EDISON

Nanoco Group

Moving forward step by step

Full year results

Tech hardware & equipment

The longer than expected commercialisation cycle has been frustrating but we believe that Nanoco continues to make progress on a number of fronts. The first commercial shipments of its CFQDs in computer monitors are expected in calendar Q118, royalties from Dow are now increasing and the pipeline of OEMs working with Nanoco remains robust. The company's ability to execute and customer confidence should also be enhanced by the recent fund raise and strengthened balance sheet.

Year end	Revenue (£m)	PBT* (£m)	EPS* (p)	DPS (p)	EV/sales (x)	Yield (%)
07/16	0.5	(12.3)	(5.2)	0.0	102.9	N/A
07/17	1.3	(10.6)	(4.5)	0.0	38.8	N/A
07/18e	4.7	(6.4)	(2.3)	0.0	11.0	N/A

Note: *PBT and EPS are normalised, excluding amortisation of acquired intangibles, exceptional items and share-based payments.

Staged ramp starting in computer displays

Nanoco is now seeing a staged build up in volume shipments of product into the display market via AUO, the number three TV/computer display manufacturer globally. The first models are expected to become commercially available in calendar Q1 with more to follow later in the year. The commercialisation cycle in TV is more protracted but the pipeline continues to mature. Nanoco is engaged with many major brands and AUO demonstrated a broad range of television models at the Touch Taiwan conference in September. We see progress in securing OEM customers as a significant commercial milestone to look for. Dow now appears to be shipping commercial volumes, with royalties building quarter on quarter from a low base.

Market opportunity still looks significant

We retain our view that the opportunity is substantial and it does not take heroic assumptions to drive significant earnings expansion. IHS forecasts that quantum dot (QD) displays will reach 26m by 2021, of which 90% will be cadmium free. The European Commission's ban on the use of cadmium in displays and LED lighting sold within the EU from Oct 19 is now accelerating design activity and strengthens Nanoco's competitive position. Outside of display, the company's progress in medical imaging and agricultural lighting is becoming more noteworthy and could start to factor in estimates and the valuation if progress continues to plan in FY18.

Valuation: Opportunity not priced in; uptake in TV key

Our revenue estimates are broadly unchanged and remain at the lower end of what we believe to be a likely range of outcomes. We have reduced FY18 operating costs by c £0.7m, which reduces the EBITDA break-even level to £11.5-14.0m depending on royalty/product mix. The November raise of £8.0m (net) should remove a major constraint on Nanoco's ability to execute its strategy and improve customer confidence. We see the first design wins with TV OEMs and then visibility of volume shipments as the next key milestones. Achieving this will make the pathway to growth and profitability much clearer and could pave the way for sentiment change in the stock. We believe that upside can be delivered by execution on the opportunity in QD film for displays alone, while the IP and opportunity in next-generation display architectures and outside of display are at present not priced in.

20 November 2017

Price	**24p**
Market cap	**£69m**

Net cash (£m) at July 2017	5.7
Shares in issue	285.9m
Free float	89.9%
Code	NANO
Primary exchange	LSE
Secondary exchange	N/A

Share price performance

%	1m	3m	12m
Abs	(11.7)	(25.8)	(51.0)
Rel (local)	(10.1)	(25.8)	(55.3)
52-week high/low		50.0p	23.0p

Business description

Nanoco Group is the leading commercial supplier of cadmium-free quantum dots (CFQD) and IP. The near-term focus is on the display market, where CFQDs are used to enhance picture quality. The company is also developing solutions for medical imaging and lighting.

Next events

AGM	January 2018

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Edison profile page

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Moving forward step by step

While the initial commercialisation cycle is proving more protracted than anticipated, Nanoco is making progress on a number of fronts.

Computer displays first out of the gate

Nanoco is now seeing a staged build up in volume shipments into the display market via AUO, the number three TV/computer display manufacturer globally (16.4% market share according to IHS). Via Wah Hong, the company is now shipping product for two AUO manufactured computer monitor models scheduled for commercial launch in Q118, with others in the pipeline for later in the year.

