EDISON

Nanoco Group

Full-year results

Building foundations for volume uptake in FY20

Tech hardware & equipment

FY18 results were as expected, with revenues up and losses narrowed despite the slow commercialisation cycle in display. FY19 will be a year of laying foundations to ready the facilities for volume production in nanomaterials, but we expect a doubling of revenues nonetheless. The move to volume production should support a further inflection in FY20.

Year end	Revenue (£m)	PBT* (£m)	EPS* (p)	DPS (p)	EV/sales (x)	P/E (x)
07/17	1.3	(10.6)	(4.5)	0.0	71.0	N/A
07/18	3.3	(7.1)	(2.6)	0.0	28.0	N/A
07/19e	6.7	(5.6)	(1.9)	0.0	13.8	N/A
07/20e	13.0	(2.1)	(0.7)	0.0	7.1	N/A

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

Results reflect delays, billings support cash

Growth in revenues to £3.3m (vs £1.3m in FY17) reflects the contribution from the company's tier one US customer. Adjusted operating loss dropped to £7.2m from £10.7m in 2017, with the higher revenues supported by the full-year benefit of FY17 cost savings. Year-end net cash of £10.7m (our forecast £7.9m) reflects the fact that billings increased to £6.5m from £1.1m, including £3.1m of deferred income; we had previously categorised some of this as a loan.

Laying the groundwork in advanced electronics

Good progress continues to be made in developing the new manufacturing facilities at Runcorn for Nanoco's tier one US electronics company. The build-out of the facility is on track for completion this calendar year and will be followed by commissioning, stress testing and optimisation. Volume production is expected to start in H1 FY20. The new facility's footprint indicates that capacity will be significantly larger than the current cadmium-free quantum dot (CFQD) line.

Working to enhance CFQD performance

The first commercial shipments of high-end gaming computer monitors using Nanoco's CFQDs have been pushed out to CY19, due to customer scheduling decisions. Penetrating the high volume mid- to high-end TV market remains key to achieving significant revenue from this segment and we continue to believe that quantum dots' (QDs) ability to leverage LCD infrastructure is an attractive proposition for mid- to high-end panel manufacturers. To support this opportunity, resources are being reallocated from the Runcorn display production team to R&D, to improve the brightness of their QDs, key to addressing the 8k TV market.

Valuation: Opportunity and IP value still substantial

Improving visibility has led to management giving guidance for revenues to broadly double y-o-y in FY19, driven by pre-production services from the major customer. We forecast a near-doubling again in FY20, driven by nanomaterials product sales. Ascribing a valuation is difficult, but the strength of the company's IP has been given a significant endorsement through attracting the tier one US customer, and a scalable business model should support strong margins as volumes come through.

22 October 2018

Price	**35.95p**
Market cap	**£103m**

Net cash (£m) at 31 July 2018	10.7
Shares in issue	285.9m
Free float	95%
Code	NANO
Primary exchange	LSE
Secondary exchange	N/A

Share price performance

%	1m	3m	12m
Abs	(2.8)	(12.5)	30.7
Rel (local)	1.8	(4.4)	39.5
52-week high/low		48.9p	22.8p

Business description

Nanoco is a global leader in the development and manufacture of cadmium-free quantum dots and other nanomaterials. Nanoco's platform includes over 650 patents and specialist manufacturing lines. Focus applications are advanced electronics, displays, lighting and bio-imaging.

