BOE Varitronix (710 HK)

Global auto display leader riding on smart cockpit trend

BUY

Target Price	**HK$26.0**
Up/Downside	**55.7%**
Current Price	**HK$16.7**

BOE Varitronix (BOEVx) is the global largest automotive display leader capturing 18% market share in 1H22 (by shipment area). Leveraging BOE Group's leading technology and strong client base, BOEVx is rapidly transforming into an integrated automotive smart cockpit display solution provider. Backed by its industry leadership and solid product roadmap, we believe BOEVx is well positioned to benefit from upgrade trend in the booming smart cockpit market. We estimate BOEVx's revenue/earnings to grow at 33%/47% CAGR over 2021-24E, driven by 37% CAGR in automotive display segment (89% of FY22E sales). We initiate with BUY and TP of HK$26.0 based on 25x FY23E P/E. Upcoming catalysts include smart cockpit product launches, client wins and capacity expansion in Chengdu plant.

- **Global auto display leader to benefit from smart cockpit boom.** BOEVx is the global largest automotive display leader and offers a broad range of high-end products, including BD cell display, AMOLED display, mini-LED and display systems. Driven by the smart cockpit boom and strong growth of Chinese NEV clients, we expect more high-end display products to enter mass production and contribute growth in the next few years.

- **Leveraging BOE's resources and Chengdu capacity expansion.** BOEVx continues to leverage strong support in R&D, supply chain and panel resources from BOE Group, and capacity expansion of Chengdu new production base will allow BOEVx to capture new orders and ODM orders from parent company in FY23-24E.

- **Solid roadmap in smart cockpit to drive LT growth.** BOEVx's next-gen smart cockpit display technologies include Privacy on Demand (POD) technology, auto-grade 4.8K naked-eye 3D display and AR-HUD etc. We believe BOEVx's technology leadership in automotive display solutions will continue to pave way for its long-term growth in smart cockpit industry.

- **Valuation/Key risks.** We estimate revenue/ earnings to grow at 33%/47% CAGR over 2021-24E, driven by 37% CAGR in automotive display. We initiate BUY with TP of HK$26.0 based on 25x FY23E PE. Upcoming catalysts include NEV booming demand, product penetration and capacity expansion. Risks include capacity ramp up delay, macro weakness and slow technology upgrade.

Earnings Summary

(YE 31 Dec)	FY20A	FY21A	FY22E	FY23E	FY24E
Revenue (HK$ mn)	4,527	7,738	10,565	14,081	18,011
YoY growth (%)	26.7	70.9	36.5	33.3	27.9
EBITDA (HK$ mn)	216	513	760	1,032	1,382
Net profit (HK$ mn)	68.6	327.8	553.7	756.4	1,032.4
YoY growth (%)	174.3	377.6	68.9	36.6	36.5
EPS (Reported) (HK$)	0.09	0.45	0.76	1.04	1.42
Consensus EPS (HK$)	0.00	0.45	0.71	0.98	1.35
P/E (x)	24.9	14.2	21.9	16.0	11.7
P/B (x)	0.4	0.8	2.0	1.5	1.4
Yield (%)	215.8	236.7	74.9	187.1	255.4
ROE (%)	2.5	10.7	15.6	18.8	22.4
Net gearing (%)	(61.6)	(34.3)	(40.1)	(13.5)	(21.1)

Source: Company data, Bloomberg, CMBIGM estimates

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Stock Data

Mkt Cap (HK$ mn)	12,293.2
Avg 3 mths t/o (HK$ mn)	15.3
52w High/Low (HK$)	18.86/5.84
Total Issued Shares (mn)	737.0

