projected BLG's penetration of Lumileds and IQE's revenues to reach 20% by 2021E from 5% in 2018E, with a gradual step-up each year. Management have pointed to BLG having the

potential to theoretically penetrate all of Lumileds' revenues, though we believe half of their revenues by 2026E is a more reasonable assumption given the risks. In reality, the penetration rate would fluctuate significantly from year to year but for illustrative purposes, we modelled out a linear progression.

As a sense check for our assumptions, we followed the royalties 'rule of thumb' suggested in a renowned research paper titled *Determination of Royalty Rates* by Russell Parr, CFA which states that royalties are generally priced to receive a quarter to one-third of the benefit to the licensee.

Figure 18: BLG's share of Lumileds and IQE's gross profit improvement



Source: Wilsons estimates

Our base case of 20% gross margin uplift shows that BLG's royalty revenue would equate to roughly 30% of the gross profit improvement to Lumileds and IQE. At a 25% margin uplift, this becomes 25% and at a 15% margin uplift, it is c38% of the benefit.

- Osram, a lighting products provider claims that for each 1% efficiency improvement in LEDs in terms of light output, this results in a 3-4% gross margin uplift for manufacturers.
- BluGlass' green LED study in May 2015 showed a significant improvement in light output of about 10% using BLG's technology over existing green LEDs. Our base case of a 20% margin uplift is on the conservative side to account for the uncertainty of the actual performance once LEDs manufactured through RPCVD are rolled out in scale.

Figure 19: BLG royalty revenue model

LUMILEDS (LED)						
Royalty rate approach - 31 Dec Y/E	**2016E**	**2017E**	**2018E**	**2019E**	**2020E**	**2021E**
Lumileds revenue (A$m) - Dec 31 Y/E	**2,447.0**	**2,667.2**	**2,880.6**	**3,082.2**	**3,267.1**	**3,430.5**
Growth (%)	10.0%	9.00%	8.0%	7.0%	6.0%	5.0%
BLG penetration rate (%)			5.0%	10.0%	15.0%	20.0%
Share of Lumiled's revenue covered by BLG (A$m)			**144.0**	**308.2**	**490.1**	**686.1**
Growth (%)				*114.0%*	*59.0%*	*40.0%*
Gross margin uplift using BLG's technology (%)			**20.0%**	20.0%	20.0%	20.0%
Value of revenue + GP uplift (A$m)			**172.8**	**369.9**	**588.1**	**823.3**
Growth (%)				*114.0%*	*59.0%*	*40.0%*
Royalty rate (%)			5.0%	5.0%	5.0%	5.0%
Total royalty revenue (A$m)			**8.6**	**18.5**	**29.4**	**41.2**
Growth (%)				*114.0%*	*59.0%*	*40.0%*
Royalty as % of benefit			*30.0%*	*30.0%*	*30.0%*	*30.0%*
Royalty Revenue Scenario Analysis (A$m)						
Scenario 1: 15% gross margin uplift			**8.3**	**17.7**	**28.2**	**39.5**
Scenario 2 (Base): 20% gross margin uplift			**8.6**	**18.5**	**29.4**	**41.2**
Scenario 2: 25% gross margin uplift			**9.0**	**19.3**	**30.6**	**42.9**

IQE (Non-LED - power electronics)						
Royalty rate approach - 31 Dec Y/E	**2016E**	**2017E**	**2018E**	**2019E**	**2020E**	**2021E**
IQE revenue (A$m) - Dec 31 Y/E	**209.9**	**221.2**	**241.1**	**267.7**	**302.6**	**348.1**
Growth (%)	13.3%	5.4%	9.0%	11.0%	13.0%	15.0%
BLG penetration rate (%)			5.0%	10.0%	15.0%	20.0%
Share of IQE's revenue covered by BLG (A$m)			**5.6**	**26.8**	**45.4**	**69.6**
Growth (%)				*378.1%*	*69.6%*	*53.4%*
Gross margin uplift using BLG's technology (%)			**20.0%**	20.0%	20.0%	20.0%
Value of revenue + GP uplift (A$m)			**6.7**	**32.1**	**54.5**	**83.6**
Growth (%)				*378.1%*	*69.6%*	*53.4%*
Royalty rate (%)			5.0%	5.0%	5.0%	5.0%
Total royalty revenue (A$m)			**0.3**	**1.6**	**2.7**	**4.2**
Growth (%)				*378.1%*	*69.6%*	*53.4%*
Royalty as % of benefit			*30.0%*	*30.0%*	*30.0%*	*30.0%*
Royalty Revenue Scenario Analysis (A$m)						
Scenario 1: 15% gross margin uplift			**0.3**	**1.5**	**2.6**	**4.0**
Scenario 2 (Base): 20% gross margin uplift			**0.3**	**1.6**	**2.7**	**4.2**
Scenario 3: 25% gross margin uplift			**0.3**	**1.7**	**2.8**	**4.4**

