

AMG CMD 30-03-2023

H. Schimmelbusch
[00:02:30]

We are here in Frankfurt, in Hoechst, because the lithium headquarter of our downstream operations is based here. One of the biggest problems of the lithium industry is that it was a small industry, specialty chemistry, and suddenly it is a strongly growing, big industry.

And in such situations, since it is a complex material, the technical expertise is not broadly distributed. And we were lucky enough to be able to attract a fairly substantial amount of people when Chemetall, the originator of lithium in the world, a German company, was bought by Albemarle.

The decision to go into lithium in AMG dates back to 2016, where we decided to ultimately invest \$75 mln to build a spodumene facility in our Mibra mine in Brazil.

In 2022, that investment in our lithium operations in Brazil produced 63% of AMG's record breaking EBITDA of \$343 mln. This percentage of 63 is expected to grow to 70 and 80% of the total of AMG's EBITDA which is also supposed to grow in the next years.

And this is the same percentage as lithium activities in Albemarle. Albemarle is a lithium company. So, nobody questions that. Although Albemarle has substantial other activities and catalysts, and [inaudible].

The strategic question for AMG therefore whether the difference between 70% and 80% and 100% is a difference large enough to separate lithium from the rest of the company. That needs very careful decision making. But until we have made the decision we are a lithium company, like Albemarle.

So this question is under careful consideration and there is no haste.

We also have certain decisions which are in the making as regards to the expansion of our business. They will be very important for this decision also.

The 3 presentations today highlight the dynamic nature of the lithium value chain in AMG. From mining to battery-grade hydroxide. Our underlying strategy at AMG: in everything we do, is to interpret market dynamics, anticipate long-term needs and position AMG's expansive capabilities to generate value for you.

And the lithium value chain is a shining example of execution of that strategy. Please note that the word "lithium" was not mentioned in the IPO prospectus filed by AMG in going public in Amsterdam in 2007.

We operate 2 lithium business units: the upstream mine in Brazil and the downstream processing business in Germany. Each of these businesses will be described in these presentations by Fabiano Costa to my right, who built the mine in Brazil, and Dr. Stefan Scherer to my left, the CEO of AMG's downstream operations, who is building the refinery in Germany.

We have included into this presentation, because we were asked to, and we are most happy to include, Dr. Kölln who is sitting here, the young man to the left; he is managing one of the biggest growth aspects of AMG: LIVA, the lithium-vanadium battery unit which we formed, fully management team and we are building batteries. Stationary batteries and we will come to that. And he will present it. It will be a substantial, a substantial unit over time.

The presentations today are fairly comprehensive. What is left to me is to add a few remarks about the strategic thinking behind all that. I will explain the strategic thinking and I will also comment a little bit on LIVA.

The Mibra mine that you see is in Minas Gerais. The Mibra mine has been a tantalum mine for quite some time. The lithium content in the ore was not processed. It was stored in tailings. We started to invest in processing of lithium in 2016 and started to produce spodumene lithium concentrate in 2018. In addition to technical and other challenges, of this diversification in Brazil, we had to find a customer for the qualifying of the product. We found that in a contractual tolling partner in China. This leading lithium refine has become a very valuable long-term partner.

The Mibra mine is a low cost producer of spodumene. Historically that has been also, or partly, the result of the processing of tailings, so it's a circular economy aspect. And the credits from the production of tantalum, as Fabiano will detail, the tantalum production is under long-term contract and partly thanks to the tantalum production the spodumene costs at the Mibra mine are below \$500 per ton. CIF China.

This low cost position will be further enhanced when we expand production from 90.000 tons to 130.000 tons of spodumene which is underway. And going operational later this year.

We are determined to fill the empty space in Europe, where a battery-grade hydroxide refinery is missing.

There is not one hydroxide refinery in Europe. It's strange, but there is also not one hydroxide refinery in the U.S. We have quite an infrastructure framework of building 5 units, 5 modules as we say; 20.000 tons each.

The first module is under construction and you have a model there in the hall. 20.000 tons; we expect, and everybody else expects, there is a consensus that in 2030 the European market needs 600.000 tons of battery-grade hydroxide.

The first module is based on spodumene from Brazil, converted into technical grade, or technical-grade hydroxide, in China.

Prior to an upgrading plant, being operational in Brazil, we are in basic engineering for building a carbonate plant in Brazil.