Source: FactSet

Shareholding Structure

BOE Technology Group	54.3%
Ko Chun Shun	10.0%

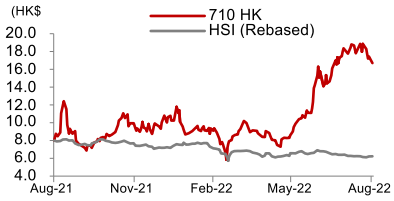
Source: HKEx

Share Performance

	Absolute	Relative
1-mth	-8.6%	-7.6%
3-mth	84.9%	95.8%
6-mth	83.3%	110.4%

Source: FactSet

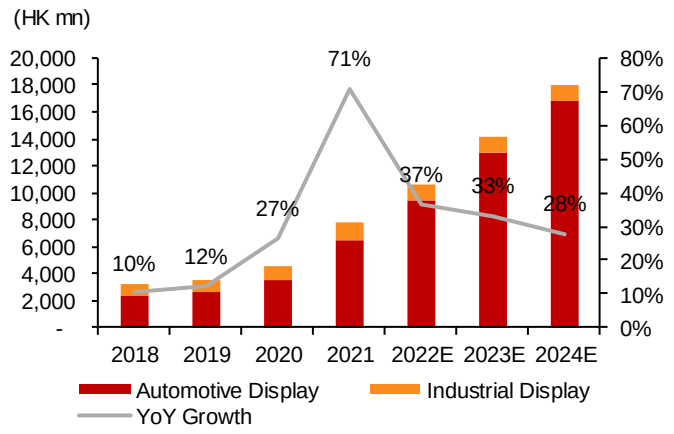
12-mth Price Performance



Source: FactSet

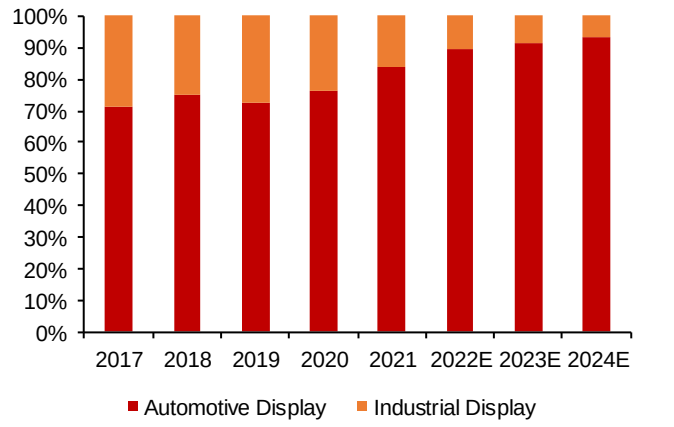
Focus Charts

Figure 1: BOEVx revenue forecast



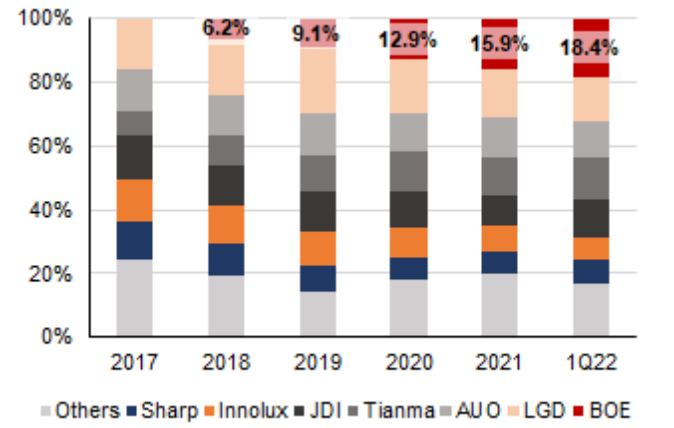
Source: Company data, CMBIGM estimates

Figure 2: BOEVx revenue breakdown



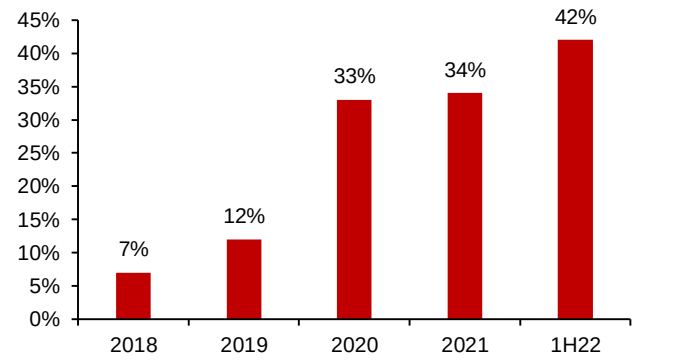
Source: Company data, CMBIGM estimates

Figure 3: BOEVx is global No.1 in auto display market by shipment area



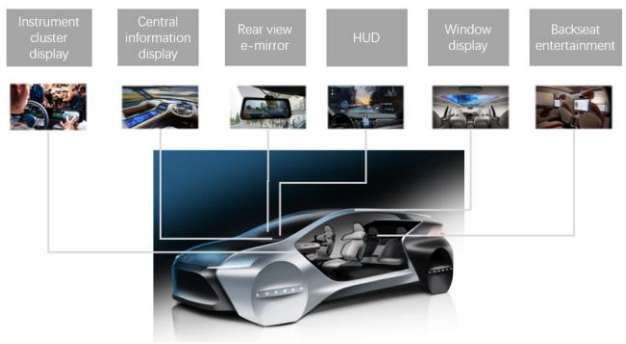
Source: Company data, CMBIGM estimates

Figure 4: BOEVx's penetration of sales volume from China Top-20 auto OEM



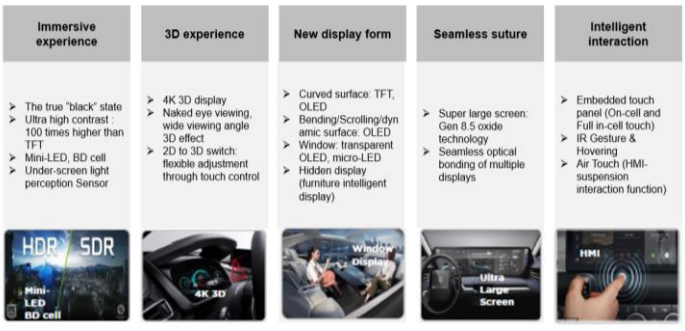
Source: Company data, CMBIGM estimates

Figure 5: BOEVx automotive product offerings



Source: Company data, CMBIGM estimates

Figure 6: BOEVx's smart cockpit display technology



Source: Company data, CMBIGM estimates

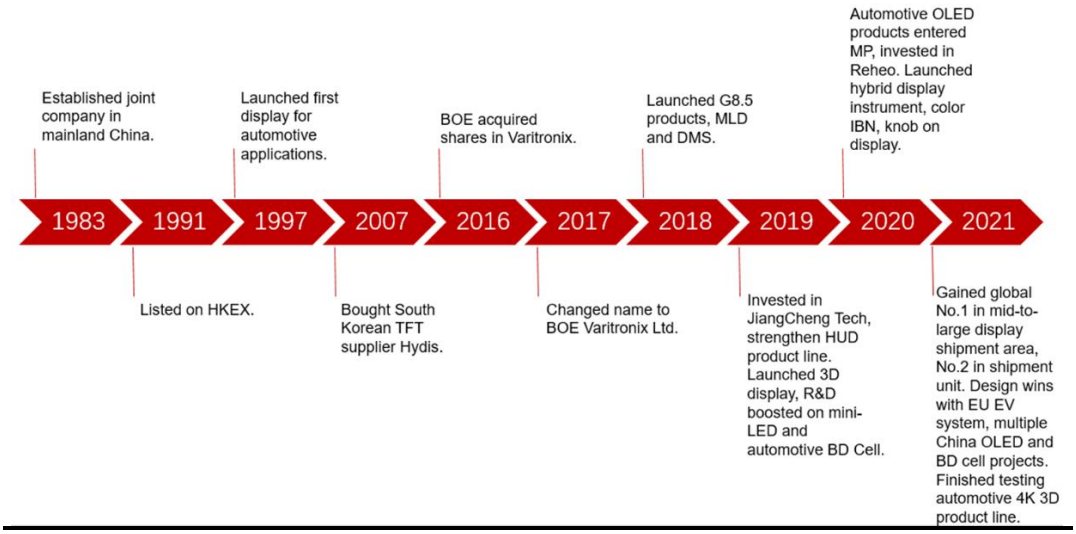
Global automotive display leader riding on smart cockpit trend

Established in 1978 and listed on HKEX in 1991, BOE Varitronix (BOEVx), formerly Varitronix International, is a global leading automotive display provider, focusing on TFT and touch panel display products. After acquisition by BOE Group in 2016, BOEVx is now BOE's sole sales platform of automotive business, and rapidly transforms into a leading integrated automotive smart cockpit display solution provider.

Leveraging BOE's leading technology and client base, BOEVx became global No.1 automotive display supplier in 2021, in terms of total shipment area and total mid-to-large sized shipment, based on Omdia. China is now BOEVx's largest market, accounting for 71% of revenue. BOEVx's products covered 42% of sales from China Top 20 auto OEM in 1H22 (vs 34% in 2021), and shipped to 52% of China's high-end NEV as of 1H22.

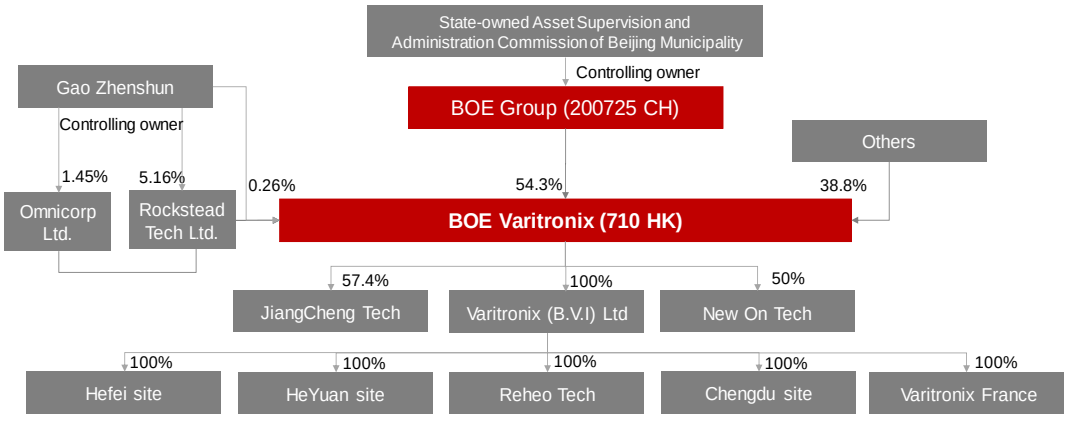
BOE Group is the largest shareholder with 54.3% shares. BOE Group's dominant shareholder is state background entity Beijing State-Owned Assets Supervision and Administration Commission. BOEVx reported 71%/378% YoY revenue/NP growth in 2021, and 51%/164% YoY revenue/NP growth in 2022.

Figure 7: BOEVx development history



Source: Company data, CMBIGM estimates

Figure 8: BOEVx shareholding structure



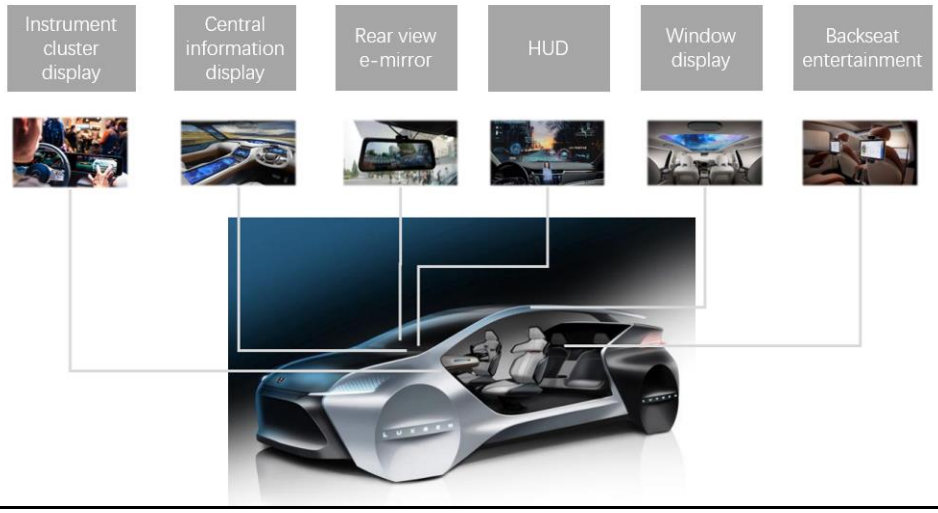
Source: Wind, CMBIGM estimates

Well-established product portfolio in smart cockpit display solutions

BOEVx offers a wide range of automotive display products since 1997, including passive solutions, TFT-LCD, touch solution and optical bonding solutions. Automotive display products accounted for 92% of 1H22 revenue.

With established product portfolio in automotive display products, BOEVx is now expanding rapidly into smart cockpit solutions, which include digital instrument cluster display, center information display, HUD (head-up display), rear view and side view E-mirror display and highly integrated digital cockpit display in free form, curved design and touch integration.

Figure 9: BOEVx automotive product offerings

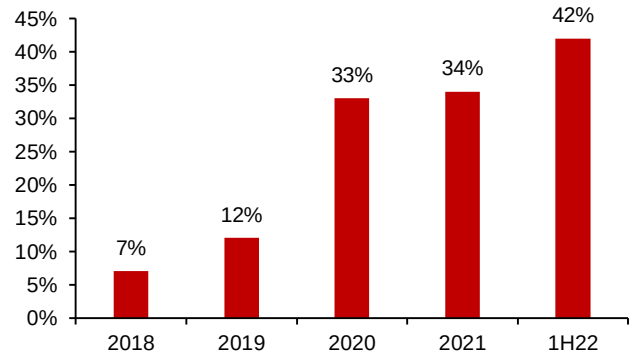


Source: Company data, CMBIGM estimates

Extensive client coverage and rapid expansion in Chinese auto OEMs

BOEVx has established a broad client base, covering global auto OEMs from China, Europe, the US and Korea. BOEVx generated 68%/16%/6%/4% of revenue from China/ Europe/US/Korea markets in 1H21. In China market, BOEVx's products covered 42% of sales volume from China's Top 20 auto OEM in 1H22 (vs 34% in 2021), and shipped to 52% of China's high-end NEV as of 1H22. BOEVx's domestic customers include Chery, Li, Xpeng, BYD, NIO, SAIC, FAW Group, Geely and Chang'an.

Figure 10: BOEVx's penetration of sales volume from China Top-20 auto OEM



Source: Company data, CMBIGM estimates

Figure 11: Strategic partnership with China auto OEM and supply chain

Source: Company, CMBIGM estimates

Global automotive display: large-sized/multi screens, OLED/ mini-LED upgrade

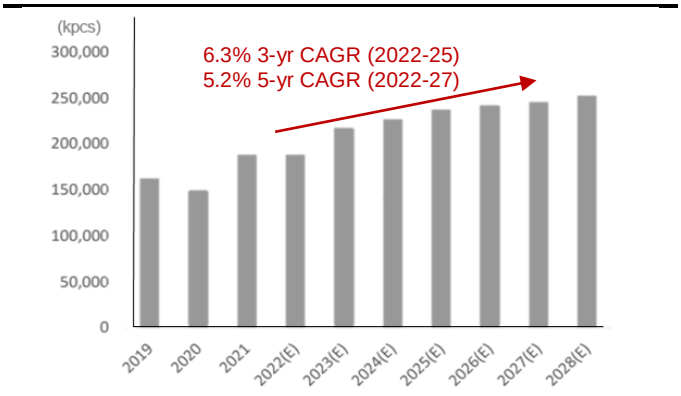
Trend 1: Smart cockpits to drive display size and multi screens

Smart cockpit solutions have progressed rapidly in recent years, and upgrade of in-vehicle features revolutionize the driving and in-car user experience. Smart cockpits consist of features such as center stack display, human machine interface (HMI), head-up-display (HUD), in-car entertainment, and navigation systems. In the era of software-defined cars, we believe displays will become the key enabler of smart cockpit solutions.

Looking ahead, smart cockpit is poised to expand from luxury cars to mass market models in coming years, and we believe automotive display industry will be driven by rising penetration of infotainment displays, digital instrument cluster displays and HUDs.

