

# PRELIMINARY RESULTS PRESENTATION

For the year ended 31 July 2018



# DISCLAIMER

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*It should be noted that past performance cannot be relied on as a guide to future performance. This presentation contains forward-looking statements with respect to Nanoco’s plans and objectives regarding its financial conditions, results of operations and businesses.*

*The financial information referenced in this presentation does not contain sufficient detail to allow a full understanding of Nanoco’s results. For more detailed information, the entire text of the preliminary results announcement for the full year ended 31 July 2018, can be found on the Investor Relations section of the Nanoco website ([www.nanocogroup.com](http://www.nanocogroup.com)).*

## AGENDA

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**HIGHLIGHTS**

**Michael Edelman**  
**CEO**

**PERFORMANCE OVERVIEW**

**Michael Edelman**  
**CEO**

**FINANCIAL REVIEW**

**Brian Tenner**  
**COO & CFO**

**SUMMARY**

**Michael Edelman**  
**CEO**

**Q&A**

## HIGHLIGHTS

- Rapid progress in development of alternate uses for our quantum dots in electronics applications
- Significant expansion of commercial production facility at Runcorn – to complete by December 2018
- Slower adoption in display
- Revenue and other income more than doubled to £3.5m (FY17: £1.6m) driven by new nano-materials opportunities
- Billings increased to £6.5m (PY £1.1m)
- Overhead cost base reduced by £1.5m (12%) with a full year benefit of savings completed in FY17
- Cash of £10.7m sufficient to fund the Group through to commercial production from Runcorn in H1 FY20
- Completed changes in the Executive team to focus on transition to commercial production and delivery



***“The Group is at an important transition point as we rise to the challenges of scaling up to address exciting short term opportunities”***



# OVERVIEW



## COMPANY OVERVIEW

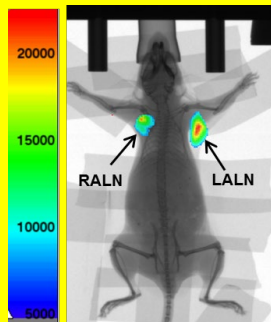


**Display**

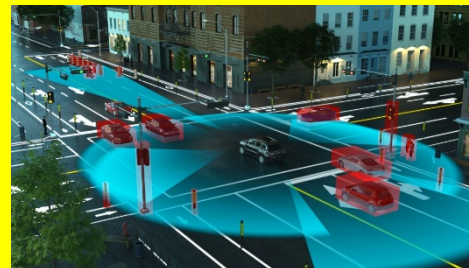


**Lighting**

**NANOCO**  
GROUP PLC



**Life Sciences**



**Nano-materials**

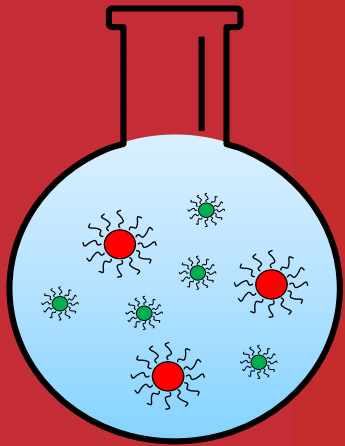
- Electronic materials sector
- Nano-material pioneer
- Focus on cadmium free quantum dots and other nano-materials
- Extensive patent portfolio, c.650 patents granted / pending
- HQ & R&D in Manchester, UK
- Manufacturing in Runcorn, UK
- c.100 staff
- FTSE: NANO.L since 2009
- Global
- ISO 9001 Certified

## INCREASING SCALE OF COMMERCIAL OPPORTUNITIES

- Platform technology with large addressable end markets
- Solved fundamental problem of scale by developing patented process to volume produce nano-materials
- Ability to tune nano-materials to specific end market applications
- Successfully licensed technology to Merck and Dow for the display industry
- A number of commercial research and development opportunities under discussion for delivery in FY 2019







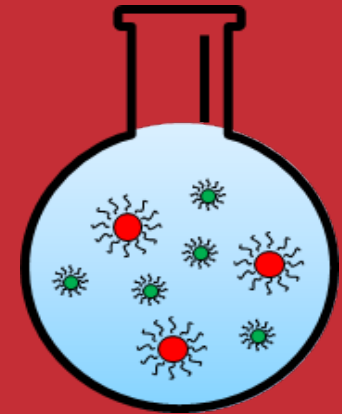
NANO-MATERIALS





## NANO-MATERIALS – GAME CHANGING

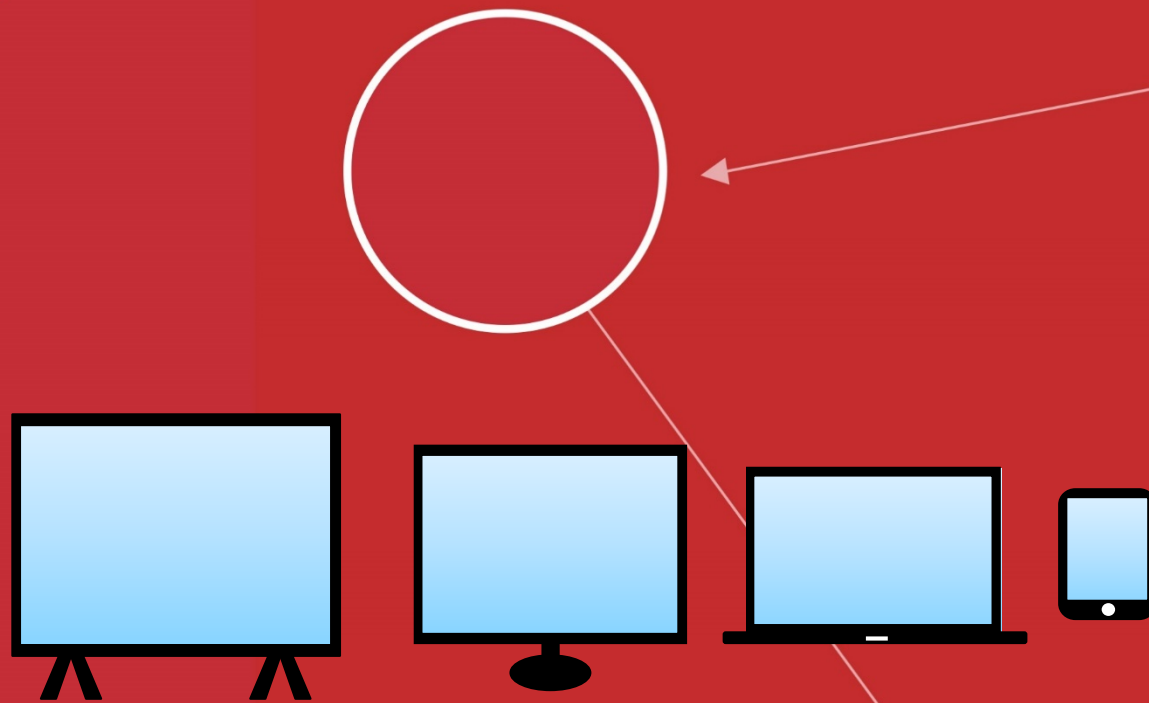
- Move from traditional, costly semiconductor processing to increased functionality in nano-materials
- Nano-material development is a core competency of Nanoco
  - Complex particle design and development
  - Scale up
  - Mass production
- Focus on new generations of quantum dots, 2D materials
  - Formation of Nanoco 2D Materials Ltd
- Applications in advanced electronics and autonomous vehicles



