

SLIDE 1: TITLE

Thank you, Dr. Li for that kind introduction. It is an honor to be here today among such a distinguished group of speakers. This event brings together leaders in chemical engineering, who make our industry a powerful contributor to the world's economy. More important, you improve the quality of life for people globally. This conference will make all of us better prepared to continue the good work of the chemical industry. So, thank you again for inviting me.

You may be interested to know that Dow's board of directors is in China all this week and will be holding its quarterly meeting here. This is only the second time in our company's more than 100 year history that Dow's Board of Directors has met outside the United States. Their presence here this week shows just how important we consider the Asia-Pacific region to Dow's future.

I think it is very appropriate that this conference was organized to include representatives from China, Japan and the United States. Our three countries are substantial players in the world of chemicals and the overall economy of the world. The Asia-Pacific Region accounts for one-third of global chemical consumption. In the future, perhaps just a few years from now, that is predicted to become half of all chemical consumption.

Of course, the future is what I'm here to talk about. More specifically, I've been asked to give you our view of the current state of the chemical industry and discuss some of the critical issues that we must all face if we are to continue making the great contributions to society that we do.

Before you head to the specific technical seminars, I want to talk about some broad and general concepts to keep in mind as you go through the week and back to your jobs after this conference. My hope is that these general concepts will help you focus your future efforts in a way that creates maximum value for your organizations and the global society that we all serve.

With that objective in mind, let me start with a current view of the chemical industry. Where are we today?

SLIDE 2: Global Chemical Industry

We are a vital industry. We make more than 70,000 products and generate economic value of more than \$2.2 trillion US dollars per year. We employ more than 10 million people directly and 50 million more indirectly who support our businesses worldwide. The jobs we create are among the highest paying in all of manufacturing.

More important, the products and services we provide meet the needs of society. In fact, they enable our way of life. Without chemistry, we would not be strong, healthy, safe, connected to one another, active, much less the creative and inventive beings we are. In fact, it is not an overstatement to say that without chemistry, our world as we know it would cease to exist.

We are a \$2.2 trillion industry today ... and growing.

SLIDE 3: Chemical Industry Sales by Region, 2004

Much of that growth will come in Asia. Asia-Pacific already accounts for 28% of chemical industry production today, but that is growing rapidly.

China in particular has become the manufacturing center of the world, and the chemical industry will be here to supply it. China is today the **second largest consumer of chemicals**, behind the US. And **China represents 40-45 percent of Asian demand** for most chemical products.

The chemical industry is growing all over the world with the global population, as we help meet expectations for an improved standard of living -- particularly in less developed areas of the world.

But in spite of the importance of what we know we do, we face many challenges. I'd like to describe some of these **challenges and critical issues** — and talk about how we can meet them together. I'll also use some examples of what Dow is doing to react to these challenges, in hopes of sharing ideas that could help your organizations.

Before I start, let me make one central point that underlies all the rest. That is, the most critical issue of all is that our organizations must **receive a fair return on the investments we make...we must remain profitable...to stay in business**. This is an obvious and simple reality, but it must be in the front of our minds as we look at all the other critical issues facing us.

SLIDE 4: Critical Issues & Challenges

I want to highlight four critical issues in particular. There are many more I'm sure you can think of, but given the time we have, I'd like to focus on these.

First is rising and volatile oil and gas costs. As you know, our industry is affected more than others with rising prices because we use hydrocarbons as raw materials as well as energy. This is a real threat to our industry's profitability.

SLIDE 5: Critical Issues: Rising Oil Prices

Here is a historical look at the cost of oil...only a few short years ago at only \$10 per barrel. Today, we're pushing seven times that cost.

SLIDE 6: Critical Issues: Rising Natural Gas Prices

Natural gas prices also have risen dramatically, but unlike oil prices there's a lot of variability by region.

There are tremendous differences in natural gas prices, depending on where you operate. But in almost all the major chemical producing nations, these prices are at all-time highs as well.

