

Event: **EUROPEAN PETROCHEMICAL ASSOCIATION KEYNOTE ADDRESS**
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Location: Monte Carlo, Monaco
Date: September 25, 2006

Energy and the Chemical Industry: The Future Arrived Sooner Than We Expected

I am honored to be here in a double sense, first to speak before so many experienced and knowledgeable members of our industry, and second, to be part of this distinguished panel of keynote speakers.

Today I am going to cover two items:

Number one, a realistic appraisal of the world's use of energy both now and in the future;

Number two, how we in the chemical industry have a major role to play in shaping a future ... where higher growth is compatible with responsible stewardship of the planet.

First, the subject of energy, starting with the observation, obvious but often overlooked, that energy powers civilization ... it heats and cools our homes, runs our ships, trains, planes and automobiles, our computers, telephones, refrigerators, our hospitals, and of course, our great manufacturing plants. At the end of the day, we cannot avoid the simple fact that energy is the indispensable element of modern civilization.

Now, at a time when whole new regions of the world are taking advantage of unprecedented opportunities for economic growth ... with the promise of greater prosperity more equitably distributed than ever in human history to hundreds of millions of people across the globe ... we need to remind ourselves that this prosperity depends on energy, most of it in the form of fossil fuels.

And that's not likely to change any time soon. By the year 2030, experts estimate that energy use will have grown between 50 and 60 per cent ... and the proportion of fossil fuels in that mix will remain roughly at what it is today ... about 80% ... with the rest divided among nuclear, hydro-electric, wind, solar, geothermal ... and combustible renewables.

And by the way, these projections are based on a relatively conservative estimate of the world's population increasing ... from 6.5 billion people today to 8 billion by 2030 ... a rate of only about 1% a year. Given that the growth rate between 1971 and 2001 was 1.6%, this projection might well be on the low side, and therefore future energy use may actually be higher than now projected.

This increased use of energy ... that nearly all experts agree will continue for at least the next two decades ... is occurring despite the dramatic increases in the price of energy ... and this is something of a departure from the recent past.

For example, during the first oil shock of the early 1970s, when the per barrel price of oil increased from \$3 to \$12, demand fell. In the second oil crisis later in the decade, the price of oil tripled to the mid \$30 range, and demand dropped by 10%. However, during the past four years, prices have gone from about \$20 to \$70. But unlike the oil shocks of the 70s, demand has grown. And what's interesting is that in the industrialized world demand has stabilized at about 50 million barrels a day. But in the emerging economies demand has increased.

This is the classic good-news and bad-news scenario. The bad news is that energy prices are moving higher and higher ... which for those of us in the chemical industry ... in fact for all manufacturers ... increases our costs and puts pressure on our profit margins. In 2002, for example, my company spent \$8 billion on hydrocarbons and energy. This year that number will be well above \$20 billion.

But the good news is what I mentioned earlier: that higher demand for energy in emerging economies is being driven by economic growth ... generating greater prosperity for millions of people ... in China, India and elsewhere ... people whose living standards are moving upwards as their economies grow. And here again, for the chemical industry, that means higher demand and more markets for our products.

So as we look at our future, we see a growing tension between rising living standards on the one hand – which everyone welcomes – and on the other, the daunting prospect of generating and using 60% more energy ... mostly fossil fuels, including a much greater use of coal ... whose known global reserves, incidentally, are estimated to last 165 years, while natural gas is set at 70 years and oil at 45 years.

Coal, of course, is the least clean-burning fuel. It is also the one that is in great abundance and located in some of the world's largest and most robust economies; namely, China, India and the United States. Within the next two years, China alone is slated to build 168 traditional coal plants.

We are already – right now – concerned about climate change and other challenges to the earth's eco-systems. Given the increase in the use of fossil fuels that we are facing ... and adding to that the greater use of coal ... we have reason to be even more concerned about the future health of the planet, particularly in the area of global warming.

Essentially the question is, do we achieve greater and more equitable prosperity at the risk of the planet's health ... and therefore our own ... or do we deny economic prosperity to hundreds of millions of people in order to safeguard the environment?

Well, realistically speaking, we have zero chance of denying economic prosperity to the world, but I think we have a fair chance of getting the best of both worlds ... prosperity and environmental stewardship, but it's going to require a global consensus on the use of energy that we do not have at the moment ... in fact, that we are nowhere close to having.

Let me briefly describe what that consensus must involve.

The first step is energy efficiency, which is the most important of our short-term options. Energy efficiency begins with the notion that the cleanest, most reliable and most affordable source of energy is energy saved. It's the energy we don't use that saves us the most, pollutes the least, and probably most importantly, is actionable by everyone ... homeowners, industrial users, offices and retail stores, and transportation.

Greater energy efficiency across the board means, of course, pursuing the "usual suspects" of conservation; for example, power plants that use fuel more efficiently ... and cars that do the same. It means doing all of the little things that are well within the power of ordinary people ... better insulating our homes, turning off the lights when we don't need them, using public transportation, to name just a few. It means running our great manufacturing engines more efficiently. Just as energy efficiency shows up in large numbers on the bottom line of companies like ours, so it will also show up in the household budgets of million of people.