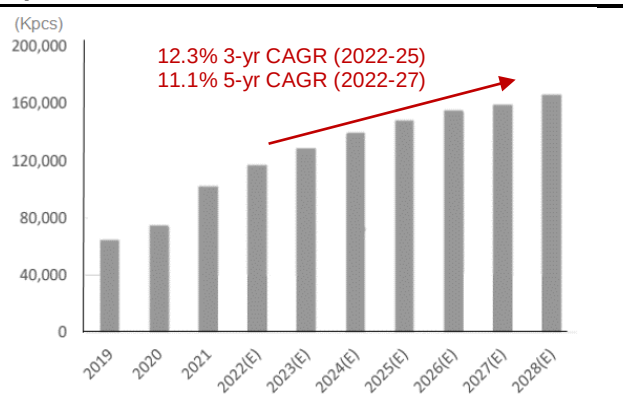
According to Omdia, automotive display global shipment is expected to grow at 6.3% CAGR over 2022-25E and 5.2% CAGR over 2022-27, while mid-to-large (>=8") sized automotive global shipment will grow at 12.3% 3-year CAGR and 11.1% 5-year CAGR. Major growth drivers include increasing adoption of rear-seat entertainment, e-mirror, instrument cluster displays, HUDs and center stack displays. As such, average number of displays in new car models is expected to increase from 1.95 in 2021 to 2.66 in 2025.

Figure 12: Global auto display shipment forecast



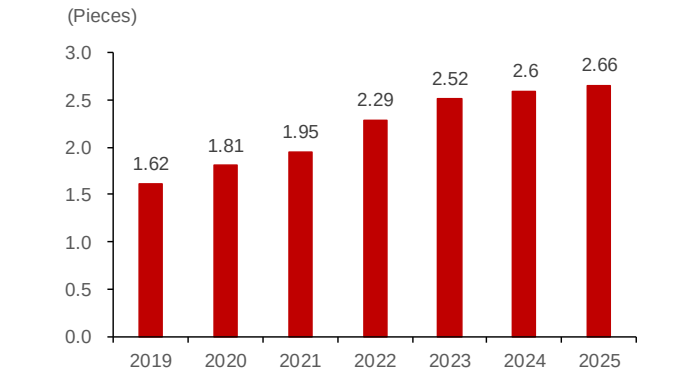
Source: Omdia, CMBIGM estimates

Figure 13: Global mid-to-large auto display shipment forecast



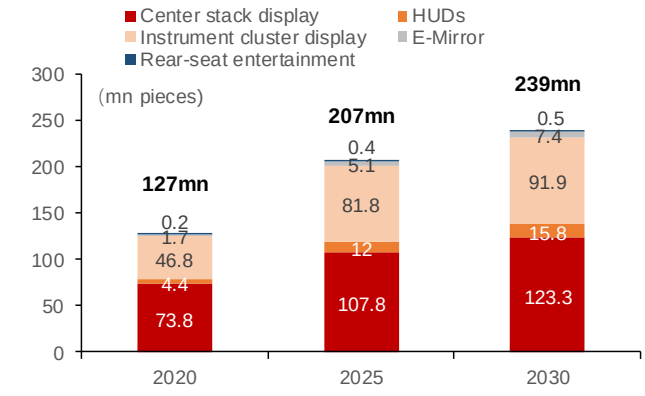
Source: Omdia, CMBIGM estimates

Figure 14: Average number of displays equipped in new car models during 2019-25



Source: Zuosi Auto Research, CMBIGM estimates

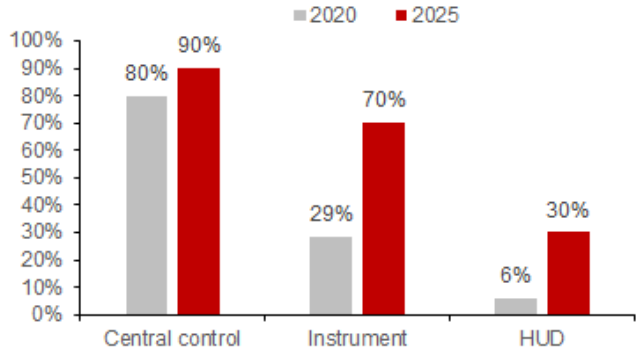
Figure 15: Automotive display shipment forecast by display type during 2020-30



Source: Omdia, CMBIGM estimates

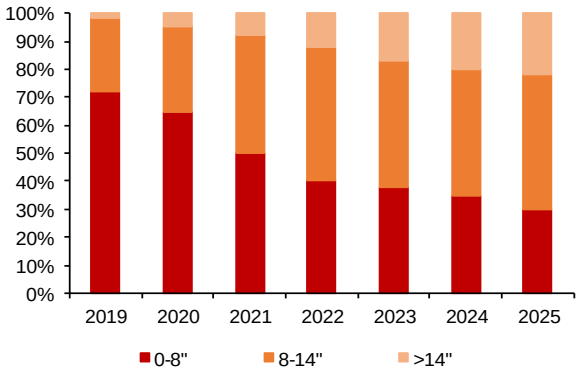
In addition, digitization of cockpit panels will accelerate adoption of larger displays, touch panels, HUD and navigation systems. For instance, Tesla's large central control panel has become the mainstream for cockpit design in recent years. Penetration of auto display size larger than 8" is expected to reach 72% in 2025 (vs. 49% in 2021), while extra-large display (>14") penetration will reach 20% in 2025, based on ZuoSi Automotive Research.

Figure 16: Rising penetration of automotive central control, instrumental cluster and HUD displays



Source: Qi Che Zhi Jia, ICV Tank, CMBIGM estimates

Figure 17: Automotive central stack displays mid-to-large display size penetration trend



Source: Zuosi Auto Research, CMBIGM estimates

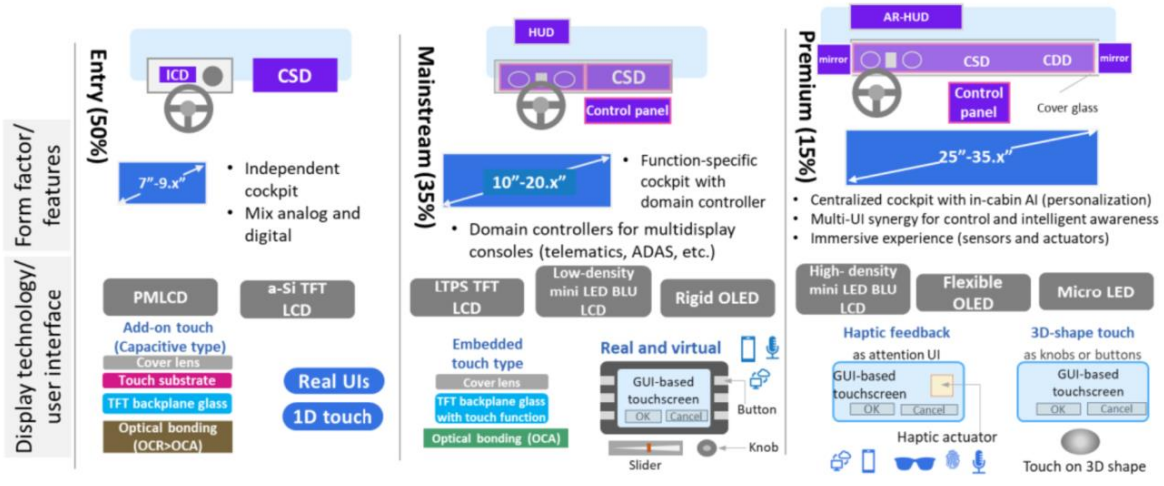
Figure 18: Li Auto One equipped with four pieces of BOE Vx's automotive displays

Source: Company data, CMBIGM estimates

Figure 19: Example of extra-large screen in future automotive cockpit design

Source: Company data, CMBIGM estimates

Figure 20: Smart Cockpit design and technology trend by segment (2021-26)

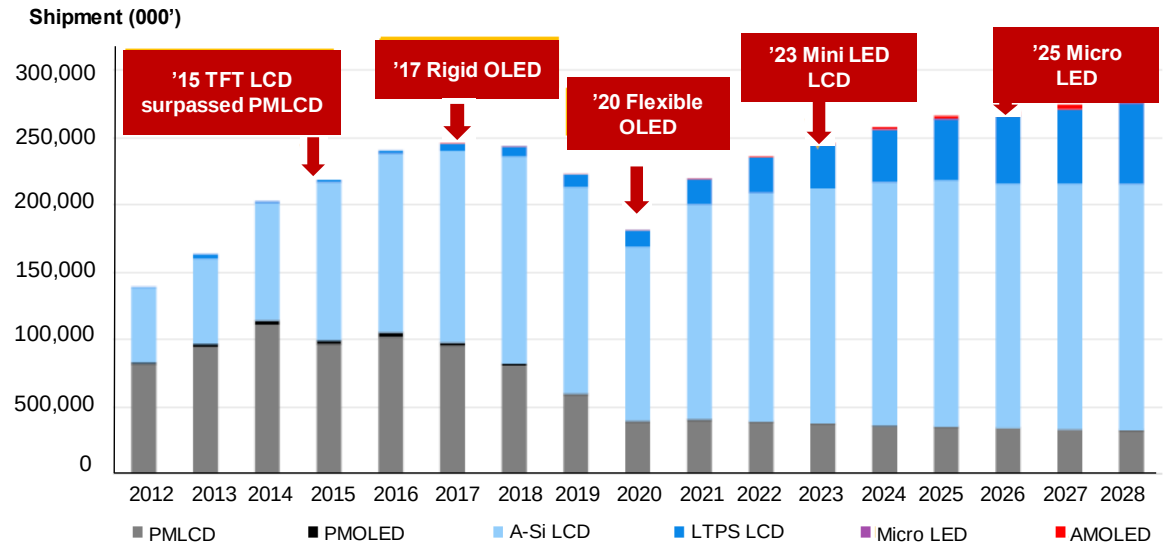


Source: Omdia, CMBIGM estimates

Trend 2: Technology upgrade from TFT-LCD to OLED and mini-LED

TFT-LCD display is mainstream technology, and OLED/mini-LED is catching up. TFT-LCD (Thin Film Transistor-Liquid Crystal Display) display technology currently dominates the automotive display market, which is based on a-Si and LTPS technologies. In recent years, OLED, mini-LED and micro-LED are gaining traction. OLED technology does not require back panel and color filters, and provides better contrast, lightness and color spectrum, compared to traditional TFT-LCD.