We selected Bitterfeld as a location and groundbreaking was in May 2022. We estimate our capital expenditure \$140 mln, including the infrastructure for the expansion and excluding the investments to make the refinery feed-agnostic. This was not project financed; it was financed from cash flow, this investment. You see a picture of the refinery, it's fairly advanced, and commissioning will be around august/september.

The downstream strategy was decided starting 2019 in the context of building an extensive lithium team in Frankfurt. Chemetall GmbH, the world's leading lithium company at that time, was sold to Albemarle that happened in 2015. Chemetall had been a 100% subsidiary of Metallgesellschaft and actually had invented lithium in 1922. Produced the first lithium salts. Albemarle apparently was focused on the overseas production assets of Chemetall as they did this acquisition. In Nevada, Chili and Australia.

The intellectual property in form of a large team obviously was non-core, and available to be integrated to AMG. In the meantime we have over 20 formal Chemetall employees, including the management and the research team in our AMG family. Led by Dr. Scherer head of Lithium GmbH. At the time Dr. Scherer pointed out that we also should fundamental research and in order to target solid-state batteries.

We were most happy to be able to attract a world leading name here: Dr Vera Nickel. And she is one of the persons in the world who have a chance to be the leader in that material for solid-state batteries. That is materializing in a pilot plant around the corner here.

And we are in basic engineering for a larger semi-commercial plant in order to keep our leadership development intact. The main point is that in addition to feeding additional modules by the way of additional resource projects for the refinery, there is great deal of optionality to arrange feeds through commercial contracts with producers of a variety of lithium containing materials.

In a way it repeats the business model of the custom smelting industry in copper. Dr. Scherer will explain this.

The lithium sector is transforming itself from a small niche to a major industry. The liquidity of these various markets contained along the value chain of lithium will rather erratically change over time. As happened in all the development of large metal industries in the past. The central role in all of this is the last step of the value chain: the link to the end market. And that is battery-grade lithium hydroxide. And that's the refinery.

The revenue potential of the Bitterfeld battery-grade hydroxide complex, fully built, 5 modules, is in the range of \$5 bln per annum, and due to our flexibility in feed material we believe this operation will provide a very strong return on investment under any market condition.

We are active in searching to develop new lithium resource projects. And we have a variety of things we offer. The AMG lithium to resource owners, junior miners for example, the AMG lithium value chain gives our lithium team the ability to participate in the development of lithium resources. Beyond our Mibra mine. The slide tries to illustrate that. We provide mining expertise in hard rock or brine resources, engineering support, project management services through our Brazil based plant engineering group which has 35 engineers and support staff with global reach. Spodumene processing now, ability to sign long term bankable off-take contracts, with or without German government support, upgrading such contracts into project financing structures, and finally to provide the missing equity.

Fabiano will comment further on our resource development strategy which cannot be detailed any further beyond our non-disclosure agreements, on which we of course cannot comment to much.

A great example however of developing additional resources is our investment last week of Zinnwald Lithium as a partner with Zinnwald together we will pursue a definitive feasibility study for the project in east, east Germany, establishing a raw material base in Germany close to our Bitterfeld operations has obvious attractions.

The global lithium demand is pointing into the right direction. My perception is that the lithium demand and supply forecasters are far apart in their predictions, both in demand and in supply.

The demand forecasts are driven by the e-Car forward statistics. Forecasts of the e-Car intensity in each country, announcements of transition by companies and states, and so on. That doesn't sound to difficult.

The supply forecasts are more challenging. Relying on a large extend on the announced projects including the announced timelines and complemented assumptions about the production in China.

Some of these announcements must be taken cautiously, because many projects who are announcing timelines have announced parallel shifting timelines over quite some time.

Resource development frequently lacks the expertise of how to access lithium process technology. After all, the lithium industry was a very small industry.

Additionally, recent dramatic increases in interest rates, combined with global unrest in the banking sector, will restrict access to viable capital to only the most attractive projects.

This dynamic will reduce the rate of new lithium projects coming online. That is already happening. I do not envy junior miners trying to raise project financing in today's market conditions.

Conversely, AMG has about \$350 mln in unrestricted cash and over \$500 mln in liquidity, and no near term principle maturities. Combine this with our substantial operational cash flow generation and we are in a uniquely strong position to finance our strategic initiatives, while maintaining very reasonable conservative leverage.

