Cautionary statement

This presentation contains forward looking statements that are subject to risk factors associated with, amongst other things, the economic and business circumstances occurring from time to time in the countries and sectors in which Johnson Matthey operates. It is believed that the expectations reflected in these statements are reasonable but they may be affected by a wide range of variables which could cause actual results to differ materially from those currently anticipated.
## Agenda

<table>
<thead>
<tr>
<th>Start</th>
<th>Session</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30am</td>
<td>Sustained growth and value creation</td>
<td>Robert MacLeod</td>
</tr>
<tr>
<td>9:50am</td>
<td>Clean Air and Q&amp;A</td>
<td>John Walker and Phil Blakeman</td>
</tr>
<tr>
<td><strong>11:00am</strong></td>
<td><strong>Break</strong></td>
<td></td>
</tr>
<tr>
<td>11:30am</td>
<td>Battery Materials and Q&amp;A</td>
<td>Alan Nelson</td>
</tr>
<tr>
<td><strong>12:15pm</strong></td>
<td><strong>Lunch</strong></td>
<td></td>
</tr>
<tr>
<td>1:00pm</td>
<td>Efficient Natural Resources and Q&amp;A</td>
<td>Jane Toogood</td>
</tr>
<tr>
<td>1:40pm</td>
<td>Health and Q&amp;A</td>
<td>Robert MacLeod, Garrett Dilley and Paul Evans</td>
</tr>
<tr>
<td><strong>2:30pm</strong></td>
<td><strong>Break</strong></td>
<td></td>
</tr>
<tr>
<td>3:00pm</td>
<td>Delivering shareholder value</td>
<td>Anna Manz</td>
</tr>
<tr>
<td>3:20pm</td>
<td>Concluding remarks and Q&amp;A</td>
<td>Robert MacLeod</td>
</tr>
</tbody>
</table>
## Restatement

### Clean Air

<table>
<thead>
<tr>
<th></th>
<th>Emission Control Technologies</th>
<th>Reallocation</th>
<th>Clean Air</th>
<th>% of Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>For year ended 31\textsuperscript{st} March 2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales excluding precious metals (£m)</td>
<td>2,224</td>
<td></td>
<td>2,224</td>
<td>60%</td>
</tr>
<tr>
<td>Underlying operating profit (£m)</td>
<td>318.2</td>
<td></td>
<td>318.2</td>
<td>62%</td>
</tr>
<tr>
<td>ROS (%)</td>
<td>14.3</td>
<td></td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>ROIC (%)</td>
<td>30.7</td>
<td></td>
<td>30.7</td>
<td></td>
</tr>
</tbody>
</table>

### Efficient Natural Resources

<table>
<thead>
<tr>
<th></th>
<th>Process Technologies</th>
<th>Precious Metal Products</th>
<th>Reallocation</th>
<th>Efficient Natural Resources</th>
<th>% of Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>For year ended 31\textsuperscript{st} March 2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales excluding precious metals (£m)</td>
<td>587</td>
<td>403</td>
<td>(71)	extsuperscript{(1)}</td>
<td>919</td>
<td>25%</td>
</tr>
<tr>
<td>Underlying operating profit (£m)</td>
<td>90.4</td>
<td>86.4</td>
<td>(13.8)	extsuperscript{(2)}</td>
<td>163.0</td>
<td>32%</td>
</tr>
<tr>
<td>ROS (%)</td>
<td>15.4</td>
<td>21.4</td>
<td></td>
<td>17.7</td>
<td></td>
</tr>
<tr>
<td>ROIC (%)</td>
<td>11.4</td>
<td>19.8</td>
<td></td>
<td>13.5</td>
<td></td>
</tr>
</tbody>
</table>

1. £61m of Noble Metals medical sales and £10m intra sector sales
2. Noble Metals medical
## Restatement

### Health

<table>
<thead>
<tr>
<th></th>
<th>Fine Chemicals</th>
<th>Reallocation</th>
<th>Health</th>
<th>% of Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For year ended 31st March 2017</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales excluding precious metals (£m)</td>
<td>284</td>
<td>(48) (1)</td>
<td>236</td>
<td>7%</td>
</tr>
<tr>
<td>Underlying operating profit (£m)</td>
<td>64.5</td>
<td>(12.8) (1)</td>
<td>51.7</td>
<td>10%</td>
</tr>
<tr>
<td>ROS (%)</td>
<td>22.8</td>
<td></td>
<td>21.9</td>
<td></td>
</tr>
<tr>
<td>ROIC (%)</td>
<td>12.3</td>
<td></td>
<td>10.4</td>
<td></td>
</tr>
</tbody>
</table>

1. Catalysis and Chiral Technologies

### New Markets

<table>
<thead>
<tr>
<th></th>
<th>New Businesses</th>
<th>Reallocation</th>
<th>New Markets</th>
<th>% of Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For year ended 31st March 2017</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales excluding precious metals (£m)</td>
<td>191</td>
<td>117 (1)</td>
<td>308</td>
<td>8%</td>
</tr>
<tr>
<td>Underlying operating profit / (loss) (£m)</td>
<td>(14.4)</td>
<td>26.6 (2)</td>
<td>12.2</td>
<td>2%</td>
</tr>
<tr>
<td>ROS (%)</td>
<td></td>
<td></td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>ROIC (%)</td>
<td></td>
<td></td>
<td>6.2</td>
<td></td>
</tr>
</tbody>
</table>

1. £61m medical sales, £48m Catalysis and Chiral Technologies and £8m intersegment sales
2. £13.8m Medical profit and £12.8m Catalysis and Chiral Technologies profit
Sustained growth and value creation

Robert MacLeod
Chief Executive
Sustained growth and value creation through:

- Chemistry which drives solutions to complex problems
- Sustained leadership in growing, high margin, technology driven markets
- Relentless focus on operational excellence
- Investment in R&D which accelerates growth
Solving complex problems across the group with world class chemistry

Materials characterisation and testing

PGM chemistry and metallurgy

Material design and engineering

Surface chemistry

and its application

Provision of customised solutions

Development of new and next-generation products

Scale-up of complex manufacturing
We address three big global challenges

**Improving air quality**
Increasing concern by consumers and governments on **Clean Air**
How to reduce powertrain emissions as efficiently as possible

**The efficient use and transformation of natural resources**
Growing population and consumer aspiration is increasing demand for **Efficient use of Natural Resources**
How to achieve greater efficiency and optimal yields in the use of natural resources

**Improving healthcare**
Need for affordable **Healthcare** which is increasingly personalised
How to make complex, often highly potent APIs, efficiently and quickly
Technology leadership gives us #1 positions

**Clean Air**
- #1 Diesel
- Joint #1 Gasoline
- Opportunity in battery materials

**Efficient Natural Resources**
- #1 Methanol
- #1 PGM recycling
- #1 PGM products
- #1 Oxo alcohols
- #1 Formaldehyde
- #1 SNG / #1 BDO
- #1 NDA

**Health**
- #1 opiates
- #1 ADHD
- Opportunity to expand
Sustained growth and value creation

Chemistry which drives solutions to complex problems

Sustained leadership in growing, high margin, technology driven markets

Investment which accelerates growth

Relentless focus on operational excellence

Driving attractive returns:

Expanding ROIC to 20%

Mid to high single digit EPS CAGR

Progressive dividend policy
Sustained growth and value creation through:

- Sustained growth in Clean Air
- Breakout growth in Health and Battery Materials
- Market leading growth in Efficient Natural Resources
- Relentless focus on driving efficiency
Clear visibility of sustained growth in Clean Air

Heightened air quality issues causing rapid change

In Europe Light Duty:
• In short term, we grow strongly from substantial share gains
• ICE powertrain and legislation substantially reduces diesel/gasoline share sensitivity

