

04.22.08 - Clean Energy Celebrated at MIT

Governor Deval L. Patrick
MIT Earth Day Remarks
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As Delivered

Governor Patrick

I want to observe Earth Day by talking about energy and for very good reason.

Climate change is the environmental challenge of our time. The combustion of fossil fuels for electric power generation, transportation, heating and other purposes, releases greenhouse gases today in amounts unprecedented in human history. Massachusetts is very much at risk. We have hundreds of miles of coastline threatened by sea level rise. We have ecosystems threatened by changes in temperature and precipitation, and we have urban populations that will be hit especially hard by more and hotter summer days. The health-related impacts of heat are worsened.

In the age of fossil fuels, Massachusetts has been at an economic disadvantage as well. We have no oil, coal, or natural gas supplies of our own. We're at the end of the pipeline for every fossil fuel we use, and as a result, we pay top dollar and spend most of our energy dollars out of state. The international panel of climate change tells us that to avoid the worst effects of climate change, we need to reduce greenhouse gas emissions by 80% by 2050. 80%. It is as plain as can be, that to reverse the course of climate change, we must fundamentally change the way we produce and use energy.

As long as fossil fuels remain cheap and abundant, as they were for most of the '90s and indeed for much of American history, the purely economic impetus for clean energy innovation was slight, frankly. But now supplies are constrained and demand is rising, as China and India surge into the global economy, and the price squeeze is on. Crude oil is trading above \$115 a barrel - did anybody check today? I knew it would be higher. And heating oil - I wish it were a laughing matter - and heating oil and gasoline are at record highs.

The age of clean energy is here. And power comes not from fossil fuels, but from technology, innovation and skill. Those are commodities that we have in abundance here in Massachusetts - and they are infinitely renewable.

And I do believe we must think of this as a shift in an age, instead of in merely in a resource. The Stone Age didn't end, as somebody said, because they ran out of stone; but because humankind had a better idea.

So, let me share with you some ideas that we have been working on in my administration.

First, Massachusetts is already taking the lead on direct mitigation of climate change. One of my very first acts as governor was to bring Massachusetts into the Regional Greenhouse Gas Initiative -- and since then our state has been leading the development of this first-in-the-nation cap-and-trade program for carbon dioxide emissions from large power plants. RGGI will hold its auction of emissions allowances in September, and Massachusetts will be among the first states to participate, and I'm very proud of that.

Massachusetts is the first state in the nation to bring greenhouse gases into the mainstream of environmental regulation as well. We now require analysis and mitigation of greenhouse gas emissions from large real estate development projects through state's environmental review process. That policy led to a voluntary commitment by that little college up the river to set a legally enforceable cap on greenhouse gas emissions from development of its Allston campus - the first such cap on a real estate development projects in the country.

And we have begun an ambitious analytical exercise we call the Climate Road Map. This is an attempt to move beyond

the vague and largely aspirational "climate action plans" that typically get done, and get put on a shelf and forgotten. This exercise promises rigorous assessment of our current trajectory of emissions growth, on a business-as-usual basis, and careful analysis of what we gain in emissions reduction from each of the policies we put in place -- so that we can judge which of these and other initiatives give us the kind of impact we're looking for.

More than likely, the key to greatest success will be technological advances - new ways to light our homes and offices, get ourselves from place to place, and power our industries that sharply reduce our reliance on coal, oil and natural gas.

A clean energy future means a clean energy economy - an economy that feeds on innovation in clean energy technology for growth, not just necessity.

For Massachusetts, I believe, this presents a tremendous opportunity. If we get this right, the whole world will be our customer.

Some of this new way has to do with government. Not all of it, but some. For years, we have subsidized and protected the oil, coal and natural gas industries. That's mostly the federal government, but even at the state government level, we have historically built in subtle biases in favor fossil fuel power generation. In Massachusetts, we have an Energy Facilities Siting Board that has the power to overturn a city's or town's denial of permits for an electric generating power plant, allowing such a plant to be sited over the town's objections. Every state has one - if we didn't, we would not have enough power plants. Siting is always controversial. But this state law only applies only to large plants, so that small renewable projects of one or two wind turbines, for example, can be stopped by a town, with no recourse to the Siting Boards. That's what I mean when I say subtle, and as we are beginning to discover, latent obstacles to moving this agenda forward.

Ironically, the only renewable energy project large enough to qualify for this siting assistance is the most contested one of all: Cape Wind, which by the way, I enthusiastically support. What a powerful - just think what a powerful symbol of our clean energy future that could be -- the first offshore wind farm in the United States - sited right here in Massachusetts.

There are other ways state government can help. We have a comprehensive energy reform bill on the brink of passage in the Massachusetts Legislature, in fact it has moved out of the House and the Senate and is now in conference. It will revolutionize energy policy in the state, and we have the Speaker of the House, in large measure, to thank for helping move that forward, get it started.