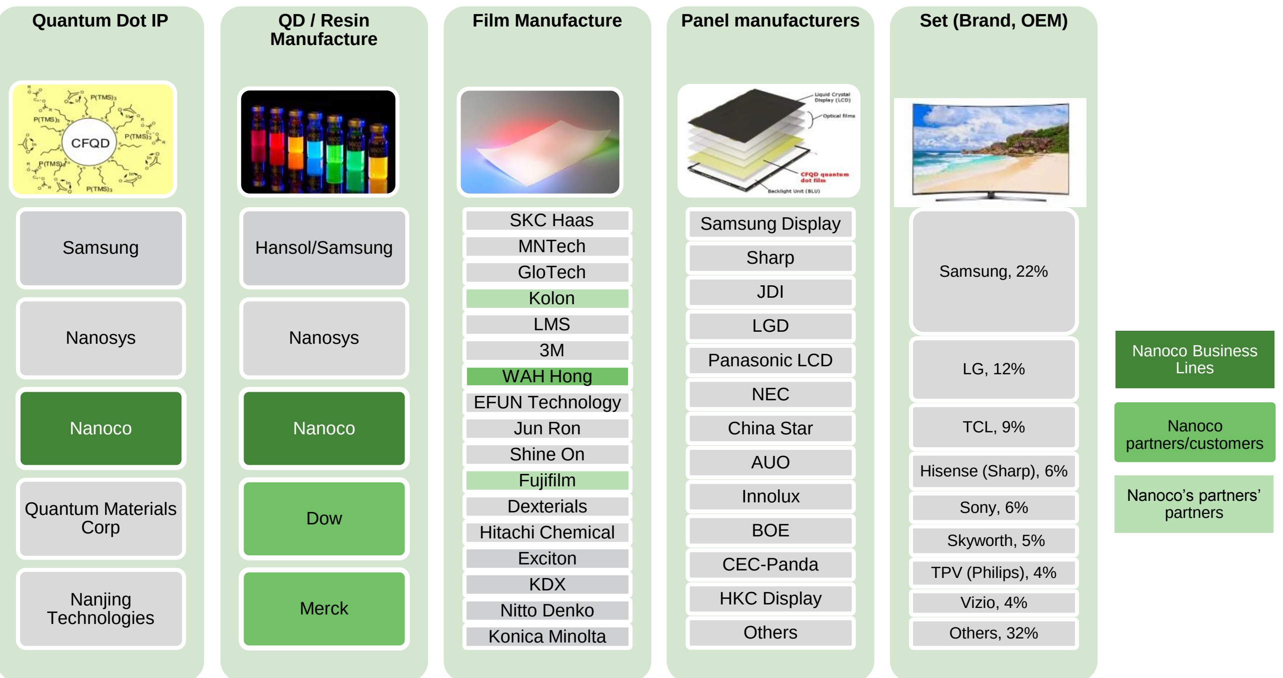
TV pipeline full: Visibility on first commercial shipments the key milestone

The commercialisation pipeline continues to mature within the much larger TV market. The company is in discussions – at varying stages – with a number of major OEMs, including Sony, Dell, Vestel, TP Vision, AUO, Samsung, Foxconn, Compal, BOE, Qisda, Innolux TCL and Hisense. AUO demonstrated a broad range of television models at the Touch Taiwan conference in September, although as yet we have no visibility on their progress in securing OEM customers.

Dow moving forward

Licensee Dow appears to be at a similar stage to Nanoco with respect to commercialising its product. We understand that Dow is engaged with two Korean film manufacturers – KDX and Kolon – and that the first products (again likely to be computer monitors) may reach the market in the near future. Reflecting this, royalties from Dow have been increasing quarter on quarter, albeit from a small base.

Exhibit 1: Increasing penetration of the display supply chain



Source: Edison Investment Research

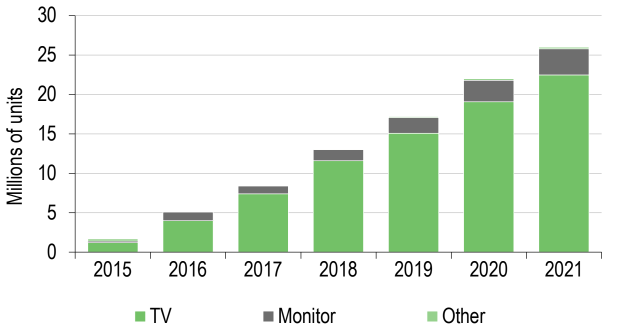
Stall in progress at Merck

Progress at Merck has stalled somewhat, in part due to management change. The company has a development production facility in Darmstadt, but has yet to commit to building a production-scale facility. Merck's main focus appears to be on second-generation QD filter displays, which are likely three or more years away from a significant volume ramp. Nanoco will continue to supply product to Merck for development shipments until it decides to build its own plant. We also note that Merck is working with three Japanese film suppliers, though we are yet to see these relationships pay dividends with regards to revenues for Nanoco.