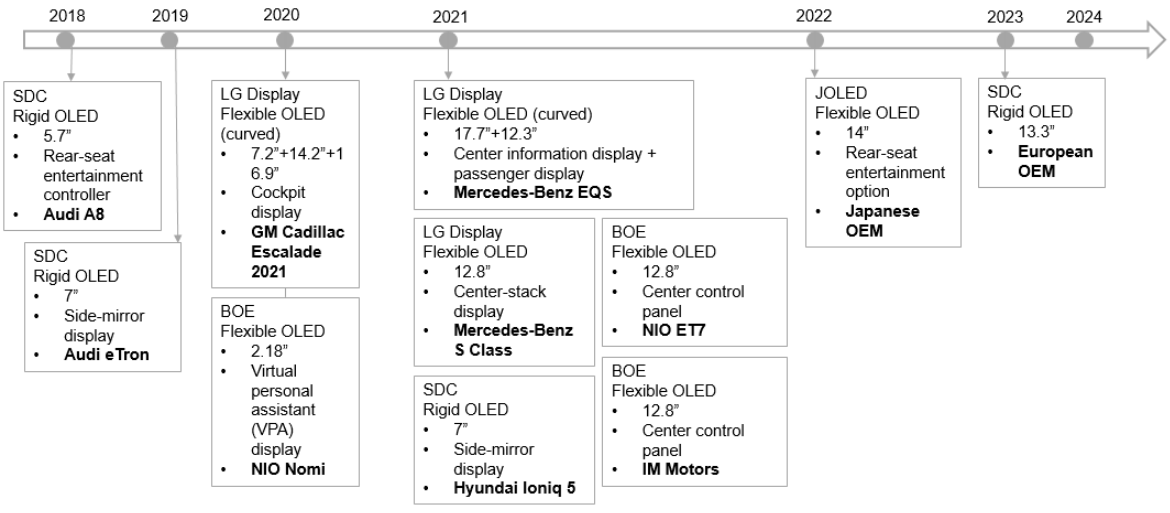
Figure 21: Automotive display shipment forecast by technology (2012-28)



Source: Omdia, CMBIGM estimates

OLED automotive display is dominated by SDC (Korea), BOE (China) and JOLED (Japan). All three companies have strong parent companies with broad business coverage (Samsung for SDC, BOE for BOE Vx and Denso for JOLED). OLED display is a rising trend for automotive display in recent years, and all key players benefited from the technology, capacity and client resources from their parent companies.

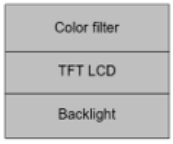
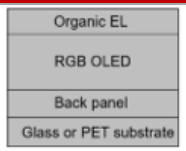
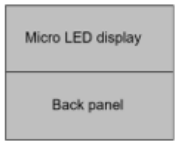
Figure 22: OLED technology application timeline in automotive display field



Source: Omdia, CMBIGM estimates

Mini-LED/micro-LED are emerging automotive display solutions. Mini-LED display offers better contrast and lightness level than LCD, and has lower cost than rigid-OLED. It also delivers longer product lifetime and lower energy consumption. Micro-LED has the best performance in terms of lightness, contrast level, product thickness and product lifetime. According to Omdia, mini-LED is expected to be adopted in automotive display in 2023, while micro-LED is still now at an initial stage and will enter automotive market in 2026.

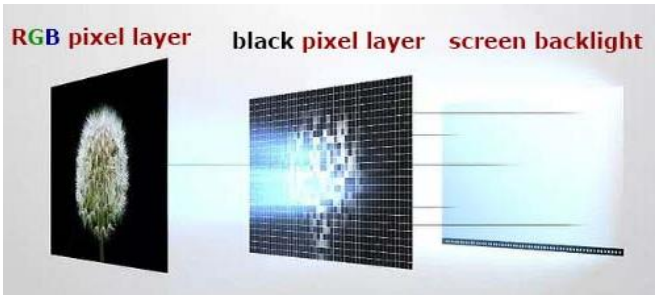
Figure 23: Display technology comparison

Technology	TFT-LCD	OLED	Mini LED	Micro LED
Structure				
Light type	Backlight	Organic light	Backlight/ Organic light	Organic light
Lightness level	Low	Medium	Mid-to-high	High
Contrast level	Low	High	Mid-to-high	High
Thickness level	Thick	Thin	Medium	Ultra-thin
Product life	Medium	Short	Long	Long
Cost	Low	Mid-to-high	Medium	High
Maturity level	Mature	Mature	Mass production	Near MP

Source: LEDinside, CMBIGM estimates

BD Cell is an emerging display technology developed by BOE. BD Cell is a display technology introduced by BOE, which can greatly improve the contrast ratio of display and mark a breakthrough in TFT-LCD technology. BOE features two layers of monochrome and color cells for the display, and uses pixel division technology and micron-level dimming technology to control the images more finely so that the display can have an ultra-high contrast ratio of up to million-level and show the most natural colors. BD Cell display technology shows finer images and consumes 40% less power than OLED display of the same size so it has strengths in terms of both image quality and cost. BD-Cell technology was successfully mass-produced on TV in 2019, and is gradually expanded into various fields such as automotive display.

Figure 24: BOE's BD Cell structure



Source: tab-tv.com, CMBIGM estimates

Figure 25: BOE's BD Cell technology

ITEM	OLED	HDR LCD	BD-Cell
BLU Type	No need	D-LED BLU	E-LED BLU
Partition	Panel Resolution	500~1000	2,000,000
Contrast	150,000 : 1	≤20,000 : 1	>40,000 : 1
L0	<0.001nits	~0.3nits	<0.01nits
Quality	I/S Bad Life time short	I/S Good Life time Long	I/S Non Life time Long

Source: displaydaily.com, CMBIGM estimates

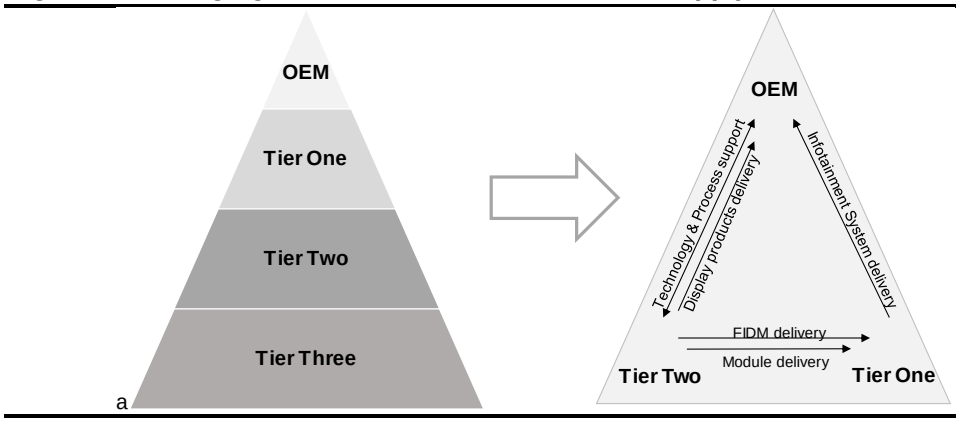
Trend 3: Display suppliers to drive innovations in smart cockpit

Automotive display suppliers to strengthen partnership with OEMs and tier ones. Traditional business model of in-car display supply chain is hierarchical, resulting in long lead time and long delivery time. In recent years, auto OEMs have started to strengthen corporations with automotive display suppliers for more timely product delivery, which can also shorten product development cycle and enhance R&D corporations.

For example, AUO and Innolux started to directly supply mini-LED display modules to US auto OEMs, and Samsung Display is working closely with Audi to develop OLED products. BOEVx has established a close relationship with Chinese auto OEMs, and we believe the emerging business model will accelerate the development of smart cockpit systems in new-gen car models in China. In particular, for premium car models, we believe display panel suppliers will become the key driver of smart cockpit innovation.

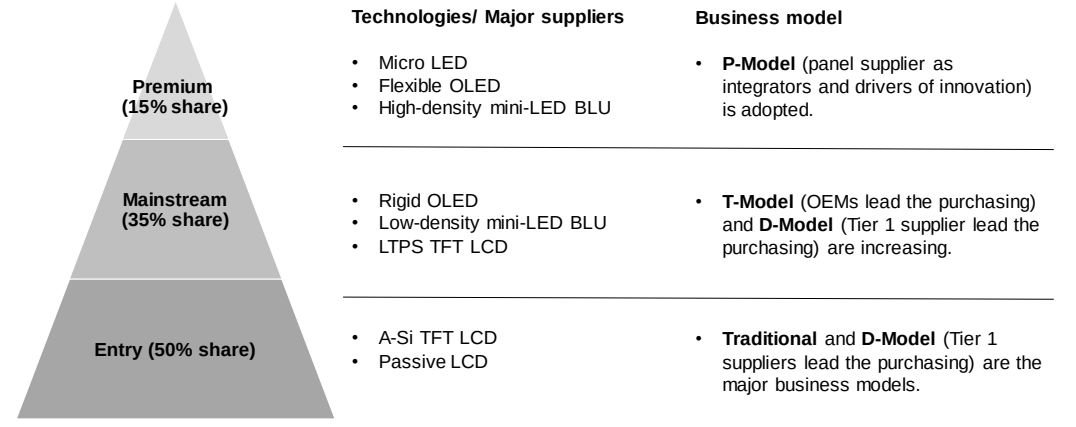
Innovation and smart cockpit to drive long-term growth. As the automotive display industry leader, BOEVx is investing to drive innovation of smart cockpit display solutions. BOEVx has increased investments in Reheo Tech and JiangCheng Tech in 2022-21 to enhance its technology in full lamination and HUD products, and it aims to further develop smart cockpit system product portfolio through more investments in the future.

Figure 26: Emerging business model in automotive supply chain



Source: Omdia, CMBIGM estimates

Figure 27: Display technology and business model of auto supply chain



Source: Omdia, CMBIGM estimates

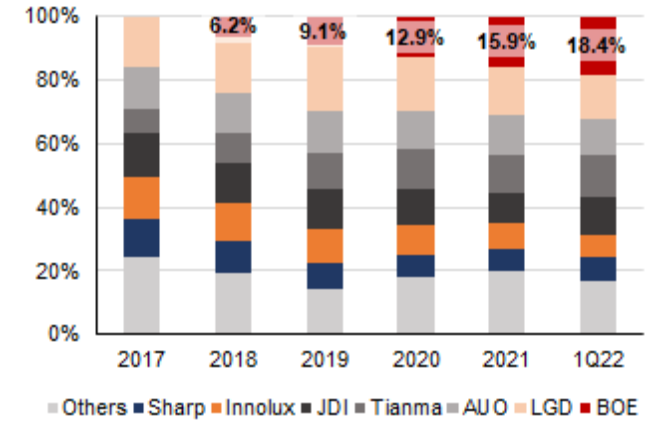
Competitive landscape

BOE is the front runner with rapid share gain on NEV localization

BOEVx is global No.1 automotive display supplier by shipment area since 2021, capturing 18.4% market share in 1Q22. It has been gaining global market share over the past three years, surpassing LGD to become the market leader in 2021 (vs. No.7 in 2018).

