OUR ENERGY FUTURE
AND
SMART GRID COMMUNICATION

Testimony of
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Commonwealth of Massachusetts
before the
Federal Communication Commission
Field Hearing on Energy and the Environment

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I. Introduction

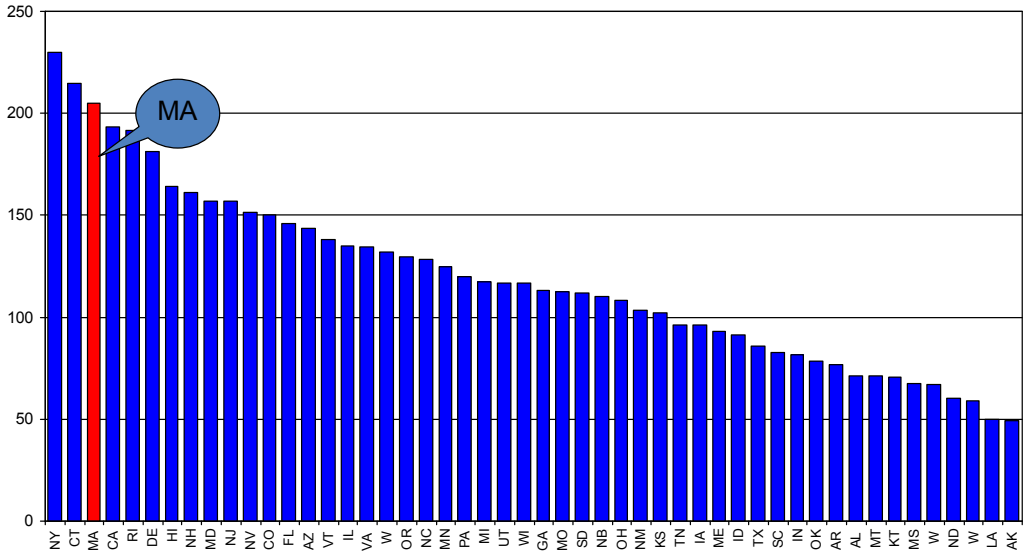
Thank you, for the opportunity to testify on behalf of the Commonwealth of Massachusetts. As Secretary Bowles indicated, Massachusetts is engaged in changing our energy future for the better, as much as we can, as fast as we can, and as easily as we can. My agency is the Department of Energy Resources and our mission is to create an environmentally and economically greener energy future including 1) maximizing efficiency, 2) fostering renewable resources, 3) assuring safe, reliable economic supplies and 4) growing clean energy companies and creating jobs.

A smarter grid is a necessary component of our energy future, but it is only one of many necessary components. My remarks below will touch on Massachusetts energy initiatives and provide context for my perspectives on the smart grid.

II. Massachusetts Energy Initiatives

Massachusetts' historically high cost of energy and our innovative people have combined to establish us as a leader in efficiency. Our energy productivity is one of the highest in the nation, with our economy generating $200 of gross state product for every million BTU consumed (US GDP is $116 per million BTU consumed). Efficiency and economic growth can and do go hand-in-hand in Massachusetts.