Market opportunity still looks attractive

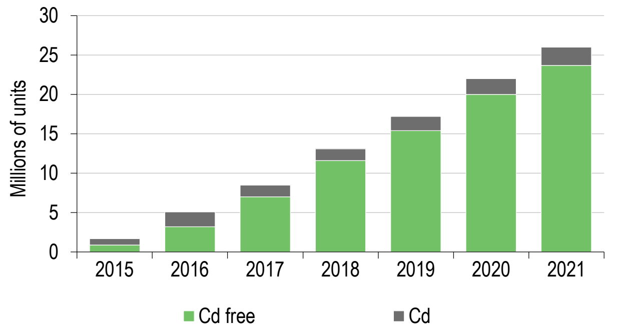
While timescales have slipped, from a competitive and market opportunity standpoint the opportunity for Nanoco in display remains attractive.

Exhibit 2: IHS QD display market forecasts, by application



Source: IHS

Exhibit 3: IHS QD display market forecasts – Cd and Cd-free



Source: IHS

Strong growth in cadmium-free quantum dots (CFQD) still forecast

Market analyst IHS forecasts that the market for QD displays will reach c 26m units in 2021, up from an estimated 8.5m in 2017, with cadmium-free dominating (growing from 7m in 2017e to 23.7m in 2021e). These estimates have been slightly pared back (or pushed to the right) from its previous forecasts of c 32.8m, likely reflecting the more protracted commercialisation cycle to date, but also lower than forecast shipments in 2017 – in part due to significant price increases at Samsung.

This nevertheless still represents a sizeable opportunity – we estimate a total addressable market of at least £250m even when assuming 20% y-o-y price erosion – and as discussed later, we believe that Nanoco should be well placed to take significant market share.

Moreover, we use the IHS forecasts as the basis for our estimates, but it is worth highlighting that rival analyst DSCC is considerably more bullish. DSCC forecasts that QD TV shipments will rise at a compound annual growth rate (CAGR) of 90% from 2016 through to 2021, hitting just over 100m units, 34% of the total market. The same analyst has also communicated an even more bullish scenario, whereby if current technical issues are overcome and manufacturing costs are reduced, QLED screens could account for the entire LCD TV panel market by 2021.

Competitive position still strong

While the European Commission's October 2019 ban on cadmium in displays and LED lighting sold in the EU comes in later than the cadmium-free lobby would have liked, it strengthens Nanoco's competitive position nonetheless. The company is now seeing increased design activity, particularly with Chinese OEMs as they prepare for the transition. IHS's forecasts reflect this decision, with the estimated proportion of Cd-free displays rising to 91% in 2021, up from previous estimates of 85%.

Competitively, Nanoco remains in a strong position. Samsung is dominating QD TV shipments, accounting for all of the CFQD TVs sold commercially to-date. Nanoco remains in pole position to take the lion's share of the market as other vendors bring CFQD products to market. The most significant competition for Nanoco at the product level may turn out to be Dow and in the longer term Merck, but Nanoco will also benefit from the royalties in this case – although the royalty rate per device is expected to be more than an order of magnitude lower than for product. Nanosys, the leading cadmium quantum dot supplier, is also likely to play a role. Nanosys is actively marketing its Hyperion cadmium-light product and is developing a cadmium-free solution. Beyond this, we have yet to see any cadmium-free supplier make significant inroads into the display supply chain.

Progress outside of display

Nanoco has also seen developments in the non-display applications for its technologies.

Perhaps most materially, progress is being made in the Life Sciences division. Along with University College London, Nanoco has been awarded a significant government grant to continue testing of the applications of QD's for vivo imaging, diagnostic and targeted therapy of cancer. We understand that the basis of this research revolves the around the propensity of tumour cells to absorb non-toxic cadmium free quantum dots whereas healthy cells do not. Importantly, this research is now fully funded by the Innovate UK grant.

Quantum dots are being used for niche lighting purposes, including both horticultural and photodynamic therapy. According to the company, trials with pilot customers has indicated that the yield of hydroponic crops is improved when using lighting of the specific wavelength required for optimal growth conditions, which can be readily customised using quantum dots. The company's technology is also being used in an on-going trial with professional American football teams, where 'light patches' are applied to bruised tissue, thereby reducing swelling, thus speeding up recovery times. Both these lighting applications are currently in the process of being commercialised, and should progress continue as expected, we will look to build these developments into our forecasts over the course of 2018.

