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.
Introduction and Key Strategic Opportunities

Neil Carson
Chief Executive
JM Executive Board

Neil Carson
Chief Executive

Robert MacLeod
Group Finance Director

Larry Pentz
Executive Director
Environmental Technologies

Bill Sandford
Executive Director
Precious Metal Products
Other Senior Management

<table>
<thead>
<tr>
<th>John Fowler</th>
<th>Jack Frost</th>
<th>Barry Murrer</th>
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<td>Division Director</td>
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<td>Fine Chemicals</td>
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<td>Technology Centre</td>
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<th>Nick Garner</th>
<th>Geoff Otterman</th>
<th>John Walker</th>
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<td>Corporate and Strategic Development</td>
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<th>Ian Godwin</th>
<th>Sally Jones</th>
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# Programme

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<tr>
<td>13.30</td>
<td>Introduction and Key Strategic Opportunities</td>
<td>Neil Carson</td>
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<td>14.00</td>
<td>Emissions Legislation, Energy Security and a Low Carbon Economy</td>
<td>Larry Pentz, Jack Frost</td>
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<td>15.50</td>
<td>Global Drivers for Precious Metal Products</td>
<td>Bill Sandford</td>
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<td>16.35</td>
<td>Global Drivers for Fine Chemicals</td>
<td>John Fowler</td>
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<td>17.00</td>
<td>Further Growth - R&amp;D Focus</td>
<td>Robert MacLeod, Barry Murrer</td>
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<td>17.25</td>
<td>Summary and Conclusions</td>
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<td>Q&amp;A</td>
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Purpose of the Day

**Present**
the results of the group’s **ten year** strategic review

**Highlight**
the **global drivers** for the group

**Explain**
key **growth** opportunities over the next **ten years**

**Detail**
how research will be key in delivering **future growth**
Evolution of the JM Group
Sales ex pms

Growth in shareholder value from focus on environmental technologies...

<table>
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<tr>
<th>Segment</th>
<th>2000/01 Sales (£m)</th>
<th>% of Total 2000/01</th>
<th>% of Total 2009/10</th>
<th>% Change</th>
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<td>Environmental Technologies</td>
<td>£977</td>
<td>45%</td>
<td>66%</td>
<td>71%</td>
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<tr>
<td>Precious Metal Products</td>
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<td>19%</td>
<td>12%</td>
<td>-16%</td>
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<td>Fine Chemicals</td>
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<td>5%</td>
<td>22%</td>
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<td>Other</td>
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12% 2000/01 to 2009/10
22% 19% to 22%
Johnson Matthey Today

- **£2.2bn*** sales (ex pms), underlying PBT £332m***
- ROIC target >20%
- 9,000 people
- 1,000 employees working in R&D
- 7.3% p.a. EPS growth in last ten years***
- No.1 or 2 in core segments
- Global operations

*Based on Vara consensus estimates for 2010/11 of 17th December 2010 (EPS of 113.7p)
JM Attributes

- Common features of a successful JM business
- Provides focus for future investment
- Not the sole determinant of a good JM business

A leading technology based company
JM’s Key Strengths

**Expertise in the fundamental science that underpins our technologies**
- Catalysis, materials chemistry, nanotechnology, pgms

**Deep involvement in and understanding of pgms**
- Expertise spanning refining, pgm chemistry, market dynamics

**Ability to maximise synergies**
- E.g. complementary offering of DPT technologies and JM’s process catalysts

**Trusted partner with customers, regulators etc.**
- Fundamental understanding of what our products do for our customers – enables us to make better products
- Regulatory understanding, materials handling – managing pgms, controlled substances

**Reputation**
Global Drivers Impacting the Chemical Industry*

- Population Growth
- Urbanisation
- Ageing Population
- Increasing Wealth
- Health & Nutrition
- Natural Resource Constraints
- Environmental Factors
- Climate Change Regulation

* Based upon key megatrends identified by Goldman Sachs Global Investment Research
Global Drivers Impacting the Chemical Industry

Population Growth
Urbanisation
Increasing Wealth

Automotive
Electronics
Construction
Bulk chemicals

Emission control catalysts
Obscuration enamels
Pgms
Petrochemical catalysts and processes
Global Drivers Impacting the Chemical Industry

Health & Nutrition
Ageing Population

- Agricultural chemicals
- Pharmaceuticals

- APIs
- Medical components
- Ammonia synthesis and nitric acid catalysts
- Fine chemicals
- Pgm catalysts
Global Drivers Impacting the Chemical Industry

- Energy security
- Resource efficiency
- Alternative energy
- Recycling

- Gas / coal to products technology
- Catalysts
- Pgm refining
Global Drivers Impacting the Chemical Industry

Environmental Factors
- Climate Change
- Regulation

Emission control
- Clean fuel
- Low carbon

Emission control catalysts
- Abatement technologies
- Hydrogen catalysts

Purification products
- Fuel cells
- Carbon capture and storage
Global Drivers Impacting the Chemical Industry

Emission control catalysts
Obscuration enamels
Automotive
Electronics
Petrochemical catalysts and processes
Construction
Bulk chemicals
Gas / coal to products technology
Energy security
Alternative energy
Resource efficiency
Recycling
Catalysts
Pgm refining
Environmental Factors
Climate Change
Regulation
Natural Resource Constraints
Population Growth
Urbanisation
Increasing Wealth
Health & Nutrition
Ageing Population

Pharmaaceuticals
Agricultural Chemicals
Ammonia synthesis and nitric acid catalysts
Fine chemicals
APIs
Medical components
Pgm catalysts
Abatement technologies
Low carbon
Hydrogen catalysts
Purification products
Fuel cells
Carbon capture and storage (CCS)
Emission control
Clean fuel
Emission control catalysts

JM attributes deliver superior growth
Our Strategy to Deliver Growth in Value
Key Elements Unchanged

**Continued core focus on leading edge catalysis driven by:**
- Ever improving air quality
- Energy security
- Sustainability
- Development in emerging markets

