INVESTOR DAY
Chemicals segment 2014

At the heart of the Verbund

Transcript – Keynote speech
May 22, 2014
1. Keynote speech – Kurt Bock

Why do we talk about Chemicals today?

Chemicals – strong contribution to BASF’s sales and profitability

Sales* to 3rd parties

<table>
<thead>
<tr>
<th>Segment</th>
<th>2013</th>
<th>EBITDA*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals</td>
<td>23%</td>
<td>28%</td>
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<tr>
<td>Performance</td>
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<tr>
<td>Products</td>
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<td>19%</td>
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<tr>
<td>Agricultural</td>
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<td>Solutions</td>
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<tr>
<td>Functional</td>
<td>23%</td>
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<td>Materials &amp;</td>
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<td>Solutions</td>
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2013: €74.0 billion*  
2013: €10.4 billion*
Thank you Maggie and welcome also from my side. It is a pleasure to have you back here at our venue. It almost feels like home now after I think we have had two Investor Days already here. In 2011, we talked about our strategic path forward “We create chemistry”. Two years ago we talked about our automotive strategy, a very much downstream topic and last year we went to Asia, obviously to talk about our Asian operations. So, today it’s about chemicals, the Chemicals segment.

You might say, okay, this big segment is in BASF upstream, kind of boring. We know. You are good at your Verbund. You know what you are doing. Why should we spend one day talking about the Chemicals segment? I think it is important for a couple of reasons, I will talk about in a second, but most importantly, the Chemicals segment is a pre-condition for the success of BASF. That is very, very important to keep in mind. Everything we do in the Chemicals segment, not just the growth of BASF Group, also in our downstream operations. What we try to achieve today is to give you a better and broader understanding what that business is all about and how it also contributes to the entire performance of BASF.

So, what I am going to do now is to talk very briefly about why we have this Chemicals’ Day and then I will try to set the stage talking about the large trends we see within our industry, which really drive the future development of this business within BASF.

Let’s start with why we talk about Chemicals. This you already saw in our little movie. Chemicals is about 23% of our total business in terms of sales. It’s, however, 28% of EBITDA which looks like it has a pretty high profitability. Actually, it has a very good profitability, but please keep in mind the €17 billion of sales which represented 23%, that is only the sales to third parties. On top of that comes about €6.4 billion of sales which we transfer, sell to our downstream operations. If you keep that in mind and then do the maths, the chemicals segment also would represent about 28% of BASF. So, it has its fair share of sales, but also a fair share of profitability and it again shows you that we have overall a very well balanced portfolio. So, it’s an important part of BASF in terms of profitability.
Chemicals in a nutshell (2013)

- Core of each Verbund site
- ~6,000 customers in all regions
- ~1,500 products
- €6.4 billion transfers to BASF downstream divisions
- €178 million R&D expenses
- €17 billion sales to third parties
- €3.0 billion EBITDA

Chemicals is a strong earnings contributor

EBIT after cost of capital*
in million €

- EBIT after cost of capital* concept was introduced in 2004.
- **Without Catalysts (now part of Functional Materials & Solutions segment).
- **The former Plastics segment also earned a premium on cost of capital during the 2008 / 2009 recession.

Chemicals earned a premium on cost of capital even during the 2008 / 2009 recession***
You know a few of those numbers already. It’s a relatively large business, but it’s also a relatively complex business when you really drill down further on, because people always focus on very large products, which are always on your mind. We will talk about them today as well. But, again, we have about 1,500 products. We have about 6,000 customers. We have €6.4 billion of transfer sales to our downstream operations. We spend about €200m in R&D. Not the biggest share of R&D within BASF, but it’s material because it’s very much about process development and, again, we have a very strong profitability. We also have a strong underlying cash generation and the free cash flow of that segment is about €1 billion a year.

It is a cyclical business. It’s partially driven by supply and demand. We’re going to talk about this today as well. But, what you can see here also is that even after cost of capital, that segment always has contributed to BASF’s performance. Even in the downturn of 2009, which was very, very severe as we all know, we still had a positive EBIT after cost of capital. You also see a slight increase over the years. The compounded growth rate is something like 7% when you start from 2004 going all the way to 2013.
Several events shaped the Chemicals segment since 2008

Major events shaping Chemicals

**Last Chemicals Investor Day**

- Acrylic acid to Petrochemicals
- Expansion BASF-YPC, Nanjing

**2008 / 2009 recession**

- Expansion BASF-YPC, Nanjing
- New segment structure
- Major shale gas-based investment projects*

**2008**

- 2008 / 2009 recession

**2009**

- Expansion BASF-YPC, Nanjing

**2010**

- New segment structure

**2011**

- Focus on organic growth capex

**2012**

- Feedflex, Port Arthur

**2013**

- TDI plant Ludwigshafen, Germany

**2014**

- Butadiene extraction Antwerp, Belgium

* Under evaluation

Chemicals: Strengthen our Verbund and secure growth

**Major Chemicals investment projects**

- Ammonia and gas-to-propylene in USA*
- MDI plant Chongqing, China
- Acrylic acid complex Camacari, Brazil

- TDI plant Ludwigshafen, Germany
- Expansion Verbund site Nanjing, China
- Butadiene extraction Antwerp, Belgium

* Under evaluation
It also has gone through quite a few changes over the last couple of years and that’s the rea-
son why we talk about it today. We had a Chemicals’ Day back in 2008. This was pre-crisis,
pre-recession obviously when the world was very different from what we see today. But, even
after that we had a couple of changes. We moved, for instance, the acrylic acid value chain
into the Chemicals segment. We had a big expansion in Nanjing in our Chinese facility. We
had to cope with the changes in the US shale gas market, predominately changing the feed
stock composition of our cracker in Port Arthur. We changed the segment structure - very im-
portant - something you will learn about today a little bit more. And we put more money into
that business to keep it growing and to make sure that it stays competitive within the overall
structure of BASF. Just recently we had a couple of announcements with regard to shale gas
in North America as well.
So, lots of changes, which are important, and for that reason we are here today.

I talk about investments briefly. Here you see a few examples. When you look at these pic-
cures, and I’m sure you are aware of all these major investments BASF is doing right now, the
question immediately pops up: How about supply/demand? I know this is on the mind of many
of you and we will talk about this today in very detail. I think, this is important because we
should avoid general statements about supply/demand in our industry. There is not the one
chemical cycle. There are many different cycles and many different situations with regard to
supply/demand and for that reason you also have this afternoon the opportunity to really drill
down in the divisional presentations and I am sure you will use that opportunity.

Nevertheless, this is one of the biggest investments programs we ever had in the Chemicals
segment and it is kind of unique because there are a couple of first timers here. There is the
first time a real big chemical investment in South America. We have tried to do this for dec-
ades, essentially. Never could find an entrance. Never could find a real good commercial rea-
son to be there until finally we could first secure raw material supply – propylene - and then
started acrylic acid and superabsorbents. Those plants are under construction as we speak.

There is another first, which is our TDI plant in Ludwigshafen. Isocyanates in Europe are pretty
much focused on Antwerp, which is a very strong, very, very powerful and very profitable site.
Nevertheless, we do now TDI in Ludwigshafen. It’s a major undertaking because it is not just
this TDI plant itself. It’s also about the adjacent supporting plants and that is very important
because this is all about the competitiveness of Ludwigshafen which is in the heart of Europe.
I know, again, on the minds of many of you is the question what is the competitiveness, what is
the future of the petrochemical industry in Europe and that is something we can discuss here
today as well and you can ask the question why are you putting so much money into your site
in Ludwigshafen? What is the rationale behind that?

So, lots of investments, important investments for BASF which will lead to discussions today,
I’m quite sure. Those are the reasons why we here today talking about chemicals.
Current trends in the upstream chemical industry

Global growth  | Sustainability  | Raw material change  | Dynamic competitive environment

Real chemical production excluding pharma (World)*
in trillion US$

CAGR 2010-2020
World: 4.3% (GDP: 3%)
Emerging Markets: 6.7% (GDP: 5%)

2020
4.7 trillion

2013
3.4 trillion

Asia Pacific  | North America  | Europe  | Rest of World

Strategically relevant market of BASF’s Chemicals segment 2013: ~US$550 billion**

Source: BASF  *Revised statistics with new baseline, recognizing large market demand in Asia. **BASF not focused on base products, e.g. PVC, polyolefins, fertilizers
Let me now cover a couple of trends we see in our industry and I try to focus here on trends which are really important for the upstream chemicals business, our Chemicals segment. And we will cover this in four categories. Global growth, why this is also from a growth point of view an interesting business. Then sustainability: What is the contribution? What are the challenges for chemicals? Raw material change, very important topic. There is lots of change going on again as we speak. And the competitive environment: What is the future of an integrated company, like BASF, in that chemical space?

Let me start by going back where we were three years ago, here in this venue again, when we talked about our strategic path forward “We create chemistry”. We made a couple of statements: We said the chemical industry is going to grow above GDP and most probably the emerging markets will have a share of about 60% of global industry by 2020. Those two assumptions still hold true from today’s point of view. Actually, when you now look at the 2013 numbers, you see that this is moving pretty much into that direction.

There are slight deviations: We have seen lower growth in Europe, for instance. We have also slightly lower growth in some emerging countries, but the general picture still holds true.

What is important here when you’re looking here at the chemical production globally, excluding pharma, what is important is really the blue bar at the bottom because that is really within this chemical universe the strategically relevant market, which is important for our Chemicals segment. You can clearly see this is just about US$550 billion, out of roughly US$3.5 trillion in 2013 and this really tells you that our Chemicals segment is quite a focused operation. We are not everywhere. We are not doing everything in our Chemicals business, but we have a very focused strategy, which has been developed over many, many decades and has been implemented I think with great discipline and we are following that path into the future.

So, when people talk about BASF they always assume we are doing everything. That is not the case. Chemicals, it’s a very focused operation.
Chemistry as an enabler: Global chemical market growth expected to accelerate

- Chemistry as an enabler
- Major growth drivers are:
  - Increasing standards of living in emerging markets
  - Substitution of established materials
  - New chemistry-based solutions

Sustainable chemicals production balances ecology, economy and society

- Sustainability as future growth driver
- Enable customers to develop more sustainable solutions

Balancing of sustainability dimensions is key
- Governments set regulatory framework

Key aspects for Chemicals
- Downstream growth
- Energy consumption
- Emissions, climate protection
- Occupational health and safety
- Renewable resources
Growth: You might be surprised that we talk about growth in the Chemicals segment as well, but actually, it’s an important driver for our downstream businesses. You see here a couple of usages, applications downstream where the Chemicals segment plays an important role driving future growth. This is about substitution of established materials. It’s about new chemistry-based solutions. You will learn much more about this later today.