Next events

AGM	13 December 2018

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Edison profile page

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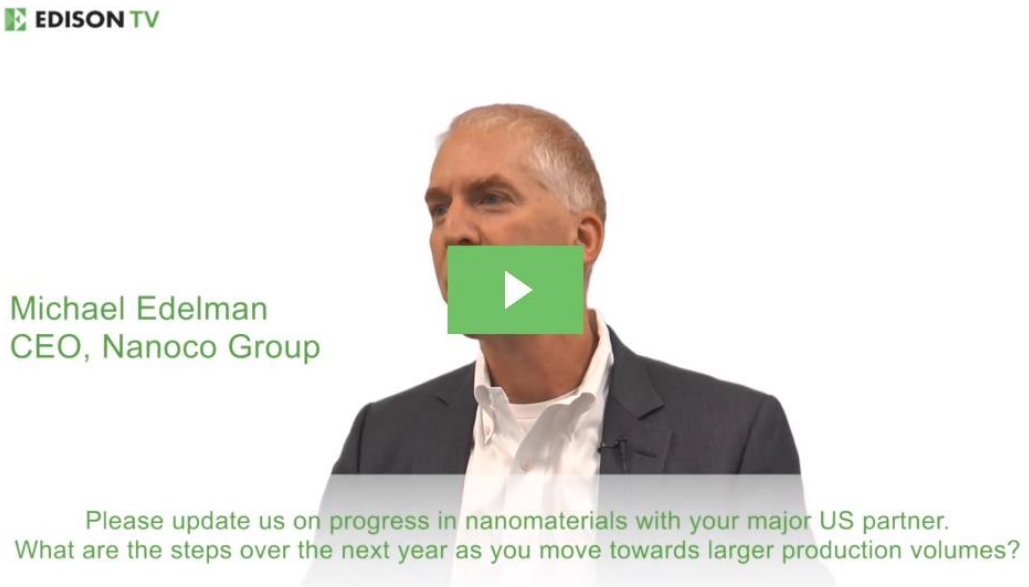
Building foundations in FY19

Nanomaterials: Progressing well, significant potential

The company is making good progress with the build-out and commissioning of its Runcorn facility to support volume production of nanomaterials for advanced electronics for the US customer. The build-out of the facility is on track for completion this calendar year, which will be followed by commissioning, stress testing and optimisation.



Facility should support a significant inflection in revenues

The move to volume production should support a significant inflection in revenues. With an estimated £4m to be invested in the facility over FY18 and FY19, capacity will be significantly larger than the current QD line, which management estimates has the capacity to supply c 1m large televisions per year (implying well over £15m revenue potential). We also note the follow-on R&D agreement that Nanoco signed with the same customer in April, to further develop nanomaterials for the same application. This indicates that this relationship has the potential to be a lasting one, as well as being a meaningful endorsement of Nanoco's IP and expertise.

Apple – the most likely candidate?

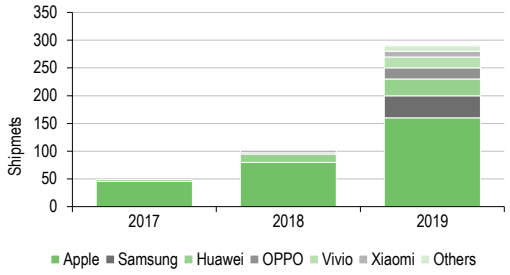
We note recent broker reports hypothesising that Nanoco will be a supplier for the 3D sensor in Apple's next generation of mobile devices. Given the scale of facility build-out, we cannot think of any other obvious candidates who would require such capacity. Apple has pioneered the 3D sensing market, including a rear-facing 3D sensor in the top of the range iPhone X models (X, XS, XS Max and XR) models to power a facial recognition system called FaceID. Current models use a silicon-on-insulator sensor, but nanomaterials could potentially be used in future generations. Many observers expect FaceID to permeate deeper into the product portfolio over time. The Android camp is now following suit, with the feature set to be included in a number of high-end models scheduled for launch this year. Front-facing 3D sensors are expected to start appearing in the 2020 timeframe.

Whether the customer is Apple or not, it is clear that this customer relationship is significant and creates the prospect of commercial volumes within the near term.

Significant product uptake cycle

If correct, successful execution on this opportunity would expose the company to what is anticipated to be one of the strongest technology uptake cycles for electronics components over the next five years, with market analyst Yole Development forecasting the total addressable market for 3D sensing components to grow at a 43% CAGR, from just below $2bn in 2018 to $18bn in 2023.This growth will be driven first by adoption in the consumer market (primarily handsets but also tablets and PCs) and then by the rapid proliferation of sensors in cars, both inside the cockpit (gesture recognition, face authentication, fatigue monitoring) and outside, with the introduction of more sophisticated safety features and the migration towards autonomous driving.

Exhibit 1: 3D sensor shipment forecast by vendor



Source: Isiah Research

Looking for a brighter future in display

The first commercial shipments of high-end gaming computer monitors using Nanoco's CFQDs have been pushed out to CY19. This is a low-volume specialist market, although it is growing healthily. Market analyst WittsView estimated that 2.5m units were sold in 2017 (up 80% y-o-y) and forecasts growth to 3.5m in 2018. Nevertheless, penetrating the high-volume, mid- to high-end TV market (total annual shipments c 260m units a year) will be key to driving an inflection in this segment.

