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Olin Corp. (OLN)

Investor Day

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MANAGEMENT DISCUSSION SECTION

Larry P. Kromidas

Director-Investor Relations & Assistant Treasurer, Olin Corp.

Good afternoon. Welcome to Olin's 2019 Investor Day. I'm Larry Kromidas.

Logan Bonacorsi

Director, Investor Relations, Olin Corp.

And I'm Logan Bonacorsi. We have a great lineup for you this afternoon but before we begin the presentations, we should like to cover a few housekeeping items. We encourage you to review our forward-looking statements on slide 3 of the Investor Day slide deck. Risk factors are described without limitation in the Risk Factors section of our most recent Form 10-K, and in last week's fourth quarter earnings press release. A copy of today's presentation is available in the investor section of our website olin.com.

Larry P. Kromidas

Director-Investor Relations & Assistant Treasurer, Olin Corp.

Just other – a few other housekeeping items before we begin. Please turn your cell phones to silent if you haven't already. In the unlikely event that we need to evacuate Freedom Hall, the emergency exits are located in the doorway you just came in and there's a couple on the side here as well to your left. Please take a moment to locate those. Finally, we will have a question-and-answer session after the presentations. All of the speakers that you will hear from today will be available to answer questions then. We ask that you please hold your questions until then.

Logan Bonacorsi

Director, Investor Relations, Olin Corp.

As Larry mentioned, today's event is being webcast, as well as recorded for future playback. With that we'd now like to turn it over to Olin's Chairman, President and CEO, John Fischer.

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

Good afternoon. It's a real pleasure to be here today, and we're all very excited to host you and hopefully you'll enjoy our story for the day. First I'd like to just introduce the various speakers we have today. First from IHS we have John Mulholland who is the Vice President in their strategic consulting group and we have Jim Varilek who runs our Chlor Alkali Business. We have Damian Gumpel who is Incharge of Caustic Soda for us, Pat Dawson who runs the Epoxy business, John Sampson who's Incharge of Business Operations and importantly from your perspective capital spending, and then we're going to end up with Todd Slater who's our Chief Financial Officer. So you'll be hearing from all of them very shortly.

I think just as a reminder about Olin. We are the largest chlor alkali producer by capacity in the world today and as we stand up here today we think it's a very opportune time to be talking to you because we just concluded what we think was a very successful 2018. We generated adjusted EBITDA of \$1.265 billion, which represents a 34% increase over 2017 levels, and a 50% increase over 2016 levels. In addition to that, we generated free cash flow of \$587 million, which is a very strong year for us from that perspective.

There's a general broad theme that you're going to hear about today, and that is we believe that from the supply and demand perspective in the global chlor alkali industry there's – we're – is undergoing structural change. And what we're going to talk to you about first is what that change is and what the genesis of it is and John Mulholland from IHS will do that, and then you're going to hear a whole series of speakers talk about what that means for Olin and how Olin benefits from that. And we believe very strongly that we will benefit in that over the next several years, it's going to lead to a very significant increase in our adjusted EBITDA as we move through time. And we'll give you those numbers and we'll walk through how we get that. So to start the presentation today I'd like to call up Mr. John Mulholland from IHS and he will talk about their views of the global chlor alkali industry and also their views of re-investment economics within that industry. John?

John J. Mulholland

Vice President, Chemical Strategy Consulting, IHS Markit

Thank you, John. Good afternoon. I'm John Mulholland Head of Chemicals Strategy Consulting at IHS Markit. I was also the Executive In-Charge of a recent project we conducted for Olin. Today, I'll share with you our view of the Chlor Alkali and Vinyls markets, as well as providing an investment outlook for the industry. During the time I have today, I'll focus on key findings from my work and discuss what we think is a real dynamic period ahead.

With that let's get started.

It's a disclaimer and the first section I'll provide some industry context, which includes some history and some forecasts from IHS Markit, as well as selected analyses from our work. You'll see three of these charts. One each for chlorine, caustic, and PVC. So, I'll take a moment and describe them. This is a time series of global chlorine supply and demand. The green bars are demand and the black line is nameplate capacity, which includes existing capacity, as well as announcements to date. It's not operating capacity, which at maximum production would be about 88% to 90% the height of the black line. I'm showing history from 1998 to 2017, and a forecast period from 2018 to 2030. We have forecast growth for chlorine from 2018 to 2030 to be 21 million metric tons. We're also predicting growth slowing from an annual average growth rate of approximately 3% to 2% in the forecast given histories, some may say this is a bit conservative.

On the next page, I'll describe some background for this projection. And even though growth is slower, demand requirement is substantial. This is a summary of applications of global chlorine demand for 2017 and 2030. Chlorine has many applications including chemicals for pulp and paper, water treatment, polymers used in construction, adhesives, sealants, as well as medicines, insecticides and other applications. The largest application by far is vinyls. The common name for PVC which will drive half – approximately half the growth of chlorine in the forecast period. For those of you less familiar with PVC, it's used in pipe and profile applications for construction as a replacement for traditional materials such as copper and wood.

On the prior page, I noted that I'd provide some background on our growth projection 2%. Areas growing above 3% include vinyls, epichlorohydrin, MDI and TDI. Those that are flat include propylene oxide from the chloral hydrate process, chlorinated intermediates, and the others category. And finally, pulp and paper and polycarbonates are declining.

Next, we'll look at caustic supply and demand. Caustic is a co-product of chlorine, using the typical electrochemical process to convert salt into chlorine and caustic yield 1.1 ton of caustic for every ton of chlorine produced. Similar to the chlorine time series, we see a slowing of growth from about 3% over history from 1998 to 2017 to about 2% in the forecast period. We also forecast demand of 23 million dry metric tons. Now, a dry metric ton just means 50% solution – caustic solution product. Caustic is ubiquitous product used in a wide variety of

applications. Even the applications noted here are relatively broad categories that consume caustic in multiple ways, for example, soaps and detergents, organic chemicals and inorganic chemicals.

As chlorine is tied to construction, caustic is tied to consumption, which is highly correlated with GDP. The largest application for caustic is the extraction of alumina from bauxite, which is the first of two processes to make aluminum.

Excuse me, did I – I went backwards, excuse me. My glasses here, that's caustic, the 23 million metric tons, and then I'm sorry going back to the global caustics. My glasses here, you can see alumina as the largest application and the many uses, pardon me.

The final product we'll look at is PVC. PVC is the third most widely produced plastic after polyethylene and polypropylene. Over the forecast period, PVC demand is expected to grow by 21 million metric tons at an annual average growth rate of 3%. As I mentioned earlier PBC is the largest application for chloride driving half the growth over the forecast period. It's for this reason we chose to model PVC as the primary derivative of the Chlor Alkali facility. I'll talk a little bit more about this in the next section.

Let's compare supply and demand growth for chlorine over time. Now again I'm going to show you the same three segments of time 1998 to 2007, 2008 to 2017 and 2018 through 2030. And I've split the second section into two five year segments to highlight what happened in the market.

You'll see from 1998 through 2030 there's been a transition from the industry from being balanced to being oversupplied, and then to one that now requires additional capacity. From 1998 through 2007 the global chlorine market was essentially balanced with capacity growth matching that of demand.

From 2008 to 2012 new capacity additions were almost 19 million metric tons creating an overhang of more than 13 million metric tons relative to demand. While the recession had an impact during this time much of this supply demand disparity was overbuilding in China. Given the global nature of the business this overbuilding affected the entire industry.

From 2013 to 2017 capacity growth – this capacity growth slowed and the industry consumed about 6 million metric tons of excess capacity. As a point of reference China added about 3 million metric tons every year from 2008 to 2012 whereas it added less than 1 million metric tons per year from 2013 to 2017.

Looking over the forecast period we see demand growth outstripping capacity growth given limited announcements of new capacity, we believe the current oversupply will be consumed over the next four to five years. We also don't anticipate a return of overbuilding in China. In the mid-2000s China encouraged an investment to enable the country to move to self-sufficiency. To essentially achieve that, and we believe China will be more tempered in the upcoming period aiming to maintain a balance chlor alkali supply and demand while minimizing environmental impact.

Examining operating rates not only provides insight into the impact of annual changes of supply and demand, but also provides an understanding of industry profitability. In the first period, global operating rates were in the mid-80%-s, a sign of a balanced industry. In the second period, operating rates dropped to a low of 75% in 2009 and 2012, following a recession and the aftermath of the unprecedented building in China.

China's incremental capacity from 2008 to 2017 reduced capacity utilization approximately 2% per year for the whole global market with most of this impact being felt in those early five years. Global operating rates have

climbed steadily since 2012 due to continued demand and limited new capacity. We're projecting the industry will hit 90% operating rates around 2023, something we haven't seen going all the way back to 1998. Now we can debate whether sold out is 88% or 90%, but we all can agree that without more capacity things are going to get tight.

By the way, it's also worth noting that historically North America has run about 2% ahead of global operating rates, meaning that it will likely reach sold out conditions even sooner. So instead of 2023 globally, it could be as early as 2021 in North America. I'll summarize at this point.

First of all, it's a pretty positive message. Chlorine, caustic, and PVC are growing. In fact, each has projected demand growth over the forecast period in excess of 20 million metric tons. Since 2013, global demand growth has outpaced that of capacity and has consumed a significant portion of the overhang of global capacity. However, if capacity is not added, we expect to reach sold-out conditions within the next four years to five years.

In the next section, I'll discuss how the industry can meet these requirements. The primary objective of the project was to assess the viability of a world scale chlor alkali investment. We focused our efforts in five major areas. First, assess the demand requirements for – to sell out a world scale facility. Second, estimate capital costs of an integrated chlor alkali to PVC complex in five major regions; assess production costs in each region at the best potential sites for chlor alkali and derivative production. And fourth, determine the preferred location and timing, and finally evaluate the economic viability based on project cash flow. So what's a world scale facility? Based on our analysis, a world scale chlor alkali integrated facility built in North America would produce 1 million metric tons of PVC per year, take four years to five years to build and require \$5 billion to \$6 billion of capital.

Now, there's an awful lot there, not only in the topic sentence, but also in the diagram itself. So I'll take some time to go through it. But even before doing so, I want to point out what we have here is a depiction of a facility that could be in North America. We're not only using the North American metrics, but also using ethane for the cracker as feedstock and natural gas. You'll see in other areas, they'll use naphtha and/or coal. The primary driver of the facility is PVC to determine this we assess the PVC market and its demand and determine what output would not disrupt the market as well as examine those facilities that were being constructed. Based on our analysis 1 million metric tons per year of PVC is the appropriate size for a world scale facility.

The proceeding units are then sized to produce the required volume of PVC. This facility will include a chlor alkali unit that will produce 580,000 metric tons of chlorine and 635,000 metric tons of caustic per year. Just to be clear, the numbers I gave you the 1 million metric tons for PVC 580,000 metric tons for chlorine and 635,000 metric tons for caustic that's production. So, understand the capacity of those units, you just divide by 90% the operating rate that we use. The facility also requires an ethylene cracker one that's about a third to half the size of those typically designed for polyethylene facilities. That said this would most likely be a condo cracker where the unit is optimally sized and has multiple owners. We looked at a smaller wholly-owned facility and one that is jointly owned and found them to be relatively close in economics.

We also estimated a startup of 2024 allowing one year for planning, and four years for production, and for building, excuse me, construction. Finally to build the complex will require \$5 billion to \$6 billion for a world scale facility that's \$5,000 to \$6,000 per metric ton of PVC produced for a facility that's producing 1 million metric tons per year.

Before leaving the stage I'd like to share with you some of our assumptions and provide some comments on the level of assessment we conducted. First the assumptions, and actually I have a number of these here but the model actually was a pretty significant part of our analysis, I just do want to make sure I share a little bit more of

this. First it's a Chlor Alkali facility with derivative units for vinyl chloride monomer and PVC. It's a world – it's world-scale so it's in the top 5% globally for production. It purchases natural gas, ethane, catalyst and oxygen. The cogeneration unit has been designed for the entire complex and the Byrne investment is sized for 100% onsite consumption.

Also our capital costs estimates include owners' costs such as project development costs and contingencies to account for potential risks that could increase the costs of the project such as the laser scope changes. And finally I want to point out that our estimates are typically used for strategic planning, business development and project feasibility. And they have an expected accuracy of minus 30% to plus 50%. So while we're proud of the analysis we did we will point out that if you're going to make an individual investment decision this will require a deeper look, a deeper analysis.

Now I'll bring together the capacity and industry level capital requirements. In the first section, I told you PVC demand growth was going to be about 21 million metric tons that means this will require 21 world-scale facilities at 1 million tons per year. At \$5 billion to \$6 billion per world-scale facility this would create a required expenditure for the industry of \$105 billion to \$126 billion. Please note these facilities will also consume the 50% of the caustic forecast as well as 50% of the chlorine forecast.