**Maintain differentiation through technology**
- Enhanced investment in R&D in core markets

**Strong position in pgms remains an intrinsic part of group**

**Primary focus is organic growth**

• Ever improving air quality
• Energy security
• Sustainability
• Development in emerging markets
Our Strategy to Deliver Growth in Value

Increased Emphasis on:

- Developing new opportunities underpinned by our core chemistry expertise
  - Materials science and surface chemistry

- JM attributes
  - Provides focus for investment and growing new business

- Manufacturing excellence
  - High technology, high efficiency

- People and culture
  - Globalisation drives integration of cultures
Our Strategy – Looking Forward

For first five years:

- Strength in core segments anticipated to deliver **double digit growth** in group sales (ex pms)
  - Higher growth in catalyst segments
  - Mid to high single digit growth in other businesses
- Some **growth** in EBITDA margins (ex substrates)

Looking further ahead:

- Good **opportunities** in existing segments
- Step change in development of fuel cell market
- New **opportunities** through R&D
Our Strategy – Looking Forward

**Increase total R&D spend:**

Existing businesses

- Up from £100m p.a. to £135m p.a. to extend technology advantage

Targeting new opportunities

- Initially up to £5m p.a.
- New structure in place
- New £200m p.a. business in ten years

**Capital efficiency remains embedded:**

- ROIC target >20%
- Net debt (incl. pension) / EBITDA between 1.5 to 2.0 times
- Average capital expenditure 1.2 to 1.3 times depreciation
Our Strategy – Sustainability and Manufacturing Excellence

By 2017:

- Achieve carbon neutrality
- Achieve zero waste to landfill
- Halve key resources consumed per unit of output
- Achieve a zero ‘greater than three day accidents’ safety target
- Implement ISO 14001 at all manufacturing sites by 2010
- Reduce annual incidence of occupational illness cases by at least 30% by 2013/14
## Summary

| Strategy review emphasised attributes and strengths of JM | Major global trends provide strong drivers for growth | Key elements of strategy unchanged | Further focus on growth through R&D |

Group well positioned for long term growth
Emissions Legislation, Energy Security and a Low Carbon Economy

Larry Pentz
Executive Director, Environmental Technologies
Key Strategic Opportunities – Emissions, Energy and Low Carbon

A convergence of trends supports an environmental strategy...

**Global Trends**
- Growing population
- Increasing wealth
- Urbanisation
- Global warming
- Shifting energy sources
- Respiratory health concerns

**Resulting Focus**
- Low Carbon Economy
- Energy Security
- Emissions Regulations

...creating a ‘sweet spot’ for JM technology
Emissions Regulations
Legislation Drives Growth

- ~50% JM sales ex pms driven by legislation
- **Tighter legislation** still to come
- **Substantial growth** over next five years
Light Duty Vehicle Production Continues to Grow, Shift to Asia

Source: IHS Global Insight (December 2010)
New and Tighter Regulations Across the World

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Tighter Regulations Drive Increased Value

- Lower pollution levels
- Particulate number legislation
- More stringent in-use compliance
- More dynamic test cycle proposed
- Current and future standards for ROW

- Requires improved catalyst technology
OEMs have Options to Achieve Regulations

- Number of catalysts (or volume) / vehicle will vary
- Powertrain vs emission control cost trade off
- Tighter regulations require **improved catalyst** technology
- Lower pgm loading requires **improved catalyst** technology
- Wide range of catalyst value per vehicle

- Ensures continued catalyst value growth
Light Duty Diesel – A European Market

- **Particulate matter** is a major concern
- Potential of markets outside Europe?

**Tightening regulations add additional catalysts:**

- **Euro 4:** Oxidation catalyst (DOC)
- **Euro 5:** DOC plus diesel particulate filter (DPF)
- **Euro 6:** DOC + DPF plus NOx control
Additional Greenhouse Gas Regulations Provide Further Opportunities

- CO₂ – a new pollutant
- A product of combustion
- Cannot be catalytically transformed
- Can be reduced by:
  - Consumer decisions – smaller powered engines
  - Powertrain development

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<th>Powertrain Development</th>
<th>Additional Catalyst Value</th>
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<td>Electric vehicles</td>
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Heavy Duty Vehicle Volumes Will Grow
But with Annual Volatility

No. of Vehicles (>6t)

Source: JD Power and IHS Automotive
Tighter Regulations – New Countries, Additional Vehicles

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<td>Beijing – Euro V</td>
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Increased Value with Tightening Regulations

- Engine management and emission control trade-offs

- Alternative choices but increasing catalyst value per vehicle

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A $2.5bn Market by the end of 2015

Source: JD Power and JM estimates
Technology Investment to Keep Pace with Growth

**R&D dimensions:**
- 5% sales ex pms
- Eight R&D facilities
- 50 test cells globally
- 500 R&D people (11% of ECT)

**Investment in:**
- Applied research in materials
- Catalyst formulation design
- OEM specific application development
- Manufacturing techniques

**Development of:**
- More efficient catalysts
- Lower pgm usage
- Combination of technologies
- Greater focus on ‘in-use’ emissions
Emissions Regulations – Further Tightening to Come

- **Cars**
  - US LEV III
  - EU 7
  - ROW Catch Up

- **Trucks**
  - Next US HDD
  - EU VII
  - ROW Catch Up
  - Non-road Tier 4B
  - Non-road Stage V PM Number

- **Other**
  - US Locomotive Tier 4
  - IMO Tier III Marine

**Timeline**
- 2016
- 2017
- 2018
- 2019
- 2020

**Key Points**
- Discussions occurring, timing not fixed
- Focus on NOx and particulate control
- Secondary pollutants to be added
- Further emphasis on in use compliance
Emissions Regulations – Opportunities for Process Technologies

- Global tightening of sulphur levels in fuels
- Methanol substitution in transportation fuels
- Alternative fuel mandates
  - Biofuels, natural gas, GTL diesel etc.
- Oil refining discharge limits e.g. SOx, NOx, Hg
- And for fuel cells – zero emission vehicle requirements
Tightening Regulations Drives Hydrogen Market

