



# 51st State Perspectives

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## MASSACHUSETTS: A GREAT CLEAN ENERGY STORY— DERs AND THE NEXT CHAPTER

IN PARTNERSHIP WITH



JULY 2018

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## ABOUT SEPA

The Smart Electric Power Alliance (SEPA) is an educational nonprofit working to facilitate the utility industry's transition to a clean energy future through education, research, standards and collaboration. SEPA offers a range of research initiatives and resources, as well as conferences, educational events and professional networking opportunities. SEPA is founder and co-sponsor of Solar Power International and winner of the Keystone Policy Center's 2016 Leadership in Energy Award. For more information, visit [www.sepapower.org](http://www.sepapower.org).

## ABOUT SCOTTMADDEN

For more than 30 years, ScottMadden has helped our clients transform the way they operate, plan, and maintain the grid and interact with their customers. The Grid Transformation practice focuses on helping clients adapt to the myriad of changes driven by the increasing penetration of distributed energy resources, such as distributed generation, storage, demand response, and microgrids. We help our clients choose the path that meets their reliability, customer, and regulatory goals, and then we help them implement it.

## ACKNOWLEDGEMENTS

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## Executive Summary

The Commonwealth of Massachusetts has long been a leader in the deployment of clean energy. It was an early adopter of a renewable portfolio standard (RPS) and energy efficiency targets. Massachusetts currently has an RPS for “all retail electric suppliers” of 15% by 2020 and 25% by 2030. Eversource Massachusetts and National Grid Massachusetts both achieved more than 3% savings through energy efficiency programs as a percentage of their retail sales in 2016.<sup>1</sup> The Commonwealth has a significant penetration of distributed generation and robust enrollment in net energy metering (NEM) programs. In addition, it has a target for electric vehicles (EVs) of 300,000, or 15%, of all registered vehicles by 2020. The state’s target for storage is 200 megawatt hours (MWh), also by 2020, supported by additional programs and funding. Massachusetts has focused on the reduction of greenhouse gas (GHG) emissions, and this is reflected in the various programs implemented during the last 30 years.

The Commonwealth went through retail deregulation in 1997, leaving the investor-owned utilities as wires-only businesses. Retail choice has been in effect ever since. Customers have the option to select among retail energy service providers or remain with the utility. Community choice aggregation (CCA) has also gained popularity in the Commonwealth, providing yet another option for communities seeking alternative energy supply.

The New England Independent System Operator (ISO-NE) was established at the same time that retail deregulation occurred, creating a wholesale market for the region. The significant penetration of distributed energy resources (DERs), particularly rooftop solar, has spurred ISO-NE to develop rules to govern the participation of DERs in the wholesale market and improve forecasting capabilities to

better understand their location and behavior on the grid.

Beyond retail deregulation, the emergence of DERs has not significantly altered the utility business model in Massachusetts. NEM has been in place since 1982 with high levels of enrollment, and the Commonwealth has seen the same challenges with NEM as have emerged elsewhere in terms of appropriate compensation for excess generation and utility delivery charges. Massachusetts continues to operate under traditional cost of service ratemaking; however, some innovative proposals were approved in the recent Eversource rate case, including changes to NEM and approval of performance-based ratemaking (PBR).

The Commonwealth opened a proceeding on grid modernization in 2014, and the utilities filed grid modernization plans in 2015. In May 2018, the Massachusetts Department of Public Utilities (DPU) issued an order that approved utility proposals for grid-focused upgrades but not advanced metering infrastructure (AMI). Grid modernization investments will enhance automation and visibility of the grid and support the deployment of DERs; however, customer-facing investments were not approved. The lack of AMI limits the ability of the utilities to engage customers and develop offerings tailored to their needs.