Asia transforms in scale

North America grows steadily

Margins maintained through focus on efficiency
Breakout growth in Health from a deeper, broader API portfolio

We have established positions in attractive, growing market

Increasing API complexity/generic penetration play to JM strengths

Our growth will come from:

- Our existing portfolio will outperform
- Our new product pipeline in generics adds c.£100m OP in 2025
- Building on strong reputation for driving development and commercialisation
- Enhancing our growth by entering adjacent segments
Breakout growth in Battery Materials through technical leadership

Market is still in its early stage but the opportunity is substantial

We have already developed materials with market leading performance characteristics

We will invest in high energy manufacturing capacity, starting in 2018/19
Outperformance in targeted, growth segments in Efficient Natural Resources

Market has changed significantly in recent years

We have leading positions in most markets

We will outperform in higher growth segments

Increased efficiency of operations will enhance performance
We create value by investing in our technology through three stages

<table>
<thead>
<tr>
<th>Stage</th>
<th>Clean Air</th>
<th>Efficient Natural Resources</th>
<th>Health</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Selectively invest through New Markets sector</strong></td>
<td>e.g. Battery Materials</td>
<td>e.g. Agrochemicals</td>
<td>e.g. Medical Devices</td>
</tr>
<tr>
<td><strong>Scale-up</strong></td>
<td>e.g. Emission Control in Asia</td>
<td>e.g. PGM Refining in China</td>
<td>e.g. API Manufacturing in both Innovators and Generics</td>
</tr>
<tr>
<td><strong>Sustain and grow</strong></td>
<td>e.g. Emission Control in Europe &amp; NA</td>
<td>e.g. Hydrogen catalysts</td>
<td></td>
</tr>
</tbody>
</table>
Sustained growth and value creation through:

- Improving performance through common standards and simplified processes
- Accelerated by IT enablement
- Creating a business that is more robust and more agile
- Releasing £50m of cost over the next 3 years for reinvestment and margin expansion
Our vision is for a cleaner and healthier world

By 2025, we will:

- Enhance technology leadership in our targeted markets
- Have three substantial and growing sectors
- Have excellence in everything we do

Be one of the best performing, most trusted and admired speciality chemicals companies in the world
Clean Air: Sustained growth and value creation from a global leader

John Walker – Sector Chief Executive, Clean Air
Phil Blakeman, Ph.D. – Managing Director, Clean Air Sector, Asia
Sustained growth and value creation from a global leader

Europe Light Duty grows strongly in short term and broadly flat over 10 years

North America Light Duty delivers consistent growth

Asia transforms in scale

Operational efficiency supports margin and ROIC

Mid single digit sales CAGR over next decade
Our Sector strategy assumes:

- **Impact of legislation only included where quantifiable**
  - Euro 7/VII is likely to drive increased value per vehicle but is not included

- **Diesel share declining to 25%* of Western Europe by 2025**
  - Every 1ppt decline below 25% would impact gross profit by ~£4m

- **Increased penetration of hybrids**
  - Neutral for gasoline to gasoline hybrid or diesel to diesel hybrid

- **Global BEV penetration increasing to 6% by 2025**
  - Every 1ppt increase above 6% would impact gross profit by ~£7m

---

* 25% of Western Europe light duty vehicles (including commercial vehicles) by 2025, equivalent to ~20% of Western Europe passenger car sales
Sales grew at 11% CAGR over last 5 years

Sales 2016/17 by sub-business

- **Light duty**
  - Europe LDV: 37%
  - Americas LDV: 15%
  - Asia LDV: 15%
  - Europe HDV: 15%
  - Asia HDV: 15%
  - Americas HDV: 2%
  - Other: 2%

- **Heavy duty**
  - Europe LDV: 12%
  - Americas LDV: 4%

OP grew at 18% CAGR over last 5 years

Strong ROIC at 31%

Global manufacturing footprint

1 Sub-businesses restated: South American businesses transferred from Europe to Americas, Americas LD truck business transferred from Heavy Duty to Light Duty, Heavy Duty includes non road.
Share gains and tighter legislation gives visibility of mid single digit CAGR over 10 years

1-2 Years

Strong growth driven by:
- Additional ~20 ppts share secured in Europe Light Duty diesel
- Tightening legislation in Europe

3-6 Years

Good growth driven by:
- Tightening legislation in Asia and Europe
Partly offset by:
- Continued Europe diesel decline and early BEV penetration

7-10 Years

Growth driven by:
- Tightening legislation in US
Partly offset by:
- Faster BEV penetration and further Europe diesel decline
Four key Clean Air segments to discuss

01 Europe
   Light Duty

02 Americas
   Light Duty

03 Asia
   Light Duty

04 Global
   Heavy Duty
Europe Light Duty – Broadly flat over 10 years following strong short term growth

Sales 2016/17

- £828m
- Europe LDV: 37%
- Americas LDV: 15%
- Asia LDV: 15%
- Europe HDV: 12%
- Asia HDV: 15%
- Americas HDV: 12%
- Other: 2%

01 Vehicle production
02 Air quality
03 JM share
04 Hybrid / diesel / gasoline
05 BEV
01. Vehicle production expected to grow but is not a material driver of growth

2% p.a. vehicle growth impacted by:
- Population +
- Increased wealth +
- Better public transport -
- Car sharing / ride hailing -
02. Air quality drives tighter legislation which adds value per vehicle

Gasoline: Sales per vehicle increases significantly

**Euro 6b**
Three way catalyst x2

**Euro 6c/d**
Three way catalyst + gasoline particulate filter

~2x value per vehicle

GPFs expected on >90% of GDI vehicles by 2025
GDI vehicles expected to be 80% of gasoline

Diesel: Sales per vehicle increases

**Euro 6b**
Diesel oxidation catalyst + catalysed soot filter + selective catalytic reduction

**Euro 6c/d**
Advanced selective catalytic reduction

Up to 1.5x value per vehicle
03. Fundamental change in emission control market led to significant increase in JM share

Public confidence in emission control significantly hit

NOx emissions in the public spotlight

OEMs moved quickly to improve emissions ahead of legislation
03. Our leadership in diesel technology and fast response led to share gains

Our technology delivers significant decrease in NOx emissions

Excellent low temperature NOx conversion

Outstanding thermal durability

Strong customer relationships and manufacturing agility

JM diesel share increases by ~20 ppts in 2018/19

Real World Driving NOx Emissions
EU5 – EU6d

Tailpipe NOx emissions (mg/km)

Euro 5 range full real world cycles

Euro 6b range full real world cycles

Euro 6d clean diesel car urban cycles

Euro 6d clean diesel car full RDE cycles

10x

7x

1x

0.6x

CF

2.1

1.5

1.0

Source: Emissions Analytics
03. In addition our gasoline filter technology is driving material share gains

Particulate number emissions of JM GPF are below future regulation requirements

<table>
<thead>
<tr>
<th></th>
<th>TWC</th>
<th>GPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF 1.5 (09/17)</td>
<td>1.4x10^{12}</td>
<td>1.2x10^{12}</td>
</tr>
<tr>
<td>CF 1.0</td>
<td>1.2x10^{12}</td>
<td>1.0x10^{12}</td>
</tr>
</tbody>
</table>

High performance
High filtration efficiency
Low backpressure

JM gasoline share will increase by ~5 ppts as Euro 6d phases in
04. Demand for diesel and gasoline ICEs increasingly impacted by consumer behaviour

Consumer awareness of vehicle emissions has increased

Consumer are moving through a spectrum:
- From: diesel to gasoline
- From: ICE to hybrids
- To: EV
04. Hybrids will become a significant part of the market

**Consumers**
- Hybrid offers fuel efficiency for small vehicles and urban driving

**OEMs**
- Hybrids needed to manage fleet average CO₂

Opportunity for more complex systems to manage stop / start engines

Neutral impact on Clean Air
04. Diesel / diesel hybrid share of light duty Western Europe is assumed to decline to 25%* by 2025

"Majority view" and "Range of views" are illustrated in the diagram. The majority view suggests that the mix of pure diesel ICE and diesel hybrids will see a significant decline, with a majority of cars assumed to be hybrids by 2025. The range of views indicates the potential variability in the adoption rates.