- Low sulphur fuel, heavier oil, diesel demand drive hydrogen
- Hydrogen demand increases, particularly in Asia
- Hydrogen installed catalyst market of $800m – averages $200m p.a.
- Expect hydrogen market growth of 6 to 8% p.a. over next five years

35% average market share today
- Strong presence in Asia
- Good relationships with major industrial gas suppliers

Source: Freedonia Group Inc.
Emissions Regulations – Summary

• Legislation drives growth
• Vehicle volumes expected to be up in both light and heavy duty vehicles
• Fuel efficiency requirements offer new opportunities
• Tighter legislation provides added value for JM
• Substantial growth over next five years
Energy Security
Opportunities in Energy Drive Growth

- Natural Resource Constraints
- Energy security
- Resource efficiency
- Alternative energy
- Recycling
- Gas / coal to products technology
- Catalysts
- Pgm refining

- ~10% JM sales driven by natural resource utilisation
- Energy security concerns result in increased interest in coal / gas to products
- Double digit sales growth over next five years
More Value from Coal

- Coal is an abundant and key strategic resource
- Primarily used to produce electricity and for industrial consumption
- Energy consumption growing in China
- Power generation technology improving

New processes use coal as substitute for natural gas and oil

Proved Reserves at end 2009
(Thousand million tonnes)
(anthracite and bituminous coal shown in brackets)

Source: BP Statistical Review of World Energy 2010
Increase in Useable Natural Gas Reserves

- Rapid deployment of **new** drilling technique
- Projected shale gas will supply **40%** of US gas by **2020**
- Shale formations found around the world
- Improved natural gas transport infrastructure
- Gas pricing decoupled from oil

- Growth potential as a feedstock for chemicals and fuels

Source: EIA
Coal, Gas and Biomass to Products

- **Steam Reforming**
- **Gasifier**
- **Water Gas Shift**
- **Sour Shift**

- **Hydrogen**
- **Methanol**
- **Ammonia**
- **Fischer-Tropsch**
- **Substitute Natural Gas (SNG)**

- **Transportation fuel**
- **Traditional markets (refineries)**
- **Traditional markets (formaldehyde etc.)**
- **Gasoline blending**
- **Olefins**
- **Propylene**
- **DME**
- **Diesel**
- **Pipeline**

**Fuels**

**Chemicals / Refineries**
Alternative to Oil Based Feedstocks

• Substitute for transportation fuels
• Alternative routes to petrochemical products
• Trade off between financial cost and reduced imports

• Development and growth of process technology and catalysts
Methanol Demand Remains Significant in China

- Shift towards energy
- Fuel blending – M5, M15, M85, M100
- Methanol to Olefins now proven (Shenhua)
- Global methanol installed catalyst market of $400m – averages $100m p.a.

- 45% average market share today
- China focusing on larger more efficient plants
- Well positioned with new market leading JM Apico catalyst and technology

Source: MMSA
Coal to Substitute Natural Gas (SNG)

- China is short of natural gas
- SNG can utilise natural gas pipeline infrastructure
- Potential outside of China – US, Korea

- Initial licensing and catalyst sales
- Catalyst replacement beyond
- JM awarded four projects to date (three in 2010/11)
Energy Security Drives Growth for Process Technologies

- Coal to substitute natural gas (SNG)
- Coal to methanol
- Coal / gas to liquids and compact GTL
- Increased gas processing and purification
- Biomass conversion

- Double digit growth over next five years

Photo courtesy of Shenhua
Low Carbon Economy
New Opportunities from a Low Carbon Economy

- Developing markets – some early commercialisation
- Technologies play to JM’s strengths
- Potentially large markets e.g. fuel cells

Environmental Factors
- Climate Change
- Regulation

- Emission control
- Clean fuel
- Low carbon
- Emission control catalysts
- Abatement technologies
- Hydrogen catalysts
- Purification products
- Fuel cells
- Carbon capture and storage (CCS)
Low Carbon Economy

JM has a range of core technologies which will develop over the next five years...

Energy and resource efficiency
- Advanced gas heated reformer
- Process and catalyst improvements
- Fuel cell vehicles

Carbon capture and storage
- Syngas technology for precombustion and capture

Greenhouse gas abatement
- New markets for N₂O abatement catalyst
- Coal methane abatement technology

Renewable and low carbon energy technologies
- Advanced biofuels technology and catalysts
- Silver inks for photovoltaics
- Fuel cells for CHP applications
The Low Carbon Economy – Fuel Cells

Jack Frost
Director, Fuel Cells
Fuel Cells

Fuel cells

- A **clean efficient electricity** generation technology
- Central to the development of the low carbon economy, **reducing urban emissions** and providing energy diversity and security
- **Good fit with JM core skills** in catalysis, technology and precious metals and with our strategic focus

JM and fuel cells

- Targeted the key catalytic components of the fuel cell – the **membrane electrode assembly (MEA)** as our primary product
- **Strong parallels** with our vehicle emission control catalysis business

Fuel cells and cars

- Electric cars **set to grow** in importance driven by:
  - Zero emission regulations
  - Decarbonisation of the transport sector
  - Energy security
The Nature of Electric Cars

Electric cars
- **Quiet, very efficient** and non-polluting at the point of use
- Electricity can be produced from a variety of fuels including **low carbon fuels**

Batteries are an important technology for electric cars but...
- Limited range, heavy, long refuelling times

Consensus\(^1\) that electric vehicle fleet will be a combination of...
- Plug in hybrid electric vehicles (PHEV) with an internal combustion engine (ICE)
- Battery electric vehicles (BEV)
- Fuel cell electric vehicles (FCEV)

Hydrogen supply infrastructure
- **Cheaper** than a battery charging infrastructure
- Only a small fraction (5\%) of the total cost of ownership of a FCEV

\(^1\) A portfolio of power trains for Europe – a fact based study, McKinsey 2010
http://www.iphe.net/docs/Resources/Power_trains_for_Europe.pdf
Power Train Costs Converge Rapidly