Let me continue with sustainability. It’s a buzzword. Everybody has a different perception what sustainability is all about. From our point of view it has three dimensions - ecology, society, and making money - and you have to balance those three criteria.

There are a couple of challenges with regard to sustainability which you see depicted here on this slide. Energy consumption very, very important. Climate change has a direct consequence on what we’re doing in this segment. European climate discussion is going on. But also, the topic of renewable resources comes up very, very often under this headline of so-called green chemistry. There are some people out there who basically believe that this industry will move out of fossil-based chemistry very soon, something we do not subscribe to as you probably imagine and we talk about this as well.
Sustainable solutions provide major business opportunities for BASF

Example: Solar power

Chemistry as an enabler
- Sustainability enables and supports long-term business success
- Chemicals segment benefits from sustainability aspects, driving demand for chemicals
  - e.g. sodium nitrate
  - e.g. polyamide
  - e.g. precursors for Basotect®
  - e.g. precursors for Oppanol®

Global growth  Sustainability  Raw material change  Competitive environment

Fossil feedstocks to remain backbone
Renewables provide new opportunities

Fossil feedstock based chemical process
- Processes optimized for efficiency and economics
- Further upside: Incremental improvements and step-changing / breakthrough innovation
- Fossil feedstock will remain backbone of chemical industry in mid-term future

Renewables based chemical process
- “Renewed” availability, high public acceptance
- New technologies, processes emerge rapidly
- Potentially higher total costs
- Opportunities can be captured by differentiation versus petrochemicals: Better economics and / or better properties

Global growth  Sustainability  Raw material change  Competitive environment
Here you see a couple of examples how we contribute as BASF to provide a more sustainable future. I don’t want to go through all of this. Just one interesting example which is sodium nitrate, which has a storage capacity for energy which we are using for the solar energy business. Sodium nitrate is kind of a commodity type of chemical, but obviously it has applications which are kind of interesting. There are not too many companies who produce it very, very effectively.

You are aware of lightweight materials in cars. That’s a topic we talked about two years ago at our Automotive Day. Polyamide, again, tightly integrated into our Chemicals segment. The products are now sold within a division which is called Performance Materials, following a re-organization about roughly two years ago.

Feedstock an important topic which is really on our minds right now because there are strategic considerations we have to make and it’s a very interesting time with regard to feedstock. But, actually, I don’t think it’s so interesting because there is renewable feedstock.

Renewables today in our BASF universe account for about 4% to 5% of total raw material. The share went up a little bit when we acquired Cognis a couple of years ago because they have palm oil to a certain degree as a feedstock.

The industry in general has a slightly higher share: 7% - 8%. That share will continue to grow, but from my point of view, it’s completely unrealistic to believe that this renewable piece will really change our industry in any dramatic fashion very, very soon. There are technical reasons and there are commercial reasons. We will talk about this today as well. Yet, there are applications where renewables provide very interesting opportunities and that is something we also pursue and you will learn about it today as well.
Crude oil and natural gas are the major raw materials for chemicals

- **Oil**
  - Ethylene (C2)
  - Propylene (C3)
  - C4-Olefins
  - Aromatics (C6, C7)
  - Methanol (C1)
  - Acetylene (C1*)
  - Ammonia (C1*)

- **Natural gas**
  - Downstream Chemicals

* C1-based

Global growth | Sustainability | Raw material change | Competitive environment

Raw materials landscape is diversifying based on regional differences

- **Shale gas**
- **Naphtha**
- **Ethane, natural gas**
- **Mixed feed**
- **Naphtha**
- **Renewables**
- **Abundant coal**
I don’t want to bother you with the entire value tree of BASF because it’s quite complex. But, I will show you two conceptual slides basically trying to depict how we see the world and how the raw materials go into the different value chains of BASF. Obviously, in the past it has been very much oil and natural gas. Those are the two, as we all know, big cornerstones of our industry.

That is going to change a little bit because the world is changing and that is really what is on our mind when we talk about raw material change. It’s not renewables. It’s really this very picture here because this picture looked different just a few years ago. We are all aware of the shale gas situation in North America. There are always rumors that this is a short-term experience. We don’t buy it. We think this is long-term. This is going to last. It’s a good opportunity for BASF as well.

We also see a situation now in China which is kind of interesting, because China increasingly turns to coal as the base of the chemical industry and that is an interesting challenge because yes, it is commercially, economically very, very attractive. Economics of coal-based chemistry are very comparable to US Gulf Coast shale gas applications. But, there are obviously sustainability issues when you think about water consumption and CO₂, just to name two.

Then there is the Middle East. Everybody has been talking about the Middle East for the last decade and it always has been an attractive location to do base chemicals. You are all aware there is one relatively big chemical company which has virtually no presence in the Middle East and that is BASF.

So, some people always ask us, did you miss the boat? Didn’t you see this coming? Why are you not really in the Middle East? Why are you still investing, for instance, in Europe? That is also something we will discuss today what is the relative competitive advantage Middle East versus Europe and why do we still feel comfortable doing petrochemicals, base chemicals in Western Europe.

And, finally, South America is very much about renewables. Still South America imports a large chunk of chemicals from the US.
Increasing usage of alternative feedstock in global chemicals market

- Oil
- Natural gas
- Shale gas
- Coal
- Renewables

**Downstream Chemicals**

**Ethylene**
**Propylene**
**C4 Olefins**
**Aromatics**
**Methanol**
**Acetylene**
**Ammonia**
**Intermediates**

Global growth | Sustainability | Raw material change | Competitive environment

Raw material supply and integration concepts will define competitiveness

**North America**
- New capacities based on shale gas
- Export of NGLs* / LPG** and base-products

**China**
- Strong domestic demand will drive capacity additions
- Abundant coal reserves drive coal-to-chemicals investments
- Expected to remain a net importer of many basic chemicals

**Europe**
- Ongoing restructuring of olefins and polyolefins industry
- Focus on innovative chemistry
- Integrated production setups will remain competitive

**Middle East**
- Diminishing feedstock advantage due to shale gas (USA) and coal (China)
- Export hub for raw materials and base-products

**South America**
- Focus on renewable resources
- Will remain net importer of chemicals from the U.S.

Global growth | Sustainability | Raw material change | Competitive environment
So, the new world looks a little bit different. There may be coal. There is already coal. For instance, in ammonia in China very, very important. There will also be renewables. Certain applications will always remain kind of a niche opportunity application, but it will have its share, growing share, within our industry.

Here you see again the major trends and challenges we are seeing in this world of changing raw material opportunities.
Changes in the competitive environment

1980
- Oil & Gas
- Petrochemicals
- Commodities
- Specialties
- Crop protection
- Plant-Biotech
- Pharma

2013
- Shell
- Dow
- BASF
- DuPont
- BASF
- Conoco
- Shell
- Inventa
- Celanese
- DuPont
- Laness
- Bayer
- ICI
- Bayer
- Syngenta
- Rhône Poulenc
- Sanofi
- AstraZeneca

Global growth | Sustainability | Raw material change | Competitive environment

Active portfolio management at BASF

Acquisitions
- Engineering plastics
- Catalysts
- Construction chemicals
- Water-based resins
- Pigments, plastic additives
- Oil & Gas
- Personal care & food
- Battery materials
- Functional crop care
- Omega-3 fatty acids
- Enzymes
-...

~ €16 billion sales

BASF core business
Selected transactions 2001 – today
- Gazprom
- Monsanto
- Petronas
- Shell
- Sinopec
- Statoil
- Total

Strong partnerships

Divestitures
- Pharma
- Agro generics
- Vitamins premix
- Printing systems
- Construction equipment, wall & flooring systems
- Gas Trading*
-...

Chemicals divestitures
- Fibers
- Polyethylene
- Fertilizers
- Styrenics**

~ €22 billion sales

Global growth | Sustainability | Raw material change | Competitive environment

* Closing expected by end of 2014  ** Transferred into Styrolution JV on Oct. 1, 2011
Let me conclude by talking quickly about our competitive environment. I think you have seen this slide before. You are very much aware of the situation back in 1980. Lots of integrated chemical companies coming from oil and gas all the way up to or down to, however you want to see it, to pharmaceuticals. This has changed obviously. The world looks very, very different today. Lots of good players in this current world of 2014 as we speak. It feels like, when you look at this now and look at the blue line of BASF, like nothing really has changed. Yes, these guys got rid of their pharmaceutical business model 10 years ago, but they are still running oil and gas which is always something we can discuss. So, it looks like a monolithic development of BASF.

I think this is a complete misconception because behind this kind of static looking blue line has been a tremendous change within our company. We stepped out of many, many businesses over the last 10, 15 years. Businesses, some of them where we had a dominant role in the past, where we really were the innovative force, and the best example probably is fertilizer. The Haber-Bosch process, something BASF invented. We had our 100th anniversary just recently of that technology which was introduced in Ludwigshafen and we stepped out of the business selling it to a Russian company – Eurochem - recently.

So, what I’m trying to say here, the green line on the right-hand side of that slide, some of those companies now run businesses which were owned by BASF just a few years ago. So, Lyondell Basell, all of our polyolefins are now part of that operation. Ineos, we have a joint venture called Styrolution where we put our styrenics business into a 50/50 joint venture recently and we can talk about this today as well if you like.

So, the world has changed. I think BASF has adapted and what we’ve tried to do today is to explain to you what is the path forward, what are the strengths and weaknesses of our business, what are the opportunities and why are we optimistic about the future of our chemical segment and feel good about what we are doing here and why do we believe that this business is a cornerstone of BASF. It is fundamental for the overall competitiveness of our company.
## Upstream and downstream business models clearly differentiated at BASF

<table>
<thead>
<tr>
<th>Classical Chemicals</th>
<th>Operational and technology excellence</th>
<th>Scale, Verbund integration, competitive raw material supply</th>
<th>Complexity reduction</th>
<th>Reliable, low cost logistics</th>
<th>Commodity marketing</th>
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<tbody>
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<td></td>
<td>Deep understanding of customer needs</td>
<td>Customized services and solutions</td>
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<td>Industry and application experts</td>
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<td>Tailored offerings for market and industries</td>
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<td>Customer proximity and application know-how</td>
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<th>Functionalized Materials &amp; Solutions</th>
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<td>Global growth</td>
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Which leads to one final point which is also about competitiveness. The question, can you guys really run different business models within one company, can you really focus entirely on being mean and lean and reliable and low cost and large scale and low feedstock cost in upstream and at the same time be customer oriented, customer focused, innovation driven, market oriented in downstream? This is really something you can combine within one company.