While Massachusetts has made tremendous progress in the deployment of clean energy, it has not taken the more transformative steps that other states have taken to enable the integration and optimization of DERs. States that have focused on greater integration of DERs (e.g., New York and California) have initiated proceedings and pilots related to valuing DERs on the grid, identifying beneficial locations, and implementing non-wires alternatives with DERs. These states have

<sup>1</sup> ACEEE, *The 2017 State Energy Efficiency Scorecard*, 2017, <http://aceee.org/research-report/u1710>

highlighted the value that DERs can bring to the distribution grid beyond their renewable characteristics. In Massachusetts, the focus has been on integration of clean energy and reduction of GHG, which has resulted in high penetrations of

renewables. To date, however, the same focus has not been placed on upgrading physical infrastructure (e.g., AMI) and changing the utility business model to drive integration and optimization of DERs.

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## Introduction

Massachusetts has been a leader in the deployment of clean energy. It was an early adopter of RPS and has focused on energy efficiency. The Commonwealth's commitment to reducing its GHG has informed these policies, as well as other targets to implement EVs and battery storage.

Renewables make up 13% of total energy usage<sup>2</sup> in the Commonwealth. Decentralized renewable generation makes up 9.2% of nameplate capacity.<sup>3</sup> These figures illustrate the degree to which renewables are part of the Commonwealth's energy generation and consumption. Further demonstrating its priorities, the Commonwealth's current 2016–2018 Three-Year Energy Efficiency Plan sets a nation-leading energy savings target of 2.94% of electric sales. New England, generally, and Massachusetts, specifically, have been at the forefront of discussions to bring offshore wind and cheap hydropower from Canada into the region.

Such initiatives notwithstanding, the question this paper explores is whether and to what degree regulators and utilities are changing key elements of the utility business model and physical infrastructure to further accommodate DERs. DERs are defined as rooftop solar, battery storage, EVs, and demand response, typically located behind the customer meter. In states considered “transformative” in previous 51st State Perspective reports, there has been a combination of investment in infrastructure, proposals to change

the ratemaking construct, and clear regulatory focus on the integration and optimization of DERs.

When compared to other states, the Commonwealth has not provided the same focus on upgrading infrastructure, deploying AMI, or optimizing DERs as other states have. Some states have put particular emphasis on the integration and optimization of DERs. In places like New York and California, this focus has included proceedings related to valuing DERs on the grid, identifying beneficial locations, implementing non-wires alternatives with DERs, and sharing of data with DER developers that enable them to select optimal locations for implementation. Other proceedings have pushed utilities to make DER interconnection processes more streamlined. Pilots in both states have focused on how to integrate DERs into the distribution system (and some cases in the wholesale markets) and demonstrate the benefits they can provide under certain use cases. This does not diminish the Commonwealth's achievements in clean energy generally, but it does speak to the priorities that the DPU and legislature have set.

As in earlier 51st State Perspectives papers on New York, California, Illinois, and Colorado, this paper discusses the degree to which Massachusetts is transforming its grid to accommodate a variety of resources and will:

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2 EIA, calculated as percentage of net generation in Massachusetts from renewables, including small-scale solar, 2017, <https://www.eia.gov/state/print.php?sid=MA>

3 EIA, based on state-level summary data Form EIA-860 and Form EIA-861 filings, including net metered and non-net metered distributed renewable capacity, 2016, <https://www.eia.gov/state/print.php?sid=MA>

- Discuss the current state of the electricity market in Massachusetts
- Evaluate the degree to which the market has evolved from a traditional, centralized grid with limited customer choice to a more distributed system enabling more customer choice
- Assess whether Massachusetts’ utilities are prepared for rapid growth of DERs