But this also means that we need additional investments, more than PVC. And if you assume a similar amount of capital for additional investments, and we did some analysis in that area, but again this is more estimates, you're going to get about some of the same numbers. So this is going to almost double it. We're going to bring it up to about \$200 billion for the industry, again with a [ph] B (00:20:16).

To put this in perspective, the world needs 21 chlor alkali PVC facilities, probably another 20 facilities for the other derivatives. So now you've got 41, 42 facilities. The forecast period is 13 years. That's about three world-scale facilities every year.

And given that it takes four to five years to plan and build a facility, we're not likely to see any new capacity that hasn't been announced until 2024. So what that does is our forecast was 2018 to 2030. 2018, it's already passed. The work we started was at the end of last year, but so – this is one of the years, yet another four to five years. You've now taken 13 down to almost 7 years. So again, this will be very compressed. Will it be that bad? It's just a way to look at this and make sure it's a big number, it's a lot to do in a short period of time. And by the way, it does not include replacement capacity or – for retirement, maybe of older facilities or some of those that might be closed for health, safety and environmental reasons, such as those receiving chlorine by truck or rail, which is happening still in a fair amount in China.

Finally, we recognize that some of this capacity will be consumed by debottlenecking and incremental investment, but even accounting for this the number of required facilities is significant. So where do you build the next world-scale facility? This bar chart compares capital costs of individual regions relative to those of North America. This bar chart compares the capital costs of individual regions specifically to the U.S. Gulf Coast. Based on our analysis, capital cost relative to that of building in the U.S. Gulf Coast range from a low of 75% for China into a high of 125% for Europe.

Now, different plant configurations and location factors affect these estimates. And we talked about the plant configuration. In each one you're making PVC, the same amount. But if you're in China, you're going to use NAFTA and if you're in United States, you're going to use ethane. So we want to make sure [ph] – or (00:22:37) are you going to buy salt, or are you going to have a [ph] brine (00:22:41) investment. So with that, that's – those are actually some of the things that we will configure those to make like output, if you would. And then there's also

regional location factors such as the purchase of equipment, materials, labor rates, exchange rates, political risks and even the weather could affect these things. So [ph] I just would (00:23:02) actually do a comprehensive analysis on an ongoing basis of these location factors.

We also examine cash costs for key products produced in each of the five regions. Here are the relative cash costs for ECU and PVC by region. As you can see, the Middle East and North America are the most [ph] advantaged (00:23:28) locations. Both locations have low-cost ethane feedstock for their crackers and take advantage of low-priced natural gas for cogeneration facilities that provide lower electricity costs, which are important for chlor alkali.

Now, although China had the lowest capital cost, this advantage is eclipsed by the operating cash cost advantages of the Middle East and North America, making the Middle East and North America the most attractive locations to build the chlor alkali PVC facility. For reference, I've noted the difference between China's and North America's cash costs. China's cash costs in 2018 are \$165 per metric ton higher in ECU and \$233 per metric ton differential in PVC. So given all that, how do we pay for all these world-scale chlor alkali facilities?

This chart shows product pricings impact on a project's internal rate of return. The three diagonal lines are isoquants or specific internal rates of return. For example, points on the gray line are combinations of caustic and PVC product prices that yield a 15% internal rate of return. In our analysis, we found the IRR for [ph] our (00:24:56) U.S. Gulf Coast investment to be less than 10%. For illustration in this chart, I've used the basis of \$500 for caustic and \$800 per metric ton for PVC. So while the demand outlook is healthy, prices close to those of today don't justify investment.

In order to achieve more attractive returns, either or both product prices must increase. A [ph] 50% (00:25:24) IRR is achievable by maintaining the PVC price, let's say, \$800. [ph] We'd (00:25:30) have to raise caustic from \$500 to \$1,050. Similarly maintaining caustic prices of \$500 would require [indiscernible] (00:25:39) raise PVC prices to \$1,150 per metric ton. So we're at a crossroads. On one hand, the world needs more capacity and on the other, the prices today won't pay for the investment. So this is a real challenge for management in this industry.

That said, we believe prices will increase. However, they may not make the transition in an orderly fashion. There will not only continue to be competition among existing suppliers, but also regional dislocations as well as inter-material competition. So for example as PVC prices begin to [ph] raise (00:26:19), you can see high density polyethylene and maybe some other products vying for some of the applications that PVC has today.

To wrap this up, I'll summarize our findings. In the first section, I talked about the markets for chlorine, caustic and PVC and their promising outlook. We examined the impact of chlorine supply and demand growth on the industry, how it moved from balanced to oversupplied, and now to the point where we project it to be sold out globally by 2023.

In the second section, I've shared IHS' view of what a world-scale chlor alkali facility is. Again, here it is by the numbers production of 1 million metric tons of PVC, 580,000 metric tons of chlorine, 635 metric tons of caustic. Takes four to five years to build and costs \$5 billion to \$6 billion of capital investment. In aggregate, the industry needs over 40 of these world-scale facilities with an industry price tag of up to \$200 billion. And recall that since it's unlikely we'll see new capacity before 2024, again that's going to be compressed.

When it comes to cost advantage, China has the capital cost advantage over the other regions. However, North America and the Middle East are ultimately the most attractive locations to build given their cash cost advantages.

Finally, while the demand is relatively strong and capacity is required, current prices just won't justify the investment in these facilities. That said, whether orderly or disorderly, we feel prices will ultimately move to pay for the required facilities. We also anticipate pretty interesting times for the chlor alkali and vinyls industry. Thank you very much.

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

Thanks, John. I'd like to just come back to what I said right before I sat down, which was to say that the broad theme today is the structural change that John just talked about, and the rest of this presentation is going to delve into why does Olin think it is in a good position to benefit from this, what are we going to do, the how and why it's going to lead to ultimately to significant growth in adjusted EBITDA.

I will start out by saying we firmly believe that we will benefit. We have the assets in place to do so. John Sampson will talk about that. We have the market position and you'll hear about that from Jim and Pat and Damian. We have the resources. You'll hear about that from Todd. And we also have the cost position.

On this slide, I'll talk about the cost position. But first, I just want to say from our perspective there are growth opportunities both on the chlorine side of the molecule here and on the caustic side of the molecule here. And we're talking about not just price, as John referenced, but we're also talking about volume opportunities. From the cost perspective, the majority of our chlor alkali capacity is located in the U.S. Gulf Coast and we have access to low cost electricity and low cost ethylene. And as John Sampson would tell you that ethylene mobilizes our vinyls assets. Also, that same Gulf Coast locations puts us in an advantage position to be an export of both chlorine derivatives and caustic soda pretty much globally, a great strength for us.

Many of you have seen this slide before, but our market position, we think, is unparalleled in the industry. We've got the world's leading position from a chlor alkali perspective. I opened the conversation with that. But on top of that, we're the number one producer of membrane grade caustic soda, we're the number one producer globally of epoxy materials, we're the number one producer globally of chlorinated organics products, and in North America we're the number one producer of industrial bleach and Jim will talk you through that, and the number one producer of hydrochloric acid. So we've got a number of market-leading positions that we can lever.

We've also got the broadest chlorine derivative portfolio of anybody in the world. We have 19 specific outlets for chlorine ranging from some of the things I mentioned, bleach and hydrochloric acid, up through the entire chlorinated organic chain and the epoxy chain. And we think this gives us one huge advantage over everybody else. We are able to work on a daily basis to maximize the value of chlorine in our system. We were talking at lunch, we can turn a bleach plant on and off every hour, we can turn HCL on and off every hour, we make decisions on the epoxy chain every two or three hours. So we have an absolute advantage of moving to the highest value for chlorine on a regular and recurring basis.

And that same advantage that we have there is what affords us the opportunities to grow. We can look at these different markets and Jim and Pat and Damian will take you through those markets in some detail and make decisions on where the best place to grow is, but we're very convinced we have significant opportunities to grow.

And here you can see it. We're essentially saying we have volume opportunities and price opportunities across the breadth of our both the chlorine derivative portfolio, but also the caustic soda portfolio. And this is really the story you're going to hear for the rest of the day. Where do we think that's going to lead us? We're going to get price. We're going to get [audio gap] (00:32:08). We're going to get margin improvement and it's going to lead us over the next several years to a place where we think we can generate adjusted EBITDA on an annual basis of

over \$2 billion. The broad theme is we've got growth and it's going to lead to significant EBITDA growth. And from now on, we're going to hear about the details of the chlorine derivative portfolio, first from Jim, then you'll hear from the others after that.

So, Jim, talk to you about the chlorine derivative portfolio.

James A. Varilek

Executive Vice President & President, Chlor Alkali Products and Vinyls & Services, Olin Corp.

Thanks, John. Appreciate it and good afternoon everybody. Thanks for coming this afternoon. I'm Jim Varilek and I lead the Chlor Alkali Products and Vinyls division. I'm going to build on what John Fischer said and especially what John Mulholland said earlier about the structural change that's taking place in the industry and specifically how well Olin is positioned to capture that value from the structural change. I'm also going to provide a good bit of visibility into the chlorine envelope that I think many of you haven't seen before.

So while most of the time we talk about our leading chlor alkali position, we also hold a number of other leading positions in the marketplace. We're the number one merchant EDC supplier in the world, and I'll talk to that a little bit later. As John mentioned, we have the leading chlor alkali or chlorinate organics position in the world and we're the only company with assets in both Europe and in North America.

Pat will talk about our leading [ph] epoxy (00:33:54) position a little bit later. As John mentioned also, we're the number one bleach producer in North America and we sell more merchant chlorine to the U.S. market than anyone else. We have a broad array of portfolio, 19 different outlets for chlorine. And the reason that's important is it allows us to place our chlorine into the highest value applications; not just move it, but to place it. We have seven plants across North America; four regional plants, which are very well positioned to meet the needs of the regional markets and our regional customers and three world-scale plants on the U.S. Gulf Coast that gives us access and capability to ship our products anywhere in the world.

Now some basics. This is the basic chemistry. At its simplest form in this industry, we take saltwater or brine and we electrocute it. And when we do that, we get what we call an ECU. We get 1 ton of chlorine, 1.1 tons of caustic soda and a little bit of hydrogen. And as simple as this sounds, this creates a huge challenge as well for this industry as we're constantly in a battle to balance the supply and demand on the chlorine side versus the supply and demand on the caustic side. And that's why having the 19 different outlets that we do for chlorine is so important [ph] as that (00:35:27) we're uniquely positioned to be able to strike that balance and balance both sides of the ECU.

Size and scale. Size and scale is very important. On this chart, you see on the left-hand side that Olin is the largest chlor alkali producer in the world relative to our peers and by a pretty significant margin. And that scale is very important in that on the right-hand side you see the cash cost estimate provided by IHS that shows Olin as the lowest cost producer among all of our peers in the world. We have some very well-situated plants. We're in North America where we have low power costs. And then you combine the access that we have to the world markets, the size and scale that we have, and it provides a very significant advantage. And what that allows us to do is to take full advantage of that situation, produce product and chlorinated derivatives here in the U.S. and we can ship them anywhere in the world and we can compete very profitably. And this gives you maybe some information that you haven't seen before, a look inside the chlorine envelope and actually how the chlorine is consumed across the envelope.

As John mentioned earlier, the benefits that we have because of this envelope is that operationally we can dial up one plant, dial down another plant if we have issues or if we have an upset, we can immediately transfer that

capacity onto another chlorine derivative and we can keep our chlorine assets running at very high utilization rates. And also, we're not exposed from any single market or customer issue because we can move product from the bleach market into the chlorinated organics market or we can build some inventory [ph] in epoxy (00:37:26), but again we're able to adjust and – well, basically adjust across any market demand or customer upset that we might have. So very, very valuable chlorine envelope that we have, again, to place the chlorine.

So now just starting on the left-hand side, chlorinated organics, you can see is about 7% of our chlorine consumption across a variety of different products. [ph] HCL (00:37:53) hydrochloric acid and bleach is another 8% of our chlorine. Epoxy is about 10%, and Pat will speak to the integration there later on. The [ph] vinyls (00:38:02) business is about 20% or one-fifth of our overall capacity and its EDC and vinyl chloride monomer, that's our access to the vinyls market. Dow, very important customer and a very important relationship that we have, accounts for one-third of our chlorine consumption. And as I mentioned before, we have the leading merchant chlorine position in the United States and that requires another 20% to 22% of our chlorine usage.

So, again, this portfolio provides us a very, very good value optimization capability, being able to place the chlorine and, importantly, replacing the chlorine and we're very consistently supplying caustic to the market, which has a significant value to our customer base.