MA: High Energy Productivity



Source: EIA/Census 2005

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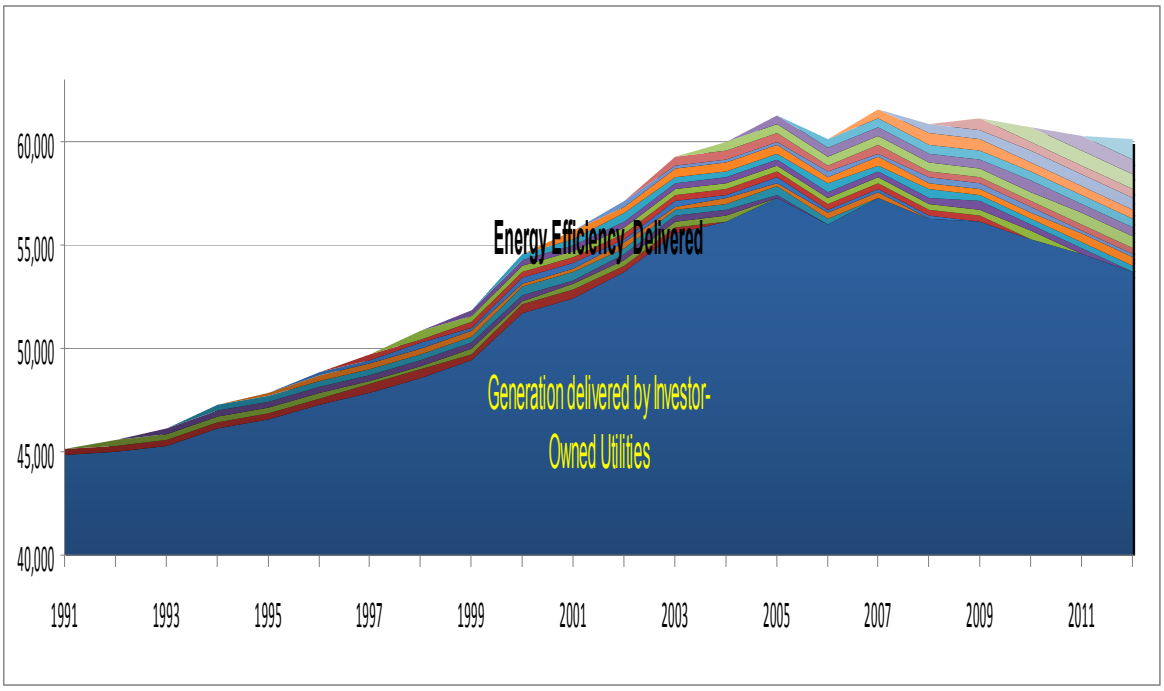
Massachusetts' long and distinguished record investing in energy efficiency is delivering great results. We have continuously invested in efficiency for over three decades. In the past, we collected and invested ¼ of a penny from every kWh distributed by our regulated utilities in wide ranging and far reaching energy efficiency programs. This totals about $125 million per year for our electric efficiency programs, which is about $20 per capita (for comparison purposes, the US total spend is about $2.5 billion, or about $8.39 per capita). These programs result in saving energy for about 3.6 cents per kWh saved, and contribute to an overall savings of 10% of our kWh consumed. This is a great deal, especially when the annual cost of power from generation in the wholesale market averages 8 cents per kWh in New England.

We are in the process of transforming our efficiency infrastructure and our economy in Massachusetts to create a greener energy future for the Commonwealth. Statewide three-year efficiency plans just submitted to our Department of Public Utilities call for generating benefits of over $6 billion from a $2 billion investment. This transformation began with Governor Patrick and our Legislature's leadership to fundamentally change the equation for investing in efficiency. Instead of investing a prescribed amount and getting all the efficiency we could for a certain sum of money, we are now required to invest in all efficiency that is less expensive than supply sources. Our transformation is being accelerated by investing revenues from our participation in the Regional Greenhouse Gas Initiative, and is being further turbocharged by the federal stimulus.