Total Cost of Ownership – excluding tax
EUR/km

Ranges based on data variance and sensitivities (fossil fuel prices varied by +/- 50%; learning rates varied by +/- 50%)

Source: McKinsey
Fuel Cells for Larger Cars and Longer Journeys

Lowest Cost CO₂ Abatement Solution in 2050

Increasing annual driving distance (1,000km)

<10

10 - 20

>20

Increasing car size

A/B C/D J

Battery electric vehicle

Fuel cell electric vehicle

Source: McKinsey
Fuel Cell Costs – McKinsey 2010

Fuel cell stack cost
EUR/kW

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEA (excl. catalyst, incl. GDLs)</td>
<td>500</td>
<td>252</td>
<td>16</td>
</tr>
<tr>
<td>Structure</td>
<td>81,362</td>
<td>14,274</td>
<td>22,228</td>
</tr>
<tr>
<td>Periphery</td>
<td>38,565</td>
<td>18,892</td>
<td>7,475</td>
</tr>
</tbody>
</table>

EUR per fuel system
C/D segment

~90%

MEA (excl. catalyst, incl. GDLs)
Catalyst (incl. platinum)
Structure
Periphery

FC stack lifetime (’000km)
115 180 247 290

Platinum use (g/kW)
0.93 0.44 0.24 0.11

Ø Fuel cell stack cost EUR/kW
500 110 43

Min 221 42 16
Max 781 252 98

Source: McKinsey
Size of Merchant MEA Car Market

Value of Car MEA Market (ex pms)

Source: McKinsey
What is JM doing about this Opportunity?

- Fuel cell technology investment
- Catalysis technology is critical
- Participation in early fuel cell markets

- Provides revenue and learning by doing
- In the next decade many of these markets are as large as cars
Today’s Markets – Stationary CHP

- Hydrogen generated in-situ using a range of **fuels**: natural gas, renewable gas etc.

- Enables clean, quiet, **pollution free power** generation on a scale from 1kW to MWs

- Large units for combined **heat** and **power** for hospitals, hotels and banks. Commercial sales in the US and Korea

- Fuel cells can be **scaled** to give power to individual houses (or smaller offices, clinics etc.)

- Large **government funded** programmes underway in Japan and Korea

- **First** commercial **sales** underway in US
  - Large homes in California with expensive electricity

- Forecast a **rapid expansion** into worldwide markets as costs reduce
Markets – Direct Methanol (DMFC)

Readily available fuel, especially at small scale enabling commercial portable devices now

**Leisure**
- Recreational vehicles, leisure craft, remote cabins
- Dissatisfaction with batteries, solar and wind
- Noise and pollution of IC generators

**Military**
- Infantry men, unmanned craft
- US infantryman carries >20kg batteries
- Low weight, long run times, fast ‘recharging’

**Electronics**
- Near term – stand alone chargers offering mains autonomy
- Possible future products have significant potential
- Battery / fuel cell hybrid laptops, portable electronics, cellphones
The Fuel Cell MEA business in 2020

MEA market size >£1 billion excluding pgm

Cars are important... but so are other markets

All markets growing rapidly supported by global trends and advancing technology

JM positioned to participate in each of these markets
Johnson Matthey
Key Strategic Opportunities – Emissions, Energy and Low Carbon

- **Emissions regulations** – a growing global vehicle market with tightening regulations
- **Energy security** – strong interest to get more value from coal and natural gas
- **Low carbon** – desire to stabilise CO₂ in the atmosphere using novel low carbon technologies

**JM**

- All require high technology catalytic solutions
- JM well placed
- Significant growth potential
Global Drivers for Precious Metal Products

Bill Sandford
Executive Director, Precious Metal Products
Global Drivers Impacting the Chemical Industry

- Emission control catalysts
- Obscuration enamels
- Automotive
- Electronics
- Petrochemical catalysts and processes
- Construction
- Bulk chemicals
- Gas / coal to products technology
- Energy security
- Alternative energy
- Resource efficiency
- Recycling
- Pgm refining

- Population Growth
- Urbanisation
- Increasing Wealth

- Natural Resource Constraints

- Environmental Factors
- Climate Change
- Regulation

- Health & Nutrition
- Ageing Population

- Emission control catalysts
- Clean fuel
- Emission control catalysts
- Low carbon
- Hydrogen catalysts
- Purification products
- Fuel cells
- Carbon capture and storage (CCS)

- Pharamaceuticals
- Agricultural Chemicals
- Ammonia synthesis and nitric acid catalysts
- Fine chemicals
- Medical components
- APIs
- Pgm catalysts
Sales Excluding Precious Metals

Manufacturing
- Noble Metals
- Colour Technologies
- Catalysts and Chemicals

Precious Metal Services
- Pgm trading and marketing
- Precious metal refining

2009/10

£420m
Our Manufacturing Businesses

**Account for 65% or ~£270m of division’s sales ex pms**

- A **wide range** of products / applications
- **19** manufacturing sites worldwide
- **Investing** in manufacturing excellence / product innovation
- All businesses have **good ROIC**
- Some mature products with limited growth potential...
- ...other products impacted by global drivers have **good growth potential**
Global Drivers
Manufacturing Businesses

Global Drivers

Ageing Population
Climate Change
Nutrition
Growing Wealth

End Uses

Automotive
Nutrition
Healthcare
Automotive

<table>
<thead>
<tr>
<th>Products</th>
<th>End Uses</th>
<th>Sales by Product Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass obscurations enamels</td>
<td>Auto glass protection</td>
<td>£85m</td>
</tr>
<tr>
<td>Conductive tracks</td>
<td>Heated rear glass</td>
<td>53%</td>
</tr>
<tr>
<td>Pgm alloys</td>
<td>Spark plug tips</td>
<td>33%</td>
</tr>
<tr>
<td>Pgm wire / powder</td>
<td>Engine sensors</td>
<td>8%</td>
</tr>
<tr>
<td>Pgm salts</td>
<td>Autocatalysts</td>
<td>6%</td>
</tr>
<tr>
<td>Base metal catalysts</td>
<td>Plastics / polymers</td>
<td>Brown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Enamels and Conductive Tracks</td>
</tr>
<tr>
<td>Green</td>
<td>Pgm Alloys / Wires / Powder</td>
</tr>
<tr>
<td>Purple</td>
<td>Pgm Salts</td>
</tr>
<tr>
<td>Brown</td>
<td>Base Metal Catalysts</td>
</tr>
</tbody>
</table>
Automotive

