



Capital Markets Day 2017

Thursday, 21st September 2017

Sustained Growth and Value Creation

Robert MacLeod

Chief Executive, Johnson Matthey

Welcome

Okay, good morning everybody, and welcome to Johnson Matthey's Capital Markets Day for 2017. I would like to welcome you all, and thank you very much for coming for what will be a very full day.

Introduction

Our aim is to give you greater insight into JM's future plans and opportunities. And for those of you who joined us last night, I hope you had a chance to engage with the JM Team.

At the results presentation in June I outlined some of the organisational changes that I had made recently, and today you will hear about the opportunities which those changes open up for JM.

Our intention is that you understand our confidence in the medium-term performance we outline in our R&S this morning.

One of the most impactful changes I described at results was the change I have made to the team, both at executive level and deeper into the group, and that is the team you will meet today. Not just the main presenters, but we also have a number of show and tells, which illustrate how we turn great, clever chemistry into growth and where you will meet a number of our colleagues. I know you will find those sessions useful, so please do make the time to see them in the breaks.

Future of Johnson Matthey

Today is about the future of JM and how we will drive growth and value creation in the short, medium and long term. We have a strong business and a clear strategy to create long-term value.

JM is a world-class technology company, and at our core is our chemistry. We are world-class chemists, and we use that world-class expertise to solve complex problems for our customers. In a world which is becoming increasingly challenging, our expertise in chemistry and our ability to scale it up, is a competitive advantage. That competitive advantage enables us to build close collaborative relationships with current and future customers.

We focus on high margin, technology driven growth markets, and in those markets the combination of our chemistry and our customer focus gives us leadership. We then sustain those leadership positions through a virtuous circle of investment in research and development to enhance our expertise and understanding in the fundamental chemistry, which then enables us to develop new or better ways of solving our customers' problems and this in turn deepens our relationships with our customers.

Investment in the strongest growth opportunities by sector, by market and by geography is underpinned by our relentless focus on operational efficiency, and each presentation you will hear today will show how we employ this strategy across our business.

World class chemistry

But I am going to start with our chemistry. We have more than 1,400 people working in research and development, solving complexity for our customers, driving growth for us, and true to our view that JM can help to make the world cleaner and healthier.

Our science has been established over many years. We invest in it and in our talent and our skill and knowledge is acknowledged across the academic and commercial scientific community and amongst our customers.

Our four key chemistry strengths are in the materials characterisation and testing, PGM chemistry and metallurgy, material design and engineering and surface chemistry. Taken together they cover our ability to provide fundamental insights about materials, their design and then the control of their activity through chemical and functional manipulation.

Competitive advantage

But it is not just about our chemistry alone; our competitive advantage is in combining knowledge of the fundamental chemistry, with commercial and scalable solutions, potentially customised for each and every customer. This combination allows us to out-perform in our target markets and creates high barriers to entry.

Unfortunately, we do not have time to go into detail of each of these areas today. So today you instead will hear a lot about our high, and in some cases getting higher, market shares. This is the tangible evidence of our skills and capabilities. We do not compete on price; we win based on our technology. And these capabilities give us the opportunities to drive growth.

Three global challenges

We operate in three growing sectors. Growing because they address the three big global challenges. Within these areas we look for businesses that meet our core criteria. They are growing, can generate attractive returns and, as I have said already, are where our chemistry and customer focus creates leadership positions.

Improving air quality

The need to improve air quality in cities across the world is an ever-greater focus and we play a very important role in reducing power train emissions. In the short term tighter legislation and an increasing shift towards hybrid gasoline cars will help to limit emissions and we are growing our market shares with our excellent technology.

Battery materials

But a substantial longer-term opportunity for JM is obviously in the battery materials space given the changes in the automotive power train. The solution, which governments, consumers and OEMs are looking for is one, which solves for power, range and cost effectiveness. And we have developed a market-leading product, which is already solving for those three factors. It is yet another example of where our chemistry gives us an edge.

Natural resources

As the world's population and income continues to grow, the need to use the world's natural resources more and more efficiently becomes increasingly important. We play an important

role in this sector by enabling the transformation of natural resources to provide products and raw materials as efficiently as possible to many industries, including our own Clean Air sector.

Healthcare

And the trends in healthcare are for increasingly targeted and personalised medicines at an appropriate cost. This is extending the demand for more complex and potent active pharmaceutical ingredients, otherwise known as APIs, and these have increasing challenges around their bioavailability. So growth in this market will require chemistry based solutions as well.

Three leadership sectors

Our leadership position by sector underpins our confidence in the growth we will drive in each of these three sectors. Leadership, as I have said, comes from our ability to commercialise our chemistry and continually invest behind that strength.

In Clean Air we are number one in diesel given our focus on this as a growth area for over ten years. With growth in Clean Air being driven in the future by hybrid gasoline cars and pure electric vehicles, we will shift our focus and build leadership positions in these areas.

In gasoline we start from a position of strength as joint number one. And as Alan will show you in Battery Materials, we start from a position of leading chemistry. As this sector grows from its current small scale, we will build a leading market position based upon this chemistry advantage.

In our Efficient Natural Resource sector we are number one or two in pretty much every segment in which we operate. I think we are about fourth in one very small segment.

In Health, our focus is the large, high-growth, outsourced small molecule API segment. Here we have leading positions in controlled substances, which we are using as the platform for leadership in the wider API segment.

Core strengths

Taking all these together, our core strengths, the growth drivers of the markets in which we operate and the increasingly complex challenges that the world and our customers are facing, will enable us to drive attractive returns in the medium term.

Our focus on high-margin growth sectors will expand our return on capital to 20% and we expect to deliver mid to high single-digit earnings per share growth. And together with the strength of our balance sheet and our free cash flow, this supports our progressive dividend policy.

What I hope that you will take from today is an understanding of and lots of evidence for our confidence that this will be the future performance at JM.

Agenda

So this is the agenda for our presentations today. You are going to hear about the clear visibility that we have for sustained growth in Clean Air. The strategies we have in place to deliver break out growth in Battery Materials and Health and how, through a sharper focus, investment in the key growth areas will drive top and bottom line growth, ahead of our markets, in our Efficient Natural Resources Sector. Anna will then describe the further value

we can create through our focus on efficiency across the group. But before we go into the details I want to give you my take on each of these sectors.

Emissions

The impact from emissions from vehicles on air quality is a major issue across the world. In the first instance, significant legislation to enhance air quality has been and continues to be enacted. This is what has driven our business to date. We have been very successful and have a number one position today. We have out-performed the market over the last decade with both top line growth and expanding operating margins from driving efficiency across the business. But as you know, heightened concerns are causing rapid changes to the automotive power train landscape, and those structural changes will impact our business. And across the world, but particularly in Europe, consumers are much more aware of air quality issues and this is changing their buying behaviours.

In addition, consumer confidence in OEM suffered a significant hit with the 2015 emissions scandals. To understand the impact that these have on our business and the steps we are taking, you have to look at these drivers sequentially.

First the legislation in Europe with the advent of Euro 6C is positive for our business as the catalysts on gasoline cars will become more complex and therefore of higher value for us. And as OEMs try to rebuild consumer confidence in Europe they are getting ahead of legislation to meet the new real-world driving emissions standards.

To deliver this they have needed complex solutions at speed. We have delivered that very successfully, and that is why we go to the next few years with a hugely increased share of diesel; up 20% points to about 65%. And also an enhanced share of gasoline, up 5% points to 45%. This will deliver strong growth in Europe in the next couple of years, and will be the key driver of double-digit sales growth we will deliver overall in Clean Air in the next two years, even as diesel's share reduces.

With tighter legislation on gasoline in Europe our sensitivity to the mix of diesel and gasoline vehicles will dramatically reduce, and John will take you through the details in a minute. But on a gross profit level, a percentage point change in the mix between diesel and gasoline will impact us by just £4 million, and that is before we do any mitigation. These share gains, the reduced sensitivity to diesel and the fact that the value to us of a hybrid car is the same, or even higher, than its pure internal combustion engine equivalent, gives us the confidence that our European Light Duty catalyst business will be bigger in the medium term than it is today.

Growth

And as we move from the short to medium term, we are confident that we will continue to grow our overall Clean Air business. Growth in this period switches to Asia, where they are adopting tighter Euro 6 standards, benefitting both our light and heavy-duty business.

And throughout the whole period the rest of our business, that is our European and North American heavy-duty diesel and North American light-duty business will continue to grow steadily. These will enable us to deliver mid-single digit growth through the medium-term as Europe light-duty shifts to gasoline hybrid and global battery electric vehicle penetration increases.

Of course, the adoption of pure battery electric vehicles will have an impact upon this business, which we estimate as a £7 million impact on gross profit for each one percentage point increase in battery electric vehicle penetration. As we transition from emission control catalysts to battery materials, we will manage our cost base in our current Clean Air business with agility and a relentless focus upon efficiency, to mitigate the potential impact on this business, whilst at the same time growing our battery materials business quickly.

Overall, we have clear visibility given the share gains that we have made and the up-coming legislation, which will ensure that our Clean Air business will grow throughout the next ten years.

Health sector

Turning now to the Health sector, where we operate in the very large outsourced API market, which is about \$40 billion in sales, growing at 8% per annum. We have strong skills in this area, and a good track record with innovator and generic pharma companies. Today you will see how demand for increasingly complex APIs and cheaper, more available drugs, as generic penetration increases, plays to our strengths.

What we do not have yet is a deep, broad portfolio of commercial products. The regulation timeline for pharma approval is long, and therefore to build a portfolio takes time. We therefore began to invest to build this pipeline in 2014. While we will continue to invest, because that is the nature of this industry, we expect that the value from this pipeline of new generic products alone will be sufficient to increase our operating profit in this sector by around £100 million by 2025.

The margin impact of growing scale is even more positive, and we move quickly after 2019 to a business with margins in the high 20s, against the roundabout 20% margin we have now. This builds on our core, great chemistry and a strong reputation for commercialising that chemistry. And as we look further out, we have the ability to take these skills into new areas, which require the same skill base.

Battery Materials

Our second area of breakout growth is in Battery Materials. However, this is a much more immature market. There is quite a long runway ahead before this industry even starts to be 10% of what it could be. The potential is very significant, because when pure battery electric vehicle penetration reaches 10% of new vehicle sales, the cathode materials market will be in excess of \$30 billion. However, before we get there, our industry will have to build a lot of capacity and solve some significant technical challenges as I have described already.

Our strategy is to invest in the high value end of this market and use our technology skills to succeed with customers who value enhanced battery performance. We entered this market in 2012 and we have developed high-power lithiumide phosphate materials. But of course, it is not just about high-powered materials; we need a range of high energy materials too. And the good news is that we already have a product, which we call enhanced LNO, that is enhanced lithium nickel oxide, which has market leading performance characteristics.

Most importantly it is not just us saying this, but that is what our customers are telling us too and you will hear much more about that from Alan later.

Pace of progress and investment for growth

I am really, really excited about the pace of our progress and today you will hear about our plans to invest ahead of our substantial growth. And we are developing plans for an initial investment in 2018/19 of around £200 million for enhanced LNO manufacturing capacity. This is a market of very strong growth and, like our Health sector there will be significant margin improvement as we build scale, given our decision to focus on the high-value segment where our technology is a competitive advantage.

Efficient Natural Resources is the place where we have made the biggest changes in order to be well positioned, given that the market dynamics of this sector have changed significantly in the last few years. For example, fewer new plants are being built across the world, but the need for our technical skills to enhance the efficient use of the world's natural resources is even greater. The total market is big and complex and covers many geographies and industries. The growth rates vary, and we target where growth and our technical skills are best aligned. As a result, we have leading positions across many segments based on our technology strengths.

We will focus on investment on those segments with the highest growth, and this is behind our confidence that we can grow ahead of the market. And margins will expand as we improve the efficiency of our operations.

Expanding our return on invested capital will be driven by the investment decisions we make. That is why we have a differential approach to resource allocation. It reflects the underlying growth potential of each business, given the development of the market and the opportunities by geography.

Selective investment

We see our investment in three stages. The first is where we make selective investments ahead of an opportunity. These are in our new market sector, and this covers areas, which have not yet been commercially developed but where the future commercial opportunity allies to our three global mega-trends. Our approach reflects the fact that at this stage of development the financial metrics are very different. And by managing the growth potential within the new markets organisation they get the necessary attention and focus to nurture them towards success and to ensure that we make rigorous go/no-go investment decisions.

Clearly we are further ahead with our confidence to invest substantially in battery materials where we have invested around \$150 million to date. In all cases, the chemistry behind our business sectors drives growth and value for us, as we sell solutions to our customers' complex problems.

Once we have the confidence in these opportunities we move to our scale up phase and this can last for many years. For example, we have had emission control business in China for more than ten years, but there is still a great opportunity to grow substantially from here as tighter legislation comes through.

API Manufacturing

API manufacturing is also an area in which we've been operating for many years. But from where we are today we will invest further to scale it up and drive growth.

As businesses mature their growth potential may reduce but are still none the less very attractive and in these areas we will retain our market position and drive growth and value as appropriate. Clearly our emission control businesses in Europe and North America are at this stage. At any of these stages though, it is possible that the solutions that we have developed mean that our customers no longer need technology to solve their future problems. The solution may be good enough and therefore the technology does not have to move forward. At that point we may have a business where our technical edge will not drive the returns we want to see across the group, and in these cases we would consider selling the business.

And later Anna will provide a context on the financial characteristics of each of these three stages.

Better business practices

We can also run our business better. Our decision-making can be quicker. We can use data better. We can simplify our organisation and remove layers and we can build transferable skills across the sectors. These will all be enabled by our investment in our IT infrastructure that we commenced a few years ago, an absolute requirement to enable us to run our business better. This will make us a stronger, more agile organisation and will release £50 million of cost savings, which Anna is going to take you through later.

Beyond financial targets

So far I have principally talked about value measured by financial targets. Beyond that there is a further value we create, and that is our vision for a world that is cleaner and healthier today and for future generations. As we invest and as we grow the business our sustainable business agenda is the lens through which we view total success. It is an area of focus that is becoming more and more embedded in the company and one that, as you heard earlier, is inspiring our research and development agenda and which is increasingly important to our current and future employees.

Our financial performance, and our performance in driving a cleaner and healthier world mean that in 2025 we will have enhanced our position as a technology leader in our targeted markets, have three substantial and growing primary sectors, and we will have excellence embedded into everything we do; be that our research and development, which you have heard me talk a lot about already today, our commercial relationships to ensure that we capture our optimal share of value for our shareholders, and our manufacturing to ensure that we remain cost competitive and our procurement capabilities.

Taking this all together, we aim to be one of the best performing most trusted and admired specialty chemical companies in the world. That is what our strategy is designed to achieve and today you will hear all about our long-term business opportunities.

And with that I would like to hand over John and Phil to describe our Clean Air sector in detail.

Clean Air Sector

John Walker

Sector Chief Executive, Clean Air, Johnson Matthey

Clean Air markets

Thank you Robert. Good morning. I am here to talk to you today about Clean Air and the markets that we operate in. I am here with Phil Blakeman, who is here in the front row, who is the Managing Director of Clean Air, Asia, and he will be taking you through the Asian Light Duty and the Global Heavy Duty sections. We also have Chris Morgan in the audience, so he is the European Technology Director, and you can talk to him in the breaks outside at the demo stands.

Sector Trends

So what I am going to show you is that Clean Air is a growth business for Johnson Matthey over the next ten years.

We have technological leadership in positions of strength across the regions, and the next ten years will be a period of sustained growth for Clean Air. I have broken this presentation down broadly by region as the drivers, mainly legislation, and the decisions of consumers, do vary by region. In Global Heavy Duty the trends are more broadly similar across the regions, and therefore Phil will talk to our heavy-duty diesel business on a global basis.

What you will hear today is that our European Light Duty business grows strongly in the short term, primarily as a result of around 20 percentage point share gain we have made in diesel. Our business will also grow as a result of the introduction of gasoline particulate filters.

I am going to come to the future of pure diesel engines, the impact of the move to hybrids and pure BEVs, but this business, taking all this into consideration, will end the ten years the same size as it is today.

North America Light Duty delivers steady growth, and we see a benefit as gasoline particulate filters are introduced in the medium to the long term. Our business in Asia transforms during the period, with tightening legislation for both light and Heavy Duty, in line or ahead of the developed markets.

As Robert has said, we have levers to pull with operational efficiency. We expect to deliver further operational leverage with the new capacity we are building and as a result of these individual regional trends our Clean Air business grows mid-single digit compound annual growth rate and sales over the ten years.

Period of changing legislation

This is going to be a period of huge change, and the strategy we have developed for this business takes those changes into account. Let me sum this up into four key assumptions we have made.

There will be further changes in legislation. In respect of some of this future legislation, we can predict the impact it will have on our business. For some legislation the impact is unclear, principally Euro 7, and therefore we have not included any benefit from this. You will hear from Alan that there are technical and manufacturing challenges that have to be met before BEVs will be a meaningful part of the power train mix.

Assumptions

The assumptions people are making about how quickly these challenges can be met is leading to a range of estimates for diesel share in the power train mix in Europe. As governments and consumers look to reduce emissions we will see people move through a range of choice, which will take them from diesel to diesel hybrids, to gasoline and gasoline hybrids and ultimately to pure battery electric vehicles.

In the period to 2025, we have assumed the diesel share declines to 25% of Western Europe Light Duty vehicles. This figure is in the middle of the median's view for diesel share. Every 1% decline in diesel to gasoline from here impacts gross profit by £4 million. We have arrived at this figure as the average impact over the time frame.

When I am talking about diesel and when I am talking about gasoline, I am of course including the hybrid variants. The reason for that is that a consumer choosing a hybrid car over a pure internal combustion engine car leaves Clean Air neutral as their broadly similar after treatment solutions. Given the battery components of a hybrid car, JM benefits in its Battery Materials business.

As we look to global BEV penetration, we see it increasing to 6% of the market by 2025. Every one percentage point increase in battery electric vehicles would impact gross profit by £7 million. Again, this is an average figure over the period, but of course, as Alan is going to come into, any increase in battery vehicle penetration is a benefit to Alan's Battery Materials business.

The market today

Before we look forward in more detail, let's look at where we are today. This is a strong business. We have grown sales at 11% compound annual growth rate and operating profit at 18% compound annual growth rate over the last five years. We invested heavily in facilities before the economic crisis and we made the decision to complete those investments. This meant that when the recovery came, we could grow into our new manufacturing base with minimal overhead increases and more efficient supply chains. When Euro 6 legislation was introduced we had the capacity to meet the significant volume opportunity. The efficiency of Macedonia was a key contributor to doubling our return on invested capital to 31% in the last five years.

Currently, Light Duty to Heavy Duty split is around 70:30 and this will stay like this over the next ten years. Looking at geography, when you look at this pie chart, Europe will go from 50% of our business today to 40%, and Asia moves from 20% to 30% of the business.

The future projections

So now looking forward. Here is a timeline of how we see the Clean Air sector growing over the next ten years. In the near term the 20% point share gain from European Light Duty diesel more than offsets any diesel decline or battery electrical vehicle penetration. In the medium term there is a big story to tell on Asia and in particular in China.

We should see a similar transformation as we did in Europe, with the Euro 6 legislation, for both Light Duty and Heavy Duty. In the later years we assume lower growth, as we have yet to see the detailed legislation, which will be introduced in Europe and we are assuming battery electrical vehicle increases. So overall for Clean Air we will grow over the next ten

years. Growth is stronger in the first five years and in the medium and longer-term growth moves from Europe to Asia.

Europe Light Duty

Now we are going to take you through the details behind the four segments I outlined earlier. Starting with Europe Light Duty, this business represents almost 40% of total sales today. Over the next ten years this will remain our biggest segment. However, sales in our European Light Duty business are broadly flat over the ten years as following strong short-term growth we will then see the impact of the move from diesel and the increase in battery electric vehicles. As you can see on the slide I am going to describe, five drivers of performance. However, it is worth bearing in mind that the key drivers are legislation, a fundamental shift in the emission control market, which has led to the large share gains for us, but will in future increase the pace of transformation in this sector.

So now let me go through each of the five in more detail. Current expectations are for low growth in vehicle production in Europe, and this of course includes electric vehicles. We therefore estimate that growth in pure internal combustion engines and hybrids are less than 1%. As I said earlier, it is therefore not a major driver of growth for our business. It is probably worth picking up here the size of the engines in these cars. OEMs are signalling that engine sizes are going to get smaller. These smaller engines will require more complex catalysts, and therefore we see no material impact from this emerging trend.

Legislation in Europe

Legislation in Europe is the key driver of growth for our business, and it tightens for both gasoline and diesel vehicles. Euro 6C is now in force for new models of gasoline direct injection vehicles. It requires a coded filter to be fitted to certain vehicles to control the number of particles emitted. This doubles the value to JM of these gasoline vehicles. Very broadly, and taking an average car, this increases the value per vehicle from around \$50 to \$100. GDI engines are 65% of gasoline production today and we expect this to increase to around 80%. In addition, the number of gasoline direct injection vehicles requiring filter fitment will increase to around 90% by 2025.

From a diesel vehicle perspective there is also tightening legislation. Euro 6D will add up to 50% to the value per vehicle, and this is to control NOx and there are a wide range of options available to do this. Essentially, they will require a more advanced filter system and in some cases additional catalyst content. We estimate that this will take the average value for a vehicle up from around \$250 to \$300. And, as I said previously, Euro 7 could drive further value post 2023 but we are not yet quantifying it.

Change in emission controls

Moving on from legislation, we have seen a fundamental change in the emission control market since the end of 2015 and OEMs are working to rebuild trust with consumers and regulators. The level of scrutiny and public awareness of emission control has given us tremendous short-term opportunities allowing us to grow share due to our technology, focus customer relationships and manufacturing agility. But as I said earlier, I think in the future the events of 2015 will increase the pace of transformation of this sector.

In the next couple of slides, I will show you how technology has been impacted and how we have responded and how the OEMs have delivered vehicles that now meet or beat the 2020 legislation, including meeting conformity factors well ahead of the mandated legislation.

Emission history

So let us go back in history a little bit and try and explain why such a big share gain opportunity arose for Johnson Matthey. In 2015 emission standards had a lot of media coverage. Independent tests by third party emissions experts, like Emissions Analytics, started testing cars against real world driving standards that previously were only tested in a lab. 100% of these cars on that far left bar meet the legislation that they were designed to meet.