Financials: Costs reduced, balance sheet strengthened

Full year results were slightly behind forecasts, with lower revenues (£1.3m vs £1.6m forecast, excluding £0.3m other income from government grants of £0.2m and insurance proceeds £0.1m) and slightly higher costs, resulting in a normalised operating loss of £10.7m vs £9.8m forecast. Year-end net cash was in line at £5.7m, but cash resources have been substantially boosted post year end by the £8.0m net, £8.6m gross capital raise at 18p (20% dilution).

We are not materially changing our revenue estimates for FY18, but reduce operating costs by c £0.7m, which reduces the EBITDA break-even level to £11.5-14.0m depending on royalty/product mix. We also factor in the strengthened balance sheet and dilution from the £8m fund raise.

On the assumption that follow on commercial orders are received, we believe that our FY18 base case estimates represent the lower end of a wide range of potential outcomes, and also highlight two less cautious scenarios in Exhibit 4 below. Our base case £3m estimate for product revenues could be achieved by supplying product for circa 200k displays.

Estimate break-even at 11% FY19 market share

We withdrew our FY19 estimates with the downgrade in August and still do not believe that there is adequate visibility to reinstate them. However, assuming only inflationary level cost increases but 20% year-on-year price reductions, we estimate that Nanoco could break-even by reaching a very achievable 11% market share of the QD display market based on IHS's 2019 estimates and assuming two-thirds of volumes are from licensing customers and one-third from product sales. Our analysis of the competitive situation indicates that Nanoco should do substantially better than this, and upside should drop strongly through to earnings.

Exhibit 4: Estimate changes

£m	FY16 Actual	FY17e Estimate	FY17 Actual	Change	FY18e Old	FY18e New base	Change	FY18e New mid	FY18e New positive
Product	0.2	0.5	0.5	-6%	3.0	3.0	0%	5.0	7.5
Royalties	0.0	0.0	0.0	nm	1.0	1.0	0%	2.0	2.5
Other	0.3	1.1	0.9	-24%	0.5	0.7	24%	0.7	0.7
Revenues	0.5	1.6	1.3	-18%	4.5	4.7	3%	7.7	10.7
Gross profit	0.3	1.4	1.1	-22%	3.3	3.4	3%	5.6	7.6
Gross margin	63%	84%	81%		72%	72%		73%	71%
EBITDA	(11.2)	(8.7)	(9.4)	8%	(6.2)	(5.5)	-12%	(3.3)	(1.3)
EBITDA margin	nm	nm	nm		nm	nm		nm	nm
Normalised operating profit	(12.5)	(9.8)	(10.7)	8%	(7.3)	(6.6)	-11%	(4.4)	(2.4)
Normalised operating profit margin	nm	nm	nm		nm	nm		nm	nm
Normalised net income	(12.3)	(9.8)	(10.6)	9%	(7.1)	(6.4)	-11%	(4.2)	(2.2)
Normalised diluted EPS (p)	(5.2)	(4.1)	(4.5)	9%	(3.0)	(2.3)	-24%	(1.6)	(0.8)
Net debt/(cash)	(14.5)	(5.7)	(5.7)	0%	1.8	(7.4)	-504%	(8.7)	(9.9)

Source: Nanoco Group data, Edison Investment Research

Valuation

We believe it is too early to ascribe a precise fair value to Nanoco, with the first TV design-ins and then visibility of commercial sales being the key milestones for improving visibility. Nevertheless, following the August downgrade, our confidence that this was primarily a timing issue has improved and we continue to see steady progress towards broader commercialisation. It does not take heroic assumptions for revenues and earnings to scale strongly – and for the shares to look cheap. For example, if costs grow at only an inflationary rate, we believe that achieving 30% market share with a 1:2 split in product to royalties in 2020 could generate EPS of 2.9p, which would rate the shares at 8.3x. Given the company's competitive position in CFQDs we believe that this is achievable, with the extent to which competitors take share from Samsung being a key variable. Consequently, we believe that upside can be delivered by execution on the opportunity in QD Film for displays alone.

We believe that the IP and opportunity in next-generation display architectures, medical imaging and specialist lighting are not factored into the valuation at all at present. If progress in these fields continues to plan, these should start to be reflected in estimates and the valuation over the course of FY18.