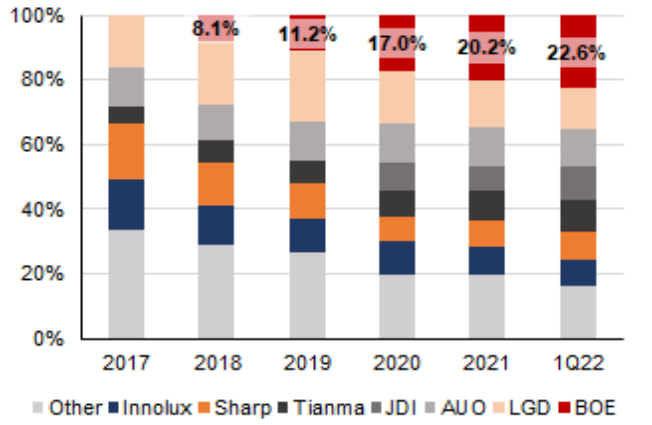
BOEVx also has leading position over its peers in mid-to-large sized automotive display with 22.6% market share in 1Q22. It was ranked global No.5 in 2018 and surpassed LGD to become global No.1 in 2021.

Figure 28: 2017-1Q22 Global automotive display market share by shipment area



Source: Omdia, CMBIGM estimates

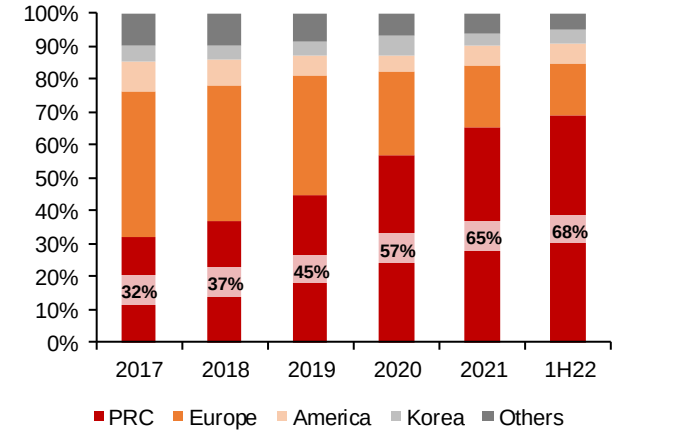
Figure 29: Global mid-to-large automotive display (>=8") by shipment area



Source: Omdia, CMBIGM estimates

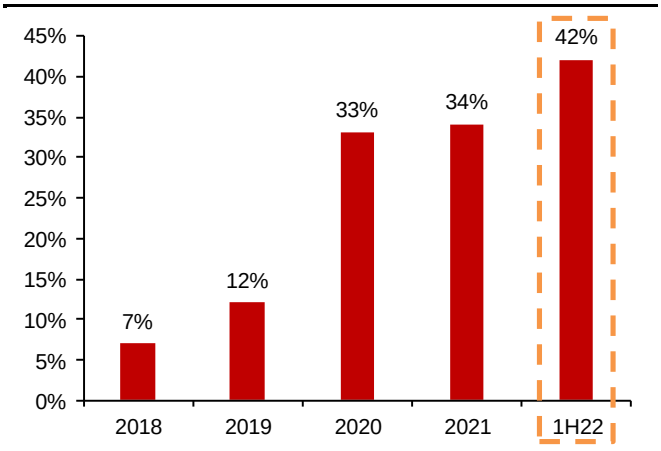
BOEVx is rapidly expanding coverage of Chinese auto OEMs. BOEVs have been increasing coverage of Chinese auto customers since 2018, after technology transition from traditional passive solution to TFT solution. Penetration of BOEVx's products in Chinese top 20 auto OEMs reached 42% in 1H22 (vs 34% in 2021). Domestic auto OEM customers include Chery, Li, Xpeng, BYD, NIO, SAIC, FAW Group, Geely and Chang'an.

Figure 30: BOEVx sales by geographic region



Source: Company data, CMBIGM estimates

Figure 31: BOEVx's coverage of China's top 20 auto OEMs



Source: Company data, CMBIGM estimates

Growth Drivers

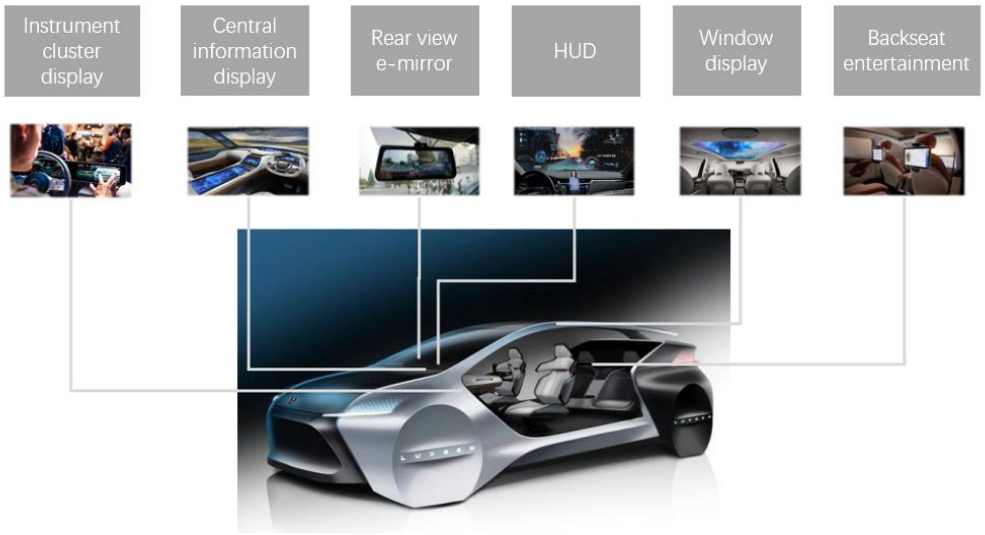
Beneficiary of automotive display upgrade and Chinese NEV growth

Well positioned to capture automotive display upgrade opportunities

Backed by technology leadership in automotive display solutions, BOEVx is well positioned to benefit from display upgrade trend by automobile manufacturers. BOEVx offers a broad range of high-end automotive display products, including BD cell display, AMOLED display, mini-LED and display systems, which will drive ASP upside in new project pipeline.

We expect gradual mass production of high-end products will contribute to growth in next few years. In China, BOEVx won large-sized AMOLED display projects for Chinese NEV OEMs and system display solution for Chinese auto OEMs in 1H22. In Europe and the US, BOEVx won a large-sized display system solution for commercial vehicles from an emerging NEV OEM in the UK. In addition, it also received an order with display using BD cell technology. Overall, we estimate BOEVx's revenue to grow 31% CAGR during 2022-24E, mainly driven by 35% CAGR in automotive display segment (89% of FY22E sales).

Figure 32: BOEVx automotive display product offerings



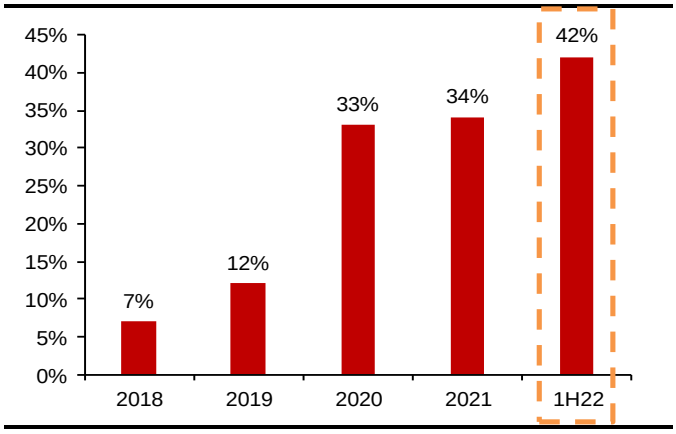
Source: Company data, CMBIGM estimates

Extensive coverage of Chinese NEV customers

As the global largest automobile display supplier, BOEVx has established an extensive client coverage, including traditional and new energy vehicle (NEV) OEMs. In particular, leveraging strong domestic client base from BOE Group since 2017, BOEVx has been ramping up penetration into Chinese auto OEMs, and its product coverage for Chinese Top 20 auto OEMs increased to 42% in 1H22 (vs 7% in 2018, and 34% in 2021). Its major Chinese clients include SAIC-GM, FAW Group, Geely, Changan, BAIC Group, Chery, Yanfeng, Neusoft and BCS etc.

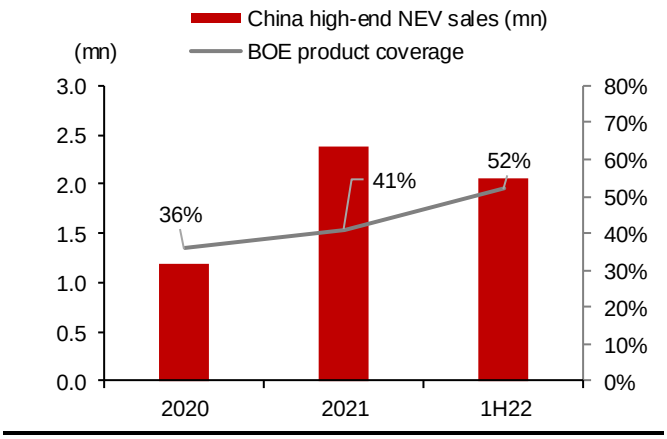
In addition, strong growth of Chinese NEV clients also boosted demand for high-end display products in recent years. BOEVx's product coverage for domestic NEV sales rose to 52% in 1H22 (vs 41% in 2021), and major customers include NIO, Li Auto, Xpeng, Nezha and BYD etc. We expect strong sales volume from Chinese NEV will sustain demand for BOEVx's high-end products in next few years.