Footnote: *25% of Western Europe light duty vehicles (including commercial vehicles) by 2025, equivalent to ~20% of Western Europe passenger car sales
04. For JM, the sales gap between diesel and gasoline will halve

**Ratio of diesel to gasoline value per vehicle**

A 1ppt shift from diesel to gasoline (including gasoline hybrids) impacts gross profit by ~£4m
04. Share gains in a growing gasoline market

Gasoline - including hybrid - vehicle production to increase 4% p.a.

Legislation approximately doubles sales value for some gasoline vehicles

JM share of gasoline market increases ~5 ppts by 2020/21

Source: LMC and company estimates
05. BEVs will take share from traditional powertrains

Consumer demand for BEVs is growing

OEMs increasing number of BEV models

Rate of uptake dependent on:
- Total cost of ownership
- Infrastructure

Europe BEV penetration

Majority view
Range of views
### Europe Light Duty summary

#### Key Driver

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle production</td>
<td>2% CAGR supports growth in sales</td>
</tr>
<tr>
<td>Air quality - legislation</td>
<td>Euro 6c/d adds ~2x value for most gasoline vehicles</td>
</tr>
<tr>
<td>JM share</td>
<td>Technology leadership and agility drive share gains in diesel ~20ppt and gasoline ~5ppt</td>
</tr>
<tr>
<td>Diesel/gasoline share</td>
<td>Diesel market share declines to 25%* of Western Europe light duty by 2025</td>
</tr>
<tr>
<td>Hybrids</td>
<td>Penetration significantly increases to manage average fleet CO₂ with neutral impact on Clean Air</td>
</tr>
<tr>
<td>BEV penetration</td>
<td>9% by 2025</td>
</tr>
</tbody>
</table>

---

*25% of Western Europe light duty vehicles (including commercial vehicles) by 2025, equivalent to ~20% of Western Europe passenger car sales*
Americas Light Duty – Steady growth over the next decade

Sales 2016/17

- Europe LDV: 37%
- Americas LDV: 15%
- Asia LDV: 15%
- Europe HDV: 12%
- Asia HDV: 4%
- Americas HDV: 2%
- Other: 2%

£334m
01. Vehicle production will grow marginally

**Vehicle growth impacted by:**
- Population +
- Car sharing / ride hailing -

**Diesel and BEV make gains**
02. Legislation tightens adding sales value per vehicle

**US legislation tightens for particulate matter**

- % of fleet required to meet standard increases over time

**Technology adds value further out**

- Filters for some gasoline vehicles from ~2024 (assumed low fitment rate)

---

**LEVIII particulate matter standards and fleet compliance rate**

- PM standard (mg/mile): 0, 2, 4, 6, 8, 10, 12
- Compliance rate: 0%, 20%, 40%, 60%, 80%, 100%
03. Expect to win share through technology in a growing diesel market

- OEMs offering greater numbers of diesel variants
- Increasing demand for diesel pick-ups, SUVs and crossovers
- Diesel attractive option to meet tightening fuel economy standards
- Strong technology provides scope for JM’s diesel share to increase
04. BEV to have marginal impact in next 10 years

- Consumer demand for BEVs is growing
- OEMs increasing number of BEV models

Rate of uptake likely held back by:
- Low gasoline prices
- BEV infrastructure
- Consumer preference for large SUV’s/pick-ups

**US BEV penetration**

- Majority view
- Range of views
Americas Light Duty summary

Key Driver

<table>
<thead>
<tr>
<th><strong>Vehicle production</strong></th>
<th>Marginal growth supports growth in sales</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air quality - legislation</strong></td>
<td>GPF adoption expected from 2024 from tighter particulate matter legislation</td>
</tr>
<tr>
<td><strong>Diesel/gasoline share</strong></td>
<td>JM technology leadership supports share gains in growing diesel market</td>
</tr>
<tr>
<td><strong>BEV penetration</strong></td>
<td>Low level BEV penetration supports growth in sales</td>
</tr>
</tbody>
</table>

Steady growth over the next decade
Clean Air – Asia Light Duty and Global Heavy Duty
Phil Blakeman, Ph.D. – Managing Director, Clean Air Sector, Asia
Asia Light Duty – **Short to medium term growth from tighter legislation will almost double Asia Light Duty in 10 years**

Sales 2016/17

- Europe LDV: 15%
- Americas LDV: 12%
- Asia LDV: 4%
- Europe HDV: 2%
- Asia HDV: 15%
- Americas HDV: 15%
- Other: 37%

£338m

<table>
<thead>
<tr>
<th>01</th>
<th>China vehicle production</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>China air quality</td>
</tr>
<tr>
<td>03</td>
<td>China BEV</td>
</tr>
<tr>
<td>04</td>
<td>Other Asia</td>
</tr>
</tbody>
</table>
01. China vehicle production growth of 2% p.a. supports sales growth

Vehicle growth impacted by:
- Relatively low vehicle ownership rate +
- Increased wealth +

But will lag economic growth due to:
- Increased urbanisation and improvements in public transport -
- Usage barriers (esp. big cities) & ownership trends -
02. China air quality focus brings legislation which doubles sales value per vehicle

China 5 gasoline
Three way catalyst x2

China 6a gasoline from July 2020
Three way catalyst + gasoline particulate filter (GPF)

China 6b gasoline from July 2023
Three way catalyst + gasoline particulate filter (GPF)

~2x China 5
Real world driving

JM has the technology to deliver to these standards
03. China BEV growing fast and impacts growth in later years

**BEV expected to grow share quickly:**

- Strong government incentives for BEV
- Tightening fuel consumption legislation continues to support BEV uptake

**China BEV penetration**

- Majority view
- Range of views

Assumption: 13%
04. Other Asian countries provide additional growth

**India grows strongly**
- Strong growth in vehicle production
- BS 6 legislation from April 2020:
  - Gasoline remains with three way catalyst only
  - Increase in technology on diesel cars partly offset as diesel market share declines

**Japan stable**
- Steady car production
- Key for maintaining our relationships with Japanese OEMs

**South East Asia growth**
- Tightening vehicle regulations across the region provide opportunities for growth
### Asia Light Duty summary

#### Key Driver

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>China vehicle production</td>
<td>2% CAGR supports growth in sales</td>
</tr>
<tr>
<td>China Air quality - legislation</td>
<td>China 6a and China 6b doubles sales value for some vehicles</td>
</tr>
<tr>
<td>China BEV penetration</td>
<td>13% by 2025</td>
</tr>
<tr>
<td>Other Asia</td>
<td>Growth from tightening legislation in India and South East Asia</td>
</tr>
</tbody>
</table>

**Asia Light Duty to nearly double sales over the next 10 years**
Global Heavy Duty— Legislation in China and India drives growth over the next 10 years

Sales 2016/17

£682m

- Europe LDV: 15%
- Americas LDV: 4%
- Asia LDV: 12%
- Europe HDV: 15%
- Asia HDV: 15%
- Americas HDV: 15%
- Other: 2%

01 Truck production
02 Air quality and JM share
03 BEV
01. Global truck production growth of 2% p.a. supports growth

- **US low single digit growth with cyclical class 8 trucks**
- **Europe mid single digit growth**
- **China marginal growth**
- **India grows in line with GDP**
02. Asia legislation triples sales value per vehicle in China and India