Source: Lumileds and IQE financial reports, S&P Capital IQ, Wilsons estimates

As observed above, we believe there is a significant recurring revenue opportunity for BluGlass if its technology successfully undergoes commercialisation. In combination with the large LED market opportunity, the scalable potential of the business appears quite promising for investors.

Price Objective		
Methodology	**Value per share**	**% weight**
DCF - Scenario 1 (royalty - 15% gross margin uplift)	$0.86	33.3%
DCF - Scenario 2 (royalty - 20% gross margin uplift)	$0.90	33.3%
DCF - Scenario 3 (royalty - 25% gross margin uplift)	$0.95	33.3%
Target price	**$0.90**	

Source: Wilsons estimates

Our scenario-based DCF analysis is largely driven by the growth from the potential retro-fitting and royalty revenue streams from Lumileds and IQE, with a modest growth in foundry revenues.

Being primarily an IP business, we believe BluGlass will develop into a high margin (40% EBITDA margin in FY19E) and high operating leverage company. We expect a modest uptick in employee expenses from FY18E-19E given the headcount requirements following commercialisation will likely increase slightly.

Following the completion of BLG's collaboration with Lumileds and IQE, BLG could potentially also receive an upfront payment. However, given the uncertainty of whether these payments will be made and their one-off nature, we have opted to exclude them from our analysis.

Wilsons is aware of the inherently high business and execution risk involved, and have reflected it in our cost of capital assumptions. We applied a relatively high WACC of 17.2% to our forecasted free cash flows for BLG.

Figure 20: BLG cost of capital calculation

WACC calculation and assumptions	
Risk free rate	4.5%
Market risk premium	5.5%
Equity beta	2.3x
Implied cost of equity:	**17.2%**
Cost of debt	6.0%
Tax rate (steady state)	30.0%
Cost of debt (after taxes)	4.2%
We:	100%
Wd:	0%
WACC	**17.2%**

Source: Wilsons estimates

Financial performance and forecast assumptions

Profit and loss forecasts

Figure 21: BLG forecasted revenue

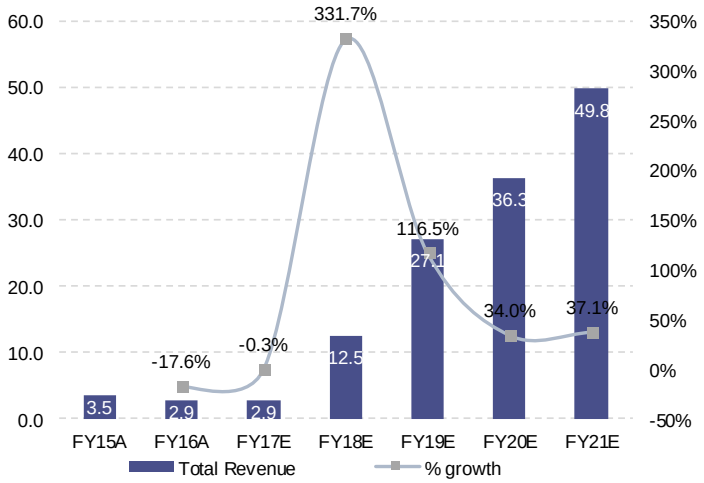
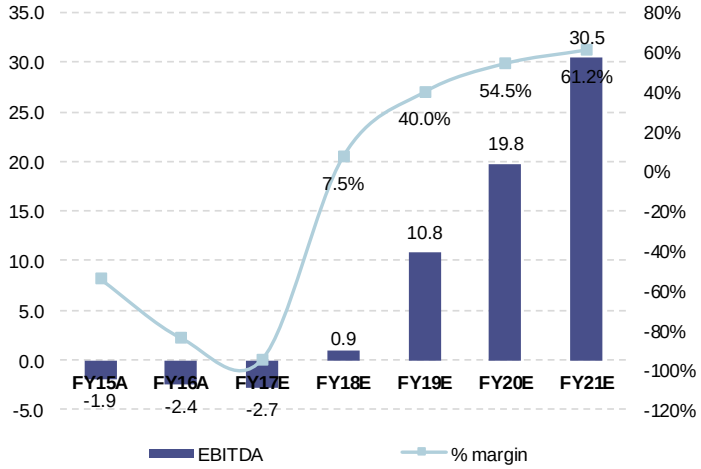


