

“Capturing the Full Potential of Alternative Energy”

Lois Quam

Incoming Managing Director, Alternative Investments, Piper Jaffray

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Thank you, Dr. Davis-Blake. I had the chance to meet a number of you this morning over breakfast and *my* favorite form of personal alternative energy – a cup of strong, hot tea... green, of course, to go with the theme of this conference. I look forward to getting to know more of you in the days and months ahead.

I'm very pleased to have the chance to speak before so many distinguished science, academic, policy and business leaders about a topic so essential to the lives of all of us and of future generations, here in the Americas and around the world.

We have a number of international dignitaries here this morning whom I want to recognize and welcome, including Dr. Miguel Dabdoub, President of the Biofuels Chamber of the São Paulo Government, Brazil; Dr. Roberto Dobles Mora, the Minister of Environment & Energy, Costa Rica; and, from Chile, Dr. Hugo Altomonte, Senior Economist and Chief of Natural Resources and Energy at the UN's Economic Commission for Latin America and the Caribbean. We are honored that leaders from some of the most important countries in the world in terms of biodiversity and biodiversity conservation are joining us.

As a native of Minnesota, I'm also very delighted that this conference is being hosted by the University of Minnesota, which has played such a historic role in developing breakthroughs in medicine, science, agriculture and other areas of international significance.

From Norman Borlaug's Nobel Prize-winning work to develop disease resistant crops, which sparked the “green revolution” in the 1970's... to the groundbreaking research being done today by Professor David Tilman and others on converting prairie grasses into renewable biofuels and beyond... this campus is a symbol of the dramatic contribution that world-class science – and scientists – can make to society.

The University also had some wonderful news just last week. Professor Emeritus Leonid Hurwicz was awarded a Nobel Prize in Economics for his work on mechanism design theory, which explores how to make negotiations and regulations work effectively in complex situations. As the Star Tribune recently reported, this theory was used in the

design of the acid rain emissions trading program¹, the forerunner of what many economists today generally accept as a primary solution to climate change – a steadily lowering cap on emissions and the creation of efficient and transparent carbon markets.

As Dr. Davis-Blake mentioned in her introduction, in recent months, I left UnitedHealth Group, where I'd spent nearly two decades working on health care – developing and bringing to scale businesses that were socially responsible and profitable. Yes, a business can be both – and increasingly must be both.

Soon, I'll be starting my new job at Piper Jaffray, the leading clean technology equity underwriter, where I will be responsible for alternative energy and health care investments.

I made this move for two reasons. First, there is no issue of greater importance today than preventing the most dangerous consequences of climate change and biodiversity loss – no other generation has ever faced a global crisis of this magnitude. To have an impact, we must find better energy solutions – and the way to do this is to explore and invest in clean energy and technology.

I saw many parallels between alternative energy development and health care – both require launching and rapidly growing new businesses, linking science to producer and consumer incentives, and creating private and public sector alliances... and I wanted to bring to bear my experience and personal commitment to the challenge of our time.

Second, I wanted to work at Piper Jaffray. As many of you may know, Piper Jaffray has an excellent record of identifying new and emerging opportunities in the marketplace, like clean energy, and creating dynamic ways to connect entrepreneurs and investors. In fact, just recently, I had dinner with a very successful clean energy entrepreneur who told me that when he started out 25 years ago, he knocked on many doors – and Piper Jaffray was the only firm that would talk to him. Piper Jaffray also has the important advantage of being based in the Midwest, the focal point of so much alternative energy exploration, in particular, biofuels and wind.

Today, I'd like to share my thoughts on our current efforts to address climate change and how they create both an obligation to act and an opportunity to pursue. An obligation because our very future could rest on our actions to develop new science, business and policy solutions – and an opportunity because these solutions will require vast innovation and scale, creating unprecedented potential for businesses and investors.

I will also talk about some of the principles involved in driving this change, and how we can make sure we can capture its full potential.