## SIGNIFICANT PROGRESS WITH US COMPANY



- Close working relationship
- Programme on track
- Dedicated Nanoco resource
- Exploring additional commercial opportunities



DISPLAY



## SLOWER DISPLAY ADOPTION

- Protracted RoHS ruling has allowed cadmium QD to persist, especially in China
  - October 2019 – cadmium exemption ends in Europe
  - China currently using cadmium QD for local Chinese market, exploring CFQD for export to Western markets in Europe and North America
- Initial adoption on high end TVs where volumes are lower than forecast and dominated by Samsung
- QLED / OLED battle for high end TVs driven by Samsung and LG
  - Samsung shipped 1 - 2m\* QD TVs in 2017
  - LG shipped 1.7m OLED panels in 2017
  - Total LCD TV market c.240m\* units, 90% below \$1000
- Critical to success will be penetration of the sub \$1000 mass TV market
  - CFQD can differentiate product for OEMs
- TV design cycles longer than anticipated

\* Nanoco estimates





## NANOCO IS ADAPTING

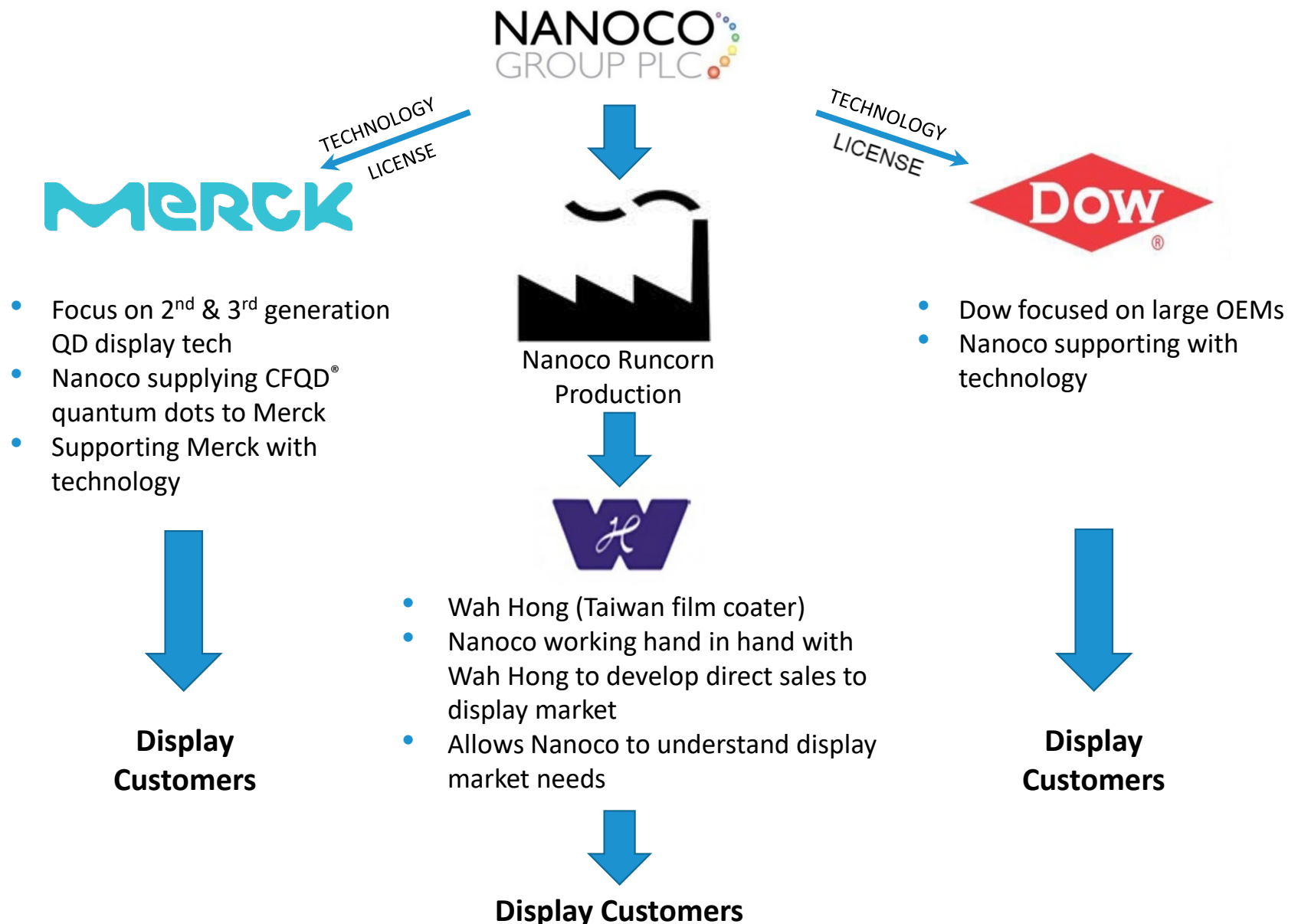
- R&D activity increased during the year to improve dot performance in line with ever increasing technical requirements of the display industry
- Internal development and production resources pivoted away from display to focus on the immediate nano-materials opportunity in the electronics market
- Working with Wah Hong to provide film to a Taiwanese display panel maker targeting the gaming monitor niche
- Revised customer launch date pushes back sales, previously expected in the 2018 Christmas holiday season
- Supporting Dow who are focused on high volume sales to major OEMs
- Supporting Merck who are focused on 2<sup>nd</sup> generation colour filter / hybrid OLED + QD and 3<sup>rd</sup> generation electroluminescent applications
- Samsung and other advancing hybrid blue OLED plus QD colour conversion

