IYC 2011 Opening Ceremony
Paris, France

Sustainability Through the *Wonders of Chemistry*

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January 27, 2011

PROUD PARTNER OF INTERNATIONAL YEAR OF CHEMISTRY 2011

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Wonders of Chemistry

I'm truly delighted to be here today … in my homeland … at the launch of the International Year of Chemistry … speaking on a subject I feel so strongly about – the potential of sustainable chemistry to reframe our future. And I'm even more delighted to be here as we kick off a yearlong celebration of this amazing science. Vive la Chemistry!

There has never been a more exciting or challenging time in human history to be in our industry. The world needs us, and the *wonders of chemistry*, more than ever. To ensure we have access to safe and abundant ***water*** to drink. To guarantee our ***food supply*** is plentiful. And to ensure we *all* have access to safe and affordable ***energy*** to power our homes and move our commerce. And yet, supplying these needs has become increasingly difficult, as the global population has exploded – more than tripling in just the last 100 years alone.

The answer rests, as it has for generations, with chemistry. But as the pace of innovation accelerates to keep up with these world needs, so too does the urgency for sustainability.

As you've heard from others today, this year marks the 100th anniversary of Marie Curie's Nobel Prize in Chemistry. But

Madame Curie wasn't just smart about science – she was smart about people. She said, **"One never notices what *has* been done; one can only see what *remains* to be done."** These words ring truer today than at any other time.

Consider these sobering statistics: Today, one in eight people in the world lacks access to safe water supplies. 925 million people suffer from hunger. More than 25 percent of all children in developing countries are estimated to be underweight or stunted.

And the challenges will only grow tougher. By 2050, there will be three billion *more* people in the world than there are today. That means three billion more people *sharing* our natural resources. Three billion more people *adding* to our global footprint. Three billion more people with the *basic human need* for clean water, accessible energy and healthy food.

And let's be honest… Many of those people will be expecting much more than the basics. Already today, for the first time in history, the middle class population of the world accounts for more than half of the total – roughly 60 percent, up from about 40 percent in 2000. Think about that for a moment.

This new middle class—much of it in developing countries—will demand a quality of life that many of us have enjoyed for

decades: comfortable housing, well-maintained schools, high-quality health care, modern communications and entertainment, and convenient transportation. Think about it – from China to Chile, Vietnam to South Africa, U.S. to Europe … billions more people expect to live a comfortable life and leave a better world for their children.

But meeting these needs poses enormous challenges, as resources are stretched thin and environmental concerns grow.

There are some who say that the only way to prevent future disaster from an increasing population and finite resources is to simply apply the brakes. Limit growth. Just stop the trend of consumerism. There are some who prefer to simply wind the clock back.

Sure, that would be easy for you or me to say as we sit in this beautiful room and eat our fabulous dinner, and talk on our mobile phones before we climb into our cars or taxis or planes at the end of this launch ceremony. We already have what we need.

But what about those regions of the world that are just starting to develop? What about those "have not's" who have worked long and hard to raise their family's quality of life? Are we to deny

them the same advantages, the same conveniences, the same access to clean water, safe food, and reliable energy—all the things that we have? Certainly not!

Even if turning back the clock were possible, stopping the pace of human progress is not. Change *will* happen. People will continue to seek out new ways to better their lives … as well they should.

But how can we keep up when resources are limited? To me, this is where chemistry really shines.

The world *demands* our kind of science. It needs *sustainable chemistry* to address these new challenges. It requires *creative ideas* to provide the kind of products and performance people expect with less impact on the environment. And history has shown us that when we put our minds to it, chemistry can deliver *amazing* things:

- Lightweight, durable, and flexible—the protective properties of plastic make it one of the world's most sustainable performers in delivering environmental, economic, and social value. When we talk about safe **food** supplies, new advanced food packaging and unique, breathable barrier films can seal fresh fruits, vegetables and meats and protect them from bacteria, extend shelf-life, and reduce spoilage.

Two pounds of plastic delivers the same amount of liquid as 3 pounds of aluminum, 8 pounds of steel, or 27 pounds of glass. And today's advanced packaging technologies save fuel and transportation costs—it takes 7 trucks to deliver the same number of paper bags that 1 truck of plastic bags can carry.

- And speaking of the protection of food, the wonders of chemistry have helped make that **food** healthier. New cooking oils that are virtually free of trans fat, extremely low saturated fat, and high in heart-healthy monounsatured fat are on the market today thanks to the wonders of chemistry. In the U.S. alone, Dow's Omega-9 Healthy Oils have eliminated some 800 million pounds of trans fat and nearly 200 million pounds of saturated fat from North American foods.