Additionally we have fixed interest rates of around 5% for our main credit facility through 2026. And close to net debt zero excluding our 30-year maturity fixed rate municipal bond in America. We are actually a 30-year bond at 4,5%, it's better than equity.

To summarize: we are quite satisfied with our enviable balance sheet position. We believe there is a clear and indisputable fundamental energy shift happening, globally built on energy storage materials. That is the demand side.

On the supply side our low cost position combined with the vertical integration strategy we are currently executing puts us into an advantageous position under all market conditions.

Every realistic scenario supply-demand we have analyzed, results in a dramatic return on investment in lithium supply chains. We believe that based on these factors our lithium strategy will result in extraordinarily high profitability, potentially for a generation or more.

As regard to the LIVA battery, I want to confine [inaudible] to the origin of the idea of a stationary battery combining instant power with low cost storage. One of our plants was operating a hot gas mill, with highly volatile electricity demand. This led to the penalties from the Utility an unusually high electricity cost. Management planned to lower its electricity cost by installing a small islandized diesel engine power plant for peak shaving. A vanadium battery was considered as a green alternative. But this did not solve the issue as the vanadium battery would not handle instantaneous electricity demand.

When operating a hot gas mill, the idea was born to let the lithium battery handle the fast discharge part and then activate the low cost vanadium battery. Artificial intelligence software was required to manage this.

LIVA structure.

We ended up buying the artificial intelligence firm in conjunction with AMG Engineering, built the battery within 12 months, the first battery. The system works as planned. The supply storage capacity enables us to build rooftop solar energy facility integrating the electricity generated in our internal grid. That fits to whatever manufacturing plant.

The first LIVA battery for third party customers is under construction. Others are in negotiation.

Indications are that the demand for such solutions is very large and global.

The vanadium electrolyte, which is of course the raw material for the vanadium part of the battery, is supplied by AMG Titanium, a traditional producer of Vanadium electrolyte in Nuremberg. To manage all of this properly we formed LIVA Power Management System with Dr. Köln as CEO, Dr. Grünberger as Chief Operating Officer, and he was the project manager of the first plant, and we already have a CFO in that company which is fast growing as I said.

Finally let me make a few remarks on AMG in 2024, if that is of interest.

We have just completed the fiscal year 2022 and surpassed the EBITDA guidance from "\$320 mln, or higher" with a final EBITDA of \$343 mln. So we surpassed that guidance.

We have posted our 2023 guidance as "\$400 mln, or higher". Looking at our year-to-date February 2023 results, we had a very good start in 2023.

In May 2023 we will have our AGM in Amsterdam. Traditionally we publish at that occasion our new 5-year EBITDA guidance, which in May 2022 was stated as "\$500 mln, or higher, in 5 years or earlier".

We presently are working on a variety of scenarios, which is necessary to come to such long term guidance statements in a responsible way.

At the AGM in May we will formally update our 5-year guidance, as we annually do. Looking at our

scenario planning my comment on the present long term guidance statement to reach an EBITDA of \$500 mln, or higher, in 5 years or earlier is, that earlier could be as soon as 2024.

Thank you for your kind attention. Alongside with Mr. Costa, Scherer and Kölln, we will answer the questions once the presentations are completed. So I will now ask Fabiano to talk about his mining operation.