Exhibit 5: Financial summary

£'m	2015	2016	2017	2018e
31-July	IFRS	IFRS	IFRS	IFRS
INCOME STATEMENT				
Revenue	2.0	0.5	1.3	4.7
Cost of Sales	(0.3)	(0.2)	(0.3)	(1.3)
Gross Profit	1.7	0.3	1.1	3.4
EBITDA	(8.1)	(11.2)	(9.4)	(5.5)
Operating profit (before amort. and except).	(9.5)	(12.5)	(10.7)	(6.6)
Amortisation of acquired intangibles	0.0	0.0	0.0	0.0
Exceptionals	(0.9)	0.0	(0.0)	0.0
Share-based payments	(0.6)	(0.3)	(0.2)	(0.2)
Reported operating profit	(11.0)	(12.8)	(10.9)	(6.8)
Net Interest	0.1	0.2	0.0	0.2
Joint ventures & associates (post tax)	0.0	0.0	0.0	0.0
Exceptionals	0.0	0.0	0.0	0.0
Profit Before Tax (norm)	(9.3)	(12.3)	(10.6)	(6.4)
Profit Before Tax (reported)	(10.9)	(12.6)	(10.9)	(6.6)
Reported tax	1.9	2.0	1.8	0.0
Profit After Tax (norm)	(9.3)	(12.3)	(10.6)	(6.4)
Profit After Tax (reported)	(9.0)	(10.6)	(9.1)	(6.6)
Minority interests	0.0	0.0	0.0	0.0
Discontinued operations	0.0	0.0	0.0	0.0
Net income (normalised)	(9.3)	(12.3)	(10.6)	(6.4)
Net income (reported)	(9.0)	(10.6)	(9.1)	(6.6)
Basic average number of shares outstanding (m)	221	237	238	278
EPS - normalised (p)	(4.22)	(5.20)	(4.46)	(2.29)
EPS - diluted normalised (p)	(4.22)	(5.20)	(4.46)	(2.29)
EPS - basic reported (p)	(4.05)	(4.47)	(3.83)	(2.38)
Dividend per share (p)	0.00	0.00	0.00	0.00
Revenue growth (%)	nm	(76.6)	179.7	251.8
Gross Margin (%)	84.4	62.8	80.6	72.0
EBITDA Margin (%)	(400.4)	(2,367.4)	(711.2)	(117.5)
Normalised Operating Margin	(465.9)	(2,639.4)	(803.5)	(140.6)
BALANCE SHEET				
Fixed Assets	3.9	3.7	3.5	5.2
Intangible Assets	1.8	2.4	2.6	3.2
Tangible Assets	2.1	1.3	0.9	2.0
Investments & other	0.0	0.0	0.0	0.0
Current Assets	27.2	18.7	8.9	11.1
Stocks	0.2	0.2	0.2	0.2
Debtors	0.9	2.0	0.7	1.2
Cash & cash equivalents	24.3	14.5	5.7	7.4
Other	1.8	2.0	2.4	2.4
Current Liabilities	(2.0)	(3.0)	(1.4)	(1.8)
Creditors	(1.9)	(2.4)	(1.3)	(1.3)
Tax and social security	0.0	0.0	0.0	0.0
Short term borrowings	(0.1)	(0.0)	0.0	0.0
Other	0.0	(0.5)	(0.1)	(0.6)
Long Term Liabilities	(0.0)	(0.6)	(0.6)	0.0
Long term borrowings	(0.0)	0.0	0.0	0.0
Other long term liabilities	0.0	(0.6)	(0.6)	0.0
Net Assets	29.1	18.8	10.5	14.6
Minority interests	0.0	0.0	0.0	0.0
Shareholders' equity	29.1	18.8	10.5	14.6
CASH FLOW				
Op Cash Flow before WC and tax	(8.1)	(11.2)	(9.4)	(5.5)
Working capital	0.2	0.5	(0.3)	(0.6)
Exceptional & other	(0.9)	0.0	(0.0)	0.0
Tax	1.3	1.8	1.9	1.9
Net operating cash flow	(7.6)	(8.9)	(7.8)	(4.2)
Capex	(0.9)	(1.1)	(1.6)	(2.3)
Acquisitions/disposals	0.0	0.0	0.0	0.0
Net interest	0.1	0.2	0.1	0.2
Equity financing	21.1	0.0	0.6	8.0
Dividends	0.0	0.0	0.0	0.0
Other	(0.6)	0.0	0.0	0.0
Net Cash Flow	12.2	(9.7)	(8.8)	1.7
Opening net debt/(cash)	(12.2)	(24.4)	(14.5)	(5.7)
FX	0.0	0.0	0.0	0.0
Other non-cash movements	0.0	(0.1)	0.0	0.0
Closing net debt/(cash)	(24.4)	(14.5)	(5.7)	(7.4)

Source: Company Reports, Edison Investment Research Forecasts

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