Figure 22: BLG forecasted EBITDA growth



Source: BLG annual reports, Wilsons Estimates

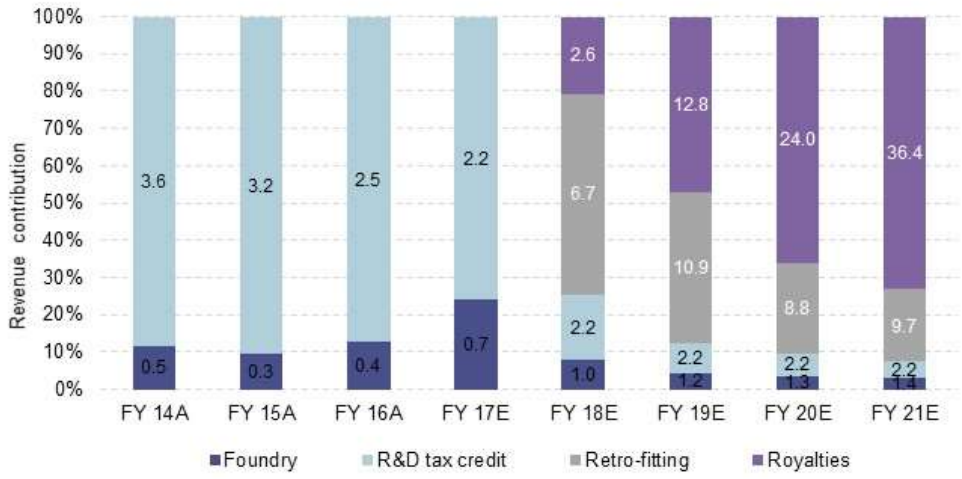
- The company currently generates small amounts of revenue from its foundry business and R&D tax rebates. Once BLG commercialises its technology, we believe the company will start generating retro-fitting and royalty revenue streams from its LED and non-LED manufacturing partners namely Lumileds and IQE.
- The company's revenue is expected to experience a significant step-up starting from FY18E. Royalty revenue is expected to constitute an increasing portion of total revenue over the next few years. We have not captured the revenue that could accrue from collaborations with new partners in the future.
    - **Lumileds collaboration**: The commercialisation from Lumileds collaboration is expected to start from H2'18E following the end of phase 2 of their existing agreement (assuming 6 months for the commercialisation process). Our broad-based estimates for the potential royalties from Lumileds is over $30m by FY21E.
    - **IQE collaboration**: The commercialisation from IQE collaboration is expected to start from FY19E following the end of their existing agreement (plus a couple months for commercial set-up). With a similar set of assumptions as in Lumileds deal, we expect royalty revenues of about $1.2m in FY19E, and $3.5m by FY21E.
- Our retro-fitting revenue forecasts suggest BLG will be able to generate $6.7m in FY18E to 9.7m in FY21E, driven by an increasing penetration rate of the global LED machines for sale from 2% to 5%.
- Based on our forecasts, we assume BLG will start paying taxes on their profits from FY21E due to their accumulated tax losses which they can use to offset their tax liability from FY18E-20E.

Figure 23: BLG P&L statement (FY15A – FY21E)