So in this slide, which shows an extract from an emissions analytics study, you can see that Euro 5 cars, which is the bar on the far left, exceed the real world driving limits by a factor of up to ten times. The next bar shows that while early Euro 6B vehicles were significantly better than the Euro 5 cars, they also exceeded the real world driving limits by a factor of around seven times. But again the second bar, 100% of those vehicles met the legislation that they were designed for.

These results were published and there was a public debate about the legitimacy of lab testing. It was all about NOx and the OEMs had to move quickly to real world driving. We had been developing technology to meet real world driving standards, and in this fast changing market dynamic we developed solutions for the OEMs at short notice, at or below the conformity factors of 1.0, and this is why we picked up 20 percentage points of diesel share.

And just for reference, so you can see now that we easily meet those standards with some of the cars today, and just for reference, future Chinese NOx standards are half of what the European real world driving standards for diesel vehicles are, and almost half of what they are for gasoline vehicles. So future Chinese legislation, along with the existing US legislation proves that diesel can be at parity with gasoline with respect to controlling NOx.

Gasoline particulate filters

So moving to gasoline, where we have been increasing our investment in the last few years, and we are also driving share gains up five percentage points. Designing gasoline particulate filters is all about getting the balance right between filtration efficiency, to enable the regulations are met and back pressure, which we need to keep low to enable minimum impact on engine power output, while optimising catalyst performance. We have the technology to ensure that our OEM partners can meet tightening emission standards with downsized engines and still deliver performance. You can see on this graph that the addition of a filter allows the vehicle to exceed targets that will come into force in 2020 on particulate matter.

We have already talked about increased consumer awareness of vehicle emissions and the part this is now playing in their choice of vehicle. They are moving through a number of options, diesel, gasoline, hybrid and battery electric vehicles. This makes for a more complex dynamic in the medium term, but it also means that when one talks about diesel and gasoline you now have to talk about pure internal combustion engine and hybrids together.

Complex catalyst systems

Hybrids are going to be a significant part of the market and they could grow to 30% of the market by 2025. For the consumer they will offer very good fuel efficiency for small vehicles under urban driving. For the OEMs this gives the car companies another option to help meet fleet average CO₂ limits. The real road driving test gives similar CO₂ levels for hybrids and diesels. For Johnson Matthey hybrids are interesting. Managing stop-start engines will likely require more complex catalyst systems and meeting real world driving emission standards is a function of the state of charge of the battery. So this will require more from the catalyst system, which is neutral to positive for Johnson Matthey.

One of the shifts affecting us is the change in consumer demand for diesel vehicles. Looking at the market and the research done around the future of diesel cars, we believe that demand for diesel, including diesel hybrids, will see total diesel share fall to around 25% of Western Europe Light Duty by 2025. And just to be clear, that is equivalent to 20% share of cars.

When we look at this share of 25% we do not make a distinction between pure internal combustion engine or diesel or hybrid diesel as the catalyst value in both vehicles is at least of equal value to us in Clean Air.

Declining diesel share

So as we think about this declining share in diesel, it is important to look at the differential in profitability between diesel and gasoline. We have spoken to you before about diesel sales value per vehicle being six times that of gasoline. Of course, this is an average number based on a huge range of vehicles. That ratio was reflective of strong pricing at the commencement of Euro 6 for diesel, the additional substrate and raw material cost per system, and of course the extra catalyst volumes that came with the technology used to meet those requirements.

When you looked at gross profit level, the ratio was lower. It is currently around four times. We are now adding more catalyst content for gasoline relative to diesel. Consequently, we are going to see the ratio of sales ex-precious metal halving to around three times over the next ten years. The reduction is proportional to the fitment rate of gasoline particulate filters.

At a contribution level we see the gap is also closing but of course it starts from a lower level and we expect it to end at around three times as for sales. From the outlook we have described in this presentation a further 1% point shift from diesel, including hybrids, to gasoline, including hybrids, impacts gross profit by around £4 million. Again this is an average for both cars and the period we are looking at and you have to note that this impact is before any mitigation we will take if this pace of change accelerates.

You can see from this slide that the decline in total diesel is an opportunity for gasoline and gasoline hybrids and we are growing share and adding significant content in this growing market.

Battery electric vehicles

Alan is going to talk to you about the potential for battery electric vehicles. It is very clear that OEMs are offering a wide and growing number of battery electric vehicle models, but for reasons that Alan is going to describe around technology and manufacturing, hybrids do offer a credible bridge between pure internal combustion engines and battery electric vehicles in

the early to middle years. Again, we have looked at the range of expected outcomes over the next ten years and we believe that battery electric vehicle penetration will be about 9% by 2025. This puts us in the mid-range of most forecasts, which are between 7-12%.

Summary

So now let me sum up before we move on to America. The key points for you to bear in mind are that legislation continues to tighten and drive added value for Johnson Matthey, particularly for gasoline vehicles. Our technology leadership has driven significant share gains in diesel and gasoline. These two factors drive our significant sales growth in the first two years. We are increasingly less leveraged to the decline of diesel share in Europe.

Battery electric vehicle penetration will increase, and while that will impact our Clean Air business, Alan will talk to you about the bigger opportunity for Johnson Matthey. And overall, we can maintain our European Light Duty sales over a ten-year period.

America Light Duty

So now moving on to America Light Duty. America's Light Duty business is 15% of our sales today, and is a business we expect to grow steadily in the next decade. The drivers and sensitivities in this business are less pronounced than those in Europe, so I am going to walk quickly through those that matter in the Americas in a similar format, focussing on North America.

As in Europe, vehicle production is growing, but will not be a significant growth driver for this business. In contrast to Europe, in terms of mix, diesel and battery electric vehicles gain modestly at the expense of gasoline.

Legislation has not been a major driver of catalyst growth in the US in recent years, however emission standards are now tightening. Over the period to 2025 the new Tier Three emissions standards demand a roughly two-thirds cut in particulate matter. This will result in the addition of filters to the catalyst system in a gasoline car from around 2024. This will likely increase the sales value to us by around two times.

North American diesel market

If we look at the diesel car market in North America, it grows over the next ten years from around 4% of the market today to 8% by 2025. OEMs are offering an increasing number of diesel variants, including pick-up trucks, SUVs and crossover vehicles. Consumers want up-sized vehicles without downsizing performance and a lot of larger diesel vehicles pull trailers and downsize petrol engines do not have the towing power required.

Diesel is attractive for the OEMs who need to meet tough regulatory targets on corporate average fuel economy, and our strong diesel technology will enable us to increase our share of this growing market.

Battery electric vehicles in North America

Battery electric vehicle penetration in North America by 2025 is likely to be 3%. Smaller engines are most likely to be affected, and therefore there is a smaller impact for Johnson Matthey.

So to sum up the America Light Duty segment, we see steady growth with a slight pick-up in medium term due to legislation, which will require additional technology and we will drive share gains.

So now I would like to hand over to Phil, who is going to take you through the Asian Light Duty and the global heavy-duty segments.

Clean Air Sector

Phil Blakeman

Managing Director, Clean Air Sector, Asia, Johnson Matthey

Introduction

Background

Thanks John. Hi everybody. I am Phil Blakeman. It is a pleasure to speak with you today. I am the Managing Director of our Clean Air Asia business. I have been with JM for 19 years and moved to China in 2007.

I am here to talk to you today about the opportunities in Asia Light Duty and in Global Heavy Duty. The reason I am going to cover Global Heavy Duty is because Asia is actually the main growth driver. And also, a big part of this business today is in North America, where I was also based for four years.

Asia Light Duty

So Asia Light Duty. It is currently 15% of our sector sales and over the next ten years this business will almost double in size. I am going to describe four drivers of performance. China is a main growth driver and so this is where I will focus.

Growth

Again, vehicle production is not the key driver for our growth story in China. Current expectations are for 2% growth per annum, lower than historic growth in vehicle production, and this of course includes electric vehicles. We therefore estimate that growth in pure IC and hybrids is less than 1%.

As in the other markets that John discussed, legislation is the key driver of our growth. In many aspects upcoming China 6 legislation will move faster and further than European legislation. We can leverage the same technology, which has been so successful in driving share in Europe, to meet the legislation requirements in China.

The reason for our confidence is being able to leverage this European technology, is that filters will be added to vehicles in China to meet this legislation, especially on GDI engines. The addition of these filters doubles the value per vehicle available to us, although value per vehicle is around three-quarters of that we find in Europe.

Filter fitment starts with this China6 legislation from 2020. We see further fitment support with the introduction of real world driving in 2023 and expect to see a ramp up to 70% fitment rate of the gasoline market by 2025. We aspire to gain share, but even if we only hold share at our current 30%, growth will come from this increased value per vehicle and the increase in the number of vehicles.

Our expectations for BEV to have a 13% share in China by 2025, with a faster ramp up from 2020 as more investments and infrastructure come online. This is higher than in Europe and it is driven by strong government incentives. This is a big implication for Clean Air in China in the later years as it means in that period a large portion of the growth in vehicles in China comes from BEVs.

The rest of Asia

I briefly want to mention the rest of Asia. India is also moving to Stage 6 legislation from April 2020, but the market characteristics and the legislation specifics mean that gasoline vehicles will not see filter fitment. There is a large diesel car market in India, which sees a big technology content per vehicle increase. However, this increase in value per vehicle is partially offset as the diesel vehicle share halves.

Japan is a steady market for us. We already have strong relationships with Japanese OEMs and the value of our Japanese business to us is not only the sales in Japan but the global business opportunity with Japanese car makers.

In South East Asia we have continued opportunities for growth from tightening legislation.

So overall, legislation is the key driver of growth in Asia Light Duty. As you have seen, a significant uplift in the sales value per vehicle in China occurs. There is big opportunity in the rest of Asia and taken together we can drive sales growth, which will nearly double sales in the region, despite this increasing penetration of BEVs in the China market.

Global Heavy Duty

So moving on to Global Heavy Duty, which is just over 30% of Clean Air sales to date. We expect good growth over the next ten years and strong growth in Asia driven by legislation. Again, I am going to talk you through three drivers.

If you look at the three regions overall, there is limited truck production growth and in the US the growth in Class 8 trucks is very cyclical. Given its size sales growth in our global heavy-duty business does reflect the cyclicity of this US market.

In Europe, we expect to see mid-single-digit growth, while in China we have seen strong growth recently driven by policy changes on load weights, and we expect growth to moderate.

India in the long term will grow in line with GDP, although in the short term it is volatile. So tighter legislation in China and India, triple sales value per vehicle for Johnson Matthey.

In China, legislation is expected to begin from January 2021 nationwide. However, the impact will start to come through in 2020 as cities are allowed to choose to implement ahead of the nationwide legislation. We move from a selective catalytic reduction system to a much more advanced catalyst system, which includes filters, and these systems are already well established in Europe and the US. On average the sales value per vehicle triples from around \$130 to \$400, while the value per vehicle will vary widely across a wide range of engine sizes.

In India, legislation is going directly from BS4 to BS6, skipping BS5, and this also increases catalytic value per vehicle. For a typical truck the value trebles, although there is a huge range in value per vehicle today. After legislation, the value per vehicle is similar to that in China.

For both markets we are able to leverage technology and experience from the developed markets. This is critical in building the relationship with Asian OEMs, who have not experienced this level of legislation before. In a competitive market we are confident we can grow our current share of 30%, given our strong technology experience and our customer focus.

Electrification in heavy-duty vehicles will have minimal impact on our Clean Air business over the next ten years. Changes will happen first to city buses and smaller trucks with defined usage patterns. Our strength is in large trucks where any impact will come later and be more muted. Truck purchases are an economic calculation of weight of freight carried versus total cost of ownership. Electrification impacts this calculation with battery weight limiting cargo rate and concerns over time taken to recharge and concerns over the battery longevity compared to a diesel engine. For these reasons, any power train change is likely to be outside the ten-year period we are talking about today.

Summary

In summary, this is a robust business. We will deliver steady growth in the first few years and then we will see an acceleration in the medium term with legislation in Asia, particularly China and India. This will require additional technology, significantly increasing our sales per vehicle and giving us the opportunity to grow our share. And with that I will hand you back to John.

Business Performance Improvements

John Walker

Sector Chief Executive, Clean Air, Johnson Matthey

Thank you Phil. So the presentation that you have seen so far has been about the growth drivers of our business and the impact that they will have on our performance. I want to move now to talk about things that we are doing in the business to improve performance.

You heard me talk earlier about the step changes we made in manufacturing and the impact that had on the return on invested capital. This business has a great track record of improving efficiency, even when we are driving rapid top line growth. You saw our announcement for major investment in Poland, and you could see from the trajectory of growth we have outlined in China we will need a similar investment there.

These investments provide us with additional capacity we will need, but they also provide us with agility and flexibility in manufacturing. As you have seen today, there are a number of trends, which will play out in the market. We need to be able to transition production in a plant between different products, and we also need to be able to be very responsive to changes in demand from our customers.

Our new manufacturing capacity has this flexibility. As it comes on stream it improves the flexibility of our overall manufacturing footprint and reduces our underlying cost of production. With procurement Anna will be giving you an update of our procurement opportunities, and I think it is fair to say that the Clean Air sector will pay a significant part in delivering those savings.

Customer management

We're implementing integrated global key account management structures and we expect to see significant benefits from this.

Improved collaboration with our customers. Customer management used to be on a regional basis. As our customers become more global – and you heard Phil talking about how he's strengthening his relationship with Japanese OEMs – we need to manage our customer relationships on a global basis. Aligned to the more global nature of our business, we're building processes in the support functions in the sector which will drive improved efficiency throughout the business. So, for example, as we grow our Asian businesses, we will leverage the infrastructure, the knowledge and the experience that we already have in our developed markets to expand these developing markets.

Key performance drivers

So you heard a lot today, but the key performance drivers of this business are very clear. We have big share gains in Europe Light Duty in the next two years, and we can maintain the sales of this business over a ten year period despite the challenges from the decline in diesel share and the increased penetration of battery electric vehicles. Our Americas Light Duty business grows steadily. You have heard about the very good growth that we will deliver in Asia Light Duty and this is despite the relatively high level of battery electric vehicle penetration in China. Similarly, our Global Heavy Duty business grows steadily, with strong growth in China and India and more modest growth in the US and Europe.

You have also heard about the opportunities we have to drive efficiency. Our investment in additional capacity enhances our agility, improves our flexibility and reduces our costs. We have a very clear view of this business and a great deal of visibility as to its growth drivers and we expect Clean Air to deliver mid-single-digit growth in sales over the next ten years.

And with that, I'll invite Robert back up here.

Q&A

Robert MacLeod: So, thank you very much John and Phil. We've got about 20 minutes or so to take your questions on Clean Air before we break for coffee or tea. So if anybody has any questions I think there's a microphone in front of each – pretty much each seat. So if you want to grab a phone, stick your hand up and we'll try and get to you. If you could say your name, I think probably, just for the record and where you're from, that would be helpful. And I'll compere but then hand out to John and Phil as appropriate. So, sorry Martin we'll go here first, hand out first over here.

Jeremy Redenius (Bernstein): Good morning, thank you, Jeremy Redenius from Bernstein. Just one question to start off. Thanks for sharing the sensitivity to the – to basically the move away from diesel or the switchover to petrol, £4 million per percentage point. Can you talk about – does that just drop through to EBIT at the same rate? I mean is there any change in fixed cost structure there before mitigation? And also can you talk about potential mitigation to that change, potential ways to adjust the cost structure?

Robert MacLeod: That's very much a gross profit number; it doesn't include anything below gross profit, so it doesn't talk about what we might do beyond that, so things like what we

might – if the pace of diesel decline happens quicker than we'd adapt our footprint more quickly, or as appropriate. And of course we do things differently on R&D as well and of course you reassign separately. So it's very much just the gross profit element only.

Jeremy Redenius: But could you talk more about the – what levers you could pull beyond that

Robert MacLeod: John, do you want to go into a bit more detail about the levers?

Jeremy Redenius: – get a better feel of sensitivity?

John Walker: I think I just want to get back to the simplicity of the story, that's a European story, and we have a growth opportunity in the short term, so we're investing for that growth. We then have legislation benefits to come in and then overlaying that we have the death of diesel story and battery electric vehicles. I mean those are the kind of four pieces that make up the ups and the downs. I think we've demonstrated in the past what we can do when we've had to leverage some of our manufacturing capability to be able to generate cost savings, and I think we have a lot of options up our sleeves with the footprint that we're going to have in place, it is going to give us a lot of flexibility to be able to make some changes if we need to.

Jeremy Redenius: Thank you.

Robert MacLeod: Okay, so Martin I think you were second, so – I don't know if that works.

Martin Dunwoodie: Thanks, Martin Dunwoodie from Deutsche Bank. I'll start with two, if I can. Technology in catalysts, your 20% market share gain in diesel in Europe, is that a legacy, your technology has been better for a while or is the competitive environment changing quite rapidly within this? I.e. are you still continuing to forge ahead and invest in R&D more, maybe, than your competitors are?

And then the second thing: China and your assumptions for implementation on standards there. I think in the past they've always been relatively – I guess the word is pragmatic in the way they've been implemented. What are your assumptions in terms of implementation going forwards? Because I guess environmental concerns are increasing there a lot more. Are you assuming 100% implementation or maybe a bit less than that?

Robert MacLeod: I'll get Phil to answer that second question later, but on the technology I can't really comment about what our competitors are doing. All we can comment about is what we're doing. We've been a leader in diesel for many, many, many years, and we've continued to have that advantage, and we've continued to invest in diesel because we could have seen – we saw what was coming with the legislation and we were – that allowed us to be very, very well-placed to take advantage of those changes rapidly. And it was the speed of change that was the thing that made the biggest difference and I think the fact that we had that edge which we've had for many, many years allowed us to keep ahead on the diesel side.

Martin Dunwoodie: But no change in competitive environment from what you've seen in the past?

Robert MacLeod: Well I mean clearly we've done pretty well on the market share gains but it's still a tough market, absolutely.

Martin Dunwoodie: Thanks.

John Walker: So I think we were ahead, we've stayed ahead and we're staying ahead and some of that is now built into the base. So...

Robert MacLeod: Phil, do you want to answer the question about fitment–

Phil Blakeman: Sure, well implementation of legislation, right, in China. So Light Duty legislation is on the books, clearly going to start in July 2020, and that legislation also may have a ramp-in because the legislative environment allows for cities and provinces to implement the legislation ahead of the national nationwide requirement. Heavy duty is working to a similar timeframe but is not finally implemented. It's a lot of visibility on the content of that legislation, so we're very sure about the impact to the systems and the catalysts which are required. The outstanding point which has not happened is that it is not implemented yet at the national level into law. We – the industry expects and Johnson Matthey also expects that to come in nationwide in January 2021 and we should have some announcement from the government by the end of this calendar year.

Robert MacLeod: But Phil, it's right to say there is always a ramp-up in China. It's not like Europe, for example, where it's a sort of a cliff and – is that the right word? A cliff or a step change straight away. I mean there will be a ramping-up effect. It used to take five or six or seven years. I think it's just got – it's got much quicker, hasn't it?

Phil Blakeman: It's got much quicker and yeah, Heavy Duty also ramps in through 2020 with the cities being allowed to bring forward.

Andrew Benson: Yeah, Andrew Benson, Citi. Two questions. Do you think in emerging regions the fuel quality is going to be a constraint or do you think it's just going to be legislation because historically that has been a factor? And can you explain the difference, in your opinions, between American BEV penetration and European penetration, is it quite substantial?

Robert MacLeod: We can do both.

Andrew Benson: That's very kind.

Robert MacLeod: Good. John, do you want to talk about – do you want to try both of those?

John Walker: Fuel quality – and maybe Phil can chime in here – fuel quality in developing countries has been an ongoing issue. The improved-quality fuel first gets delivered to major cities, and rural areas end up being the ones that are late to the party there but I think low-sulphur fuel is now available nationwide in most of the big developing markets that we're involved in, China and India in particular are the ones that I'm talking about. So I don't see fuel quality as being much of an issue from now going forward.

And BEVs, I think part of this – me being American, there's an interesting dynamic here, but I think battery electric vehicles just with the driving style and the distances that American people drive is one thing that I think is influencing where range kind of has to catch up to the distances that American people drive is one point.

Andrew Benson: So you buy the shares but not the cars.

Robert MacLeod: And I think it's true to say as well that in China there's obviously much more government support to enable that to happen much more quickly potentially than

Europe and putting all the infrastructure in place as well. That's why we see a difference but look, let's be clear, that's – this is a forecast of eight years away and you can see from the ranges that there's some pretty wide ranges out there and so we've just made a fair estimate, we think but we've given, as well, you the sensitivity to that should our estimate, of course, be wrong.

So with the microphones we only seem to have one per side, so if there's a question over on this side and then we'll go backwards and forwards.

Joachim Kotze (Rootstock Investments): Morning.

Robert MacLeod: Morning.

Jahim Kotter: Can you hear me?

Robert MacLeod: Yeah, go.

Jahim Kotter: I'm Joachim Kotze from Rootstock Investments in South Africa. I've got a question: you've illustrated the shift away from – towards battery electric vehicles, that you can still grow your Clean Air segment, but how does that affect – in terms of sales, how does that affect other dynamics such as profitability, specifically talking about the margins, returns and the competitive landscape?

Robert MacLeod: Well, we talked – as you say, we talked quite a bit about sales. Anna's going to talk a little bit later about the margins, but we don't see a material change in margins. They'll decline a little bit in the short run as a result of the Euro 6C and the filter fitment that we've talked about but then with all the operational efficiency things that John was talking about, then they'll recover back to sort of similar sort of levels where they are today.

John Walker: And I think what we tried to do is to be as clear as we could from our market out assumptions and list those assumptions that went into our result of our European business as an example of staying flat. We tried to be as clear as we could in the assumptions that we used to come to that. So you have, I think, all the data to be able to make your own model assumptions.

Robert MacLeod: If you look in overall terms, we're not signalling a material change one way or the other on margins. Anna will talk a little more about the detail over the next few years but in the overall aggregate over the ten-year period, it's going to be broadly stable.

So, we'll do over here. So can we – you're right in the corner there Neil, so it'll take some time to get to you.

Neil Tyler (Redburn): Good morning, Neil Tyler, Redburn. Two from me as well please, firstly on diesel again. In slide 28 you talk about the value uplift in the European market from 6B to 6C and D. On the slide it says 1.5 times but I thought I heard you say \$250–300, so is the remainder an assumption around average engine size increasing in the remaining vehicles or something else? And if not, would that average engine size increase, increase that value further?

John Walker: There's a very large range in the assumptions, there's a very large range of the options available; so that was just some guidance to try and get you there.

Neil Tyler: Okay. Are you willing to give us a comparable value for the US diesel engine – or catalyst value compared to that number, because I suspect that's significantly higher given the regulations are fuel agnostic?