Development efforts are now being focused on producing brighter CFQDs, key to driving uptake in 8k televisions, which require brighter back lights. Resource has been reallocated from the Runcorn display production site to R&D to support this development.

Despite the delays, we believe that the window of opportunity will remain open. QDs' ability to enhance colour gamut and dynamic range while leveraging existing LCD infrastructure remains an attractive proposition for the volume market in mid- to high-end televisions. OLED is likely to remain a high-end technology for some time, due to the cost of building dedicated capacity to support volume growth. This may now be starting to happen – and we note industry chatter that Samsung may offer a sub-$1000 QDTV in the Black Friday sales.

The launch of second-generation devices could be a catalyst for first-generation QD film technology to permeate into the lower mid-segment. Samsung is developing hybrid blue OLED displays using QD for colour conversion and could demonstrate the first devices at CES in January. Nanoco is also active in the industry's development of second- and third-generation QD television architectures. The company works with Merck on second-generation colour filter/hybrid OLED + QD and third-generation electroluminescent applications. Dow is targeting high-volume opportunities in first-generation QD film.

Lighting: Targeting lighting partners in indoor farming

Nanoco's QDs are now shipping in end-product through Carewear, a US company that has developed QD-based light systems to treat pain and injuries. The company is initially targeting the professional sports market, so volumes will be modest.

Commercialisation efforts in lighting are now focused on the horticultural segment, where the rapid forecast growth of indoor farming presents an attractive potential opportunity. Market analyst Statista estimates that, as of 2016, there were 2.3 million square feet of indoor farms worldwide, but expects this to grow to between 8.5 million square feet and 16.55 million square feet by 2021. Yole estimates that the total market for lighting for this segment will be worth c $3.8bn in 2017, increasing to $5.8bn in 2020, of which LED will account for $794m, growing to $2bn.

The opportunity for Nanoco lies in the fact that QDs can be used to efficiently deliver highly tuned light-emitting wavelengths to optimise growth, reduce energy or even tune flavours. The key objectives for management over the course of the 12 months will be to sign up one or more lighting customers/partners and to establish a foundation of trials to support broader adoption.

Medical imaging

The use of Nanoco's QD technology for use as a detection agent in medical imaging is an early-stage development, but one with exciting potential. The opportunity in this market stems from the fact that the molecular size of QDs suggests that they could preferentially accumulate in tumours and lymph nodes. The light emitted by these accumulated QDs can then enable better detection or more targeted treatment of cancers.

Since Nanoco's QDs are cadmium-free, they are particularly suitable for use in the human body compared to cadmium-based alternatives. The company's biological QDs are water-soluble to enable the absorption process, whereas those intended for other applications are not.

To reduce the lead time and costs to commercialisation, the initial focus is on opportunities that require only topical application, as the clinical trial costs are typically much lower for agents that are administered in a topical patch in comparison to those that are injected (administered systemically). Also, for agents with short-term exposures, such as diagnostics, the toxicological study cost is significantly lower than for agents that are chronically administered.

The company is now working to prepare the technology for clinical trials. The company has engaged a global contract research organisation to perform toxicology trials and initial tests have found no evidence of mutagenicity (capacity to cause mutations).

Potential spin out

The funding requirement and timescale to commercialisation cycle of Nanoco Life Sciences will require a fundamentally different strategy for value crystallisation compared to the company's other businesses. Management has stated that in early stage discussions to identify the right strategic partner to take the business forward and provide funding.