SLIDE 7: Critical Issues & Challenges

The second issue we face is the cyclical nature of our industry. We have this terrible habit of overbuilding when times are good and creating more supply than there is demand. This creates short peaks, followed by painful troughs with plummeting prices and profitability. These down periods drive downsizing and cost-cutting, including cuts in research and development needed to find new products and new processes that are needed to constantly invigorate our industry.

This bad habit is why it is difficult for our industry to attract the outside investment needed to keep us financially healthy.

SLIDE 8: Critical Issues & Challenges

The third challenge is rapid commoditization of the products we make, and a need for more innovation to fill the pipeline of new products.

It's a basic fact of our business, that every product or technology eventually becomes a commodity. What you do that's unique today, won't be unique any more in 10 years ... or 5 years or even 1 year.

Technology diffuses across our industry, academia and government. Patents expire. Products are imitated. This results in profits that are slim or non-existent, particularly when conditions of oversupply are allowed to occur.

There has not been enough innovation to bring to market new products to replace those that have become commoditized. There have been, arguably, no major discoveries of a new fibers or polymers with breakthrough properties in the last 30 years. Despite the problems of high energy and feedstock costs, there has been only limited success in finding economically viable breakthroughs in alternative feedstocks.

Of course this partially comes from a lack of fair profits that are needed to reinvest in research and development, which is caused by the other challenges I described earlier. Companies decreased their focus on new products development because of cost containment or cost-cutting, which were necessary to compete in an increasingly commoditized landscape where only low price will win the order.

The result is few high value inventions are coming around to increase the overall health of the industry.

SLIDE 9: Critical Issues & Challenges

The final critical issue I'll raise is that of higher regulatory standards, both local and global. Of course, government has a legitimate and important role in regulating industry and business. But at the same time, the regulatory pressure on the chemical industry is increased by the fact that most of the people in the world don't trust and, in fact, fear the chemical industry. We can expect more regulatory pressure in the future.

While the regulatory burden here in China is much less than Japan and the U.S., this will change very soon. There's growing influence from international organizations and treaties, which will create global standards.

For example, the European Union is seeking to drive its chemical management program, called REACH, to other countries around the world. Meanwhile, the United Nations is developing an alternative called SAICM -- the Strategic Approach to International Chemicals Management. Our chemical industry trade associations in the U.S. and Japan are working hard to shape SAICM so that it is workable for industry.

Then there's the concern about climate change and greenhouse gases. The Kyoto Protocol is in effect today, but developing nations like China do not face limits, and the U.S. has not signed on. However, it won't be long before some sort of new global framework, now called "Kyoto next", will begin being shaped. We can assume that in the next decade, all our industry -- whether in China, Japan or the U.S. ... whether small or large -- will need to operate according to the principles of sustainable development. Everyone, not just multinationals, will be held accountable for the "triple bottom line": Economic prosperity, plus Environmental stewardship, plus Social responsibility.

SLIDE 10: Strategies to Address These Challenges

So, those are the four critical issues. You can see how interrelated they are and how, when taken together, they create a very challenging environment for our industry and our organizations.

How will we address these challenges?

I don't claim to have all the answers, but let me share with you some strategies Dow and other companies are adopting to manage successfully in such a complex world.

Let's start with the issue of rising feedstock and energy costs. Clearly, one strategy is to focus on ways to use less to produce more.

SLIDE 11: Strategies: Conservation and Efficiency

Dow is one of the world's largest industrial power producers and consumers.

In 1994 Dow established a goal to reduce its energy intensity by 20% by 2005. Dow exceeded that goal by year-end 2004, reaching an energy intensity improvement of 21%. We're about to set yet another aggressive energy efficiency goal for 2015.

One way we achieved that efficiency is through the use of **cogeneration**, which is the simultaneous production of electricity and steam. Cogeneration typically uses 20-40% less fuel than conventional power generation. Cogeneration also reduces the emissions of carbon dioxide and helps to improve air quality, compared to conventional utility power.