**China V**
Selective catalytic reduction + ammonia slip catalyst

**India BS IV**
Diesel oxidation catalyst or selective catalytic reduction

**China VI**
diesel oxidation catalyst + catalysed soot filter + selective catalytic reduction + ammonia slip catalyst
From January 2021 (expected)

**India BS VI**
Diesel oxidation catalyst + catalysed soot filter + selective catalytic reduction + ammonia slip catalyst
From April 2020

Scope for share gains from our technology and focus on diversifying customer base to Asian OEMs
03. Expect BEV to have minimal impact over next 10 years

Interest in truck electrification but early technology solutions not suitable for majority of market

Limited by economic calculation of weight of freight carried versus total cost of ownership

Broad range of possible outcomes in the longer term
# Global Heavy Duty summary

## Key Driver

<table>
<thead>
<tr>
<th>Category</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck production</td>
<td>2% CAGR supports growth in sales</td>
</tr>
<tr>
<td>Air quality - legislation</td>
<td>China VI / India VI drive significant increase in technology and triples sales value per vehicle</td>
</tr>
<tr>
<td>BEV penetration</td>
<td>Minimal impact on sales growth</td>
</tr>
</tbody>
</table>

---

*Sustained growth in global Heavy Duty driven by legislation in China and India*
Clean Air
John Walker – Sector Chief Executive, Clean Air
Opportunities to drive efficiency

Efficient, flexible manufacturing

Procurement

Customer focus

Organisation
Consistent value creation from a global leader

Europe Light Duty broadly flat absorbing decline in diesel share of market and BEV penetration

Americas Light Duty grows steadily with limited BEV penetration

Good growth in Asia Light Duty despite strong BEV penetration

Sustained growth in global Heavy Duty driven by legislation in Asia

Improved operational efficiency supports margin

Mid single digit sales CAGR over the next 10 years in Clean Air
Battery Materials: Delivering breakout growth

Alan E Nelson, Ph.D., P.Eng.
Sector Chief Executive, New Markets and Group CTO
New Markets: three businesses at scale, focus on battery materials

**Alternative Powertrain**

Become a leader using our chemistry advantage and JM capabilities

Flexibility across hybrid, BEV and fuel cell technologies

**Battery materials the most developed opportunity**

**Life Science Technologies**

Become a leader in pharma and agchem catalysts and processes

Cross-selling technologies with our Health sector

**Medical Device Components**

Become a leader in the development of medical device components

Collaborate with customers to provide innovative solutions

---

1. Formerly Catalyst and Chiral Technologies (CCT)
We have developed best-in-class high energy battery materials

Investment of c.£200m from mid-2018 to manufacture up to 10,000 metric tons from FY21/22

We expect to be on automotive platforms in production from FY21/22
The evolution of the automotive powertrain faces many challenges.
OEMs focused on bringing affordable long range xEVs to market

“Ford is...adding 13 new electrified vehicles to its product portfolio by 2020; more than 40 percent of Ford’s name plates globally will be electrified by the decade’s end”

“Ford is...adding 13 new electrified vehicles to its product portfolio by 2020; more than 40 percent of Ford’s name plates globally will be electrified by the decade’s end”

Press release, December 2015

“All models launched after 2019 will have a hybrid or fully electric propulsion”

“All models launched after 2019 will have a hybrid or fully electric propulsion”

Håkan Samuelsson, Volvo CEO
H1 Results, July 2017

“We are now focusing on the electrification of our core portfolio and the introduction of BEV models through the 2019-2021 period”

“We are now focusing on the electrification of our core portfolio and the introduction of BEV models through the 2019-2021 period”

BMW Group Investor Presentation, August 2017

“Volkswagen is...launching more than 30 purely battery-powered electric vehicles over the next ten years... BEV sales will be...equivalent to some 20 to 25 percent of the total unit sales expected at that time”

“Volkswagen is...launching more than 30 purely battery-powered electric vehicles over the next ten years... BEV sales will be...equivalent to some 20 to 25 percent of the total unit sales expected at that time”

Volkswagen, Strategy 2025, June 2016
Today xEV adoption is limited by total cost of ownership

**Total cost of ownership (TCO) for passenger cars, Europe 2017**

<table>
<thead>
<tr>
<th>Type</th>
<th>Cost per mile (indexed to 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol</td>
<td></td>
</tr>
<tr>
<td>Diesel</td>
<td></td>
</tr>
<tr>
<td>PHEV</td>
<td></td>
</tr>
<tr>
<td>BEV</td>
<td></td>
</tr>
</tbody>
</table>

- xEV penetration today driven by government subsidy
- xEVs are forecast to reach TCO parity in the mid 2020s, depending on vehicle segment
- Cost of lithium ion batteries has declined over the past decade
- Cathode materials over this time have not changed significantly

---

1. JM estimates for mid-size passenger cars based on externally sourced data on cost of ownership
Demand for cathode materials between $15bn and $100bn by 2025

Projected xEV (BEV and PHEV) global light duty vehicle powertrain share 2015-2025, %¹

- Estimates of xEV (BEV and PHEV) penetration range from 4% - 25% by 2025
- ICE and mild hybrids still expected to dominate market for the medium term

Projected automotive cathode materials market by 2025:
- $15bn-$100bn of sales
- 500k to 3.3m metric tons of capacity required, c. 150k today for automotive markets

¹. Upper bound (Roland Berger, UBS (incl. OEM forecasts)); Lower bound (BP energy outlook, IHS)
A range of materials are required

Powertrain implications on cathode volumes and chemistries

<table>
<thead>
<tr>
<th>Material demand(^1)</th>
<th>Micro HEV</th>
<th>HEV</th>
<th>PHEV</th>
<th>EV Medium</th>
<th>EV Long</th>
<th>PHEV-bus</th>
<th>E-Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ave. Pack size (kWh)</td>
<td>0.6</td>
<td>1.0</td>
<td>10</td>
<td>30</td>
<td>70</td>
<td>70</td>
<td>250</td>
</tr>
<tr>
<td>Cathode (kg), approx.</td>
<td>c.1</td>
<td>c.2</td>
<td>c.20</td>
<td>c.50</td>
<td>c.120</td>
<td>c.120</td>
<td>c.400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials positioning</th>
<th>LFP</th>
<th>High power</th>
<th>Safety and cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NMC / NCA</td>
<td>High energy and range</td>
<td></td>
</tr>
<tr>
<td>JM</td>
<td>eLNO</td>
<td>High energy, range, cost and safety</td>
<td></td>
</tr>
</tbody>
</table>

1. Based on average of existing and known products
JM is addressing the challenges for the adoption of xEVs

JM focus:

**Technology investment**
- Broad portfolio of cathode materials
- Sustained cathode materials innovation
- Building manufacturing capacity

**Addressing cost ($/kWh)**
- High energy material with low cobalt
- Addressing barriers in the supply chain
JM has a strong position in the value chain

Raw materials → Cathode materials → Electrodes → Cells → Systems

Key challenges to address:
- Material cost
- Energy density
- Chemistry
- Deactivation

JM focus

Insight to drive materials innovation
Raw materials: strategic sourcing of metals

- **JM-wide longstanding history** of metals procurement and management

- Leveraging nickel and cobalt contracts and buying power with **Efficient Natural Resources**

- Strategic partnership with **Nemaska Lithium** for the supply of lithium

- Developed **advanced precursors** to enable starting production from raw metals
Electrodes, cells, and systems: insights to drive materials innovation

- Understanding electrode structures to design cathode material morphology to **improve energy density**

- Understanding cell performance to **match cathode performance** with anode, electrolyte, and separator

- Understanding pack-level performance to **improve cathode materials lifetime and safety**
Cathode materials: using our chemistry to develop leading materials