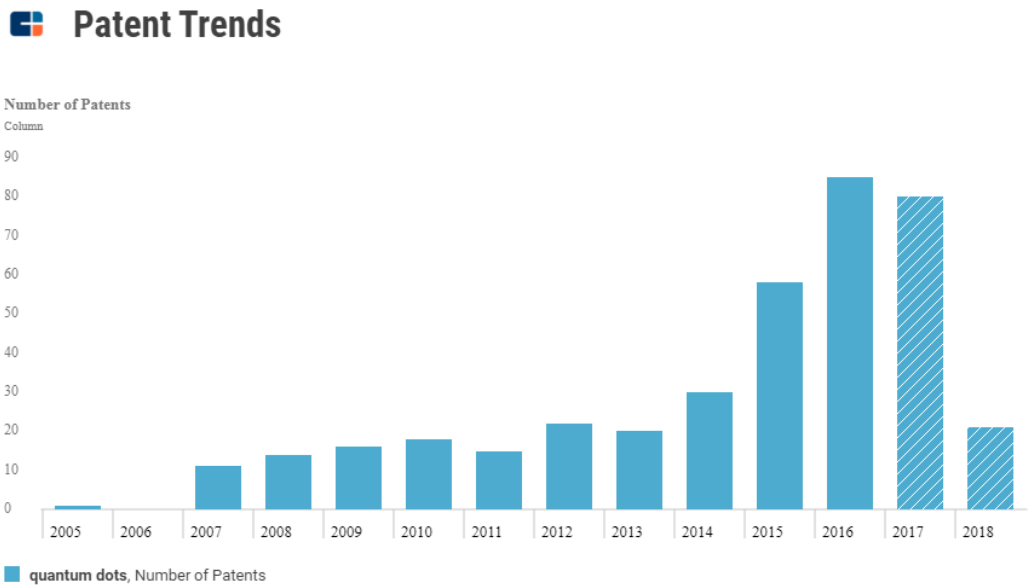
Leading IP owner in a heavily patented area

While the pathway to commercialisation has been a protracted process, we believe that it is worth highlighting that the number of patents filed mentioning QDs has increased markedly over the past few years. We believe that this signals that the technology is now starting to come of age, with potential for commercialisation across a broad range of applications.

Nanoco now has over 650 patents covering QDs, their manufacture, applications and other nanomaterials, which we believe makes the company one of the most significant IP owners in this domain. We also note that the company's IP portfolio, specifically its proprietary scalable 'molecular

seeding' manufacturing IP, was key to securing its major US customer. Given the increased patenting activities, other opportunities could well arise, while the company's intrinsic IP value should support the share value if commercialisation is delayed.

Exhibit 2: The trend in the number of patent applications filed that mention QDs

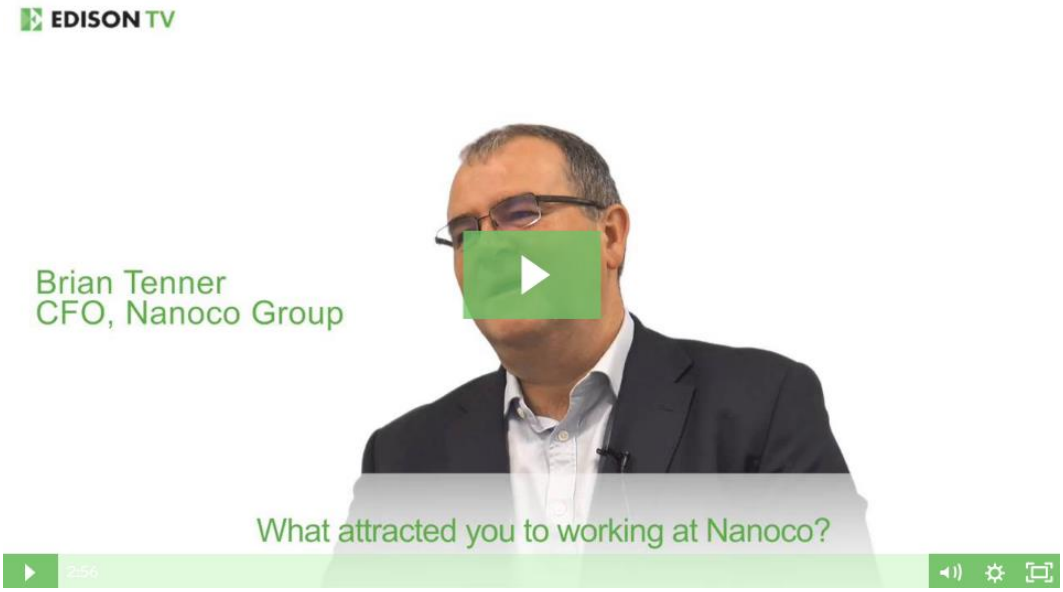


Source: CB Insights. The patterned column(s) may show a decline due to a delay between patent filing and publication.

Financials: Results reflect delays, billings support cash

FY18 results were as flagged at the trading update. Growth in revenues to £3.3m (vs £1.3m in FY17) reflects the contribution from the company's US customer, offset by continued delays in display. Adjusted operating loss dropped to £7.2m from £10.7m last year, with the higher revenues supported by the full-year benefit of cost savings last year.