Dow uses cogeneration to produce 75% of the electricity we need to manufacture our products worldwide. We have 21 co-generation plants at Dow sites around the world.

SLIDE 12: Strategies to Address These Challenges

Another strategy to respond to high-priced feedstocks is to integrate with upstream feedstocks in order to better control input costs. This is an advantage that companies like Sinopec and Petrochina have for their chemical businesses. Likewise, Dow has joint ventures with Petronas in Malaysia, as well as state oil companies in Kuwait, Oman and Argentina. These ventures provide very low cost hydrocarbon feedstocks.

SLIDE 13: Strategies to Address These Challenges

Yet another way to help overcome high input costs is to achieve scale that leads to economies in production. When you have world-scale assets, you almost always achieve the lowest unit cost.

By contrast, small chemical companies who cannot afford newer technology cannot achieve scale and will not remain competitive. They will be forced to close or consolidate. You can see that happening here in China today.

SLIDE 14: Strategies to Address These Challenges

Another strategy to consider is moving to alternative feedstocks. The tremendous surge in oil and gas prices is making this more economically attractive every day.

SLIDE 15: Alternative Feedstocks: Coal to Chemicals

One example is using coal as a feedstock for producing chemicals. In countries like China, with no oil or natural gas feedstock advantage, you pay market price

for your feedstocks – which makes it extremely difficult to create value from commodity products. Coal chemistry, which has been around for a long time, is now a viable alternative.

Dow currently has a pre-feasibility study underway with Shenhua Coal to explore the possibility of building a world-scale chemical complex that uses coal as the feedstock. We are working closely with government officials at all levels as we go forward. And, while it is still too early to tell, the technology looks promising at this point.

SLIDE 16: Strategies to Address These Challenges

Biomass and renewables also are worth considering as alternative feedstocks. Currently about 5% of industrial chemicals are bio-based. This is mainly alcohols, amino acids, vitamins, pharmaceutical ingredients and other specialty chemicals. Depending on advances in genetic engineering and future feedstock costs, chemicals from biomass could double by 2010.

SLIDE 17: Alternative Feedstocks: Biomass and Renewables

One fast-growing example is biodiesel. This fuel can be made from renewable resources like palm oil, jatropha, rapeseed and soybean oil.

Soy and other seed oils also can be used as feedstocks for other chemical products, such as polyols. In fact, Dow is pursuing the commercialization of polyols for polyurethane foam that are made from soybeans and other seed oils. Another possible feedstock is glycerin. Glycerin is available at lower and lower costs because it is a byproduct in making biodiesel. You could make a lot of downstream products out of glycerin, and more research is being done in this area.

These are a few examples that are being commercial, or approaching commercialization, today. But for most chemicals and plastics, bio-based routes are not economically competitive ... yet. But that could change in 10-20 years. Chemical engineers all over the world are working on the technology to make it competitive. Some day we may see many of our hydrocarbon-based processes replaced by renewable feedstocks.

SLIDE 18: Strategies to Address These Challenges

Let's look at the challenge of managing cyclicity. What are our strategies for managing that?

How do we overcome our industry's tendency to overbuild?

I believe the industry must be more disciplined and restrained in adding capacity. We need to have a realistic view of demand, and also understand who else is building.

SLIDE 19: Strategy: Manage Cyclicalities

Even here in China, with high growth and increasing demand, some experts are voicing their concerns about overbuilding and oversupply.

Our markets are global, so we should not allow the demand in China to lull us into thinking that it's impossible to overbuild here. It could happen.

A recent article in Chemical Marketing Reporter stated that if all the crackers that have been announced get approval by Beijing and are built, there could be an oversupply crisis in 2008. Some experts say it could create a trough that's even worse than the one in 1997.

Nine new crackers are expected to start up from 2008-2010 in China alone. And six more are planned in Saudi Arabia for start up in 2008.