- **IP across a range of battery materials:** LNO, NMC, and LFP

- **Over 60 R&D scientists**

- Leveraging **nickel expertise** across JM

- Using **Clean Air expertise** in materials engineering and understanding automotive qualification cycles

- **Strategic partnerships** with cell manufacturers and automotive OEMs
Significant progress in high energy materials in the past year

2012
• Entered lithium ion battery market

May 2016
• Licensed key high nickel intellectual property

2017
• Developed high energy cathode materials and scaled-up to pilot scale
• Validated benefits of materials with cell manufacturers and OEMs
• Materials in qualification cycles with six customers
• Identified manufacturing sites for our plants
• Approved investment for demonstration scale manufacturing facility

2018
• Investment on first plant of c.£200m from mid-2018
We have a wide portfolio of battery materials including JM eLNO.
JM eLNO delivers a step-change in performance

Historical (20 years) Current (5 years) Future (low Co, high energy)

NC + Al → N(0.8)CA
+ Ni
+ Mn
NMC111 + Ni → NMC622 + Ni → NMC811 + Ni
+ advanced chemistry enhancements
+ energy density
+ safety
+ cycle life
+ improved power
+ improved impedance

JM Battery material development focused on beyond NMC materials
JM eLNO a step-change increase in energy density

- eLNO will enable longer range EVs with lower pack level cost
- Step-change increase in energy density compared to NMC(622), NMC(811) and NCA materials
- Material can be further optimised for any customer automotive application
- Technology is a key driver for market share gain and margin capture

---

1. Based on external third party and/or customer testing
JM eLNO delivers outperformance against all other key metrics

- On every key metric eLNO is the best material in the market
- eLNO delivers improvements across energy density, power, range, life cycle and safety
- Cost advantaged through the efficient thrifting of cobalt

1. Based on external third party and/or customer testing and public sources
Customers have validated the performance of JM eLNO

<table>
<thead>
<tr>
<th>versus NMC</th>
<th>versus NCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>“...delivered higher energy density than NMC(811)”</td>
<td>“...shows improved power performance than NCA”</td>
</tr>
<tr>
<td>“...delivered better rate capability than NMC(811)”</td>
<td>“...improved low temperature power performance than NCA”</td>
</tr>
<tr>
<td>“...cycle life equivalent to or greater than NMC(111)”</td>
<td>“...shows higher capacity retention than NCA”</td>
</tr>
</tbody>
</table>

Feedback from leading cell manufacturers and OEMs
Market timeline for the commercialisation of battery materials

<table>
<thead>
<tr>
<th>Qualification stage</th>
<th>Typical volume per stage</th>
<th>Milestones</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial testing</td>
<td>10 – 100 kg</td>
<td>Validation of cathode material performance</td>
<td>3 - 6 months</td>
</tr>
<tr>
<td>Cell performance</td>
<td>1 – 2 MT</td>
<td>Full range of materials testing under different conditions</td>
<td>Year 1</td>
</tr>
<tr>
<td>Selection and award</td>
<td>100 – 200 MT</td>
<td>Technical and commercial review and selection</td>
<td>Year 1 - 2</td>
</tr>
<tr>
<td>Scale-up</td>
<td>500 – 1000 MT</td>
<td>Preparation for full scale manufacturing for platform</td>
<td>Year 2 - 3</td>
</tr>
<tr>
<td>Commercial launch</td>
<td>&gt; 2,500 MT</td>
<td>Commercial launch of vehicle platform</td>
<td>Year 3 - 5</td>
</tr>
</tbody>
</table>
## JM manufacturing plans for high energy eLNO

<table>
<thead>
<tr>
<th>Production volume</th>
<th>Investment start date</th>
<th>Start of production</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 MT</td>
<td>2016</td>
<td>Today</td>
<td>Samples to multiple customers from JM asset</td>
</tr>
<tr>
<td>10 MT</td>
<td>2017</td>
<td>2018</td>
<td>Pilot plant qualification materials to customers</td>
</tr>
<tr>
<td>500 MT</td>
<td>2017</td>
<td>2019</td>
<td>Demo plant qualification materials to customers</td>
</tr>
<tr>
<td>10,000 MT</td>
<td>2018</td>
<td>2021</td>
<td>JM commercial plant production for materials</td>
</tr>
<tr>
<td>&gt; 10,000 MT</td>
<td>...</td>
<td>...</td>
<td>Additional commercial production based on demand</td>
</tr>
</tbody>
</table>
Conclusion

- We have developed best-in-class high energy battery materials

- Investment of c.£200m from mid-2018 to manufacture up to 10,000 metric tons from FY21/22

- We expect to be on automotive platforms in production from FY21/22
Efficient Natural Resources: Outperformance in targeted, growth segments

Jane Toogood
Sector Chief Executive, Efficient Natural Resources
Efficient Natural Resources:

- Market leading positions
- Strategy to deliver growth
- Sales growth above the market and operating profit 1% above sales growth
Efficient Natural Resources: bringing together Process Technologies and Precious Metal Products

<table>
<thead>
<tr>
<th>Process Technologies</th>
<th>Precious Metal Products</th>
<th>Reallocation</th>
<th>Efficient Natural Resources</th>
<th>% of Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>For year ended 31st March 2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales excluding precious metals (£m)</td>
<td>587</td>
<td>403</td>
<td>(71)(1)</td>
<td>919</td>
</tr>
<tr>
<td>Underlying operating profit (£m)</td>
<td>90.4</td>
<td>86.4</td>
<td>(13.8)(2)</td>
<td>163.0</td>
</tr>
<tr>
<td>ROS (%)</td>
<td>15.4</td>
<td>21.4</td>
<td></td>
<td>17.7</td>
</tr>
<tr>
<td>ROIC (%)</td>
<td>11.4</td>
<td>19.8</td>
<td></td>
<td>13.5</td>
</tr>
</tbody>
</table>

1. Removing £61m of Noble Metals medical sales and £10m intra sector sales
2. Removing Noble Metals medical
What you will hear today

Overview of our Efficient Natural Resources business and the markets we operate in

How we serve our customers and the rest of the Johnson Matthey group

Our strategy and how we will deliver it
We create value from the efficient transformation and use of natural resources:

- Demand for the world’s natural resources is increasing
- Efficient Natural Resources enables our customers to use natural resources more efficiently
- Using JM’s core chemistry and technology expertise to solve complex and variable problems through close collaboration with customers
We serve four market sectors creating value through technology and customer service

Efficient Natural Resources
2016/17 sales by sub-business

£861m(*) excl. pms

Chemicals
Chemical catalysts and process technology
40% of Sector sales

Oil & Gas
Refinery catalysts and gas purification
23% of Sector sales

PGM Services
Precious metal products, recycling and business solutions
Providing metal and metal products to the JM Group
27% of Sector sales

Advanced Glass Technologies
Advanced glass materials and conductive inks for use in automotive glass and other industries
10% of Sector sales

(*) Excludes £58m Diagnostics Services sales
We use our technology to lead the market

**Technology Leadership Positions (1)**

- Methanol  #1
- Hydrogen  #1
- Gas Processing  #1
- Formaldehyde  #1
- FCC additives  #1
- PGM Services  #1
- AGT  #1

(*) Based on multiple market research sources
We deliver outstanding customer service

- PGM Chemistry and metallurgy
- Catalyst design and engineering
- Scale up of complex manufacturing
- Customer service

Leveraging our competences to provide efficient transformation and use of natural resources
Our core strengths underpin #1 or #2 market positions in almost all our key segments

**Chemicals - £343m**
- Chemical catalysts
  - $5.4 billion\(^{(2)}\)
  - (highly fragmented, ~ 40 segments)
  - JM present in ~ 30% of overall market
  - JM #1 or #2 in almost all key markets