This conference comes at a pivotal point. Earlier this year, the United Nation's Nobel Prize-winning Intergovernmental Panel on Climate Change stated that evidence of climate change is now "unequivocal," and that most observed temperature increases are

¹ Minnesota Star Tribune 10/15/07

very likely due to greenhouse gases produced by human activity² -- mainly the burning of fossil fuels.

And the impact of climate change appears to be intensifying by the day...

For example, the Arctic ice cap is currently melting at a faster rate than scientists had predicted, and we are at a point where scientists and eyewitness explorers, like Minnesota's Will Steger, are re-evaluating the situation fundamentally based on the melting of ice this past summer. At the recent Clinton Global Initiative meeting in New York, which I attended, estimates of exactly when the reduction of Arctic ice will have broad-based and dramatic consequences varied between 12 and 45 years.

Conserving biodiversity is also a major concern, and as G8 leaders stated earlier this year³, is critical to vital ecosystem services and to the sustainability of the global economy. Here, too, the news is disconcerting. At the Nobel Conference at Gustavus Adolphus College a few weeks ago, NASA's James Hansen warned that business-as-usual warming could result in the loss of 25 to 50% of all plant and animal species. He insists that it is still "technically possible" to keep species extinction below 10% -- but that is still a vast price to pay for our delayed action.

The truth is no one knows precisely what the future consequences of global warming and biodiversity loss will be, but we do know that much will depend on how much -- and how quickly -- we act.

Governments invest heavily in areas such as defense spending to deter and protect themselves from crises like military conflicts. Businesses spend billions every year on risk management. However, despite the disturbing and mounting evidence, we have yet to see this kind of comprehensive commitment to our environmental challenges at a national and global level.

As governments, businesses and individual citizens, we have an obligation to act now and to act forcefully.

There are some important signs of progress, including the rigorous international dialogue now taking place. Examples include this very conference, and the upcoming United Nations Climate Change Conference in Bali this December. In addition, the United Nations Convention on Biological Diversity, which was signed at the 1992 Earth Summit along with the Convention on Climate Change, will meet in Bonn next year to examine progress towards its target to achieve, by 2010, a significant reduction in the current rate of biodiversity loss.

There are also individual nations that are leading the charge. As a Norwegian-American, one notable example is Norway's innovative carbon tax on petroleum production, which was introduced in the early 1990s. Due to that move, Norway's continental shelf is now

² "Climate Change 2007: The Physical Science Basis Report," 02/06/07

³ The G8 Summit Declaration "Growth and Responsibility in the World Economy" issued on 6/07/07

the most energy-efficient petroleum producing region in the world, with carbon emissions less than one third of the global average.⁴

However, as we all know, there is much more that can and must be done.

To contribute to energy conservation efforts, businesses must view combating climate change as an imperative and take definitive steps to curb their energy consumption.

For example, as the Wall Street Journal recently reported, the International Energy Agency has found that energy use in heavy industry could be reduced by 18 to 26% just by applying best practices and available technologies. That savings is equivalent to about one and a half times Japan's annual energy needs.⁵

There is also example after example of how changes at the consumer level can dramatically impact energy use, as well.

For instance, the Alliance to Save Energy, the Natural Resources Defense Council, Philips Lighting and others are calling for new policies to encourage consumers and businesses to switch to advanced compact fluorescent light bulbs and other energy-efficient lighting by 2016. Such a move they say would save \$18 billion annually on electricity bills and save an amount of lighting energy equivalent to the power generated by 30 nuclear power plants⁶.

But while the gap between where we are and where we need to be can seem daunting, it should be seen as an area of extraordinary, unprecedented global potential – in other words, an opportunity.

The change required to combat climate change and conserve biodiversity will create a change in business and society similar to the Industrial Revolution. The new energy realities require nothing short of an energy revolution, a thorough retooling of our energy economy in ways that match up with the realities of the 21st century. It will affect every aspect of daily life and business, creating an immense set of opportunities for investors, businesses and individuals.