John Walker: Yeah, the – I don't know if I have a number in the top of my head but the difference between the US legislation is basically the size of the engine, so the volume of the catalysts are larger and that's what's going to drive that dynamic.

Neil Tyler: Thank you. And the second question is regarding the China outlook. You mentioned – Robert, you mentioned in your opening comments that where the technology advantage of JM became less meaningful, it wasn't necessarily an attractive business and then you go on to say that effectively the technology being used in China is the technology already being used in Europe. So to what extent does that create a risk that a new investment in China wouldn't necessarily be filled up quickly and meet the 20% return target?

Robert MacLeod: Well I think the – as you know, our Clean Air business for many, many years, it's a sort of – you build the infrastructure and the facilities pretty much once you've won the business. I mean you've got that time. You win the award and you've got two years before the platforms come to market. So we're pretty confident that the investments that John was talking about to grow in China, which are a similar sort of size he talked about in Poland, we'll be able to fill that up pretty quickly through all the growth that Phil was talking about in China, so that's – we're not particularly concerned about that.

The question is then what happens beyond that and what happens in the second phase and the third phase and our challenge is to continue to drive the technology forward. And you've seen over the years – I mean here we are 41 years since – or more than 40 years since the legislation started in Europe and America, and it's still continuing to advance, so there's no reason why that can't happen for some time to come in China as well.

John Walker: And I think when – India is a really interesting example where you're skipping a legislation. So for, especially, domestic companies in India going from the BS 4 directly to BS 6, the technical challenge in doing that is pretty immense, and they need help with partners like us to be able to get through that.

Robert MacLeod: Okay, I think we're doing the back and forwards, so it's this side's turn now.

Chetan Udeshi (JP Morgan): Chetan Udeshi from JP Morgan. Now, I had a question on the sensitivity which is very useful to decline in share in diesel, but that's based on a 2025 sort of mix.

Robert MacLeod: It was an – it's an average over the period. So it's not based on –

John Walker: It's an average of the next year by year by year and then averaged over the years.

Chetan Udeshi: So if the – can we use as – that as a benchmark to estimate the impact to the value of diesel if the share of diesel goes down faster over the next five years as well? Because at the moment the diesel –

Robert MacLeod: I think it's close enough to use as an average throughout that period, yeah.

Chetan Udeshi: That's useful. And the second question is on the market share in China and India in, say, five years' time. Clearly you are working with your customers now, and you've seen a big increase in market share in Europe so probably you have some visibility on that aspect, so can you share how do you see market share in China and India evolve over the next five years as we ramp up into those new regulations?

Robert MacLeod: Well I thought Phil mentioned it, but Phil, do you want to say again what you –

Phil Blakeman: Yeah, I'll just – so on the Light Duty markets in China and India we do see opportunities to grow our share from our current 30% but we're not baking that into these statements of doubling the business size at this moment in time.

On the Heavy Duty side we're, again, number one in these markets today, about 30% share and this whole change to the next-generation technology, change in the legislation and the compliance environment means that a lot of the Asian customers, who are very significant in these markets, it's not just the global OEMs, they need to also come to companies like Johnson Matthey who know how to do these things, who have the experience from many years and can bring that quality and comfort as they try and meet these tough new legislations. So on Heavy Duty, yes, there is a real opportunity which we have put into some of our base assumptions to grow our share.

Chetan Udeshi: My question was Chinese – or regulation is closely resembling European standards now –

Robert MacLeod: Yeah.

Chetan Udeshi: – so why can't your share increase to the same extent you've seen in Europe? Is there a reason to –

Robert MacLeod: Well it's a much more competitive market in China, for a start, there are more – we had an edge at the start in Europe. In China it's a completely different customer base, new customers, so it was always going to be a more competitive environment anyway and there's some more local competition other than just the three big multinational players. So we've always said it was going to be tighter – sorry, a lower share as a result of that tighter competition, but we're still number one; we think we're number one and there's an opportunity to gain a little bit of share from where we are today but we're not going to get to the levels that we're seeing over here.

Chetan Udeshi: Okay, thank you.

Robert MacLeod: I think you had a question here.

Stephanie Bothwell (Bank of America Merrill Lynch): Thanks, it's Steph Bothwell from Bank of America Merrill Lynch. I just had one, actually, it was on the statement you made earlier on the need to be flexible, and I think you said on the new facilities, the new manufacturing facilities, you will have that. If I think about the legacy business and your manufacturing facilities there, what sort of flexibility is there and if you wanted to switch, for example, between diesel and gasoline, what sort of incremental CapEx investment would that require?

John Walker: Thank you. If you take a look at our legacy investment there's some flexibility to be able to move from gasoline to diesel but there's less flexibility to move from Light Duty to Heavy Duty, for example and the new capability we're putting in gives you the flexibility to do all of the above, like gasoline to diesel or Light Duty to Heavy Duty. So I don't know if that answered your question but –

Robert MacLeod: I mean the new plants will be much, much flexible and the reality is that we're going to put – invest in these new plants which will give all the flexibility we need; we won't be putting much additional CapEx into the older plants, it'll be much more maintenance CapEx in those areas.

So, how about here on this side? We'll come back – it's Andrew next afterwards and then we'll come to the back.

Question: Yes. A bit of clarification, really. You've talked about the collapse in the diesel share in Europe to 25% yet you've also stated categorically that you have the technology in diesel to meet the legislation just as you have in gasoline, so what's actually driving the collapse? What – is it just consumer confidence is completely gone, given the driving characteristics of diesel engines, which seem to work very well in Europe?

Robert MacLeod: Well when was the last time you saw an article in the newspaper saying, 'Buy a diesel car,' or even a diesel-hybrid car? So I think it's ultimately consumers that are driving that change at the moment. And as we said, a bit like battery electric vehicle penetration, there's a pretty wide range of what the diesel share will be in even next year, let alone 2025. So what we put in here was a reasonable – what we thought was a sort of – a reasonable basis on which to plan and of course we will be flexible enough to adapt our business accordingly but it's driven by consumers.

Question: So if consumer sentiment changes –

John Walker: And I believe diesel, or diesel-hybrids, will be higher than 25%, yeah. That's what we modelled. My personal belief is it'll be higher. I was in Frankfurt last week, so some of the car companies, or especially German car companies, are starting to make some statements that are starting to reinforce that diesel is going to be around in some shape or form for a lot longer than it was appearing. So I think it's a moving landscape right now, we still need a little bit more clarity on where it's going to end up.

Robert MacLeod: But certainly diesel doesn't – I think pure diesel internal combustion engine cars will decline very quickly; I think more and more hybridisation of those is likely to come.

Question: Okay.

Robert MacLeod: Over to – I think Andrew had his hand up first – sorry, he had his hand up before.

Andrew: Yeah, thanks, I just want to check a few numbers, for obvious reasons.

Robert MacLeod: Oh Andrew.

Andrew: So, number one on market share, you've talked about the five percentage points in gasoline and then the 20 in diesel. Can I check the base for each?

Robert MacLeod: Well, we –

Andrew: Have you actually given it? Is it 30% for each in Western Europe?

Robert MacLeod: No, I thought we said them, I mean it's 45–65 –

Andrew: 45–65.

Robert MacLeod: – for diesel and 40–45 in gasoline.

Andrew: Okay, thank you. And then the second question was on slide 28. Just remind me of the ramp up of the two-times value for Euro 6C and D and then the 1.5 times for the same on diesel, please?

Robert MacLeod: Now you really are getting quite detailed, Andrew, aren't you?

Andrew: Yeah.

Robert MacLeod: I mean the Euro 6C – thank you Andrew, it's – this is on the GDIs, isn't it? This is the fitment of filters onto GDIs –

John Walker: Yeah.

Robert MacLeod: – which today, John, it's – we've got, what, 60% – 50%, 60% of cars are GDI?

John Walker: 60% of cars today are direct injection gasoline and that's going to be moving to 80% of the vehicles and then you need to overlay the fitment rate on that. So I think the difference in what we know now from what we said before was that the legislation wasn't totally finalised and what it looks like now is that the fitment rate is going to be higher than we signalled before. So the terminal value of filters on gasoline cars will be higher than we mentioned before, significantly higher than we mentioned before.

Robert MacLeod: So I think we're ultimately saying, as it says on the slide, that at the end we think you'll have more than 90% of the 80% – so, sorry too many numbers for you but probably, Andrew, you'd like that – so 80% of gasoline cars will have GDI by 2025 and of those 80% of gasoline cars, 90% will need a filter. It's not there yet; it's 65% of gasoline cars today have a GDI and the fitment rate today, John, of filters, well it's not very many at the moment.

John Walker: Very low.

Robert MacLeod: So the pace of growth with modern life

John Walker: So the ramp rate is slower but the peak is going to be higher from what we said before.

Andrew: Yeah, thank you very much.

Robert MacLeod: Is that enough numbers, Andrew? You can get him – knobble him after in the break. Sorry, I'm going to be disciplined and go to that side as well, so who was next on that side? Over here and then hold onto the mic and we'll come to you because we might have to make your question the last one. Actually, no, Christian, you had your hand up so we'll come back to you afterwards and then we'll have to stop for a break and everybody can then get their questions in the break, we'll have half an hour.

Dominik (Ayora Capital): Good morning, it's Dominic from Ayora Cap. I just want to come back to the profitability question. So you're saying sales growth will be mid-single-digit till

2025, the next ten years roughly, and thank you for giving us the gross profit impact as well and I want to ask about that because if we assume market share goes from 50 down to 25%, that's roughly £100 million hit to gross profit. If you grow mid-single-digit over the next five years you will add roughly 1 billion in sales to your business, taking current margins that's about 140 million in additional profit but you're losing 100 million from that shift away from diesel. So how do we think – and that would suggest then hardly any profit growth over the next ten years. How do we think about profit in that context, please?

Robert MacLeod: Do you have your spreadsheet in front of you, it sounds like you've been working it out as we've been talking. I think what I said was very clear: we're going to have strong growth in the top line over the next couple of years, driven primarily by the share gains we've got here in Europe. That will have a bit of a decline at a margin level in the – and profitability, so now we're into profitability in the first couple of years, and Anna will go through this very clearly later on today. When we then get to the latter part, we're saying that margins will recover, so broadly to the same level as they are today. And we're trying to give you as much data as we can, but clearly there's some levers we pull internally around the profitability – all the improvements that John's talking about, operational efficiencies etc. that we're driving, which will maintain that profitability. Okay? So –

John Walker: You need all the pieces to – if you're looking – if you're thinking about Europe but you're asking a global profitability question, you can't ignore the Asian pieces and the steady growth that we have in North America either. So...

Robert MacLeod: Okay, right. Well done for your perseverance.

Sebastian Bray (Berenberg): Good morning, Sebastian Bray of Berenberg Bank speaking, I would have three questions please. So the first is on the impact of these changes within the catalysts on the platinum, palladium and rhodium loading; from memory this is not so big a profit driver from Johnson Matthey albeit outside autocatalysts, but it is quite important for returns. Will PGM loading go up as a result of the changes that you're discussing in catalysis?

The second is on market share certainty. I appreciate you qualifying in advance but what makes you sure that you will actually gain 5% by 2020? Do you just simply assume that X number of models will sell Y amount? And finally, how much of the Euro 6C and 6D opportunity has, in your view, already been realised as a result of front running? Thank you.

Robert MacLeod: Okay, let's do some of the market share ones first. So the market share assumptions that we've got are market share of that product set. So we're not making – when we talk about market shares of 65% of diesel – of diesel and diesel-hybrids, we're not making any comment about what diesel share will be versus gasoline share. And of course we're making a very generic – we don't know exactly which cars are going to be sold, which car company is going to sell their car but we're on enough platforms that it averages out to be – we're pretty – we don't mind so much about which cars are sold; obviously we do but it doesn't become so important. And most – the vast majority of those market share gains that we talked about in diesel and gasoline are secured; we wouldn't be talking to you about them today if they weren't secured. So the vast majority of them are there. So that was the middle question.

The last question – this is the bad thing about asking three, especially when you get to my age.

Phil Blakeman: It was 6C.

Robert MacLeod: 6C, what proportion of 6C and 6B? Well, 6C comes in later, so not very much yet. 6B, John, how – or 6 – the diesel share, how much of that is already in our numbers?

John Walker: 6B?

Robert MacLeod: Sorry, 6 –

Speaker: 6D.

John Walker: D. So 6C is coming in, it's a big impact on gasoline with filter fitment and the real impact of that we're going to see in around 2021. And Euro 6D – when you get to Euro 6D final, which is again September 2020, you're in the kind of 2020–2021 range, where some of these additional catalyst pieces that we talk about and some improved filters will be fitted for the Euro 6D final legislation and that's when you finalise these conformity factors with the error bar. So it's a conformity factor of one plus the error and they haven't figured out what the error is going to be yet, so they still have to figure that out. But it'll be – everything is around 2021 for both 6C and d.

Robert MacLeod: But on the diesel side what you're seeing – and one of the reasons why we've gained share is you're seeing the OEMs going further faster. They're accelerating because of course consumers are now aware of the emissions issue, they're aware that emissions analytics are going to take their car and drive it around in the real world, so they want to make sure they are on the – they're not on the naughty step, as you might say and they're as low quality – low emissions as possible, so they are going further faster. Exactly the ramp-up rate will depend exactly on each OEM and how they decide to move it forward.

Your last question about – or your first question, I should say rather than your last one was about PGM loading. Now, that really is outside my level of detailed knowledge and I'm hoping, John, it's in your detailed knowledge.

John Walker: For some of the start-stop requirements, precious metal loadings may go up in some of those. I don't know if any of our technical colleagues have some better guidance on that. But I think the precious metal loading is all about the mix, so the whole gasoline-diesel split, so I don't have a summary number in my head that I can give you right now. So...

Robert MacLeod: But a move away from diesel into gasoline, it obviously plays well for palladium and that's probably why palladium prices are doing – well one of the reasons why palladium prices are doing quite well at the moment. Obviously, a move away from diesel is less good for platinum because it tends to be a much higher mix of platinum on a diesel car and truck than there is on a gasoline equivalent. Okay?

So we'll do the last question, Christian, so if you still want to ask the question or have you given up?

Christian: Why not? I want to pick up on the consumer side of things. If I'm not mistaken, a Renault ZOE is costing these days €22,000, a battery electric vehicle, compared to a combustion engine equivalent of €11,000 and that even excludes the battery in terms of owning the battery, another €10,000, or the monthly rent. So why, as a consumer, should I buy a battery electric vehicle, given the prevailing price spread, and how do you forecast 9%

penetration of these cars where there is a significant gap in terms of range, charging convenience, infrastructure problem and reach?

Robert MacLeod: Christian, thank you very much for your advert for how good the emission controls are, and how good our business will be in the long run. You'll notice that apart from in China, in both the Americas and in Europe, we're in the midpoint. We picked the midpoint kind of deliberately because we're not good enough to opine on exactly what's going to happen in eight years' time. So we kind of took the view that let's pick somewhere in the middle and then we can guide you on that sort of assumption. If we take in a view of we might think might happen, or what you might think happen, and we told you that we think penetration was going to be very low, some people would say, 'Well, you're just in denial mode.' So we're giving you the sensitivity to it; we're not making an opinion and saying that's what's going to happen, it was just very much a modelling-purpose assumption to use and then we'll just see what happens between now and then in the real world but it's a modelling assumption only. But your point is well made but it's up to the consumer, each individual one of them and each one of us to decide what we do.

Christian: Thanks.

Robert MacLeod: Anyway, so that's it for Clean Air for the moment. We'll have a break, we'll come back, if we can, in about 20 minutes or so where we're going to hear from Alan Nelson about Battery Materials. Thank you John; thank you Phil.

Speaker: Well done, John.

Robert MacLeod: – not for something completely different but we're now moving into Battery Materials and you're going to hear today from Alan Nelson about the progress we've been making on our Battery Materials business, so over to you Alan.

Battery Materials

Alan E. Nelson

Sector Chief Executive, New Markets and Group CTO, Johnson Matthey

The New Markets sector

Thanks Robert, good morning everyone. I'm the Chief Technology Officer and Sector Chief Executive for New Markets for Johnson Matthey. I'm going to talk to you today about the progress that we've been making around high-energy battery materials and how this will deliver breakout growth for the company. I'm also joined here today by Jane Butcher, sitting in the front row up here. Jane is the Managing Director for our Alternative Powertrain business and seated just next to Jane is Shelley Brown and Shelley is the Global Technology Director for Alternative Powertrain. Both Jane and Shelley will be available during the break to answer any questions and of course show you some of the demonstration that we have out there in the lobby as well.

Before I discuss Battery Materials, I want to briefly cover our New Markets sector. New Markets, as you are aware, was established several years ago to identify emerging and growing markets which require the core chemistry competencies of JM to solve some of the most pressing global challenges. And in tackling these challenges, we aim to build significant

businesses for JM over time. Today we have three businesses at scale: Alternative Powertrain; Life Science Technologies and Medical Components.

Alternative Powertrain

Alternative Powertrain combines battery materials, battery systems and fuel cells to unlock the technical and customer synergies across the evolving powertrain market. Life Science Technologies, which was previously known as Catalysis and Chiral Technologies, or simply CCT, is focussed on providing catalysts and process to both the pharmaceutical and agriculture chemicals markets. Medical Components leverages our science and technology to develop products that are used every day in medical procedures to save lives around the world. And while all of these businesses and activities make up the foundation for New Markets, the focus for today's presentation will be on battery materials and the exciting and rapid progress we've made around high-energy cathode materials.

Significant progress in Battery Materials

I'm pleased to say that we've made tremendous progress over the past year to accelerate the execution of our Battery Materials strategy. We've developed the best-in-class high-energy cathode material and our high-energy material is not a me-too to NMC, nor is it a fast follower into the market, but it is a material that is a significant step up in energy density as well as overall performance. We've been quietly developing this material within our R&D teams, and we're excited to have six customers already test and validate the performance of our material. And to support commercialisation, we're targeting investment of approximately £200 million from mid-2018 to manufacture up to 10,000 metric tonnes with the start of production in fiscal year 2021–2022, and we expect to be on automotive platforms in production with our high-energy cathode materials thereafter. And while this is a few years away, it is fair to say that the EV market is still in the early days of mass adoption, and we believe we are well timed for the massive EV growth. As such, we expect our Battery Materials business to grow as the pace of adoption grows over the next decade and as we build a significant business for JM.

Challenges to EV adoption

There are many challenges holding back EV adoption today, some of which we're using our science and our technology to address. Legislation is a key driver, including emissions legislation, particularly in urban areas and in cities, and carbon dioxide emission regulation that requires OEMs to move at pace. Where we do see EV adoption are in regions which are heavily influenced by government subsidies and incentives and of course regulation. Technology is a key enabler for the mass EV market, and one of the key issues facing the industry today is overall lack of performance and particularly around range, recharging rates and the ability to recharge and associated infrastructure. Today we're leveraging our science and our technology to develop materials that have better range and recharging characteristics for consumers.

Total cost of ownership is another barrier for EV adoption, and we're also focussing our efforts to reduce the total cost of ownership on a dollars-per-kilowatt-hour basis for our cathode materials. This is one area where we can and we are making significant progress, as you will see shortly.

OEM's focus on bringing affordable long range xEVs to market

We're confident that our cathode material improvements solve many of these issues and with our new cathode materials ready to address these consumer concerns and reduce the total cost of ownership. And this view and approach aligns well with the automotive OEM strategies to bring affordable, long-range EVs to the market. We've put on this slide just a few recent statements from OEMs to highlight the drive to bring affordable vehicles with range to the market. These plans include both plug-in hybrid, as well as pure battery electric vehicles, with the full range of announcements primarily focussed on reducing the total cost of ownership across the EV powertrain mix. And it's worth noting that the first generation of EVs were largely inconsistent with this approach to market. Some OEMs initially targeted very low price points and – sacrificing range – and others targeted great driving range at a premium cost and all failed to crack the mass EV market.

xEV adoption is limited by the total cost of ownership

Today what is clear is that falling cost will eventually allow EVs to compete with conventional gasoline and diesel vehicles on price, and will continue to prove performance to the levels that most consumers desire and need. And on the consumer front, let's be absolutely clear: people don't buy EVs today primarily because of cost and performance and again, namely range concerns. Total cost of ownership remains a barrier to mainstream EV ownership which will require innovations in cathode materials, as well as innovations across the entire lithium-ion battery supply chain. In the absence of other drivers, such as regulation, total cost of ownership will limit the mass adoption of EVs compared to petrol and diesel combustion powertrains. The industry is, however, working to close this gap.

Today's lithium-ion batteries enjoy incremental improvements each and every year, boosting performance within established design and manufacturing processes. For example, the cost of lithium-ion batteries has declined about 14% per year over the past 15 years, primarily driven by optimisation in cell manufacturing and manufacturing cells at scale. However, the cathode materials over the same timeframe have not changed significantly, with the industry still reliant on NCO or NCA, NMC, LCO and LFP. More importantly, the price of raw materials has increased significantly over the same timeframe, with the price of cobalt trading over \$60,000 per metric tonne recently.

Projected demand for cathode materials

We do not expect that total cost of ownership parity will be reached until the mid-2020s but of course we acknowledge that there's many differing views whether this could be earlier or whether this could be later. What is clear is that the total cost of ownership, as well as assumptions around legislation and technology and consumer behaviour, result in a range of EV adoption scenarios. The chart here on this slide shows a range of views for the global EV market: that is combined plug-in hybrid vehicles, as well as full battery electric vehicles and this excludes mild and micro-hybrids. So this is a slightly different view than John showed earlier this morning.

Regardless of which adoption curve will develop, what is absolutely clear is this will drive considerable demand for cathode materials well beyond the installed capacity base today. For example, if we just make the simple assumption that this range of adoption represents full battery electric penetration, the total cathode demand would range between

500,000 metric tonnes to well over 3 million metric tonnes, which would imply approximate market size of \$15 billion–100 billion. And for that extreme case, that high case of 25% full BEV penetration, the cathode materials market would require an investment over \$60 billion to build over 600 trains each at 5,000 metric capacity. This would represent over 20-times increase of the current global automotive cathode materials capacity across all of the manufacturers today, and that is before we even start considering nickel, cobalt, lithium requirements or energy availability and infrastructure.

Based on this view, it is absolutely clear that the automotive cathode materials market today is nascent, and it will undergo significant growth, beginning in the early-to-mid-2020s to meet the long-term industry needs. It is this range of adoption scenarios which is underpinned by the broad market growth drivers that feeds into our Battery Materials strategy and paces our cathode materials investments.