**Oil & Gas\(^{(1)}\) – £199m**
- Refinery Catalysts
  - $7.6 billion\(^{(2)}\)
  - (mix of large and small segments)
  - JM present in ~ 37% of overall market
  - JM has narrow position in $2.7 billion\(^{(2)}\) FCC market
  - JM #1 or #2 in all key markets

**PGM Services - £234m**
- Largest single refiner of pgms
  - JM #1 in all PGM services markets
  - JM has leading position in global refining capacity
  - Focus on serving internal customers

**Advanced Glass Technologies - £85m**
- Advanced Glass materials
  - £200m
  - JM present in ~ 44% of overall market
  - Automotive largest segment, smaller decorative, PV
  - JM #1 or #2 in all markets

---

\(^{(1)}\) Excludes Diagnostic Services sales
\(^{(2)}\) Data from The Catalyst Group resources
Increased demand for efficient use of natural resources

**MegaTrends**

- Economic Development
- Natural Resource Efficiency
- Energy Security
- Restricted raw material availability

**Market Dynamics**

- Global growth 3%
- Oil price lower for longer
- Automotive production growth
- Increasing PGM recycle & reuse
- Over capacity in chemicals
- High growth regions
- Shift to clean, cheap feeds
- More environmental legislation
- Plastics growth
Differentiated approach given range of growth in markets

<table>
<thead>
<tr>
<th>Underlying medium term industry market growth</th>
<th>Average medium term growth rate in segments that JM operate in</th>
<th>Range of growth rates in segments that JM operate in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals</td>
<td>2.5%</td>
<td>2 - 4.5%</td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
<td>2%</td>
<td>0.5 - 3%</td>
</tr>
<tr>
<td>AGT</td>
<td>2%</td>
<td>2 - 3.5%</td>
</tr>
<tr>
<td>PGMS</td>
<td>Low single digit growth</td>
<td></td>
</tr>
</tbody>
</table>

2 - 3%

2.5%

2%
Platinum Group Metals: a secure & sustainable source of critical raw materials to JM Group and customers
JM strategy capitalises on current market trends

**MegaTrends**

- Economic Development
- Natural Resource Efficiency
- Energy Security
- Restricted raw material availability

**Market Dynamics**

- Global growth 3%
- Oil price lower for longer
- Automotive production growth
- Increasing PGM recycle & reuse
- Overcapacity in chemicals
- High growth regions
- Shift to clean, cheap feeds
- More environmental legislation
- Plastics growth

**Implications for strategy**

- Drive efficiency
- Increasing PGM recycle & reuse
- Maintain in depth customer process insight
- Focus on high growth markets
- Bigger footprint in high growth regions
- Shift in PGM demand & mix
- Fewer licenses, more catalysts
- More gas and bio-based opportunities
Our strategy to deliver consistent market outperformance

1. Maximise growth through differentiated investment by segment and region and focus on margin retention in lower growth markets.

2. Focused investment in R&D to maintain & extend technology leadership.

3. Deliver additional value through focus on efficiency.

4. Explore long term growth opportunities by extending our capabilities into adjacent markets, geographies and technologies.
1. Maximise growth through deep understanding by segment and region

% of sales\(^{(1)}\) in each growth area\(^{(2)}\)

<table>
<thead>
<tr>
<th>Growth Area</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1%</td>
<td>4.8</td>
</tr>
<tr>
<td>1.1 -2%</td>
<td>25.2</td>
</tr>
<tr>
<td>2.1 -3%</td>
<td>34</td>
</tr>
<tr>
<td>3.1 - 4%</td>
<td>27.2</td>
</tr>
<tr>
<td>4.1%+</td>
<td>8.8</td>
</tr>
</tbody>
</table>

Increasing investment

(1) 2017/18 budget sales
(2) 10 year growth rate
2. Focused investment in R&D to maintain and extend technology leadership

Unique set of materials science and scale up capabilities

Maintain R&D spend at consistent level

R&D closely aligned to value creating sector positions and growth areas

Working closely with leading edge partners and customers to deliver step change innovation

Add value to our customer’s operations through new data driven insights

Core shell reformer catalyst
Optimised metal content, same performance

New methods of fabrication for PGMs using additive layer manufacturing
3. Deliver additional value by focus on efficiency

Enablers for Efficient Natural Resources

- Operational Improvements
- Complexity reduction
- Organisational efficiencies

Examples

- PGM refinery optimisation
- Portfolio Optimisation
- Spans & layers

Deliver Operational Improvement
- Operating profit 1% ahead of sales growth
4. Explore long term growth opportunities by extending our capabilities into adjacent markets, geographies and technologies

New natural resource landscape
Exploring new market spaces

Alternative feedstocks
Gas to chemicals
Biorenewables

Customer and circular economies
Recycling
New customer solutions
Consortium to commercialise technology for low carbon chemicals and fuels

Strategic consortium

Develop and scale up of Virent BioForming® Technology

Aim to deliver a commercial facility to produce cost effective, bio-based fuels and bio-paraxylene
The future for Efficient Natural Resources means:

- A wider scope building on JM core competencies and leadership in chemistry and technology
- Performance improvement by focussed investment and efficiency
- Sales growth at 1% above the market (excl. PGMS) and operating profit 1% above sales growth
- Creating value for customers today and in the future by efficient transformation of critical natural resources
Health: Delivering breakout growth

Robert MacLeod, Garrett Dilley and Paul Evans
What you will hear today

Overview of our Health sector and the market we operate in

How we create value with our Innovator customers

How we create value with our Generics customers

Our strategy and what this will deliver
Health sector to deliver breakout growth

We operate in a growing, $40bn segment

We have expertise for both Innovator and Generics companies

We have a portfolio of successful products but that portfolio is not yet at scale

We ramped up our investment to broaden the pipeline from 2014

Therefore, sales growth from 2019/20 will be double-digit with margin reaching the high 20%s
Outsourced small molecule API is growing at 8% p.a.

Global sales in API
$170bn

- Outsourced small molecule APIs
- Outsourced large molecule APIs
- In-house

Generics
$29bn
9% growth p.a.

Innovator
$11bn
6% growth p.a.

$110bn

An attractive segment which plays to our strengths

Increasing focus on healthcare costs is driving:

- More targeted and potent APIs
- Greater competition by generic companies

This is leading to:

- Increasing complexity of APIs and their delivery mechanism
- Increasing trend to outsource API development and manufacture

1. Based on 2017 estimates
We create value by solving our customers’ complex challenges

<table>
<thead>
<tr>
<th>Our core capabilities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong brand and position in controlled substances (e.g. opiates and ADHD)</td>
</tr>
<tr>
<td>Proven track record in rapidly developing synthesis routes for APIs with high molecular complexity</td>
</tr>
<tr>
<td>Solid form sciences capability</td>
</tr>
<tr>
<td>Catalyst design and development</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What we do:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overcome challenging problems in the development and manufacture of complex APIs</td>
</tr>
<tr>
<td>Work with both:</td>
</tr>
<tr>
<td>• Innovator customers for novel APIs</td>
</tr>
<tr>
<td>• Generic customers on known APIs to navigate IP landscape</td>
</tr>
<tr>
<td>Manufacture commercial scale volumes of controlled and non-controlled APIs</td>
</tr>
</tbody>
</table>
Examples of creating value by solving our customers’ complex challenges

**Example 1: capabilities in developing synthesis routes**

Development of complex molecules used to treat a genetic muscular dystrophy disorder.

**Example 2: solid form science capability that improve bioavailability and saves money**

Optimised crystal form of an antiemetic avoided lengthy milling process and improved bioavailability of the API.