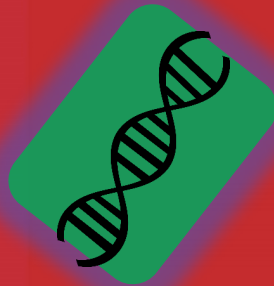
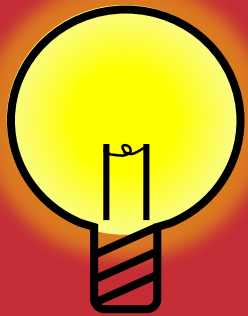
*Increasingly  
demanding*



## MULTI-CHANNEL STRATEGY STILL RELEVANT

### Nanoco Non-exclusive Licensees



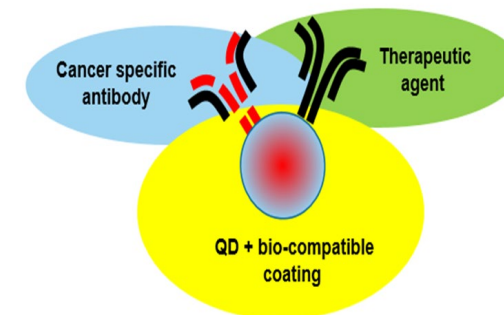


OTHER MARKETS



## OTHER MARKETS

	LIGHTING	LIFE SCIENCES
<b>Initial application</b>	Horticulture lighting, Light therapy	Image guided surgery, cancer diagnostics & targeted therapy
<b>CFQD Advantage</b>	Enhanced plant growth, Photodynamic therapy for pain management and skin treatment	Enhanced tumour imaging and diagnosis, non toxic
<b>Key partnerships</b>	Horticultural lighting companies, CareWare Corp	Covance, Charles River Labs, University College London, Cancer Research UK
<b>Next milestone</b>	Increase sales	File IND with FDA, Explore partnerships
<b>Strategy</b>	Uses existing display supply chain	Spin out and fund as stand alone entity
<b>Status</b>	1 commercial contract signed	Positive proof of principal, positive toxicology, GMP





# CareWear<sup>®</sup>

## Wearable Therapeutics



**Reduce Pain | Accelerate Recovery**  
**Improve Performance | Reduce Joint Stiffness**

The first wearable, wireless, FDA-registered LED light patches for athletes in all sports: on the training field, on the road, even at home. With 5000+ LEDs per patch, CareWear Light Patches start relieving pain and accelerating recovery in just 30 minutes.

STICK, CLICK, AND GO

# FINANCIAL REVIEW



## FINANCIAL HIGHLIGHTS

### Billings

- Significant increase as US Company made advance payments against future product sales – used to fund capital programme
- A number of development milestones delivered during the year
- Display royalties and licence fees continue under contract at minimum levels

### Costs

- Staff cross training to create agile / flexible workforce and cost base
- Full year benefits of cost control actions taken in prior year (£1.5m benefit)
- Costs remain closely managed and focussed on commercial opportunities

### Cash

- Conservation of cash resources continues as a key management focus
- Current resources sufficient to support current cash burn through to commercialised production early in H1 FY20
- Contingency plans exist for further unforeseen delays in commercialisation