Requirement for a wide range of cathode materials

With this range of scenarios in mind, we manage our business with a focussed view on both the range of possible EV adoption rates and, importantly, vehicle energy and cathode material requirements. Across the various vehicle platforms, the average pack size varies from less than 1kWh for micro-hybrid vehicles to greater than 250kWh for heavy-duty applications, including buses. This subsequently translates into a wide range of cathode volume requirements across the EV powertrain spectrum. For example, the amount of cathode material required for a long-range full battery electric vehicle is about seven times the amount required for a comparable plug-in hybrid vehicle.

So, looking ahead to 2025 and even beyond, the industry requirements for cathode volumes will depend significantly on the overall EV growth rate and the powertrain mix. Suffice to say the automotive cathode materials market is only now beginning to grow at pace that can meet the automotive industry demand by the mid-2020s. And why are we so focussed on cathode materials? Simply because the cathode is the most critical determinant today in terms of rate, performance, cost and safety. Today the incumbent cathode materials are phosphates or transition metal oxides, like NMCs, that were primarily developed for consumer electronics applications. We've seen the automotive industry today move from NMC-111 to NMC-622 to improve both performance and cost. However, the automotive industry requires better performance than these materials currently offer or, more correctly, are even capable of offering, specifically for energy density, lifetime and for cost. This is driving the cathode industry towards materials with higher and higher nickel content, increasing from 60% to greater than 80% due to higher energy density requirements, lower cost and accessing lower cobalt through cobalt thriftling.

JM eLNO

We recognise these industry requirements and for several years we've been developing the next generation of high-performance automotive cathode materials, with a focused effort to improve both performance and cost and today we're excited to announced the launch of our enhanced LNO – our enhanced lithium nickel oxide, or our eLNO – to the market. Our enhanced LNO is not an incremental improvement but it is a step change in energy density that in the end improves both performance and cost to drive mass EV adoption. And I'll speak more about the performance benefits on our eLNO shortly.

How JM is addressing the challenges to the adoption of xEVs

Our strategy creates levers to manage the business within the range of EV adoption rates. Firstly, we have a broad portfolio of cathode materials, including LFP, NMC and our unique enhanced LNO, to meet the specific demands of the automotive market and vehicle segments. This gives us freedom to optimise the cathode material composition and performance across platforms, driving towards the most favourable cost position, again on a dollars-per-kilowatt-hour basis, for our customers. With our engineering and process development expertise, we're also able to manufacture these new materials at scale. In less than nine months we've taken our high-energy enhanced LNO to pilot production scale with performance improvements, and today we're scaling to demonstration-scale quantities. We have developed large-scale manufacturing plants and we've identified sites to bring our high-energy materials commercial plants to the market. Helping to address cost, our technology on enhanced LNO provides an advantage position to manage raw material availability and specifically the pricing of cobalt; this is a significant JM advantage.

In 2016, the battery market represented 50% of the global cobalt demand, compared to 36% of the global lithium demand. With the recent increase in cobalt prices, our ability to thrift cobalt, much like we've done in PGMs and auto catalysts for well over 40 years, is a key market differentiator for JM.

And lastly, we have strong expertise in raw material supply chain management. This includes not only metals, but transforming those metals into key precursors to feed our Battery Materials business. This is what we've done for decades in our catalysis businesses for both Clean Air and Efficient Natural Resources, and we're bringing this expertise to bear today in Battery Materials. We're managing all of these levers to drive adoption of our materials where performance and cost drive total cost of ownership lower.

JM's position in the battery value chain

Our focus on our Battery Materials business, to be absolutely clear, is cathode materials, but this also includes understanding how the materials perform in real-world applications. It is this chemistry in its applications that you heard Robert speak about earlier today that translates into sustained value-capture for Johnson Matthey.

This simplified view of the lithium-ion battery chain starts with raw materials, then into precursors and cathode materials, to coated electrodes which are then assembled into cells and those cells are assembled into packs, modules and ultimately systems.

We focus on the value segment that has the greatest impact on performance and cost and today that is the cathode material. In a typical PHEV sell, for example, cathode materials can account for up to 40% of the cell material costs and the 25% of the total cell manufacturing costs. Cathode materials are also the key determinant in energy density, power and in lifetime. While cathode innovation is the most important, it cannot happen in a vacuum with respect to the other battery components. This is why we also focus our science on understanding how our cathode materials are formulated to create electrodes and how those electrodes perform in both cells and packs. We do this in partnership with our customers to optimise our cathode materials for their specific applications, just as we've done with our automotive OEM customers in Clean Air for well over 40 years; that is we choose to play in the value chain that aligns with our core competencies and delivers differentiated

performance to our customers. And we've made significant progress towards executing our Battery Materials strategy across all segments of the value chain.

Raw materials sourcing

Our Battery Materials business benefits from Johnson Matthey's longstanding history in raw material sourcing and metals management, specifically we're leveraging nickel and cobalt contracts and buying power with efficient natural resources today. And we manage our raw material supply chain through strategic partnerships, including a partnership with Nemaska Lithium to supply lithium hydroxide that we signed in 2016. We developed advanced precursors, starting from raw metals, for our high-energy battery materials, leveraging our R&D capabilities. And this ability to internally manufacture cathode material precursors allows us the flexibility to master to front end of the supply chain to drive higher margins, just as we've done for decades with catalysts in, again, both Clean Air and Efficient Natural Resources.

Innovation

Importantly, we do not innovate in isolation and it's our strength of understanding the other areas of the value chain that accelerates our progress in developing cathode materials. Our understanding of electrode structures helps us improve the structure and energy density of the cathode materials themselves. Our understanding of cell performance helps us match the cathode performance with the other parts of the cell, that is we're able to balance the cathode with the anode, the electrolyte and the separator. And our battery pack level understanding helps us improve cathode materials' lifetime and safety at scale.

Each of these areas, including our position today in battery systems, provides insights to drive cathode materials innovation for real-world automotive applications. And all of this feeds into our focus: developing high-energy cathode materials. For our cathode materials portfolio, we have leveraged our rich history, as you all know today, over 200 years in innovating in advanced materials and manufacturing those materials at scale. This has enabled an expanding portfolio of new materials, our high-energy enhanced LNO, NMC, LFP and others. And we have access to intellectual property across all of these key platform areas. We now have over 60 R&D scientists developing our battery materials, which we've scaled up dramatically in the past year. Many of these scientists transferred into our Battery Materials business from Efficient Natural Resources to take advantage of our scale-up and manufacturing expertise. And we're also leveraging the deep expertise that we have in nickel chemistry from our Efficient Natural Resources sector as well. Additionally, we brought in scientists from Clean Air who have expertise in materials engineering and the automotive qualification cycle and their unique demands. And of course, we're also utilising our industry-leading scientists from our corporate R&D centre to drive further improvements in materials optimisation. And lastly, we're leveraging our strong OEM relationships to define strategic partnerships for the development of automotive-grade cathode materials. And as a result of our focus, we have rapidly accelerated our position to be a trusted and credible supplier of high-energy materials to the market.

Significant progress in high-energy materials in the past year

We entered the lithium-ion battery market in 2012 and in 2014 we entered the battery materials market with a leading position in LFP. In May 2016, we licensed key high-nickel

intellectual property and since then we've made significant progress developing our own unique cathode materials. To date, we've developed an exciting and new higher-energy-density cathode material; we've executed our high-energy materials development, leveraging JM resources; we've scaled up our high-energy cathode material to pilot scale, and are currently building larger assets; we have validated the benefits of our high-energy cathode material with cell manufacturers and OEMs alike, and today we have that material in qualification cycles with six customers. We're completing the front end and engineering design phase, or feed, for our commercial-scale manufacturing plant and as I will come to soon, we have plans to invest around £200 million for the first of our commercial plants, beginning from mid-2018.

A wide portfolio of battery materials

Together with LFP, NMC and our strategic development of enhanced LNO, we have a broad range of materials in our portfolio today to meet the needs of our customers and the demands of the automotive industry. Today we maintain a strong position in LFP and its high-energy variant LMFP for applications which demand high power, low-temperature cold crank performance and unparalleled safety. We continue to see the overall market for LFP growing, however with some narrowing of the vehicle applications to hybrids and buses. And to that end, we continue to develop our LFP materials for those specific applications. We have rapidly expanded our portfolio to high-energy materials with our enhanced LNO material, but it's important to also stress that we also have NMC materials in our portfolio today as well. Our focus though is enhanced LNO, as this offers game-changing performance, and we wanted to make sure we didn't bring to the market another me-too to NMC. And thinking way ahead, we're future-proofing the business by making long-term strategic investments in the next-generation technology areas, such as solid-state batteries, lithium air, lithium sulphur and silicon-based anodes. Our progress building a Battery Materials business over the past three years is unparalleled in the industry.

JM eLNO in the context of high-energy cathode material development

Our customers are excited about our high-energy cathode materials as well. To understand why this material is so important to the automotive industry, it may be helpful to place our enhanced LNO in the context of high-energy cathode material development. In the beginning, there was LCO, lithium cobalt oxide, one of the first cathode materials commercialised over 25 years ago. LCO has good energy and power density but it's limited with respect to safety and lifetime. More importantly, the increasing cost of cobalt means this material is neither sustainable, nor cost-competitive in a rapidly-growing market. To improve performance and overcome some of these limitations, the industry started replacing some of that cobalt initially with nickel and then eventually with manganese and aluminium. This created two branches to the high-energy materials tree. The first focused on NCA, shown here at the top and the other focused on NMC materials, shown here at the bottom. High-nickel-content materials, while having higher energy density also have lower safety performance and lifetime, thus the NMC market has continued to look for ways to have the best of all the key properties by changing the composition, essentially changing the ratio between nickel, manganese and cobalt. And it's this continual search for compromise that gives rise to not one NMC material today but a range of NMC compositions that we simply refer to as NMCs.

Today, the automotive industry standard is NMC-622 but NMC-622 will not and cannot meet the future demands of the automotive industry. NMC-811 is in development but continues to be limited by poor safety and lifetime. We've recognised this trend and more importantly opportunity several years and started the development of a non-NMC material that provides the best of all of the key properties. Our enhanced LNO is not NMC but it is the next step in the evolution of high-performing, high-energy-density cathode materials.

Development of eLNO

We've developed our enhanced LNO at speed, utilising our capabilities to work at pace, based on our deep understanding of materials chemistry. And in less than a year, we have taken a material from laboratory to customer sampling into qualification cycles. This is because we are harnessing the science and technology expertise across all of JM to accelerate high energy material development. And this not only plays to our skills, it plays to our strengths.

Step-change increase in energy density

We developed an outperforming, high energy cathode material as our first step. And importantly, this is only our first step. Today this high energy material, our enhanced LNO, has step-change increase in energy density compared to other high density materials. That is compared to the current automotive commercial benchmark, NMC 622, our enhanced LNO has 20-25% higher energy density. And compared to the next generation NMC material, NMC 811, our enhanced LNO has 5-10% higher energy density.

And importantly, this higher energy density performance has been validated by our customers. This will enable longer range EVs with lower pack-level cost, addressing several of the key barriers limiting EV adoption today. And we've done this by using our technology to develop the best cathode materials, which will translate into market share gain, and margin capture for JM. And we've done all of this in less than a year.

Outperforms all other key metrics

But the performance benefits of our high energy cathode material do not stop there. Our enhanced LNO is the best material in the market, whether that is energy density, power, range, cycle life, safety, and it is the most cost competitive. Utilising our expertise in material science, catalysis, surface chemistry, we developed a material which delivers improvements across all of the key performance vectors. And while all of them are important, the one key parameter, of course, is dollars per kilowatt-hour, which on this graph, is a culmination of both range and target cost. And this is where our material has a unique advantage: higher energy density with lower cobalt content.

We did this without compromising the other attributes and, in fact, our enhanced LNO has other compelling, competitive advantages driven by clever JM chemistry. And that is why we're so excited by this opportunity, and why we are prepared to make a significant investment to bring our high energy material to the market. We understand the fundamental chemistry and how to manufacture this material at scale, which gives us an additional advantage to optimise our enhanced LNO further for any customer-specific application, all of this enabled by JM Science and Technology. And again, it's important to remember this is only our first generation, high energy material.

Validated by customers

And you don't have to take our word for it when it comes to the performance benefits. What is most important is that our customers have validated the performance benefits of our high energy material as well. We have delivered higher energy density and better rate capability than NMC 811. And the cycle life is equivalent to or better than NMC 111, the high energy industry benchmark for cycle life. The performance of our high energy enhanced LNO also shows improvements compared to NCA. We've demonstrated better power performance, especially at low temperatures, and we've also shown higher capacity retention and lifetime compared to NCA. This is all feedback from leading cell manufacturers and OEMs, not just our statements about the performance of our high energy enhanced LNO.

Market timeline

Let's now turn our attention to how and when we'll bring our high energy materials to the market, and what you can expect from us in regards to volumes and manufacturing plans. This slide shows the steps involved in taking materials to the market and through the qualification cycle. The cathode materials qualification process is identical across all of our customers. However, the timelines differ from manufacturer to manufacturer and from region to region. Customers typically perform initial testing on materials to validate the performance, and this can take up to six months. If the material passes performance testing, it is then tested in larger cells and packs with the sizes and volumes increasing at each stage of testing. At each stage of testing, larger volumes of cathode materials are supplied, and the cathode material can be further optimised, based on customer feedback.

The overall timeline from initial testing to commercial launch can take between three and five years, depending on the customer pace and the vehicle launch cycle. Today, we have our high energy enhanced LNO in the initial testing and cell performance testing stages with six leading cell manufacturers and OEMs. This shows the significant market pull and demand for our material.

An important aspect in the qualification process is that you also need to be seen as being able to provide the large volumes required to support commercial launch, even before being selected to participate in the qualification process. And with six customers already testing our high energy material, and with more to come in the short term, we have the credibility with our customers as being able to meet their commercial demand requirements moving forward. It is this understanding of the qualification cycle and required volumes that feeds into our manufacturing plans for our enhanced LNO.

Manufacturing plans

So, what are we doing to manufacture our high energy material? We have built a pilot plant and are further expanding its capacity to provide larger volumes of customer-specific materials for initial testing. We are currently building a demonstration scale facility that will be able to manufacture hundreds of tons of materials for selection and award by our customers. Beginning early next year, we will be able to supply customers with hundreds and thousands of kilograms for qualification from our larger pilot plant. And we expect to be able to provide the market with hundreds of metric tons from our demonstration scale facility thereafter.

We've also sanctioned the Front End Engineering and Design, or again FEED, for a 10,000 metric ton green field production facility, including the identification of a location for this manufacturing plant. We've also approved the purchase of land for our commercial scale facility, something you'll hear more about in the coming months. We anticipate sanctioning our commercial manufacturing plant investment in mid-2018, following the completion of our Front End Engineering and Design. And we expect start of production beginning in mid-2021, with volumes ramping up to 10,000 metric tons thereafter.

In the short term, we are continuing to evaluate other options to accelerate the commercialisation of our material, to access near-term qualification opportunities and vehicle platform launches. Looking ahead, we will continue to invest Capex to expand our production volumes in alignment with customer demands and with market growth. And of course, as Anna will discuss shortly, and Robert mentioned in his earlier remarks, we will do this with the financial discipline and rigour that you would expect from Johnson Matthey.

Concluding remarks

So, some truly great progress here, all enabled by our science and technology, and our ability to innovate at scale. We have developed the best in class, high energy cathode material. And our enhanced LNO is a step-change material for the market. We are investing today, with further investment of around £200 million from mid-2018, with an initial production volume of 10,000 metric tons and increasing volumes thereafter. And we would expect to be on automotive platforms in production beginning in Fiscal Year 21/22. This investment aligns well with the pace of growth for the overall cathode materials market, which is expected to expand significantly beginning in the early to mid-2020s. And suffice to say, we are both confident and excited about our position in the battery materials market today.

Thank you for your time this morning, and we'll be happy to take any questions that you might have, just a couple.

Q&A

Robert Macleod: At which I will take questions and crikey, there's quite a few already. So, whoever that is in pink over there, so since you're very close to the microphone. And we'll try and do the same as we did last time; we'll do a 'backwards and forwards', although there are quite a few hands on that side, guys, I'm afraid, or on this side. So it may end up staying over here for a bit. Over to you, sir.

James Knight (Exane BNP Paribas): Okay. So it's James Knight at the Exane BNP Paribas. I've got three to kick off. Firstly, in terms of the capacity or planning, how flexible might that be? Or do you have to decide from day one that's pretty much all eL – eLNO, or could it be flexed to NMC?

Secondly, in terms of LNO, what are the specific technical challenges versus other cathode materials? I think I remember reading, in the past, it maybe has thermal stability issues.

And then thirdly – this may be the most stupid question of the lot, but could you quantify the proportion or help us quantify the proportion of cobalt in LNO catalyst – cathode versus NMC? Thank you.

Robert MacLeod: Well, the short answer to the last question – which isn't a very stupid question, by the way, it is a very good question – is no, we can't, because that's obviously very commercially sensitive to us. I mean, obviously our customers will know about it, but we don't want to be sharing to the outside world too much about our own material today. So, we're going to keep that under wraps. Suffice it to say it's low cobalt, which is one of the key – key things. So sorry, we're not going to give some of the commercially sensitive stuff away.

On the first question – I'll let you answer one question, don't worry – the first one is it is a pretty flexible plant; that's what we would do. We'll make sure it's as flexible as we possibly can make it. One of the things with these sorts of plants is, you know, we've got to make sure we build the right plant for our process that we have today. We now understand how to make enhanced LNO. So we now need to make sure we build a plant that can make LNO as effectively as we can possibly can, but building in that flexibility as well. So that's what we're going to do over the future.

And then the second question, which I've forgotten already – Alan, since I've forgotten it, over to you.

Alan Nelson: Happy to. So the second question was around technical challenges. And the first thing that I'd say again is our enhanced LNO is neither NMC nor LNO. So, if you're trying to compare here, the performance of our material with what you've seen and what you've read in the open literature and other sources, about some of the limitations, I'd just be a bit careful because it's neither of those materials. What we've done is we've developed a material to address these specific limitations, much of which have you referenced in terms of thermal stability, lifetime safety, cycle life. And we've used our chemistry to develop a new material that addresses many of those issues. And again, as Robert mentioned, a lot of that secret is in our composition and how we manufacture that material.

Robert MacLeod: Okay. Adam, you're very keen to ask a question, so I'll go with Adam. Sarah – Sarah, can we – oh no, that's not Sarah. Sorry, can we go for this – the chap here? And, no, it's going nowhere. And then – and then later.

Adam Collins (Liberum): Adam Collins from Liberum. A couple of questions: Alan, I can see you're very confident about the performance and cost characteristics of LNO, which you describe as class-leading. But if I could just ask you a question around the customer testimonials on slide – whatever it is – no. It's interesting to see that those testimonials don't refer, in any case, to safety. And then the testimonial that relates to cycle life says it's greater or the same as NMC 111. But there isn't a reference to it being a better performer in terms of cycle life than higher generations of NMC. And I wondered if you could just explain why you don't have anything here that suggests that it is safer, or does have a superior cycle life, because my understanding is that's one of the issues with high nickel LNO.

And the second question is on the 10,000-ton production plan. At a 10% penetration rate for EV, that would give you, in my estimation, around about 5% of the market. But you – yeah at 10%. Roughly, it would be a 200,000-ton market at that point. So, to what extent is there scope to go further than that? And if that is the right calculation, aren't your plans rather modest in terms of addressing the market by 2025?

Robert MacLeod: Adam, you get the prize for the longest question. Alan, do you want to do the first one?

Alan Nelson: Yeah. So look, what I would say is in regards to the customer feedback that we've presented here today, please understand and appreciate that it is just a small segment of the overall customer feedback that we've obtained on our materials. As you – as you correctly point out, Adam, safety is certainly one of the key attributes that the cell manufacturers and OEMs would look at as well. And although we didn't have it up here, just to try to keep the slides in terms of management content, we have performance improvement when it comes to safety as well with our enhanced LNO materials. So it is one of the other areas that we're addressing.

We did describe and touch on it briefly in the slide – and I forget the slide number – that has the spider chart diagram knots on it.

Robert MacLeod: Slide 77.

Alan Nelson: Yeah, so there's real data that sits behind that chart; it's not just our guess in terms of putting, you know, darts on a board. There's actually hard data that sits behind there, and we do have the data on the safety side of things as well.

So, you mentioned on – and you may have to restate the question, because I forgot, so.

Robert MacLeod: Yeah, I'm struggling with your data. But if you take our analysis, when you look at the chart on slide 66, you see if we're getting into higher penetrations of battery electric vehicles only – pure BEVs, not hybrids – then you need a lot more than 500,000 tons of capacity.

Adam Collins: Right.

Robert MacLeod: And so, you know, you're absolutely right, 10,000 tons as an initial capacity is a small part of the overall market. What we're going to target is those customers that are target – going for – are prepared to pay for the high value, energy performance – high value performance that we can give and use our science to deliver. Look, you wouldn't expect us to go in day one and announce we're going to make, you know, hundreds of thousands of tons of material. We're doing an initial – we describe it very carefully as an initial investment. Let's be clear, it's not the end of our investment plans. If our plans are successful, which we believe they will be, we'll be investing very quickly after that as the market develops.

Over here. Sorry, hands – question – hands going up very quickly; there's a race to get your hands up here. How hungry are you, by the way? My stomach's starting to rumble, but we'll give you time for more questions. We'll go on for a little bit longer, and then we'll break for lunch.

Martin Dunwoodie: Great, and thanks. It's Martin Dunwoodie from Deutsche Bank. I guess it's following on a bit from Adam's question, but why would you use NMC, given the advantages this has pretty much across the board by the looks of it? Why would somebody be using NMC after this?

And secondly, I presume this – you've developed this in-house – obviously, a big announcement today. I presume this is patented, and you have a kind of an exclusive right

on this. Would you consider licensing this out to other people, in terms of developing this market overall?

And then the third point: coming back to your capacity expansions in future, if it's going to cost up to £200 million for the first 10,000 tons that's green field, what would it be to, say, double that overall? I presume it's going to be something like half of that cost going forward, but just to get an idea of how – what the intensity would be going forward after that.

Robert MacLeod: So the last question, there's not going to be massive economies of scale as you double up because, you know, some of the kit that goes into the factory is not that scalable. You build them at – most of these are done on 5,000-ton trains, and to go from 10,000 to 20,000, you need, you know, four trains and you know, the costs are going to be broadly similar. So, don't make – don't factor in massive cost synergies.