**Our core capabilities:**

- Strong brand and position in controlled substances (e.g. opiates and ADHD)
- Proven track record in rapidly developing synthesis routes for APIs with high molecular complexity
- Solid form sciences capability
- Catalyst design and development

*We will continue to broaden our capabilities in strategically focussed areas*
Our business is based on our core capabilities

**JM’s existing facilities:**

- Full range of manufacturing assets in US and Europe
- Key development sites in Boston (US) and Cambridge (UK)
- Pilot and kilo lab capabilities in China
- >1,000 employees

**2016/17 | Sales £243m**

- Innovator: 75%
- Generic: 25%
- Development: 10%
- Controlled substance manufacture: 27%
- Non-controlled substance manufacture: 63%
Ramped up investment since 2014 will drive breakout growth

The timelines in the pharma market are long:

**Generics projects typically take 4-6 years**

- Opportunity to co-invest to enhance returns

**Innovator projects take even longer**

- Development risk is taken by the customer
- Projects are affected by clinical attrition and novel technology challenges

<table>
<thead>
<tr>
<th></th>
<th>2013/14</th>
<th>Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector sales from new products (launched in last 5 years)</td>
<td>0%</td>
<td>19%</td>
</tr>
<tr>
<td>Size of pipeline (generic and innovator)</td>
<td>~20 products</td>
<td>~60 products</td>
</tr>
<tr>
<td>Annual R&amp;D investment</td>
<td>£8m</td>
<td>£34m</td>
</tr>
</tbody>
</table>

Returns from this investment starts to come through from 2019/20
Our strategy: deliver breakout growth by providing solutions to the complex problems of innovator and generic companies

**Trends**
- Increased demand for high potency drugs
- Poor bioavailability profiles
- Increased complexity of drugs

**Focus**
High barrier to entry segments
- Controlled substances
- High potency APIs

Using our high value-add capabilities of
- Developing synthesis routes for complex APIs
- Solid form sciences
- Catalysis enabled API manufacturing

**JM strengths**
- Scale up of complex manufacturing
- Materials design and engineering
- Materials characteristics and testing

Double-digit sales growth beginning in 2019/20, with margins increasing to high 20%
Health - How we create value with our Innovator customers

Garrett Dilley
We work with innovators on their API challenges

Innovators value chain

Drug discovery

Clinical Development

Commercialisation

Reformulation

Development projects by customer type

Our core capabilities enable access to high-value clinical development projects

Supply of clinical development opens door to commercial manufacture opportunity

JM assists in filing for commercialisation and is listed as manufacturer on regulatory documents
Driving growth through expertise across development to commercialisation

<table>
<thead>
<tr>
<th>Innovators</th>
<th>% sales</th>
<th>Contractual terms</th>
<th>Sales ranges</th>
<th>Areas of focus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical development</strong></td>
<td>42%</td>
<td>6 months - 3 years</td>
<td>£250k - £5m per project</td>
<td>Number of clinical development projects</td>
</tr>
<tr>
<td>– API development and manufacture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Commercialised API</strong></td>
<td>58%</td>
<td>3– 10 years</td>
<td>£1m - £25m p.a. per project</td>
<td>Number of commercialised APIs</td>
</tr>
<tr>
<td>– development and manufacture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sales £22m 2013/14

- Clinical development
  - API development and manufacture: 4 commercial, 21 in clinical development

Sales £59m 2016/17

- Clinical development
  - 7 commercial
  - 19 in clinical development, 12 of which are in late clinical trials
  - 4-6 expected to convert to commercial between now and 2024
Core capabilities: why our customers come to us

- High barrier to entry segments
- High value APIs
- Proven track record in rapidly developing synthesis routes for complex APIs
  - Solid form sciences
  - Catalyst design and development

Relationship building and targeted pipeline

World class development capabilities in Boston (US) and Cambridge (UK)

Crystal form expertise to rival large pharma – key in solving bioavailability challenges of novel APIs

Pipeline analysis

~60% with “high” molecular complexity or complex transformations/analyses

~50% highly potent or controlled molecules

~20% contain key catalysis steps

Customers include: Biogen, Nektar and Metacrine

Competitors include: Siegfried, Evonik, Cambrex, Alcami, AMRI, Hovione

Strong brand and position in controlled substances (e.g. opiates and ADHD)
Customers come to JM for expertise: an example

JM begins work on API 1 with Customer A and awarded contracts for API 2 and API 3

Customer A awards Commercial Supply Agreement for API 4

Customer A awards API 6 and extension of API 5

New 5 year commercial supply agreement signed with Customer A

<table>
<thead>
<tr>
<th>Year</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Early Phase Clinical Development</td>
</tr>
<tr>
<td>2013</td>
<td>Early Phase Clinical Development</td>
</tr>
<tr>
<td>2014</td>
<td>Early Phase Clinical Development</td>
</tr>
<tr>
<td>2014</td>
<td>Ceased with clinical attrition</td>
</tr>
<tr>
<td>2015</td>
<td>Late Phase Clinical Development</td>
</tr>
<tr>
<td>2015</td>
<td>Commercialised Manufacture</td>
</tr>
<tr>
<td>2016</td>
<td>Early Phase Clinical Development</td>
</tr>
<tr>
<td>2017</td>
<td>Early Phase Clinical Development</td>
</tr>
</tbody>
</table>

API 1, API 2, API 3, API 4, API 5, API 6

2012-2017: Early Phase Clinical Development, Late Phase Clinical Development, Commercialised Manufacture, Active projects
Innovators: growth well ahead of the market

We have a strong foundation in the large and growing Innovator outsourced API market

With Innovator customers, we will:

- Continue to grow our product pipeline
- Increasingly convert these to commercial-scale API manufacturing

We will add new skills and expand capacity

This will deliver growth well ahead of the market
Health - How we create value with our Generics customers

Paul Evans
We develop and manufacture complex, high value APIs

Generics value chain

<table>
<thead>
<tr>
<th>API development and formulation</th>
<th>FDF(^1) development and formulation</th>
<th>FDF and API scale-up and process transfer</th>
<th>Commercialisation</th>
<th>Reformulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 4 years</td>
<td>2 - 7 years</td>
<td>ongoing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

JM competes in API development and manufacturing\(^*\) and API manufacturing\(^**\)

$29 billion global outsource API market

$140 billion brand value coming off patent over next 5 years

Generics partners work with us to access the same strengths that innovators value

Generic companies include: Teva, Mylan, Sandoz, Par and Amneal

JM competitors include: Alcami, AMRI, Cambrex, Hovione, Noramco, Mallinckrodt and Siegfried

* small scale quantities  ** commercial scale quantities

1. Finished Dosage Formulation

$140 billion brand value coming off patent over next 5 years
US market characteristics

**Indicative drug product lifecycle**

- **Drug product value ($)**
- **Price ($/unit)**

- **Innovator launch of branded on patent product**
  - ~6-14 years
- **First to file entry of generic competitor(s)**
  - 180 day first to file exclusivity
- **Other generics enter market**
  - ~3-8 years
- **Branded price**
- **Generic price**

- **Branded value capture**
- **Generics value capture**

**Drug product prices change dramatically when generics enter the market**

**API price dynamics not correlated to drug product price dynamics**

**Relationships with customers vary from $/unit API sales to profit sharing agreements**
Our current portfolio will deliver low single-digit growth

<table>
<thead>
<tr>
<th>Current product portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>API area</strong></td>
</tr>
<tr>
<td>Controlled substances</td>
</tr>
<tr>
<td>Bulk opiates (principally pain relief)</td>
</tr>
<tr>
<td>Specialist opiates (pain relief &amp; addiction therapy)</td>
</tr>
<tr>
<td>ADHD</td>
</tr>
<tr>
<td>Non-controlled</td>
</tr>
<tr>
<td>Diverse therapeutic areas</td>
</tr>
</tbody>
</table>
Building our portfolio: our API product pipeline approach