But the economic incentives may not be enough. Essential to conservation and efficiency is government support ... by which I mean all governments, including those in both the industrialized and industrializing worlds. This support includes but is not limited to:

- * Education and outreach programs to motivate consumers to save energy ... and here I think Europe is setting the standard for the world;
- * Funding for public and private sector R&D programs dedicated to efficiency and conservation;
- * Implementing and enforcing standards of efficiency in all sectors: residential, industrial, commercial and transport;
- * And providing real incentives – including tax incentives – for efficiency and conservation.

And as I say, leaving conservation to laissez faire economics will probably not get us to where we want to be. There must be some form of government intervention.

In addition to conservation, we must also place much greater emphasis on the efficient deployment of our energy resources ... and this is an area that is sometimes overlooked by policymakers.

For example, in both the United States and here in Europe there has been, in recent years, a decided tilt towards the use of natural gas ... and for very good reasons ... natural gas is a clean-burning, environmentally friendly fuel, both abundant and inexpensive. But the unintended consequence of that preference, combined with a number of other factors ... including static or declining supply, insufficient competition, poorly-timed market liberalization ... has caused natural prices to dramatically increase ... squeezing our industry's profit margins and also threatening to further de-industrialize both Europe and the United States.

The natural gas situation highlights the importance of both diversity of supply and security of supply to the overall energy challenge, particularly in the large mature economies. The problem requires both the public and private sectors to take a thoughtful look at the issue ... and examine whether we are matching the right fuel to the right use.

For example, is nuclear power being used to its fullest potential, in the way, for example, that countries like France use it? Is there, after all, an inordinate fear of nuclear power? And is there a serious effort being made to educate the public on the ramifications of poorly deploying energy, both in economic terms and in geo-political terms? And are we making a consistent effort to increase, over the long term, the use of alternatives like biomass and solar power ... or do those alternatives tend to ebb and flow with the price of conventional fossil fuels?

No one is more aware of the issue of energy deployment than the governments of emerging economies, who are putting in place measures to minimize their "addiction to oil" and to maximize the added value of various sources of energy ... with an eye towards the effective deployment of coal and nuclear in the short term, and later on, biomass and renewables.

And speaking of government – I cannot leave the subject of energy and environmental stewardship without saying a word about Kyoto. I know it is easy to criticize the Kyoto protocol, and the agreement is without a doubt flawed. But it is also most certainly a significant achievement in that it took on an immensely difficult task: bringing together the governments of the world to solve a long-term global problem. In that respect Kyoto was a success. And probably its single greatest success, although also flawed in some ways, is the development of market mechanisms to control carbon emissions, and here once again, Europe has led the way.

Now the task before us is to build on Kyoto and here, without going into a grand plan, I would suggest two basic principles for future progress:

Number one, that all countries participate to some degree.

Number two, that each country sets targets to produce more energy from carbon-free sources ... putting people and technology to work in a way that would create opportunities in every country and every region.

So with that overall framework in mind, let's look specifically at our industry ... how energy is affecting us and the role we can play in reconciling the tension between growth, greater energy use and the health of the planet.

First, there's the practical matter of production. Given the likelihood that energy and feedstock costs will remain high by historical standards, there is every reason to believe that productive assets will continue to gravitate to regions that offer advantaged feedstocks ... namely, the Middle East and Asia. That means that in the short term, some owners of oil and gas – whether private companies or state-owned enterprises – will forward-integrate using conventional technology.

It also means the emergence of more partnerships. Dow, for example, is teaming up with partners who offer lower-cost feedstocks and local expertise ... as we in turn offer technology, know-how and access to our global customer base. The combination makes sense in that a partnership brings together strengths that neither partner can offer alone, while at the same time lowering risk and reducing capital intensity for both.

Meanwhile, over the medium term, by which I mean 5 to 15 years, we in the industry are likely to see a breakthrough in olefins, with the commercialization of technology that produces olefins directly from methane ... which will enable greater utilization of both coal and stranded natural gas.

Over the long-term, say 15 to 30 years, we will probably see a further breakthrough involving the use of biomass as a feedstock. This, by the way, is already underway; Dow, for example, produces a differentiated polyol product from soybeans. And the use of plants as feedstocks means that bio-engineering will have a major role to play ... genetically altering plants to enhance the performance of the end-use plastic or chemical.

As I draw these timelines around these projected breakthroughs, I am mindful of the subtitle of my remarks ... the future almost always arrives sooner than we think. So it would not surprise me if these breakthroughs arrive sooner rather than later.

Finally, let me offer some thoughts on the role of our industry in this brave – and somewhat daunting – new world of higher growth and higher energy use. First and foremost, we need to remind ourselves that we are an essential industry ... a \$2 trillion enterprise that supports virtually all others.