Q&A

M. den Drijver ABN AMRO [01:32:30]	<p>You mentioned, when you talked about the medium term, 5 trains up and running, 5 bln in sales, profitability at healthy levels at all market circumstances. You have also provided the insight in the production costs for the Brazilian conversion plant.</p> <p>Now to judge whether you can actually be profitable under all market circumstances, it would be worthwhile if you could give something of a range of the production costs of the German conversion plant in Bitterfeld as that would play a major role, and also the tolling agreement that you have with that binding agreement. That would be question 1.</p>
H. Schimmelbusch	<p>I don't know whether I got it. Are you talking about the conversion costs? Of the carbonate plant in Brazil? The estimated conversion costs of the carbonate plant in Brazil and of the conversion costs of the German refinery?</p>
M. den Drijver	<p>That is correct. Specifically the German refinery plant and also the tolling agreement for which you have a binding agreement in place. So that we have a picture, that we can form a picture of the overall profitability.</p>
H. Schimmelbusch	<p>Well, we do not disclose contracts with customers, tolling contracts.</p>
M. den Drijver	<p>But this is not with customer contracts. This your own production cost.</p>
H. Schimmelbusch	<p>Look, are we talking about the tolling agreement or ...</p>
M. den Drijver	<p>Both.</p>
H. Schimmelbusch	<p>Why don't you comment on conversion costs of the refinery in Germany? Generally.</p>
S. Scherer	<p>I mean, it is not even started up, right? So it's a conversion cost model. And, if you want to compare it with other things which are out there already, it's simply not possible, because such a plant is not existing.</p> <p>So, when I give you now a cost, it is only a portion of what you can see in other places, right? So, we are foreseeing something in the range of high digit, 3 digit numbers in \$ per ton.</p>
H. Schimmelbusch	<p>Say something, say a number.</p>
S. Scherer	<p>Something between 800 and 1.000.</p>
H. Schimmelbusch	<p>\$ per ton.</p>
S. Scherer	<p>Yeah. 800 to 1000 \$ per ton.</p>
H. Schimmelbusch	<p>800 to 1.000. Ok, so that's the one thing. And carbonate in Brazil. Conversion costs?</p>
F. Costa	<p>I think it was in the presentation. Again, it's an early stage. It's a felt 3 for the carbonate plant, but we are quite comfortable to state that the carbonate will be out of Brazil for less than \$10.000 per ton of carbonate to the plant in Germany.</p>
H. Schimmelbusch	<p>So that's the raw material cost of Germany this carbonate from Brazil will be \$10.000 per ton. So the difference between that plus the conversion costs will make the profit to the market price of the particular product.</p>
M. den Drijver	<p>That is after 2026. Prior to 2026 you still have that tolling agreement.</p>

H. Schimmelbusch	Either we are talking about the tolling agreement or we are talking about - later on - the carbonate plant in Brazil. About the tolling agreement we cannot unfortunately tell you what that is, because it is subject to non-disclosure agreements, obviously. So, ok.
S. Demeester ING [01:36:58]	<p>Thank you for the extensive presentation and for taking my questions. Three questions if I may. The first one is indeed Martijn's question: I think it would be helpful to return to the slide with the yellow bars, on the net hydroxide margin, to give some comfort on the minimum profitability of the early stage refinery. Where you have the tolling agreement in place, to give some idea on what we could expect in the first phase of the development.</p> <p>Just to get some colour on what you see as minimum profitability or what we could like model for 2024 when it's still in this early phase where you have all the tolling agreements in place.</p> <p>And the second question is, maybe more for Mr. Scherer: I would like to hear your thoughts on sort of recent newsflows on novel technologies in sodium-ion, in China, bottom-end of the market, and whether this could present sort of a risk to the developing lithium chain supply globally.</p> <p>And then the third question is also near-term. That's on the pricing structure. Today, your contract in Brazil tracks Chinese lithium carbonate prices. Which as we have seen are very volatile. Would you consider moving to different contract structure? More long-term, to reduce that volatility in your P&L, or would you stick with the current setup and accept the volatility which has large upside as we have seen last year, but potentially also some downside. So these are my three questions to start with.</p>
H. Schimmelbusch	As regard to the profitability of the refinery depending on prices and a lot of other things, our scenario planning has a range of 60 mln to 200 mln per module. That has a lot of assumptions behind it, and of course the 200 mln reflects a price of \$70.000 up, and the \$60 mln is the spread of \$3.000 which is a very, very established spread, times 20.000 tons gives 60 mln.
S. Demeester	<p>That 3.000, that is the difference between technical-grade, battery-grade minus the cost of production at your end. So this directly translates into EBITDA. Ok, that's very helpful, I think that is also what Martijn was after.</p> <p>And then the potential, given that diverging spread is quite substantial, indeed.</p>
H. Schimmelbusch	The second question was?
S. Scherer	<p>Sodium-ion. Well sodium-ion is not really new. [Inaudible] is basically promoting this technology in China. And sodium-ion for sure has not the performance criteria, or cannot fulfil the performance criteria of lithium-ion battery.</p> <p>Now having said this, for passenger EV's I think it is unlikely that you will see this. It has not proven even in a small series of batteries that it is actually useable. And I think [inaudible] has announced working on this some time last year or even two years ago, and since then you haven't heard anything new about it. So it's kind of a sleeping beauty, I would call it. So, I mean you never know. Maybe there is some niche applications market, where size and weight doesn't matter, but again, giving the chemical and physical properties of lithium-ion for small, compact applications like you need in the passenger car, lithium-ion in my view is the only mass market technology.</p> <p>And at the end of the day OEMs of this world do not tend to change their technology platforms every 2 years. So once they are set for lithium-ion, it will take a lot of time to make them changing their mind and maybe investing in another battery platform. Which still has to show that it can deliver.</p> <p>But, you know, from time to time you have these technologies bumping up. And you have to take a hammer to get them down again.</p> <p>eFuels is now a new one, right? Extremely high cost. CO2 reduction is one thing, NOx is the another thing; when you have been in China you know what I mean, right? When you walk through a yellowish fog through the streets, and it's extremely expensive. It's just using masses of electricity for producing synthetic fuel. Which is also not new. It has established 100 years ago already. So that's a little bit on technologies.</p>
H. Schimmelbusch	As regard to the third question, price formulas, there is always a philosophy difference between spot pricing and long term pricing. In the long term pricing you tend to have a formula mixing several components.