- When it comes to the *availability* of a safe, abundant food supply, chemistry is leading the way. Many of today's most advanced insect control technologies are favored by farmers around the world because they're effective, with the absolute minimal impact on the surrounding environment. There are insect control products on the market today that are derived from *biological organisms* that fight a broad spectrum of insect pests in a variety of crops. Some of

these products even naturally degrade through U.V. light and soil microbes.

- Turning to **energy**, we all know the story. Everyone needs it. Power hungry electronics demand it. And with earth's population growing dramatically in the coming decades, billions more people will expect it. Traditional sources of energy will continue to play a part, but it won't be enough. Chemistry must come up with new solutions. And it is. The solar story isn't new, but today's approaches are. At Dow, we have taken bold steps to develop the first-ever, mass-market building integrated photovoltaic solar panel that seamlessly integrates with roof shingles. Standard roofers can install these innovative POWERHOUSE™ solar shingles on almost any home in America—making solar power more affordable and accessible for the masses. In addition to their innovative design, the energy generation core of the POWERHOUSE product is a smart choice as well. The CIGS-based solar cells have the highest efficiency of thin-film technologies … and they consume far less energy to produce … all without compromising production cost.

- There are many remarkable examples of how the wonders of chemistry are answering the call for real sustainable **energy** solutions. New heat transfer fluids that collect, transport,

and store solar heat that's efficiently converted into electricity. Just three solar plants can power 90,000 homes and prevent 350,000 tons of carbon dioxide from releasing into the atmosphere vs. traditional fuels. And let's not forget lithium ion and other technologies that are swiftly driving the automotive industry into a new generation of clean energy propulsion systems. Chemistry, automotive, and electronics companies are working hard to collaborate and advance this exciting area.

- **Water** is essential to human life, and yet so much of it is inaccessible or undrinkable. Every day, lack of access to clean water and sanitation kills thousands. In fact, I saw a statistic that said ancient Romans had better water quality than half the people alive today. We must do a better job, and with the wonders of chemistry, we can – and are!

- New high-performance *Reverse Osmosis* membranes are making desalination of seawater a more affordable and energy-efficient option for water-stressed regions. In the last few years, 40 large membrane seawater desalination plants have come on line around the world, each producing more than 50,000 cubic meters of clean water per day.

- *Ultrafiltration* technology removes bacteria, viruses and other harmful matter from groundwater, keeping it safe for

public consumption. This technology also plays a key role in water recycling for agriculture and industrial applications.

- *Ion Exchange Resins* are essentially chemical sponges, removing man-made and natural contaminants from ground water. These resins also remove trace impurities from chemical processing, helping companies improve product quality and lowering their impact on the environment.

- Those of us in the chemical industry love to talk about our technologies and products that improve the quality of life. But too often, we don't talk enough about how we apply the wonders of chemistry to lower our company's carbon footprint … to shrink the impact of our production processes on this great earth.

- At Dow, we've jointly developed advanced amine technology with Alstom to capture carbon dioxide from new or existing facilities. Carbon capture and sequestration reduce green house gas emissions from coal combustion, which represents 40 percent of the world's power generation. One large-scale facility in Europe is being designed to capture 1.8 million tons/year of carbon dioxide. That's at just one facility!

- We've also implemented new flare technology that uses hydrogen instead of more costly methane to eliminate waste

gases, thus reducing costs and green house gas emissions. Now this may not seem like a big deal, but there are thousands of flares used to deal with waste gases at companies around the world. The initial implementation at just a *few* selected Dow sites has helped us reduce our energy costs and *lowered* our carbon dioxide emission to the equivalent of taking 8,600 cars off the road.

These are but a fraction of the examples of what great chemical companies, research organizations, academia, and many others are developing.

But with all that we've done for decades, and especially over the last several years, the question remains: Is it enough?

Enough to meet the needs of the three billion additional people who will be citizens of Earth by 2050? Enough to meet their needs in a smart, sustainable way?

In Madame Curie's words – "…one can only see what *remains to be* done." And I think we all know the answer … much, much more is needed.

But none of us can do it alone. We must pull together the right people in the right places for the right purpose. Few industries have the power to convene like the chemical industry.

To me, the energy and excitement of IYC 2011 stems from *convening* the best minds from industry, governments, academia, NGOs and others to solve world problems. This event – and this year – should be *just the beginning* of bringing together people … who can collaborate to make a meaningful, positive impact on our world.