<table>
<thead>
<tr>
<th>Accounts for £85m (31%) sales ex pms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pgm salts sold to internal (ECT) and external customers</td>
</tr>
<tr>
<td>All other products sold to external customers</td>
</tr>
<tr>
<td>Asia biggest growth area</td>
</tr>
<tr>
<td>CAGR 10% sales ex pms</td>
</tr>
</tbody>
</table>
Nutrition

Products
- Pgm catalysts
- Base metal catalysts
- Nickel catalysts
- Pgm scavenger

End Uses
- Fertilisers
- \( \text{N}_2\text{O} \) abatement
- Edible oils / sweeteners
- Food spoilage inhibitor

Sales by Product Group

- £30m (43%)
- £30m (57%)

Accounts for £30m (11%) sales ex pms
>10% CAGR sales ex pms
Nutrition

**Fertiliser use driven by population growth**

- **Growing wealth** drives meat consumption
- Fertiliser demand expected to grow strongly in Asia
- By-product N$_2$O, powerful GHG (310 times CO$_2$)
- **Strong growth** for N$_2$O abatement but depends on Kyoto replacement, cap and trade etc.

---

**Johnson Matthey has leading share in fertiliser and N$_2$O catalysts**

Nutrition

**e+™ Ethylene Scavenger**

- Recently developed in collaboration with Anglo Platinum
- Huge amount of fruit *destroyed* due to over ripening
- Climacteric fruit emit ethylene on ripening
- **e+™ postpones ripening process**
### Health and Personal Care

<table>
<thead>
<tr>
<th>Products</th>
<th>End Uses</th>
<th>Sales by Product Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pt alloys</td>
<td>• Medical device components</td>
<td>- 19%</td>
</tr>
<tr>
<td>• Pgm catalysts</td>
<td>• Eyecare</td>
<td>- 35%</td>
</tr>
<tr>
<td>• Base metal catalysts</td>
<td>• Pharma APIs</td>
<td>- 46%</td>
</tr>
<tr>
<td></td>
<td>• Personal care items</td>
<td></td>
</tr>
</tbody>
</table>

Accounts for £65m (24%) sales ex pms
Health and Personal Care

Demand for medical products driven by growing population...

- ...and also **ageing** population in **wealthy** countries

- **Largest market** for medical devices is USA
  - Other markets growing quickly

- Demand for **APIs** largely in West
  - Demand and manufacturing moving East

- **CAGR 9%** sales ex pms
Precious Metal Services

Accounts for 35% or £150m of division’s sales ex pms

- Pgm trading and marketing
- Precious metal refining

Provides service to Johnson Matthey group and its customers

- 65% of group sales are pgm based

Volume growth will (largely) reflect growth in market / Johnson Matthey group sales

Profitability influenced by pgm prices
Global Drivers
Precious Metal Services

Global Drivers

- Population Growth
- Growing Wealth
- Environmental Factors
- Natural Resource Constraints

Growing Need for Pgms and Refining

- Jewellery and industrial uses of pgms
- Emission control
- Fuel cells and low carbon technologies
- Refining
Gross Pgm Demand
1996 - 2010

Auto largest sector (51%)

Future growth driven by:
- Population growth
- Wealth growth
- Environmental factors
  - Engine exhaust catalysis
  - Fuel cells
Engine Catalysis

- **Light Duty Cars**: 97% catalysed
- **Heavy Duty Diesel**: 33% catalysed
- **Non-road**: 9% catalysed

**Total Number of Engines**
- 75m
- 3.5m
- 2.2m
Pgm Trading and Marketing
Platinum Demand in Fuel Cells 2001 - 2010

Pt ozs '000

2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Early signs of market traction

Fuel cell loadings* significantly higher than ICE (4-5g):
- 84g in 2011
- 40g in 2017
- 22g towards 2050
- 10g beyond 2050

Pt demand sensitive to fuel cell car penetration

* Based on McKinsey study
Pgm Trading and Marketing

Platinum Supply-Demand

RSA main producer

Significant reserves

RSA mines having to deal with:

- Higher capex
- Rising operating costs
- New mining legislation
Russia is largest producer

90% of world production is by-product

Supplies supplemented by Russian stock sales... close to exhaustion?
Pgm Refining

“High grade” refineries in UK and USA

• Two key sectors
  • JM product customers
  • Autocat recycling
• Profitability strongly influenced by pgm price movements

Outputs: Pt 45t p.a. Pd 50t p.a.
Conclusions

Manufactured Products

- **Key products** with **strong drivers**
  - **Double digit** growth in sales
- Some mature products with limited growth potential
- Average sales ex pms CAGR in **high single digits**

Precious Metal Services

- Global drivers support **growing demand** for pgms
- Volume growth to reflect Johnson Matthey sales / total market
- Profitability impacted by pgm prices
Global Drivers for Fine Chemicals

John Fowler
Division Director, Fine Chemicals
Global Drivers Impacting the Chemical Industry

Health & Nutrition
Ageing Population

Pharmaceuticals
Agricultural chemicals

APIs
Medical components
Ammonia synthesis and nitric acid catalysts
Fine chemicals
Pgm catalysts
Global Trends Driving Fine Chemicals’ Strategy

**Global Trends**

- Ageing population
- Longer life expectancies
- Economic development (BRIC)
- Expanded access to healthcare
- Drive to lower cost medicines

**Resulting In**

- Generics will continue to grow double digit over the next ten years
- Emerging markets will see strong growth in pharmaceuticals
- Fine Chemicals’ leading global position in narcotic based pain therapy will benefit
Key Business Strengths in Fine Chemicals