	<p>In our long term pricing we have mixed certain components estimating or drawing on the profitability of the customer. Mixing the profitability with the customer on a theoretical, negotiated basis, of negotiated parameters, with spot prices. And you are never correct.</p> <p>There are times when the spot prices would have been better, especially in very high price situations where Pilbara gets auction prices which are of course above the general index prices and is benefiting from that.</p> <p>We have always done a very conservative mixture of prices. Peacefully negotiated with our customers. So, as I said you are never correct. In low price scenarios we benefit. In high price scenarios, in very high price scenarios we give something up. It's a trade off.</p> <p>We are still optimizing these things and right now we are entering of course throughout the value chain a lot of contracts, and we are learning here. But that are the basic philosophies.</p>
Questioner "3" [01:45:25]	Two questions, one follow on from the pricing question: you sounded very confident that prices actually may go up again in the second half of the year once these particular Chinese...[interrupted by H. Schimmelbusch].
H. Schimmelbusch	No, no, we don't do confidence here. The future is the future, we are not confident or [inaudible] confident about the future; we are a low cost producer. That's important.
Questioner "3"	But that wasn't my question... [interrupted by H. Schimmelbusch].
H. Schimmelbusch	<p>We are making money and there is a base. Our focus in this whole thing, in each element and in the total value chain is, we want to be the low cost producer. And that then stabilizes our profitability forecast. Now, let's try to do something confident. I said that all the forecasts of for example benchmark, or Wood Mckenzie or people like that, show a sliding down of the lithium prices medium and long term. Very steady. They also show a production deficit in 2030 of considerable amounts, and it is in the same literature.</p> <p>So you get a book of 40 pages, in benchmark, and in this book you read that the price will go down, and then you read about a substantial production deficit in the end of 2030. So it cannot be true! Because if that production deficit is the case, then people will buy, and therefore the price will correct itself. So, I think it is very difficult to do this forecast, and I don't envy the people who have to do it. Because it's analytically and otherwise very complex.</p> <p>We believe in a delay and a complex road towards additional production. And that delay will be cementing the intrinsic...it will be volatile but there will be an intrinsic lag of production.</p> <p>Because it's easier to build a [inaudible] plant or a giga factory than to build a mine. The difference between building times of a mine: a mine you have to do 5 to 10 years and then you have a mine. A plant, a conversion plant: 2 to 3 years.</p> <p>So, I think we are living in a time where it will be volatile, but there will be a scarcity of supply, as a major issue of this industry.</p>
Questioner "3"	<p>I agree with that, and I'm looking just to this year in terms of how your pricing works compared to the spot market. You're looking from this current level of weakness [inaudible] to recover. Other forecasts are suggesting that lithium prices may go down to 30.000 a ton before recovering again. How, in that type of environment, how does your revenue fluctuate with lithium prices.</p> <p>Let's say lithium pricing goes up and down, up and down, ...[interrupted by H. Schimmelbusch].</p>
H. Schimmelbusch	<p>What you are asking is what will be the first quarter of AMG. I tell you it will be ok.</p> <p>But I can't tell you what it will be, because we don't want to do guidance on a quarterly basis.</p>
Questioner "3"	<p>My question is: how does the revenue receive relates to the fluctuations in spot.</p> <p>So how much have you got locked in at fixed prices, versus how much do ...[interrupted by H. Schimmelbusch].</p>
H. Schimmelbusch	Well, there is a certain time lag involved but we are not disclosing what that time lag is, you have to wait until the first quarter and then you have to wait until the second quarter, and then I think you can simulate, once you have those two numbers, you can really well simulate what the time lag is by which these price

