TO GROW A SUSTAINABLE CLEAN ENERGY CLUSTER, THERE'S NO ONE ROUTE TO SUCCESS

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STIFF COMPETITION FROM MORE RESOURCEFUL STATES MEANS MASSACHUSETTS MUST TAKE A MULTI-PRONGED APPROACH.

Will we ever run out of oil or any other fossil fuel? Unlikely. We will either run out of affordable fossil fuels or we will decide that the long-term costs — financial, environmental, social, and geopolitical — are too high, regardless of supply. In fact, the Stern Review on the Economics of Climate Change, a major study recently released by the British government, reports that "if we don't act, the overall costs and risks of climate change will be equivalent to losing at least 5 percent of global GDP each year, now and forever."

One can argue the specifics of when and how each factor might impact our economic status, but there is little remaining argument that a transition in our energy usage is coming.

At present, the health of our economy is highly dependent on the availability of affordable, reliable energy. A change as fundamental as shifting from a fossil fuel-based economy to one that is based on sustainable resources and practices is very difficult to defend from a business perspective unless the alternative is commercially viable.

Three things could make the alternatives viable. First, market forces could rapidly drive the cost of fossil fuels so high so quickly that investment in the development of resources that are reliable, sustainable, and domestic becomes a priority. Factors that may drive this scenario are the intense competition for oil we are seeing from China, India, and other countries. Availability and stable pricing are likely to be the most important indicators of evolving market forces in this case. However, the U.S. is home to enormous coal reserves, so this scenario alone is not enough to shift our investment in energy technologies.

Second, voter demand could drive tighter and better regulation of various emissions from various sources, thereby improving the economics of sustainable energy sources and practices without waiting for absolute market drivers. Such regulation is, in my opinion, one of the most important responsibilities of government in a capitalist, democratic society. When effect is years distant from cause, e.g., if one degree Centigrade of global warming were to result from carbon dioxide emitted from human sources over the course of 200 years, the market cannot reasonably be expected to provide adequate signals to buyers and sellers to mitigate the costs associated with the currently accepted behavior. Unfortunately, global — or even domestic — consensus for this type of government-driven market signal has been impossible to obtain, so we cannot depend on it to help drive change.

Third, we can develop clean energy technologies and services that make sense economically today. Entrepreneurs in this arena are handicapped by lack of funds and the prevalence of myths and misunderstandings, but their businesses still present today's most direct opportunities to reduce fossil fuel consumption. Fortunately, the creativity and determination inherent in most entrepreneurs are already serving the clean energy sector well, especially in Massachusetts.

I am fortunate to be in a position to work with such entrepreneurs on a frequent basis. At the office, I am the associate director of the Massachusetts Technology Transfer Center (MTTC), which is mandated to help to commercialize inventions from our nonprofit research institutions. And as a volunteer, I am co-founder of the Energy Special Interest Group (ESIG) at the MIT Enterprise Forum as well as chair of its 2007 Ignite Clean Energy (ICE) Business Presentation Competition. For the purposes of our outreach to universities and investors, we define clean energy to be any technology, product or service that reduces the use of fossil fuels. This very broad definition serves the interdependent purposes of addressing climate change and energy security well and simply. It encompasses, among other things, the generation of electricity from a renewable source such as solar cells or wind, enhanced efficiency of existing processes, and services that offer opportunities for conservation.

Our goal at the ESIG and with our clean energy programs at the MTTC is to help grow the clean energy cluster in Massachusetts and the Northeast by supporting the birth and growth of new enterprises in the field. Both organizations participate in active outreach to inventors throughout the region, promoting the formation of startup companies in Massachusetts. There is an emphasis on university-based researchers but, because our goals are economic development and the creation of clean energy-based companies, we work with non-university inventors and entrepreneurs as well.

We organize two major programs per year. The MTTC is in the planning stages for the third annual Conference on Clean Energy with the Massachusetts Hydrogen Coalition and the MIT Enterprise Forum ESIG. Last year's program included investor pitches by 15 startup companies as well as industry sessions, a finance panel, and a job fair. In the spring, the ESIG will hold for the third year the finals of the ICE Competition. Professional and student entrepreneurs with the best investor pitches will share more than $200,000 in cash and prizes.