Plans Built on Experience



Source: DOER

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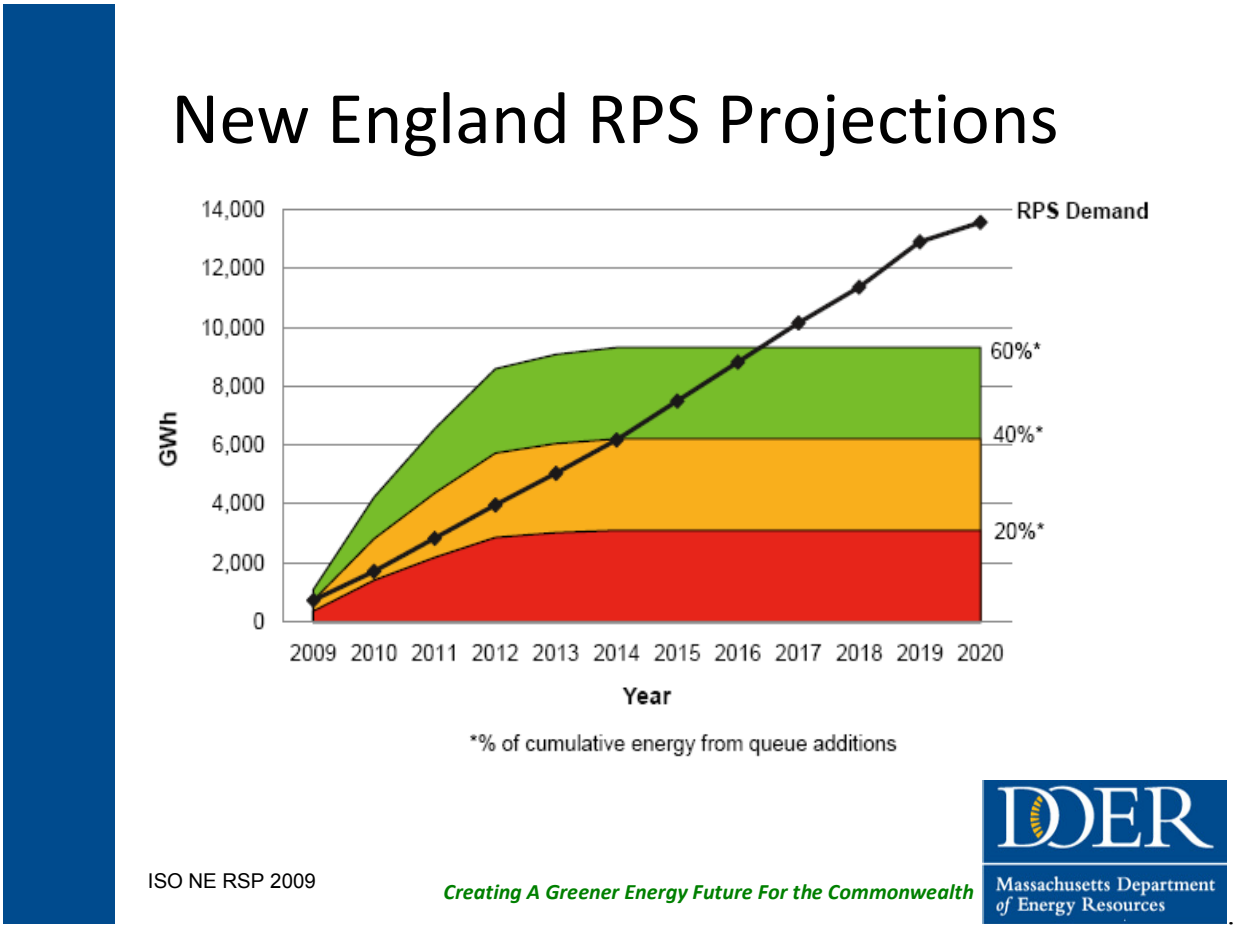
In addition to our efficiency initiatives, the Commonwealth is pursuing any and all affordable opportunities to increase the renewables content in our supply mix. Our renewable portfolio standard, established in 1998, is one of the most established programs in the country. In recent years, we have met virtually all of our annual renewables requirements with new renewable generation. In 2008, we doubled the increase in our annual renewables requirement for electric suppliers and are on track to continue to meet this with renewables. This has included a more than ten-fold increase in PV from over 1000 projects, as well as wind power generation in the state in the last two years.



With the combination of our efficiency success with renewables development, we are on track to meet well over half our current energy load with carbon-free resources by 2020.