	<p>formulas kick in. But we started well I said, you know. It's a very important statement.</p>
F. Costa	We started *very* well.
H. Schimmelbusch	[Laughs] Yeah, very, very well. But unfortunately that is not quantified [/Laughs].
F. Gänsch (?) Deutsche Bank [01:50:50]	<p>I have two questions: first regarding the hybrid energy system: what is the potential, how do you develop the business until the end of the decade, partnering? And second question: I missed some comments regarding 25% participation in the mine in Eastern Germany. What your idea is regarding this new site.</p>
H. Schimmelbusch	<p>Ok, the first one is a question of the market potential of the LIVA battery? Well, we are, as has been said, we are right now in the business of building batteries for urgent use in our own plants. And we have a few customers outside, and all these plants are under construction in our own engineering capabilities and they are very profitable.</p> <p>Because for example, there is a huge potential of solar roof installations which has not been done in plants. It has been done in Bavaria on the farm houses, but it has not been done in the production plants because it doesn't pay. You have to then make a contract with the utility and sell to the utility the intermittent electricity production from the rooftop. And this is not profitable.</p> <p>However, when you have a battery in-house then you create an internal grid, then you feed the grid by the solar roof, and you reduce the electricity import from the utility, and therefore you can apply the electricity price to that calculation and the higher the electricity price, the more the money you make on your solar rooftop. That is a very interesting mechanism, because it is very, very green. The high electricity price enhances the rooftop in the industry.</p> <p>But you need a battery for that. And the battery in the industrial applications has to be fast. Instant availability. So, that's where we add to the peak shaving, the solar application. And our demonstration customers then have a mix of uses and the central idea is to create your own grid. Within the plant. And manage the electricity streams within your plant as an internal grid. And that is the attraction of this. So you reduce your electricity consumption. And we are now using those batteries as demonstration plants, and building a marketing system.</p> <p>And the key competitor is the diesel engine. The diesel engine is our competitor. It sounds good to me. A diesel engine as a competitor. We have a Geschäftsführung (= management) in this [inaudible] plant, who happily came and said "we reduce our electricity cost, by flattening the volatility and therefore we will reduce the penalties which we have to pay to the utilities". And we said: "now how will you do that?" And he said: "we have an offer for a diesel engine". And then we said: "well a diesel engine doesn't fit very well into our sustainability report". If we announce that we now have a great idea, namely to burn diesel in order to... AMG is not made for that. So that was the origin of this LIVA battery idea. And it's spreading very fast. Another application which is very interesting is for grid management. We are working on several large projects for grid management. Where large entities...take an airport, take eh..... want to have their own grid. For grid management purposes, to optimize their grid management.</p> <p>And that is then batteries in the neighbourhood of 50 to 100 MWh capacity. Or \$100 mln investment. So we are talking about... this will be a separate market. The industrial market is the first market. And it's very wide spread in its applications.</p> <p>In one of our own plants we are installing a rooftop solar...we do peak shaving but also applied for solar, and we in this plant also produce green energy because we import hydrogen in that plant, or we buy hydrogen, and we want to produce now our own hydrogen from solar energy on the rooftop. So an incredible variability of applications.</p> <p>The other question was? "You have a project", you mean Zinnwald? Zinnwald is the one and only lithium property in Germany when you disregard the geothermal ideas from water. This is a very complex project and we wish everybody luck from that; the deep water geothermal</p>