Figure 33: BOE's coverage in China Top 20 auto OEMs



Source: Company data, CMBIGM estimates

Figure 34: BOE's product coverage of China NEV



Source: Company data, CMBIGM estimates

Leveraging BOE's resources and Chengdu capacity expansion

Strong support in R&D, supply chain and panel resources from BOE Group

BOEVx currently sources TFT/OLED panels from BOE Group for display modules, and BOEVx is BOE's sole distribution platform of automotive modules and system products. BOE Group has eight production lines for automotive panels: Beijing (Gen 5 TFT), Ordos (Gen 5.5 AMOLED), Mian Yang (Gen 6 OLED), Nanjing (Gen 8.5 TFT), Chengdu (Gen 4.5 TFT), and Hefei (Gen 5 TFT, Gen 8.5 TF, Gen 6 OGS). We believe BOE's extensive panel resources will ensure stable supply and quality assurance of BOEVx's display products, which offers a competitive advantage over its peers.

BOE also provides other support to BOEVx: 1) R&D: TFT/OLED and next-gen display technology; 2) supply chain management: driver IC and component procurement during shortage; 3) capacity: BOEVx orders will be prioritized in case of panel supply shortage.

Figure 35: BOE and BOEVx automotive display production locations

Location	Product Line	Site Name	Capacity	Production Timeline	Total Investment
Beijing	Gen 5 a-si TFT-LCD	B1	60K/month	2005	RMB11.0bn
Ordos	Gen 5.5 LTPS/AMOLED	B6	60K/month	2014	RMB 22.0bn
Mian Yang	Gen 6 OLED	B11	48K/month	2019	RMB 46.5bn
Nanjing	Gen 8.5 OXIDE TFT-LCD	B18	60K/month	2015	RMB 29.2bn
Cheng Du	Gen 4.5 a-si TFT-LCD	B2	45K/month	2009	RMB 3.4bn
	Automotive display module			2023	RMB 2.5bn
He Fei	Gen 6 a-si TFT-LCD	B3	90K/month	2010	RMB 17.5bn
	Gen 8.5 a-si TFT-LCD/oxide TFT	B5	100K+/month	2014	RMB 28.5bn
	Gen 6 OGS	TM1	60K/month	2014	RMB 5.4bn
	Automotive module				
	Optical bonding	Reheo			
	AR-HUD and W-HUD	Jiang Cheng		2022	RMB 2.5bn
He Yuan	Monochrome LCD				
	Automotive module				
	Touch panel/ Optical bonding				
	In-car systems products				
Hong Kong	R&D, marketing center, headquarter				

Source: Company data, CMBIGM estimates, *red highlights BOEVx production bases, others belong to BOE Group

Capacity expansion in automotive display module in Chengdu

To capture business opportunities and expand market share in the automotive display industry, BOEVx announced to expand its TFT and touch panel display module capacity in Chengdu. It is jointly invested by the BOE Group and BOEVx Varitonix, with total cost of RMB2.5bn.

Chengdu new production base started construction in Jan 2022, and Phase I will enter mass production in 1Q23E, focusing on 5-inch to 35-inch display modules. Mgmt. expected early production to begin in 4Q22E to ensure mass production in FY23E.

Annual capacity is expected to reach 14.4mn pieces, which will increase total capacity by 30-40%. We believe new capacity will allow BOEVx to capture new orders and ODM orders from parent company in 2023-24E.

Figure 36: BOEVx's new automotive display base in Chengdu

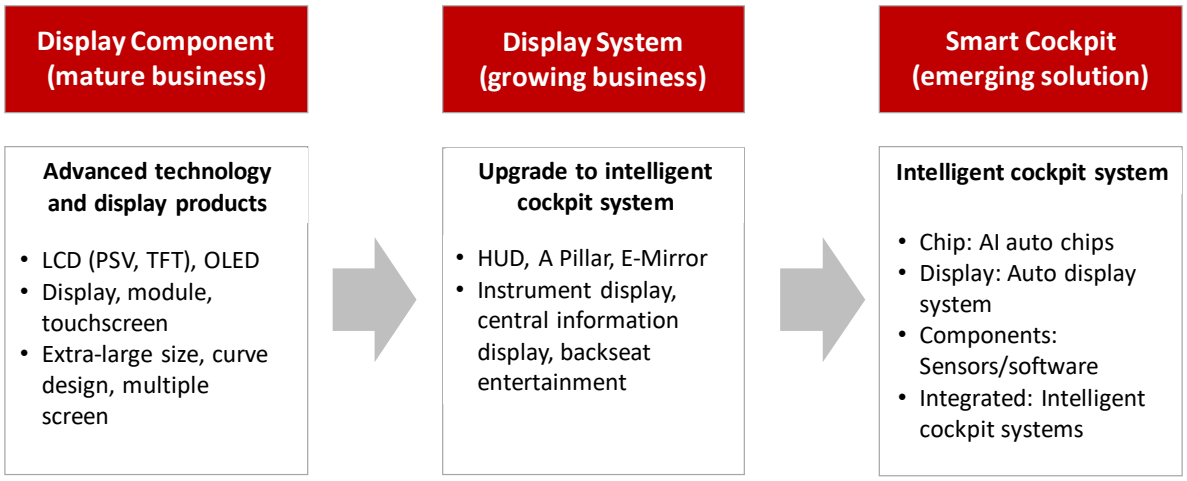
Source: Company website

Solid roadmap in smart cockpit to drive LT growth

Digitalization and upgrade of driver/passenger experience in smart cockpit become a major trend in automotive industry, and rapid development of NEV has triggered changes in automotive architecture and redefined smart cockpits.

With a vision to become a leading automotive smart cockpit display solution provider, BOEVx has upgraded its display product portfolio into smart cockpit display system in recent years. In a long run, BOEVx aims to provide one-stop smart cockpit solutions based on “chip, panel & component complex” ecosystem, which integrate AI autonomous driving chips, auto display systems and sensor/software into a smart cockpit system.

Figure 37: BOEVx’s product strategy: from display component to smart cockpit



Source: Company data, CMBIGM estimates

1) Automotive display components:

BOEVx provides basic passive solution, optical bonding technology and one-stop solution for automotive display. In-car display products include digital instrument cluster display, center information display, HUD (head-up display) and rear view and side view E-mirror display. BOEVx invested in Reheo Tech in 2020 to strengthen optical bonding technology.

2) Automotive display systems

Riding on the smart cockpit trend, BOEVx started to transform from tier-2 to tier-1 supplier to offer smart cockpit display and system solution: 1) panel display systems include instruments, central control and back-end entertainment, and 2) image systems include HUD, A Pillar and E-Mirror. Several display system projects with Chinese OEMs have entered mass production in 2021.

3) Automotive smart cockpit solutions

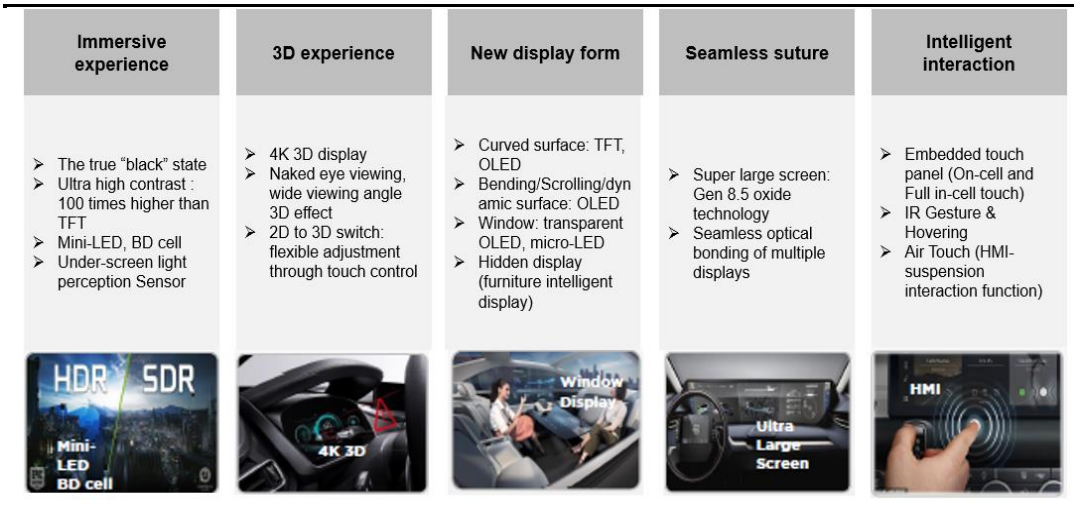
To extend its footprint into auto smart cockpit market, BOEVx invested in Jiangcheng Tech in 2021, which offers AR-HUD and display assistant system products for smart cockpit solution. This company has commenced mass production of an AR-HUD project for a Chinese auto OEM in 1H22.

BOEVx's leadership in next-gen smart cockpit display technology

Looking ahead, we believe BOEVx's technology leadership in automotive display solutions will continue to pave way for its long-term growth in smart cockpit industry.

- **Free-form curved display solutions:** BOEVx obtained first project win from a well-known European auto OEM, which demonstrated recognition from customers.
- **Privacy on Demand (POD) technology:** POD makes it possible to switch between Privacy mode and Public mode, and drivers would not be distracted by entertainment contents on Co-Driver Display (CDD). BOEVx showcased its prototype in CES 2022.
- **Auto-grade 4.8K naked-eye 3D display:** It provides visually attractive 3D display performance, more viewpoints, wider FOV, and algorithm adjustable depth. Naked-eye 3D display combined with contactless gesture control can greatly improve user experience. BOEVx revealed its first prototype in CES 2022.
- **Augmented Reality Heads-Up-Display (AR-HUD):** BOEVx leveraged its leadership in LCD to launch after-market monochrome HUD products in high-volume HUD market in 1H22. BOEVx also launched its first AR-HUD product for mass production in 1H22, and started to plan for next-gen HUD such as 3D and lightguide technology.

Figure 38: BOEVx's next-gen smart cockpit display technology



Source: Company data, CMBIGM

Figure 39: BOEVx's auto smart cockpit solutions

Source: Company data

Figure 40: BOEVx's 4K 3D display at CES 2022

Source: Company data

Financials forecasts

Expect net profit to grow 69%/37%/37% YoY in FY22/23/24E

We estimate revenue to grow 37%/33%/40% YoY in FY22/23/24E, backed by 37% CAGR in automotive display segment given strong auto smart cockpit display demand and rapid capacity expansion.