So now let's take a few minutes and I'll step you through each of the product areas. I'd like to start off with the merchant chlorine market. The biggest takeaway here – the main takeaway on chlorine is simply that it's going to continue to tighten. And I say continue to tighten because it has been tightening over the last two and a half years.

In the chart on the left, you can see the yellow bars are the demand and the demand has been relatively constant for the last four, five years, roughly 2 million tons of requirement for merchant rail chlorine in the U.S., and it's been very consistent and steady.

But what has changed is the actual supply available to service this market. And what's happening is the producers are choosing to [ph] derivatize (00:39:43) the chlorine and move it downstream into higher value applications than selling merchant chlorine. And also, the cost with rail and freight and so forth is adding to that choice that producers are making. And as a result of that, over the last several years, we've seen a significant decline in the availability of chlorine into the merchant chlorine market. And what that is doing is it's uplifting the pricing that we're seeing in chlorine, and we have been seeing that consistently over the last couple of years, and we expect that to continue into the future.

Now let's move on to HCL. The HCL market really doesn't get a lot of attention very often, but it really does have an important role for Olin's regional plants. The HCL market is primarily a regional market. And if you take a look at the pie chart on the left-hand side, you can see the variety of markets that it does serve: oil and gas, brine, calcium chloride, steel markets and the food market as well. And it's a wide variety of markets and these are regional markets in general.

If you take a look at the bar charts on the right-hand side, you can see that this has been a growth story for Olin, going all the way back to year 2000 when we sold less than 50,000 tons of HCL to the marketplace. And you can see in 2018, we sold about 200,000 tons and in 2020 with the additional capacity of 70,000 tons that we're adding to the marketplace, we're going to grow to in excess of 220,000 tons to service this market.

Now, I'd like to shift over to bleach. Bleach is another growth story for Olin. And if you take a look at the right-hand side, we'll start with the growth and that is Olin was about 100,000 tons of bleach sales to the marketplace in

2008. And in 2018, we sold over 250,000 tons of bleach into the market for about 11% compounded growth rate over that period of time. And you can see also that we intend to sell over 300,000 tons of bleach in the 2020-2021 time period. We're adding an additional 60,000 tons of bleach capacity in the next year or two in order to meet the demands of the market that are dramatically shifting. And I'd like to take a second to go through how the market is changing and why we foresee the growth in bleach.

First of all, water treatment today – most of the municipalities use chlorine to purify the water, and that is shifting again for reasons. People don't want to handle the chlorine, the freight costs are going up, and so there's a shift that's taking place with the municipalities where they're using bleach to purify water instead of chlorine to purify water. And as a result of that, there's a shift in demand and you're seeing bleach grow.

For the same reasons that the municipalities don't want to handle the chlorine or deal with it, availability and tightness of supply, some of the non-integrated bleach producers who were buying chlorine, buying caustic, putting them together to make bleach in a regional marketplace, they're now shifting to want to buy bleach instead of make bleach. So you've got a transformation of an intermediate step in the industry as well and that's adding to the demand for bleach and Olin is extremely well positioned to be able to capitalize on this because we have 2.5 times the capacity of the next largest player in the marketplace, and we're adding an additional 60,000 tons to meet the needs of the marketplace. So, with our nine different plants across various geographies in North America, we're very well situated to take on this additional growth.

Now I'd like to shift to EDC, which is another area where we hold a unique position in the marketplace, but let's first start with the fundamentals. On the left-hand side in the pie chart, you can see that 94% of all the EDC produced in the world actually is used in integrated sites to make PVC. Only 6% of the EDC made in worldwide makes it to the merchant market. And important to note that of that 6% the vast majority of the EDC is actually in Asia. The demand is in Asia with a small amount in Europe as well. So the merchant market small and it's in Asia and it's certainly not in the United States. The other thing to note about the merchant market is that Olin holds the largest merchant market position in the world. So we're the majority supplier into the EDC market.

Lot of shifting and changing taking place in EDC as well. If you look on the right-hand side, you can see that the blue bars – there's a slight decrease in the supply available to the marketplace and that's primarily because [ph] swing players (00:45:03) that would make some EDC, they make PVC, but they make some excess EDC and offer it to the market. The [ph] swing players (00:45:10) are now placing that EDC to grow their PVC business. And so, that market or that product is being pulled off the market.

But what's important here is that we see about 2 million metric tons of EDC growth from non-integrated PVC players. Because of the cost that you heard John Mulholland talk about before, integrating into PVC or all the way back into chlorine, ethylene is a significant investment. So people in the PVC market and in Asia primarily, are adding capacity or want to add capacity without integrating all the way back.

The natural stopping point is with EDC to be able to get the ethylene and the chlorine in order to meet that requirement. And again, Olin is extremely well situated to be able to capitalize on that growth. We have the integration into chlorine and ethylene and we have the ability to ship anywhere in the world from our low-cost positions. And I guess I should make one further note here that we do have the ability to meet the demand because we have low-cost bottlenecking opportunities as well.

Now I'll shift to the last product area that I'm going to cover, chlorinated organics. And the chlorinated organics, I'll start with the chart on the right-hand side and introduce maybe a new subject here, which is the [ph] HydroFluoro-Olefins (00:46:46), our HFOs. HFOs are new refrigerants that are taking place or that are taking into them, are

being introduced into the marketplace. The chlorinated organics business is really a solvents market and a refrigerants market. The solvents market is regional and steady. The refrigerants market, which is automotive air conditioning, stationary air conditioning and refrigeration, is actually a global market and quite dynamic.

The dynamics that are taking place are really around creating environmentally-friendly or low global warming refrigerants and that's where HFOs come in. HFOs are being introduced into the marketplace as an environmentally-friendly low global warming alternative to the existing refrigerants that exists today. And they're anticipated to grow quite significantly as you see by the red bars on the right-hand side, very significant growth from almost nothing in 2015 to an estimated 300,000 tons by the end of 2030.

And what's interesting as far as Olin is concerned is not so much the red bars, but the blue line above that because for every pound of HFO that's produced, it requires 2 pounds of carbon tetrachloride. And why that's important is that Olin has the largest capacity to produce carbon tetrachloride in the world. And we have sites in both Europe and in North America that can produce carbon tet, and they have the ability to meet the demands that will be required on either continent. So, again, we're very well positioned and uniquely positioned in the marketplace to capture this growth.

So at the outset, I said that our relationship with Dow utilizes about one-third of our overall chlorine consumption, and this is a very important strategic relationship that we have with Dow. It's primarily two large contracts that drive our relationship. One is on the chlorine caustic and the other is in vinyl chloride monomer, VCM.

The chlorine and caustic contract is a long-term contract. It's about 1.5 million tons per year. It's cost based and it really does a very good job of providing integration for Dow into their [ph] downstream Polyurethanes business (00:49:21) and also for Olin on a site basis as it provides us some benefits from an integration standpoint. It's a good base load on our business and it provides a steady stream of EBITDA over the duration.

The VCM contract is a very different contract in that it runs through 2020, but it's an ethylene toll agreement where Dow supplies Olin with the ethylene, we convert that into VCM by adding the chlorine and then we supply that VCM to a [ph] fenceline (00:49:56) Dow customer on Dow's behalf to provide the VCM to them for PVC usage.

The contract runs through 2020. And important to note that at the end of the contract in 2021, Olin takes over a direct relationship that we have with the customer with a contract that's already been negotiated and that's in place that will carry us through to well into the next decade. So we already have that lined out with a new contract and that contract is expected to give us an uplift of EBITDA of between \$50 million and \$75 million per year.

So now you've seen the product positions that we have, how we're uniquely advantaged in many of the markets that we play in and the products that we produce, our balanced portfolio that gives us good access, both to the chlorine side and also to the caustic side.

John spoke earlier about the need for additional capacity and the need to grow. And we do have the ability at Olin to be able to grow and grow significantly. We have low capital, high value expansion opportunities across multiple sites that allow us to grow our chlor alkali capacity by as much as 20%. But without one big major step change, it's not a world-scale plant and it's not at a single site or at a single time. It's a number of smaller steps across multiple sites that allow us to grow as the market requires us to grow. And in fact, we have 200,000 tons of expansions already in process that we expect to be online within the next one to two years.

So we're very excited about the growth opportunities, both that are stemming from the marketplace and the structural change that's taking place, [ph] but how – (00:51:53) we're uniquely qualified to be able to supply that. So at the end of the day, we can, we will and we are providing the growth needs of our customers and our product lines.

So as I wrap up, I'd like to leave you with three key messages. First of all, there is a structural change that's taking place in the global chlor alkali industry. Olin is uniquely positioned to capture the value from that structural change and we have the ability to grow across our portfolio and to continue to add value to the chlorine side of the ECU and also to provide a steady stream of caustic soda to the marketplace.

And with that, I'd like to turn it over to Damian Gumpel, who will cover the other side of the ECU caustic soda. Damian?

Damian Gumpel

Vice President, Global Caustic, KOH & Vinyls, Olin Corp.

Thank you, Jim, and good afternoon. I want to thank you again for taking your time to spend part of your day with us to learn about these exciting opportunities. As Jim said, my name is Damian Gumpel. I'm the Vice President of our Global Caustic, KOH & Vinyls business. And it's my pleasure to spend a few minutes with you today to tell you about how the structural change we see unfolding creates an exciting opportunity for Olin in caustic soda.

Now, our vision in caustic soda is to provide the most secure supply to our customers and through that create differentiated value to our shareholders. Now, this vision is based on four principles you see outlined here that I'll explore a little further for you in my time today.

First, as our guest speaker, John Mulholland covered, the supply/demand balances are poised to tighten to sold out conditions over the next several years, and that also and more importantly, current prices are nowhere near reinvestment economics.

Second, as caustic soda tightens as forecasted, we see customers who align with secure suppliers. Being able to give them that security of supply will actually gain an advantage over their peers who won't have that security of supply. This competitive advantage we feel is worth a premium above and beyond the prevailing price of caustic soda. We at Olin seek these customers.

Next, Olin's position as the leading caustic soda supplier offers a compelling value proposition. Now, I want to key in on a word I used. I said supplier not producer. We say that for a reason. A producer manufactures the product and then moves it or allows someone to come, pick it up at their dock or at their plant and take it onwards. We have a different view. We market caustic soda. We make it, we market it. What that means is we want to be aligned and be as close to our customers as possible because we want to be their supplier of caustic soda.

And finally, we not only see the value of caustic soda rising, but of Olin's caustic rising even higher, giving our position and focus to be the most strategic supplier to the customers and markets we serve.

Now, I want to start with some basic about caustic soda because it is a rather unique molecule for several reasons and obviously one that's near and dear to my heart. And I'll highlight three of these reasons today for you.

First, caustic soda has two different types of uses. Some buy it for alkalinity or the [ph] OH (00:55:51) side. It's the side you see on the right, the oxygen-hydrogen, making a hydroxide or the base part of caustic soda, if you remember your high school chemistry on acids and bases. I see a [ph] few nonce (00:56:06).

The base side is used in certain production processes in the facilitation of them. As an example, caustic soda is used to dissolve things when making alumina or pulp and paper. The other use highlighted on the center side in raw materials is to actually consume it in the manufacturing of products, think things like soap, superabsorbent polymers for disposable diapers, sodium-based food preservatives, mining products and a whole variety of other uses.

Another interesting feature of caustic is that it has a wide range of applications, wider than chlorine and that its demand is not as dependent on a single end-use sector like chlorine is into vinyls and construction. I'll just ask you to recall the slides that John Mulholland showed around the chlorine pie, if you will, and the caustic pie. This diversity of demand for caustic tends to make caustic demand less volatile and less tied to a single factor versus chlorine.

And lastly, the usage factor of caustic soda into many applications is less than one. So the cost of caustic soda is a fraction of the overall production cost of the end use. Take for example alumina, aluminum costs in caustic soda. Because of these usage factors every \$10 change per ton of caustic soda price means roughly a \$2 per ton change in the cost of aluminum. Now that's based on average consumption ratios.

Now knowing these basics we can now turn our attention and take a look at demand. Now as IHS Markit and John very nicely covered, there are very favorable caustic soda demand fundamentals through now and 2030. But I want to peel back the onion just a little bit more for you today.

First, caustic soda is tied to consumables, things that people use in everyday lives, as we highlight here on the right side. So generally speaking, we like to say that as population growth goes caustic soda demand follows. However, there is a factor above and beyond that that can drive caustic soda growth higher and that is increase in things like income and per capita consumption of caustic soda.

Think developing countries where people in India, Southeast Asia, Brazil, China, are using things like toilet paper, tissue, napkins, paper towels, disposable diapers for the very first time and going forward. In economies like the U.S. it means something more like this.