	<p>lithium projects are futuristic ideas. We will see what happens.</p> <p>This lithium project in East Germany is very old. Has been mined. Has a considerable reserve to be mined, and has an ore body which reaches into Czech Republic under the border. So it's one third in Germany, two thirds in Czech Republic.</p> <p>The Czech Republic portion is owned by the Utility, CES, called CES, 51% and 49% by an Australian Junior. And the German part is owned by London-based, London-listed Junior company. In which we took a significant minority stake.</p> <p>The rationale for this minority stake is to be combining our know-how, in order to find an optimal solution. And there are various alternatives. The one alternative is to develop the German part separately. Second alternative is to develop the German part in conjunction with the Czech Republic part, which has implications for where to put the plant, the chemical upgrading plant, either in Germany or there, and the third one is to start with the German plant and then make it in such a way that you can combine it later on with the Czech part.</p> <p>That all is a beginning thing. We have a very definitive idea of what the optimal solution is. We believe in rationality. Because the economic difference of these various alternatives is very significant.</p> <p>And we will convince everybody as we are optimistic people that our ideas will then be implemented. And if they are implemented, we will feed one or two modules from Germany. And from Czech Republic. Modules in Bitterfeld.</p>
Frank Gänsch	Timeline?
H. Schimmelbusch	We cannot say, because first we have to convince everybody that our ideas are the better ones. And, you know, convincing processes, a combination of technical arguments, patience, and many things... So we are entering that process, you know.
M. den Drijver [02:00:38]	Just a follow-up on that question: convincing the shareholders of that junior mine would that include potentially also making a bid for the whole company? Is that one of the strategic options you could consider?
H. Schimmelbusch	<p>That hasn't crossed our mind.</p> <p>[Body language transcription] While looking at H. Schimmelbusch, J. Dunkel vigorously shakes his head suggesting the denial by Schimmelbusch of any such bid. As a result E. Jackson, sitting next to him on the front row, started to smile. After H. Schimmelbusch's reply, J. Dunkel briefly smiled towards him.</p> <p><i>Whether a bid for the whole company was discussed or not, "spider in the web" Schimmelbusch would surely have been the first to know. It might well be that such a bid discussion effectively took place. Since that knowledge then triggered J. Dunkel "to guide Schimmelbusch in his reply", as at that point Schimmelbusch had two options: admit or deny.</i></p> <p><i>If on the other hand there hadn't been any such bid discussion, Dunkel's strong reaction wouldn't have made sense, knowing that Schimmelbusch would be aware and logically speaking just had one option to respond: deny. And in that case there wouldn't have been any reason to smile either.</i></p>
M. den Drijver	Just to follow-up on the flexibility of the German conversion plant, you mentioned it might require some investments to make it agnostic. You mentioned recycling, lithium carbonate. What kind of investments are we talking about to do that, roughly?
H. Schimmelbusch	<p>I don't want to answer for Dr. Scherer. In my view the critical quality of the German refinery will be modelled after the successful custom smelters in the metal industry.</p> <p>And the biggest example here in Germany is Aurubis in Hamburg. Conventionally called Norddeutsche Affinerie of which I had the privilege of being chairman for a long time.</p> <p>Aurubis in Hamburg is I think the largest copper smelter in the world, and is highly successful in the high cost location. And why? Because they can take any copper containing material. All sorts of scrap, including electronic scrap, copper concentrates, high arsenic copper concentrate, low arsenic copper ..., any.</p>