Now there will be, of course, as the industry develops and our processes develop. But initially, I wouldn't want you to put in a – you know, a halving like you were just suggesting; I think that's – that's a bit on the optimistic side.

Martin Dunwoodie: Yep.

Robert MacLeod: I really should learn to write the questions down because I really – my memory's going. Alan, on you go.

Alan Nelson: You and me, both. So Martin, just back on your first question: why would you use NMC? We have the same question. I mean, if you look at the performance of the material, it is a very compelling value proposition in terms of performance and cost. And so, I mean we think we're well placed to compete with NMC in the marketplace today.

And you asked the second question about patenting versus licence. We are, of course, patent protecting our material, of course, as you would expect. You know on the licensing question, we don't see that as an option for us today. But you know, depending on the way that the automotive market continues to move forward with potentially dual sourcing requirements, there may be something that we'd consider at some point if it allows the rapid growth in the overall marketplace, and allows us to grow the marketplace. But again, we're not seeing that today, we're not seeing that as a requirement.

Martin Dunwoodie: Great, thank you.

Robert MacLeod: We've invested a lot in developing this material, we want to make sure that we capture as much value in the short term as we possibly can; licensing not on the agenda today.

Martin Dunwoodie: Right.

Robert MacLeod: Thanks. Right, I'm going to go back over to this side. Crikey, the microphones are all at the top, sorry. So we'll go right to the end over there, if we could. Sorry, Katharine. Katharine injured her knee, so this going up and down the stairs is good for her therapy.

Question: A real quick one: are you working with an external consultant on the FEED studies?

Robert MacLeod: Yes.

Question: Could you name that entity?

Robert MacLeod: No – quick answers to quick questions.

Question: Thank you very much.

Alan Nelson: Have to write that one down.

Robert MacLeod: I would say let's start again. And do you want to just keep the microphone there, and join me later? I mean we don't have the capacity to do all the FEED ourselves. Even – I mean John, when he builds a new plant, he will go and do an external FEED study as well; that's normal industry practice.

Jean-Baptiste Rolland (Bank of America Merrill Lynch): Hi.

Robert MacLeod: Sorry.

Jean-Baptiste Rolland: Hi, Jean-Baptiste Rolland, Bank of America Merrill Lynch. Two quick question: how do quickly do you reckon that your technology, or demand for technology, could grow? Do you see it becoming the chemistry of choice for OEMs, and what market share – you think you could extract out of the global cathode materials market with this technology?

Second – quick second question: in what – so, at what premium do you intend to sell this technology versus NMC 622 or NMC 532, given that the same – are you targeting to go for mass adoption? In which case, you would also be probably facing some headwinds in terms of – in terms of pricing, given that your clients are probably also loss-making on your – actually, clients would probably be loss-making. Thank you.

Robert MacLeod: Yeah look, I think what's our market share going to be in x years' time? It's very, very early for us to assess that. So I wouldn't want to give an indication on what it will be. I mean clearly, the question is deciding where we're going to play in the whole market. This whole market is not going to be a single technology and a single sort of value – business value driver. There'll be some parts of the market which will want – which will be prepared to pay high value for a high value product, there are other parts of the market – will want a me-too type product – a commodity – and that will be good enough for them. We're not going to play so much in that space; we're going to pay in the forward.

So the market shares will become dependent on whether you're looking at the aggregate market, or the particular niche in which we play. And clearly, we're going to target a higher share for the – for the niche in which we play. It would be far too early for me to give you a sort of a market share estimate today. You know, let's move it forward. We're just announcing this today to you all so to go and say, 'And by the way, we're going to have that market share,' it's too early.

And on the other question around the premium, well come on, we're not going to do our pricing discussion in front of you. I mean, we're – you know, that's something we're going to negotiate with our customers. I mean again, it comes to that whole sort of value, you know, because ultimately we're giving them value with lower dollar per kilowatt-hour. So how much of that do we capture, and what's the premium that we get for that? That's a – we're still in that – early stages. We're in the testing cycles and the validation cycles that Alan talked

about. And at this stage, it's very much on a technology discussion; we haven't really got into the hard, nitty-gritty commercial discussion just yet. That will come later.

Jean-Baptiste Rolland: Right.

Robert MacLeod: But clearly, we'll be charging the premium. Crikey, still lots of questions. We're going over to that side. Sorry, I'd forgotten that I'd given – I'd said that we were going for you.

Jeremy Redenius: Hi, Jeremy Redenius from Bernstein. Thanks for taking the questions. A few questions: First of all, I saw that you had – your qualification process was six customers. Do you have any agreed contracts? And if not, when would you expect to have agreed contracts in hand?

Second, I was a little bit surprised by the capital intensity, so the £200 million, just judging relative to kind of NMC or LFP announcements I've seen, any particular reason this capital intensity's higher?

And then thirdly – I know I'm going to get knocked for this but anyway – can you tell us the voltage that it might operate at? Thanks.

Robert MacLeod: Well you'll get – you're not getting a notch on the last question. No, we're not going to tell you the voltage. On the first two, do you want to go for those, Alan?

Alan Nelson: So just in regards to the six customers in terms of contract timing, the way that the typical qualification cycle progresses is essentially from stage to stage to stage. So the contract – the second contract would follow from the first, etc., etc. So, you don't have – you're not going to sign a contract for the 10,000 metric tons until you've progressed through that stage. So, we're working through that.

What we do have is we have line sight in terms of what those qualifications cycles are for those six customers, what their specific volume requirements are, what the timing would be, and what their timing is for the large platform and commercial launches. And we're pacing and timing our investment based on those plans.

Robert MacLeod: And the capital intensity –

Jeremy Redenius: Just – sorry, just to follow up on that, is there a certain point in time in which you would know you've effectively won that business or not?

Alan Nelson: So in the second to the last stage – and I don't have the slides up – but the second to the last stage that's there, the scale-up stage, that's when you would know because that's essentially the PPAP stage for battery materials.

Jeremy Redenius: And so that would be next summer?

Alan Nelson: Well it depends from customer to customer.

Jeremy Redenius: Yeah.

Alan Nelson: So we'd – you know, we've provided a range in there because that is the range that our customers are telling us in terms of their qualification cycles.

Jeremy Redenius: Got it, okay.

Robert MacLeod: Okay? And the last one was about capital intensity versus NMC material.

Alan Nelson: Capital intensity: you say why is it higher? The capital intensity that we have for our material is no different than what it is for NMC. So if you go and if you actually scrub through some of the announcements that are made in terms of expansion, you have to sort out what's – what was on the ground from an ISPL/OSPL standpoint etc., versus an overall greenfield build. And if that – which you normally see, again across the industry, wrong numbers – is that 5,000 metric tons require a CapEx investment of about \$100 million. And again, there's some ranges to that but just roughly speaking, that is – tends to be about the scale and level of investment.

Jeremy Redenius: Thank you.

Robert MacLeod: And of course, once we know – once we've finished our FEED work, then the object will be the FEED is to narrow down the cost variability on that. So at the moment, it's plus or minus quite a large number because it's in the early stage, but we'll narrow all that down over the next few months.

Jeremy Redenius: Okay.

Alan Nelson: Finished with that.

Robert MacLeod: Okay, now we're back over to this side. I'm going to go here at the front. And we're going to stop for lunch at half past, which gives us five minutes for questions. But Alan won't go anywhere. We've got Jane and Shelley here at the front as well, who can answer more of your questions if you want to get them at lunchtime.

Georgina Iwamoto (Bank of America Merrill Lynch): Hi, it's Georgina Iwamoto from Bank of America Merrill Lynch. I just have one question. In your most recent annual report, for battery materials you indicated over the next ten years, you would expect sales growth of around 15%, and then a long-term growth rate of around 15% per year. Do those indications still hold following the announcement today, or would we expect an update on that?

Robert MacLeod: They are not – there's a difference between the short term and the long term. I mean clearly when we did that analysis, that was principally predicated on our LFP business that we had; this is different. So clearly, this would change our forecasts that we had before.

Georgina Iwamoto: Thank you.

Robert MacLeod: So I'm going back to this side of the table, and you're right next to someone over there, Katherine, so –

Alex Stewart (Barclays): Hi, it's Alex here from Barclays. You talked about your eLNO being a premium product – it's clearly a premium product. When we talk about premium customers, are we thinking Bentley, or are we thinking Audi, or Ferrari? Can you give us some idea of what segment of the car market you are aiming for? And I apologise, I don't know that much about cars, so I hope that's an indicative range.

Robert MacLeod: Sorry, I don't know too much about cars either, but premium market, it's – you know, I don't think it's quite like that. I don't think it's per car – per sort of going for the top end of the range of vehicles. It's – it's the energy, it's the performance of the car that is needed, and the particular customers and what they want in their cars. And what they're looking for at the moment is dollar per kilowatt-hour, longer range, safety etc. And that can

apply just as much to a small car as it can apply to a large car. So I don't – you know, it's the particular customer dynamic, and what they want to achieve out of the battery. So the premium doesn't mean it's going to be on a Ferrari, for example; it could just as easily be on a – I don't know if I going to name a – I'll be – I'm not allowed to brand, am I? But it could easily on a smaller vehicle too.

Right, we've probably got time for maybe one or two more. There's one more on this side, and it's – this side of the room. Andrew, you lost your chance; you didn't put your hand up quick enough.

Charlie Webb (Morgan Stanley): Charlie Webb, Morgan Stanley. Three questions, if I may. Who else has access –

Robert MacLeod: I'm not sure you'll be allowed three; these guys want one more question. But go on quickly, and do it quick.

Charlie Webb: Who else has access to, I don't know, licences? I think the SF does, but maybe you could just confirm who else does.

What are the returns expectation for this investment and over what timeframe?

And finally, do you think this material will drive costs below the \$100 per kilowatt-hour, or have the ability to drive costs below the \$100 per kilowatt-hour?

Robert MacLeod: Right, do you want to answer – so the return one. Look clearly, you know, Johnson Matthey's – as we talked before about being a high return business, our aspiration and our goal is to be a 20%-return-on-capital business. But clearly in the short run, this is not going to be a 20%-return-on-capital business as we're investing ahead of that. But we would be investing in an area that we think – that we believe has the characteristics that can drive that sort of return. So the level of the return for the business will depend upon the level of investment that we need to make, and how we – quickly we're scaling it up. But absolutely, we would expect to be – we see a route to a 20% return on capital business in its entirety, okay?

So, going back to who else has LNO: well, nobody else has eLNO, that's for sure. Do you want to say anything else about LNO?

Alan Nelson: No, I would just reiterate – you know, if you look at the – the IP space that's out there, there's a number of base compositions that have been licensed. For example, NMC, LNO et cetera. But what we've done is actually develop a different material. We rely on that base intellectual property, though just to be clear, to give us the freedom to operate. And then we're building and innovating on top of that base intellectual property and filing our own protection on top of that as well.

And then just briefly in terms of cost, I mean that – in terms of driving this towards \$100 per kilowatt-hour, that is certainly our goal. I mean if you look at the industry benchmark or where you really need to get to for mass EV adoption, whether that's the right target or whether that's the key psychological target, it is a key barrier. Of course, a lot of things factor into that cost because that's a pack-level cost. So you know, a lot depends on the price of nickel and cobalt moving forward, a lot depends on the size of the packs, or the size of the cells as well. But we see where there's actually a route to get to, you know, whether it's \$100 a kilowatt-hour or close to it. And so again, we think this is a good play and a good

option, for us to drive that total cost of ownership. And again, if we get to the \$100, or maybe a little bit high, a little bit low. But that is ultimately our main focus.

Alex Stewart: And where – where do you think we are today, on average?

Alan Nelson: Where are we at today?

Alex Stewart: Yeah.

Alan Nelson: The overall NMC market?

Alex Stewart: Yeah, please.

Alan Nelson: So NMC on a pack-level basis, say for a plug-in hybrid configuration, is probably \$185 a kilowatt-hour, maybe to \$200 – somewhere in that range. Again, it depends on the cathode material.

Alex Stewart: Sure. Thank you very much.

Robert MacLeod: Okay? So, does anybody have one last question on this side? And then I'm afraid we are going to have to break for lunch, but do capture these people. Sorry, Peter.

Chetan Udeshi: Chetan Udeshi, JP Morgan. Only one question.

Robert MacLeod: Good man.

Chetan Udeshi: So when you compare and contrast to your product development, your lock-in with customers in catalyst business – was it Battery Materials – how you compare in contrast? Because you know, probably you have much better visibility in your catalyst business because you are working on custom projects. So how have you factored that into play in terms of deciding on this big investment in your battery material business because you know, essentially it's an oligopoly in catalyst market – three global players. But in Battery Materials, you have almost every month one new player if not more. So, how has that filtered into your decision on investment and future investment in this business?

Robert MacLeod: Well okay, I mean where we are today is – as Alan described, and it's entirely consistent with – John talked about – we're at a very much a nascent part of the electrification growth in that market. It's not a developed market today; far from it, it's very much evolving. So you know, John has got very – as he describes earlier on – he's got very clear visibility on the legislation, on the market, on the contract awards for many years. And we've got – and that's because we've been in this market for 40 years. It didn't start off as an oligopoly of three; it started off as a, you know, quite a spread of people. But then it concentrated quite quickly.

So what's going to happen to this market? I guess none of us really know what's going to happen to this market. And again, let's not – I think we've got to be careful about defining it as a single market because I think there will be different parts of the value chain and different customers will want different things.

So, where are we at the moment? What we've done is we've made fantastic progress in the last year or two in the development of our technology. And now, it's a case of how we do we leverage that, how do we grow a business, and how do we really maximise the value from that great technology? Because remember what I said right upfront: JM is a technology company; we win on technology, not on cost. So what we're going to do is have the best

technology, and we hope that we've explained some of that to you today. And then we leverage that into driving the business forward. That's our strategy.

How it actually plays out on a day to day, what happens to the concentration in the market in the long run, time will tell in the long run. But if you have the best technology, customers will come to you because – or you can go to customers and sell to them about why they should win your – buy your business, and so – or buy your products. And that's what we're aiming to do.

Right, that's Alan. Jane, do you want to stand up? Shelley, do you want to stand up? These are the two – three people that if you've got – if the people who didn't have a chance to ask questions, go and speak to them. Of course, you can speak to Anna, and John, and Jane and the rest of us too. But any questions on batteries, they're the guys. Thanks very much. We'll see you in a about half an hour after lunch.

Robert MacLeod: Okay, how are we doing? Okay, I think we're nearly ready to get started. So now what we're going to do today – this afternoon's first session, is we're going to cover both Efficient Natural Resources and Health. So what we're going to do is Jane's going to start off by giving a presentation on Efficient Natural Resources, and we'll follow that straight into a presentation on the Health sector. And then we'll run the Q&A together for both Health and Efficient Natural Resources at the same time.

So, without further ado, over to you, Jane.

Efficient Natural Resources

Jane Toogood

Sector Chief Executive, Efficient Natural Resources, Johnson Matthey

Introductory remarks

Okay, can you hear me? Yes. So, good afternoon – very excited to talk to you today about Efficient Natural Resources. And I'm going to talk to you about the opportunities in the business where our core chemistry and technology strengths form the platform for our leading market positions.

Efficient Natural Resources created to deliver growth

Two divisions combined

We've got a strategy here which aims to deliver growth ahead of the market over the medium term. So Efficient Natural Resources has been created from combining the majority of the two former divisions of Process Technologies and Precious Metals Products. And shown here are the numbers giving the size and scale of the business, accounting for 25% of the JM Group sales, 32% of the profit, and employing around 4,000 people. The whole business has a long legacy of excellent customer service built on deep chemical understanding and technology expertise in markets with similar growth trends. As I shall explain shortly, restructuring the business into Efficient Natural Resources and building on these competencies with a broader focus will provide us with further opportunity.

Creating value

So today, I shall take you through an overview of what the Efficient Natural Resources business is, those markets in which we operate, and how our strategy will deliver sustained value to customers, both internal and external, and enable JM to outperform in our markets.

So let me take you through what is Efficient Natural Resources. In a world where population growth is putting increasing pressure on our natural resources to feed the growing appetite for all things material, we create value from the efficient transformation and use of natural resources. We're leaders in applying science, the very best of our JM chemistry and technology, building on our core expertise in catalysis, platinum group metals and process technologies with a range of diverse capabilities to solve complex and variable problems, working closely and collaboratively with our customers.

With our chemistry and technology expertise, we can help our customers transform, purify, recycle and use key natural resources such as oil, gas, biomass and PGMs into materials that build and fuel the modern world, while reducing the impact of this activity on the environment and adding value to JMNR customers. Our strategy will enable us to outperform our competitors in our chosen markets.

Sector sales

So what does the business look like? We have commenced a strategic review to assess the alignment of our Diagnostic Services business with the rest of the group. So the sales from that business are excluded from the sales I'll talk about here, and on subsequent slides.

We currently operate in four sub-sectors, each creating value from the efficient transformation and use of natural resources. The Chemicals Business makes up 40% of the Sector sales. Here, our catalysts, process technology and know-how help customers transform natural resources, ranging from oil to gas to biomass, into the useful products that make up and enable the modern world, from the glue that's the basis of plywood to the fertilisers that have enabled agriculture to sustain a global population greater than five billion, to the coating that prevents chocolate melting in your hand.

This space includes both licensing and catalyst business, and last year 13% of our sales related to licensing. The Oil & Gas business makes up 23% of the Sector sales. Here, we enable purification of natural gas and the production of hydrogen, as well as efficiently transforming crude oil into petrol and chemical feedstock. Together, the Chemicals and Oil & Gas businesses – 63% of Sector sales – make up our Catalyst Technologies business. Our Advanced Glass Technology sub-sector makes up 10% and makes advanced glass materials and conductive inks, mainly for automotive use. And finally, our PGM Services business makes up 27% of the Sector sales. This is a core activity for JM, where our expertise has been developed throughout our 200-year history, and where we manage platinum group metals through their lifecycle of refining, purification, product manufacture and again, recycling to meet, in particular, the needs of JM's other businesses.

Chemistry expertise

The common thread across all our businesses is the chemistry expertise that we apply to solve our customers' problems. We have particular strengths in PGM and base metal chemistry, and catalyst design and engineering. Our expertise in these fundamental areas of

chemistry has led us to the industry-acknowledged number one position from the perspective of technology and technical support.

Working with Methanex

Let me just illustrate this now with a couple of examples. JM is the market and technology leader in methanol, and Methanex is a key customer, who's the world's biggest producer and seller of methanol. JM works closely with Methanex, providing technology, catalysts and services to support both their existing plants, and for new plants and revamps. An important part of our close relationship is the ongoing operational support and advice provided by our experts in our Customer Service team, which helps ensure reliable and efficient operations.

Working with Air Products

Air Products is a leading industrial gas company and supplier of hydrogen gas, and JM is the leader in hydrogen catalysis technology. Our relationship with Air Products is a win-win for both companies: JM enables delivery of increased efficiency, reliability and capacity for the operator Air Products, and Air Products enable faster development and validation of new products for Johnson Matthey.

So together with our fundamental chemistry, it's our ability to take the inspiring science and scale-up the complex manufacturing – which is not easy to do – and to work closely with our customers, which enables them to bring their products to market faster, improve the performance of their products and reduce the environmental impact.

A catalyst solution

So let me just give one other example of what this looks like day to day. While working closely with our fluidised catalytic cracker, or FCC refinery customers, our Technical Service team found that they had problems with poor operational performance from metal contaminants, particularly iron and vanadium. We used our deep applications knowledge, and material characterisation and modelling skills to understand the deactivation mechanism, and then used our catalyst design and testing capabilities to develop a catalyst solution, which traps and effectively removes those metal poisons.

The new catalyst was tested in a pilot plant, then successfully scaled-up and trialled with one customer, and is now being rolled out across the whole market. Customers with benefited from increased throughput, lower operating costs and lower SO_x emissions.

Four market sectors

Chemical catalysts market

So our core strengths underpin our strong market positions. We're number one or number two in almost all our key segments. So let's take it segment by segment and work around the slide. The chemicals catalysts market is around a US\$5.4 billion market. However, we operate in only about 30% of that space, which you can see on the grey part here. Here we have sales of \$343 million.

Top ranking leader in key markets

Within the chemicals market, there are many sub-segments – around 40. And we operate in 15 or so of these, and we have the number one or number two position in almost all key markets here. For example, we just talked about methanol. This is one of the top seven global chemicals by volume, and we're number one in methanol technology and catalysts.

Oil & Gas catalysts market

Oil & Gas catalysts market is a larger overall market, with refinery catalysts at US\$7.6 billion. And whilst we're present in 37% of the market, our position in the FCC market, which represents about \$2.7 billion of that total, is focused on a particular niche activity, that of refinery additives. These are used in fluidised catalytic crackers, or FCC, which makes gasoline. Our environmental additives remove 'S', so sulphur, from the FCC, and our performance additives make more propylene. Our sales in this total segment of \$199 million, represent a number one of two position in all the key markets in which we operate.

Advanced Glass Technologies

In Advanced Glass Technologies, we are participating in a much smaller materials market of only around \$200 million, where we also have a number one or two position in all the sub-segments. Here for example, are specially designed automotive glass enamels are printed around the edge of windscreens and used to prevent deterioration upon exposure to UV light.

PGM Services

PGMS is a little different. Our key role is as a reliable supplier of platinum group metal products and recycler of used PGMs to the JM Group. We also produce PGM products for use typically by specialised industrial customers. We are focused and specialised in PGMs, having the globally the best and highest capability to refine these metals.

So to summarise, we operate in a sub-set of the overall markets, each of which is quite fragmented, and where we have leadership positions in all – nearly all of our key sub-segments.

Market drivers

So let's take a look now at what's driving change and creating opportunities for our markets. The demand for natural resources is increasing with population growth and increasing wealth, driving demand of additional resources for use in health, nutrition, transport and the environment. Meeting the grower demand will – the growing demand will require higher productivity, more efficient use of natural resources, a greater emphasis on recycling, and a growth in the circular economy and a shift, of course, towards higher and secure energy resources.

More specifically, the oil price is likely to stay lower for longer with prices in the \$50-60 a barrel range, and oil declining as a percentage in the energy mix. At this price level, refiners will look to get more value from their barrel of oil. There's a shift to clean, cheap feedstocks, especially gas.

Low cost and long-term availability has helped reshape chemicals growth in North America and other advantaged regions. This corresponds with an overcapacity in the chemicals market, and historically low plant utilisation rates look set to persist with lower levels of new plant builds resulting in a reduced licensing outlook.

Within that picture, there are higher growth regions, with addressable markets moving east, and China being a key driver of chemicals demand with the ongoing growth in the use of plastics in packaging, automobile and construction.

