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Department of Energy Resources
DOER.SREC@state.ma.us.

October 28, 2016

Re: Next Generation Solar Incentive Straw Proposal

DOER,

My name is Richard Schmalensee. I am a resident of Massachusetts and the Howard W. Johnson Professor of Management Emeritus and Professor of Economics Emeritus at MIT and former Director of the MIT Center for Energy and Environmental Policy Research. I am submitting comments concerning the DOER's Next Generation Solar Incentive Straw Proposal.

I appreciate the opportunity to submit written comments.

Sincerely,

Richard Schmalensee

Massachusetts Next Generation Solar Incentive Straw Proposal

Comments submitted by Richard Schamlensee, Howard W. Johnson Professor of Management and Economics, Emeritus, MIT

Background and qualification

My name is Richard Schmalensee. I am a resident of the Commonwealth of Massachusetts. I am also the Howard W. Johnson Professor of Management Emeritus and Professor of Economics Emeritus at MIT and former director of the MIT Center for Energy and Environmental Policy Research. I have also served as the John C Head III Dean of the MIT Sloan School of Management and as a Member of the President's Council of Economic Advisers.

In 2015, I directed MIT's multidisciplinary study *The Future of Solar Energy*, with the goal to "assess solar energy's current and potential competitive position and to identify changes in U.S. government policies that could more efficiently and effectively support the industry's robust, long-term growth." [1]

The efforts by the Massachusetts' Department of Energy Resources (DOER) to reform the existing system of incentives given to solar power through solar renewable energy credits (SRECs) represent a step towards supporting such long-term growth of the solar industry and an acknowledgement that the existing system of incentives is unnecessarily costly. The straw proposal, however, provides higher subsidies for the least efficient technologies. The proposal will likely keep costs unnecessarily high for Massachusetts' electric consumers.

Although distributed (or residential) solar energy can bring benefits to home-owners and communities, it is not the most technically or economically efficient way to achieve our common environmental goal of reducing greenhouse gas emissions. Large-scale (or utility-scale) solar, in particular, is much more cost-effective, as I discuss in more detail below. For the same

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[1] Richard Schmalensee et al., *The Future of Solar Energy*, MIT Energy Initiative, 2015. p. xiii, http://energy.mit.edu/research/future-solar-energy/

total investment, large-scale solar will generate more clean power and thus bring more benefits to all of Massachusetts's citizens than distributed solar.

Solar energy is part of the solution

At MIT, we undertook the study mentioned above because of a conviction that solar energy has enormous potential to reduce global greenhouse gas emissions while meeting the planet's future energy needs because it is one of the few low-carbon energy technologies that can be scaled up to supply a large share of global energy needs. We concluded that solar power should be a critical component of any serious strategy to mitigate climate change risk. For that to happen, though, solar technologies will ultimately have to be cost-competitive with traditional fossil generation and other forms of renewable generation. To achieve that, the study recommended that we shift our focus toward new technologies and sound policies that will make solar a compelling economic option in the future. In particular, we recommended increased R&D funding for solar research focusing on technologies using Earth abundant materials, energy storage, and concentrated solar power. And we recommended reforming subsidies for solar energy to increase their impact per dollar spent.

In the United States, we have seen very rapid growth of solar energy in recent years. Most of the solar installed in our country is in the form of large-scale solar plants, although distributed solar is getting significant attention despite its smaller share and higher cost. According to the solar industry, large-scale solar accounts for around 60% of all new solar installations, and new large-scale installations are expected to triple in 2016.[2]

Most of that development is occurring in California and other states in the western part of the country, but solar energy is being deployed at all scales in all regions of the nation. Several states in the east, particularly Massachusetts, New Jersey and New York, are in fact experiencing some of the most rapid deployments of distributed solar.

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[2] GTM/SEIA, *Solar Market Insight 2015*, March 2016.

This widely applauded growth of solar power has been helped by a rapid and substantial decreases in the cost of solar facilities and the development of innovative business models, but also by a large number of federal, state, and local subsidies and incentives. In Massachusetts, we currently support solar growth through our Renewable Energy Standard and a special solar carve out that requires electric suppliers in the state to purchase an increasing amount of solar electricity, generated in Massachusetts by relatively small-scale facilities, each year, at a price set by the SREC program that we are now discussing. We also support solar power through net energy metering, a variety of favorable loan and grant programs, a 15% income tax credit for up to $1,000 in net renewable expenditures, and property, sales, and excise tax exemptions as well. Together, all these programs make payments to distributed solar that are among the highest in the nation.