These two major events have showcased more than 30 early-stage companies in the two years they have been held, not counting those that do not qualify to pitch but still exhibit. Not all the ideas presented will prove to be viable, but all make a good or even great case for long-term success. Irrespective of changes in government regulation, the latest news about climate change or any other factors, these entrepreneurs are developing business strategies to deliver clean energy technologies to businesses and consumers that offer a significant competitive advantage over what they are already doing.

Here is a sampling of what these Massachusetts entrepreneurs are offering:

- Exciting new photovoltaic technologies based on nanostructured material may enhance the efficiency of solar cells by a factor of three to five, dramatically improving the economics of this rapidly growing industry.
- Green buildings — and the know-how to make them — that take advantage of the cost savings of modular building practices to provide highly efficient residential homes that are attractive and affordable.
- From Boston University, Babson College, and various startup companies come a number of schemes for taking organic waste and turning it into such forms of energy as hydrogen and natural gas and other biofuels.

- From MIT and some startups come methods for making fuel cells more robust and able to handle fuels other than pure hydrogen, which is a problem to generate and transport.
- From UMass Amherst comes cost-effective production of ethanol from cellulose (more energy-efficient than from corn) based on the apparently unique attributes of a recently discovered bacterium from the Quabbin Reservoir.

The most exciting aspect of this list is its diversity. No silver bullet exists to solve our energy and related problems. We must innovate in every aspect of business and technology. We need to find radical solutions for our energy generation needs but in the meantime, the fastest way to significant impact, and thereby business success, is to improve the energy efficiency of existing processes. Every field of science and engineering, along with almost every business model, has something to contribute to the dramatic reduction in our dependence on fossil fuels. The sheer breadth of this opportunity plays directly to our strengths: innovation, entrepreneurship, expertise.

To succeed in their transition from the lab to a startup company to production, these entrepreneurs need money, customers, and partners, just as any new technology does. We do our best at the MTTC and the ESIG to provide opportunities for all of these factors. However, additional resources are needed, particularly if we are to keep companies from migrating to other states that offer more incentives. The Massachusetts Technology Collaborative Renewable Energy Trust, which is the major funder of both the MTTC's Conference on Clean Energy and the ICE Competition, is a great asset for the state. Nonetheless, the high-tech inventions still in university labs would benefit particularly from additional support.

Focused support of clean energy businesses is critical to the emergence of a vibrant, sustainable clean energy cluster in Massachusetts and the surrounding region. Competition is strong: California regularly makes headlines with the innovative clean energy legislation it enacts, often to the direct benefit of entrepreneurs. Coupled with its well-known venture capital community, California is a formidable competitor. With a new administration there are strong indications that we can expect a change in the public policy regarding clean energy. Within the first few weeks of his tenure, Governor Patrick acted to implement the "Regional Greenhouse Gas Initiative" (similar to the Kyoto Protocol but just for the states of the Northeast). Entrepreneurs with young companies have informed me of the incentives they have been offered by neighboring states and of their frustration with state regulation. The formation of the Business Resource Team in the office of the Secretary of Economic Development is a positive development from the Romney administration, and even more is in the offing from the Patrick Administration. Of particular importance are the appointments of Ian Bowles, Secretary for Energy and Environmental Affairs, and Greg Watson, Assistant Secretary for Clean Energy Technology.

To compete with more aggressive states, Massachusetts needs to combine forces with surrounding states. While Massachusetts has an abundance of riches with respect to world-class universities and an entrepreneurial environment (including investors) unmatched by most regions, it is still a small state without anything approaching the resources of California. Our neighbors are hosting companies with exciting new technologies; most have their own green energy funding organizations as do we. By pooling forces, we can make the Northeast an international powerhouse in green energy.

Linda Plano is associate director of the Massachusetts Technology Transfer center (MTTC), co-founder of the MIT Enterprise Forum Energy Special Interest Group (ESIG) and chair of the 2007 Ignite Clean Energy (ICE) Business Presentation Competition.