BLG P&L (A$m)							
Y/E: 30 Jun	**FY15A**	**FY16A**	**FY17E**	**FY18E**	**FY19E**	**FY20E**	**FY21E**
Total Revenue	**3.5**	**2.9**	**2.9**	**12.5**	**27.1**	**36.3**	**49.8**
% growth		*-17.6%*	*-0.3%*	*331.7%*	*116.5%*	*34.0%*	*37.1%*
Foundry	0.3	0.4	0.7	1.0	1.2	1.3	1.4
% growth		*11.3%*	*90.4%*	*40.0%*	*20.0%*	*10.0%*	*10.0%*
R&D tax credit	3.2	2.5	2.2	2.2	2.2	2.2	2.2
% growth		*-20.6%*	*-13.5%*	*0.5%*	*0.5%*	*0.5%*	*0.5%*
Retro-fitting revenue				6.7	10.9	8.8	9.7
% growth					*62.0%*	*-19.1%*	*10.0%*
Royalty revenue				2.6	12.8	24.0	36.4
% growth					*393.5%*	*87.4%*	*52.0%*
EBITDA	**-1.9**	**-2.4**	**-2.7**	**0.9**	**10.8**	**19.8**	**30.5**
% margin	*-54.2%*	*-84.1%*	*-94.7%*	*7.5%*	*40.0%*	*54.5%*	*61.2%*
% growth		*27.8%*	*12.3%*	*NM*	*1048.9%*	*82.4%*	*54.2%*
D&A	0.8	0.6	0.6	0.6	0.7	0.9	1.3
EBIT	**-2.7**	**-3.0**	**-3.3**	**0.3**	**10.1**	**18.8**	**29.2**
% margin	*-76.2%*	*-104.8%*	*-113.8%*	*2.8%*	*37.4%*	*51.9%*	*58.7%*
% growth		*13.3%*	*8.2%*	*NM*	*2807.1%*	*86.2%*	*55.1%*
Net interest income/(expense)	0.0	0.0	0.1	0.1	0.1	0.3	0.5
PBT	-2.7	-3.0	-3.2	0.5	10.2	19.1	29.7
Tax expense	0.0	0.0	0.0	0.0	0.0	0.0	-8.9
NPAT (norm.)	**-2.7**	**-3.0**	**-3.2**	**0.5**	**10.2**	**19.1**	**20.8**
Share based payments	-0.5	-0.4	-0.6	-1.6	-3.5	-4.7	-6.5
NPAT reported	**-3.2**	**-3.4**	**-3.8**	**-1.2**	**6.7**	**14.4**	**14.4**
Diluted EPS (norm.) (cps)	-0.9	-0.9	-0.9	0.1	2.6	4.9	5.3

Source: Wilsons estimates

Figure 24: BLG forecast revenue breakdown



Source: BLG company reports, Wilsons estimates

- Given BLG is primarily an IP-driven business, we expect it to have high operating leverage, leading to a positive EBITDA in FY18E as the company commercialises its technology.

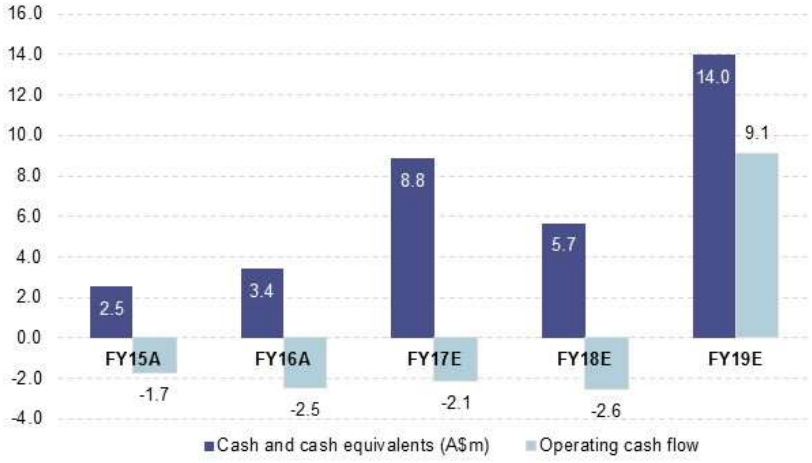
Balance Sheet

- The company does not have any debt on its books, nor does it plan to issue any debt in the upcoming years. We believe BLG has sufficient cash on its balance sheet ($10.5m at the end of H1'17) to fund its commercialisation plans.
- BLG raised over $7m in H1'17 which provides around three years of cash-burn visibility.
- Most of the fixed assets are comprised of intangible assets such as intellectual property and patents. The total value of these intangibles were $8.7m at H1'17.