As the MIT report documents, this array of subsidies simply delivers much less solar generation per dollar than a well-designed support system would. In particular, we argued that net energy metering should be replaced by a more economically efficient system of retail rates. We noted that net metering has two serious problems. First, net metering provides a subsidy to distributed solar that is not received by large-scale solar. Second, as the MIT report discusses in detail, net metering shifts costs from consumers with distributed solar towards those without. [3]

DOER's Straw Proposal to modify the SREC program presents similar challenges. Because of the way it is structured (administratively set, fixed price through a long period of time, and adders to the least efficient technologies), the program favors smaller, distributed solar. Also, by setting prices administratively, the Straw Proposal moves further away from market-based pricing. Not only does it not make economic sense to give higher subsidies to the less efficient solar technologies, but these higher costs then get passed on to all consumers through increased electricity rates.

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[3] I made this point as well in an opinion piece: *Pricing solar so it doesn't raise everyone's energy rates*, Boston Globe, 23 March 2016.

Large-scale renewables are more cost effective than distributed solar

One of the most important things we can do to reduce greenhouse gas emissions is to scale up solar energy. To do that in a sustainable way, we should reduce the cost of solar plants and encourage public policies that place a greater emphasis on rewarding the lowest-cost sources of solar electricity, not providing extra subsidies to the highest-cost sources as the current proposal would.

Despite the attention that distributed solar has been getting over the last few years, it is large-scale solar that will help us achieve our climate goals at the lowest possible cost. In the MIT solar study, we estimated that distributed residential solar systems were significantly more expensive per unit of capacity than utility-scale systems — about 70 percent more expensive on a levelized-cost basis.

Other studies also support this result and conclude that large scale solar is significantly more cost effective than distributed solar and will continue to be in the future.[4] For instance, in a widely referenced study of electricity technology costs, the financial firm Lazard has concluded that "policies designed to promote wind and utility-scale solar development could be a particularly cost effective way of limiting carbon emissions; rooftop solar and solar thermal remain expensive, by comparison" [5]

The Lazard report notes the following levelized costs:

Wind:	$32-77/MWh
Solar utility scale:	$50-70/MWh
Biomass:	$82-110/MWh
Solar rooftop residential:	$184-300/MWh

Although each region and each project will have different costs, the ranges described by Lazard make the case for distributed solar to be a major source of clean electricity a very difficult one.

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[4] The Brattle Group, *Comparative Generation Costs of Utility-Scale and Residential-Scale PV in Xcel Energy Colorado's Service Area*, May 2015; Lazard, *Levelized Cost of Energy Analysis*—Version 9.0, November 2015.
[5] Lazard, *Levelized Cost of Energy Analysis*—Version 9.0, November 2015.

Moreover, as our study showed, high penetration of distributed solar systems generally requires reinforcing distribution systems, thus raising their costs. In addition, residential roofs are often not optimally aligned for solar generation, so that large- scale solar plants produce more energy per unit installed than smaller distributed solar systems.[6] These considerations further weaken the case for distributed solar.

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The most cost-effective path for future solar growth is to concentrate on large, utility-scale systems that are both more cost effective and more technically efficient. Regulators in Massachusetts should take all this into consideration as they continue the debate on the future of solar policies in the state. It is clear that much of the state's impressive solar growth relative to other states is because solar subsidies are more generous here, not because Massachusetts is sunnier. The ultimate goal should be to treat all solar and other renewable generators equally, and to reform policies that unnecessarily raise power rates for everyone.

If our state is going to make sharp reductions in carbon emissions as well as enjoy healthy economic growth, solar generation will have to be greatly expanded. But given the already high cost of electricity in Massachusetts, it is critical to obtain solar power as cost-effectively as possible and ensure that all consumers benefit.

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[6] The Brattle Group, *Comparative Generation Costs of Utility-Scale and Residential-Scale PV in Xcel Energy Colorado's Service Area*, May 2015.