Now for those of you on the phone, can't see me, I apologize. I'm holding a box, a cardboard box that I got delivered to my house just last week, one of several boxes I got delivered to my house last week and the week before and the week before that. This was a box from a famous global online retailer. Oh, you've heard of them too.

Now this box is emblematic of what I'm going to talk about here, about the per capita growth. Now I got this box. Sure enough I opened this box, this cardboard box, and I was greeted with yet another box, more carton. Now why is this important?

Well, caustic soda is used to make these boxes. You take the wood. The wood is made of wood fibers held together by a naturally produced glue called [ph] ligand (01:00:10). In order to isolate the wood fiber and make things like cardboard and paper and tissues you have to dissolve away that [ph] ligand (01:00:18). That's what caustic soda is used for.

So now, with that said, and as I told you, I get many of these in my house. Want to get a quick show of hands for you. How many of you guys get stuff delivered to your house in boxes? Quick show. Okay. I see a lot of hands. Keep them up because I'm going to ask two more questions. How many of you guys get more boxes today delivered into your house than, say, five years ago? Okay. Pretty much every hand. How many of you guys think you're going to get more of these boxes in your house over the next five years than today? Okay. That's a lot of hands. Unscientific poll. You just demonstrated per capita consumption of caustic soda is going up in this room. Thank you.

Now I will highlight one other thing, again, near and dear to me. In the bottom of these boxes there's a stamp, and there's a stamp that says who produced it, where was produced, and some properties about the strength of the carton in the box. I'm very pleased to say that these two boxes I hold up, we supply the caustic soda to these two people and growing quantities, and we just – we need long-term contracts that are very favorable to both parties.

Going back to the story. So when you put all this together, we do see that caustic soda demand can grow higher than chlorine over this period. We, Olin, are bullish on that. The IHS base case of 23 million tons of caustic demand growth [ph] has – (01:01:49) with a 2% growth rate equal to chlorine. However, if you subscribe to the notion that population growth is growing at a healthy rate and per capita consumption of caustic is also growing, then one must subscribe to the notion that caustic soda could actually grow at a higher rate than chlorine.

If we take the more historical 3% growth rate that John showed for caustic soda and see that going through 2030, that doesn't mean 23 million tons of new caustic soda demand. That means closer to 30 million tons of new caustic soda [ph] demand required (01:02:28). And if you think about that, that means that in top of the required investments that John spoke about, roughly 14 additional on top of those would be required just to meet this additional caustic soda demand if caustic soda grows at 3%.

Now keep in mind, this equates using John's numbers to about \$75 billion of additional investment on top of the \$200 billion. And this delta would just [indiscernible] (01:03:01) for the caustic soda side, not to address any chlorine demand growth.

So now if you recall then John's slide 24 in the presentation with the isoquants of PVC and caustic prices, if one believes that caustic soda demand will be higher than chlorine, then one could also think that caustic soda prices are the ones that [ph] will (01:03:25) need to move more than the PVC line to incentivize reinvestment for additional capacity. And I'll just refresh you on those figures.

Holding PVC prices, caustic soda prices [ph] will (01:03:38) need to reach \$1,050 a ton. If you just move straight along the horizontal, as an example, to reach 15% IRR and prices would have to reach \$1,500 to reach a more acceptable 20% IRR.

Now as you know well, caustic soda is produced in North America, but we supply caustic to the global market. So when you think about – what I just covered on the economics and security of supply, we think that's going to be a strong key priority for customers going forward. And we see that as a strength for us [ph] and being able to supply (01:04:14) markets in the regions we serve.

We are the largest membrane producer in the world, 50% larger than the next. In the Americas region, membrane cost, it carries a price premium over diaphragm into certain segments. Two-thirds of our 50% caustic soda sales are in North America, where we have the largest network to not just supply customers, but reduce the logistical chain and increase the reliability of our shipments. About a quarter of our sales are in Latin America, where we have built the largest supply network. I'll cover more in these two regions shortly.

Lastly, our large membrane and diaphragm facilities in the U.S. Gulf make us an attractive supplier, a flexible supplier to the overall global market. So we need a global portfolio, but as you will see, one that is focused on marketing to customer needs at the local level. And our local supply capabilities start with North America.

Our North America network consists of seven sites that you see here in blue. Combined with a 34 terminals in red, we're very well poised, positioned to serve a variety of customers via truck, rail, barge and marine modes. One key region is the Southeast, which is predominantly pulp and paper. These customers take their product via truck and railcar. The ability to be a strategic supplier to serve multiple mills, respond to sudden demand changes and have redundancy across shipping points are key differentiators in this segment. We see demand growing in this region with new mill investments in the future. In the Midwest and mid-Atlantic regions, our terminal locations allow us to be [ph] within close truck (01:06:07) range of the manufacturing base there.

And lastly, we are the largest supplier in Eastern Canada, which we supply from both our [indiscernible] (01:06:17) but also supplemented with caustic soda, both membrane and diaphragm that we ship out of the U.S. Gulf. This is important because this area, this region is one that relied partly on European imports for their caustic soda needs. But with things like mercury rationalization and a trend that's been unfolding for about 10 years, exports from Europe into Eastern Canada have declined by over 50% in 10 years.

In total, we have a robust network, built to provide multiple shipping points, shipping modes, product grades, reduced transit time and freight cost to our customers. And these are all elements of the Olin value proposition when it [ph] comes time (01:07:03) to negotiate supply contracts.

Now turning to Latin America, this is a region with a lot of opportunity for Olin. So I'll spend a little bit of time here with you. First, generally speaking, imports supply half of the demand today and almost all of that comes from the U.S. Gulf. Going forward, imports will be needed to supply the lion's share of the demand growth in Latin America. If you go by IHS Markit's forecasts, imports were poised to grow from 2 million dry metric tons a year today to over 3.5 million dry metric tons a year by 2030, a significant step change increase.

Most of the import volume is, if you will, moved to the market. Think about the big alumina refineries in the northern part of Brazil that just take product via large vessels from a loading port in the U.S. Gulf down to their port of receipt.

However, there is a growing segment that is truck-based, that is very different and where logistics and supply capabilities are just as important as just having the caustic soda. These two sectors that I'll highlight for you are best represented here in Mexico and I highlight in Southern Brazil. In order to meet customer requirements here imported caustic must arrive via first a vessel, then is put into a shore tank and then it's shipped out to a customer, one truck at a time anywhere from 5, 10 miles to in excess of 100 miles. Now think about that for a moment because when I tell you some of these numbers, you'll get an appreciation of the supply chain and the importance of supply that's needed here.

When you think about the average-sized customer that consumes caustic soda in this region, the average-sized customer needs about five trucks a day for what I'd call a medium-sized customer. Five trucks a day means one truck of caustic soda has to arrive at their location. 5, 10, 100 miles from that tank that supplies the caustic one truck every five hours, every day, 365 days a year to maintain operations.

Larger locations like some of the largest pulp mills in Brazil need three times that amount every day like clockwork, 365 days a year to maintain operations. So, hence my theme of – you get value not from just being a

producer of caustic soda, but being a supplier of caustic soda. And given that reliance of imports in logistics needed to serve the customers that security of supply commands a premium, especially in Latin America over other regions. And this is the region that we are very well positioned for.

The truck growth in this segment is conservatively 200,000 to 300,000 dry metric tons a year over the next five years, just five years. And that's based on public known announcements of expansions and new investments in this region. Think all of the pulp and paper investments that are underway and announced in Brazil and Uruguay and Chile. significant world-scale investments in pulp and paper, all requiring caustic soda, and the majority of those requiring membrane grade caustic soda for which there is no new capacity in South America and Latin America for, for which it is all being exported out of the U.S. Gulf and the U.S. Gulf will be required even more to meet that supply in the future.

So to serve this market, Olin has a strong position. We have local sales, commercial, logistics/supply chain people on the ground across Latin America. We actually recognize this opportunity in the first days after Olin completed the acquisition of the Dow Chlorine Products in October 2015 and we have aggressively grown our position and focus in this region.

Since that time, since the early 2016, we've more than doubled the number of terminals that we ship out of. We've introduced membrane supply. We've increased truck trailer shipments by almost 50% to about 130 truck trailers per day today in this region out of these terminals and that volume continues to grow each day.

In terms of what that means for pricing, we see it moving upward in the region with security of supply commanding that premium. And just as a data point of what actually is achievable because these data points have transpired. There were two cases that I want to bring to your attention. Back in October of 2015, I was actually in Brazil and some of you that cover the industry may recall there was a significant disruption to a local producer there. They had an issue with an ethylene cracker. Ethylene cracker, as John mentioned, important for the PVC manufacturer. You don't have your raw materials, you can't run a chlor alkali unit. And caustic soda got very tight in October of 2015. It got so tight that we, Olin, were selling trucks for \$1,500 a ton out of our tanks and we couldn't keep up with demand.

I'll give you a second data point, occurred actually less than 12 months ago, again another disruption in the region there. Caustic soda got tight. We resold trucks for \$1,000 a ton. So these numbers that we talk about and look at the [ph] iso bands (01:13:19) that John alluded to are numbers that are achievable. Under the certain supply demand circumstances have been achieved. But we believe under the structural period of change security of supply is going to command a premium in the market and Olin is well-positioned to be that supplier.

So in summary, caustic soda fundamentals are strong. We agree with IHS Markit's assessment that chlorine and caustic demand will outpace supply and that will happen here in the medium-term three, four, five years. But on top of that we, Olin, believe that we see signs that caustic soda demand will actually outpace the demand growth of chlorine.

With these trends, we see a favorable appreciating price outlook for caustic soda for Olin's caustic soda through 2030. We see that coming from not just the market, but the value-add from our capabilities to supply customers who require security of supply in this period of structural change.

So as you think of Olin and caustic soda, I'm going to leave you with just five thoughts. Just if you take away anything from my time with you, five things. First, we're the largest caustic soda membrane producer in the world. We have the largest supply network in North America. We are committed to growing our supply capabilities to

meet the customer needs. We will place an increasing value on that security of supply we offer versus the next best producer alternative. And lastly, every box that arrives at your doorstep, think caustic soda. Thank you.

Larry P. Kromidas

Director-Investor Relations & Assistant Treasurer, Olin Corp.

Thank you, Damian. Why don't we take a 20-minute break now? There are refreshments [ph] right at (01:15:32) the main door that you came in through and why don't we return to our seats at 2:40. Thank you.

[Break] (01:15:39-01:38:31)

Logan Bonacorsi

Director, Investor Relations, Olin Corp.

Please find your seats. We'd now like to begin the second half of our afternoon with Pat Dawson, who is responsible for Olin's Epoxy business. Pat?

Pat D. Dawson

Executive Vice President & President, Epoxy and International, Olin Corp.

Thank you, Logan. Welcome back. My name is Pat Dawson. I'm the President of Epoxy division and Olin International. And what I'd like to do is build on what you've heard from John, Jim, Damian, and really build on this [ph] theme (01:39:37) of our leadership position and how we are extending, enhancing and growing our chlorine portfolio. And, of course, I'll talk to you about how we're doing that through [ph] Epoxy (01:39:47) value chain.

First of all, [ph] Epoxy (01:39:52) consumes 10% of the chlorine we produce and we liberate a significant amount of caustic, which Damian then takes to the market. Secondly, we are the lowest cost, largest most integrated producer with a global reach. Our strategic intent and focus is on growing our leadership position across the [ph] Epoxy (01:40:14) value chain as we continue to experience improving supply demand fundamentals.

Let's take a quick look at the kind of integration we have in Epoxy, and also take a look at some of the barriers to entry into what we do. It starts with our low-cost position in chlorine to make allyl chloride, which we then convert to epichlorohydrin, which I will refer to as EPI. We also have world-scale low-cost phenol that is converted to [ph] bisphenol-A (01:40:49), BPA, that is reacted with EPI to make liquid epoxy resin. Keep in mind that 90% of the world's EPI molecules are used to produce epoxy resin.

Allyl's unique competitive advantage is in our integration and constantly finding ways to be more productive with our assets and our integrated supply chain. The barriers to entry into this value chain are sizable. It's very complex and corrosive chemistry to operate, complex forward and backward integration, and it requires a high investment cost. To build a greenfield site with the assets you see outlined here in the red and the – I'll call that bluish, greenish color. To rebuild those assets on a greenfield site would be about \$1.5 billion.

If you want to replicate the Olin assets that we have in place globally, we have two of these chains, one in Freeport, Texas and one in Stade, Germany. To replicate that would require approximately \$3 billion to \$4.5 billion in capital. That's not including the chlor alkali investment.