Cash flow

- Net cash outflow from operations was $2.5m in FY16. We expect the company's net cash outflow from operations to remain relatively flat in FY17E, due to a reduction in grant revenue.
- We expect BLG's NPAT in FY18E to remain subdued given the onset of outsourced manufacturing costs attached to the retro-fitting revenue generated in H2'18E. This combined with a gradual rise in receivables as retro-fitting and royalty revenues kick in leads to a negative operating cash flow for the year.
- Net cash burn is expected to reduce from FY19E, when the current collaborations with Lumileds and IQE start to generate royalty income at a full run rate. We are forecasting BLG to become operating cash flow positive from FY19E provided they are successful in commercialising the RPCVD technology.
- Capex is expected to pick up slightly in FY18E but should grow at a low steady rate from FY19E given manufacturing will be outsourced to third parties.

Figure 25: Cash balance and operating cash flow



Source: Wilsons estimates

- Note that the FY17E cash balance is inclusive of the $5m institutional placement and $3.1m share purchase plan conducted during H1'17A (less transaction costs).

Appendix 1: Management and Board

Board

Dr William Johnson BS-Phy, MS-EE, PhD – Non-Executive Chairman

William has extensive experience in business development, M&A, technological leadership and general management experience in various organisations ranging from start-ups to Fortune 500 high-technology companies. He currently serves as president and CEO of SPTS Technologies, a manufacturer of capital equipment for the semiconductor and related micro-device industries. He had SPTS acquire a cornerstone investment in BLG and form a JV with the company in 2010 to solidify the plasma basis of the RPCVD process. He formerly held positions in marketing, technical and executive management positions with Ford Motor Co Scientific Research Laboratories, PerkinElmer Corp, Ulvac Corp, Varian Associates, Intevac Inc, Oryx Instruments and Materials Corp and Therma-Wave Inc. He was also founder and managing director of Crane Ridge Associates, a firm providing consulting and M&A guidance to high-tech clientele.

Mr Greg Cornelson BEc – Non-Executive Director

Greg is an economics and business development specialist and has held leadership positions in large multinationals as well as start-ups. He has held a number of non-executive director roles in companies listed in Australia. Greg was a former director of MOV Corporation.

Mr Chandra Cantamneni Msc, MS, MBA – Non-Executive Director

Chandra has over 30 years' experience in the semiconductor industry and has worked in engineering and senior management positions for some of the world's largest semiconductor companies. He was formerly the technical director for the University of California Los Angeles (UCLA)'s California Nano Systems Institutes. Before UCLA, Chandra was vice president of Worldwide Fab Operations of the US-based Peregrine Semiconductor Corporation.

Mr Vivek Rao MS-EE, BSc-Elec – Non-Executive Director

Vivek is a semiconductor capital equipment specialist with more than 21 years of experience in the global industry and is currently the Executive Vice President and Chief Operations Officer of SPT Micro-technologies. He is also the managing director of international subsidiaries in Germany, Taiwan, Singapore and Malaysia for SPT Micro-technologies.

Management

Mr Giles Bourne BA (Hons), MBA, FAICD – Chief Executive Officer and Managing Director

Giles is a senior executive with over 20 years of international business development experience in the clean-tech, technology and manufacturing sectors. He is a specialist in developing offshore business opportunities, setting up domestic and international partnerships, JVs and licensing deals, and securing inward expansion investment for Australian corporations. His role at BLG is to provide leadership as well as develop sales and marketing structures to support the commercialisation of the LED and solar technologies.

Dr Ian Mann PhD, MBA, MSc, BSc-Eng, FAICD – Chief Technology and Operations Officer

Ian has a PhD in polymer science and has extensive experience in managing and developing technology companies, and commercialising high-technology projects. He was previously the CEO of Bandwidth Foundry International Pty Ltd, where he worked on chip-based optoelectronics, while leading a commercial microfabrication foundry service for innovative Australian companies and research institutions.

Mr Stuart Uhlhorn BEc Dip Fin Mgt, FAICD, FCPA – Chief Financial Officer

Stuart has extensive experience in financial management, marketing, M&A and JV management and contract negotiation. He has worked with some leading companies across Australia, Europe and Asia. He was formerly the head of corporate services at Insurance Australia Group. Before that, he worked with Brambles, where he was responsible for several M&As in Australia and Europe. Stuart has played a crucial role in negotiations of the SPTS JV and has helped BLG secure funding of over USD 8m.

Dr Marie Wintrebert-Fouquet PhD – Chief Scientist

Marie is one of the founding scientists of BLG, having previously worked at Macquarie University in the sciences faculty for 10 years. She was closely involved in growing and characterising nitride-based thin films and has helped develop BLG's RPCVD process. Marie's expertise in crystal growth and her advanced material characterisation techniques are integral to the work conducted at BLG, where she has established all aspects of device design and fabrication, from modelling through to measurements.