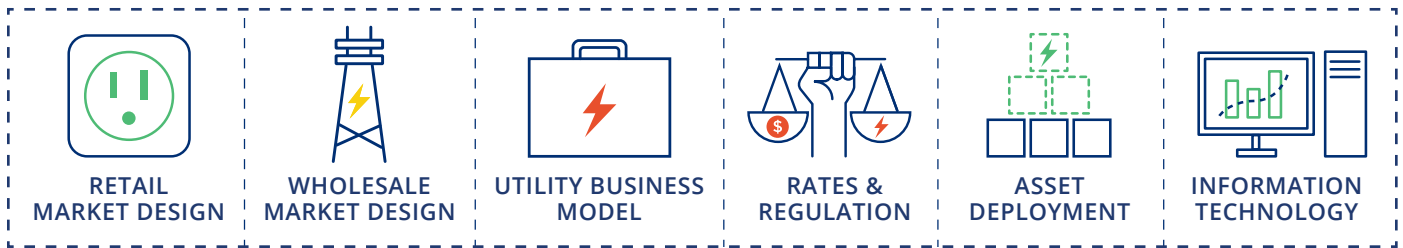
This paper begins by identifying the efforts taking place in particular areas through the lens of the market transformation “swimlanes” developed by SEPA in its previous report, *The 51st State—Phase II Developing Roadmaps to the Future*.<sup>4</sup> The swimlanes are organized to describe the current state of

Massachusetts’ utilities and infrastructure. The swimlanes are:

- Retail market design
- Wholesale market design
- Utility business models
- Rates and regulation
- Asset deployment
- Information technology

The paper then assesses the degree of transformation taking place in Massachusetts against the four key market reform doctrines from another SEPA report, *The 51st State—Blueprints for Electricity Market Reform*.<sup>5</sup>

## 51<sup>ST</sup> STATE SWIMLANES



Source: Smart Electric Power Alliance, 2016

## SEPA’S 51<sup>ST</sup> STATE KEY DOCTRINES

DOCTRINE		DESCRIPTION
<b>1.</b>	<b>PROMOTE EFFICIENCIES</b>	A primary goal of the market should be to promote efficiencies in the production, consumption, and investment in energy and related technologies.
<b>2.</b>	<b>CLEARLY DEFINE ROLES</b>	The role of the utility, as a public service entity, should be clearly defined so that all market participants can understand their roles in enabling customer options in a fair, transparent, and nondiscriminatory manner.
<b>3.</b>	<b>IDENTIFY PRINCIPLES OF RATEMAKING</b>	Rate structures should provide transparent cost allocation that supports a sustainable revenue model for utility services providing a public good.
<b>4.</b>	<b>FOSTER CUSTOMER CHOICE</b>	Customers should be presented with a variety of rate and program options that expand their choice of and access to energy-related products and services that are simple, transparent, and create stable value propositions.

Source: Smart Electric Power Alliance, 2016

4 SEPA, *The 51st State—Phase II: Developing Roadmaps to the Future*, 2016, <https://sepapower.org/knowledge/research/>

5 SEPA, *The 51st State—Blueprints for Electricity Market Reform*, 2016, <https://sepapower.org/resource/blueprints-for-electricity-market-reform/>



By combining these two frameworks, this paper provides a holistic view of the Commonwealth's electricity market and assesses the degree to

which it is transforming these elements to further integrate DERs.

## DERs IN MASSACHUSETTS

Massachusetts' leadership in the deployment of clean energy is well-documented, and the state has a long history of innovation in various areas, including energy efficiency, solar power, energy storage, and EVs.

### ENERGY EFFICIENCY

Massachusetts offers a variety of tax incentives and grant, rebate, and bond programs to encourage consumer investments in energy efficiency. It enables Property Assessed Clean Energy (PACE) financing; the programs that allow a property owner to finance the upfront cost of energy or other eligible improvements on a property and then pay the costs back over time through a voluntary assessment, though it does not currently have any active PACE programs. The state government has utilized a variety of approaches to achieve nation-leading energy savings, such as setting energy efficiency requirements for public buildings and vehicle fleets, benchmarking energy use, and encouraging the use of energy savings performance contracts. Additionally, research at several institutions in the state are focused on efficient vehicles.<sup>6</sup>

#### *Energy Efficiency Resource Standard*

In 2009, Massachusetts enacted an energy efficiency resource standard that applies to all utilities in the state (regulated and unregulated).