I hope we can learn from the past.

SLIDE 20: Strategies to Address These Challenges

Another strategy to cushion the cycles is to form partnerships and joint ventures. And partnering is a strategy that also addresses another one of our challenges – innovation.

Partnerships – whether they are with academia, government research labs or companies – are very valuable. Partnerships can bring access to new technology and new ideas. They also can allow us to share risk and reward. No one company or university can hope to develop or maintain all the capabilities that it needs to innovate. We have to partner. Dow learned the value of partnerships long ago.

For example, back in 1952, Dow formed its first overseas joint venture with Asahi Chemical in Japan. Today we have more than 100 joint ventures around the world.

Dow is forming research partnerships with many top universities, here in Asia and around the world. When you can pair up knowledge in academia and industry, you can create some powerful opportunities.

SLIDE 21: Strategies to Address These Challenges

The most important component in addressing innovation is people. The right people, with the right competencies, in the right places, working on the right things.

Recruiting, of course, is a top priority. There are a lot of talented people out there, and you really need to compete for them. Then, once you have attracted talented people, you have the more important challenges: **orienting, training and integrating** them into your organization, and **deploying** them onto the right projects so they are productive quickly.

SLIDE 22: Strategy: Increase Innovation

One of our areas of focus over the past year in R&D at Dow has been to address the concept of “**critical mass**.” Over the years, Dow had built a lot of small R&D labs in various places around the world. And many of them were too small to really deliver the kind of focused innovation we need ... they were too isolated and didn't have the resources they needed. Innovation comes best when you have a critical mass of people who can collaborate with one another and draw ideas from many disciplines and technology wells. This is why we've consolidated some of our labs, to create a greater sense of community among our researchers.

We also are investing in R&D locations in growth geographies like China. For example, in August, Dow announced plans to build a new R&D Tech Center in China in Shanghai which could house more than 1,000 employees. The Center will include a state-of-the-art research and development (R&D) facility as well as a global information technology (IT) center. The location was chosen because it is close to our customers, it offers excellent infrastructure and it gives us the ability to recruit top talent from across China to Shanghai. Scientists and engineers at the R&D Center will work on market-driven scientific and technological innovations, enhance current product platforms and create the product platforms of the future.

SLIDE 23: Strategy: Increase Innovation

The most powerful innovation is innovation that creates true value as defined by the customer. Everyone is seeking the next blockbuster product or technology. Where will the next blockbuster come from? I'll tell you: it will be something that solves a major want or need of customers and consumers. Customers will pay for the functionality they want. The blockbusters of the future will be products and technologies that will create entirely new categories of their own. To achieve this kind of innovation depends on the ability to **identify market gaps and needs** of significant value ... and **innovate into those gaps**.

SLIDE 24: Strategy: Increase Innovation

Some would say that the reason there haven't been any new blockbuster polymers, fibers or chemicals is that **the world doesn't need them**. They say we already have invented all the materials we need.

I would instead say that we have **many unmet market needs out there**. The challenge is that these needs are so huge that we don't even see them as something we can address. Instead of accepting these challenges as societal issues that can't be solved by science, we need to look at them as market needs. What are some examples of these market needs?

SLIDE 25: What are the Market Gaps?

We've already described some of them:

- Alternative feedstocks and routes that would allow us to create traditional chemical and plastics products from something other than oil and gas.
- Clean water. Water demand in China alone is expected to triple between 1995 and 2030 (source: Insight Investment report). Water needs are far outpacing GDP growth rates.
- Improvements in infrastructure – reliable power, better and more affordable transportation, etc.
- Food technologies that improve diet and health. For example, Dow's METHOCEL dietary fiber, which is made from natural cellulose **could** help fight diabetes. Scientists in Dow and the U.S. government found that adding a few grams of METHOCEL™ fiber to a high-fat diet **slowed fat absorption**, potentially reducing the development of insulin resistance – a precursor to Type II diabetes. More research needs to be done to validate this in humans, but it looks promising so far.