- **Advantage through broad skills in chemistry**
- **Investment in R&D and technology**
  - Critical mass in API development through Pharma Services
- **Leading market share in key therapeutic areas**
  - Pain therapy
  - Attention Deficit and Hyperactivity Disorder (ADHD)
  - Drug addiction treatment
  - Platinum oncologics
- **Focused niches targeting higher margin APIs, 20%+**
- **Strong customer relationships with both brand and generic companies**
- **Diverse and flexible manufacturing capability**
- **Highly regulated markets with significant barriers to entry**
- **Outstanding record of regulatory compliance**
The Global Pharma Market

- **Pharmaceuticals**
  - Market: $800bn

- **Small Molecule Pharmaceuticals**
  - $530bn

- **Small Molecule API**
  - $30bn

Source: IMS, Datamonitor, Business Insights, Pollak, Kalorama, LCM M&I
Strategic Focus – Niche APIs

Currently compete in circa 10% of global small molecule API market
Delivering API sales growth of 9% p.a. over the last five years vs global pharma market growth of 6%

JM API Sales by Market 2010/11 (e)

JM API Sales by Region 2010/11 (e)
Strategic Focus – Global Pain Therapy

**Significant barriers to entry**
- Highly regulated markets
- Tight control over import / export of narcotics

**Globally a key therapeutic area**
- Codeine third leading therapy class in the US
- Ageing population in the West increasing demand

**Growth in emerging markets**
- Pressure from WHO to make pain medication more freely available

**Opiate API market to accelerate from 4% CAGR to 6% over the next ten years**

**Opiates Consumption 2008 by Region**
Percentages in parentheses refer to share of global population

- **North America** 35% (5%)
- **Europe** 34% (7%)
- **Emerging** 12% (45%)
- **ROW** 19% (43%)

Source: INCB, IMS and JM data
Emerging markets are China, India, Brazil, Russia, Mexico, Turkey and South Korea
Global API Market Share by Volume – Opiates

Source: NRM-INCB Annual Report 2009
Strategic Focus – Generics

- Leadership in terms of **volume** and **growth**
- Government healthcare **reforms**
- Insurance **bias** towards generic usage
- Current market forecast to **grow** in excess of **10%** p.a.

- Circa **80%** of current JM sales to generic markets
- Ability to leverage R&D for first to file opportunities

**Total Prescriptions Dispensed (USA)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Brands</th>
<th>Branded Generics</th>
<th>Unbranded Generics</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>43</td>
<td>11</td>
<td>21</td>
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<tr>
<td>2005</td>
<td>40</td>
<td>10</td>
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<td>2009</td>
<td>26</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>2010 (e)</td>
<td>23</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>2015 (e)</td>
<td>18</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>2020 (e)</td>
<td>14</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: IMS and JM estimates
Strategic Focus – Emerging Markets

- Current CAGR of **15%** is forecast to continue at similar rates through to 2014.

- Economic development will drive use of pharmaceuticals.

- Pain therapy is under utilised in emerging markets. Growth forecast at least **15%** CAGR.

Source: IMS Health Market Prognosis, JM estimates
Emerging markets are China, India, Brazil, Russia, Mexico, Turkey, and South Korea.
China – Significantly Underserved Narcotics Pain Market

- Only **22** narcotic drugs available in China vs **123** in the West
- Narcotic consumption has more than **tripled over the last five years**, albeit from a low base
- Historical reticence to the use of opiates is **changing**
- China pharmaceutical growth at **20%**

**Illustrative Morphine Per Capita Consumption Between China and Other Countries**
(grams / million population)

- China: 1,000
- France: 37,000
- USA: 66,000
Growth Opportunities

**Global market share of opiate APIs**
- Ageing population will drive steady growth in established markets
- JM’s US market share growing, capacity in place with acquisition of Riverside plant

**Economic development will drive pharma growth in emerging markets**
- Established Chinese JV with Hebei Aoxing
- Indian narcotic market growing rapidly but access still limited

**Continued generic growth underpins new API product pipeline**
- Several first to file generic opportunities in place with more being developed
- High volume, complex APIs and advanced intermediates targeted as a result of addition of Riverside plant capacity
Conclusions

Drivers and strategy in place to deliver future growth

Cost effective manufacturing and capacity in place to meet future demand

Sales growth over the next five to ten years forecast high single digits

Critical mass in R&D through our Pharma Services business to support new products

Key business strengths aligned with core JM attributes
Further Growth – R&D Focus

Robert MacLeod
Group Finance Director
Role of M&A

M&A remains an element of our strategy
- Bolt-on acquisitions likely – <£100m

Will constantly review and refine existing portfolio as necessary

Focus is on organic growth
- Scarcity of large acquisition candidates
- Leading market shares limit our opportunities
- M&A will be used to accelerate organic growth strategy
Balance Sheet Structure

- **Target** net debt (inc. post tax pension deficit) / EBITDA: **1.5 to 2.0 times**
- Large working capital swings possible
  - As business grows, requires substantial **working capital**
  - In good times, high working capital exacerbated by higher pgm prices
- Requires relatively conservative balance sheet to **fund growth**
- In tougher times, **balance sheet boosted** by large working capital inflows
- Will address balance sheet **efficiency** as appropriate
Further Growth – R&D Driven

- **Organic growth prospects** in existing businesses are very good
- Strategy process has reconfirmed that R&D is a **key component of our strategy** evidenced by:
  - ECT market shares
  - Apico
- Identified opportunity to **further leverage** group’s R&D expertise
- **Increasing focus** upon investing in R&D
  - Overall R&D spend up from circa **£100m** to circa **£135m** p.a.
  - Up to £5m p.a. to **target new opportunities** in adjacent markets
- **New structure** and **investment** in place
Overview

Research gives options for future growth

A key competence is our ability to arrange, control and anchor metals on a nanometre scale

- Arises from our catalysis businesses
- Will be needed in future but...
- It also gives us options to enter related areas

Key abilities strengthened by acquisitions

- E.g. Synetix on base metals
- Intercat for refineries technologies
- X-zymes for enzymic catalysis
## Key Competence