For one thing, this legislation will unleash energy efficiency - the cleanest energy of all. For years, we have given electric utilities a fixed amount - \$125 million a year - of ratepayer funds to spend on energy efficiency upgrades - and not a penny more, no matter how much better we would do if they had a little bit more to make that difference. On top of that, our rate structure rewards the utilities for selling their customers as much electricity as they can - an incentive that undermines both our energy efficiency efforts and our emissions reduction goals. We're not unlike other states in that respect.

But now our public utility commission is in the process of reforming rates to reward efficiency rather than volume. And the pending energy bill will require electric utilities to obtain all energy efficiency upgrades in residential, commercial, and industrial settings that are cheaper than the cost of power generation. This may mean as much as quadrupling our investments in energy efficiency. That will be good news for consumer costs and good news for clean energy.

The legislation will also require utilities to enter into long-term contracts for renewable energy, providing renewable power developers the means to get financing for their projects. The bill's expansive "net metering" provisions will also make it easier for people who own smaller scale solar, wind or distributed power to sell their extra power back to the grid at a favorable rate. And it will integrate our state building code with standards of the International Energy Conservation Code, keeping Massachusetts at the forefront of energy efficiency in new buildings.

We have taken this further, calling on the green building industry to help me set standards - first for state government, then for the private market - to achieve the goal of zero net energy buildings in the not-so-distant future. Come and be

a part of this. We can set the course for the world.

Then there is solar energy. The power of the sun is all around us, you feel it especially on a day like today, and the public is increasingly eager to capture it. But to date it is but a small, and expensive, part of our electric power system. Its benefits for the economy and the environment seem elusive.

But solar power, more than any other, presents a case study in the synergy that is possible between government, the academy, and the private sector to stimulate technological innovation and cash in, frankly, on jobs and growth in the clean energy industry.

Let me illustrate this with a story.

Evergreen Solar is a manufacturer of solar panels whose technology grew out of the engineering lab of Emanuel Sachs, right here at MIT. Evergreen's headquarters is in Marlboro, about 30 miles from here, but its main manufacturing operation had been in Germany for a long time. Germany, as you may know, has strong pro-solar policies and incentives.

In late 2006, Evergreen was looking to build its first full-scale manufacturing facility in the United States, and it wasn't even considering Massachusetts. Mind you, its headquarters are based here, but it wasn't thinking about Massachusetts. Before I took office, between the time I was elected and inaugurated, we got involved with corporate leadership of Evergreen Solar and persuaded them to give us a chance to compete for that first manufacturing facility in the state.

We were able to come through with a package of incentives that was competitive with several other states. Not the cheapest, but competitive. Evergreen chose Massachusetts as the base of its U.S. manufacturing operations. By next year, Evergreen will triple its Massachusetts employment, up to 1,000 workers, in just two years.

Now what made the difference for Evergreen was the commitment Massachusetts made to grow the market for solar photovoltaic energy. We have pledged to increase installed solar power in Massachusetts from 4 MW last year to 250 MW in 10 years. And my administration brokered a commitment from the state's electric utilities to help promote solar power, identifying customers with good roofs, and facilitating the process of interconnection - the first alliance of solar-panel manufacturers and utilities in the whole country.

Solar power is popular among the public, but it is expensive - the upfront cost of buying and installing solar power is high, and the payback period can be long.

So, in January, my administration launched a program called Commonwealth Solar, a rebate program that defrays the cost of going solar with rebates of up to 60 percent of the cost for homeowners, and up to 40 percent for businesses. This slashes the payback period for the investment, after which the solar panels generate electricity virtually for free.

In just three months of operation, Commonwealth Solar has approved nearly 60 applications, for rebates totaling more than \$1 million and installations of 350 kW in generating capacity. Backed by \$68 million in existing ratepayer renewable energy funds for the first four years, Commonwealth Solar is expected to put us on a path to achieving our 250 MW solar goal.

Thanks to places like MIT, with its Energy Initiative, Massachusetts is becoming a center of solar technology innovation. Just over a week ago I think it was, the Germany-based Fraunhofer Institutes declared MIT to be its U.S. home for clean energy research, establishing an MIT-Fraunhofer Center for Sustainable Energy Systems, with backing from the Commonwealth's Renewable Energy Trust and electric-and-gas utility National Grid.

The MIT-Fraunhofer Center will bring 70 new scientists, engineers, and technologists to bear on the challenges of clean energy technology, with spin-offs in Massachusetts and all around the world. One of the Center's first goals is slashing the cost of producing solar panels by roughly one-third - a critical step toward making solar power competitive in the marketplace without subsidies.

And just today, I think you know this, the Chesonis Family Foundation bestowed upon MIT \$10 million to fund a "solar

revolution project," to explore new materials and systems for producing solar power, with the goal of hastening the migration of solar energy from the fringe to the mainstream.