Cash performance was better than expected. Year-end net cash was £10.7m (excluding a £407k 2028 loan note related to university grants) versus our estimate of £7.9m, with an increase in billings to £6.5m from £1.1m last year. This figure includes £3.1m of deferred income – we had previously categorised some of this as loans.



Estimates: Services doubling revenues in FY19

We are introducing estimates for FY19 and FY20. With the majority of FY19 revenues likely to be derived from services and milestone payments from the major customer, visibility is better than it has been in previous years. Hence, management has issued formal guidance that it expects FY19 revenues to be around double the FY18 figure. We understand that c 40–50% of our £6.7m FY19 revenue estimate figure has already been contracted. We are not forecasting any volume product shipments (to any application) or royalties from display partners, Dow or Merck.

We forecast slight cost inflation and a £1.9m working capital outflow as the company readies for commercial production. Based on these forecasts, FY19e net cash drops to £3m.

Visibility is considerably lower for FY20, but with volume production of nanomaterials anticipated for H120 and significant investment in capacity supported by the tier one customer, successful execution should drive significant revenues from product sales. We forecast product sales of £9m (across all categories), offset somewhat by a reduction in service revenues.

Looking ahead to how the financial profile is likely to evolve once volume shipments commence – this is an operationally geared model, so clearly profitability and cash flows will depend on revenue uptake. However, the strong IP underpinning should generate healthy margins and cash flows as revenues build.

Gross margins will depend on a number of elements, including product pricing and yields, but as production beds down we would expect them to be strong – well above 50%. We do not believe that the current cost structure needs to expand significantly to support volume growth – although we would expect some reinvestment back into R&D as the company moves into profitability. Depending on mix and margins, we estimate that the company would break-even around the £15m revenue level. Profitability should scale strongly after that.

With £10.3m net cash on the balance sheet, we believe that the company has enough resources to take the business through to anticipated volume production in H1 FY20, although we believe that some additional funding is likely to be needed to support the production ramp-up in H1 FY20. If things progress to plan, we believe the company may have a number of options available to support its funding needs other than issuing equity.

Exhibit 3: Estimates

Year-end August	FY16	FY17	FY18	FY18	FY19e	FY20e
£m	Actual	Actual	Estimate	Actual	New	New
Product	0.2	0.5	na	0.2	1.0	9.0
Royalties/Licenses	3.0	1.8	na	1.1	1.0	1.3
Services	0.2	0.6	na	0.0	0.0	1.0
Revenues	0.5	1.3	3.3	3.3	6.7	13.0
Gross profit	0.3	1.1	3.1	2.9	4.9	8.8
Gross margin	63%	81%	94%	87%	73%	68%
EBITDA	(11.2)	(9.4)	(6.0)	(6.2)	(5.0)	(0.8)
Normalised operating profit	(12.5)	(10.7)	(7.1)	(7.2)	(5.9)	(2.4)
Normalised net income	(12.3)	(10.6)	(6.9)	(7.1)	(5.6)	(2.1)
Normalised diluted EPS	(5.2)	(4.5)	(2.5)	(2.6)	(1.9)	(0.7)
Net debt/(cash)	(14.5)	(5.7)	(7.4)	(10.7)	(3.4)	(0.8)