Clearly, there are different needs in those businesses upstream versus downstream and you see here the upstream model which is very easy to explain. Again, we go into much more detail today. There are obviously different, sometimes overlapping but largely different needs in our downstream business. We do think that we can combine those businesses in one company and we have done this for more than 100 years. Actually, when you look at where BASF started, we started pigments etc. in what we call today downstream operations. So, these are not new businesses to BASF. This has always been part of our integrated philosophy based on a very, very strong Chemicals segment. But, that is again something we can discuss today.

So, what I tried to do this morning is briefly tell you why Chemicals. Secondly, what are the big trends? I think these trends offer big opportunities, but they also pose some challenges, like raw materials change to BASF.

What we like to do now is to go into our Chemicals segment in more detail to explain what is it all about, how do we run the business, what is really on our mind going forward. And then in the afternoon you will have the opportunity to really have deep dives with our Divisional Presidents to answer probably not all of your questions, but probably most of your questions you might have. I sincerely hope that at the end of the day you will go home with a much better understanding of what we are doing which then should fill into your analysis and recommendations.

And with that, thanks for your attention. I would turn over to Wayne now, who will really bring the business closer to you. Thanks a lot.
2. Keynote speech – Wayne T. Smith

BASF’s Chemicals segment is a strong cash and earnings contributor

We will
► continue to strengthen the Verbund, create synergies and add value
► maintain our high level of profitability through process innovations and stringent cost management
► grow externally with the chemicals market

Our strategic focus is to enable and support growth of
► BASF’s downstream segments
► BASF in emerging markets

Shale gas is an opportunity for BASF

Chemicals segment grows by selling into the BASF Verbund and to the market

Sales Chemicals in million €

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<th>Year</th>
<th>Sales to other BASF segments</th>
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Note: Sales data restated for IFRS 10 & 11 impact and segment changes.
Thank you, Kurt, and good morning everyone. Let me start with a very brief summary of the Chemicals segment at BASF. It’s a set of interconnected businesses which have grown very nicely over time. They’ve been very profitable and they form the backbone of these highly integrated value chains that work their way all the way down into the specialty divisions of BASF.

But, what we talk about here today are commodity chemicals. So, this means we run our businesses hard, we focus on margin, we focus on cost, and we focus on integration. Very, very simple. But, at the end of the day, this segment has spun off a tremendous amount of free cash flow for BASF.

Now, what I would like to do here is start with a few messages, some simple messages, that I would like you to take home with today. These are the core messages I would like you to think about when we talk about BASF’s Chemicals segment. First and foremost is what I just said. It is a strong earnings and a strong cash contributor. It has been for a long time. And it will continue to be well into the future.

Now, where will we focus? I’ll make a couple of simple statements here. We will continue in every possible way to strengthen the Verbund to find synergies and to add more value wherever we can do it.

Secondly, we will always maintain our high profitability. No question. With a focus on process technologies and very, very strict and stringent cost management.

And, we will grow but we will say we will grow externally with the market. So, what do I mean by with the market? You heard from Kurt we have, I think, a relatively unique portfolio with a unique set of value chains and some will grow a little bit more than the market over time, some will grow with the market over time, some maybe a little bit less, but, as a whole, we will grow with the market. So, what we mean is we do not aspire to and we do not intend to somehow out-race the market when it comes to commodity chemicals. That’s not our mindset. Our mindset is not to try to grab market share and grow rapidly with commodity chemicals. Our mindset is to grow profitably because our strategic focus with the chemical segment is to enable and support growth of the whole value chain in the downstream specialty business units and also to enable and support growth of BASF in the emerging markets.

Then, finally, one more message, shale gas and when I say shale gas we mean North American shale gas - here is a real outstanding opportunity for BASF.

Okay, so, let’s start with some figures. Simply, the sales development over time. You heard from Kurt that we sell externally to the merchant market, but we also transfer quite a bit of product internally to the value chains. You can see both components here. So, when they add up together, when we talk about consolidated sales, external and internal, it’s about EUR23b and it has grown rather rapidly over time. 11% average annual growth over the years. But, the important component here is the volume growth. We had a little structural change in there. You have some price development. But, the volume growth averaged year-on-year about 5%.

We point out there that in 2012 - I think most of you know - we had to restate our figures. Two reasons. Accounting rule changes with IFRS. We could no longer consolidate 50/50 joint ventures. So, this took some sales out for the chemical segment. But, at the same time we eliminated our Plastics segment and took the upstream precursors, the commodity precursors, and we put them into Chemicals. So, this added some sales back.
Chemicals with stable profitability, little correlation to oil price

**EBITDA margin Chemicals / oil price**
Index 2001 = 100

- Oil price
- EBITDA margin Chemicals (as % of sales)

Chemicals is a stable earnings contributor to BASF Group

**EBITDA BASF Group**
in million €

- EBITDA BASF Group
- thereof EBITDA Chemicals
Here we show a chart that compares our margins, our EBITDA margins, with oil price development. So, clearly, the world has grown to be able to deal with and adjust to a structural change in oil price over the years. But, you can see, our margin in terms of the chemical segment stays within a certain band and it is not really correlated with that. What's correlated with the oil price, of course, is our top line price. But, the margins, to be very, very clear and Kurt referenced this, when we talk about commodity chemicals, margins are a function surely of supply and demand of individual product lines and we have many of them. You have to look at each product line by itself.

What you can also see here is a little bit of cyclicality. Kurt referenced that. Again, with commodities you will have some cyclicality. Our margins today are down a few percentage points from where they were at their all-time peak in 2010 and 2011.

Stable earnings contributor. Here we have EBITDA of BASF and the relative contribution of chemicals. Stable, growing over time, and as you saw from Kurt’s chart, as well, from an EBIT after cost of capital standpoint, we have always returned a very, very significant premium even in the lowest points of the financial crisis.
Chemicals generates strong and steady free cash flow

Cash flow Chemicals in million €

Since 2001, Chemicals contributed ~€17 billion of free cash flow to BASF Group

Chemicals – Three distinct divisions, one mission: Create value

Petrochemicals
- Supply of cracker products and basic chemicals
- Focus on C3 and C4 value chain

Monomers
- Supply high-volume monomers and inorganic chemicals
- Focus on aromatics and ammonia based value chains

Intermediates
- Supply of broad portfolio of intermediates for the chemicals industry
- Focus on C1 value chain
And, finally, I think you know BASF. To a certain degree we can think of BASF as a cash-generating machine. The Chemicals segment has been a very nice contributor there. Since 2001 the Chemicals segment has spun back into BASF more than EUR17b of free cash flow. This is after CapEx development.

So, if I can summarize: I think historically nice growth, very good profitability, and, to a certain degree, a cash engine in the Chemicals segment.

It’s made up of the three divisions. Petrochemicals, Monomers, and Intermediates. I highly encourage you to stay this afternoon for the three breakout sessions. I hope you can all stay and have a chance to really dig a little bit deeper here.

All of the divisions have the commonality of the fact that they sell commodity chemicals and they’re all deeply, deeply rooted in the Verbund. But, each presentation this afternoon will take a slightly different angle to highlight something a little bit different. So, Rainer Diercks in Petrochemicals. This is really the beginning point of the Verbund and he will show you how it has developed the structure around the world over the years, how we’re building that. Talk a little bit about a couple of technology examples that are interesting.

Stefano Pigozzi of Monomers will focus more on the cost management and the tremendous efficiency drive that we try to drive in the entire segments of Chemicals.

Sanjeev Gandhi will highlight a little bit more the innovation activities that we have in the Chemicals segment and even highlight a couple of interesting renewable based programs that he is operating in the Intermediates division.
Balanced portfolio of products for internal supply and merchant market sales

**Internal supply driven**
- Industrial gases
- Acetylene
- Purified ethylene oxide
- Formaldehyde
- Ammonia
- Cracker products
- Butanediol
- Caprolactam
- PBT** base resin
- Acrylic acid
- MDI
- TDI
- PolyTHF®
- Amines
- Higher alcohols
- Polyalcohols and specialties
- Formic acid
- Inorganic salts
- Glues and resins

**Merchant market driven**
- Butanediol
- Caprolactam
- PBT** base resin
- Acrylic acid
- MDI
- PolyTHF®
- Amines
- Higher alcohols
- Polyalcohols and specialties
- Formic acid
- Inorganic salts
- Glues and resins

Principles for internal supply driven and merchant market driven products

**Internal supply driven**
- Reliable supply of key raw materials
- Access to chemicals not available in the market

**Merchant market driven**
- Capture value of attractive chemicals markets
- Top-3 position in target market
Okay, so, you know the numbers. It’s a big segment. EUR23b of consolidated sales, many, many products as you saw in Kurt’s slide. The question might be how do we think about this portfolio, how do we organize it and what is common and what is not. First and foremost, if we have a product in the Chemicals segment at BASF it has to be interconnected into a profitable and growing value chain. It has to be.

Now, the downstream units, at the end of the value chain, these tend to be driven by innovation in terms of application, product functionality, close work with the customer to get customized solutions for that customer. A little bit different drivers. Value-based pricing.

In the upstream part of the value chain, we’re focused on cost, we’re focused on margin, we’re focused on high reliability in operating our plants, capacity utilization. These are the key topics.

But we can think about maybe two broad groups. One group in the blue side on the left-hand part of the chart, this is more driven by the downstreams. In other words, if we were to make an investment in the Chemical segment, it’s more likely driven by the downstreams. Take a couple of examples on the chart here. Would we ever build a cracker to supply olefins to the merchant market? The answer is never. Okay, we would build one to feed the value chains of the whole unit.

Would we ever build an acrylic acid plant simply to serve the merchant market? The answer is never. We would build it in conjunction with downstream units with an intention to drive a good portion into the specialty divisions.

You can even see in the dotted line portion here there are some products that never leave the Verbund. They’re basically intermediates. These are product names you’ve seen. We make them, they feed the chains, and we don’t sell anything to the merchant market.

Now, the other side of the chart, on the orange side, shows that we also have some big pieces of the value chains that have interesting markets to sell into. Okay, so, within TDI, PolyTHF, a whole host of amines businesses, these are within the Chemicals segment, but frankly, we might make investments just to serve the merchant markets. We stay interconnected with the Verbund, but the driving force might be the opportunity in the merchant market.