Olin is the only epichlorohydrin producer in North America, and is for a good reason. Our integrated facility in Freeport, Texas has the lowest cost EPI and LER in the world. We also have the leading low-cost and capacity share position in Europe. And we have low-cost opportunities to expand our capacity of EPI and LER on existing

infrastructure at a fraction of the cost versus what I mentioned on the previous slide. I'm not showing the EPI capacity that was overbuilt in China, simply because there are no material quantities of EPI that lead China.

Just a little bit of color to our global reach and what I have is [ph] are assets – (01:42:54) you see here, our flagship assets in Freeport, Texas, where we had the full integration that I spoke to along with having that full integration in Stade, Germany. So we've talked about those sites. And then what you also see here are some of our smaller plants, which we call are CER, are converted epoxy resin plants. And I'll talk to that in a minute, how we further advance liquid epoxy resin into converted epoxy resin. We do that at these assets in places like Guarujá, places like Pisticci in Italy, and Gumi in Korea, and Zhangjiagang in China. And these converted resin plants are very important to our downstream growth and very important to giving us more options as to how we make money in the [ph] Epoxy (01:43:44) value chain.

Let me walk you through a slide here. This is kind of like following the chlorine molecule, and give you more detail on how [ph] Epoxy (01:43:54) extends and adds value to the chlorine envelope for Olin. First, we take chlorine and we make allyl chloride and then we can sell that to the water treatment market as allyl chloride or further advance and convert that allyl chloride to make epichlorohydrin. With EPI we can sell it, again, to water treatment customers or to epoxy resin manufacturers where that makes sense. We then take the EPI, react it with [ph] bisphenol-A (01:44:24) to make liquid epoxy resin and we sell up or we improve our margins by 3.5x as we go from selling EPI into the merchant market to selling it as a liquid epoxy resin. So there's an increase of 3.5x in our margin versus selling that EPI.

We can then either sell the LER. We can sell it direct to the big coatings houses like PPG [indiscernible] (01:44:51) or we can take that LER and advance it to converted epoxy resin, which I showed you on the previous slide [indiscernible] (01:45:01) and we can take it one more step forward and instead of making a liquid epoxy, make it a solid epoxy resin that goes into a lot of powder coating markets or we can take the liquid epoxy resin and advance it on downstream into making applications like a brominated epoxy resin, which fits into the downstream. And when we advance epoxy into the downstream, that's another 5x to 6x improvement margin versus simply selling it as epichlorohydrin.

So let's be clear here. Our first strategic objective is to sell out our upstream and midstream assets, which upgrades the value of our chlorine envelope and liberates large amounts of caustic soda, which enables our entire chlorine envelope to run at higher operating rates. The second objective is to grow the midstream and downstream portions of the value chain, which serve as a great vehicle to capture higher returns to the ECU and the EPI molecule. This is what selling up means to us.

If you look at the applications that epoxy goes into, it's quite diverse. There's many applications where epoxy does not have a substitute. Customers use epoxy because they have to in order to get the properties they value, such as corrosion protection and a variety of performance coatings applications, such as oil and gas pipelines or chemical resistance properties required in industrial coatings or things like sea containers or sea going ships or you can go to Home Depot and you can buy an epoxy kit and coat your garage floor with epoxy.

Over 50% of epoxy is consumed in coatings applications. Of course, you find epoxy in your cell phones, your tablets, your computers, in your cars where epoxy is a critical component of the [ph] electoral (01:47:10) laminate, in the printed circuit boards, in your electronic gadgetry. Epoxy provides thermal stability and electrical insulation properties to help your phone be more durable and reliable after you drop them or maybe occasionally throw them.

It's worth elaborating on our plans to grow our downstream applications in electric laminates, [ph] wind (01:47:37) energy and formulated products. This is a segment of our business that customers will pay us for cost competitive innovations, and that's why we have R&D and technical development capabilities that you saw in the global map there. We have R&D capabilities in the U.S., Germany and China. And keep in mind that our downstream does consume 15% of the chlorine that I take from Jim.

Our downstream businesses have the highest margins, the best growth rates of any part of our value chain. And our development priorities are highly customer-driven as opposed to being R&D driven. We continue to be encouraged by the amount of new electrical laminate being demanded in the automotive industry due to more electronics in our cars and by the growing electric vehicle market. It's estimated that the demand for laminate will grow from a 0.5 square meter to 4 square meters during the next five years and that will require more epoxy resin with excellent thermal stability and structural integrity properties.

[indiscernible] (01:48:46) wind energy factoid, about 36% of the wind blade is comprised of epoxy, the rest of it is fiberglass and balsa wood. So each wind blade has about 11,000 pounds of epoxy per blade. About one in three blades in the world is made from Olin epoxy. The levelized cost of wind energy will continue to be more competitive as blades get longer and the metrics I just gave you is based on a 64-meter blade which fundamentally goes from about this stage to as far as you can walk into the other room or from home plate to second base and then go another 90 feet beyond and that's about 64 meters and the technology is moving to 75 meters. As blades get longer, you're more efficient, more efficient with your turbine and the levelized cost of wind energy comes down.

We also sell into the formulated products area which is really [Technical Difficulty] (01:49:48) specific driven application in areas like floors where you're looking for good chemical resistance or you want to be able to clean these floors like in a food processing plant. In epoxy, we formulate a system for customers to give them those kinds of properties or we do light waiting, for like pressure vessels, propane vessels instead of steel making those out of a composite fiber where epoxy is used to bind that together.

From a consumption standpoint, you can see that China is the largest market followed by EMEA North America and Latin America. Demand growth ranges from 5% to 6% in China and emerging margins – emerging geographies [indiscernible] (01:50:34) around 2% to 3%. Emerging geographies grow more in the 5% to 6% whereas emerging geographies in China, I mean, to say are in more than 5% to 6% range where the more mature geography is around 2% to 3%.

While our overall Epoxy participation exposure to China is minimal, our assets in Asia are vital for these downstream growth opportunities in wind energy and electrical laminates where we have leading market positions both locally and globally. More critical is our participation in utilizing our North American assets to grow all parts of our value chain not just in North America, but globally as well. Our primary focus with our European assets are to grow our midstream and downstream businesses in areas such as powdered coatings and formulated products. Our European assets have the flexibility and scale to be utilized globally as well.

Shifting to industry supply demand fundamentals, you can see that EPI and LER operating rates outside of China are in the high-80s which is the highest level we've seen in 10 years. As mentioned earlier China does not export any significant amounts of EPI and they are a net importer of epoxy resin. So, this is why the supply demand numbers do not include China. We certainly saw proof of these higher operating rates starting in late 2017 and first half of 2018 with the increase in EPI and LER prices and expansion of our margins.

Looking forward, higher cost EPI and higher cost BPA give much less incentive for capacity additions from non-integrated producers of LER in Asia and in Europe. Short-term we have the opportunity to grow EPI and LER through low-cost debottlenecking and longer-term we are fortunate to have much of the infrastructure in place for a potential brownfield investment in both EPI and LER when conditions are right.

So, Olin Epoxy will continue to accelerate EBITDA growth both near-term and longer-term. Quite frankly there was only one way to go from where we were in 2014 and that of course was up. And I also have to note that in 2017, our EBITDA would have shown growth over 2016 if not for Hurricane Harvey. We demonstrated that we can run epoxy at \$200 million EBITDA run rate which we did in the back half of 2018.

We can reach these future EBITDA segment earnings with our existing asset structure. Epoxy's value of liberating more caustic soda in the future will also continue to grow and move upwards. As the industry supply demand fundamentals continue to improve, this dynamic plays to our strength of our advantaged position and our strength in upstream and midstream segments of our value chain. This is truly what sets us apart from our Epoxy competitors.

So, to wrap up in summary, we will take our leading Epoxy position to enhance and drive the growth of Olin's chlorine portfolio. Here's what I want you to remember, three points. Number one, Olin is largest, lowest cost, most integrated producer with a global reach are wheelhouses in the upstream and the midstream. Point number two, we are getting closer to the tipping point of supply demand balances, and this is a critical driver to our future improved margins. And point three, Olin is in an excellent position to grow volume, increase our operating rates and to keep liberating more caustic soda. All of this drives the growth of Olin's integrated chlorine portfolio.

Thank you. I'd like next to have John Sampson come up. So, John over to you. [indiscernible] (01:55:04).

John M. Sampson

Vice President & Senior Vice President-Business Operations, Olin Corp.

Thanks, Pat. My name is John Sampson and I lead Business Operations for Olin. This means, I have accountability for around 75 chemical plants, 22 sites around the world, and we have 3,000 very enthusiastic operations employees who look forward to making more and more of the chlorine caustic HCL bleach Epoxy, chlorinated organics [indiscernible] (01:55:30) heard about today.

This afternoon, you've heard how Olin has positioned itself for success both in Chlor Alkali and the Epoxy business. Our leading position across Chlor Alkali and Epoxy industries set up Olin for success both in the near-term and for many years to come. And thanks to a disciplined approach towards capital investment. We are positioned to capture value across the energy industry cycle and through the structural change that was spoken to earlier, thereby expanding our reach into key markets, while expanding our margin.

To make all this happen we have to deliver on low cost, you've heard about low cost a lot today and reliable operations. So, let's talk specifically about the strategy we're using to invest in our assets and ensure they are primed and ready to deliver.

In operations, our daily task is simple. Ensure safe, efficient and reliable operations across Olin's asset base. It's what we live for in operations and we recognize that we're the stewards of the largest portfolio of assets capable of producing more chlorine, caustic, bleach, HCL, epoxy chlorinated organics, you know the list, than any other company in the world. But the fun part of this job being in operations is really about growth. And I will address that in the later slide.

Our plants are comprised of a network of flexible technologies that are advantaged in scale, location and cost. Furthermore, we benefit from an exceptional feedstock position, which supports our ability to leverage operational costs across the chlorine envelope. These enables help ensure our success today, and they will support our growth ambitions as we deliver value in the future. So let's take a quick look at how we manage capital.

Olin, again, has the largest chlorine franchise in the world. To maintain its asset base we are strategically dividing our capital investments into two main categories, value preservation and value generation. On the value preservation side, quite simply [indiscernible] (01:57:50) focused on optimizing our current asset base. We further subdivide that category into two buckets, building blocks and maintenance and reliability.

I'll take a minute to talk about building blocks because that may not be a term you're used to, but we look at building blocks as a unique subset of value preservation and that we want to carve out the fundamental investments that are required if you're going to be in chlorine [indiscernible] (01:58:17) franchise.

Our building block capital projects are investments in three critical areas, energy, [indiscernible] (01:58:25) and electrolytic cells. Getting the building block investments right means we have the lowest cost electrochemical unit from which we can make the lowest cost chlorine, caustic, EDC, vinyl epoxy bleach, HCL.

So Olin ensures low costs by making timely and appropriate building block investments. The maintenance and reliability section can round out our value preservation investments and they really are the blocking and tackling you have to go through each and every day to make sure the assets are well maintained and can run and deliver the products when you need them and where you need them.

On the value generation side or growth, we're really focused on expanding our assets whether it be brownfield or simple expansions of assets we have in place to strategically grow our low-cost positions across the chlorine envelope.

Just take a quick look at how we manage these investments on the next slide. A lot of colors here, but I want to draw your attention first to the right side of the chart and talk about that blue bar on top. The message here is post-2020, we have a large part of our capital investment that will be targeted towards growth. We haven't ignored growth in the first few years we've been together. You can see the blue bar exists in the three bars on the left, but post-2020 after we finish some basic fundamental housekeeping, we have a large percentage of our capital that we targeted at growth.

Jim mentioned earlier, we've got chlor alkali and bleach and HCL that's coming online here in the next year or two. Those are brought on by the 2016 through 2019, investments you see there in blue. And just real quickly on the red, that really is more of a integration project that's hooking together all 75 chlorine plants in ERP system. We've spoken to that before. That will be done in 2020 which again provides more capital available for growth going forward.

The yellow and the teal at the bottom are really again back to building block and maintenance and reliability. What you see there is a little bit of heavier investment early on, because we had to reinvest in the asset base. Some of the acquired assets that came as part of the acquisition need to be refreshed, they have been underinvested in, but that will start to attenuate in the out-years. We will have a lot of those building block investments made. We will have a lot of the blocking and tackling in place. And so, again it's back to the bar on the right where we see a large blue component targeted at growing the asset base. But we're not just making capital investments, we've also made some strategic investments to drive low cost. And we'll take a quick look at those.

Here's a quick example on two critical investments for us, electricity and ethylene. In the red bar, you can see that we've got strategic investment in ethylene via a 20-year agreement [indiscernible] (02:01:27) ethylene via a new world-scale cracker. This ensures we'll have producer economics on a critical raw material for making EDC. And Jim told you earlier, we're the largest merchant supplier of EDC. And if you remember, Jim talked about our vinyl business in the way it will change come 2021. And here you can see in 2020, we have our last payment to access that low-cost ethylene as part of that changeover in that VCM contract.