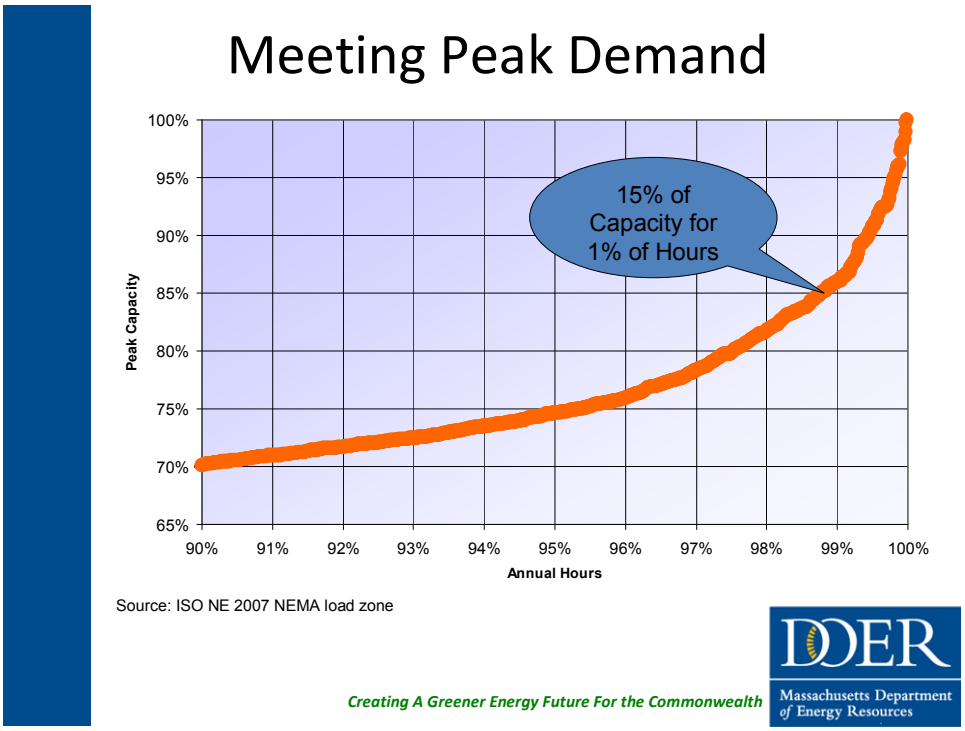
II. Smart Grid Perspectives

Massachusetts experience provides an important context for consideration of how and where a smart grid will help enable our greener energy future as well as limitations in terms of both customer behaviors and integrating new resources.

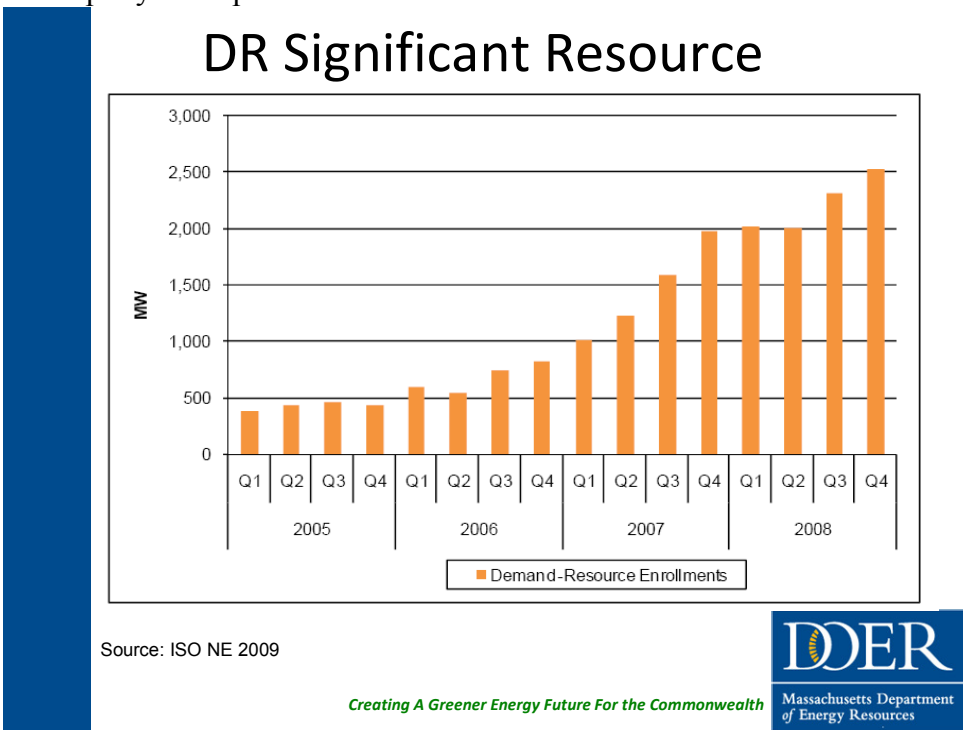
Customer behaviors: Peak Demand
Reducing peak demand by enlisting customers' participation in energy markets has substantial benefits. In Massachusetts almost 15% of our peak demand occurs in just 88 hours per year. With appropriately structured markets, many customers have shown a willingness and ability to reliably reduce their demand for these few hours each year and thereby eliminate the need to build some generation.