In a business panel discussion during the opening days of last year's UN Climate Change Summit, Mexican President Felipe Calderón spoke about how business, government and society need to work together on energy and climate change solutions that will increase efficiency, improve life and protect the environment.

Dow has taken this mandate to heart. For example, we collaborated with BASF to develop a Hydrogen Peroxide to Propylene Oxide technology that reduces wastewater by 70 to 80 percent and energy use by approximately 35 percent, compared with existing PO technology.

And we collaborated with Nalco Company to implement an innovative technology that saves one billion gallons of fresh water each year at Dow's largest production site.

Sustainability pulls us all together. It transcends generations and geographies. Cultures, governments, and ideologies. Because at the end of the day, sustainability impacts every one of us on a very personal level. It's about our own well-being; it's about the welfare of our children and our grandchildren; our families and friends; and it's about the future of our human race. We may disagree on *how* to fix it, but it is clear that no one can fix the problem alone.

In collaboration with our customers—and by the way, that's another very important constituent in the sustainability story … what our *customers* are telling us and asking for is a critical part of the equation. And trust me, many of them ***ARE*** asking for sustainable solutions, but with the provision that we maintain performance in accordance with what consumers demand.

As I was saying, we're collaborating with our customers to develop breakthrough *coatings* that not only have ultra-low odor and VOCs, they actually clean the air!

That's right! A paint that scrubs the air of formaldehyde, a gas typically emitted from new furniture, carpets or cabinetry. Just imagine the possibilities if we could take this technology another step forward, and develop an active paint that could eliminate flu viruses or trap other airborne pathogens!

This kind of sustainable chemistry comes from thinking big and differently – from looking beyond the short-term problems in front of us to the larger challenges facing the world. That's what the chemical industry and Dow does every day.

In fact, sustainability is part of our company's mission – *"To passionately innovate what is essential to human progress by providing sustainable solutions to our customers."*

You see, we don't view sustainability as a shackle to our business, or something that simply adds costs. We see it as an opportunity – and a challenge. And I don't know a chemist, or material scientist, or a physicist who doesn't love a good, tough challenge.

After all, chemistry is not about finding *easy* answers. It's about uncovering the truth. To find the *right* answers to seemingly impossible problems.

"A scientist is not a person who gives the right answers; he's one who asks the right questions." These are the words of French anthropologist Claude Levi-Strauss, and he could not be more correct.

Let's start asking the right questions. Let's look beyond the issues of today and focus on the needs of tomorrow. Let's open the dialogue to explore unimagined answers, to think about solving the unsolvable.

If you need inspiration for this challenge, let me tell you about something I found that fundamentally changed my world and my way of thinking. It is so important to me that I keep it by my bedside and read it nearly every night. I recommend it for all of you. It provides comfort; it provides inspiration; and more than anything, it provides hope (pause).

I'm talking, of course, about the periodic table of the elements… that magical chart of elements that make up everything on Earth. There are just 118 elements, but the combinations are as limitless as the stars – especially when combined through the ingenuity of what we at Dow refer to as the 119th element – the Human Element.

There has never been a more exciting time to cheer for chemistry and those 118 elements—whether you're a professor, a student, a scientist, an NGO, a government official, or frankly anyone involved in our industry. The world is counting on us.

Ladies and gentlemen, this is a defining moment – the year that Chemistry shines, gains the respect it deserves – and as a result, fosters even greater positive change for sustainability, for protecting our planet, and for meeting the needs of people around the world.

Let's make this year count! I hope we will all leave here today committed to doing more … to doing our share in the spirit of IYC.

For students and those of you in academia – Dream big! Follow your curiosity, and inspire it in others so that the world will continue to find new solutions—sustainable and responsible—through the *wonders of chemistry*.

Business leaders – Let's work together for the sustainability of our companies, of the industry and most importantly, of the world. Compete as appropriate, but collaborate whenever you can to ensure a better environment for all. Share your expertise and experience with leaders in newly emerging regions – help them learn faster the lessons we learned the hard way. Help them achieve the highest and safest standards of operation as quickly as possible. And above all, let's lead with our actions.

For the advocates and policymakers here – continue to push the envelope and the industry to accept what's best for us all. But

be realistic and respectful. Remember, our companies are made up of real people, with families, like you, who care just as deeply about ensuring a healthy community and a safe and prosperous world for generation to come.

And finally, for all of us, let us be vocal … excited … and *PROUD* to share the message of chemistry and its role in solving today's toughest challenges for clean water, healthy foods and clean, safe energy.

Join me in celebrating the *wonders of chemistry*. Vive la Chemistry!

Thank you.