So, both of these categories have slightly different drivers, but, at the end of the day what binds them together is the need, the absolute need, for economic advantage, for competitive cost advantage through interconnections in the Verbund for process technology and efficiency.
Continuous development of Chemicals global asset footprint

Major investments

- Steam cracker, Port Arthur
- BASF-YPC, Nanjing
- Expansion BASF-YPC, Nanjing
- BASF Specialty Chemicals, Nanjing
- Feedflex, Port Arthur
- PVC
- Polyamide fibers
- Minority share in 'Williams cracker'
- Polylefins
- Styrenics
- Acrylonitrile, Seal Sands
- Divestitures / Joint ventures

BASF has leading positions in the chemical markets

**No 1 globally** (~50% of sales of BASF Chemicals)
- MDI, TDI
- Glacial acrylic acid
- Acrylic esters
- Polyamide film
- Oxo alcohols
- Polyalcohols

**Leading regional market position**
- Butanediol and derivatives
- Purified ethylene oxide
- Specialty amines
- Carboxylic acids
- Inorganic salts
- Glues and impregnating resins
- Plasticizers
- Solvents
- Standard amines
So, Kurt talked a little bit about this already in terms of how the portfolio and the structure of the Chemicals segment has developed over time. This shows a timeline of some of the major investments we’ve made. If you go back 1999/2000, up to maybe 2004, there were some very significant investments made by BASF because we were essentially very much extending our footprint of the Verbund around the world. We built two new Verbund sites. One in Kuantan, Malaysia; one in Nanjing, China. We built a new cracker in Port Arthur, Texas. So, these were some heavy investments.

In the intervening years we have extended these and further developed these Verbunds. So, we’ve invested less intensively, but really developed those existing Verbunds.

Now, at the same time, Kurt also mentioned we have consequently looked at what doesn’t fit any more within BASF and we’ve pruned the business, but I would say pruned some pretty big branches. We talk about a long time ago. 1999 PVC we exited the market. Polyolefins 10 years ago. Kurt mentioned both styrenics and fertilisers more recently.

But, what’s the common thread here of why we stepped out? When we see a situation where there is a relatively short value chain and we don’t see the opportunity from an innovation standpoint to further differentiate either through cost, process technology or through product differentiation, this doesn’t fit for BASF. If we can’t add anything except the raw material advantage to compete, it’s time to get out.

So, these were some big decisions and the portfolio has changed and I think at the end of the day, what we can say is, at least from my perspective, I think we have a very interesting portfolio. A whole number of growing and profitable and interesting value chains. If you add them up, you say half of our external sales, half of the EUR17b of sales, are represented by products that we have the number one position in the world and the other 50% we have very many leading positions and on a regional basis we’re in the top one, two or three.
We add value as one company
Okay, now let’s talk a little bit more about the Verbund. I think you all know the concept of the Verbund. This composite of integration and interconnectivity. So, it’s not a new concept, but I would like to try to bring it a little bit more to life.

Very simple statement. This is one of our four core strategic principles in BASF. We add value as one company. I can tell you everything we do in BASF is designed to be interconnected. Designed to find some synergy or some additional value.

Now, maybe if you think about a diversified conglomerate structure in some industry, broad-based set of industries who serve a broad-based set of markets, many, many different businesses, decentralized, individual strategies all tied together at the top via simply a shareholder structure, some small holding company structure. I can tell you BASF is the exact opposite of that. 180 degrees opposite. Everything we do we try to think about how do we interconnect, how do we integrate. We have 112,000 people in the company. I will tell you everyone knows the statement, everyone believes the statement and everybody lives the statement.

So, what we’re going to talk about in a few minutes is the Production Verbund. I think this is what you all know. This is easy to visualize. This is many, many production plants hooked together with physical pipes, sharing raw materials, balancing energy and so on. I think this is clear. But, the Verbund concept is really more than that within BASF. It’s this concept of tying together and finding linkages.

I will use an example, the Technology Verbund. So, we spend around about EUR1.8b every year in R&D. We have 10,000 people in R&D. Can you imagine? 10,000 people in R&D. We have the broadest set of technology platforms in the chemical industry. So, you would think in principle, in a perfect world, if we could tie together the minds of these people you can imagine what we could do. Now, this is not easy, of course, but this is what we aspire to with an organization which is open, transparent, team-based. This is the idea behind the Technology Verbund.

Could also talk about the Customer Verbund. With many big industries we serve, maybe construction, packaging, consumer products, automotive. I think a lot of you had the opportunity to visit our Automotive Day a couple of years ago where we said we sell between EUR9b and EUR10b every year into the automotive industry. Every single OEM in every single region of the world has a significant relationship with BASF. Catalysts, coatings, polyurethanes, engineering plastics, fuel additives, you name it, and we have a deep integration into that industry. I would say from a chemistry standpoint, who is more deeply integrated into this industry than BASF? It’s clear, nobody. Nobody. What I’m trying to get across, this is the power of the Verbund and this is why we believe in the concept of an integrated chemical company.
Verbund is in our DNA and hard to copy!

Ludwigshafen – the role model
Verbund site

- 2,000 buildings
- 2,800 km pipeline
- 2,100 trucks per day
- ~400 rail cars per day
- ~20 barges per day
- 10* km²
- 250 production assets**
- 2,100 trucks per day
- 230 km rail tracks

*B including production area Friesenheimer Insel; **Organized in 120 production plants
Okay, now let's talk about the production Verbund. I throw up a simple chart here, and honestly this is a simplified block diagram of the production Verbund. The only thing to say is that raw materials are in blue and some of the value chains are in orange.

But, what you can see and get an appreciation from is everything is interconnected. The products from one plant become the raw materials to another plant. The energy producing facilities are balanced with the energy requiring facilities. All the side streams, the bi-products, the waste streams are captured, they're grabbed, they're put back into the system, they're re-utilized, or we turn them into something else that we can sell and the infrastructure is leveraged. It's a tremendous advantage and frankly, I think you can get the impression here it's not easily reproducible.

So, what does it look like in real life? That is an aerial shot of Ludwigshafen. If you haven't had the opportunity - I know a lot of you have been to Ludwigshafen - if you haven't had the opportunity and you're interested, please speak with Investor Relations because we love to showcase this because it's powerful, frankly. You can see the statistics. 2,000 buildings, 250 chemical production sites, almost 3,000 kilometers of pipeline. I love these statistics. 400 rail cars per day in and out. This is unbelievable.
Chemicals global asset footprint: Verbund and major production sites

Verbund generates >€1 billion p.a. global cost savings*, supports sustainability

Global reduction in carbon emissions of 6.1 million metric tons/a and reduction of waste
Example Ludwigshafen: avoidance of 7 million metric tons of freight = 280,000 fewer truckloads
Shared use of on-site facilities: fire department, security, waste water treatment and analytics

* Savings include only tangible synergies. Additional (intangible) benefits and retained profits are not included.
I think if you laid this thing across Manhattan Island, it goes from something like Battery Park almost up to Times Square. This is impressive and we have six of them. We have six of them around the world and they’re not static. We keep growing them. We keep finding ways to add more pieces to it, reutilize more streams. We have active projects in every one right now. In Nanjing, we just started up an acrylic acid plant, SAP plant, the butylacrylate plant. We have some amines plants that are under construction in Nanjing. In Kuantan, we’re building an aroma chemicals value chain. In Antwerp, butadiene extraction. We’re tying into the system there. Ludwigshafen, TDI you heard Kurt talk about it. Freeport, a new dispersions plant is under construction, and we want to build an ammonia plant that we will talk about later today. Geismar, a new formic acid plant. These things are always growing, we’re building, we’re interconnecting and hopefully bringing more value.

Okay, so everything I’ve talked about so far is conceptual, but what’s the bottom line? The bottom line is that the Verbund concept brings cost savings and it lessens the impact on the environment.

Here we show a little bit of a breakdown of some of the cost categories. So, if we talk about balancing energy requirements between plants that produce energy and plants that require, we estimate more than EUR300m a year are saved. Look at logistics. Unbelievable. More than EUR600m a year saved. You talk about a pipe from one plant to another plant. Not a truck, not a rail car, not a barge in between, not moving things around the world, and unbelievable savings. Clearly, infrastructure in many, many ways to be able to leverage another EUR100m a year.

This doesn’t capture all the costs though. We transfer EUR6b of products to our sister divisions. There is no marketing cost there for that production. There is no selling cost there. There is no technical service cost there. Working capital is minimized because it’s a pipe between two plants. There is a lot more here and frankly, with the investments that we’re making and the ones that are on the table, that are underway, we estimate it could and should add another couple of hundred million euros of benefit going forward into the Verbund concept.

You can also see the impact on the environment. You use less energy. You save a lot of CO2. You save about six million tons of CO2 each year through the integration concept. Look at the logistics savings. Just in Ludwigshafen, just at the Ludwigshafen site almost 300,000 less truckloads required than if we operated plants independently and had to move things around. So, I think a very impressive opportunity here.
Verbund means efficiency and also flexibility – if steered intelligently

Verbund simulator enables
- Optimized operations
- Efficient utilization of assets
- Management of value chains

Verbund proved flexible in 2008 / 2009 crisis
- Capacity reductions
- Flexible placement of people
- Retained profitability
- Flying start out of crisis

Verbund does allow for portfolio changes
- e.g. fertilizers, styrenics

Chemicals is at the heart of the BASF Production Verbund

Additional Verbund benefits
- Flexible planning along value chains
- High security of supply, low logistics costs, no sales and sourcing costs
- Joint quality management
- Joint engineering and process development
- Cross-functional knowledge exchange
- Additional capacity at Verbund sites dilutes fixed costs

Philosophy of transfer pricing
- Safe and flexible supply at competitive prices
- Transfer prices linked to market prices
- No cross-subsidizing
- Value driven management in all steps of the value chain
Now, it’s worth taking a moment to talk about the concept of flexibility because sometimes we get these questions. You talk so much about integration, does this mean that somehow you’re locked in and you don’t have variables and things that you can move and change? The answer is no. It’s a pretty sophisticated system. Our engineers have built over the years these rather complex gigantic simulation programs, Verbund simulators. So, for example, if some plant in the middle of the site experiences a temporary downturn in demand, they need to cut it back, what’s the implication for everything else because it’s all interconnected? This is modelled. We drive these programs every week and we know how to make the adjustments to try to overall optimize the situation.

But, maybe the best example, the best example was during the financial crisis 2009, end of 2008, beginning 2009 where we dramatically, dramatically took down production in the Verbund. Within a few months we took the effective cracker capacity in Ludwigshafen down to 20% because we thought of the two sites Antwerp and Ludwigshafen as one unit and we re-balanced through the simulator. We moved more than 900 people around where they weren’t needed, to where we needed some more help, we went to short time working and such and we saved several hundred million euros. I would say, from my perspective, I think BASF has reacted faster and more intensively than most other players in the industry despite the fact that we’re all tied together here in a Verbund.

The other question we sometimes get is what about the portfolio? Does this integration somehow tie you up a little bit and make you less flexible in terms of changing your portfolio? Again, I don’t think so. We have two recent examples. Kurt mentioned them both - fertilizers and styrenics. So, we sold our fertilizer facilities largely based in the Antwerp Verbund. Now another company, EuroChem, operates those facilities. It’s still interconnected to the Verbund. It’s just via service agreements. Everything operates the way it used to. Everyone captures the value.