This ethylene investment is really critical for us, because ethylene is the only real efficient way to globalize the chlorine side of the ECU. Caustic is easy, you put it in a ship, you put it in a barge, you can move it around the world. Chlorine, okay, you can [ph] liquefy (02:02:08), put it in a railcar and rolled it around, but that's about all you can do with it unless you have ethylene you compared with and make EDC. So, this investment is critical because we are again the largest merchant supplier of EDC.

And with that low cost ethylene and low cost chlorine, guess what, we've got the lowest cost EDC in the world. This investment has already produced \$180 million of value versus market-based ethylene in the last three years. The blue bar you see in 2016 is a power investment, targeted at our Louisiana and Texas assets that help deliver reliable low-cost power for Olin assets as we ran those assets really hard over the last few years and we want to ensure that we get run at high rates consistently with limited risk. These investments pair with our capital plan and drive low-cost.

Just a real quick aside on what I'm talking about when I talk about growth on the next slide, we've got a 50,000 chlor alkali expansion that's coming online here in the next year or so at \$200 a ton. So when I talk about investing for growth and talking about low-cost investments, incremental expansions that are much, much lower than the previously announced multiple \$1,000 per ton investments.

So let's take a quick look at our growth plans. We have a series of growth opportunities that are in various stages of completion. At the very top, we've got near-term one year to two years, we have projects that are in process that will be RTO-ing, [ph] returning into operations (02:03:48) starting up here in the next 12 months to 24 months. These projects are in direct support of that structural change that we spoke about earlier and it allows Olin to capture a significant amount of the market growth that will take place.

Over 200,000 tons, 250,000 tons coming soon to a [ph] theater (02:04:10) near you. Near-term, we have expansion plans in place with chlorine, caustic, HCL and bleach, and again at a very low cost, at a very easy increment. In the three year to four year timeframe, we have an additional several hundred thousand tons of capacity that we can bring online via incremental expansion. These are easy to do low complexity projects.

And lastly a little further out with a little more complexity, a little more effort, an additional 0.5 million ton plus additional capacity added to what we're doing already today. Add it all up and over 1 million tons of growth that will expand Olin's low cost highly reliable ability to deliver quality products [ph] and in (02:04:56) operations we look forward to doing all of this at the right time.

So I'm going to wrap up in summary by saying that Olin really has four key advantages. We've got high-quality assets in the right locations around the globe. We've got a strategic approach to capital that ensures our assets we'll be ready to run, when we needed and [ph] when to run (02:05:21). We're taking advantage of the low-cost incremental expansions. Think about bringing on ECUs at \$200 a ton. I dare you to find someone else that can do that. We've got low-cost raw materials and low-cost operations and we've got a cost efficient growth action plan in place. Or said another way, Olin has an ability to make, manage and move molecules [indiscernible] (02:05:45) portfolio better than the competition. And that truly is a sustainable advantage.

Now, I ask Todd Slater to come forward and speak to you about Olin's financial strategy. Thank you.

Todd A. Slater

Chief Financial Officer & Vice President, Olin Corp.

Thank you, John. You heard from a number of our business leaders this afternoon on Olin's ability to capitalize on the structural supply and demand opportunities in both of our chemical businesses. These opportunities result in a very strong outlook for Olin with opportunities to improve earnings and expand cash flow going forward.

We will continue a balanced and disciplined approach to our capital allocation by investing in our businesses, deleveraging the balance sheet and returning cash to our shareholders. You can see our significant financial improvement over the last three years here on the next chart. On the far left-hand side our revenue is increased by \$1.4 billion over the last three years. This growth was driven by a 33% improvement in Chlor Alkali Products and Vinyls as well as a 20% improvement in Epoxy revenues.

Over that same three-year period, adjusted EBITDA increased by \$425 million or 50% reaching \$1.265 billion in 2018. This improvement in adjusted EBITDA was primarily propelled by a 75% improvement in Chlor Alkali Products and Vinyls and Chlor Alkali Products and Vinyls improvement was a result of improved pricing.

Caustic soda price improved over 50% over the last three years. Chlorine, EDC, HCL, chlorinated organics, they all improved by anywhere from 15% to over a 100% in the last three years. Beyond just Chlor Alkali, Epoxy improved 50% in their EBITDA from 2016 to 2018, driven by improved volumes and improved margins.

These improved earnings resulted in additional free cash flow, as you can see on the far right hand chart. The primary difference between the increased EBITDA and cash flow was about a \$100 million of increased capital spending that John Sampson talked to you a few moments ago.

Now let's focus on our 2018 cash flow. Reviewing our 2018 capital allocation will demonstrate our balanced and disciplined approach to investing in the business, deleveraging the balance sheet, and returning cash to the shareholders. We invested \$385 million in capital in the businesses in 2018, approximately 10% of that was value generation. The next two slides will go into more detail about our optimization of the balance sheet but Olin management has historically and will continue to maintain a prudent capital structure that is – and we are committed to a conservative financial policy. This ensures that we can handle economic uncertainties and enables us to invest opportunistically in our businesses.

Our financial strength has enabled stable shareholder returns in the form of dividends. We have an unbroken record of 369 consecutive quarterly dividends, more than 92 years of dividends.

Now, let's talk about our accomplishments in optimizing the balance sheet. Over the last three years, Olin has reshaped its debt profile by creating manageable, staggered towers of maturity, by repaying debt, and issuing bonds for 2027 and 2030 with interest rates ranging anywhere from [ph] 5% to 5.125% (02:10:32). Since the acquisition we have repaid \$440 million of debt and we expect to prepay another \$250 million to \$300 million of debt in 2019.

With a combination of debt reduction and EBITDA growth over the last three years, our net debt to EBITDA ratio has been reduced to 2.4 times with additional improvement expected in 2019. We are committed to operating with investment grade metrics over the long term. We do have a significant interest expense savings opportunity in 2020.

One question that I've been asked repeatedly over the last three plus years is why don't you repay those – or call those Dow acquisition bonds. Well, the answer is because of the Reverse Morris Trust that we did in October of 2015, we are unable to call them until October 15, 2020. Assuming all the appropriate legal caveats when those bonds get called in 2020, Olin expects to save between \$50 million and \$70 million of interest. The payback on the call premium is one year or less. You should see in 2021 lower interest expense and improved cash flow from this opportunity.

Let's talk about Olin's free cash flow yield over the last three years. We reviewed the improvement in our free cash flow over the last three years. As you can see over that same timeframe, Olin has consistently outperformed a broad-based chemical peer companies generating a higher free cash flow yield. Overall, we have averaged 150 points better yield than these peer companies.

Now, switching gears, let's talk about the next several years. This slide is familiar, John showed it earlier. Olin has experienced a 50% improvement in EBITDA over the first three years and to achieve \$2 billion we need to only approve another 60% from where we are today.

We've discussed our 2019 outlook on the call last week on our conference call. As we look forward within the next two to three years, we see a clear pathway to \$1.5 billion of adjusted EBITDA with the assets we have in place today. The factors that you heard – you heard from everyone today support our confidence that \$2 billion of adjusted EBITDA should be achievable, again driven by volume growth, improved pricing and improved margins.

Now let's unpack that a little bit. You start with the 2018-2019 outlook for adjusted EBITDA of \$1.265 billion is the base. First, we have the signed VCM contract that becomes effective in 2021, that's worth approximately \$75 million of additional EBITDA. When caustic soda recovers to just the – just the prices we saw last summer that's worth \$225 million of adjusted EBITDA to Olin. You've heard from Pat, the opportunities that are there for Epoxy in volume and margins and that's our next building block and it's worth a \$150 million of adjusted EBITDA.

The next series relates to growth in volume in Chlor Alkali Products and Vinyls. The first block is improved operating rates. If we just go back to improved operating rates and little bit higher volumes than we experienced in 2018, we saw these volumes in 2016 and 2017 that's worth another \$100 million of adjusted EBITDA to Olin. Capacity expansions that are in process and will come online in the next one to two years for HCL, bleach, chlorine, caustic soda that's worth at least \$75 million.

And the last bar there is worth a \$120 million and those are again low-cost incremental Chlor Alkali expansions that are available in three to four years. All told, these opportunities are within our control or pricing and margins frankly we've seen within the last year. That gets us to the \$2 billion. That's all before the benefits in pricing from the structural supply and demand that changes, that are occurring in the Chlor Alkali Products and Vinyls space that you heard from John Mulholland earlier.

If you assume conservatively, you had \$100 a ton for chlorine, chlorinated organics, EDC, that's worth another \$250 million to Olin annually. Again if you assume conservatively, \$100 a ton on caustic soda, that's worth \$300 million a ton – that's worth \$300 million to Olin, all these metrics are in the back in the appendix. Again, I'll just remind you, those changes still don't get you to the pricing that would be required to build a new greenfield facility that John Mulholland talked about earlier.

I think this bridge demonstrates to you the wide and varied opportunities that we see to achieve \$2-plus-billion of adjusted EBITDA. And now I would like to turn the meeting over to Larry Kromidas we get ready to begin our question-and-answer session. Larry?

Larry P. Kromidas

Director-Investor Relations & Assistant Treasurer, Olin Corp.

Thank you, Todd. While we assemble the Q&A panel, just some final logistics on the Q&A session. Logan and I will have microphones. We ask that you please wait until we get to you, so that everyone hear and everybody on the webcast can hear your question. Prior to asking a question, we ask that you please state your name and the firm you represent. Finally, please limit yourself to one follow-up question so that we may allow as many attendees as possible to ask a question.

With that, I turn the program over to John Fischer. John?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

Okay. So we're ready to take Q&A.

QUESTION AND ANSWER SECTION

Larry P. Kromidas

Director-Investor Relations & Assistant Treasurer, Olin Corp.

Go to Frank.

A

Logan Bonacorsi

Director, Investor Relations, Olin Corp.

Name and firm?

A

Frank J. Mitsch

Analyst, Fermium Research

Frank Mitsch, Fermium Research. I guess my first question is did Larry and Logan coordinate his tie with her dress like? I think it's very sharply done. And kudos to Larry on your pending retirement. We're going to miss you brother.

Q

Larry P. Kromidas

Director-Investor Relations & Assistant Treasurer, Olin Corp.

Thank you, Frank.

A

Frank J. Mitsch

Analyst, Fermium Research

As I look at the near-term and long-term targets, typically you gave a metric, but not a timeframe or a timeframe [indiscernible] (02:18:34) metrics. I'm going to try and marry the two. I thought I heard that \$1.5 billion of EBITDA you believe is [ph] eminently achievable or (02:18:40) achievable in two to three years. Did I hear that correctly?

Q

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

You did. Yes.

A

Frank J. Mitsch

Analyst, Fermium Research

And then secondly, when would you think that you could get that longer term that \$2 billion metric given the outlook for Alkali?

Q

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

After three years.

A

Frank J. Mitsch

Analyst, Fermium Research

All right. And then one more granular question. And Pat, you talked about EPI and liquid epoxy resin going into the supply demand charts, you excluded China. And I know you quickly went as to why you excluded China. I'm just curious as to why that is.

Q

Pat D. Dawson

Executive Vice President & President, Epoxy and International, Olin Corp.

Sure.

Q

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

Go ahead.

A

Pat D. Dawson

Executive Vice President & President, Epoxy and International, Olin Corp.

Can you hear me? Yeah. The reason, Frank, I excluded China is because if you look at the [ph] X4 (02:19:28) data over the last 10 years, there's hardly any EPI at all that has come out of China. And I think you can speculate as to why that is, but the fact of the matter is it just hasn't come out.

Q

And also on LER, China is a net importer of liquid epoxy resin. So the impact there of China's slowdown can back up material in other parts of the world, but China is a net importer. So that's some learning that we've been going through here over the past couple of years.

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

Don?

A

Donald David Carson

Analyst, Susquehanna Financial Group LLLP

Don Carson, Susquehanna Financial. Question for IHS on your outlook for caustic. What do you see as the tipping point or the operating rate at which you start to see this fly up in pricing? Do we get there before the 90%

Q

sold out rate that you talk about in 2023 and what are the constraints [indiscernible] (02:20:32) presumably at some point on caustic for example, there would be some demand substitution, you might see some shifting to soda ash, for example. So what are the constraints on seeing this fly up in prices?