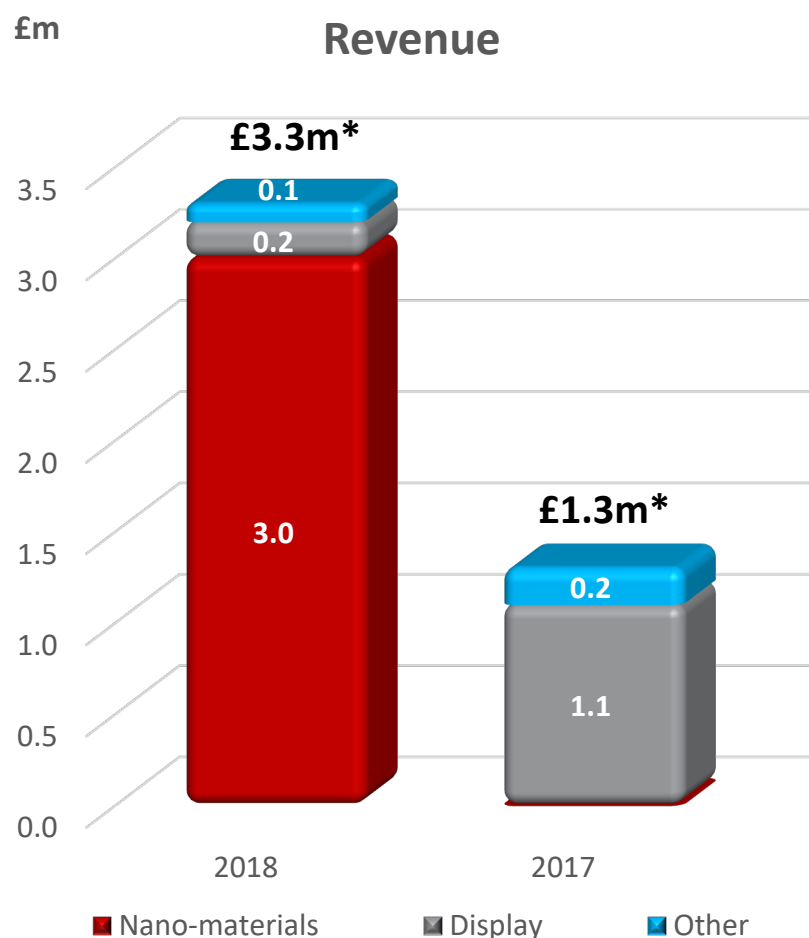
## INCOME STATEMENT

	2018 £m	2017 £m	Change £m
Revenue and other income	3.5	1.6	+1.9
Cost of sales	(0.4)	(0.3)	(0.1)
Gross profit	3.1	1.3	+1.8
R&D investment	(4.0)	(5.5)	+1.5
Sales and General Admin	(5.5)	(5.5)	-
Loss Before Interest, Depreciation & Amortisation	(6.4)	(9.7)	+3.3
Depreciation & Amortisation (including PY impairment £0.1m)	(1.0)	(1.2)	+0.2
Operating loss	(7.4)	(10.9)	+3.5
Tax and financing costs	1.4	1.8	(0.4)
Loss after tax	(6.0)	(9.1)	+3.1

- Revenue growth from services and milestones delivered under new nano-materials agreement
- Cost base allows investment to support new opportunities
- Created improved flexibility in staff skills (and hence cost base) to support nano-materials development