Over 95% of the things that touch our lives every day ... from a glass of water to a tube of toothpaste ... to the clothes we wear, the food we eat, the computers and telephones we work with ... the cars we drive ... the medicines we take ... all of these things are made possible by the science of chemistry and the products that are derived from our industry.

So to the question, asked in some circles, “Do we need chemicals?” the only rational answer is, “We cannot do without them.” ... and that means today and tomorrow and many more tomorrows. Our science ... our researchers ... in our companies and in our universities ... still have much to offer the world, although those educated in science are increasingly being found in places like India and China ... and less in Europe and the United States.

But wherever the expertise is found, the salient point for the petrochemical industry is this: We can help.

In fact I would say we can lead the way.

We are, after all, not like other basic industries, dependent on a single material like steel or wood. We are about molecules ... re-arranging and manipulating them to create new materials and new technologies that can have a direct impact on energy efficiency ... such as lighter-weight cars ... or filters that make diesel fuel run cleaner ... or breakthrough manufacturing processes like those I’ve just mentioned using methane or bio-materials.

As this audience is well aware, our industry is one of the world’s largest and most intensive users of fossil fuels. It is now clear that the world’s climate is being impacted by increases in greenhouse gases, of which CO₂ is the single largest component. And reasonable people agree that although global warming’s effects are difficult to predict in any exact measure, it most certainly has the potential to generate catastrophe for future generations, if left unchecked.

Some have said our industry’s intense appetite for fossil fuels disqualifies us from being part of the solution. On the contrary, no industry is more acutely aware of the need to reduce our dependency on oil and natural gas than ours.

In other words, we can lead the way on energy because we have to.

In fact, we have already taken some important steps. From 1996 to 2005, for example, we at Dow cut our consumption of energy per pound of product by more than 20 percent ... which required an investment of \$1 billion, but returned \$4.4 billion to the bottom line ... a classic case of “doing well and doing good.” And, over the next ten years, we are confident we can improve our energy efficiency by an additional 25 percent.

With greater efficiency and a commitment to burning cleaner fuels, we are also pledged to reduce the intensity of our company’s greenhouse gas emissions by 2.5% annually between 2006 and 2015. Because of our scale, that step alone will reduce CO₂ emissions from the equivalent of 3 million automobiles or 6 million homes over this time period.

But having said all that, we cannot be content with focusing only on our own energy and greenhouse gas footprint. We must engage others, sharing our technology and know-how with our customers and our partners wherever we do business.

Recall that two decades ago, our industry embarked on the Responsible Care movement ... putting in place goals and processes for the safe management of chemicals. And we have made tremendous strides. Today we are among the safest of industries, safer, for example than retailing.

We at Dow are now expanding our commitment to the much broader realm of sustainability, including not only the energy issue, but other challenges:

- * The challenge of sustainable water supplies.
- * The challenge of an adequate food supply.
- * The challenge of decent housing.
- * The challenge of personal health and safety.

We will become fully engaged on these four challenges — water, food, housing, health — because we have the resources and technology to make a genuine difference . . . and we believe that our entire industry has similar resources ... and similar responsibilities.

To be a successful, thriving industry, we need economic growth ... throughout the globe ... we need a healthy environment ... we need a stable and secure political climate and we need the trust of our customers and our communities.

If any of these is missing, we ourselves are at risk, because in the end, our license to operate depends on the approval and the permission of the societies where we produce and sell our products. In other words, we must do our part to set the stage for a future that is just as full of promise and opportunity as our past has been.

So to the question, what is the impact of energy on our industry, my answer is ... “We don’t know yet ... at least, we don’t have the complete answer, because it depends on how we respond.”

But there are a few things we do know.

We know that energy is the sine qua non of economic growth.

We know that fossil fuels will comprise the lion’s share of energy for the foreseeable future.

We know that energy costs are squeezing our margins.

We know that those costs, over the long-term, will remain high.

We know that, as a result, the industry will continue to migrate assets to regions with access to low-cost feedstocks and energy.

We know that some oil companies will expand into chemicals and some chemical companies will seek partnerships with oil companies.

We know that conservation and diversity of supply are key to the efficient use of energy and that alternative sources like biomass and solar would change the equation in our industry, if feasible on a large-scale basis.

We know that a large increase in greenhouse gases is gambling with the future of the planet, and poses too large a risk to be left unaddressed.

And finally, we know that our industry can play a large role in resolving the conflict between energy, growth and the environment.

What we don't know is exactly how all of this will play out.

Certainly, we don't have all the answers ... no one does ... but we do know the unlimited possibilities that the science of chemistry offers ... those elements of the periodic table that we memorized so long ago ... they are still there for us to discover and to invent new and better ways to use chemistry.

If we can apply the ingenuity of the most important element – the human element – we can solve the problems that confront us. But it will require the efforts of all of us in the private sector as well as the cooperation of our governments. This won't be easy, but it is not impossible.

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