The standard requires utilities to offer programs that reduce the cost for consumers to make their homes more energy efficient. Between 2016–2018, the average incremental savings achieved by investor-owned utilities was 2.93%.<sup>7</sup> Additionally, in 2016, Massachusetts achieved 1.53M MWhs in energy savings and 228 MW in peak-demand reduction, which was the highest electricity demand reduction target among all the states with energy efficiency resource standards.<sup>8</sup>

#### *Public Buildings Requirements*

Massachusetts has several programs targeted at state buildings. Executive Order (EO) 484 (2007) requires a reduction in overall energy consumption in state-owned and leased buildings of 35% by 2020 from fiscal year 2004 consumption. In fiscal year 2015, continued progress in state buildings resulted in additional efficiency gains with a cumulative Energy Use Intensity (EUI)<sup>9</sup> reduction of 15% from a 2009 site EUI. The state publicly tracks progress toward EO 484 targets.<sup>10</sup>

### SOLAR POWER

In 2007, the Commonwealth initially set a target of 250 MW of solar generation by 2017, which was later revised to 1,600 MW by 2020. Massachusetts exceeded the 2020 target and currently ranks third in the nation for cumulative-installed solar capacity,<sup>11</sup> with 2,108 MW as of April 2018.<sup>12</sup>

6 ACEEE, *The 2017 State Energy Efficiency Scorecard*, 2017, <http://aceee.org/research-report/u1710>

7 Ibid.

8 EIA, *Massachusetts State Profile and Energy Estimates*, 2017, <https://www.eia.gov/state/analysis.php?sid=MA>

9 EUI expresses a building's energy use as a function of its size or other characteristics. More information can be found here: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/understand-metrics/what-energy>

10 Massachusetts State Government, *Massachusetts Leading by Example Initiative*, (no date) <https://www.mass.gov/service-details/leading-by-example-initiatives#transportation>.

11 NREL, *Open PV State Rankings*, 2017, <https://openpv.nrel.gov/rankings>

12 Massachusetts State Government, *Renewable Energy Snapshot*, 2018, <https://www.mass.gov/service-details/renewable-energy-snapshot>



**TABLE 1: SOLAR PHOTOVOLTAIC (PV) INSTALLED CAPACITY BY SECTOR, IN MEGAWATTS (MW<sub>DC</sub>)**

SECTOR	YEAR-END 2016	YEAR-END 2017
RESIDENTIAL PV CAPACITY	440	522
NON-RESIDENTIAL AND UTILITY SCALE PV CAPACITY	1,110	1,489
TOTAL	1,550	2,011

Source: GTM/SEIA, 2017<sup>13</sup>

Table 1 shows the increase in solar photovoltaic installed capacity by sector from 2016 to 2017.

The history of solar generation goes back more than four decades. In response to the 1970’s oil crisis, the Massachusetts legislature introduced a number of tax incentives to support the development of renewable energy resources, including solar.

With the restructuring of the electric industry in the 1990s, the rules were changed for qualifying facilities, and a Renewable Energy Trust Fund (Fund) was created to support the growth of renewable energy technologies via financial incentives. The Fund was transferred to the Massachusetts Clean Energy Center (MassCEC) after it was formed in 2009. The monies raised by the System Benefits Charge (SBC), a charge for renewable energy paid by customers of investor-owned utilities in Massachusetts, are now used to support MassCEC, which is dedicated to accelerating the success of clean energy technologies, companies, and projects in the Commonwealth, including solar.<sup>14</sup>

## ENERGY STORAGE

In accordance with the bipartisan energy legislation signed by Governor Baker in 2016 (the “Act”), the administration announced in June 2017 a 200 MWh energy storage target to be achieved by January 1, 2020. The target, set by the Division of Energy Resources (DOER), builds upon Governor Baker’s Energy Storage Initiative (ESI), a \$10 million commitment through grants to analyze opportunities to support Commonwealth storage companies and develop policy options to encourage energy storage deployment.

The Act further requires that each electric distribution company submit annual reports and a final compliance report to DOER no later than January 1, 2020, detailing how they have complied with the energy storage target.

Table 2 compares energy storage targets in Massachusetts with leading states, such as New York and California. The initial grant funding will gather data on different business models and applications that may ultimately lead to more ambitious targets in the future.