Automotive is a key driver of PGM metals, recycling and AGT, and John has already described, very eloquently, the growth rates expected in automotive production and so on. And there

will be more environmental legislation driving lower emissions in this space, and indeed across the whole chemical industry. For PGMs, this drives demand and, at the same time, the relatively low investment in primary supply will increase PGM recycle and reuse.

Overall market growth rates

Homing in now on our markets, what does this mean for the overall market growth rate? So the first column of this table shows the overall industry growth rate for the chemical catalysts, Oil & Gas catalysts and Advanced Glass Technology industry at around 2%. So as I just described, JM operates within a sub-set of the overall market. And the second column shows the medium-term average growth rate for that sub-set of the market that we operate in.

But the markets that we operate in are quite fragmented, as I've described. And so that average is actually calculated from a range of different growth rates across the sub-segments. And on the third column, you can see the typical growth rate across different market sub-segments. So in other words, when you drill down to a product and geography level, there are sub-segments of the markets in which we operate, which have more or less attractive growth rates.

Secure supply of PGM an advantage

PGMS growth rates are missing from the table, so let's look a little bit further at the PGM Services business. PGM Services has a particular role with Johnson Matthey. The primary roles is to secure a secure supply of PGM to all JM businesses – they all require some PGM – and a ready recycle route for all JM scrap. The PGM supplied can be in various forms, including sponge, basic chemical salt or PGM deposited on supports, such as carbon or ceramic. The PGM Services also offers a comprehensive range of PGM products in a very wide range of forms, including also wires, cloth, coatings and engineers' forms.

The ability to manage our own metals circuit means we are largely protected from an over-reliance on other market players and outside refiners. We gain advantage for JM by offering a closed loop or supply-refine service to external customers. We make it easy for glassmakers, fertiliser-makers and other industrial customers to use exotic and expensive materials by doing things this way.

And we also take PGMS and scrap that might have passed through many hands, such as used auto catalysts, electronic scrap, or jewellery materials, or products we did not make. And this is open-loop refining. And it's of interest because open-loop customers want cash, not metal returned, offering us an opportunity to buy the metal for future use for the JM Group. We have our arms around the PGM world like nobody else does.

Strategy

Efficiency efforts continue

So given the market growth and the trends that are impacting, there have been some implications for our strategy to deliver a strong performance. And there are some things we shall need to continue doing: we'll need to continue our efforts to drive efficiency, to focus on internal PGM use, and maintaining in-depth, customer process insight.

New strategic approaches

However, the dynamics have also caused us to adjust our approach with respect to areas of focus: we will have the opportunity to focus on higher growth markets and geographies, the

balance of sales will move away from lumpy licensing towards a greater level of catalyst sales, and our feedstocks will move more towards gas and bio-based opportunities.

Focus on growing markets

So what's our strategy? How will we run this business? Our strong market positions have been built up over many years. Success has stemmed from building on winning positions in market sub-sectors through technology and service leadership. General growth across the areas we're in conceals wide variations across markets and geographies. Our strategy is to focus investment on the faster growing markets and to adjust our footprint to the higher growth geographies, such as China and the US.

Maintain technology leadership via R&D

As well as investing to maintain our technology leadership via R&D, we'll target that investment towards areas generating higher potential growth via efficient R&D management. We've kicked off new initiatives aimed at giving us a step-change in functional excellence, spanning commercial and supply chain activities, designed to help drive our top line as well as delivering efficiencies. Finally, we'll also explore growth opportunities in the longer term through extending our capabilities into adjacent markets, geographies and technologies, where we can plan a route through to winning position.

So as I mentioned earlier, our technology position, coupled with our customer and technical service offering, leaves us well placed to win, and continue to grow, and generate cash in the range of sub-sectors in the natural resources space where we operate. The picture illustrates some quite interesting dynamics. If you look across the sector, there's quite a range in expected growth rates for the markets where we have leading positions. And those growth rates range from low to much higher. So this chart shows the split of our sales into the markets with our view of the growth rate of those markets over ten years. This range gives us the opportunity to grow our top line faster than the average for this group of markets. We achieve this in general by selectively targeting our investments towards the higher growth sub-sectors to ensure we have the right products and services, along with the correct footprint and capabilities in our commercial organisation and our supply chain, to take full advantage of this faster than average growth.

With technology and chemistry at the heart of our success, we shall continue to spend money on R&D, specifically targeted at growth in value-creating segments and geographies. Going forward, we expect to maintain R&D spend at a consistent level.

In this sort of business, delivering step-change innovation relies on deep understanding of customer needs. And we shall continue to work closely with customers, and also with other leading-edge partners and researchers to do this. There's further opportunity in the future to offer enhanced service to customers through insights generated from data on catalyst and refining performance.

Let me just give you a couple of examples of what this looks like. Steam reformer catalysts are the most important catalyst type in some markets where JM has clear technology leadership. Using our catalyst design and manufacturing skills, we've developed a patented, new product where the active metal is located exactly where it's needed: the catalyst pellet surface, not throughout the pellet. So if you look at the photographs here, the top left, the first is this core, four-hole steam reformer catalyst. The second two photos show where the

nickel is located by looking at a cross-section of those catalysts. The second photo – top, second one in – is the traditional product, where the nickel is located throughout the pellet. The next photo across to the right is the new, core, eggshell technology, where metal is located only on the surface where it's needed for the chemical reaction. This results in a much more efficient and sustainable use of metal and gives a product with the same class-leading performance. Successfully launched in the hydrogen market, now rolling out to ammonia methanol. We're taking the same innovative approach in new applications, such as our mercury-removal products and gas processing.

And looking at something's that a little bit fresher. In ALM, the 3D parts: so ALM is Additive Layering Manufacturing. 3D parts are built up in successive layers of material, and it's all under computer control. We're exploring the use of ALM to make a step-change in manufacturing by combining our core PGM chemistry, the materials and the manufacturing skills, with next-generation manufacturing technologies.

The first step to develop new methods of fabrication for PGMs requires new enabling technology to make high quality powders suitable for layer deposition. Still at a relatively early stage, we've made suitable powders and done printing for experimental customer applications. ALM has potential to impact a broad range of markets where lightweight, complex parts are required for high performance applications. The photos here show two different ALM approaches. On the left, a laser metal deposition is used to fuse metal powders together to produce materials. And on the right, 3D printing is being used to build up layers to make ceramic parts. And if you go to the stand outside, you can have a look at the examples.

Focus on efficiency

In addition to maximising our opportunity to grow our top line based on selective investment in our capabilities in the fastest growing segments, we've also identified a range of initiatives to further improve our efficiency and effectiveness. These initiatives can be characterised as operational and organisational efficiency enablers, and improvements based on reducing the complexity of our business. We see particular scope to make our business less complex, without in any way diluting the value we bring to our customers. We see the chance to reduce our product portfolio significantly by eliminating our redundant or little-used products from the products slate.

JM has been a world leader in PGM refining for many decades. Nevertheless, we see significant scope to apply newly developed technology and techniques to enhance further our refining performance to the benefit of our customers and the JM Group. Finally, the spans and layers of our organisational structure have grown out of step with industry best practice in recent years. Our less complex business model can be effectively managed with a less complex organisation, with wider spans and fewer layers, and with a clearer line of sight between our core capabilities and our customers' businesses. Overall, we plan to grow operating profit 1% ahead of sales growth as we deliver operational improvements.

In JM, we have deep technology leadership in the businesses we operate in. And restructuring Efficient Natural Resources, we've brought together two divisions to form a new business with a clearer purpose. Our renewed purpose and capabilities will mean that we will have opportunities outside our current traditional homeland of oil, gas and PGMs in enabling

the transformation of other critical natural resources. We're currently evaluating which natural resources provide the opportunity to create complementary businesses, meeting our objectives of added value to JM and to our customers.

Additionally, building on our core capabilities and taking into account long-term market drivers such as the move to cleaner feedstocks, we see the opportunity to move into adjacent markets and technologies through transformative R&D, partnerships and M&A.

We also see longer term opportunities to get involved further in the circular economy. We currently help recycle and reuse PGMs and spent catalysts, and our objective in the efficient – to help in the efficient use of natural resources, using our core competencies, could take us more in this direction.

As a solid speciality chemicals company with origins all the way back to JM's 200-year history, we've quite naturally talked about solid material products like catalysts and PGMs as our business throughout this presentation, and indeed they are. But as we talk to our customers however, it becomes clear that the value lies just as much in our understanding of them and their applications and our service levels, as it does in our delivered solid products. So we seek longer term opportunities to build on the value of our service provision in the coming years.

Consortium to commercialise technology

An example of where we are moving into adjacent technologies is with Virent. Johnson Matthey is part of a consortium, which includes Coca Cola, Toray and bio-renewables company Virent. The consortium aims to develop, scale-up and commercialise Virent's Bioforming technology for low carbon chemicals and fuels, including materials to produce bio-polyester. Basically, this is about creating a soda bottle that can be bio-based and recyclable, addressing a growing consumer pull. Johnson Matthey and Virent have formed a team to conclude catalyst and process development activities, as well as the subsequent marketing and licensing of the resulting low carbon fuels and chemicals technology platform.

So, to finish, I would like to summarise my excitement for the future of this business. Whilst Efficient Natural Resources is a resilient business that's integral to the JM Group, there's so much opportunity to build on the JM core competencies, leadership and expertise in chemistry technology. We will deliver performance improvement, where our focused investment will lead to: sales increasing 1% above the market growth, with the exception of PGMS, which will grow at low single digit over the medium term; and operating profit growing 1% of sales growth, driven by efficiencies plus the benefit of restructuring, as announced in June 2017. We will be creating value for customers today and in the future by the efficient transformation of critical natural resources.

Thank you. Over to Robert, I think now.

Robert MacLeod: Thank you Jane. We'll do the Q&A at the end, if that's all right.

Health

Robert MacLeod

Chief Executive, Johnson Matthey

Overview of our Health sector and the market we operate in

So, I'm now going to talk you through – talk through Health with a couple of colleagues who I'll introduce you to in a minute.

So, it's a pleasure for me to be talking to you about our Health sector today, and I'm really excited about the potential that this sector has to deliver breakout growth for JM. To access this potential we've been investing in the business over recent years, and we will be explaining today how and where we've made that investment, in the next 45 minutes or so.

Firstly, I will give you an overview of the market: the key trends and information on how we're positioning our business. This is coming from me because I continue to search for a chief executive for this sector. This is taking longer than I had hoped but I am prepared to take the time to make sure we find the right person. I'll then hand over to Garrett Dilley from our sector leadership team on the innovator side, and he will explain how we use our technology strengths and the sector's global assets with our innovator customers. You will then hear from Paul Evans, who heads up our generics business. He will explain how we use those same strengths and assets to deliver value with our generic customers. Lastly, you'll have me again, to explain how this all comes together in our strategy for the sector and what that will deliver.

Health

So, to start with, our Health sector is well positioned to deliver breakout growth. In part, this is due to the fact that we operate in a large and growing market within pharma, and which totals around \$40 billion. Global healthcare trends play to our strengths across innovator and generics, and this will allow us to grow at above-market rates.

Today, we have a portfolio of successful products and a competitive advantage. To strengthen this, we ramped up our investment in our new product pipeline, starting in 2014. In this sector the investment horizon – time horizon is quite long, but we are confident that returns from that investment will start to come through in the next few years. This is a strong platform on which to build with the strategy we're about to describe to you. This will deliver breakout growth, as I've said, from 2019/20 when we will deliver double-digit sales growth with margins reaching the high 20s compared with the 20% we have today. Our health business really does present a fantastic opportunity for us.

Global drug market

But first, let me explain more about the market. The global drug product market is huge and growing at about 6% per annum. Of this the global API market – again that's the active pharmaceutical ingredient market is about \$170 billion, also growing at around 6%. Within that market, we operate in the \$40 billion outsourced small molecule API market that covers both generic and innovator activities. This is growing faster than the overall market as a whole, around about 8% per annum. And more specifically still, we work on those small molecule APIs that have the most challenging technical barriers to overcome. This is of course at the heart of what JM does across our businesses.

Cost effective treatments

The need for cost-effective treatments is driving some relevant trends for our segment. First, pharma companies are seeking more and more targeted and potent APIs. These address specific biochemical pathways in the body, and provide a more effective therapy. Such APIs come with greater molecular complexity, and in turn often bioavailability challenges that require our technology strengths to overcome.

Also, the focus on cost is driving an increase in generic products and greater outsourcing by innovator and generic companies alike. These market growth rates are clearly a positive, but it is fair to say that in the pharma market success depends on bottom-up molecule selection rather than riding underlying market growth. We, therefore, target molecules where our chemistry and technology strengths give us an advantage in their development and manufacture.

API development

JM has a reputation in the pharma market for rapidly and effectively solving challenges in API development and manufacture which sit outside the run-of-the-mill. This has been true since we entered the market by solving the unique challenges around bringing platinum-based therapies to the market. More recently, we have become best known as a controlled substance house, solving difficult chemistry and manufacturing challenges. For many years, we've had deep catalyst design and development skills that we have applied to the pharma market, and more recently we have enhanced our capabilities to include solid form science expertise; and we apply both of these skills to controlled and non-controlled substances.

Innovative customers

It is important though to also recognise that the demands of our innovator customers are slightly different to those of our generic customers. With innovator companies we work on novel APIs for new drugs. They pay us to help them develop and then scale up the manufacture of their API. They own the IP but we play an important role in helping them to bring their drug to market. For generics, the API is known widely, and the emphasis is on appropriately navigating the IP landscape to produce a product that is equivalent to the branded version. But in both cases, it is the same technology strength in development and manufacturing that advantage us.

Examples

Let me give a couple of examples to showcase our capabilities. The first example is of work we carried out on a novel API for an innovator customer, where the API target treatments for genetic disorders. And when we talk about molecular complexity, in this example we are talking about a molecule with over 500 non-hydrogen atoms; as a contrast, ibuprofen has just 15 non-hydrogen atoms. So, to bring this molecule together required a range of detailed chemistry expertise and close collaboration with a customer to find the optimum synthesis route to these molecules, and it is now a commercial product.

The second example is from work on a generic compound. With generics, the crucial outcome is to develop a product with bioequivalence to the brand and with a defensible IP position, and with our clever solid form expertise we developed a cocrystal of the active, which achieved all of this. By improving the bioavailability of the API, we were also able to remove multiple

steps from the manufacturing process, getting the cost of production as well, another key criteria for our customers.

So, our core capabilities today are those described here on the right, and from these two examples you can start to see how we use them to create value. Obviously, though, we will continue to invest in broadening these capabilities in line with our underpinning group-wide strengths and with a strategic focus, as we grow this business.

The business today

But before we go into the details about the future, I thought it'd be helpful to describe our business today. On the right, you can see the strength we have in controlled substances but also that we predominately operate in the generics market. These sales are based on the four core capabilities I outlined on the previous slides, and they are supported by our global assets. These shared capabilities and assets drive good synergy between our innovator and generics businesses. Indeed, working with innovators on their cutting-edge challenges helps to keep us at the top of our game when it comes to solving technical challenges with generic APIs.

You will also note that our development sites are situated amongst the leading US and European biotech communities, as we work to solve the most difficult chemistry and manufacturing challenges, working closely with our customers on their most important projects.

Investment

So, because of the attractiveness of this market and JM's strengths, we substantially ramped up our investment in 2014, to drive growth from a new product pipeline. As I've said, the timelines in the pharma market are long, and therefore we always knew that it would take some time before that investment yielded a return; and we are just starting to see the benefit of our increased investment in our new generics pipeline, which Paul will detail later. It is vital to maintain a steady level of investment over the long term, and that is what we aim to do, although our results today are being impacted by insufficient investment in years gone by.

Paul will also describe how co-investing is an increasing trend of an evolving market structure. Our ability and willingness to complement this type of commercial arrangement with our technology capabilities can allow us to capture more value, and be an attractive partner for our customers.

We will also continue to build our innovator business, although the timelines to commercialisation are even longer. In this case, though, the development risk is taken by our customers, and they also have clinical attrition risk as well, as some products fail to get through clinical trials. But with both innovator and generic customers, we aim to convert projects to commercialisation, which is where we will also make significant profit and, as you can see, we have made good progress in developing our pipeline over the last few years.

Whilst the foundation for strong growth in the five- to ten-year time range has already been laid, and we will start to see returns coming through soon, we fully intend to invest further in our capabilities to address this market, and position the business for even stronger long-term growth, and this approach is reflected in our strategy.

Challenges

When we look at the challenges that our customers are facing, driven by the increasing cost focus in the market, and we analyse our own strengths, there is a clear role for JM to play in supporting our customers. This drives our strategy, which is to become the partner of choice for the innovator and generics companies when a success of their target molecules requires overcoming difficult chemistry, bioavailability and, or manufacturing challenges. The focus on high barrier to entry segments reflects the strength of JM: in our chemistry, the scale-up of complex manufacturing processes, and our ability to operate in tightly regulated or controlled environments.

High value capabilities

Our range of high-value capabilities also reflects the technical challenges being faced by the market, and these match JM's core strengths in materials design, engineering and characterisation. Addressing these distinctive challenges is what JM is all about. With innovators, our success will require that we take more projects through to commercial scale, and therefore increase our development capacity and capability.

With generics companies, our success will require that we improve efficiencies for our established products whilst continuing to invest in a balanced pipeline, underpinned by the same capabilities. Together, these will generate double-digit growth for the sector, beginning in 2019/20 with margins increasing to the high 20s.

So, I'd like to hand you over to Garrett and Paul, to talk about our Innovator and Generics businesses respectively, starting with Garret.

Innovator Business

Garrett Dilley

Senior Director, Business Development, Sales, and Marketing, Johnson Matthey Pharma Services

Introduction

Thank you Robert. Good afternoon. My name is Garret Dilley, and I head up the commercial function of our Innovator business in North America. Today, I'm going to speak to you about our global Innovator business.

A strong foothold

Now, JM has developed a strong foothold in the large and growing innovator outsourced API market. Our routes in material science, catalysis and controlled materials give us a technical advantage in the space, and also credibility with our innovator customers. I'll explain how JM plays in the market, how we differentiate ourselves, our progress to date, and where we're going.

Innovators

Now, innovators are those companies that develop novel products, providing new and improved therapies into the clinic. This provides a large potential client base with over 1,000 companies developing drugs today. JM participates in the value chain after the drug discovery process, from the point where the active ingredient is known but the process for

best manufacturing is not. Developing the optimised physical form of this active ingredient and speed to market are critical in this process, and that's where JM's capabilities come in.

In clinical development, JM develops manufacturing processes for APIs, and manufactures supplies to support clinical testing. Supply through clinical development gives us a great chance at winning the contract for the commercialised API. At commercialisation JM will assist with filing of regulatory documentation, and is actually listed as a manufacturer on such documentation, and then JM manufactures the commercial API. And post-commercialisation, JM develops next-generation processes and helps with new formulations.

Commercialisation

Now, JM has evolved from a development service to one which brings development processes through to commercialisation. When we take an API to commercialisation and manufacture, the returns increase. By providing development and commercialisation services, the demand for our services has increased, and you can see this in the three years since fiscal year 13/14 where the Innovator business has over-doubled.

In clinical development, JM is paid a fee for development service and then for supplying the product in clinical development – in clinical quantities. Fees for development and manufacture are based on resource-loading or quantity. This leads to a relatively large range in sales, as you can see on the slide. You will also notice in the slide that clinical development work is charged for on a project basis over the clinical phase, which may last from six months to three years. In contrast, payment for commercial APIs can last three to ten years. Therefore, the sales and profitability rise rapidly as the project progresses through the clinic and into commercialisation.

Now, the client's switching costs are high here, and again increasingly so as the product moves through the clinic and into commercialisation. You can see sales increase at commercialisation by looking at our pipeline today, where our 19 development projects account for around 42% of sales, with 12 of these being well progressed in the clinic, yet seven products in the commercialisation stage account for about 58% of sales.

Now, of this pipeline of 19 development products, with the expected clinical attrition, we forecast it will bring a further four to six APIs through to commercialisation with our customers.

Investing in capabilities and capacities

Now, while growing this business over the years, we've also continued to invest in our capabilities and our capacity to enhance our offering to innovators. Our customers come to us to solve a challenging problems, not just to outsource their work, and the projects we secure are thanks to the positioning around our strengths. This is reflected in our pipeline, where 60% of our pipeline is made up of molecules with high molecular complexity, or which rely on complex transformations for analysis. Around 50% of our pipeline are projects that utilise our skills with highly potent or controlled molecules. These are high barrier to entry manufacturing areas. Robert noted the shift in the market toward targeted and more potent APIs. In fact, 25% of the branded API market today is highly potent, and that is increasing at about 10% per year.

Around 40% of our pipeline has benefited from our solid form sciences expertise and about 20% of our pipeline is differentiated by our ability to deliver key catalysis steps with JM's market-leading range of catalysts, including propriety chemo and biocatalysts.

Commercial success

Now, to exemplify how these capabilities come together to deliver commercial success, I'd like to talk you through how we've built a very strong relationship with one of our customers over the last five years.

In 2012, JM was awarded an early-phase clinical project, based on our strength in developing prototype processes and delivering API supply requirements. A close relationship developed and the customer began to rely on JM for such prototype development; and with that two additional programmes were awarded, one of which was enabled by our catalysis expertise. Now, in late 2012 JM's development experience, solid form expertise and high potency manufacturing capabilities – based on these, the customer awarded a multi-year contract to develop a full-scale process and manufacture of clinical and commercial supplies of a fourth API, a late-phase drug candidate. This drug was approved in 2013, and a five-year contract extension for its manufacture was signed this year with JM.

Well, work on these earlier APIs has ceased due to the clinical attrition we've spoken about; JM has been awarded contracts to develop a process for, and deliver API for, a fifth and sixth API, projects which capitalise on our strengths in catalysis and complex molecules. This relationship with the customer has been worth about \$13 million over the five-year period, with the commercialised API being the most significant contributor to that. And of course we continue to work on APIs five and six, doing everything we can to give them their best chance for success to commercialisation.

So, that gives you an idea of our current position in the outsourced innovator API market. As we continue to build this business, we will continue to leverage our strengths and solve the complex challenges, bringing more projects into our API development pipeline.

Commercial-scale products

Now, we already have seven commercial-scale products, and expect a further four to six products over the next seven years from our current pipeline. By 2025, we aim to be adding one to two commercialised products from our pipeline each year. The projected annual profit per molecule is expected to be in the range of a half million to £5 million for the vast majority of the molecules, with upside to that range for a few of the molecules. To get to adding one to two commercialised products each year, we will be adding new skills, including spray-drying and expanding capacity in these high-barrier-to-entry areas and to our high-value-added capabilities, those same capabilities and assets that we share with our Generics business. This will enable us to deliver growth well ahead of market, and we expect the Innovator business to remain around a quarter of the Health sector, going forward.