We expect net profit to grow 69%/37%/37% YoY in FY22/23/24E, given EBITDA margin improvement on economies of scale and better efficiency. Our FY22-24E EPS are 5-8% above consensus given our more bullish view on automotive upgrade demand and smart cockpit solution.

Figure 41: P&L forecast

US$ mn	2021	1H22	2H22E	2022E	1H23E	2H23E	2023E	2024E
Revenue	**7,738**	**4,831**	**5,734**	**10,565**	**6,373**	**7,708**	**14,081**	**18,011**
YoY	*70.9%*	*51.0%*	*26.4%*	*36.5%*	*31.9%*	*34.4%*	*33.3%*	*27.9%*
Automotive display	**6,509**	**4,335**	**5,110**	**9,445**	**5,852**	**7,052**	**12,904**	**16,776**
YoY	*88.7%*	*68.2%*	*30.0%*	*45.1%*	*35.0%*	*38.0%*	*36.6%*	*30.0%*
Industrial display	**1,228**	**496**	**624**	**1,120**	**521**	**655**	**1,176**	**1,235**
YoY	*14.0%*	*-20.3%*	*3.0%*	*-8.8%*	*5.0%*	*5.0%*	*5.0%*	*5.0%*
Operating profit	**350**	**275**	**321**	**596**	**357**	**455**	**812**	**1,122**
OPM (%)	*4.5%*	*5.7%*	*5.6%*	*5.6%*	*5.6%*	*5.9%*	*5.8%*	*6.2%*
…YoY	*397.0%*	*187.8%*	*26.2%*	*70.3%*	*29.8%*	*41.6%*	*36.1%*	*38.2%*
Net profit	**328**	**251**	**303**	**554**	**335**	**422**	**756**	**1,032**
NPM (%)	*4.2%*	*5.2%*	*5.3%*	*5.2%*	*5.3%*	*5.5%*	*5.4%*	*5.7%*
…YoY	*377.6%*	*163.8%*	*30.1%*	*68.9%*	*33.4%*	*39.3%*	*36.6%*	*36.5%*

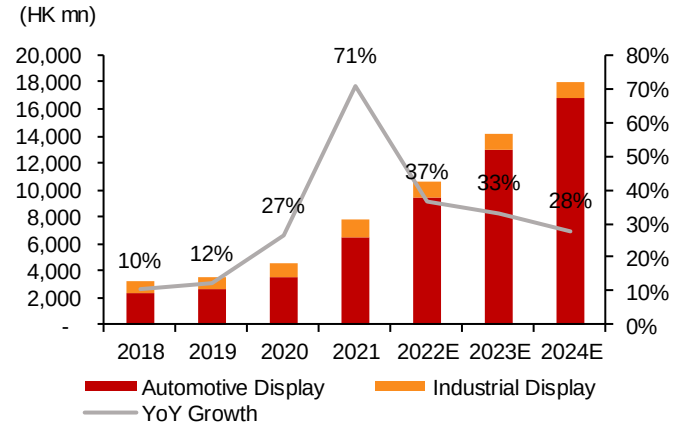
Source: Company data, CMBIGM estimates

Figure 42: CMBIGM estimates vs consensus

	CMBIGM			Consensus			Diff (%)		
US$ mn	FY22E	FY23E	FY24E	FY22E	FY23E	FY24E	FY22E	FY23E	FY24E
Revenue	10,565	14,081	18,011	10,303	13,203	16,654	2.5%	6.6%	8.1%
Operating profit	596	812	1,122	564	787	1,078	5.8%	3.2%	4.1%
Net profit	554	756	1,032	524	726	989	5.7%	4.3%	4.4%
EPS (US$ cents)	76.16	104.04	142.00	70.50	97.63	135.14	8.0%	6.6%	5.1%
Operating margin	5.6%	5.8%	6.2%	5.5%	6.0%	6.5%	0.2 ppt	-0.2 ppt	-0.2 ppt
Net Margin	5.2%	5.4%	5.7%	5.1%	5.5%	5.9%	0.2 ppt	-0.1 ppt	-0.2 ppt

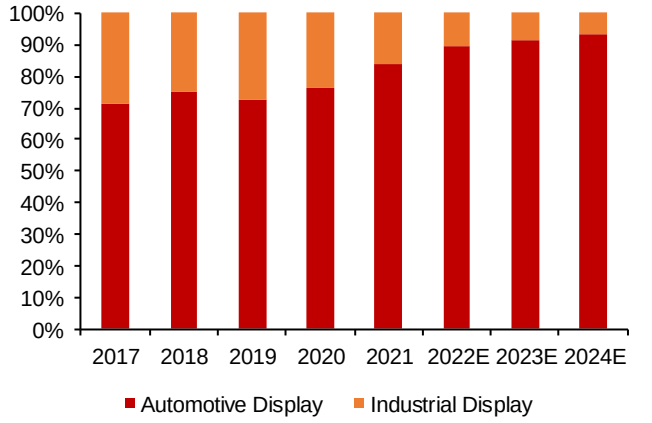
Source: Company data, CMBIGM estimates

Figure 43: BOEVx revenue forecast



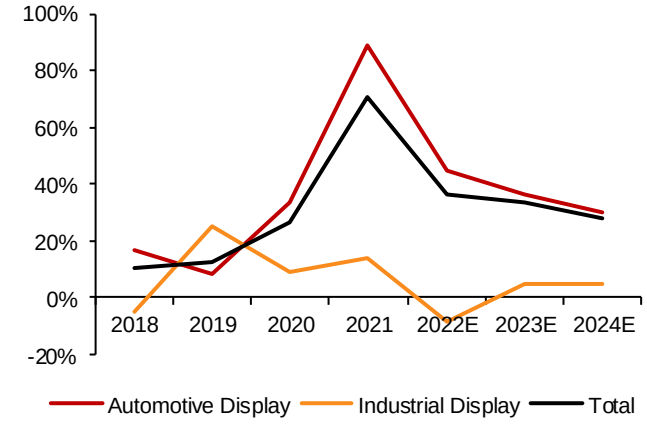
Source: Company data, CMBIGM estimates

Figure 44: BOEVx revenue breakdown



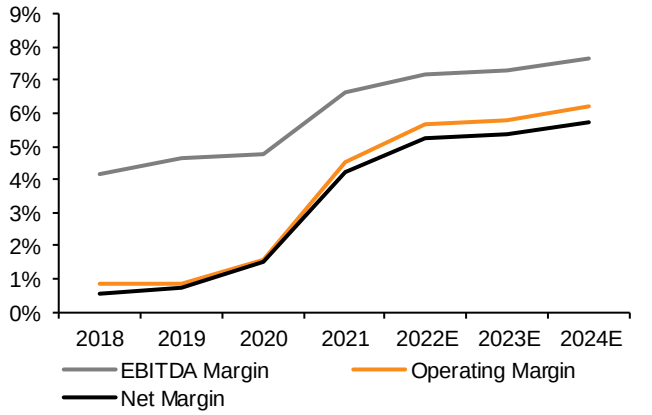
Source: Company data, CMBIGM estimates

Figure 45: Revenue growth by segment



Source: Company data, CMBIGM estimates

Figure 46: Margin trends



Source: Company data, CMBIGM estimates

Valuation

We initiate BUY with TP of HK$26.0 based on 25x FY23E PE, given 47% 2021-24E EPS CAGR and improving ROE to 22% in 2024E (vs 15% in 2022).

We believe BOE Varitronix will benefit from acceleration in product penetration in both traditional and new energy vehicle customers, continuous technology upgrade to meet intelligent cock-pit display demand and Chengdu's new plant capacity expansion. In the long term, we are positive about auto display system products and smart cockpit display solutions to drive growth.

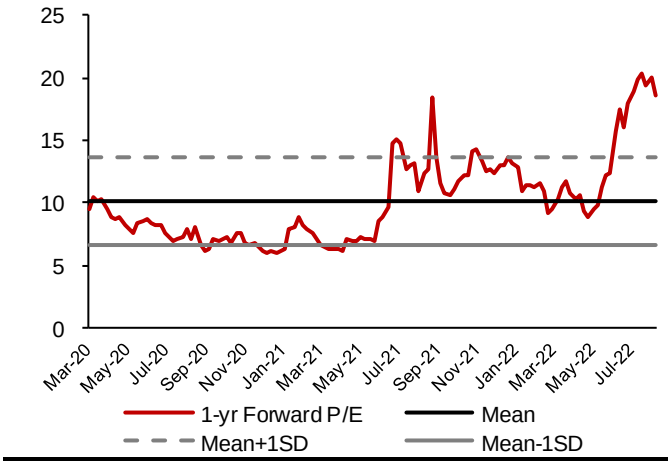
Upcoming catalysts include NEV booming demand, product penetration and capacity expansion. Risks include slower capacity ramp, macro weakness, and slower display technology upgrade.