Ms Stef Winwood – Investor Relations & Marketing Manager

Stef is an experienced, creative and strategic marketing and communications professional with more than 12 years' experience building brands and businesses. Over the past decade, Stef has specialised in technical communications for Fortune 500 companies as well as technology start-ups, translating complex technical information for non-technical audiences.

Appendix 2: Historic timeline

Date	Announcement
November 2012	Achieved proof of concept of its LED technology, now being produced with industry-equivalent electrical properties, significantly de-risking the technology.
December 2012	Received commitments for placement to institutional investors to raise USD 2.35m for commercialisation of its RPCVD technology for LEDs.
February 2013	Successfully produced p-type GaN films using RPCVD technology that met industry benchmarks.
July 2013	Received a grant of USD 3m under the Australian Federal Government's Clean Technology Innovation Program.
November 2013	Announced that it increased its operational capacity with the successful commissioning of a former production MOCVD system at the company's Silverwater facility.
December 2013	Received first customer revenue for foundry services.
July 2014	Succeeded in significantly improving interface challenge (key technical hurdle) for planned brighter LED milestone demonstration.
August 2014	Appointed CEO Giles Bourne as managing director; BLG brings online the scaled-up RPCVD system (BLG-300).
November 2014	Received first trial RPCVD epitaxy order and appoints international agent for custom MOCVD epitaxy.
April 2015	Convinced Veeco, the largest player in LED equipment manufacturing market, to evaluate RPCVD p-GaN for LED and power electronics applications.
May 2015	Succeeded in preliminary efforts to use RPCVD p-GaN for green LEDs, demonstrating potential performance advantages of low-temperature deposition for new, high-growth market; also shipped first RPCVD foundry customer order for green LEDs.
September 2015	Announced a key specialised epitaxy (foundry) customer committed to an order for estimated USD 300,000 of foundry development to be delivered over six months.
November 2015	Received a go-ahead for the next iteration of its evaluation with Veeco Instruments following positive initial results on 2-inch wafers.
March 2016	Entered into an exclusive collaboration with Lumileds, a LED market leader.
April 2016	Signed a collaboration agreement with HC SemiTek, a leading Chinese LED chip manufacturer, for multiple LED applications. BLG raised USD 3m of capital through a placement.
September 2016	Designed and implemented an upgraded RPCVD system, BLG-180, which aims to improve uniformity of thickness.
October 2016	Entered second phase of exclusive collaboration with Lumileds, also raised USD 5m in capital.
November 2016	Received USD 600,000 foundry order from a new customer, and signed an exclusive collaboration agreement with IQE, a global designer and manufacturer of advanced semiconductor wafer products.

BluGlass (BLG)

Business description

BluGlass (BLG) is an Australian company specialising in semiconductor manufacturing technology. Previously a research division of Macquarie University, the company was formed in 2005 with an aim to commercialise its proprietary technology. BLG has developed a method of growing semiconductor layers using Remote Plasma Chemical Vapour Deposition (RPCVD). The benefits of using RPCVD are increased device performance, lower manufacturing costs, and a more environmentally friendly process compared with today's technology. Importantly, the main benefit of RPCVD is its low temperature deposition of the semiconductor layers, resulting in brighter and more efficient light production compared with the incumbent MOCVD method. BluGlass is in the pre-commercialisation stage.

Investment thesis

BluGlass is an Australian technology company developing and commercialising a breakthrough, innovative semiconductor technology – RPCVD – to produce LEDs. RPCVD has the potential to lower the cost of production for LED manufacturers, and has applications in other markets namely power electronics and solar cells.

In 2016, BLG signed exclusive collaboration agreements with LED market leader Lumileds for the application of RPCVD. The company also recently signed a collaboration agreement with HC SemiTek, the largest LED chip manufacturer in China. In November 2016, BLG entered into an exclusive collaboration agreement with IQE, a leading manufacturer of advanced semiconductor products for electronics. These collaborations indicate that leading players in the industry see the potential for commercialisation in RPCVD.