And with that, I'd like to pass you on to Paul.

Generics Business

Paul Evans

Vice-President and General Manager, Johnson Matthey

Introduction

Thank you Garret, and good afternoon. My name is Paul Evans, and I head up the Generic Products and Solutions Segment of the Health sector.

I'm excited to be with you this afternoon, and in this section I will describe the generic market, how we operate in the space, and outline our position today. I'll talk about how the investment plan we started in 2014 is expanding that position, and end with a review of the returns that will support our growth projections.

Generic value chain

Now, the generic value chain differs from the innovators in a few key areas. Our customers, the generic drug companies, do not focus on the discovery of a new molecule, the target molecules that are already approved, and clinical testing is typically focused on showing equivalency to the brand, and there's a heavy emphasis on navigating the patent landscape to allow commercialisation.

Now, JM participates in this market by identifying brand molecules of commercial interest, and then investing at our own risk to redesign the manufacturing process or solid form of the API, to circumvent patent protections or create our own IP position. We then work closely with our generic company partners as they bring the drug product to market, with JM focusing on achieving commercial scale manufacture of the API.

Now, the selection and manufacturing of the API utilises JM's high-value capabilities of solid form sciences and particle engineering, complex chemistry solutions and catalyst-enabled API production: the same strengths that innovators value.

A highly fragmented industry

Now, despite the recent consolidation at the drug product level, the industry still remains highly fragmented. Only a few companies have achieved double-digit market share, providing opportunities for those API suppliers developing and launching new products, and our customer base, including the generics companies listed here, mirror this diversity.

Market value

I'd like to highlight two areas of addressable market value: the API market, and the drug product market. Both vary significantly from year to year, driven by the expected year of generic market formation, essentially when the brand patent – when the brand product comes off patent. And as you'll learn in the coming slides, JM can extract value from both of these addressable markets.

Generics market value dynamics

Against the backdrop of how we participate in this market, I'd like to also provide some insight into the generic market's value dynamics. I'm starting after the brand's value has developed. At the time of generic launch, generics enter the market at lower prices, and the extent of the fall in prices is a function of the number of generic competitors at launch. The overall product volume can either stabilise due to the reduced brand marketing, or increase

as generic availability drives further prescriptions. In either case, the generic market penetration is very rapid in the US, and the brand will quickly lose share until it reaches an underlying floor of typically 10% or less.

Now the API price dynamics will not necessarily correlate to what's happening to drug product prices. These will be a function of the API competition.

Now, the ex-US markets have their own nuances with respect to the slope of these changes, especially without the first-to-file incentives of the US market, but the differentiation between the API and the drug product is similar, and the impact to JM is that by capturing value from the two different addressable markets – profits on the drug product and the API margin – those value streams are not correlated.

Primary value driver

Currently, in today's business, the primary value driver of our generic commercial segment is the manufacture and sale of controlled substance APIs. These sales mainly occur under a typical product price mechanism but we have some limited term profit-sharing arrangements that drive additional margin for JM.

Controlled substances

Now, a brief comment on the controlled substances. These can be impacted by manufacturing or procurement quotas or import/export restrictions. While some of our past ADHD business in the US has been impacted by changes to our customer's quota, the recent reductions in US aggregate quota are focused more on the bulk opiate APIs, which will only be a minor impact to our US margin. We are optimistic that we will obtain the necessary quota to support our projections in the ADHD space, and the higher margin specialist opiates are split between products with quota and those without quota restrictions, like addiction therapies.

In our ex-US market, which today is mainly a bulk opiates business, those bulk opiates are being impacted by a change in the product mix, with importation of drug product increasing over locally sourced bulk API. We still expect to see growth from today's portfolio, mainly from the specialist opiates market, where we are well positioned to support some upcoming customer launches with our API. This will be partially offset by some parts of our ADHD business, where competition is increasing and some existing profit-share arrangements will contribute less in the near term. As a whole, our focus in the controlled substance area will be to prove efficiency, to extract maximum value.

Expanded pipeline of APIs

Our significant growth in this segment will be driven by the manufacture and sale of a greatly expanded pipeline of APIs, beyond the controlled substances of our current business, a pipeline that we've built but have not yet launched. And these products were specifically selected to capitalise on our core technology differentiators. Now, when building a large pipeline of new products you need a process, and our new product selection process is a disciplined approach that utilises risk-based financial analysis to support selection, development prioritisation and, most importantly, the commercial business model that we will employ, either API product pricing or profit-sharing partnership.

Now, we move methodically through these stages, from early opportunity identification, where we continuously monitor the developments in the phase III clinical studies and the brand analyst projections: through screening of technical and investment fit to full business strategy and valuation, and then a focus on executing the development plan, to commercialisation, which includes regulatory filings, applicable patent litigations and, finally, launch. And as the pipeline launches, this will deliver a portfolio effect, where we will have less reliance on any one product, however, you can see that the timelines in this process can be quite long, and our performance will remain sensitive to lumpiness from launch timings until the early 20s, when a large proportion of our pipeline has commercialised. You will see the impact of this in the coming slides.

Investment in API pipeline

So, a few years ago when we initiated a substantial investment in an expanded pipeline of new APIs, and started to capitalise the development costs, and currently we have a pipeline of over 40 products in various stages of development. The pipeline covers a range of therapeutic categories, from cardiology to GI, to neurology and oncology, with neurology and oncology around half of the pipeline's indications. It's important to note that in the generics segment, our customers do not sell and we do not select products based on their therapy class or indication; the focus is more on our capabilities, and that's why more than half the pipeline would be considered highly potent APIs.

The outlook is that we will be commercialising these products in line with either a patent limit date or their FDA approval date, and we expect to launch more than 14 projects in the next three to four years, with a further 20 or so advanced to pending regulatory approval. As products launch, we will realise each product's commercial value in accordance with the competitive landscape and the co-investment model that we've employed. Certainly, not all projects will succeed, and annual returns for each product will have a wide range, with the low end at around £1 million per annum and the high end around the £10 million per annum level.

A little more colour on our ramped up investment. We started increasing our investment in 2014 and targeting around £25 million per annum. The dark pink represents the projected span for the currently identified pipeline that I just reviewed with you, and as these advance spend on these products will decline. But keeping our targeted investment level will allow us to develop additional products, which are not yet identified in the pipeline or part of the projected returns that I will show you, so the light pink gives us additional head room for further pipeline development.

The submissions for regulatory approval are a leading indicator of the pipeline's progress. They represent the products pending launch, and you can see the timing of when we expect the identified pipeline to queue up for approval.

Profits

Co-investment and partnerships

As outlined earlier, JM's profits are generated by either the margin on the direct API sale, or we may earn a share of the profits from a generic company's drug product sales, by having co-invested in the development of the drug product. And by co-investing, what I mean is that

we both guide and financially support the drug product development in addition to the API development.

Now, each new product opportunity has its own risk/reward profile that we utilise to determine how much we're willing to invest in each project before allowing the partner to take over the remaining R&D funded. And this partnership model enables us to make returns in excess of the API manufacturing margin but it requires us to be involved in the drug product development, along with the API commercial manufacturing. So, when you consider this overall investment, it's a mix of both API and drug product development spend. Currently, around 80% of the projects in the Generics segment pipeline are co-investments with some level of profit-sharing partnership.

Risk-based financial model

As mentioned, we utilise a risk-based financial model, and this considers the major risk drivers of litigation, development, regulatory review and brand market evolution, and it accounts for their impact on the investment, the filing and litigation strategy, the launch timing and the market forecast. So, this forecast chart that's seen here is already risk-adjusted by these drivers, and it provides a range around the significant growth we will achieve through the launch of our already-built and in-progress pipeline of projects. So, here you can see how the pipeline comes together to add approximately £100 million OP by 2024/25.

Partnership with Mayne Pharma

Now, we've already launched one of these partnerships and it's an example of a highly successful co-investment by JM, the launch of generic dofetilide with Mayne Pharma. The overall objective was the development of a generic version of Pfizer's TIKOSYN capsules, an antiarrhythmic agent used to prevent irregular heartbeats. Now, Johnson Matthey first had to develop a thorough understanding of the patent landscape for dofetilide, and then utilise our core chemistry and capabilities to identify a non-infringing manufacturing process, a non-infringing crystal polymorph, and meet exacting purity and particle size requirements. The development programme for the API was undertaken in alignment with Mayne Pharma to minimise the development time for both the API and the drug product formulation, and this allowed us a first-to-file submission, a first US generic approval, and 180 days of market exclusivity. And we continue today to share profits as the only true generic in the market because our technical advantages were the key solution that other generics have not yet achieved.

Summary

Executing on the generic segment strategy entails building on a solid foundation. We've been supplying APIs for decades, and we've had profit shares in the past, but the difference today is that we are investing in the pipeline to commercialise additional new products in a growing market. We are utilising our core technology differentiators to select products in which we will have a higher probability of commercial success, and we are managing the risk/reward profile to capture additional margin from appropriate profit-sharing partnerships. So we will continue to create value from our existing product portfolio, plus we will deliver substantial growth from fiscal 20 from our new product pipeline.

Robert?

Concluding Remarks

Robert MacLeod

Chief Executive, Johnson Matthey

Thank you Paul. And now just for a few concluding remarks from me. And Garrett of course, thank you too.

As you've now heard, our Innovator and Generics businesses work together and have some really exciting opportunities ahead of them. In Innovators, we will deliver well above market growth. In our existing Generics business, we will deliver low single-digit growth but our Generics business will see breakout as our pipeline, as Paul described, comes to market. Of course, continued long-term investment is required. Capitalised research and development will be maintained at around £25 million a year, as Paul suggested. We will build additional capabilities in areas that require our science to meet increasingly technical challenges, for example high potency APIs. And CapEx, in addition to our capitalised research and development, will run at around £30–40 million a year: higher than the Group's rate of CapEx as this is a business in scale-up mode and offering significant returns.

So to quickly recap, you've heard how we operate in an attractive and large market, one driven by advancing technologies to meet the challenges of providing better and more cost-effective treatments. The technical solutions to meet these challenges match our technology strengths, particularly when it comes to delivering complex APIs and when these require an optimised solid form. Our committed investment over recent years, as well as our strategy, position us well to deliver above-market growth in our Health sector. We have the platform to transform this sector and scale it to a very significant business, and of course we have other broader health opportunities within new markets that may add to this business in time. I am therefore confident that this business will grow sales at double-digit rates beginning in 2019/20 with margins reaching the high 20s.

So, thank you very much for listening to both those presentations, and with that, we'll take any questions that you may have on either the Health sector or on Efficient Natural Resources.

Q&A

Robert MacLeod: So, first question here in the middle.

Michael McNamara (Temporis Capital): Hi, Michael McNamara from Temporis Capital. In the Healthcare, approximately half of the business is in the opiates, and that's pain relief and addiction therapy. I'm sure you're aware of the opioid crisis in the US and of multiple state attorney general's beginning the process that will likely end in massive fines to the – I don't know what part of the drug industry but some part of the drug industry, similar to what we saw in the tobacco industry. What is your exposure to that kind of risk, and for something that – if there is any risk, is 3% of your overall sales worth carrying that risk?

Robert MacLeod: It has to be said that our – you're right, we play in a bulk opiate market for pain therapy, but the vast majority of that is here in the UK. It's manufactured in the UK and sold in Europe. We have a very small share indeed of that market in the US.

Michael McNamara: Well, then that means that you have even less revenue with all the risk.

Robert MacLeod: Well, there's no – sorry, I don't know if everybody else heard? 'Less revenue and all the risk.' I think there's no indication at all at the moment, at all, that this risk is going to go down to our level. And we've, you know, we've been investing in the pharma market for quite some time; we've been in the market for a long time, and we've always looked very, very carefully at the risk/reward dynamics and understanding what role we play and how far down the value chain can go – we can go. And our legal analysis has always been that this is not a risk for us, even given what's going on in the US today.

Over there, I think Andrew had his hand up quickly.

Andrew Stott (UBS): Thank you. Andrew Stott, UBS. Just coming onto the numbers on the pipeline, the 100 million of profit by mid-next decade, I wasn't quite clear on that base case in terms of the attrition rate you'd expect. So, there was an example given of roughly a 50% attrition rate in one of the customers. So that 100 million, what is the attrition rate applied?

Robert MacLeod: Well, I'll let Paul give a little bit more detail in a minute but, I think, make sure we don't muddle or confuse what the attrition rate in the innovator space versus the attrition rate in the generics space. Innovator space, it is quite high because you have that clinical attrition rate. In the generics market, it's much less; that clinical – that risk is much less. It's more a development risk: are you able to develop the API in an effective way. So it's much, much less.

There is, I mean, as Paul said – and maybe, Paul, you can give a bit more detail in a second – we don't – all projects aren't going to succeed. And so within that spectrum part of the reason why there's a low case and a high case: in some of the lower cases we're obviously assuming some failures, in the higher cases obviously you're assuming more successes, but that is already factored in to that range of potential outcomes. So, the mid case as we have is our view today on the most likely case.

Paul, would you add anything further to that?

Paul Evans: No, I think the key is separating the attrition rate on the innovator side, which is the success of that molecule actually getting to commercialisation; since we are starting with only already approved products, that attrition rate is taken out of that equation.

Robert MacLeod: Okay?

Andrew Stott: Thank you.

Robert MacLeod: Adam?

Adam Collins: It's a question on the capitalised R&D, the 25 million. Just to confirm, that capitalisation at 25 million is R&D, and is it all of the R&D that takes place in the business today? And the profit forecast for the pipeline looking forward, just to clarify that is after the R&D amortisation that will occur over the product's life?

Robert MacLeod: Absolutely, clearly it's after the already amortisation of that capitalised R&D. And if you go back – sorry, I haven't got my slide deck and, or my glasses in front of me, but if you go back to, as Paul was describing, on slide – forgive me a second, slide 121, when he was talking about the process to build the API portfolio. At the front end, up until

you get to really the development stage, we expense that, so the capitalised R&D is only once we're in the development phase pre – and then obviously when you get to the commercialisation phase, then you're into the depreciating that capitalised R&D. So, the answer to your question is: no, it's not the – we spend more than 25 million; it's around about the early 30s million for the sector as a whole. And that difference between the 25 and the early 30s is not just – it's some of the work that we do in the innovator space but also some of that pre-selection work, which is described, as I said, on slide 121.

Adam Collins: Okay, would you be able to say what the corresponding revenue expectation is around the 100 million of extra profit?

Robert MacLeod: I'd rather not give that at this stage but because, as Paul described, it's quite – 80% of those products have co-investment type models, therefore the revenue drop-through is pretty high.

Chetan Udeshi: Can you give us any indication of how diversified – I mean is there one product which is accounting for a significant proportion of this expected, or is it well diversified?

Robert MacLeod: Well, we've a portfolio of about 40 products, and I think within that period is about 25 or so launching in that, because not –

Paul Evans: More than that are launching within the timeframe.

Robert MacLeod: So it'll make more than 25, so 30 products, so it's a relatively broad spread. I mean, yes, there are some which are lower value and some which are high value but there's not one knockout – well, that's the wrong term but, you know, one large API that's making all the value there. It's – there's a broad enough portfolio that we're not so dependent on one.

Question: And with the company getting deeper into pharma API business, I mean, is the level of synergies with the rest of JM getting looser and looser? So the question is: what is the sort of synergies level between the Health business overall and JM, the rest of the JM business?

Robert MacLeod: Look, we view this as a very attractive business, and it's a good business which we've been investing in over the last few years. We think it has tremendous growth potential; it plays to our strengths. Look, I'm not going to overstate the synergy between it and the rest of the group; there are synergies across the group but they're not ginormous. But we look at this as a business as a whole; it's an attractive business with attractive markets, and I'm sure we can be successful with it, and I'm excited about the opportunity that we can deliver with this. Andrew?

Andrew Benson: Yes, thanks very much. Andrew Benson. Within the – your new Efficient Natural Resources business, you've obviously got the old PGM services activities, which are critical for your, you know, all your platinum group metal businesses but if you are successful as you hope in nickel-rich batteries does – would that division have a substantial role to play in the nickel supply chain, and what sort of cost time horizon would it require alliances to achieve that?

Robert MacLeod: Jane, do you want to answer that?

Jane Toogood: Yes, so as I said at the end of the presentation, we're evaluating many opportunities about where we can play in the whole use/reuse/transformation of efficient natural resources, so nothing more to say at the moment.

Andrew Benson: Thanks, that's helpful.

Robert MacLeod: I mean, I think the reality is, look, our PGMS business is primarily focused on platinum group metals. That's what we have and we know, and we know it well. Jane's business is also the old, the former, you know, process technology business. We do a lot of work with our nickel chemistry and cobalt chemistry, and a lot of the catalysts use nickel and cobalt, so we've got a very well understood supply chain and our ability to source nickel and cobalt is well established over many, many years. Now, how we will continue to deepen them if the market, or when the market for Battery Materials comes up, that's something we're starting to work on now.

Neil, can you pass the microphone over? Thank you.

Neil Tyler: Thank you. Another one for Jane actually. The division that you run now, I think you've inherited some quite significant growth, I beg your pardon, investment that was laid down prior to your arrival, so two questions related to that. First of all, should we therefore assume that as that investment translates into growth that the figures that you presented for medium-term growth are frontloaded as a result of, you know, a lump of investment in R&D and CapEx that started in 2015? And then, secondly, I didn't see in your slides but can you help us understand whereabouts we are in the investment cycle, both capex and perhaps R&D for your business?

Robert MacLeod: Okay, Jane?

Jane Toogood: Yeah, fine, I'll stand up again. So, yeah, so although of course there has been investment over time, and there will continue to be investment over time, because we have that important role not only to sustain and support the JM Group but also in delivering the sort of leading positions in the market, so I don't think there's any particular loading element to that; I think you'll see a good resilient growth opportunity there. And in terms of where we are within the investment cycle, I mean we would expect that the capex will be running at above depreciation, and we will invest appropriately to support the development of the markets but there's no particular drive on that, if that's what you're asking?

Robert MacLeod: Okay? Adam, yes?

Adam Collins: It's a question on the production plan in Health. I mean, clearly you're expounding a strategy which seems to be about an improved mix, but there'd also appear to be perhaps a leverage opportunity in that there's been quite significant changes in the UK in terms of the factory reorganisations, and you acquired quite a large amount of capacity at Riverside a few years, which is yet to be filled, so I wonder if you could just expand around how you're going to be deploying the production facilities for the expansion?

Robert MacLeod: Sure. So for those of you who are less familiar to our business, we have manufacturing assets in North America and also here in Europe, actually in Scotland. And just a couple of years ago we bought a new – a plant in Annan in Scotland. Annan is just slightly north of Carlisle in the south-west of Scotland, and we've been investing in that business to bring – it's not a business; that asset to bring it up to speed because it had been

previously mothballed. So that gives us a lot of additional capacity here in Europe, and initially we'll use it to manufacture our – the opiates and the APIs that we make over here much more efficiently because we'll be able to take relatively inefficient processes and a manufacturing asset up in Edinburgh, which is where we're based mainly at the moment, into Annan and drive efficiencies there, through larger vessels, more efficient manufacturing techniques. That's one of the major things that that will do, which will then free up some capacity in Edinburgh, which we then could use for more high-value APIs than we're using at the moment.

To some extent the same is true in the US, where we bought the Riverside asset, I'm going to say, Paul, was that four years ago?

Paul Evans: 2010

Robert MacLeod: 2010 – oh crikey, longer than four years ago, so time flies. So 2010. And we've done a similar thing, and it's freeing up the capacity in other parts of the business. But I think we need to continue to invest because I think you need to have the right capability and the right kit to make the molecules as we're evolving. You heard quite a bit about high-potency APIs, and you've got to make sure you have the right manufacturing assets and the right manufacturing environment to make those APIs. So I don't think there's going to be massive capex in terms of large-scale new plants or anything like that at this stage. It's more around building up and fitting out the rooms and the areas most efficiently, so we can make the manufacturing footprint that we need, going forward.

Okay, it looks like there's less questions for after this session, so why don't we have a break now? Thank you very much. It's 14.30. If we come back at 15.00, have a longish break since we've had a couple of short ones, and then we sort of wrap up with Anna and me finishing off and your chance to talk – ask questions about the whole group as a whole. Thank you.**Robert MacLeod:** ...couple of wrap-up presentations, firstly from Anna, who will go through some of the detail and give more about the numbers and how we're actually, really going to really drive some of the value and I'll just wrap up at the end. Then, we've got a little bit more time to answer any questions you might have. The team is still here, so if we need to, you can ask any questions about anything.

But, first of all, over to you, Anna.

Growth

Anna Manz

Chief Financial Officer, Johnson Matthey

Introduction

The final straight. So, you've heard from our four sector heads and they've outlined the short, medium and long-term plans for growth. Of course, the different stages of these businesses mean that the growth trajectories for them differ.

So, now, I'm going to recap and try and put it all together, for JM as a whole.

Guidance for 2017/18

But before I look further ahead, I want to reiterate our guidance for 17/18. That's similar sales growth, at constant currency, to the 6% in the second half of last year, and broadly flat operating profit on a constant currency basis as operational momentum is offset by lapping the one-off £17 million US post-retirement medical benefit credit, predominantly in the first half of last year, and by an increase in non-cash pension charges this year due to the lower discount rates. At the full-year results, we announced a restructuring, targeting further cost savings of around £25 million in the full year, with 10 million being achieved in 17/18. This is an associated charge in the range of 50 to 65 million. It's now well under way. Half of the £10 million will be seen in Efficient Natural Resources as we delayer the business, with the rest benefiting New Markets and Health.

CapEx is expected to remain at the £285 million level, which was 1.8x depreciation. The CapEx plans that you've heard the sector heads talk about are either already included in that amount, or have replaced other proposals as the plans you've heard about have greater return. And so, for the rest of this presentation, I'm going to focus on our businesses beyond this year.

Sustained growth in Clean Air

John and Phil have taken you through a detailed analysis of the future of Clean Air. We've shared with you how the range of outcomes in diesel and in pure BEV penetration could impact our business, and by how much. In a changing market, we operate from strong market positions due to our technology, and with an agile operating model. And therefore, we've already made some big share gains in European Light Duty, both in diesel and gasoline. The structural changes in this industry are mainly legislative, and therefore we have significant visibility of their impact, and they're substantially positive for JM.