Figure 47: Peers' valuation

Company	Ticker	Rating	Market Cap US$(mn)	Price (LC)	TP (LC)	Up/Down -side	P/E (x) FY22E	P/E (x) FY23E	P/B (x) FY22E	P/B (x) FY23E	ROE (%) FY22E	ROE (%) FY23E
BOE Varitronix	710 HK	BUY	1,633	16.70	26.0	56%	21.9	16.1	2.0	1.5	15.5	18.6
LDG	LPL US	NR	4,122	5.76	NA	NA	-	-	-	-	(8.7)	-
AUO	2409 TT	NR	5,145	16.15	NA	NA	-	-	0.6	0.7	(3.5)	(4.6)
Tianma	000050 CH	NR	3,456	9.65	NA	NA	18.7	16.2	0.7	0.7	5.4	5.3
Sunny Optical	2382 HK	HOLD	14,663	104.90	102.3	-2%	29.7	20.6	4.5	3.8	15.4	18.6
Wuhu Token	300088 CH	NR	2,615	7.31	NA	NA	15.5	12.3	2.1	1.8	12.9	15.4
Infovision	688055 CH	NR	2,463	5.07	NA	NA	-	-	-	-	-	-
Truly	732 HK	NR	731	1.75	NA	NA	4.3	3.4	0.5	0.4	10.6	12.4
			Average				**19.0**	**14.3**	**2.1**	**1.8**	**6.8**	**11.0**

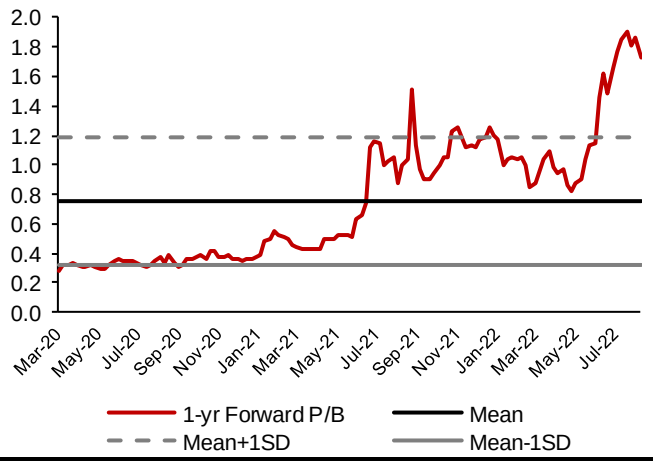
Source: Bloomberg, CMBIGM, * TP under review

Figure 48: 12M forward P/E band



Source: Company data, CMBIGM estimates

Figure 49: 12M forward P/B band



Source: Company data, CMBIGM estimates

Appendix

Management team mainly consists of members who have substantial experience working in BOE Group. The Executive Director and Chairman Dr. Gao Wenbao joined Beijing BOE Technology Ltd, the subsidiary of BOE Group. He has extensive experience in R&D, product and production management experience. The Executive Director and Chief Executive Officer Mr. Su Ning joined BOE Group since 2005 with substantial experience in module techniques and various business application areas. He was appointed as Co-chief Executive Officer in 2016 and redesignated to the Chief Executive Officer of the company in 2019.

Figure 50: BOEVx management profile

Name	Role	Education	Professional experience
Dr. Gao Wenbao	Executive Director and Chairman	Doctor Degree in Microelectronics and Solid-state Electronics from Jilin University	Joined BOE since 2003, over 20 years of display product experience, appointed as an Executive Director and the Chairman in September 2018
Ms. Ko Wing Yan	Executive Director, Co-chief Executive Officer, a member of Remuneration Committee, director of various subsidiaries of the Group	Bachelor Degree in Economics and Mathematics from Mount Holyoke College and a Master Degree in Finance from the Imperial College	Over 7 years of banking experience and extensive experience in the securities and capital market, appointed as an Executive Director of the Company in October 2014 and redesignated from a Co-chief Executive Officer of the company to the Vice Chairlady of the Company in January 2019
Mr. Su Ning	Executive Director and Chief Executive Officer, member of the Nomination Committee and director of various subsidiaries of the Group	Master Degree in Engineering from the Graduate School of Chinese Academy of Science	Joined BOE since 2005, appointed as Executive Director and Co-chief Executive Officer of BOEVx in 2016, redesignated to the Chief Executive Officer of the company in 2019. Currently the general manager of automotive SBU of the Display Business Group of BOE
Dr. Shao Xibin	Non-executive Director, Chief new product officer of Display Business Group of BOE	Doctor Degree in Condense matter physics from Changchun Institute of Physics, Chinese Academy of Sciences	From 1994 to 2006, worked at Changchun Institute of Physics, Chinese Academy of Sciences, Tohoku University and Jilin North Color Crystal Display Co., Ltd. Joined BOE since 2006, held several product and technology development roles
Mr. Jin Hao	Non-executive Director, Head of the production and sales management center of Display Business Group of BOE and Display Device of BOE	Bachelor Degree in Trade Economy from Northeast Forestry University	Joined BOE since 2003, worked as a department head of sales planning management department BOE Optoelectronics
Mr. Zhang Jianqiang	Non-executive Director, head of financial operation management of Display Business Group of BOE and regional financial director of BOE in Hefei	Master Degree in Business Administration from Anhui University of Technology	Joined BOE since 2004, worked as chief of taxation section and financial controller of BOE subsidiaries

Source: Company data, CMBIGM estimates

Financial Summary

INCOME STATEMENT	2019A	2020A	2021A	2022E	2023E	2024E
YE 31 Dec (HK$ mn)						
Revenue	**3,574**	**4,527**	**7,738**	**10,565**	**14,081**	**18,011**
Operating expenses	**3,545**	**4,456**	**7,388**	**9,969**	**13,269**	**16,889**
Operating profit	**29**	**70**	**350**	**596**	**812**	**1,122**
EBITDA	**166**	**216**	**513**	**760**	**1,032**	**1,382**
Other income/expense	(1)	(2)	(0)	0	0	0
Others	(1)	(1)	(1)	(1)	0	0
Pre-tax profit	**28**	**68**	**349**	**595**	**812**	**1,122**
Income tax	(3)	(1)	(39)	(76)	(89)	(123)
After tax profit	**25**	**69**	**328**	**554**	**756**	**1,032**
Net profit	**25**	**69**	**328**	**554**	**756**	**1,032**
Adjusted net profit	**25**	**69**	**328**	**554**	**756**	**1,032**

BALANCE SHEET	2019A	2020A	2021A	2022E	2023E	2024E
YE 31 Dec (HK$ mn)						
Current assets	**2,974**	**3,307**	**4,853**	**5,063**	**6,634**	**7,107**
Cash & equivalents	1,538	1,628	2,267	1,717	2,085	1,552
Account receivables	883	1,158	1,744	2,243	3,071	3,726
Inventories	533	503	833	1,094	1,469	1,820
Other current assets	19	18	9	9	9	9
Non-current assets	**560**	**523**	**690**	**973**	**1,329**	**1,765**
PP&E	504	467	583	866	1,223	1,658
Other non-current assets	55	56	107	107	107	107
Total assets	**3,533**	**3,830**	**5,543**	**6,035**	**7,964**	**8,871**
Current liabilities	**762**	**1,037**	**2,168**	**2,231**	**3,665**	**3,883**
Account payables	749	1,023	2,136	2,199	3,632	3,851
Tax payable	1	0	17	17	17	17
Other current liabilities	12	14	15	15	15	15
Non-current liabilities	**20**	**25**	**29**	**29**	**29**	**29**
Other non-current liabilities	20	25	29	29	29	29
Total liabilities	**782**	**1,063**	**2,198**	**2,261**	**3,694**	**3,913**
Share capital	184	184	184	184	184	184
Other reserves	2,568	2,526	2,848	3,311	3,841	4,563
Total shareholders equity	**2,751**	**2,767**	**3,346**	**3,774**	**4,270**	**4,958**
Total equity and liabilities	**3,533**	**3,830**	**5,543**	**6,035**	**7,964**	**8,871**

CASH FLOW	2019A	2020A	2021A	2022E	2023E	2024E
YE 31 Dec (HK$ mn)						
Operating						
Profit before taxation	**28**	**68**	**349**	**595**	**812**	**1,122**
Depreciation & amortization	137	147	160	193	234	285
Change in working capital	133	104	217	(696)	230	(787)
Others	(5)	(1)	(10)	(76)	(89)	(123)
Net cash from operations	**265**	**253**	**665**	**16**	**1,187**	**497**
Investing						
Capital expenditure	(69)	(56)	(247)	(475)	(591)	(720)
Others	23	28	(8)	0	0	0
Net cash from investing	**(46)**	**(28)**	**(254)**	**(475)**	**(591)**	**(720)**
Financing						
Dividend paid	(7)	(191)	(36)	(91)	(227)	(310)
Others	(8)	18	246	0	0	0
Net cash from financing	**(16)**	**(174)**	**210**	**(91)**	**(227)**	**(310)**
Net change in cash						
Cash at the beginning of the year	1,340	1,538	1,628	2,267	1,717	2,085
Exchange difference	(6)	38	19	0	0	0
Cash at the end of the year	**1,538**	**1,628**	**2,267**	**1,717**	**2,085**	**1,552**

GROWTH	2019A	2020A	2021A	2022E	2023E	2024E
YE 31 Dec						
Revenue	12.5%	26.7%	70.9%	36.5%	33.3%	27.9%
Operating profit	12.5%	139.3%	397.0%	70.3%	36.1%	38.2%
EBITDA	24.8%	30.1%	137.5%	48.2%	35.7%	33.9%
Net profit	46.0%	174.3%	377.6%	68.9%	36.6%	36.5%
Adj. net profit	46.0%	174.3%	377.6%	68.9%	36.6%	36.5%

PROFITABILITY	2019A	2020A	2021A	2022E	2023E	2024E
YE 31 Dec						
Operating margin	0.8%	1.6%	4.5%	5.6%	5.8%	6.2%
EBITDA margin	4.6%	4.8%	6.6%	7.2%	7.3%	7.7%
Adj. net profit margin	0.7%	1.5%	4.2%	5.2%	5.4%	5.7%
Return on equity (ROE)	0.9%	2.5%	10.7%	15.6%	18.8%	22.4%

GEARING/LIQUIDITY/ACTIVITIES	2019A	2020A	2021A	2022E	2023E	2024E
YE 31 Dec						
Net debt to equity (x)	(0.7)	(0.6)	(0.3)	(0.4)	(0.1)	(0.2)
Current ratio (x)	3.9	3.2	2.2	2.3	1.8	1.8
Receivable turnover days	85.3	82.3	68.5	68.9	68.9	68.9
Inventory turnover days	85.1	51.7	38.9	40.6	40.1	40.1
Payable turnover days	97.2	88.4	91.9	91.3	91.3	91.3

VALUATION	2019A	2020A	2021A	2022E	2023E	2024E
YE 31 Dec						
P/E	61.6	24.9	14.2	21.9	16.0	11.7
P/B	0.4	0.4	0.8	2.0	1.5	1.4
Div yield (%)	47.7	215.8	236.7	74.9	187.1	255.4
EV	2,751.4	2,767.2	3,345.6	3,774.4	4,269.9	4,958.5
EV/Sales	0.8	0.6	0.4	0.4	0.3	0.3
EV/EBITDA	16.6	12.8	6.5	5.0	4.1	3.6

Source: Company data, CMBIGM estimates. Note: The calculation of net cash includes financial assets.

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