Strong industry tailwinds at play: the LED lighting market is expected to reach USD 216bn by 2024, a CAGR of 28% from 2016, and global unit shipments of LED lamps and modules are set to increase at a CAGR of 19% from 2015-24. The global average price for LED lamps has declined significantly in recent years due to increasing competition, new entrants and incremental efficiency in the manufacturing process. These factors are expected to motivate LED manufacturers to trial BLG's technology to raise their bottom line.

Revenue drivers

- Adoption of RPCVD technology by MOCVD equipment and LED manufacturers
- Establishing retro-fitting and licensing agreements with LED and LED equipment manufacturing companies (Lumileds, Veeco)
- Potential to apply BLG's technology to the solar and power electronics (IQE) industries

Balance sheet

- Cash balance of $10.5m
- Intangibles of $8.7m

Margin drivers

- Successful commercialisation of RPCVD
- Establishing profitable retro-fitting and or licensing agreements
- Low capex required for retro-fitting operations

Board

- Mr Giles Bourne (Managing Director)
- Dr William Johnson (Non-Executive Chairman)
- Mr Gregory Cornelson (Non-Executive Director)
- Mr Chandra Kantamneri (Non-Executive Director)
- Mr Vivek Rao (Non-Executive Director)

Key issues/catalysts

- Transition from R&D to achieving commercial and market goals
- Developing commercial interest in RPCVD technology
- Industry acceptance
- Rapid growth in the LED lighting market
- Growth in GaN and SiC power electronics market

Management

- Mr Giles Bourne (Chief Executive Officer)
- Dr William Johnson (Chairman)
- Dr Ian Mann (Chief Technology and Operations Officer)
- Mr Stuart Uhlhorn (Chief Financial Officer)
- Dr Marie Wintrebert-Fouquet (Chief Scientist)

Risk to view

- Slow take-up of RPCVD technology
- Delays in reaching commercial agreements with collaborators
- Advances in competing/substitute technologies
- Technological hurdles
- Delays in reaching technological milestones

Contact details

Address: 74 Asquith St, Silverwater, NSW 2128 Australia
Phone: +61 2 9334 2300
Email: admin@bluglass.com.au
Website: www.bluglass.com.au

Disclaimers and disclosures

Recommendation structure and other definitions

Definitions at wilsonsadvisory.com.au/Disclosures.

Disclaimer

This document is being supplied to you solely for your information and no action should be taken on the basis of or in reliance on this document. Any advice contained in this document is general advice only and has been prepared by Wilsons without taking into account any person's objectives, financial situation or needs. Any person, before acting on any advice contained within this communication, should first consult with a Wilsons investment adviser to assess whether the advice within this communication is appropriate for their objectives, financial situation and needs. Those acting upon such information without advice do so entirely at their own risk.

Wilsons has not independently verified all of the information given in this document which is provided at a point in time and may not contain all necessary information about the company or companies covered in this report ("Companies"). Accordingly, no representation or warranty, express or implied, is made as to the accuracy or completeness of the information and opinions contained in this document. To the fullest extent permitted by law Wilsons, its related bodies corporate and their respective officers, directors, employees or agents, disclaim any and all liabilities for any loss or damage howsoever arising in connection with the use of this document or its contents. Any projections contained in this document are indicative estimates only. Such projections are contingent upon matters outside the control of Wilsons (including but not limited to economic conditions, market volatility and company-specific fundamentals) and therefore may not be realised in the future. Past performance is not an indication of future performance.

This report does not constitute an offer or invitation to purchase any securities and should not be relied upon in connection with any contract or commitment whatsoever.

Wilsons and Wilsons Corporate Finance Limited (ABN 65 057 547 323: AFSL 238 383) and their associates may have received and may continue to receive fees from the Companies in relation to corporate advisory, underwriting or other professional investment services. Please see relevant Wilsons disclosures at wilsonsadvisory.com.au/Disclosures.

Neither Wilsons nor its research analysts received any direct financial or non-financial benefits from the Companies for the production of this document. However, Wilsons' research analysts may attend site visits and/or meetings hosted by the Companies. In some instances the costs of such site visits or meetings may be met in part or in whole by the Companies if Wilsons considers it is reasonable given the specific circumstances relating to the site visit or meeting.

Wilsons advises that at the date of this report, its directors, associates and employees may have relevant interests in the Companies.

Wilsons and its related bodies may trade securities in the Companies as principal.

Wilsons contact

Phone: 1300 655 015. Website: wilsonsadvisory.com.au.