The same thing with Styrolution. We have a joint venture with Ineos. Those facilities continue to operate within the Verbund simply organized via service level agreements.

Now, there is a couple more things of advantage. I talked about quantifying what we get out of the Verbund. There is clearly more advantage, but it’s hard to put a number on it. But, if you talk about supply security, supply reliability, when you’re piping things between plants it’s a lot better than worrying about a logistical setup and trucks and rail cars and barges and hoping your material shows up on time.

Forecasting, demand planning, scheduling, these are all people that work for BASF. They sit at the same site and they work together. It works well. It’s tightly integrated. Clearly, quality management is the same mindset. But, there is a lot more clear benefits, but a little bit harder to put a number on.

Now, there is one more thing I want to point out because I want to show a couple of examples of these value chains and what we do. But, before we do that, because we talk about integration through all of our divisions, we have to address the question to you how do we transfer product between the divisions? It’s basically transfer pricing. So, how do we manage this whole process within BASF? It’s very, very simple. It’s been this way for a long time, since long before I joined the company. It’s a clear principle that each division in BASF needs to stand up on its own. It needs to show its own profitability. It needs to fight in the marketplace like it’s a standalone company. So, we transfer products at prices that are linked to market prices. Very, very clear philosophy in BASF. We don’t want any division to be subsidized by any other division.
Case study acrylic acid: Value chain contributes cash flow of approx. €1 billion*

Each value chain step represents a potential merchant market outlet

Case study acrylic acid: Leveraging the BASF Technology Verbund

Focused R&D to continuously improve acrylic acid process
- Highly selective and efficient process catalysts
- Proprietary technology for new process
  - Higher yield
  - Lower energy consumption
  - Lower investment costs
In addition, four radically new processes being investigated in research
  - One based on renewable raw materials
So, with that background let me show you a couple of examples. The first one is our acrylic acid value chain. This is a big chain in BASF. It’s simplified here, but it starts with propylene into acrylic acid, some acrylic esters. This is all within the Chemicals segment. We transfer down into the Performance Products segment, ultimately going into coatings, into paints, into fiber bonding, into adhesives, diapers, hygiene products, detergents and surfactants. It’s a very broad chain. Each and every step of the chain we sell some product to the merchant market and then we transfer some product downstream. It’s tightly tied together through tight forecasting, high supply reliability, we’re capturing all side streams, we’re balancing energy, we’re leveraging infrastructure and at every step of the way we’re grabbing some margin for BASF. You add it all up in this chain it’s around about EUR1b a year of cash flow.

Now, I’ve talked a lot about integration. I don’t want to give you the impression that integration is the only thing we think about. At the end of the day with commodity chemicals it’s your cost position. Integration is a big driver of that, but your cost position is also very, very strongly dependent upon your process technology. So, the EUR180m that we spend each year on research in this segment, most of it is spent on process related research designed to be more efficient, to be more cost effective.

So, let me give you an example here just to give you a flavor for it. We happen to believe we have the best acrylic acid process in the world, the lowest cost process and I’ll show you a figure in a few minutes. Why? We have an outstanding catalyst. We think the best operating catalyst in the world. Don’t forget the Catalysts division which is the largest producer of chemical catalysts in the world. This is an incredible advantage to feed this technology back into our segment. Also, we have some downstream purification processes which are clever and better, frankly, than what else is out there. So, we have an outstanding cost position here.

But, also, I want to point out in acrylic acid it’s an important chain. Despite the fact that we think we have the leading cost position, we have four research programs underway on new process development routes, including one that is renewables based. So, why? Why are we spending money on four new routes? Because we can never stop.
Case study acrylic acid: Leading technology strengthens profitability

Acrylic acid production technology benchmark
Industry average costs = 100; normalized

Continuous productivity improvements
- Smart production increase by run-time extension and higher throughput
- All production sites contribute to innovation and improvement ideas
- Quick transfer around the world ensured

BASF with best-in-class acrylic acid process

Case study acetylene value chain: cash flow of approx. €500 million*

Natural gas → Methanol → Acetylene → 1,4-Butanediol → Formaldehyde → Tetrahydrofuran → PolyTHF® → N-Methylpyrrolidone → Pyrrolidones → Glues & Resins → POM*** → Thermo-plastic PU → Engineering plastics → Personal care products → Other specialties → Downstream units
If we don’t stay in the low cost position, over time you lose it, so, we drive it and this is, frankly, where we think our position is. Just to give you a flavor of how we think about process technology. On the right bar here this is indexed to the benchmark industry average. This is cost position. You see the middle bar. This is our classical process. Then even our latest process, which is implemented in the two new plants that are starting up soon in Nanjing, China and Camacari, Brazil. We think it is even better from a cost standpoint.

This afternoon Rainer Diercks will talk a little bit more about this. In fact, he is going to show an example of acrylic acid innovation which I think is very interesting that didn’t come out of the central R&D group. So, it was a clever innovation that came out of one of our sites in Malaysia and it moved quickly around the world and implemented everywhere. But, it’s an example of the technology Verbund and us taking advantage of opportunities everywhere.

Okay, let’s look at another value chain. This is the acetylene value chain. This one I think is interesting because there is a lot of activity within the Chemicals segment. The Chemicals segment is in the blue boxes. The downstream specialty division is in the grey boxes. You can see we start with natural gas here to acetylene and then to a whole chain.

Once again, we’re selling externally at every step and we’re transferring downstream at every step. So, we’re grabbing margin everywhere and a lot of that margin happens to stay, for this example, in the Chemicals segment because everything in blue is considered upstream. But, at the end of the day, about EUR0.5b of annual cash flow is generated from this chain.
Chemicals supplies key raw materials to Performance Products

Performance Products
- Care Chemicals
  - Acrylic acid
  - Ethylene oxide
  - Propylene oxide
  - Vinylpyrrolidone
  - Specialty Amines
- Nutrition & Health
  - Isobutene
  - Diethylketone
  - Formic acid
  - Propionic acid
- Dispersions & Pigments
  - Acrylic acid
  - Acrylates
  - Butadiene
  - Sodium hydroxide
- Performance Chemicals
  - Isobutene
  - Monoethylene glycol
  - Acrylates
  - Amines
  - Kerocom PIBA
- Paper Chemicals
  - Acrylates
  - Acrylic acid
  - Butadiene
  - Propylene oxide
  - Vinylpyrrolidone
  - Specialty Amines
- Speciality Amines

Chemicals supplies key raw materials to Functional Materials & Solutions

Functional Materials & Solutions
- Performance Materials
  - MDI & TDI
  - Polyamides
  - Monoethylene glycol
  - PST
  - PolyTHF®
  - Propylene oxide
- Construction Chemicals
  - Acrylic acid
  - Acrylates
  - Plasticizers
  - Vinyl modifiers
  - TDI
- Coatings
  - Acrylates
  - Plasticizers
  - MDI
  - Hexanediol
- Catalysts
  - Solvents
  - Zeolite templates
- Chemicals Segment
  - Process catalysts

~40% of raw material demand covered by Chemicals

~30% of raw material demand covered by Chemicals
Okay, let me continue the conversation about connecting our businesses but with more of a focus on downstream. I'll talk about the downstream business connections of the chemical segment.

The next three slides I show we're not going to go through in any detail. I only want to point out that every division in BASF, every single one is tied into the Verbund in one way or another. Of course, some of them more than others, but everyone is critically tied in.

Here, the Performance Products segment gets about 40% of its raw materials out of the Verbund. Functional Materials and Solutions takes about 30% of their raw materials out of the Verbund and then we actually take a little bit of capabilities out of Catalysts and we feed them back to the Chemicals segment, as I described earlier.
Chemicals supplies key raw materials to BASF Crop Protection

**Crop Protection**
- Solvents
- Specialty amines
- Ethylene glycol
- Nitrotoluene
- Alcoholates

Close to entire cracker output in Ludwigshafen is used within Verbund

- **Cracker products Ludwigshafen**
  - Ethylene
  - Propylene
  - Butadiene

- **Value chains of the BASF Verbund**
  - Raffinates
  - Aromatics

- **Merchant Market**

BASF-YPC Nanjing supply for captive demand:

- 2006: 60%
- 2014: 75%

BASF Investor Day Chemicals segment – Keynote speech, May 22, 2014
Even Agricultural Solutions. Now, maybe some of you have an impression that somehow our Agricultural Solutions business is a little bit of a standalone business. It’s not. 35% of the raw materials are fed from the Verbund. If you stay this afternoon you can talk about this with Sanjeev Gandhi in the Intermediates session. They’re a critical supplier of very important precursors to the Agricultural Solutions segment.

This focus on interconnecting downstream, we can also give a few more examples here. If we take the Ludwigshafen site, virtually every molecule out of the two crackers there is fed into our downstream value chains. We sell almost nothing out of the cracker to the merchant market. This is the ultimate of what we strive for at BASF. It’s not the same everywhere, but this is what we try to drive towards. We show an example at the bottom here, Nanjing. 2006 we were feeding about 60% of our cracker output to downstream value chains and today it’s up to about 75%. So, that’s the driver, that’s the concept that we’re trying to move forward with.
High captive share of MDI for BASF’s polyurethane systems

MDI sales to downstream businesses
- Polyurethane system houses
- Thermoplastic polyurethanes

Global production network (capacity: 1,340 kt)
- Antwerp
- Geismar
- Caojing
- Yeosu (Korea)

MDI sales split Europe & USA 2013
- Captive demand
- 3rd Party sales

High captive share of MDI for BASF’s polyurethane systems

MDI global sales split 2013
- Captive demand
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MDI sales to downstream businesses
- Polyurethane system houses
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Global production network (capacity: 1,340 kt)
- Antwerp
- Geismar
- Caojing
- Yeosu (Korea)
So, I can give you a few more examples just to bring this home a little more strongly and let me start with the polyurethane’s value chain. First, let me give you a little bit of a background on polyurethanes. It’s a fantastic market from my perspective. It grows very, very nicely. The MDI driven polyurethane market grows at 6% to 8% globally each and every year. Why? Because it’s a very versatile material. There are new applications that are found each and every year. Who is driving these applications? It’s the downstream specialty divisions that are working with the customers and finding new ways to use them. So, for us, we have 35 or 40 system houses around the world that are working on these specialties. We have a thermoplastics polyurethane downstream segment. We even have a cellasto group where we make polyurethane parts and sell them to the auto industry. So, it’s the specialty activities downstream that are growing and driving the growth in this market.