Source: Nanoco, Edison Investment Research

Exhibit 4: Financial summary

£'m	2016	2017	2018	2019e	2020e
31-July	IFRS	IFRS	IFRS	IFRS	IFRS
INCOME STATEMENT					
Revenue	0.5	1.3	3.3	6.7	13.0
Cost of Sales	(0.2)	(0.3)	(0.4)	(1.8)	(4.2)
Gross Profit	0.3	1.1	2.9	4.9	8.8
EBITDA	(11.2)	(9.4)	(6.2)	(5.0)	(0.8)
Operating profit (before amort. and except).	(12.5)	(10.7)	(7.2)	(5.9)	(2.4)
Amortisation of acquired intangibles	0.0	0.0	0.0	0.0	0.0
Exceptionals	0.0	(0.0)	0.0	0.0	0.0
Share-based payments	(0.3)	(0.2)	(0.3)	(0.3)	(0.3)
Reported operating profit	(12.8)	(10.9)	(7.4)	(6.1)	(2.7)
Net Interest	0.2	0.0	0.0	0.3	0.3
Joint ventures & associates (post tax)	0.0	0.0	0.0	0.0	0.0
Exceptionals	0.0	0.0	0.0	0.0	0.0
Profit Before Tax (norm)	(12.3)	(10.6)	(7.1)	(5.6)	(2.1)
Profit Before Tax (reported)	(12.6)	(10.9)	(7.4)	(5.8)	(2.4)
Reported tax	2.0	1.8	1.4	1.4	1.4
Profit After Tax (norm)	(12.3)	(10.6)	(7.1)	(5.6)	(2.1)
Profit After Tax (reported)	(10.6)	(9.1)	(6.0)	(4.4)	(1.0)
Minority interests	0.0	0.0	0.0	0.0	0.0
Discontinued operations	0.0	0.0	0.0	0.0	0.0
Net income (normalised)	(12.3)	(10.6)	(7.1)	(5.6)	(2.1)
Net income (reported)	(10.6)	(9.1)	(6.0)	(4.4)	(1.0)
Basic average number of shares outstanding (m)	237	238	272	286	286
EPS - normalised (p)	(5.20)	(4.46)	(2.63)	(1.95)	(0.74)
EPS - diluted normalised (p)	(5.20)	(4.46)	(2.63)	(1.95)	(0.74)
EPS - basic reported (p)	(4.47)	(3.83)	(2.21)	(1.55)	(0.34)
Dividend per share (p)	0.00	0.00	0.00	0.00	0.00
Revenue growth (%)	(76.6)	179.7	150.0	101.5	0.0
Gross Margin (%)	62.8	80.6	87.0	73.4	67.5
EBITDA Margin (%)	(2,367.4)	(711.2)	(186.2)	(74.3)	(6.4)
Normalised Operating Margin	(2,639.4)	(803.5)	(215.8)	(87.8)	(18.5)
BALANCE SHEET					
Fixed Assets	3.7	3.5	6.0	6.4	6.4
Intangible Assets	2.4	2.6	3.4	3.3	3.4
Tangible Assets	1.3	0.9	2.6	3.2	3.0
Investments & other	0.0	0.0	0.0	0.0	0.0
Current Assets	18.7	8.9	13.8	6.9	4.5
Stocks	0.2	0.2	0.2	0.5	0.5
Debtors	2.0	0.7	1.4	1.6	1.8
Cash & cash equivalents	14.5	5.7	10.7	3.4	0.8
Other	2.0	2.4	1.4	1.4	1.4
Current Liabilities	(3.0)	(1.4)	(3.4)	(5.3)	(3.4)
Creditors	(2.4)	(1.3)	(3.0)	(2.0)	(1.7)
Tax and social security	0.0	0.0	0.0	0.0	0.0
Short term borrowings	(0.0)	0.0	0.0	0.0	0.0
Other	(0.5)	(0.1)	(0.4)	(3.3)	(1.7)
Long Term Liabilities	(0.6)	(0.6)	(3.7)	(0.4)	(0.4)
Long term borrowings	0.0	0.0	0.0	0.0	0.0
Other long term liabilities	(0.6)	(0.6)	(3.7)	(0.4)	(0.4)
Net Assets	18.8	10.5	12.6	7.6	7.1
Minority interests	0.0	0.0	0.0	0.0	0.0
Shareholders' equity	18.8	10.5	12.6	7.6	7.1
CASH FLOW					
Op Cash Flow before WC and tax	(11.2)	(9.4)	(6.2)	(5.0)	(0.8)
Working capital	0.5	(0.3)	4.0	(1.9)	(2.2)
Exceptional & other	0.0	(0.0)	0.0	0.0	0.0
Tax	1.8	1.9	1.8	1.8	1.8
Net operating cash flow	(8.9)	(7.8)	(0.3)	(5.0)	(1.2)
Capex	(1.1)	(1.6)	(3.0)	(2.6)	(1.8)
Acquisitions/disposals	0.0	0.0	0.0	0.0	0.0
Net interest	0.2	0.1	0.0	0.3	0.3
Equity financing	0.0	0.6	7.9	0.0	0.0
Dividends	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0
Net Cash Flow	(9.7)	(8.8)	4.6	(7.3)	(2.7)
Opening net debt/(cash)	(24.4)	(14.5)	(5.7)	(10.3)	(3.4)
FX	0.0	0.0	0.0	0.0	0.0
Other non-cash movements	(0.1)	0.0	(0.1)	0.0	0.0
Closing net debt/(cash)	(14.5)	(5.7)	(10.3)	(3.4)	(0.8)

Source: Nanoco, Edison Investment Research

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