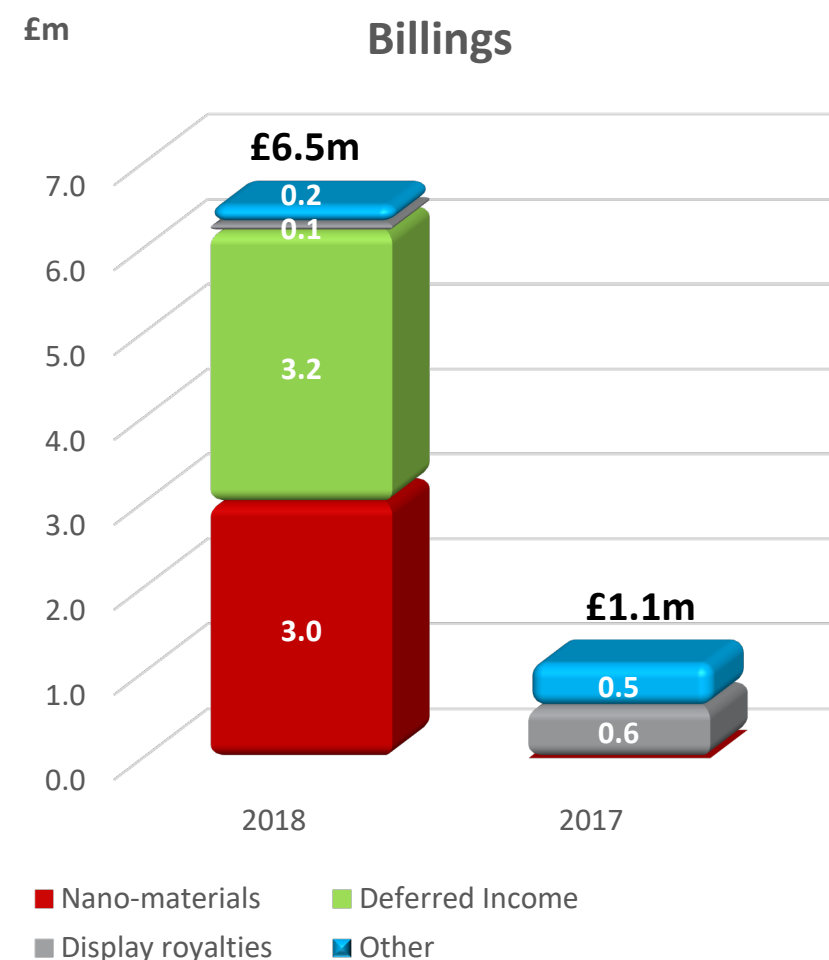


# REVENUE AND BILLINGS



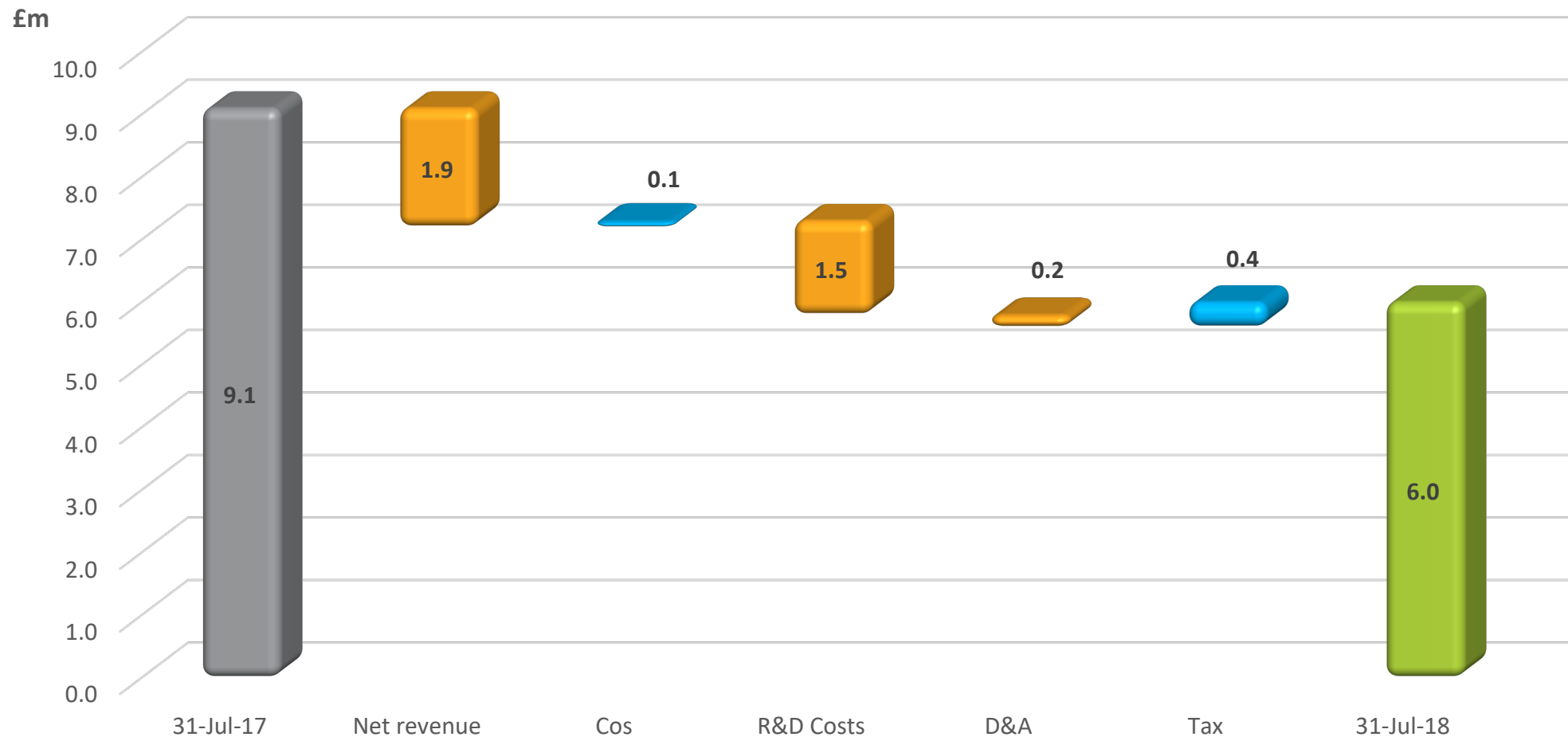
\* excludes other operating income

- Revenue of £3.3m vs FY17 £1.3m
- Key driver nano-materials income from US Company



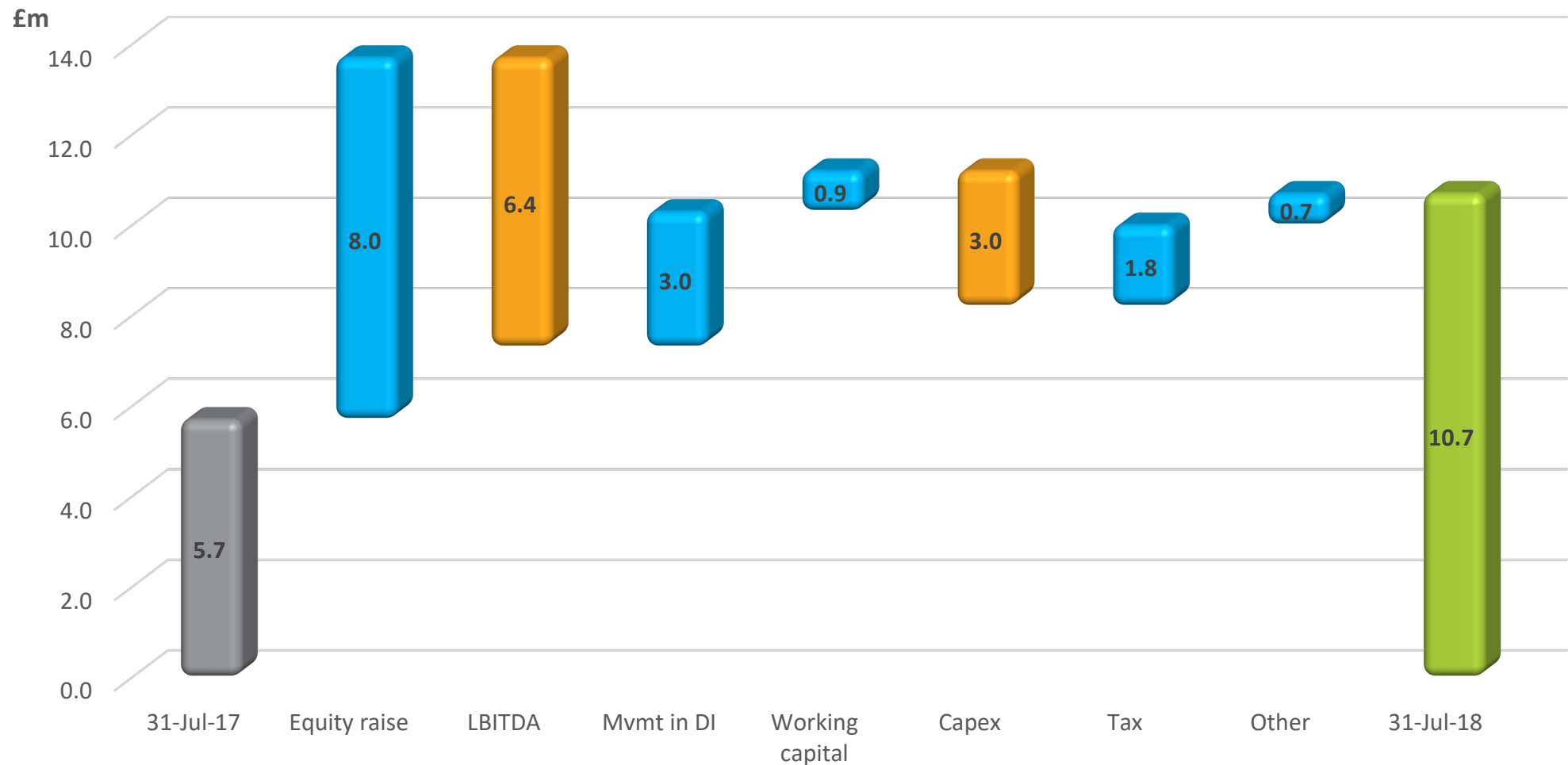
- Billings of £6.5m vs FY17 £1.1m
- Includes £2.8m advance payments by US Company against future product sales

## MOVEMENT IN NET LOSS



- Net income increase drops strongly to the bottom line reflecting income from non-product sales
- Cost base now £2.6m below FY16 peak of £13.4m
- Small reduction of £0.4m in tax benefit reflects lower pre-tax loss in the year

## MOVEMENT IN CASH 2018



- Cash resources in place to fund business beyond commercial production H1 FY20
- Remains the case in downside scenario supported by cost reductions
- FY19 will see similar levels of capex spend as we complete the Runcorn facility expansion