	<p>The German word is "Allesfresser".</p> <p>So then of course you have a wide variety of optionality and when Dr. Scherer says agnostic, then that is our intention. We want to be able to take efficiently all sorts of lithium containing raw materials, as there will be low quality materials, there will be - starting production - there will be off-grade materials, there will be recycling, and we are investing in this.</p> <p>Of course you have to be technically capable of doing it, and that requires investments upfront. And we are going through that. It was mentioned, you mentioned 80 mln for</p>
S. Scherer	Carbonate to hydroxide.
H. Schimmelbusch	<p>So of being able to tap into the carbonate market worldwide. Because we see, when we travel around even in lithium exhibitions, you are being offered carbonate.</p> <p>So the carbonate market seems to be a very liquid market in the present times. I also said that the liquidity, not liquidity in financial terms, the liquidity in these markets along the value chain will be highly different over time.</p> <p>Mimicking what happened to for example the a... the good thing about me is, you know, I have been several generations in that industry. So, I have been watching the aluminum industry. And the liquidity in the aluminum industry for alumina and for various grades of aluminum was highly different in the development phase of that industry.</p> <p>And that will replay itself and there is a large new producer coming on stream with spodumene, there will be a spodumene overcapacity for a moment and that will happen to all these stages. And the liquidity will be very variable.</p> <p>And we want to be completely able maximum flexibility to benefit from that different liquidities in the different markets: carbonate, technical-grade hydroxide, technical-grade carbonate, spodumene, and interim products.</p>
M. den Drijver	<p>My final question is a follow up on that one of Mr Gensch, if you look at the LIVA opportunity, and also you solid-state, what kind of opportunity do you see there? Should we think about it as a 100+ mln, the LIVA plus the solid-state activities? Should we see that as a 100+ mln activity or how should we view that?</p>
H. Schimmelbusch	LIVA: it's too early to tell. The solid-state doesn't have anything to do with LIVA.
M. den Drijver	No, I know, but it's two projects that you hope to eventually generate revenue with.
H. Schimmelbusch	<p>Look, don't you understand? We are early stage. In early stage it's not very prudent to make quantitative ... you only can say that what we see is a substantial amount.</p> <p>Now you can say: what is the size of the diesel engine market in the world for industrial applications? I don't know, I heard it is between 50 and 100 bln a year.</p> <p>We are competing against industrial diesel engine applications.</p>
V. Kölln	<p>But also we rely on proven technology. Because we go into [inaudible] sector, so this is very important to us that we have the availability of the system, and with a new technology that's a huge risk for us and for the customers. What happens in the future we don't know.</p> <p>We use the lithium battery for a high power unit and if the properties are good using a solid-state battery, we could easily change them. But that's far in the future.</p>
H. Schimmelbusch	<p>I'm also thinking about grid management applications in a very different way, you know, in Germany for example, the energy storage, electricity storage rested 99% on hydropower and "Pumpspeicherkraftwerke". The Pumpspeicherkraftwerke (= pumped storage power plants) are living of availability of low cost</p>

electricity in the evening.

Because the coal-fired powerplants and the nuclear powerplants are in the evening trying to sell their electricity. Low cost. So you pump it up from a lower lake to a higher lake. And then in the morning, when the industry starts again happily, you need electricity and then you let it down to the lower lake through a flow-powerplant.

99% of energy storage was Pumpspeicherkraftwerke in Germany. The problem is it doesn't work anymore. Because in the evening the nuclear is closing, the coal fire is really not in the ... so now the low cost electricity availability in the medium-term, long-term in the evening is not there. Therefore it doesn't make sense.

However in the evening you need a lot of charging of e-Cars. So now in the evening there is no low cost and therefore in the morning when you let it down the sun is shining and there is no good market for ... so in both sides Pumpspeicherkraftwerke are not something you should invest in. And nobody is investing, by the way.

So, therefore we have a "Speicher" (= storage) problem. The Speicher problem however in Germany has an automatic [inaudible]. Because you import from France or from Czech Republic. It's a connected system. So in countries where the grid is not connected to a neighbouring "saving box", [inaudible] reserve, the grid management is of central importance.

And it is more complicated daily, because as these countries add solar energy and intermittent energy, the grid management problem becomes more and more acute.

We have found such a grid management situation where the Utility has abandoned the expansion into solar and wind over and above a certain degree because of the grid management problems. So that's an ideal customer for large scale grid management backup.

And of course in grid management you need instant availability of the electricity. Because the basic task of a grid manager is to match a large number of suppliers with a large number of customers and nobody is forced to shutdown. And that of course is a very precise situation and a battery is the necessary answer to make that job efficient.

I have studied this for a long time. Electricity storage is the biggest overlooked success criterium for renewable energy, logically. And that is of course.... now, everybody knows that.

And since the Pumpspeicherkraftwerke as a national thing, as a standard solution doesn't work anymore, battery solutions are necessary.

Elon Musk for example has built a lithium battery in Australia for such stationary applications. It is of course extremely expensive and it is the one and only. I don't think there is another one.

So, the vanadium battery has this enormous advantage of being cheaper. Much more cost effective. However, when you look at the one picture you saw the tankage. You know when you see a tankage there are pipes and there is electrolytes and it's going through pipes. Vanadium battery is a little lazy to come up to stream. It takes time, a minute or 2 or 3. So you need instant reactivity, that's where lithium comes in.

Expensive but instant. Milliseconds. So the combination has enormous advantages.