As John showed, consumer behaviour is increasingly a driver of change. However, as you saw, our ability to give the OEMs the solutions that they needed to meet the changing consumer environment was behind the share gains that we made. In this environment, we expect Clean Air to deliver strong single-digit sales growth in the short term, and grow mid-single-digit on average through the decade.

In the first couple of years, growth comes substantially from our European business, from business that we've already won as a – and as a result of legislation that is already enacted. In the medium term, we expect the move from diesel in Europe to benefit gasoline and, increasingly, gasoline hybrids. You've heard us describe the market over the next ten years. However, any further structural change will impact us only by £4 million at gross profit for every one percentage point shift from diesel to gasoline.

Elsewhere over the medium term, growth will come from our Asian business expanding, predominantly on the back of new legislation, while the rest of our business maintains steady growth, as the move to battery electric vehicles in the Heavy Duty sector is at a slower pace than for Light Duty vehicles. We will maintain our investment levels in the short term as we transition our capability builds in Europe to capacity expansion in Asia. After Asia, there's no material additional capacity required. The share gains that we've made in Europe have come with about a point of margin erosion at a sector level over the first couple of years. After

that, margins returned to their current levels. This is because the legislation globally improves margins, and we focus on efficiency to drive out cost and enhance our agility.

The key sensitivities for our Clean Air business remain to pure battery electric vehicles, with the impact of one percentage point increase in the penetration of BEVs estimated to reduce gross profit before mitigation about £7 million. Overall, this is a strong business, and it's well positioned to deliver sustained growth over the next decade.

Breakout growth in Health

Moving now to Health, you heard from the team about the attractive opportunity our expertise in APIs gives us in this high-growth segment of the pharma sector. Over the medium term, our health business will deliver double-digit sales growth, together with margin expansion to the high 20s by 2020. This growth is the result of the investment that we have already made and will continue to make in building a pipeline both in innovator and generic APIs. In 18/19, while our pipeline is made up of some very successful products, it's not at scale. This will hold back sales growth, and, as we continue to invest, profit will be down in this period, and we'll see growth come through after that.

In addition to our investment in organic growth, we'll also look for opportunities to accelerate growth through targeted M&A, where opportunities meet both our strategic and financial criteria.

Breakout growth in Battery Materials

As you heard from Alan, the market opportunity for Battery Materials is substantial, and at an early stage in its evolution. It's a market that's driven by technology and has the capacity for high returns on investment. In our high-energy nickel technology, we have a market-leading product, eLNO, and as you've heard from Alan, the customer feedback has been very strong. The investment programme has started with the building of a pilot plant. The pilot plant will cost about £30 million, and it will inform the design of the plant that we build for commercial capacity. That plant is likely to have capacity of up to 10,000 metric tons per annum, and will be under construction within the year. Total spend, as Alan said, is currently estimated at around £200 million. We would expect to see JM cathode material in cars from 21/22.

Market-leading growth in Efficient Natural Resources

Highly selective investment choices and market-leading technology will allow us to outperform in Efficient Natural Resources. These are markets that are growing at around 2-2.5%, and we expect to outperform by one percentage point, whilst maintaining low single-digit growth in precious metal services. Focus on operational excellence will improve profitability, delivering profit growth a point ahead of sales growth over the medium term. In addition, the restructuring we announced in June will benefit Efficient Natural Resources by over £12 million on an annualised basis, of which £5 million will be in this year, 17/18.

Investment will continue in aggregate a little ahead of depreciation. Licensing income will remain low over the medium term, as there'll be little investment in capacity occurring. As a result, you'll see our business become increasingly second-half weighted, as the big catalyst business tends to occur ahead of the summer plant shutdowns.

Relentless focus on driving efficiency

Growth in the four sectors is further supported by a relentless focus on efficiency. This is end-to-end operational efficiency; it's not cost-cutting and it's not a project. We're driving sustained improvements across every aspect of how we run our business, and therefore the benefits are broader than cost.

It has two main platforms. First, ensuring common standards across JM. This will improve our performance by accelerating the best of JM around the group fast. As we standardise our commercial processes, we're getting a deeper understanding of our cost to serve our customers. This is allowing us to simplify our offerings, improve our product mix and identify pricing opportunities. In a moment, I'll talk to you about the benefits of standardising our approach to procurement.

Secondly, we're simplifying and automating common processes. Doing this in our planning process will take months of effort out of our business. It doesn't deliver monetary savings, but it frees up our people to target them against our biggest business opportunities. Our investment in a single global ERP system supports and accelerates our work on operational efficiency. However, as our first site goes live in 18/19, we'll start to recognise depreciation on this asset. Our efficiency work does reduce cost, and over three years we will realise at least £50 million of savings, with benefits starting in 2018/19, predominantly through better procurement. Delivery of these savings will be relatively evenly split over the three years. Of the benefits, £15 million will impact our CapEx spend, with the balance in cost of goods and overheads. Of the £35 million, I would expect to reinvest about half in projects which will drive future performance.

Improving working capital management

And as you know, we also apply this operational efficiency focus to working capital management. Our working capital has two drivers: working capital excluding precious metal, and precious metal working capital. Working capital excluding precious metal is under our control. It's a function of our efficiency in running the business, and the performance metric is working capital days excluding precious metal. My focus in running our business as efficiently as – is running our business as efficiently as possible every day. We measure success as maintaining working capital, excluding precious metal, between 50 and 60 days throughout the year, rather than just at points in the cycle. We still have a lot more to do here, but our performance year-to-date has seen an average improvement over the same period last year of seven days.

Precious metal working capital is a function of our customers' choices rather than our own. We offer our customers a unique set of services, including sourcing metal, storing metal as well as refining their metal. These services underpin our competitive strengths across a number of our businesses, including Clean Air. Here, our customers' choices impact our metal working capital needs. Our skill comes in the commercial terms we offer for the different services we provide, and the benefit of those terms in the relationship it builds with our customers. Low liquidity in the metal market, as we're currently seeing in palladium, generally leads to an increase in our metal working capital, as we manage safety stocks, as our customers store less metal with us, and as they look to us to source metal for them for production. This has increased our working capital, and this will result in a small net operating cash outflow this half.

Procurement

The scale of the opportunity in procurement will deliver most of the additional £50 million savings that we've identified. Our annual purchases, excluding precious metal and substrate, are about £1.5 billion. These purchases are made across 118 sites, with each site accountable, for the most part, for its own purchases. In the main, the only sites where we've been using procurement expertise to deeply inform how we buy is in the purchase of chemicals and other direct materials in Clean Air. This is in part because purchase data is captured with different definitions for products and different definitions for suppliers, at every site, and across more than 40 ledger systems, which has historically limited our ability to consolidate our understanding of purchases across the group.

A decision to move to a global procurement strategy started with capturing this data on a consistent basis. We now have data for a year's worth of purchases across the group on a common basis, and it's given us really deep insight as to where the procurement opportunity lies. We've started to execute against this opportunity, building new capability to ensure that we capture it in full. Professionalising procurement within JM not only reduces cost, but it also means that we manage our suppliers better, which has many additional benefits, including reducing supply chain risk.

Our rigorous resource allocation framework

Now I want to turn to resource allocation. All of our businesses use chemistry to solve our customers' complex problems, and all of them have the potential to deliver a 20% return on invested capital when they are at scale. However, as Robert outlined, our businesses are at different stages in their maturity, with different return profiles and, therefore, different resource allocation needs to be rigorous – and we need to be rigorous in the allocation of resource to accelerate that value creation.

Those resource allocation decisions are based on this framework.

Select

The return criteria we've established for our select investments reflect that these are nascent technologies – new businesses yet to be scaled up. Here we're investing heavily against future potential. These businesses bring our latest technology to new, complex problems, often in new markets. Therefore, there's likely to be a very broad range of potential outcomes. While each investment has a business plan which, over the longer term, will deliver against our 20% return on invested capital target, these businesses cannot be managed on financial criteria alone, and in new markets we supplement that with defined milestones and stage gates, where the businesses must meet predetermined criteria for further investment. And you've heard from Alan a little bit about how we've applied that approach to our investment in high-energy battery materials.

Scale-up

Looking at scale-up, these are more established businesses, but they're still sub-scale, and any additional investment needs to accelerate growth. You heard John describe this approach for Clean Air business in China. Here we've seen higher levels of R&D as we add products to win business arising from the new legislation in China. However, the nature of the market means that we will be investing CapEx in capacity to supply business that we've already won, so we'd be expecting to move towards the 20% return on invested capital quickly. You heard

Robert describe how our Health business continues to invest about £25 million a year in building the API pipeline. Until that pipeline is at scale, we will continue to invest in new APIs, well ahead of the depreciation of investment in launched APIs.

Sustain and grow

And finally, our approach to sustain and grow. Here we're targeting R&D against specific customers and products, and investing CapEx where we see immediate returns an ROIC at or above 20%. For example, our plant in Poland, which will give us both the capacity to supply new business wins for Clean Air, whilst at the same time providing a more efficient manufacturing footprint.

Consistent investment weighted to near term

So, bringing this all together, we look at investment returns on a case-by-case basis, rather than managing to a budget. Therefore, there will be some annual fluctuations, albeit this is mitigated by the scale of our spend. On average, we would expect to see R&D remain at about 6% of sales each year, but it will vary from year to year, depending on the opportunities that we see and the returns that they will deliver. CapEx will remain, on average, at 1.8x depreciation over the next few years, and it will be higher in the early years as we invest in Clean Air capacity in both Europe and Asia, in Battery Material capacity, and we continue to invest in our API portfolio in Health and our IT systems, which will deliver operational efficiencies. For 18/19, that will mean CapEx is around £100 million more than this year, reflecting the incremental investment in Battery Material capacity, on top of maintaining existent – existing investment levels elsewhere. This would take our CapEx to depreciation to about 2.1x. Over the longer term, investment in IT systems and Clean Air will decrease, with Health and Efficient Natural Resources unchanged, while future investment in Battery Materials will reflect the further evolution of that market.

Capital allocation

You've heard each of our four sectors outline growth strategies. Consequently, our priority is to reinvest in those organic growth opportunities on a disciplined basis, delivering returns consistent with our 20% return on invested capital target. We will do this while maintaining our progressive dividend policy and maintaining the balance sheet flexibility, targeting net debt to EBITDA of 1.5 to 2x, allowing us to invest in value-enhancing opportunities which accelerate our growth. As we consider potential acquisitions, we're looking for opportunities where we would expect return on invested capital to exceed our pre-tax cost of capital over the short to medium term. In new markets, our investments will be aligned with the group's strategic objectives, and with the group maintaining a longer-term view on expected returns, given the very early-stage nature of some of these markets. Subject to the above, if we find we have a sustained excess of capital, we will make additional capital returns to shareholders. This is something that the board monitors closely and will continue to monitor, but in the short term we have exciting investment opportunities in our business.

Summary

Therefore, in summary, the strategies you've heard from each of our sectors will deliver attractive returns over the short, medium and long term. However, across JM, the return profiles differ with differing levels of business maturity, and we allocate our resources rigorously to maximise these returns. In addition, we're relentlessly focused on driving

further value through efficiency in everything that we do. Collectively, this operating performance will deliver an improvement in our return on invested capital to 20%, and mid to high single-digit average EPS growth over the medium term, and a progressive dividend. Thank you. Let me hand back to Robert.

Concluding Remarks

Robert MacLeod

Chief Executive, Johnson Matthey

Thank you, Anna. And just very quickly to wrap up from me, at the beginning of today I said I hoped what you would take from today is an understanding of, and lots of evidence for, our confidence that, as Anna said, this will be the future performance at JM. We've made a lot of changes to be in this great position, and we've invested a lot in the platforms we now have. It has opened up huge opportunities across the group, and we will deliver those opportunities, from our share gains in Clean Air to the pipeline we are building in Health, and from the focus we have in Efficient Natural Resources to the market-leading products we have in Battery Materials. I'm very proud of the business, our technology and of what our employees achieve on a daily basis, but I'll be even prouder still of what we are going to achieve in the future.

So, before we finish, it just gives me the opportunity to thank all my presenters and my team for all the hard work they've put together to put this – today together for you, but just give you one more chance if you've got any more questions to ask of Anna and me, we take that opportunity now.

Q&A

Robert MacLeod: So we've got a couple of questions. Where are you going first, Katherine?

Chetan Udeshi: Just on the comment about short-term margin decline in Clean Air, it's not very clear, because are you gaining share in diesel, which traditionally has been a higher-margin business. Why is the margin declining?

And maybe just on the current quarter as such – you know, you started with the low-single-digit growth in June quarter, which was clearly a slower start with the 6%, so how do you see that sort of progressing in the current quarter? Thank you.

Anna Manz: Yeah, so your first question was around the margin erosion – the one point of margin erosion we'll see in the short term in Clean Air. We've won a huge amount of share in Clean Air. We won that share because we've got outstanding technology and we were able to move very quickly to give the OEMs what they wanted. If you think about it, previously the cycle would have been we would have had three years to work through changing the products and working with the car companies on what that solution was. We won that share because we were able to do that in three and six months across multiple products in a way we'd never worked before. Now, that came with some cost of margin. As we've learnt – as we've got those products launched and we're now manufacturing them, we're able to slowly take that cost out over time, but actually it's a testament to the fact that we could move so quickly to

deliver it. So that's what gives the margin dip in Clean Air. It will come back as it corrects itself.

The other question was the first quarter. I'll let – wherever he is – John add, but we often see summer shutdowns. Orders aren't equally phased through the year. We have very good visibility to our order book and the – and the orders that are coming our way. It really just reflected the timings of those orders and the plant shutdowns of our customers.

Jay Tonadachi: Thank you.

Robert MacLeod: Okay. Andrew, you had a question

Andrew: Yeah, thanks. On the move to 20% return on invested capital, did you give a year for that?

Anna Manz: No, I didn't, but I was kind of expecting somebody might ask me the question. Over the medium term.

Andrew: Right. So – and the general definition of medium term is within three years.

Anna Manz: Three – well, nearer five. So five-ish years is when we'll be back at 20% return.

Andrew: And that excludes acquisitions?

Anna Manz: That's correct, yeah. So it's operating.

Andrew: And how long would you expect an acquisition to take before it – before the net incremental benefit of an acquisition generated 20% return?

Anna Manz: Do you know, it's really hard to sort of give a rule of thumb, because it depends on what you're buying and why, but we're very committed to our 20% return on invested capital target, and we'd be looking hard at any acquisition that we were considering through that lens.

Andrew: Okay. Thanks.

Robert MacLeod: Any more for any more? Any other questions? Yes, we've got one – oh, we've got two quickly there. Not sure whose hand was up first, but Katherine –

Jeremy Redenius: Jeremy Redenius from Bernstein. I take your point on responding quickly, grabbing diesel market share. I guess it begs the question, though – if customers are so desperate for a quick solution, why not price it higher, such that it's not margin dilutive? Or is this just the fact that margin's not really the right way to look at this, and incremental EBIT was actually quite meaningful?

Robert MacLeod: I think you answered your own question very well at the end there. I mean, margins really aren't the best way to look at it. I mean, you know, this is great business to win. We're going to drive real value from it. The fact there is a percentage point decline in margins as we're growing double-digit in the short run – I think that's something we're – it's partly about the mix, it's partly about the costs of putting this additional manufacturing into production. And then, as we drive the efficiency through the business, the margins will recover.

Jeremy Redenius: And does that not bring any risk of, let's say, price competition across your – the rest of your product portfolio?

Robert MacLeod: It's forever thus. We've had price competition since the day we started this business, so we're used to it. It's what happens year after year, programme after programme. That's what happens. In fact, in most programmes you have price down set on an annual basis, anyway, that you've pre-booked, so you've got to drive your efficiencies in your manufacture processes anyway. And so we're confident we can navigate through this. We've done it before, and we will again.

Jeremy Redenius: All right. Thank you.

Robert MacLeod: Okay? Sorry, there was another question here. Well done, Simon. You're just there.

Sebastian Bray: Thank you for taking my question. I want to have two, please. I think it was mentioned earlier, of the £50 million of procurement savings that could be achieved, there was a mention of a figure of £35 million. Is that the figure from that that is reinvested, or have I misinterpreted this?

And secondly, if mid-term means about five years, does mid-term EPS growth of mid to high single digits include the uplift from batteries? Thank you.

Robert MacLeod: Anna, do you want to give clarity again on the 50?

Anna Manz: On the procurement, yes. So the £50 million of procurement savings – about 15 of that will come from what is capital expenditure, so it doesn't directly benefit the P&L. The amount that benefits the P&L will be £35 million, and of that we will look to reinvest somewhere in the region of half of it against future growth opportunities.

Robert MacLeod: And the medium-term growth rate and EPS obviously assumes some assumptions on batteries. Now, the – and what Alan was talking about was being on platforms in 21/22, which is almost getting you towards the end of the medium-term period. So it's making assumption of our penetration on the battery space in that – from that – essentially that one asset, because the reality is, if we were to expand more, that would be – that would come on production sometime after that sort of five-year period.

Sebastian Bray: Sorry –

Robert MacLeod: Go on. You can ask, yeah.

Sebastian Bray: Just as a quick follow-up on the CapEx. If CapEx for the next fiscal year is likely, as guided, to be £100 million larger as a result of factory investment, and the total investment in the facility is £200 million, is there a particular – is it just the nature of these facilities that you have front-loaded CapEx, or is there a reason why this is particularly seemingly half-loaded, even though there's about a three- to four-year period until the investment comes online?

Robert MacLeod: I think – I think the – I mean, the – it's not quite as – I mean, we were giving broad numbers to indicate the £100 million. But you've heard, as well, from John about the plant that we need – that we're going to invest in in China for Clean Air. We talked about the batteries investment as well. So it wasn't trying to be just single – you know, assume there's going to be £100 million spent in batteries next year on that one asset. It's more of a totality.

Anna Manz: It will be £100 million more, and it's recognising that we've got coming at the same time – Clean Air capacity build at the same time as we have Battery Materials capacity build, and maintaining the rest.

Robert MacLeod: Can you pass the mike on to –

Question: Yeah. Thank you. Just a couple more. Within the new businesses, what does what you explained to us today in Battery Materials mean for the trajectory of the operating result in the new businesses over the next three years or so? Because obviously there was a breakeven target there, and that's been sort of moved off to the right somewhat. So if you can – if you can help us understand the trajectory in the – in the operating result there.

And then secondly, just to make sure I understand in my mind – within the Clean Air sensitivities that you've provided, your operating – bridging those to your operating profit growth guidance, you're not in – not assuming any mitigation between gross margin and operating profit.

Robert MacLeod: So, on the second question, you're correct. When we give you the four for diesel and a seven for battery electric vehicles, that was very much at the gross profit level. Clearly we then would mitigate some of it as we go down through the P&L. So we would hope – not we'd hope, we'd make sure – it wouldn't be as large at that at the bottom-line level. But we didn't go into the details of what those – all those would be, but it would be a lower number.

Going to the – going to your – your first question, look, I think it's – I mean, to be clear, when we put the segments together, it created new markets. We didn't want to try and be obfuscating and not give you talk about the sort of – the breakeven business. The breakeven that we talked about for – was it –

Anna Manz: This year.

Robert MacLeod: – this year –

Anna Manz: This year.

Robert MacLeod: – is not going to be breakeven, because of the additional investment we're making in Battery Materials.

Question: Sort of, you know, not necessarily even when it gets to breakeven, but what the sort of trajectory of operating result would be until you – until you get a profit contribution.

Robert MacLeod: Well, of course, we've now got, you know, the life science technologies business in there, and the medical device components is there, so it is a profitable business in totality today. The batteries business – the pace of the battery business turning into – it's making money today as – in aggregate. But how we then move it forward, and how quickly that turns into large-scale profitability, will depend upon the success of us getting onto these car platforms in 21/22. In the medium time, we're going to have to invest. I'm not giving you the direct answer to your specific question, because it's actually quite difficult because it'll always depend upon the level of investments we need to make going forward.

Would you add any –

Anna Manz: Yeah, I mean, all I'd say is at the current time I don't feel any need to materially step up the level of investment that we have in the business. So I think you can sort of consider the current trajectory.

Andrew: Yeah, it's just coming back to the strategy again on Battery Materials, and how locked down is the decision to go it alone, in effect? You know, you have various options. You've decided, at least initially, to be 100% owner of a production site, or a number of production sites. You could have JV'd, you could have licensed out – that was discussed this morning. How locked down is the decision? I mean, there was a sort of comment from – I think from Alan about some possible other routes, and it was left hanging. So just what discussion – I mean, there's only so much you can say, but is it £200 million and done, and we just – we just put that in a model, or could there be further developments down the road, depending?

Robert MacLeod: Well, clearly – well, clearly we're sitting here today in – crikey, I've lost track of where we are. Where are we? We're in –

Speaker: 2017.

Robert MacLeod: 2017. What month are we in at the moment? We're in September. Thank you. We're in September 2017, and what Alan talked about – sorry, I don't know why I couldn't figure out what month it was. It's been a long day. September 2017, I mean, and Alan talked about doing the feed work now and the – and we're talking about approval of the project to the board in the summer of next year. So, summer, that's – there's a few months' range in summer, so it's around about the summertime next year. So, clearly it's – nothing's locked down yet, because we haven't actually made a firm decision. And so, if something else changed between then and now, then of course we – some – we could do something differently. But I would assume, at this stage, that we will be, as your words, going it alone and building that capacity. Because when we talked about the mark – the opportunity for this market, it's very, very substantial.

So having some capability, and more than just a 10,000-ton plant into the future, is, I think, a – is absolutely essential for us to play. Now, if there are other routes to go and accelerate it, that's obviously something we would look at. But none of those are locked down either, and whether they're available or not, who knows? So I would assume at this stage that we're on the going alone route. And, going back to the licensing thing, it's far too early to talk about licensing. That's something we've got – look, we've invested. We've got 60 fantastic scientists doing great work, and we've made great progress. Why not capture some of that value – maximise the value of that for ourselves today? Okay?

Anything else? No? Well, look, thank you so much indeed for coming today. It's been a long day. I think it was slide 150 we finished on, so well done on getting through all the slides. I hope you found it helpful, and I want to thank you all very much indeed for coming, for your interest, and for all your questions. Please feel free to call the – our IR team, or indeed any of the rest of us if you've got any further questions you'd like to ask later. Go through the IR team, and we'll get you further detail if you've got any other questions. But – and once again, thank you to my team. They did a fantastic effort. There's a huge amount of work that goes into this presentation, and so I hope you would thank – on – you could thank them

on my behalf, or collectively thank them for all they put together. So, thank you very much indeed for the day, and look forward to seeing you again later.

END OF TRANSCRIPT