Two-way real time communications with the thousands of end-users participating in demand resource programs that can be dispatched by system operators provide much needed assurance that these resources are reliable and are operating as expected. In fact the diversity of these

resources and their location exactly where the load centers are can provide a resource that is superior to dispatchable generation.

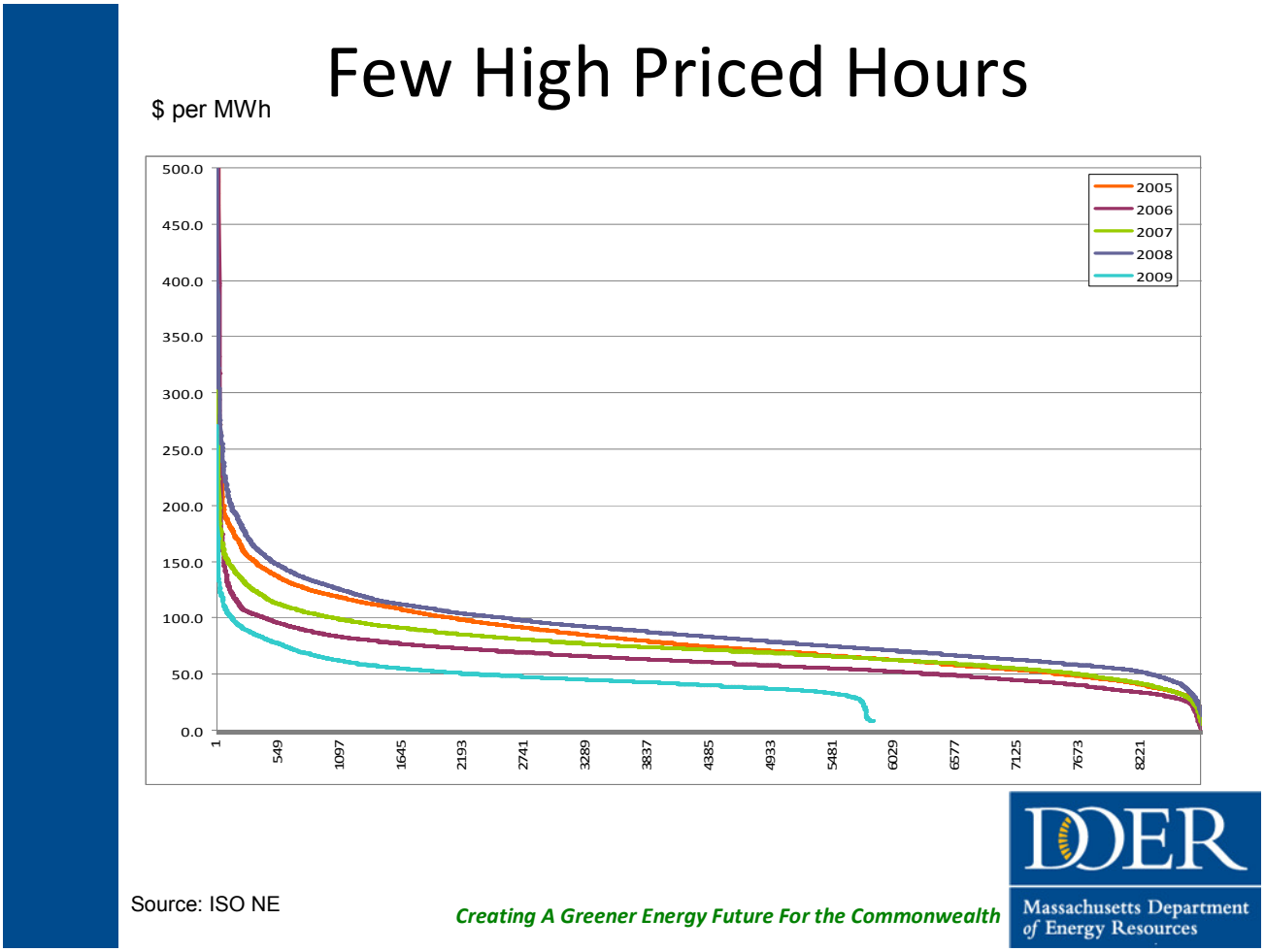


Through these programs, New England is on its way to meeting 10% of its peak demand with demand-side resources. These programs are delivering substantial economic benefit for the end-users who participate, for the grid operators who have another tool in their toolkit to reliably meet load, as well as for society as a whole, which doesn't have to fund a new power plant to meet a few hours per year of peak load.



Customer behaviors: Mitigating High Prices
Some expect real time pricing will be the "killer application" of the smart grid, unleashing vast amounts of energy efficiency and changing consumer behaviors. Providing more and better information to all energy users is a key to changing behavior along with clear recommended actions and relatively easy ways to affect change. Now, end users receive their bills months after they've consumed energy, have no idea how their usage compares to anyone else's usage and have no idea what if anything they might do to change. For those that are motivated to learn and affect change, the process for improvement is extremely daunting and requires enormous effort, intelligence and fortitude by the consumer.

Exposing customers to the relative infrequency of high priced hours will not likely be sufficient to motivate necessary changes. Much of energy efficiency already makes enormous economic sense, but change is still hard to effect despite the societal economic irrationality of the status quo.



Renewables and New Resources Integration
Integrating diverse new resources into the grid is perhaps the biggest challenge for our traditional one-way transmission and distribution grid architecture. Traditionally, grid architecture was

designed around the one way communication and control protocol based on large generating stations providing their power through transmission systems down to distribution systems and onto the end users. No information from the end user was needed in real time except total load on the system. Grid operators relied on customers calling in to determine if power interruptions were occurring.

Traditional generation stations operated at the discretion of the system operator and were relatively reliable and predictable regardless of the weather. Integrating new resources including intermittent renewables, cogeneration and distributed generation, energy storage for regulation service as well as diurnal storage and adoption of widespread electrification of transportation all present enormous challenges and require rethinking much of the fundamental grid architectural principals. This new architecture will require much more two-way continuous communication at time intervals much closer to real time.