This is the right vision for solar. Of all the renewable energy technologies, it has the unique potential to penetrate deeply into every home and business, perhaps one day integrated into roofing tiles, for example.

Clean energy technology spawns new jobs, and not just in the lab. It's also jobs for manufacturing workers, installers, electricians, sheet metal fabricators, and mechanics. It's jobs for people who mount solar panels on roofs and swap outmoded industrial pumps and motors for energy efficient new ones.

Remember, Evergreen Solar, the company that's tripling its Massachusetts workforce, it's doing that by creating manufacturing jobs - just the kind of jobs that Massachusetts has been losing in the transition to a knowledge-based economy. But clean energy is one knowledge-based economy that produces jobs across the spectrum, and that is very, very important for all of us to focus on.

In other words, green-collar jobs come in shades of both white and blue.

Take energy efficiency. What that comes down to is replacing outmoded lighting, heating, and industrial systems with high-efficiency models. That's a lot of jobs for people who remove old light fixtures and install new ones, replace old furnaces and air conditioners with new ones, swap out old motors with new variable frequency ones - even people who go door to door, replacing incandescent light bulbs with compact fluorescents today, light-emitting diodes tomorrow.

We estimate that the energy efficiency requirements of the pending energy bill, the one I mentioned earlier that's on its way out of the legislature, will yield annual savings to consumers of \$430 million in their monthly electricity bills, plus \$320 million annually in new revenues for local companies in the efficiency industry, all of that resulting in 1,800 new jobs within a year of the bill's passage. This has got to be the way that we move forward, and the direction in which we move.

Same is true with renewables. One of the biggest boosters of solar and wind energy in Massachusetts is Marty Aikens of IBEW Local 103 - the proud owners of the wind mill that you see as you drive on the Southeast Expressway through Dorchester. Where environmentalists see carbon-free energy, Marty sees work, work for electricians installing those panels and assembling wind turbines. The beauty of that is that they're both right.

Just as Evergreen was announcing its expansion of manufacturing capacity, the Massachusetts solar installation industry was beginning to flower as well. SEBANE, the Solar Energy Business Association of New England, counts 14 new members since January of this year, 12 of them Massachusetts-based, bringing the trade group to 83 across the region, with 61 based in Massachusetts and three others with offices in the state.

Let me tell you about just one of them. This story starts at another Massachusetts University, not the one up the river, this time UMass-Amherst. Dan Leary was a student at the Isenberg School of Management when he was called to serve his country as a Captain in the Army. While serving in Kuwait, Capt. Leary worked on his master's thesis in his spare time. That thesis was a business plan for a solar power delivery company, which he wanted to staff with returning veterans.

He finished his tour of duty, and finished his thesis - with the help of a grant from the Renewable Energy Trust - and started his company, which is called Nexamp. As Dan puts it, at first it was him, his laptop and a pickup truck. But in just two years, Nexamp has grown to a 12 person operation, most of them veterans by the way, located in North Andover, and the company provides not just solar services but integrated services for all sorts of energy options. They are looking to add 5 more jobs by the end of this summer.

Nexamp is currently developing an installation-finance package that requires no upfront costs to the customer, under a lease-to-buy arrangement. This innovative financing will avoid the barrier of high up-front costs that keep solar out of reach for many customers. Nexamp is shooting for 1.5MW of installations using this approach, partly by leveraging the incentives from the Commonwealth Solar program that I talked about earlier.

Here's another way to visualize the Massachusetts clean energy economy tale: A couple of weeks ago, I went out to the wastewater treatment plant on Deer Island, in Boston Harbor, in part to celebrate the installation of a large solar PV system.

And there it all was, all of it together: Evergreen solar panels; inverters by Solectria, a company based in Lawrence; installation by Borrego Solar, a California company that opened an office in Chelmsford earlier this year and that is moving to a larger space in Lowell next month - they employ 22 people today, and are planning to make this their East Coast headquarters; the electrical work was done by Lighthouse Electrical, a Pembroke-based contractor that is just one of many finding growth opportunities in renewable energy systems.

Now some of you, I know, prefer to focus on the clean energy opportunities for its opportunity to save the world, and that is vitally important. But there is a pedestrian part of my job, which is also worrying about our economic future. And what a fantastic thing to have these two interests coalesce. And that is something we are uniquely positioned to take advantage of here in the Commonwealth. We have the brainpower and the tradition of innovation that makes the clean tech sector a natural home here in Massachusetts. But we have to cultivate it, we have to work together to make that happen, and I'm trying to give you some examples of how we intended to do that and we welcome your ideas.

Solar power is just one clean energy technology, as you know. Many, many others show potential for the same synergy of government/academy/private investment that translates into companies, jobs, and progress toward a clean energy future for Massachusetts and the whole world.