The numbers are compelling:

Last year, renewable energy and energy-efficiency industries generated nearly \$1 trillion in revenues in the United States alone and employed 8.5 million workers, according to the consulting group Management Information Services.⁷

For investors, there are highly diverse and immense opportunities to create and scale new sources of energy, adapt our current methods of production and improve daily life in ways that drive down global warming emissions.

⁴ "Perspectives on Foreign Policy and Energy" speech by Norwegian Foreign Minister Jonas Gahr Støre 6/18/07

⁵ The Wall Street Journal 8/27/07

⁶ Alliance to Save Energy press release 3/14/07

⁷ Management Information Services, Washington, D.C.

In fact, we are already seeing investment in this area expand at an explosive pace:

Research from Piper Jaffray found that investment in innovative clean energy technologies grew to more than \$70 billion in 2006. That's an increase of 43% over the previous year⁸.

And the interest in renewable energy will surely only keep growing as public support continues to increase. An example is the National 25 by '25 Alliance, backed by organizations such as the National Wildlife Federation, which is calling for 25% of U.S. energy to be renewable by 2025.

In other emerging industries, rapid growth and competition usually lead to a shake-out, where often only the top few players, and the top few business models, survive. But many, including myself, believe the clean energy industry will be different. There will be no single solution to the energy crisis. Instead, the most likely scenario will be a combination of energy and efficiency options... from capturing and storing carbon emissions; to enhancing the fuel economy of our cars; to pursuing new ethanol opportunities, such as the production of cellulosic ethanol made from non-food biomass; to utilizing wind and solar power and beyond.

According to Princeton researchers Robert Socolow and Stephen Pacala, this kind of diverse and coordinated "wedge" approach could have a profound impact... and could even have the potential to lower carbon emissions 50% over the next fifty years⁹.

It will also create unprecedented depth and breadth of opportunities for businesses and investors. Some have compared the clean energy market to the halcyon days of the Internet. I disagree, clean energy is a bigger opportunity, and it's a constant opportunity. While the Web has had a profound effect on our business and way of life, clean energy – and its ability to help combat climate change – will directly impact every person on the planet. And, unlike the Web, which conceivably could be replaced by new disruptive technologies in the future, clean energy will always be in strong demand... the world will always have massive energy needs, and they will always have to be balanced against the needs of the environment. Instead of Moore's Law, the clean energy industry is fueled by the laws of nature – and there is no force as powerful or promising.

But in order to take full advantage of this potential, we will have to be mindful in our approach.

I want to return, for a moment, to the parallels I mentioned earlier between health care and clean energy,

⁸ Piper Jaffray

⁹ Pacala, S., and R. Socolow, 2004. "Stabilization wedges: Solving the climate problem for the next 50 years with current technologies." *Science* Volume 305: p. 968-972.

Several years ago, the British Medical Journal ran a series of articles on a topic called “complexity theory” – the concept that the intricacies of the human body and human systems are so vast that unpredictability and paradox are ever present. In order to effectively cure an illness, therefore, doctors must use scientific evidence and then continually adapt because surprises – unintended consequences – always occur¹⁰.

Our environment is even more complex, and, I believe, addressing its many issues requires approaches that are as deliberate as they are daring.

There are three principles often used in shaping health care decisions. I think they offer meaningful context here, as well.

The first is – Listen to the science wherever it leads. For example, as we are all aware, there is a body of scientific evidence that finds that ethanol production does not provide the level of carbon emissions relief that is important. It’s critical that we take the steps to ensure that we produce alternative energy in ways that are clear improvements over fossil fuels.

Some ethanol producers are taking action, for example, exploring new methods to lessen the use of fossil fuels in the production of corn-based ethanol and to develop new biofuels. There is work to be done, but it is encouraging. And it’s an example of how challenges often produce entirely new opportunities.