John J. Mulholland

Vice President, Chemical Strategy Consulting, IHS Markit

A

Well I think you hit [indiscernible] (02:20:45) going to be inter-material competition. I think both for the chlorine and caustic, I use the example in chlorine. Yeah, if you're going to have PVC going up, you're going to have other materials like high density polyethylene. In things like the – in caustic, you might be looking at using a different grade of bauxite to be able to use less caustic for that to make aluminum. So you see a little bit of that. And, again, I think you're getting towards the – I think we said by 2023 here in the U.S. We said 2021. I think you're looking at over the next couple of years to actually start to see us get some of that pressure on pricing.

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Damian, do you want to talk about just the caustic soda, soda ash [indiscernible] (02:21:27)?

Damian Gumpel

Vice President, Global Caustic, KOH & Vinyls, Olin Corp.

A

Sure. There's a couple of interesting dynamics there to think about. In the past consumers of caustic soda also had soda ash capabilities. You could switch from one to the other. One thing to keep in mind is caustic soda is mainly transported and consumed in liquid solution form. Soda ash is transported in a box. And now you're talking about a completely different logistic to get that product into your plant and actually process it in terms of kilns, storage, solution and so forth. So you're talking about an investment that just is needed for that piece alone.

Other thing to think about is in terms of switching capabilities the amount of soda ash capacity, it's globally running at capacity already and you are talking about new mines that would have to be developed to facilitate that. So I know it's a topic that tends to come up. Currently today we'd say there's a very small fraction of people that actually still have older capabilities to switch, but generally speaking it requires a net new investment. We're just even. At this point today, we're just not seeing it.

John Roberts

Analyst, UBS Securities LLC

Q

Hi. John Roberts UBS. The longer term \$2.5 billion-plus target, it was the really long, long-term. Still doesn't have Winchester recovered that's there. Is that possible you could get to \$2.5 billion somewhere out in the future in Winchester still not recovered by then? And what are you watching it to understand personal inventories that people have of [indiscernible] (02:23:10) the inventory that's out there that's hard to track because it's not at the retailers, it's at the consumers. What metrics do you look at to kind of get a gauge on that?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

From the standpoint of our forecast, our forecasts essentially assume the Winchester that we saw in 2018 is the Winchester we see going forward. Just for simplicity purposes. John, what we're trying to track is what – we've tried to determine what we think normal consumption is. We think that somewhere in the [ph] 11 billion to 12 billion rounds (02:23:40) and we had a period of about eight years where purchase quantity exceeded that. So we're looking at that versus where we are today in terms of selling quantity. And you can actually come up with a run rate down that says we've probably got another year to year and a half before we see inventories that the

consumer depleted sufficiently to step the demand back up to the historic [ph] 11 to 12 million round (02:24:08) level. Kevin?

Kevin W. McCarthy

Analyst, Vertical Research Partners LLC

Q

Hi. Kevin McCarthy, Vertical Research Partners. Two, I guess, related questions on capacity expansions. One near-term and one longer term. Over the near-term, can you talk about the amount of debottlenecking that you're doing and the pace of that over the next couple of years? How that will flow through your financials?

And then longer term, John made a case, and I think you agree that the market could tighten. He also mentioned it takes four to five years to bring on new capacity. And I understand you're not at reinvestment economics today, but recognizing that lag time, how are you thinking about potential for a more meaningful capacity expansion in say, [ph] Chlor Alkali (02:25:00) versus alternative uses for the capital deleveraging or returning it to shareholders?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Let me start. I think everything that John Sampson showed you there probably falls under what you would categorize as debottlenecking. The 200,000 tons [ph] that's in process (02:25:17) is debottlenecking. It's essentially taking the framework we have and reconfiguring or adding a [ph] few sales and maybe (02:25:24) more capacity.

And I think if you looked across our system, Jim talked about that, almost every plant we have has some element of that. So I think virtually the entire million tons that we've portrayed is really going to be in the form of debottlenecking. I think to answer your second question, which is what would it take for Olin to build, and I would tell you we're not going to build a greenfield. We're going to build the brownfield. We're going to add to the existing facilities that we have so that we can leverage the infrastructure that John talked about, the [ph] brine, the cells (02:25:58) electricity.

It would take a situation where we've got a set of derivative demands that sell out the chlor alkali capacity that we would be looking to build. So if somebody came forward and just for argument sake said, we'll buy [ph] a million extra tons of EDC for you (02:26:14) under a long-term contract beginning in three years, that would cause us to say, well, under those economics assuming the prices are right, that would be the trigger point for building what I'll call new capacity.

John, do you want to add anything to that?

John M. Sampson

Vice President & Senior Vice President-Business Operations, Olin Corp.

A

Yeah. No, I think you hit the nail on the head. It's really all incremental expansion brownfield investments. We've got the advantage of space that's allowing us to add to our plants pretty efficiently. [ph] We talked about the \$200 a (02:26:44) ton expansion of 50,000 tons of ECUs, that will be online here in the next 12 months. And we got other opportunities to do that and really, really, low economics. So...

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Question over here, Logan.

Matthew Blair

Analyst, Tudor, Pickering, Holt & Co. Securities, Inc.

Q

Good morning. This is Matthew Blair from Tudor, Pickering. I had two questions on slide 36 here. So, first, you show your merchant chlorine position around 20% of your total sales. Are you okay with that long-term? Would you like to get that down to zero? And could you also talk about the opportunity, merchant chlorine versus PVC there?

And then the second question, you showed Dow sales for chlorine, 30% to 35%. Part of that goes into their PO business. Now, of course, there's other ways to make PO that are more economical. Did you view that as a long-term source of sales or is there a risk that 30% to 35% could trend down over time?

John J. Mulholland

Vice President, Chemical Strategy Consulting, IHS Markit

A

Jim, why don't you answer the merchant chlorine question? I'll answer the PO question.

James A. Varilek

Executive Vice President & President, Chlor Alkali Products and Vinyls & Services, Olin Corp.

A

Sure. The merchant chlorine position, really what we're trying to do is, as I mentioned, is that we're trying to place chlorine at the highest value. So we don't have anything against selling merchant chlorine, but we want to place the chlorine in the capacity that we have at the highest value. So right now we're moving things into derivatives where we have value. And I mentioned the bleach and the HCL. If the economics improve to the point where merchant chlorine has a good value option, then that's where we'll place it. So, no, there's no intent to take it down to zero. But we have no problem with reducing it if there are better value opportunities.

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

And I think on the PO question, remember Jim mentioned, those contracts run out in 2025. None of the forecasts we showed you assume any change in that relationship past 2025. That's probably quite a ways out from where we're thinking.

From our perspective, the decision point I think is really going to be what does Dow want to do. It's our point of view that Dow could build [indiscernible] (02:29:05) capacity at both Freeport and Plaquemine if they wanted to. Our view is they're not going to want to because that's a couple of billion dollars of investment that really doesn't get them anything from a cost perspective. So I think there is a likelihood down the road that we will renew those contracts at some level, maybe not at the level they're at today, but they're going to be different in terms of Jim mentioned they were cost-based.

They're going to have to be much more of a mark-to-market. But I think that's a conversation that's probably not going to happen for another couple of years. We've sort of agreed between the two parties that that's a four-year type of a lead time to that. So in two years if we have another Investors Day, we might be in a position to talk to you more about that.

Michael Leithead

Analyst, Barclays Capital, Inc.

Q

Hi. Mike Leithead from Barclays. I guess quick question on your VCM contract. If I understand it correctly, it's about 600 million pounds of ethylene that comes with that tranche. And if I look at your annual EBITDA

incremental here of \$50 million to \$75 million, it kind of implies if that ethylene is cost based about \$0.08 to \$0.125 a pound on the ethylene margin and no margin on the VCM conversion. Is that the right way to think about it or how should I think about that \$50 million to \$75 million step up?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Jim, you can comment. I think the volume is actually quite a bit lower than that. I think it's more in the 450,000 tons. So I think your map might be off a little bit. Jim?

James A. Varilek

Executive Vice President & President, Chlor Alkali Products and Vinyls & Services, Olin Corp.

A

Yeah. I think it's just a total value. You can assess the value on the chlorine side or on the ethylene side of things. But it's a long-term contract that is – we'll just say that it has elements of making sure that we're covered from a cost perspective, variations on cost. It's a good solid long-term contract that gives us some consistent value add. You can place the value on the ethylene, you can place the value on the chlorine, but...

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

...or on the caustic.

James A. Varilek

Executive Vice President & President, Chlor Alkali Products and Vinyls & Services, Olin Corp.

A

Yeah. Yeah. And the other side of that is on the caustic. And there's value to Olin across the board, and so it's not in anyone spot, but it's \$50 million to \$75 million across the board.

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

There's a question here. Why don't we go up here first? Yeah. That's fine. We will get everybody. Thank you.

Jeffrey J. Zekauskas

Analyst, JPMorgan Securities LLC

Q

Jeff Zekauskas at JPMorgan. I was hoping you [ph] would just do (02:31:54) a little bit of a historical review. That is caustic soda prices were going up in 2017. They kept going up until – I don't know, June – contract prices in the U.S. to about June of 2018 and then they stopped going up and began to fall. Why is it that they began to fall and what is it in the current environment that would reverse the trend and have them [indiscernible] (02:32:23) and if you had to guess when that took place, when do you think it might take place?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Damian, do you want to tackle that?

Damian Gumpel

Vice President, Global Caustic, KOH & Vinyls, Olin Corp.

A

Sure. Sure. And thank you for your question.

Jeffrey J. Zekauskas
Analyst, JPMorgan Securities LLC

Q

Sure.

Damian Gumpel
Vice President, Global Caustic, KOH & Vinyls, Olin Corp.

A

What we saw if you actually go back just a little further...

Jeffrey J. Zekauskas
Analyst, JPMorgan Securities LLC

Q

Sure.

Damian Gumpel
Vice President, Global Caustic, KOH & Vinyls, Olin Corp.

A

If you go back to 2016, so about March-April timeframe, we started to see underlying supply demand fundamentals that we've kind of evolved in experiencing and John kind of spoke a bit about. We started to see that taking place in the market. And so, we saw an appreciating price dynamic of both globally and in the domestic North America side throughout the latter half of 2016 and then to 2017.

Now, then in the latter half of 2017, we saw some one-time events that provided some additional tailwinds in the form of a couple of factors. The first thing is everybody knew that Mercury was going to be [indiscernible] (02:33:19) in Europe. That created a one-time event that created some dynamics there that tightened up the market in that period of time in preparation of that.

The second was the weather event that occurred in the U.S. Gulf in the form of Hurricane Harvey occurred by about the same time. The third thing that took place is China was starting to prepare for their [ph] winter 2 plus 26 initiative (02:33:40) of curtailing emissions. That caused some tightness in the market in preparation of that. So we had some events that really drove the market higher in the end of 2017, spilled over into 2018. Those events then came to pass and then were replaced, if you will, by an event on the downside, which was this event in Brazil that occurred almost a year ago, that curtailed caustic soda demand.

So that's now played itself out over the course of the 2018 too. With that in mind now, we see [ph] once – (02:34:22) one-time events that were favorable, went away. They were replaced by one and a couple of other, [ph] call them (02:34:28), temporary events to the downside. Once these events are in the rearview mirror, we think that the underlying supply/demand fundamentals pick right back up.

Jeffrey J. Zekauskas
Analyst, JPMorgan Securities LLC

Q

If I can try one follow-up. So if we were listening to a Celanese presentation, what they would be doing is talking about all of the different derivatives that they make and finding the best market for at the market that had grown tightest and trying to stay away from the markets that were more loose. And in the presentation that you gave, you talked about your strength in so many different chlorine derivative markets, but there wasn't so much of a commentary around which market might be better to focus on or which market could be tighter or which market might be loser. Are those options not really possible for you and so your business is fundamentally different? Or are there ways that you might be able to do better in certain derivatives and if there are, which are the derivatives you're really focusing on this year?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Let me start with the answer to that, because I said in the introduction that that portfolio of chlorine derivatives that we have allows us to manage where chlorine goes to maximize value, almost on an hourly basis. And to answer your question, we make that decision almost daily of where chlorine is going to go and we make a decision where chlorine is not going to go.

I would say this. The majority of the time the outlet for chlorine, they get shorted is the merchant market because that is typically a market today, you've seen it, has been oversupplied and that's been shorted. We've seen EDC prices go from \$0.05 a pound, probably 18 months ago to today it's \$0.14. I would tell you today EDC is a lot more desirable market for us. And what we're trying to emphasize, Jeff, is we have the flexibility to do that day to day. We can turn HCL on and off on a daily basis. We can turn bleach on and off on a daily basis and bleach, which is very seasonal, we actually do that. So we said we produce probably 65% of our bleach in the summer months, June 1 to October 1.