Another one is biofuels. In the coming week, I'll be receiving the report of an Advanced Biofuels Task Force established by me, the Senate President, and the Speaker of the House last November. We say "advanced" biofuels because today's biofuels don't help us to tackle greenhouse gas emissions, they compete with our food supply.

Our state is uniquely suited to become a world center of biofuels that don't come from corn and soy but from cellulose, an abundant feedstock that comes from forestry products, the organic waste stream, and agricultural products that can be grown here in New England, like switchgrass.

The trick is how to convert the stuff to energy. Researchers around the world have been scrambling to come up with the best process. At UMass-Amherst, a team of scientists led by Susan Leschine, a professor of microbiology, discovered a bacteria that converts cellulose to ethanol in a single step. The discovery of the Q Microbe led to a spin-off company, called SunEthanol, which currently employs six people and is looking to grow rapidly.

This growth will be fueled by the proposal I have made, in partnership with the legislative leadership, to exempt cellulosic ethanol from the state gasoline tax, an incentive to get fuel blenders and distributors to adopt cellulosic ethanol as soon as it hits the market.

Here's another one: battery power.

If SunEthanol might supply new sustainable fuels for powering cars, another Massachusetts company is figuring out how to efficiently store that kind of energy in batteries to provide a clean source of power for a range of applications. The work of MIT's Yet-Ming Chiang, a Professor of Material Science, and his lab, created the spin-off A123 Systems. The technology they employ I can barely pronounce, but I am going to try: highly active nanoscale low impedance Nanophosphate electrode technology. Now, don't ask me to do that without my notes in front of me. If I understand it correctly, what this means is lower cost, smaller, lighter batteries with greater capacities and longer life, and one of the applications is plug-in hybrid automobiles, which can get mileage of more than 100 miles per gallon.

Headquartered in Watertown, A123 has grown into a global company, with \$100M in private funding, 800 employees, and about 100 here in the Bay State. Just last week, A123 submitted a bid for the state's pilot program to retrofit existing state hybrid cars into super-efficient plug-in hybrids.

And we have high hopes for the spin-off potential of another technology, and that is wind power. When I came to office, Massachusetts had a reputation for being anti-wind. The Cape Wind project was opposed by virtually every major state

political figure. We had installed precious few wind mills anywhere in Massachusetts. In short, the Commonwealth had been talking about renewable energy, but doing little about it when it came to wind. Now I have done my level best, with the help of the team I asked to stand, to change that.

Last year, Massachusetts was chosen by the federal Department of Energy to host to one of just two Wind Technology Testing Centers in the United States. This facility, which will be located in Charlestown in the shadow of the Tobin Bridge, will assess the structural integrity and durability of commercial wind-turbine blades of up to 250 feet in length.

We view the Blade Test Facility as the beginning. We have the opportunity now to turn that waterfront port area in Charlestown into a hub for offshore wind R&D. Offshore wind has enormous potential for large scale renewable power - and we aim to become the hub for that too. We are actively pursuing some of the world's leading players in wind to come now to Massachusetts - and places like MIT and UMass are a key part of our sales strategy to attract them.

All of these breakthroughs in clean energy technology will lead to a range of new technical jobs putting these technologies to work in our homes, our buildings, our cars, our power grid - and keeping them working. Over the last several years, our state colleges, community colleges and 40 Vocational Technical Education High Schools have begun developing clean energy technology training programs, and we're going to need them. The clean energy sector in Massachusetts employs more than 14,000 people now, and is growing fast. The graduates of these programs will be in high demand.

As you can see, my goal for Massachusetts is not only to encourage the use of clean energy and efficiency, but also to nurture a clean energy industry born in Massachusetts, grown in Massachusetts, and selling to the world.

Massachusetts can benefit from the whole human chain of clean energy technology development and adoption: the professors and the graduate students who do basic research and test the applications; the entrepreneurs who take that basic research and commercialize it; the private investors willing to take risks on promising but unproven products; the designers who figure out how to incorporate new technologies into buildings, cars, and manufacturing; the service providers who install the panels, replace old windows with new, set up energy management systems and maintain them; and the consumers who choose the new technology to heat or to cool their homes and their workplaces, and to get from here to there, or light their space.

To some, it may seem odd to spend Earth Day talking about ways to grow a new industry. But there's nothing odd about it. Ecology and economy share the same Greek root: oikos, which means house, or dwelling place. Economy was about managing the household, ecology about studying the habitat that we live in.

And it's never been more important for economy and ecology to work together than it is today. The threat of irreversible climate change looms on the horizon, and not the distant horizon. But avoiding it will take not only commitment but ingenuity - the kind of ingenuity that starts in a lab or in a workshop, but changes the world.

I hope everyone will help us build, right here in Massachusetts, the clean energy industry that saves our world.

Thank you so much for having me today.