Identify opportunities
- Continuous monitoring
- Customer / partner inquiries

Screen for fit
- JM technical advantage
- Expected market value
- Competitive and IP landscape

Strategy and valuation
- Technical development plan
- IP solutions
- Commercial positioning and timing

Development
- API optimisation and scale-up
- Drug product partner selection
- Drug product formulation and scale-up
- Clinical bioequivalence

Commercialisation
- Regulatory filing
- Patent litigation
- Launch prep

Disciplined go/no-go decisions with risk-based financial analysis to support decisions and prioritisation
Our API product pipeline will deliver Health’s breakout growth

**Investment**
Capitalised investment of **c.£25m** per year
Investment per product **£3m to £10m**

**Progress**
Over 40 API products in the pipeline:
- Around 15 in early stages
- Around 20 in formulation development
- Around 5 in regulatory approval stage

Over the next three to four years, we expect **14-22 of these to launch** and a further **20 to be pending regulatory approval**

**Returns**
Not all projects will be successful
Wide range of product profitability

**Building expanded and balanced portfolio**
Ramped-up investment drives our pipeline

Pipeline capitalised R&D investment (c.£25m p.a.)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Current pipeline</td>
<td>1</td>
<td>1</td>
<td>4-5</td>
<td>12-20</td>
<td>4-6</td>
<td>1-2</td>
<td>0-1</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td>Additional pipeline</td>
<td>3-5</td>
<td>6-9</td>
<td>5-8</td>
<td>3-5</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
</tr>
</tbody>
</table>

Submissions for regulatory approval

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>12</td>
<td>20</td>
<td>4</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Anticipated launches

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5</td>
<td>6-9</td>
<td>5-8</td>
<td>3-5</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
</tr>
</tbody>
</table>
Generics pipeline delivers the break out growth in our Health sector

Current pipeline will deliver c.£100m operating profit by 2025, additional pipeline will add to this in outer years
Example: development of dofetilide

Development started in 2011

Developed an innovative and non-infringing route & polymorph

Significant financial contribution in 2016/17

No other generic has entered the market yet

Utilised solid form sciences and high potency manufacturing capabilities

Partner launched in June 2016 achieving first US generic approval and 180-days market exclusivity

JM shares drug product profits

Generics summary

**Strong position today in controlled substances**

**Ramped up investment to grow product portfolio since 2014**

- We will drive value from our existing product portfolio
- We will deliver growth from our strong product pipeline
- This will deliver substantial growth from 2019/20
Conclusion: Delivering breakout growth

Robert MacLeod
Our Innovator and Generics businesses deliver success together

**Innovators**
- Enhance our position as a technology partner-of-choice
  - *Delivering well above market growth*

**Generics**
- Drive value from existing business
  - *Delivering low single-digit growth*
- Deliver growth from strong API pipeline
  - *Delivering operating profit of c.£100m in 2024/25*

---

**Long-term investment commitment required**

- Maintain R&D at c.£25m p.a. to expand generic pipeline further
- Continue to build our capabilities to meet critical technical challenges – e.g. high potency APIs
- Further enhance our capacity as we convert pipeline
- Overall capex investment (excl. R&D) c.£30-40m p.a.
Health sector to deliver breakout growth

We operate in a growing, $40bn segment

We have expertise for both Innovator and Generics companies

We have a portfolio of successful products but that portfolio is not yet at scale

We ramped up our investment to broaden the pipeline from 2014

Therefore, sales growth from 2019/20 will be double-digit with margin reaching the high 20%s
Delivering shareholder value

Anna Manz
Chief Financial Officer
Delivering long term shareholder value through:

- Sustained growth in Clean Air
- Breakout growth in Health
- Breakout growth in Battery Materials
- Market leading growth in Efficient Natural Resources

Relentless focus on driving efficiency
Rigorous resource allocation
Guidance for 2017/18:

Sales growth broadly in line with the 6% delivered in H2 2016/17

Improving operating performance offset by non cash items

Restructuring benefit of £10m in the year, with an annualised benefit of £25m

Capex £285m, 1.8x depreciation
Delivering sustained growth and value creation

Our strong market positions and legislation deliver sustained growth.

Growth driven by Europe in next 2 years with share gains and increasing profitability of gasoline and gasoline hybrid.

Subsequently, growth driven by legislation in Asia.

Investment in capacity will transition from Europe to Asia.

Margins maintained through efficiency.
Delivering sustained growth and value creation

Attractive high growth opportunities

Maintain investment to build a broader, deeper pipeline

In medium term growth accelerates to double digit as we start to benefit from the generic pipeline investment

Margin improves significantly as scale builds
Delivering sustained growth and value creation

Market opportunity is substantial and at an early stage

Our technology is market leading and customer feedback is strong

Continue to invest ahead with ~£200m investment in capacity beginning in 2018/19

Expect commercial sales from 2021/22
Delivering sustained growth and value creation

Highly selective investment choices allows us to outperform markets by 1ppt

Focus on operational efficiency improves margins, growing operating profit ahead of sales growth by 1ppt

2018/19 benefits from annualised restructuring savings

Maintaining current levels of investment
Delivering sustained growth and value creation

Driving sustained improvements in how we run our business

Improve performance through common standards and processes, enabled by IT

£50m, mainly procurement savings, over 3 years to invest and enhance margin

Improving working capital management
Common procurement standards reduce costs to invest and enhance margin

Our Procurement Opportunity

- Purchases of £1.5bn* across 118 sites
- Excluding direct materials in Clean Air, buying has been a site level responsibility
- A global procurement strategy coupled with capability build can unlock significant savings
- Whilst also mitigating risks

*(excluding precious metal and substrates) are heavily fragmented
We create value by investing in our technology through three stages.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Clean Air</th>
<th>Efficient Natural Resources</th>
<th>Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selectively invest through New Markets sector</td>
<td>e.g. Battery Materials</td>
<td>e.g. Agrochemicals</td>
<td>e.g. Medical Devices</td>
</tr>
<tr>
<td></td>
<td>e.g. Emission Control in Asia</td>
<td>e.g. PGM Refining in China</td>
<td>e.g. API Manufacturing in both Innovators and Generics</td>
</tr>
<tr>
<td>Scale-up</td>
<td>e.g. Emission Control in Europe &amp; NA</td>
<td>e.g. Hydrogen catalysts</td>
<td></td>
</tr>
<tr>
<td>Sustain and grow</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Our rigorous resource allocation framework

<table>
<thead>
<tr>
<th>Select</th>
<th>R&amp;D as % sales</th>
<th>Capex: Depn</th>
<th>ROIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meaningful early stage R&amp;D</td>
<td>Investment Ahead</td>
<td>&lt;0%</td>
<td></td>
</tr>
<tr>
<td>investment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale-up</th>
<th>&gt;5%</th>
<th>&gt;1.5</th>
<th>&gt;WACC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustain and grow</td>
<td>4-5%</td>
<td>1-1.5</td>
<td>&gt;20%</td>
</tr>
</tbody>
</table>
Consistent investment weighted to near term

R&D remains ~6% of sales

Capex Investment ~1.8x depreciation over the medium term

18/19 increase in capex with Battery Material capacity investment
Capital allocation

01
Reinvest for organic growth

02
Progressive Dividend

03
Strategic Investments

04
Return of Capital

Continue to target ROIC 20%
Net Debt* : EBITDA 1.5-2.0x

*net debt including post-tax pension deficits
Growth and value creation will deliver attractive returns

- Expanding group ROIC to 20%
- Delivering mid to high single digit EPS CAGR
- And continuing a progressive dividend policy
Sustained growth and value creation

Chemistry which drives solutions to complex problems
Sustained leadership in growing, high margin, technology driven markets
Investment which accelerates growth
Relentless focus on operational excellence

Be one of the best performing, most trusted and admired speciality chemicals companies in the world