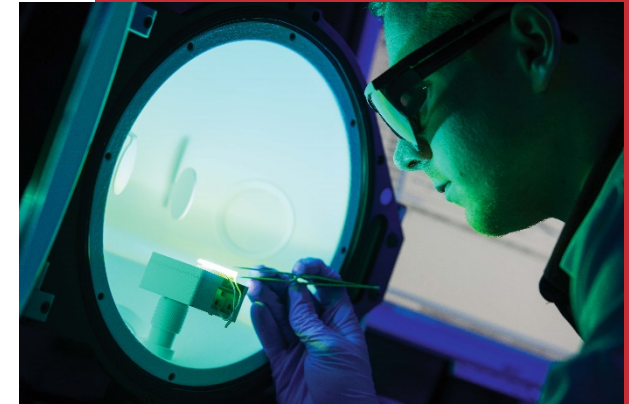
# SUMMARY





## SUMMARY AND OUTLOOK

- New opportunities demonstrate the power of our platform technology
- Deepening and strengthening relationship with US Company
- Agile re-focus of research and operational resources to support new opportunities in the electronics markets
- Major expansion of Runcorn production facility started in FY18, due for completion by December 2018
- Expect to commence commercial production in H1 FY20
- Current resources adequate until commercial production achieved – any new commercial agreements will enhance this position
- A number of commercial research and development opportunities under discussion for delivery in FY19
- Our growing pipeline of commercial opportunities will support revenue in FY19 around double that of FY18



***“The Group is at an important transition point as we rise to the challenges of scaling up to address exciting short term opportunities”***

## QUESTIONS

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Q&A

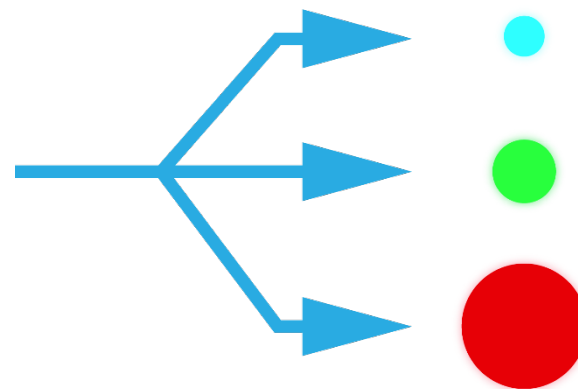


# APPENDICES



## WHAT IS A QUANTUM DOT?

- Tiny particles of a fluorescent semiconductor material
- 1 to 10 nanometers in diameter
- Size of the quantum dot determines the spectrum of light emitted
- Smaller = blue; larger = red
- Can be tuned to light beyond visible light into the Infra-red or ultra-violet parts of the spectrum



*Established  
technology with a  
wide range of  
commercial  
applications*



## BENEFITS QD DELIVER TO DISPLAY

- Benefits of QD in display
  - Enables Wide Color Gamut (WCG) displays for 4K, UHD, HDR, gaming, streaming, photos
  - Integrated into existing LCD technology
  - Consistent and accurate colours across product range
  - Improved peak brightness and contrast
  - Lightning fast response times and refresh rates
- QD competing with OLED TVs at high end
- LCD push at high end will be 8k
  - LCD 8k panel current costs equivalent to OLED
  - LCD will push on brightness, resolution and colour
  - 8k panels are <3% transmissive, requiring high brightness BLU, QD opportunity
  - Samsung rumoured to be launching 8k + QD, high brightness (4000 nits) late 2018 or early 2019
  - We believe other companies with large LCD fabs following suit
- Samsung and other advancing hybrid blue OLED plus QD colour conversion