So we're constantly doing that, trying to attract value. If we were pumping 100% of our capacity in bleach today when it's snowing outside in New York and there's not a lot of bacteria growing in frozen reservoirs, we probably would be hurting ourselves. So I can't answer that specifically to say where are we today. I mean, I can do it where we are today. We're not here to tell you we think there is a better outlook of one versus the other. I can tell you there's a couple of that, over the three years we've been to get back this together is consistently not been shorted and I can tell you there's one that's been consistent with shorted. And I think that's how we would answer that question.

Jeffrey J. Zekauskas

Analyst, JPMorgan Securities LLC

Q

Okay, thank you.

James Sheehan

Analyst, SunTrust Robinson Humphrey, Inc.

Q

Jim Sheehan from SunTrust. Could you share your thoughts on whether it makes sense for Olin to integrate downstream into PVC and under what circumstances would you consider that?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

I'll answer that. I think Owen is not going to integrate downstream into PVC. I think that is a business for an integrated PVC producer that has this global industry structure that John described. I think to do that, you actually have to be integrated into ethylene in a bigger way than we are. I think John properly categorized what we have which is [indiscernible] (02:38:24) scenario and I would say our strategy is we're going to try to optimize this chlorine derivative portfolio of 19 things. And that does not require us to go downstream to PVC to be successful in our point of view.

James Sheehan

Analyst, SunTrust Robinson Humphrey, Inc.

Q

And on caustic soda, you talked about the premium that you think you deserve for operating reliability. Now over the past few years I think you've actually had discounts in your prices that you that you're, you're working on removing. Why haven't you been able to have that premium for reliability in the past?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

I think if you went back and looked at the charts that we've had in our quarterly earnings calls for the last 2.5 years. We'd show you what the pricing metrics of caustic soda are relative to discounts. And what I would, what you will see is those discounts have consistently declined to a level today where we're yielding 80% to 100% of the "published price." So, I don't accept the premise that we've been discounting it because we're unreliable supplier. I think we I think we've gradually improved where we're actually eliminating market discounts and we're selling close to max value.

Michael J. Sison

Analyst, KeyBanc Capital Markets, Inc.

Q

Mike Sison, KeyBanc. If IHS, if their forecast is correct in the sense that the industry chlor alkali will be sold out in 2023, would you be closer to the 2.5% or the 2% and given a lot of the improvements that you see over the next couple of years?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

I think if there're correct and the industry globally is sold out 2023 we'll be a lot closer to 2.5% than we will to 2%.

Michael J. Sison

Analyst, KeyBanc Capital Markets, Inc.

Q

Great. And then a quick follow-up. In one of the slides, I can't remember which one, you had the cost of your Chlor Alkali footprint was like \$200 and then a lot of folks were well above that. Does that costs stay flattish over the next couple of years, and then when think about doing a world scale facility, and I know the IHS outlook said some – like current prices are less than 10% return. Is your return better at a lower price than what they are looking at to do that world scale facility?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

I would say that what the benefit that Olin gets that gives at its low cost position is twofold. We have access to natural gas as a power source or hydropower as a high as a power source and then it's probably 90% to 95% of our power and our plants, especially our Gulf Coast plants have significant scale. If we were to go and add significant amounts of capacity, we would be leveraging the scale in those large plants and presumably leveraging natural gas. So, it would be our expectation that our cost – we would not change the cost outlook for Olin ex a movement in natural gas which would affect the entire industry. So from that perspective, I think that's where we would be.

Eric B. Petrie

Analyst, Citigroup Global Markets, Inc.

Q

Eric Petrie with Citi. In the backdrop of improving caustic prices into next decade, just a question on contract strategy, do you see more frequent refreshes compared that the 20% to 25% renewals that you see in your cost to contracts and how do you see the pricing where it changing if any?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Damian, why don't you talk first about that what's actually occurring in the spot market and then you can comment on what you're seeing in our contracts.

Damian Gumpel

Vice President, Global Caustic, KOH & Vinyls, Olin Corp.

A

Well sure. One of the things that we see is, you know, with your underlying premise, first of all, thank you for your question. As we see the supply demand tightening, what we see then is customers taking more of their demand out for contracts and aim to lock that up because as I said in the premise of my talk is secure the supply and the importance of that. And so you get to a point where if you don't think you're going to get all the product out in the spot market that, you need to actually go out and secure contracts. And one thing that we've been seeing in the market, and if you keep up with press publications the amount of spot material has declined as this dynamic has unfolded. We see that both in the domestic and the export market. What that then means is someone like us with Olin with our position, we were then able to look across the table to a customer, put our value proposition on the table, and in the cases where we think there's value on contracting for a period for – of more than one to two years then we will do that because it achieves certain value they bring certain value to us. And conversely, if we think that the timing is not as ripe for that kind of a longer-term commitment then we'll do something more in the one or two years. But we feel, we have that flexibility we have the flexibility across our assets in our regions and our product. And so, we do a portfolio management of caustic soda across the regions we serve, across the grades we serve, across the modes to really, as John said, it's much like we do in chlorine across the envelope, we do that in a portfolio across caustic soda.

Eric B. Petrie

Analyst, Citigroup Global Markets, Inc.

Q

And my follow-up question is directed to John, but it's open for a comment by all management as well. I think the last chunk of capacity in North America that came out was 6% in 2014. Can you talk about the returns when they make those investment decisions compared to the 10% or low teens that you indicated at current pricing levels today?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Jim, you want to talk about that, that's was [indiscernible] (02:44:30).

James A. Varilek

Executive Vice President & President, Chlor Alkali Products and Vinyls & Services, Olin Corp.

A

Yeah. I think and John Sampson may – was involved with that as well. I think that the asset – the assets that were built in 2014 were made for different reasons. I think there was – there's internal reasons in terms of supply and so forth that needed to be done in renewal. So that was important to the asset, so that asset base was a brownfield asset. And it's been quite nice from our standpoint to receive that asset. The new assets that we're adding, the new capability and capacity that we're adding will be a fraction of even the cost that we spent on that product line.

Neel Kumar

Analyst, Morgan Stanley & Co. LLC

Q

Hi, Neel Kumar from Morgan Stanley. Just a question on the \$200 million – \$150 million of Epoxy improvement to get to your \$2 billion of EBITDA? And how is that split up between volume and margin improvements? And what price tag is that assuming?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

I'm sorry could you repeat that. I didn't get the beginning of it?

Neel Kumar

Analyst, Morgan Stanley & Co. LLC

Q

Of the \$150 million of Epoxy improvement to get your \$2 billion of EBITDA, what is the split between volume versus margin improvement? And what that price tag it is assuming?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Go ahead, Pat.

Pat D. Dawson

Executive Vice President & President, Epoxy and International, Olin Corp.

A

Yeah I would say it's about half and half. I think what you saw this year with pricing – you know pricing is up about 40%, and those kind of margins, while they tailed off at the end of the year mainly because of demand destocking, I think as you see demand start to pick up again, we're pretty confident those kind of margins will return. We're not too far from them today and I think it's just the normal volume growth that I spoke to in the market of around 3% also helps that as well. So it's a combination pretty much half and half between volume and margin. But make no mistake we made a tremendous jump in improvement in margins over hydrocarbons from 2017 to 2018.

Neel Kumar

Analyst, Morgan Stanley & Co. LLC

Q

And then from a follow up in terms of your chlorine envelope slide, could you just give us a sense of the magnitude or the differential between your margins selling into the merchant Chlorine market versus other derivatives like EDC?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Well as I said EDC is probably not a good example because there have been days in the last three years, if you've looked at that chart it looks like an EKG. There have been days when we would have preferred to put that chlorine in the merchant market. I would tell you that the one product that is the most consistent has been bleach. Jim had on this slide that it sells for \$100 and \$200 a ton premium to the ECU. That's very consistent. It's seasonal. It's not the biggest product but that's the one that probably does the best. The other two I would say that have not really ever been on the radar for shorting have been the chlorinated organics portfolio itself because things like carbon and tet are of very high value and epoxy just because we have the whole sequence of epoxy to upgrade that. And if you get down to liquid epoxy resin or solid epoxy resin that value creation is very substantial. Okay we have one in the back.

Aleksey Yefremov

Analyst, Instinet LLC

Q

Thank you. Aleksey Yefremov from Nomura Instinet. On Slide 71 you're showing three buckets of chlor alkali expansions and in the middle like intermediate over the next three years, four years, how would you assess the probability of doing that, is it very, likely 50/50 or.

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

I would say that's in the very likely category. I think the third bucket is the one that we'll take some analysis and take some better understanding of where the chlorine derivative demand is to support that.

Aleksey Yefremov

Analyst, Instinet LLC

Q

Thank you John. Just to follow up on the first bucket, near-term should we think of that 200,000 KT, 250,000 KIT being available early in 2020, and then you start selling it out or that's more gradual.

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

I think if you look at if you remember what Jim had on his slide he had 70,000 tons of HCL and 60,000 tons of bleach. Those two make up the majority of that 200,000 ton debottlenecking and that will be in place by sometime in the middle of 2020. Thanks.

We have one more Larry, in here.

Jeffrey J. Zekauskas

Analyst, JPMorgan Securities LLC

Q

Jeff Zekauskas of JPMorgan. If I could just try one more. Can you talk a little bit about your operating rates? And that in the discussion you've talked about various types of capacity expansions, as though you couldn't produce any more of than you are already producing. Is there an optimal operating rate for you or are you close to that? Where do your operating rates max out, why do you need to actually lift your capacity, if that's a correct description of what you've been saying?

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

Yeah. Let me clarify one point, if you look at Todd's step-up to 2.5, the first element of capacity was higher operating rates, and we have operated at – we did operate on a higher volume of chlorine produced in 2016 and 2017 than we did in 2018. Generally speaking, and John Sampson you can comment, we look at max chlor alkali operating rates, it's somewhere between 90% and 93%. The chemistry is very aggressive on both sides of the molecule and one of the disciplines we put in place and we agreed to when we did this merger was we were going to take outages when they are planned, and we weren't going to risk running longer and have some kind of catastrophic failure. Those inevitably create unplanned outages and take longer. And, John?

John M. Sampson

Vice President & Senior Vice President-Business Operations, Olin Corp.

A

Yeah I think in addition to that we've taken a teaching approach to be resilient. And so we're trying to see around corners and anticipate what our most vulnerable parts of our assets are, and then planning for how we can recover quicker. And I think that's adding another point or two to our ability to get product outcome.

John E. Fischer

Chairman, President & Chief Executive Officer, Olin Corp.

A

But generally speaking somewhere between 90% and 93% on an asset is max just because of that necessary outages.

Jeffrey J. Zekauskas
Analyst, JPMorgan Securities LLC

Q

Okay.

John E. Fischer
Chairman, President & Chief Executive Officer, Olin Corp.

A

We'll have one more and then we'll end this.

Q

Hi [indiscernible] (02:51:11). Two quick questions, one for Todd and one for John. Todd in your bridge to the \$2 billion and beyond it does not include the \$50 million of savings from the IT project that's referenced in the appendix. I'm curious why that was omitted there? And second, I know that the IT project is costing about \$80 million of the roughly \$400 million of CapEx this year. Can you build the debottleneck projects that and still are you going to basically fill up that \$80 million when that goes away from the IT project with other debottlenecking opportunities or should we expect over time the CapEx sort of underlying CapEx is the current numbers less the \$80 million?

John E. Fischer
Chairman, President & Chief Executive Officer, Olin Corp.

A

Why don't you answer the \$50 million and I will answer the capital.

Todd A. Slater
Chief Financial Officer & Vice President, Olin Corp.

A

Sure. I was trying to keep \$2.5 million at least a reasonable number to reply. I apologize. In fairness the IT project is worth at least \$50 million to us beginning in 2021 and we are taking out some of the duplicate costs that they were incurring today and that's worth about \$25 million so probably the step up in 20 months really \$25 million compared to what you see.

John E. Fischer
Chairman, President & Chief Executive Officer, Olin Corp.

A

And if you go back to the bar chart the John Sampson show the red line was actually the what he called integration that is predominantly the IT project. And he showed you on the chart on the far right where the event – the growth was a much bigger number. And I would say he is categorizing that as available for growth, that is not necessarily a committed number at this point in time, but everything through 2019 is committed.

John E. Fischer
Chairman, President & Chief Executive Officer, Olin Corp.

So, okay that – that will end our Q&A session. I'd like to thank you all for coming today and being here with us. I would say needless to say we're very optimistic. We're very excited about where Olin is. We think there are a lot of opportunities. You heard about structural change, we believe in structural change, we believe that we have the assets, the market position, the resources to take advantage of that. And I would just say one thing, we showed you a slide here on getting to \$2 billion dollars, I would tell you that from a management perspective and the people in the room with me from Olin, that's not aspirational, that's a commitment on our part to get to \$2 billion. So with that, thank you very much and travel safe.

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