Now, in the Chemicals segment we start with the big precursors MDI and TDI. So, let me give you an example here. MDI, we show the split between what’s captive, what we supply downstream and what we sell to the merchant market. If I start with the developed regions, Europe and the United States, for example, you can see how much material we push downstream into the chains grabbing margin at every step of the way. So, we can make a clear statement here. BASF would never build an MDI plant simply to serve the merchant market. It would always be in conjunction with the concept of driving downstream.

Now, if we look at the global picture, it’s a little bit less concentrated downstream and that’s because in the emerging markets the specialty units need more time to develop. They’re emerging markets. But, the concept remains the same. We build, we funnel downstream.
Acrylic acid sales to downstream businesses

- Superabsorbent polymers
- Dispersions
- Esters
- Resins
- Surfactants

Global production network (capacity: 1,350 kt)
- Ludwigshafen
- Antwerp
- Freeport
- Nanjing
- Kuantan

High captive share of acrylic acid for BASF’s SAP* and dispersions

Global sales split 2013

- Captive demand
- 3rd Party sales

3rd Party sales: Captive demand:
The same thing with acrylic acid. You can see in the developed parts of the world the very high percentage that we funnel downstream and you can see on the global basis a little bit less, but for the same exact reason.
Growing captive share of caprolactam for BASF’s downstream polyamide polymers

Caprolactam sales to downstream businesses
- Engineering plastics
- Polymers for packaging films
- Monofilaments

Operational excellence in existing plants (capacity: 800 kt)
- Ludwigshafen
- Antwerp
- Freeport

Caprolactam global sales split 2013

Captive demand 3rd Party sales

Caprolactam global sales split 2015+

Captive demand 3rd party sales
I can even choose an example here of a product line that currently operates in a tough marketplace. This is caprolactam. Caprolactam, it’s a commodity precursor. It feeds into the polyamide value chain. It happens to be a highly cyclical business. When times are good, and I will tell you times were good in 2010/2011, margins were high. We made an unbelievable amount of money. Now we, frankly, are at the other end of the cycle here. A little bit too much capacity in the world of caprolactam. But, the important point to make here from a BASF standpoint, we’re not in the caprolactam market to sell product to the merchant market. We’re in the business so that we can funnel it downstream into our engineering plastics division with specialty fibers, specialty packaging films, and this is what we’re trying to accomplish.

You can see next year we bring on a new polyamide plant in China. This gives even more focus downstream. We have enough caprolactam to serve our chain, to serve our downstream needs. We have no reason to build any more. This is how we try to drive the value chain.
High capex intensity commands extraordinary focus on capex allocation and project control

- Extensive use of cash-cost benchmarking
- Preparation of solid business cases for all projects ensures sound decision-making
- Projects approved only if cost of capital is earned even at hypothetical marginal producer price level

Capex budget 2014-2018 by segment

- €20 billion
- Chemicals: 33%
- Agricultural Solutions: 7%
- Functional Materials & Solutions: 12%
- Other: 13%
- Oil & Gas: 20%

* Including gas-to-propylene project U.S. Gulf Coast, TDI Ludwigshafen, MDI Chongqing, Isononanol Maoming
Okay, let’s now talk about the overall concept of CapEx. Capital expenditures in the chemical industry, I know some people who follow our industry are a little bit concerned. Concerned about the industry. They wonder if the industry spending too much. Maybe worried about BASF because our capital expenditures have risen in the last couple of years. But, what I would like to do is give you a flavor for how we think about this and how we manage the business and how we stay focused.

Here is the BASF CapEx plan for the next five years. EUR20b. I mean maybe one of the first things you would take away from this chart is that Chemicals and Oil and Gas represent about half of that. How come? One simple answer is these are inherently capital-intensive businesses. Maybe just to drive home the point, if we were to build a world scale acrylic acid plant somewhere in the world, depending on the scope and the location and such, maybe it costs us a couple of hundred million euros. If we were to build a specialty polyurethane system house somewhere in the world, maybe it costs us EUR5m. These are different businesses upstream and downstream.

You saw we spent EUR180m of research every year in Chemicals. This is 10%, 10% of BASF’s R&D budget.

So, the upstream businesses are inherently more capital intensive, but they’re less research intensive. The downstream businesses are the opposite. They need the R&D money because they’re working with customers to drive new products, new ideas, new applications. It’s just a business model difference.

Okay, so now to the question of what’s happening in the chemical industry? Should we be concerned about the CapEx development and how does BASF think about this? The first thing I would say is again we operate in the commodity chemical space. Margins are completely a function of supply and demand. But, as Kurt mentioned, it’s critically important to remember for BASF this is individual product line supply and demands you have to look at. There is no monolithic chemical cycle. It doesn’t exist.

The second thing is when you look at individual product lines or value chains you have to look and determine are they fundamentally global chains or are they fundamentally regional from a competitive standpoint? I’ll take you through some examples here.

Now, from a BASF standpoint, I would say three things. One, we are very disciplined and very focused on how we spend our capital. We’re focused on chains that ultimately go to the downstream and we follow a very rigorous methodology of looking at our cash cost position as it benchmarks against other players and we make our decisions on this basis. So, let me take you through each of these.

When it comes to discipline, we spend about EUR4b a year now, we’re at this kind of level on CapEx. The Board at BASF has to approve, and when I say approve, it means we have to read and discuss and approve every investment above EUR25m that’s proposed. Now, EUR25m is a small number in this industry, so I have to read this every month. Kurt Bock, the Chief Executive Officer of the largest chemical company in the world is reading this every month and we discuss it and we decide whether we approve or not. So, you might say are we micromanaging capital? I would say, yeah, we’re micromanaging capital. That’s exactly right. It has to be focused, it has to be disciplined, or we’re not going to do it.
Capex focused on organic growth as well as on bottom-line improving projects

Consolidated sales indexed (2000 = 100)

Capex as % of sales

Modelling cost curve dynamics

Cash costs

Marginal producer price

Market demand

Production capacity

Cash costs are a function of:
- Technology position
- Degree of integration
- Scale
- Raw materials source

Competitiveness in the market also influenced by:
- Logistics costs
- Sales costs
Let’s take a look at how we have spent some money in this segment as a percentage of sales over the years. If you go back, and I talked about earlier 10, 15 years ago, we spent at a very high level because we were dramatically extending our Verbund infrastructure around the world. Kuantan Verbund, Nanjing, new cracker. In the intervening years, we focused more on extending these, sweating these assets, driving them as hard as possible. We’ve now reached a point in the last couple of years where we really do need to extend this Verbund concept in our backbone, the backbone of these value chains, a little bit more. So, we’re not going anywhere near the peaks of the past in terms of percentage of sales, but you can see we’ve risen up a little bit.

Where would we see this going in the next few years? You can see the sort of funnel concept. Fundamentally, it’s peaking and will work its way down depending on what exact decisions we make in the next few years, but that’s directionally where it is going.

Also, there is quite a significant percentage of this CapEx - that we have for the future planned - driven by profitability improvement. So, we’ll talk about a couple of these. These are the shale gas projects in North America where we’re not putting new volume into the marketplace. We’re simply driving our profitability dramatically higher. So, there is less merchant market risk, less us fighting in the marketplace to grow our volumes and it’s more about profitability improvement. I’ll show you some of this.

I mentioned this concept of benchmarking our cash cost position. I would like to take a few minutes to walk you through a couple of examples to give you a flavor for how we think about making decisions because again, these are commodity chemicals. You have to have a low cost position. If you’re not a low cost producer, forget about it.

So, what we do with all of our major product lines is we ask our engineers and our chemists to constantly, constantly benchmark themselves against everything else that’s out there. So, if I look at this conceptual chart here, we talk about in an industry this could be a global chart or it could be a regional chart depending on the competitive dynamics. This would be plant number one, two, three, four, five in the industry. Maybe there are 20 plants there and each one represents a new chunk of volumes. So, this is volume as you go to the right and then the vertical axis is the cash cost position. The cash cost position is going to be a function of, you see, your technology position, your degree of integration, your scale, what’s your raw material position, and certainly, to a little bit lesser degree but certainly important, your selling costs, your transportation costs depending on where you are producing and where you are selling.

Our teams study this like crazy. It’s not perfect information. Our information is perfect within BASF because we know it. Our information about the outside world is not perfect, but I would have to say we spend a lot of time on this. We generally know the processes that are out there, how people are integrated, what their raw material location situation is to a pretty good degree. These are all assumptions, but I think it’s pretty good.

Now, if you look at this chart, the dotted line that is red, the vertical line, represents the market demand. So, if this line were over here, you would have a balanced market where there are enough plants that just serve the volume that’s required in the marketplace and the price would be pretty good. Margins would be pretty good.

This particular case we show conceptually that there are more plants or more supply than there is market demand, so you have a long market and theoretically, prices could fall all the way to the marginal cost producer level. If that occurred in a very long market, plant number four could not operate cash positive. It would have to turn off or continue to lose cash every day. Plant number three would be cash neutral and the best positioned plants here would make money. So, this is the basis of how we try to think about our investments. Let me give you a couple actual examples.
Continuous process innovation leads to best-in-class technology

- Proprietary BASF technology, with best-in-class process
- Significant cost synergies due to two parallel projects (Nanjing, Camacari)
- Acrylic acid will supply downstream units (superabsorbent polymers; acrylates)

Cost curve case study: Acrylic acid China

Acrylic Acid cash cost curve, China average cash costs 2015 in US$/kg

Cost curve case study: TDI Europe

TDI cash cost curve, Europe average cash costs 2015 in US$/kg

New Ludwigshafen TDI plant will provide superior cost structure in Europe

- Leading single-train technology
- New TDI plant strengthens and benefits from Ludwigshafen Verbund
- Schwarzheide plant to be closed after start-up of new plant

New TDI plant re-balances competitive environment of European TDI market
I’ll start with acrylic acid in China. Now, why do I pick this? Because, fundamentally, acrylic acid is a regional market. We have world scale plants in every region of the world. There are some product flows that go between regions across the ocean, but it’s relatively minor. It’s fundamentally a regional market and some people would say there is a little bit too much acrylic acid in China. Too many announcements, too many plants. What would I say to that? I would say, unfortunately, I think there is a little bit too much acrylic acid in China. So, then you say why are you making an investment? You just started up a plant. Because we took this hard look at this and we said with our technology position, with our connection with our Verbund partner Sinopec and the raw material position out of that, with the integration of our Verbund and we benchmark ourselves carefully against everybody else to the best of our ability, we think we are here on the cash cost curve. In a hypothetical situation in a long, long market, if prices fell all the way to the marginal producer, could we still earn premium on our cost of capital? If the answer is yes, then we build the plant. If the answer is no, forget about it. The answer is yes.