### Gaming



### HDR



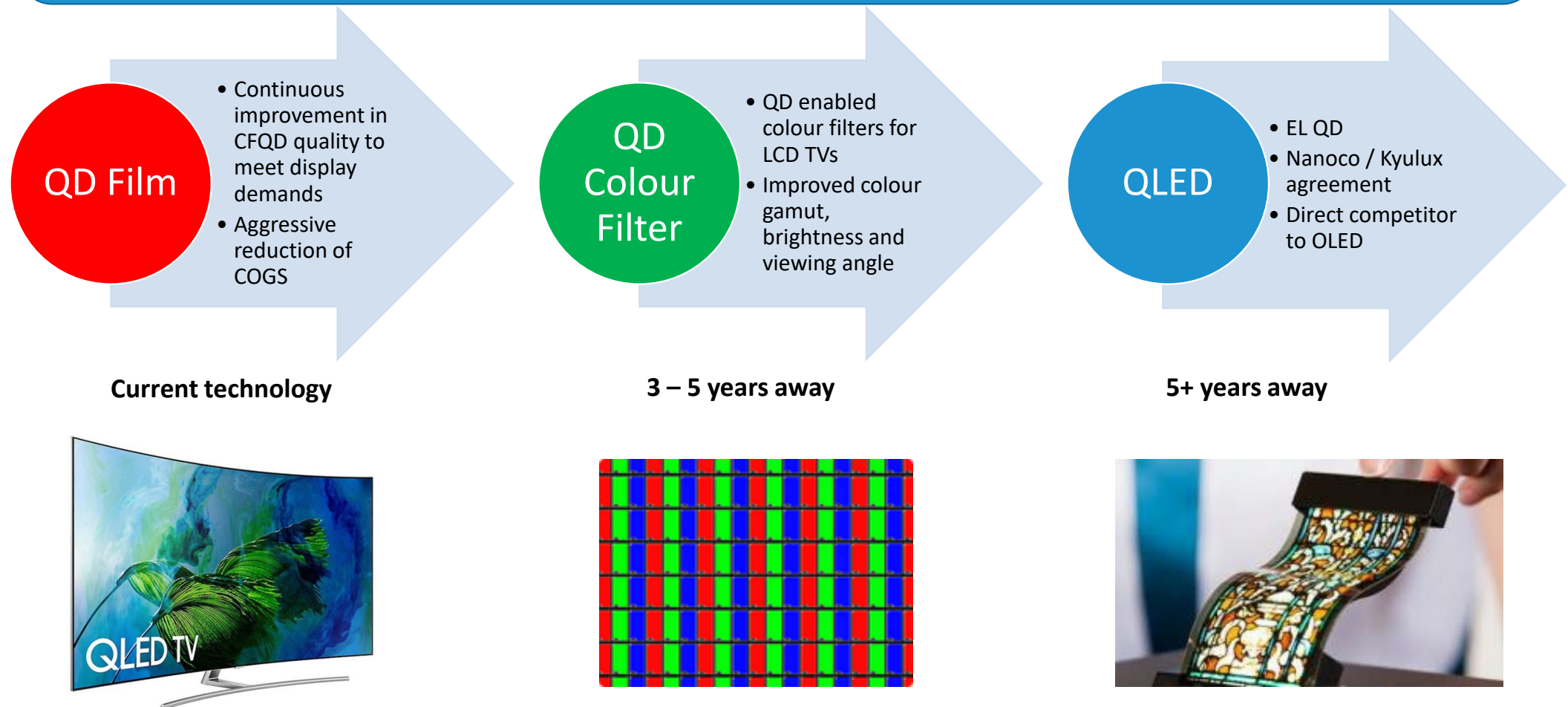
### Streaming



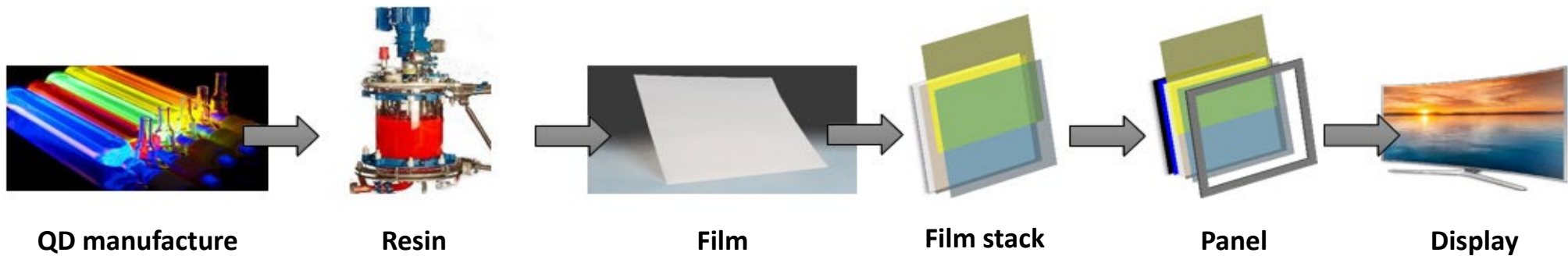
## CONTINUOUS INNOVATION CRITICAL TO SUCCESS

Nanoco has led the development of CFQD technology with rapid improvements in quality, performance and yield

Diminished R&D resource needs to be reinstated to keep up and stay ahead of competition and deliver improved technology



# BENEFITS OF CFQD® QUANTUM DOT FILM



## Better Colour Gamut

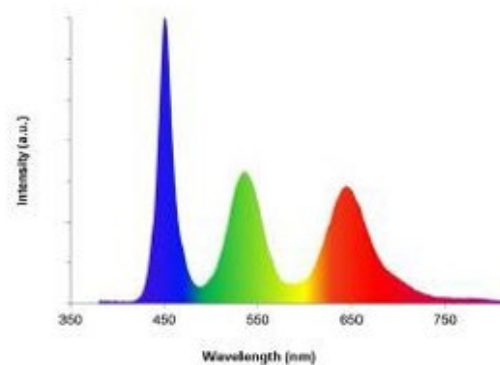
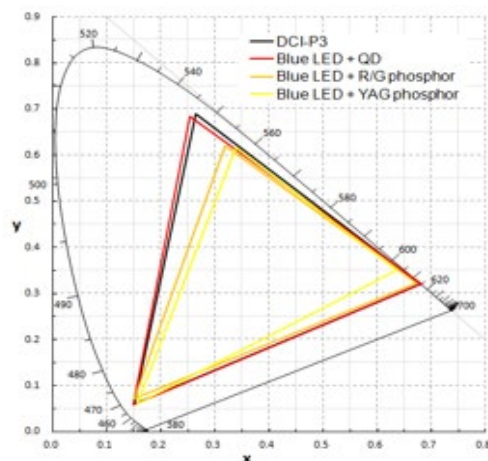
- Much improved colour saturation
- Improved colour enhancement over LCD → similar to OLED