SLIDE 26: What are the Market Gaps?

- Greener products and processes. This is a huge need, especially in developing world. The Challenges in China alone are staggering. Bill McDonough, chair of the China-U.S. Center for Sustainable Development, recently said that: "While Europe has been the driver for innovation in cleaner technologies, China promises to be the market."
 - Products that are designed specifically for the vast number of people in the developing world, who desire a better quality of life. The emergence of the consumer society in developing regions is a powerful force underway.
 - Perhaps the biggest blockbuster of all could be a solution for greenhouse gas generation: the development of technology for carbon dioxide sequestration or emission prevention. Maybe some of you are already working on that.
- Together our nations and our scientists and engineers will work to solve these challenges. After all, our three nations are the world's top investors in mainstream industrial development and innovation.

That leads to the last critical issue I'd like to mention to you today...the poor image of the chemical industry, regulatory pressures, and ever-higher expectations for our industry's environmental performance.

SLIDE 27: Strategy: Improve Performance and Reputation

As we address these needs, our industry and our profession will be seen as being part of the solution, rather than part of the problem.

Negative perceptions about our industry prevent us from growing.

While we've made progress in improving our environmental, health and safety performance, we could do more.

We need to continuously improve our performance, and do a better job of telling our story to the world

Let me share an example from Dow of what we've been working on in what we call EH&S: Environment, Health and Safety. In 1996, Dow publicly announced aggressive, voluntary, global EH&S Goals for the Year 2005. Ten years later, we are getting ready to report some impressive results on these goals. In the interest of time, I'll show you just one example.

SLIDE 28: Strategy: Improve Performance

One of the goals we set in 1994 was to reduce chemical emissions by 50%. We achieved this last year, in spite of increasing overall production by 37% during the same time period. Our engineers and chemists not only reduced our existing emissions, but have implemented technology that allowed production growth without increasing emissions.

All of these accomplishments were driven by chemical engineers and chemists at Dow. Chemical engineering and chemistry are the most prevalent degrees at Dow – we have more college graduates with ChE and chemistry degrees than any other degree.

In fact, the engineering culture really pervades Dow ... it results in a company that's very **pragmatic, practical, efficient, frugal and focused on measurement and continuous improvement**. It's even reflected in our mission statement, which is: "To constantly improve what is essential to human progress by mastering science and technology."

SLIDE 29: Strategy: Improve Performance and Reputation

Another key principle of chemical engineering is managing risk. As we know, our industry is full of hazards. But with the right practices, equipment and technology, we can manage those risks.

One example of this is Product Stewardship. We must work with our customers to make sure our products are used, transported and disposed of responsibly. Dow and many of the companies here have a long-standing commitment to Responsible Care® -- our industry's premier program for improving our performance.

We also must work with our trade associations to shape public policy and regulatory standards, especially at the national and international level. We must make sure that regulations and laws are workable, but also accept the government's legitimate role in ensuring compliance.

I believe our industry and our science hold the key to meeting all the challenges I've outlined today. The chemical industry can be **a catalyst for profitable and sustainable growth, and achieve favorable public perception in the 21st century**. We are an integral part of society and we are part of the solution to the challenges and opportunities that lie ahead.

As you attend all the great sessions planned here in Beijing, I encourage you to learn all you can about how to do things better, faster and more economically with technology, as well as how to develop new products and processes that will keep our industry healthy.

SLIDE 30: "The wise leave the road and find the way; fools cling to the way and lose the road."

As I hope I've made clear, we need your innovation. We look to you to be examples of those who embrace a Chinese proverb that I love:

"The wise leave the road and find the way; fools cling to the way and lose the road."

As you go to your sessions over the next few days, I encourage you to be those wise individuals ... follow new roads ... learn all you can ... and make the chemical industry in the 21st century an industry that meets the world's needs. Thank you and have a great conference.