Second – Change nearly always places inequitable burdens on the disadvantaged. We should be intentional about the impact of new forms of energy on the most vulnerable around us – fragile ecosystems and the poor. The way to do this is through deliberate action – creating better policies and business practices – and constantly being aware of our impact on vital issues, such as food supplies and biodiversity.

A third principle I learned in health care: Solutions require committed governmental action, but business shouldn’t wait for a clear answer from government before aggressively pursuing the opportunity.

National governments and international bodies should take actions to drive comprehensive change. As government sets clear rules this will enable new market structures to drive carbon emissions inexorably down, capital markets will do what they do best. They will drive innovation and create great new prosperity finding the best ways to achieve that clear goal.

However, business should not wait for government certainty. I learned this in health care, particularly working in the dynamic Medicare setting. If we had waited for certainty, we wouldn’t have created improved services for individuals and large successful businesses.

¹⁰ “Complexity Science” BMJ 9/15/01, 9/22/01

Business, in situations of uncertainty, can invest in diversified strategies and manage their offerings and investments to be highly responsive to a changing environment. Certainty is a luxury desired, but rarely afforded.

One example is Toyota Motor Corporation's success with hybrid cars. While most car companies in the United States were resistant to the idea of doing things differently, Toyota took the more risky – and courageous – path. It made big investments in hybrid technology, and developed an extremely useful new product, even though there were no guarantees that the public would embrace it.

But they did, and Toyota strengthened its brand, delivered terrific value to its shareholders and employees, and reported higher sales last year while GM and Ford's sales declined.¹¹ In fact, to date, Toyota has sold more than one million hybrid cars worldwide.¹² And, by the way, Minnesota is one of the fastest growing markets for hybrids.¹³

And there are countless other examples of businesses and investors who are aggressively developing or investing in clean energy technologies. A few years ago, a question commonly asked was, how big is the opportunity in clean energy?

Today, there is no longer any doubt: it's massive. Now the question is, which companies, entrepreneurs and investors will be innovative enough, fast enough and bold enough to seize it?

I think I see a few hands going up in the audience. I'll talk to you later.

A final parallel between health care and clean energy: Here in the United States, both issues have been on and off the front burner numerous times over the past few decades. But now both have reached a critical inflection point where meaningful change – in policy, business and investment approaches, and individual habits – simply must be effected.

How we respond to problems like these will shape our century. As leaders in science, business and policy, it's our job to keep the pressure on and keep the issues of climate change and biodiversity loss at the top of our nations' agendas. This is no small order.

And, yet, I am very optimistic, given the ingenuity and commitment I see.

About this time a year ago, the University of Minnesota dedicated a powerful monument to the many notable contributions of its faculty and alumni. It's called the Wall of Discovery, and it is an artistic representation of the processes that have led these men and women to invent or create key scientific and artistic advancements.

¹¹ CNNMoney.com 1/03/07

¹² The New York Times 7/24/07

¹³ Minnesota Star Tribune 9/17/07

From original mathematical calculations to hand-written music scores to architectural sketches, the tribute brings to life the critical moments when experts in their fields moved from exploration to innovation, from ideas and concepts to tangible answers.

Recently, I visited the Wall and thought about what a powerful metaphor it is for this conference. Every major accomplishment represented – from the development of the Cray Supercomputer, to the design of the Shanghai World Financial Center, to the discovery of the transistor effect by two-time Nobel winner John Bardeen – followed an extraordinarily complex, innovative and demanding process... much like the process we are involved in today.

And yet all of the scientists, the doctors, the mathematicians, the architects and the artists were able to break through, all eventually achieved their vision.

If you haven't had a chance to visit the Wall, I encourage you to do so. It is inspiring. As you walk beside it, I hope you'll do what I did – take a moment and think about the conversations that will take place over the next two days... think about what we can achieve working together at this conference and as a region... and think about the time sometime in the future when our work is reaching critical mass, when our environment is safer and our energy is cleaner, when we – too – will have our eureka moments, our moments of life-changing and world-changing discovery.

Thank you.