Kurt referenced this earlier. We’re building a big production facility in Ludwigshafen in TDI. You might say why are you building a big plant in Europe? Europe is not the highest growth region of the world. This is a commodity. What are you doing BASF? This is a commodity and it’s been a good to BASF over the years, I have to tell you. But you have to be the low cost producer or you can’t survive and if you are the low cost producer you can earn a lot of money.

So, it’s also fundamentally a regional market. Products do flow across the oceans, but not so much. So, this is why we are positioned in every region of the world with own producing plants. We’re the leader in North America. We’re the leader in Asia. We’re the leader in China. But, our European position was not so good. We had a small plant in Schwarzheide, Eastern Germany, high cost position, challenging. So, we said if we found the right integration opportunity in Europe could we consider a new investment. We frankly looked at Antwerp, we looked at Ludwigshafen, we studied it carefully and we said the Ludwigshafen site offers the perfect opportunity to integrate syn gas, chlorine, nitric acid; everything we need to make TDI is right there and interconnected. So, we believe when we start this plant up, this is our belief, this will be the low cost TDI plant in Europe, period. Full stop. At the same time we will close down our plant in Schwarzheide.

We also not too long ago acquired a small Polish producer. We just acquired intellectual property and the customer list and since then they have decided to shut their assets. Those two consolidation moves add up to about 150,000 tons. So, this plant in Ludwigshafen will start up on day one half loaded without impacting the market one bit. It’s a consolidation opportunity, but it’s possible because of the low cost position.

Maybe just another couple of comments on TDI that I think are interesting because it drives this low cost position concept home. Over the last 10 years, many, many TDI plants have shut down forever. In fact, if you add them all up, it’s about 750,000 tons of TDI has disappeared from the marketplace. Why? Because these were small, sub-scale, less technologically favorable, less integrated facilities. They couldn’t compete.

If you read the Trade Press you can go back and you can look around and you can add these things up. There have been several more announcements that people have made. We’ll see if it happens. But, you could imagine adding up those figures that people talked about another 300,000 to 500,000 tons of TDI will also shut down in the next several years. I can’t discuss why. These are other companies. But, you could imagine that cost position is the challenge. So, again, this is how we try to think about our investments.
Cost curve case study: Caprolactam

Caprolactam cash cost curve
average cash costs 2015 in US$/kg

BASF caprolactam production
focused on captive demand
- BASF plants well positioned on cost curve
- Best-in-class cost position in Europe
- Constant process improvement ongoing
- World-scale caprolactam plants supply downstream demand of polyamide 6 applications
- Further cost improvement in North America after start-up of ammonia JV with Yara

Chemicals investments support growth of downstream units in Emerging Markets

Sites with major announced investment projects

- Geismar
- Port Arthur
- Freeport
- Ludwigshafen
- Antwerp
- Kuantan
- Maoming
- Shanghai
- Nanjing
- Chongqing
- Korla
- Camacari
- Acrylic acid

Source: BASF estimate
Let’s even look again at this tough marketplace caprolactam and, again, we’re at the bottom of the cycle now, so it’s less profitable than it was two, three years ago. But, remember what I said before. We’re not in the business to sell to the merchant market. We’re in the business to drive it downstream. We have enough. We don’t need to build another plant. We’re not going to build another plant. But, the plants we have, look at how they’re positioned. So, we’re still able to make money in this market even though the market right now is very long.

The orange bar shows that this will get even better when we start up the ammonia JV in Freeport, Texas in a couple of years.

I need to make a disclaimer here now. I gave you three examples to give you a flavor for how we think about this. We cannot give you more. We do this for all our products. Please do not flood Maggie and her Investor Relations team with requests for all of our cash cost curves. We can’t do that. But, hopefully, hopefully, this gives you a feel for how we think about life.

Okay, we talked about the Chemicals segment enabling investments to support downstreams and emerging markets. Here, Kurt already talked about Nanjing, China, and Camacari, Brazil. World scale acrylic acid plants coming on stream connected with downstream derivative plants butyl acrylate, superabsorbent polymer. Again, enabling growth in emerging markets.
Chemicals investments enable growth in Asia, especially in China

Sites with major announced investment projects

- Korla
- Chongqing
- Production site
- Verbund site

Chemicals investments support growth of the Verbund in Europe

Sites with major announced investment projects

- Antwerp
- Ludwigshafen
- Kuantan
- Nanjing
- Production site
- Verbund site
Some more examples. Next year we come online with a polyamide plant in the Shanghai region, 100,000 tons of polyamide which will further take our internal caprolactam volumes.

Isononanol, this is an oxo-alcohol that goes into the plasticizer value chain and our focus is on the fastest growing segments and the highest value segments of the plasticizer value chain. Interesting opportunity with our Verbund partner Sinopec to integrate with the refinery. Get an outstanding raw material screen. We have great technology. You will see, Rainer Diercks will show you a little bit more about this, this afternoon.

MDI, most of you are familiar with our Chongqing plant that’s underway. 400,000 tons of MDI. At the first quarter press conference, Hans Engel mentioned that this plant will be a little bit delayed. As you know, or as you may know, last year the Chinese government rather dramatically and suddenly increased natural gas prices to the industry. I would say this is not a total surprise that it came, but it was a surprise in terms of the speed and the intensity. So, we had to work with our Verbund partner who is working on the precursors to the MDI plant and we had to work to optimize and rearrange a little bit to make sure that we fully optimized the site for the new gas framework. So, this will take us a little bit longer and the plan now is to start up in the second quarter of 2015.

Chongqing is in Western China. It’s in a region where there is about 270 million people. It’s about the size of the United States in terms of people. MDI in China grows at double digits. It’s the fastest growth market in the world for MDI. We will be the first plant in the West as industry develops in the West. But I also need to mention that you will see a new press release coming out very, very soon, but the news is out today. We have our next MDI opportunity in China and we have currently a joint venture in the Shanghai region, in the Shanghai Industrial Chemical Park with Huntsman and two Chinese partners. Currently, it operates 240,000 tons a day and we will double this to 480,000 tons per day, so an additional 240,000. Our piece, BASF, our equity piece is a third, so about 80,000 tons. It will come on in a couple of years from now. So, it will phase in after Chongqing and, frankly, it represents what we think is the last license opportunity to produce isocyanides in the Shanghai region. So, we were able to get this last opportunity and build upon it, leverage the current infrastructure that we have and, frankly, I think it’s a great opportunity.

And in Europe we continue to extend and develop the Verbund sites. We talked about TDI and Ludwigshafen. Also, we have a butadiene extraction plant starting up in Antwerp in the third quarter of this year.
Price development of oil / natural gas

North American shale gas will only have a limited impact on BASF in Europe

Expected key exports:
- Polyolefines
- PVC
- Methanol

Game changer shale gas
- Increased U.S. shale gas production disconnected crude oil prices from natural gas prices in North America
- Increased production of natural gas liquids (NGLs): ethane, propane, butane
- NGL price drop drives shift to lighter cracker feed slates
  - Improved profitability of light feed crackers
  - Narrow cracker output

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Now, let me finish, lead to the last section which is talking about the opportunities that we see in North America for shale gas for BASF.

Now, Kurt mentioned earlier what is BASF’s position, or view, about the shale gas opportunities in North America. We would say, clearly, we believe this is an outstanding raw material advantage for a couple of components out of shale gas remain long in the future. So, we’ve spent a lot of time studying this, a lot of time thinking about it. But the question is for us, given our strategy and the value chains that we’re in, what’s the best way for us to take advantage of this and this is what we will talk about.

The first thing is just the basic introduction. When we talk about shale gas here I think everyone likely knows this. This was driven by new technology in horizontal drilling and fracking combined with say an environment in the United States or North America in terms of the ability to own the rights to minerals below the land that you own. The fact that there was a tremendous pipeline network in existence, the fact that there is generally enough water, it’s a water intensive process and the fact that there is an incredible entrepreneurial environment in the US. You put all that together with this new technology and you can see that gas and oil now are fundamentally decoupled in terms of pricing.

Natural gas, when we talk about natural gas, there is really essentially three or four components which you have to think about in it. There is methane and then there is ethane, propane, butane which you group then together and they’re called natural gas liquids. But, that’s important for us to talk about. Before I do that though I want to answer a question that sometimes we get at BASF. Will these new capacities and the sort of excitement about new chemical capacities in North America somehow threaten or harm or hurt BASF’s business in Europe because we have such a European stronghold? The answer is fortunately no and let me explain why.

The shale gas opportunities in North America will be captured in big commodity products in the first step of the value chain. Why? Because it doesn’t make any sense to subsidize further downstream steps in the value chain into specialties. You grab the advantage, you grab the margin, you sell it upstream, you make a lot of money. But, what you haven’t seen in North America are lots of derivative downstream specialty announcements that are connected to this because frankly again it doesn’t make any sense for anybody to subsidize anything. So, what you will have are big volume commodity products with good margins and it’s very, very likely that these volumes will move outside of North America because if you add up all the announcements, even if only half of these come true, the North American market can probably not swallow all of that new capacity. Some of it will go to South America, Asia, Europe. But, what will come overseas will be these large volume commodities like polyethylene, polypropylene, PVC, methanol.

Now, will European chemical industry be influenced? I would say European chemical industry and certain segments absolutely. They’re already being influenced with lower margins. But these are polyolefin producers who tend to be not so integrated. Okay, standalone units. These are methanol players. The PVC industry which already suffers in Europe. But, from BASF’s standpoint we’re not in these businesses. We’re not in PVC. We’re not in polyolefins and frankly, we’re a big methanol buyer in Europe. So, if prices come down in Europe, good, super for BASF. So, at the end of the day being a fully integrated chemical company we don’t see a big impact.
Shale gas is beneficial for methane and ethane based chemistry

Natural Gas Liquids
- Ethane
- Propane
- Butane
- Cracker Feed

Composition of shale gas

Methane
- Power plants
- Ammonia
- Methanol

- Low transportability of ethane
  - Shift to ethane crackers
- Propane and butane easy to transport
  - Export with link to global market

- Very limited transportability of methane
- Methane to remain an abundant product with low pricing in North America (despite LNG projects)

Shale gas is a major opportunity for BASF

BASF #2 chemical producer in the U.S.*

 Converted Port Arthur cracker with high feed flexibility

Low energy costs
(energy bill dropped by 55% compared to 2007**)

Substantial profit improvement

BASF will maximize opportunity of low-cost methane

Strengthen profitability of the Verbund
Grow selected C1 value chains

* Based on sales to local customers, ** U.S. data only, normalized costs for natural gas for energy production
Let’s come back to the opportunity. Let’s take a minute to talk about, again, the components of shale gas. You can think of it again as four components. The biggest fraction will be methane and the big use for methane would be power generation facilities or some base chemical plants like ammonia and methanol. The next three components ethane, propane and butane, these would be what we call C2, C3, C4 depending on the length of the carbon chain. They can be used as a fuel source. They can be used as an energy source. They can be used as a chemical feedstock. So, a lot of the cracker conversions in North America, this is what they take - ethane, propane, butane. They replace more expensive naphtha and these conversions have taken place in the US.