## Energy Efficient

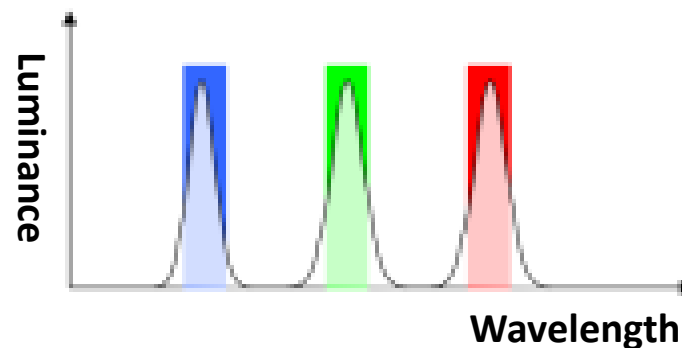
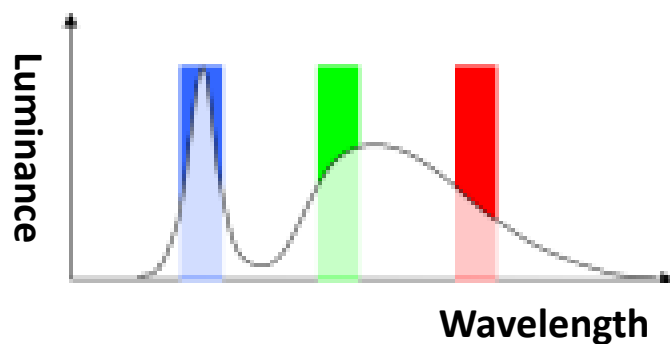
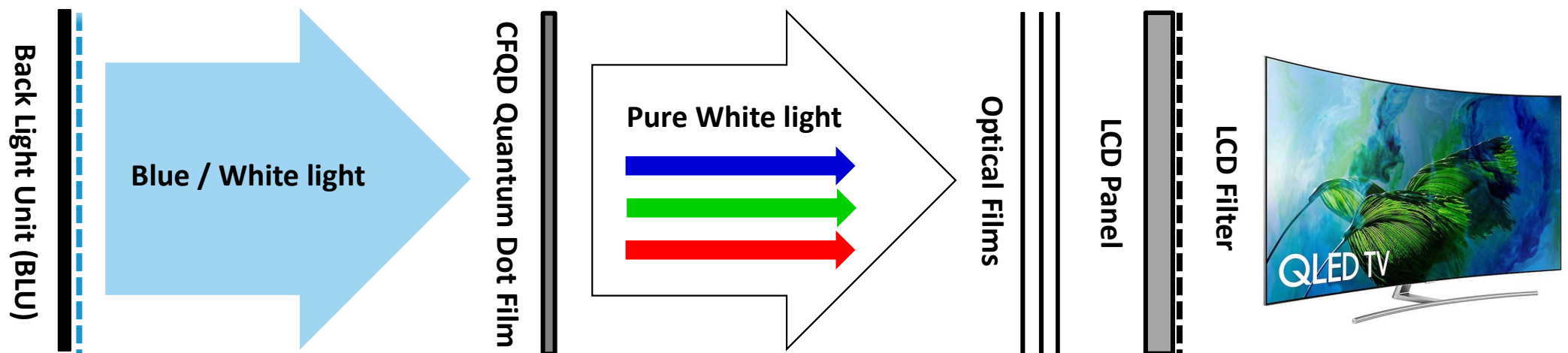
- Narrow bandwidth = more light extraction through colour filters
- Enables use of blue LED instead of less efficient white LED

## Minimal Process Change

- Uses existing LCD manufacturing infrastructure
- Uses existing LCD supply chain



## BREAKDOWN OF A QD LCD DISPLAY



Emits light – much more blue than green and red

Light energises the quantum dots in the film

Quantum dots emit precise green and red colours

LCD panel creates the image through polarised shuttering of pixels

Each pixel / shutter is paired with a coloured filter to remove all but the red, green or blue light. Filters may be replaced by QD in the future

Source: Edison Investment Research



## ROHS UPDATE

- The European Commission (EC) revised the RoHS exemption last year so that it immediately ceased for lighting and will end on 31<sup>st</sup> October 2019 for display products, after which the normal RoHS limit of 100ppm will apply
- The exemption is subject to a final review by the EC as one European lighting company and one Chinese QD company requested an extension in April.
- Nanoco expects that regulations in other key markets, including China, will fall in line with RoHS in future
- Meanwhile, our contacts with display companies indicate that most already accept the need for new display products to be cadmium-free - especially the world leading brands in both television, computer monitor and laptop displays
- The EC has also started a project to review the list of toxic substances that are restricted under RoHS regulations and to how to evaluate Exemption requests
- Indium Phosphide (InP) is included in materials to be considered for future RoHS restricted materials list because it is rated as a probable carcinogen. However, it is far less harmful than Cadmium and does not persist in the environment
- Nanoco does not use InP in its CFQD<sup>®</sup>, which have been tested and shown to be non-toxic for potential medical use in cancer treatments
- The EC has also included in this package of work one new request for cadmium based QD to be used in 'on-chip' LED lighting applications
- Nanoco is actively participating in the review process for the proposed RoHS changes and continues to champion the use of safer alternatives to cadmium-based QD



***Market leader Samsung promotes their cadmium-free quantum dots QLED TV range at CES 2017***

# LEADERSHIP

## Dr Christopher Richards Non-Executive Chairman

- CEO, Non-Executive chairman, Arysta LifeSciences
- 20 years of increasing management roles at Syngenta
- Executive chairman of Plant Health Care
- NED of Origin Enterprises plc

## Dr Michael Edelman CEO

- Led spin-out of Nanoco from University of Manchester
- GE/Bayer JV, founded www.yet2.com Europe, commercial director Colloids Ltd, Brunner Mond, ICI

## Dr Nigel Picket Co-founder & CTO

- Inventor of Nanoco's key patented scale-up technology
- Leading expert on semi-conducting nano-crystals
- Japanese Government, St. Andrews University, Georgia Tech

## Brian Tenner CFO / COO

- Experienced Quoted Company CFO with strong operational and transformation experience
- Previously Board Member and CFO of British Nuclear Group Ltd, Scapa Group plc, Renold Plc, NCC Group PLC
- NED and Chair of Audit Committee at AIM listed Velocity Composites plc

## Brendan Cummins Senior Non-Executive

- 40 years of industry experience mostly with Ciba Geigy, last role was CEO of Ciba and led the sale of Ciba to BASF
- Board of US Headquartered, Ashland Inc., Chair of Governance and Nominations Committees and member of Audit Committee
- Board of Perstorp AB, Sweden

## Dr Alison Fielding Non-Executive

- IP Group
- NED of Getech Group plc
- Astra Zeneca, followed McKinsey & Co, then co-founded Techtran Group Limited which was acquired by IP Group in 2005 and subsequently held the role of director and COO at IP Group
- Board member and advisor of several early stage and quoted IP Group backed technology companies

## SHAREHOLDER ANALYSIS (AS AT 31 JULY 2018)

Name	Shareholding	Percentage
Lombard Odier	56,783,141	19.86%
Hargreaves Lansdown Asset Management	24,279,717	8.49%
Miton	16,735,185	5.85%
Baillie Gifford & Co	15,889,617	5.56%
Dr Nigel Pickett (CTO)	11,112,347	3.89%
Interactive Investor	10,756,665	3.76%
Dr Michael Edelman (CEO)	3,124,350	1.09%
<b>Total of shareholdings above</b>	<b>138,681,022</b>	<b>48.50%</b>

Notes: The total number of voting rights in the Company is 285,934,927



## **Nanoco Group PLC**

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