Controlling Materials on a Nanometre Scale

<table>
<thead>
<tr>
<th>A typical heterogeneous catalyst Pd/C</th>
<th>Control of particle size</th>
<th>Control of particle shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 nm Pd particles</td>
<td>2 nm</td>
<td>New shapes can take us into new applications</td>
</tr>
<tr>
<td></td>
<td>50 nm</td>
<td></td>
</tr>
</tbody>
</table>

Small anchored particles, highly dispersed, very active, best use of expensive metals

Control of particle size, tunes activity and selectivity
Markets from Nanoscale Materials Chemistry

Catalysts: broad, existing JM business

Sensors

Photovoltaics

JM competence

Displays

Thermoelectrics

Printed Electronics

Batteries

Core competence allows us to grow in existing business but to develop new opportunities
Modelling and Synthesis

Expertise in modelling and synthesis helps us develop materials with better performance

Developing models for core shell nanoparticle activity

Synthesis of Au/Pd and Pd/Au core shell particles

Alternating layers of Pt/Co
## Research Projects Nearing Commercialisation

| Biomass to fuel and chemicals | Syngas and Fischer-Tropsch (FT) catalysis – enabling technology for clean and secure fuels | Advanced fuel cell catalysts |
Global Drivers Impacting the Chemical Industry

- Emission control catalysts
- Obscuration enamels
- Automotive
- Electronics
- Petrochemical catalysts and processes
- Construction
- Bulk chemicals
- Population Growth
- Urbanisation
- Increasing Wealth
- Natural Resource Constraints
- Environmental Factors
- Climate Change
- Regulation
- Health & Nutrition
- Ageing Population

Biomass to fuel
Fuel cell catalysts

- Gas / coal to products technology
- Energy security
- Alternative energy
- Resource efficiency
- Recycling
- FT catalysts
- Pgm refining

- Pgm catalysts
- APIs
- Medical components
- Fine chemicals
- Ammonia synthesis and nitric acid catalysts
- FT catalysts
- Emission control catalysts
- Clean fuel
- Abatement technologies
- Hydrogen catalysts
- Purification products
- Fuel cells
- Carbon capture and storage (CCS)
Biomass to Fuels
Feedstocks for Next Generation Biofuels

Waste Cellulose
- E.g. wood processing, agricultural residues

Pyrolysis Oil
- Versatile option for biomass processing

Algae
- High yield, non-food energy source

JM Opportunity

Syngas purification and conversion

Purification
Deoxygenation
Isomerisation
Cracking

Triglyceride conversion
Algae to Fuels
Conversion of Triglycerides

Further develops JM technology developed in DARPA project

- Multifunctional catalysts developed for conversion of methyl esters and acids to hydrocarbon fuels
- Hydrogenation (pgm) centre and zeolite

US Department of Energy Advanced Research Projects Agency (ARPA-E) funding awarded

- Microbial conversion of hydrogen and carbon dioxide into biodiesel
- Three year, $6m project between Johnson Matthey, OPX-BIO and National Renewable Energy Laboratory

Vegetable oil OR Fatty acid

Deoxygenation
Isomerisation

Linear alkanes
Branched alkanes

JM patent WO 2009095711
Syngas and FT Catalysis

Clean and Secure Fuels

Purification + Catalysts + Process Technology + Diagnostics + Services

FT Catalysis

Chemicals

Fuels
Syngas and FT Catalysis
Large or Small Scale?

Opportunities are emerging across all scales
- Market drivers are complex and geographical, but real

New process technologies => new catalyst solutions
- Advanced reforming / combustion products for distributed syngas
- Tar reforming and sour shift catalysts for bioderived syngas
- Highly active and selective Fischer-Tropsch catalysts

JM optimises the catalyst form to suit the application
FT Catalysis Timelines

- JMTC restarts FT catalyst research
- DPT acquisition brings reactor design and process technology
- Synetix acquisition brings base metal expertise in FT and scale up
- Expanded JM research project on pgm promoted cobalt
- Projects with customers - FT catalysts for variety of scales, reactors, feedstocks (BTL, GTL, CTL)
Gas to Liquids (GTL)
Fischer-Tropsch Catalyst R&D

Franz Fischer at work in 1918

Micro reactors used to simulate large scale FT operating conditions
- High throughput catalyst screening with fully integrated analysis
FT Catalyst Progress

FT Conditions: $P = 20$ bar, $H_2/CO = 2$, Temperature = $210^\circ C$

![Graph showing selectivity and activity](image-url)
Advanced Fuel Cell Catalysts
Catalyst Layer and Catalyst Structure
Cost-Down and Market Evolution for DMFC Products

Next?
- Bicycles
- Scooters
- Micro-CHP
- Laptops
- Tablet PCs
Conclusions

Many opportunities in adjacent markets

JM attributes provide focus for R&D effort

Increase emphasis on commercialisation

New structure in place and investment budgeted

New business in ten years, sales target circa £200m p.a.
Summary and Conclusions

Neil Carson
Chief Executive
Global Drivers Impacting the Chemical Industry

Emission control catalysts
- Obscuration enamels
- Automotive
- Electronics

Pgms
- Petrochemical catalysts and processes
- Construction
- Bulk chemicals

Population Growth
Urbanisation
Increasing Wealth

Health & Nutrition
Ageing Population

Environmental Factors
Climate Change
Regulation

Natural Resource Constraints

Energy security
Alternative energy
Recycling

Gas / coal to products technology

Energy security
Alternative energy
Recycling

Catalysts
- Pgm refining
- Resource efficiency

Pgm catalysts
- APIs
- Medical components
- Fine chemicals

APIs
- Medical components

Agricultural Chemicals
- Ammonia synthesis and nitric acid catalysts

Pharmaceuticals

Energy security

Clean fuel

Emission control catalysts

Abatement technologies

Low carbon

Hydrogen catalysts

Purification products

Fuel cells

Carbon capture and storage (CCS)

JM attributes deliver superior growth
Our Strategy in Summary

Key elements unchanged:

- Continued focus on leading edge catalysis
- Maintain differentiation through technology
- Strong position in pgms remains an intrinsic part of group
- Primary focus is organic growth