Now, one important thing to think about is the relative competitiveness of these products against the rest of the world because you have the oceans in between. So, these products are easiest to move around in pipelines, but if you have to liquefy them, put them on a ship, it gets pretty expensive. So, if you liquefy and transport methane or do the same with ethane, this is very expensive. I think you know this. LNG plants in North America will cost north of $10b. There was a number of them announced. We will see how many come ultimately. But, at the end of the day, the cost to liquefy and transport and regasify are about $5, $6, $7 per million mmbtu. So, there will always be a minimum difference of that price between North America and the rest of the world.

The same thing with ethane. There were some announcements about ethane export capacity that’s coming forward, but again, it’s expensive, difficult. I don’t see it being a game changer in terms of moving it around the world.

So, that means these two components will stay advantaged in North America versus the rest of the world for a long, long time. This is our belief. So, these will be the two most interesting molecules to invest in from a chemical industry standpoint.

Propane and butane, they’re relatively easy to move around the world. You can liquefy them and move them. These are fundamental fuels. They’re feedstocks. They’re used in cooking and heating situations and residential areas. These prices, it’s our view, will over time rise up. As more export capacity comes into play in North America, these will become more linked to global oil prices and this export capacity is rapidly, rapidly coming.

So, from a BASF standpoint, we would say let’s look for opportunities for methane, for ethane. Then the next question becomes well, what do we need? Ethane is fundamentally used. You can feed it into an ethane cracker and make ethylene and then make polyethylene or ethylene glycol. We’re not in that business. We have an ethylene chain but we have all the material that we need out of our cracker in Texas to support our future needs, so, we’re fully satisfied. So, our opportunity is to invest in the C1 value chain. This is where we see BASF making a move.

What you won’t see, you won’t see us announce a new cracker investment in North America. Okay, we’re not going to make polyethylene. We’re not going to make ethylene glycol. This would be for us maybe a good NPV, but it would be a completely opportunistic approach. It wouldn’t tie in to our value chains. It wouldn’t tie into our strategy. We’re not going to do it.

So, let’s talk about again what the opportunity is here for BASF. Maybe some of you don’t think of BASF as a United States chemical company. We’re not. We’re a European chemical company. But, we’re the second largest chemical company in the US. We have a pretty good presence there. We use a lot of natural gas. We use it as feedstock. We use it as an energy source. We have big calciners for our catalyst organization that are fueled by natural gas. Our energy bill has already dropped almost in half over the past number of years.

We’ve also made dramatic changes to our cracker to take advantage of this and as I’ve just mentioned, we will look for opportunities to invest in methane-based chemicals.
Port Arthur cracker* has full feed flexibility benefiting from low raw materials costs

- Since Q1 2013, full flexibility to switch to most economic feed: naphtha, ethane, propane, butane
- Cracker includes splitting unit, which optimizes quality of shale gas feed
- Added 10th cracker furnace, increased capacity to 1 million metric tons

Improved cash margins through feed flexibility

Ammonia joint venture* enables low raw materials costs for BASF downstreams

- World-scale producer economics plant with focus on captive demand only (BASF)
- Site: BASF Verbund site Freeport, Texas
- Capacity: 750 kt p.a.
- Advantages of hydrogen & nitrogen based technology:
  - Lower capital investment
  - No greenhouse gas emissions
  - Faster execution

Improved cost position for BASF’s downstream products
First situation is our Port Arthur cracker. We have already done a number of things. This is a joint venture with Total. It’s been completely converted to be completely flexibilized so we can take up to 90% of the feed as light feeds from the shale gas opportunity. It’s very, very flexible. We can optimize this thing on a daily, on a weekly basis with the particular feeds to get the best cost position going forward. We’ve also expanded it with the tenth furnace and we have some more ideas going forward. Rainer will talk about this, this afternoon.

We’ve also announced a joint venture with Yara to produce ammonia. Why do you need ammonia at BASF? Well, ammonia for us is a critical precursor for a number of big chains. Caprolactam, isocyanates, our amines business. We buy a lot of ammonia in North America. So, we said we can we take advantage of this cheap methane to really dramatically lower our cost position? The answer is yes. We said, yes, but to build a world scale plant, to get the best possible cost position do we need all of that ammonia? The answer was no. So, we said why don’t we try to find a partner where we can match our needs. So, we found a partner Yara. One of the largest merchant traders of ammonia in the world and we said why don’t we work together. BASF takes everything we need internally in the JV and Yara takes everything else and they do what they do in the merchant market. It’s a perfect fit. We’re going to build this in Freeport, Texas, a 750,000 ton plant.

We have also decided on the technology here. So, you make ammonia fundamentally from methane and this is what we’ve been talking about. But, in this particular case there happens to be plenty of hydrogen, plenty of nitrogen in the Freeport area and so we’ve decided to start the process from that standpoint. We cut the CapEx almost in half, almost in half because we don’t need the same gas plant at the front end of it and we have pricing on the streams that are linked to the methane pricing. So, it’s a perfect, perfect fit. At the end of the day we don’t take any merchant market risk because we’re not selling ammonia to the marketplace. We’re just dramatically improving our profitability.
BASF is currently a net-purchaser of propylene in North America

**Propylene supply North America**

- Flexible feed (NGL’s, Naphtha)
- Propylene purchase from market
- Propylene (Port Arthur cracker)

- Acrylic acid
- Oxo-alcohols
- Polyols
- Downstream products

**Propylene is a key raw material for several value chains**

- Port Arthur propylene production insufficient to cover growing captive demand
- Additional quantities are purchased from the market

**Gas-to-propylene complex* covers internal demand at attractive conditions**

**Propylene supply North America**

- Methane (from shale gas)
- Methanol
- Propylene

- Flexible feed (NGL’s, Naphtha)
- Propylene (Port Arthur cracker)

- Acrylic acid
- Oxo-alcohols
- Polyols
- Downstream products

**Cost leading gas-to-propylene technology covers supply gap**

- U.S. Gulf Coast location
- World-scale plant
- Start-up: ~2019
- Port Arthur cracker and new on-purpose propylene complex to cover entire captive propylene demand
- Mid-term no sales to merchant market
- Lower cost than alternative PDH technology

*Project under evaluation*
Same exact concept that we’ve recently announced a few weeks ago regarding propylene. Propylene, we are a big buyer of propylene in North America. We’ve always been a big buyer of propylene. So, the question is can we take advantage of the shale gas economics to dramatically improve our profitability. Where do we use propylene? We talked about acrylic acid, oxo-alcohols, polyols. These go into the polyurethane’s chain and we get propylene from our cracker now in Texas. But, again, we still buy a lot of it. So, we said what can we do to improve our profitability. So, we announced that we are fully interested in investing in a methane to propylene plant, a methane to menthol to propylene plant which will cover all of our internal needs. So, we will stop buying propylene externally. We’ll make it ourselves and we’ll make it at world-class pricing and cost.

Now, you might ask why did you choose the methanol to propylene concept? We haven’t heard anybody else talk about a methanol to propylene concept. You hear about propylene dehydrogenation units. We hear about other concepts. Why are you doing this BASF? Let me start by saying we took our time here to think this through. When we talk about making major investments, we’re talking about putting steel and concrete in the ground for the next 30 or 40 years we want to make sure we get it right. We want to make sure we make the best decision for BASF and since this is a make or buy decision, we don’t have to rush. We make sure we try to get this thing right. So, propane dehydrogenation, we own and operate a plant in Spain. We know it. We know how it works. We know the technology. In fact, we even developed our own PDH (propane dehydrogenation) technology in conjunction with Linde a few years ago. I can tell you we fully understand the cost structure and the technology associated with PDH.

We own and operate a metathesis plant in Texas which is another way of producing propylene. We understand exactly how this works because we own and operate one. Clearly, cracker the same thing. But, at the end of the day we saw this methane to propylene concept is giving us the best opportunity to have the lowest cost position. Two reasons. One, the process and secondly, our view of how methane prices will develop over time and how propylene prices might develop over time and what’s the relative spread there against propane versus propylene margins.

This is our view of the world. As I mentioned before, we fundamentally believe methane will stay advantaged for a long, long, long, long, long time and I would say we worry a little bit that propane will rise over time because it’s much easier to export and this is the concept. We think this approach could lead to around about 20% cost improvement over next best technology and that’s total cost. If we just look at variable cost, far, far, far superior to any other approach at making propylene. So, this is the concept behind our MTP (methane to propylene) announcement.
Shale gas-driven investments will significantly improve BASF’s earnings

- Cost position of BASF plants in North America will be in top quartile
- Shale gas based projects mostly to supply downstreams
- Shale gas based projects will drive bottom line growth
- Further selected projects under evaluation
So, at the end of the day, shale gas in North America is a great opportunity. We take a slightly different view because of our value chain setup here. We’re talking about backward integrating into Verbund molecules to drive our profitability up. Our positions are very good in North America. Great, great opportunity for BASF.
**BASF’s Chemicals segment: The success story continues!**

**Key success factors**
- Operational and commercial excellence
- Process innovation
- Focused and disciplined capex plan
- Further Verbund integration

**Chemicals will continue to contribute to BASF profit**
- Chemicals enable growth of downstream businesses
- Chemicals benefit from downstream growth
- Investment projects mainly improve cost positions

**Sales Chemicals in billion €**

![Graph showing Sales Chemicals in billion €]

**EBITDA Chemicals in billion €**

![Graph showing EBITDA Chemicals in billion €]

**BASF’s Chemicals segment is a strong cash and earnings contributor**

We will
- continue to strengthen the Verbund, create synergies and add value
- maintain our high level of profitability through process innovations and stringent cost management
- grow externally with the chemicals market

Our strategic focus is to enable and support growth of
- BASF’s downstream segments
- BASF in emerging markets

Shale gas is an opportunity for BASF
So, let me finish by simply giving you an outlook of where we’re heading in the Chemicals segment. I mentioned that by and large, if you add up all our value chains we should grow generally with the market in this 4%, 5% range. We would see our EBITDA from the chemical segment growing faster 6%, 7%, 7.5% a year working its way up to EUR4.5b, EUR5b, this kind of directional place by the end of this decade.

Just the takeaways again. Please, this is what we’re focused on. We’re focused on profitability. We’re focused on generally growing with the market. We’re focused on strategically supporting the downstreams and the emerging markets. We just talked about what a wonderful opportunity shale gas is for BASF.

Thank you very much. Appreciate your time and your patience this morning and I think now we have an opportunity for Q&A and Kurt will join.