The challenges of integrating new resources into our reliable grid include:

- Remote resources and intermittency - Renewable resources are not always located near load centers and are intermittent. In Massachusetts, this is most evident in the challenges of interconnecting some of our new wind resources which are located in less populated areas of the state - almost always in areas which also have our relatively least developed distribution systems. Revamping a distribution system which was built to service a sparse population with relatively low load to enable MWs of intermittent generation to interconnect is not a trivial undertaking. A smarter grid can and will help.

- Distributed cogeneration and other generation resources - Many cities have complex distribution network grid architecture to enable highest reliability at the least cost and to maintain safety for grid maintenance. This architecture can make it very difficult to safely accommodate distributed generation which has the valuable potential to feed back excess resources into the grid. A smarter grid can and will help.

- Energy storage and, in particular, regulation service - Today grid operators dispatch power plants at a partial load with a few minutes of lead time to ramp up and down to maintain 60hz. New resources such as flywheels and grid-scale batteries, as well as potentially connected electric vehicles can respond in seconds and thereby would enable meeting regulation service requirements without having to ramp power plants up and down, but will require new rules and market adjustments as well as communication protocols for system operators. A smarter grid can and will help.

IV. Conclusion

Some envision the smart grid to be the equivalent of the space race in the 1960s. While creating our greener energy future may be the most significant transformational activity of our lifetimes, the smart grid is only one part of the changes needed.

All in all, a smarter grid will help provide tangible value, enabling more efficiency and new resources, reducing our carbon emissions, improving our economy and reducing energy imports.

A smarter grid is not a panacea to enable all the changes we need to undertake and, in fact, is not on the critical path for many of the changes needed.

In establishing policy for smart grid communication, I encourage a close examination of the tangible benefits and costs for each activity as well as the overall initiative. This is not the case where one sweeping policy change will unleash all of the needed innovation.