Increased emphasis on:

- Developing new opportunities underpinned by core chemistry
- JM attributes provide focus for investment
- Manufacturing excellence
- People and culture
Conclusions

We believe that the strategy is right

Group well positioned for growth in next five years

- **Strong positions** in core markets
- Group anticipated to grow at **double digit rates** with **ROIC >20%**
- Business drivers firmly in place
- Continued **investment** in infrastructure and R&D

Group well positioned for future growth in five years +

- Global drivers show good fit for JM technology
- Strategy in place to **monitor changing landscape**
- Capacity to **invest** to maximise benefit of opportunities
- Proven R&D approach to **deliver** commercial success
## Glossary

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ADHD</td>
<td>Attention deficit and hyperactivity disorder</td>
</tr>
<tr>
<td>API</td>
<td>Active pharmaceutical ingredient</td>
</tr>
<tr>
<td>Apico</td>
<td>Johnson Matthey’s new methanol synthesis catalyst</td>
</tr>
<tr>
<td>ARPA-E</td>
<td>Advanced Research Projects Agency - Energy</td>
</tr>
<tr>
<td>Au</td>
<td>Gold</td>
</tr>
<tr>
<td>BEV</td>
<td>Battery electric vehicle</td>
</tr>
<tr>
<td>BRIC</td>
<td>Brazil, Russia, India, China</td>
</tr>
<tr>
<td>BTL</td>
<td>Biomass to liquids</td>
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<tr>
<td>C</td>
<td>Carbon</td>
</tr>
<tr>
<td>CAGR</td>
<td>Compound annual growth rate</td>
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<tr>
<td>CCRT®</td>
<td>Coated continuously regenerating trap</td>
</tr>
<tr>
<td>CCS</td>
<td>Carbon capture and storage</td>
</tr>
<tr>
<td>CHP</td>
<td>Combined heat and power</td>
</tr>
<tr>
<td>Co</td>
<td>Cobalt</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon monoxide</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>CRT®</td>
<td>Continuously regenerating trap</td>
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<tr>
<td>CTL</td>
<td>Coal to liquids</td>
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<tr>
<td>DARPA</td>
<td>Defense Advanced Research Projects Agency</td>
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<tr>
<td>DME</td>
<td>Dimethyl ether</td>
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<tr>
<td>DMFC</td>
<td>Direct methanol fuel cell</td>
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<tr>
<td>DOC</td>
<td>Diesel oxidation catalyst</td>
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<tr>
<td>DPF</td>
<td>Diesel particulate filter</td>
</tr>
<tr>
<td>DPT</td>
<td>Davy Process Technology</td>
</tr>
<tr>
<td>e+TM</td>
<td>Ethylene scavenger that postpones fresh produce ripening</td>
</tr>
<tr>
<td>EBITDA</td>
<td>Earnings before interest, tax, depreciation and amortisation</td>
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<tr>
<td>ECT</td>
<td>Emission Control Technologies</td>
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<tr>
<td>EPS</td>
<td>Earnings per share</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>FCEV</td>
<td>Fuel cell electric vehicle</td>
</tr>
<tr>
<td>FT</td>
<td>Fischer-Tropsch</td>
</tr>
<tr>
<td>GDL</td>
<td>Gas diffusion layer</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse gas</td>
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</table>
## Glossary

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<th>Acronym</th>
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<tr>
<td>GTL</td>
<td>Gas to liquids</td>
</tr>
<tr>
<td>H₂</td>
<td>Hydrogen</td>
</tr>
<tr>
<td>HC</td>
<td>Hydrocarbon</td>
</tr>
<tr>
<td>Hg</td>
<td>Mercury</td>
</tr>
<tr>
<td>IC</td>
<td>Internal combustion</td>
</tr>
<tr>
<td>ICE</td>
<td>Internal combustion engine</td>
</tr>
<tr>
<td>INCB</td>
<td>International Narcotics Control Board</td>
</tr>
<tr>
<td>ISO 14001</td>
<td>Series of standards specifying requirements of an environmental management system</td>
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<tr>
<td>JM</td>
<td>Johnson Matthey</td>
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<tr>
<td>JMTC</td>
<td>Johnson Matthey Technology Centre</td>
</tr>
<tr>
<td>JV</td>
<td>Joint venture</td>
</tr>
<tr>
<td>MEA</td>
<td>Membrane electrode assembly</td>
</tr>
<tr>
<td>MW</td>
<td>MegaWatt</td>
</tr>
<tr>
<td>N₂O</td>
<td>Nitrous oxide</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrogen oxides</td>
</tr>
<tr>
<td>OEM</td>
<td>Original equipment manufacturer</td>
</tr>
<tr>
<td>PBT</td>
<td>Profit before tax</td>
</tr>
<tr>
<td>Pd</td>
<td>Palladium</td>
</tr>
<tr>
<td>Pgm</td>
<td>Platinum group metal</td>
</tr>
<tr>
<td>PHEV</td>
<td>Plug in hybrid electric vehicle</td>
</tr>
<tr>
<td>PM</td>
<td>Particulate matter</td>
</tr>
<tr>
<td>Pms</td>
<td>Precious metals</td>
</tr>
<tr>
<td>Pt</td>
<td>Platinum</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and development</td>
</tr>
<tr>
<td>ROIC</td>
<td>Return on invested capital</td>
</tr>
<tr>
<td>ROW</td>
<td>Rest of the world</td>
</tr>
<tr>
<td>RSA</td>
<td>Republic of South Africa</td>
</tr>
<tr>
<td>SCR</td>
<td>Selective catalytic reduction</td>
</tr>
<tr>
<td>SCRT®</td>
<td>Selective catalytic reduction + CRT®</td>
</tr>
<tr>
<td>SNG</td>
<td>Substitute natural gas</td>
</tr>
<tr>
<td>SOx</td>
<td>Oxides of sulphur</td>
</tr>
<tr>
<td>Syngas</td>
<td>A mixture of hydrogen and carbon oxides</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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</tbody>
</table>