The forthcoming Solar Massachusetts Renewable Target (SMART) solar incentive program<sup>15</sup> contemplates an incremental incentive (for storage to encourage investment in solar + storage). This program, coupled with Governor Baker’s recently proposed “clean peak standard,”<sup>16</sup> which stipulates that a share of energy at times of peak demand come from clean sources,<sup>17</sup> may drive the development of more energy storage.

13 GTM/SEIA, *Solar Market Insight Report 2017 Year in Review*, 2018, <https://www.seia.org/research-resources/solar-market-insight-report-2017-year-review>

14 Ibid.

15 Massachusetts State Government, *Solar Massachusetts Renewable Target (SMART)*, 2018, <https://www.mass.gov/solar-massachusetts-renewable-target-smart>

16 The Clean Peak Standard would work similarly to an RPS where utilities have the option to pay an alternative compliance payment if the cost of procuring clean peak energy is too high.

17 Climate Action Business Association, *What Is The Clean Peak Standard and Will We See It in MA*, 2018, <https://cabaus.org/2018/04/03/clean-peak-standard-will-see-ma/>



**TABLE 2: STATE STORAGE TARGETS**

STATE	CAPACITY (GW)/ GENERATION (MWH) TARGET	YEAR TO ACHIEVE TARGET BY
ARIZONA (PROPOSED)	3.0 GW	2030
NEW JERSEY	2.0 GW	2030
NEW YORK	1.5 GW	2025
CALIFORNIA	1.325 GW	2024
MASSACHUSETTS	200 MWh	2020
OREGON	5 MWh	2020

Source: Power Magazine, 2018<sup>18</sup>

## FERC ORDER 841

In February 2018, FERC approved an order (Order 841) directing ISOs/regional transmission organizations (RTOs) to develop market rules for energy storage participation in energy, capacity, and ancillary service markets that recognize the physical and operational characteristics. ISOs/RTOs must submit compliance filings for Order 841 by December 2018, with implementation expected one year later. In response to this order, ISO-NE enhanced its rules for battery storage to address this gap, and implementation is anticipated later in 2018.

Source: ISO-NE<sup>19</sup>

## ELECTRIC VEHICLES

The 2008 Global Warming Solution Act (GWSA) required the Massachusetts Office of Energy and Environmental Affairs to establish a commonwealth-wide limit on GHG emissions of between 10% and 25% below 1990 levels for 2020 and 80% below 1990 levels by 2050. Since the transportation sector accounted for 40% of GHG emissions in 2011, this sector has become a primary focus in the effort to reduce GHG in Massachusetts.

In December 2010, Massachusetts released the Clean Energy and Climate Plan (CECP) containing a portfolio of policies that Commonwealth agencies are required to implement to ensure that the Commonwealth sufficiently reduces GHG emissions to achieve the 2020 target.<sup>20</sup> The deployment of zero-emission vehicles (ZEVs), such as battery electric vehicles (BEVs), fuel cell electric vehicles

(FCEVs), and plug-in hybrid electric vehicles (PHEVs), is a major thrust of the CECP.<sup>21</sup>

In May 2014, Massachusetts participated in a multi-state ZEV Action Plan and committed to increasing the number of ZEVs on the road in Massachusetts to 300,000 or 15% of the registered vehicles by 2025. The 2015 ZEV Action Plan has three broad goals: (1) complete the needed infrastructure and planning required to lay a solid foundation for the future, (2) spur market growth through consumer incentives, and (3) expand consumer awareness and increase the demand for ZEVs. As of December 2017, Massachusetts had 12,000 ZEVs deployed.<sup>22</sup>

Under the ZEV Action Plan, Massachusetts provides residents with rebates of up to \$2,500 for the purchase or lease of ZEVs and PHEVs. As of January 2018, Massachusetts had distributed more than \$12.7 million in ZEV rebates for

18 Power, *The Big Picture: Energy Storage Mandates*, 2018, <http://www.powermag.com/the-big-picture-energy-storage-mandates/>

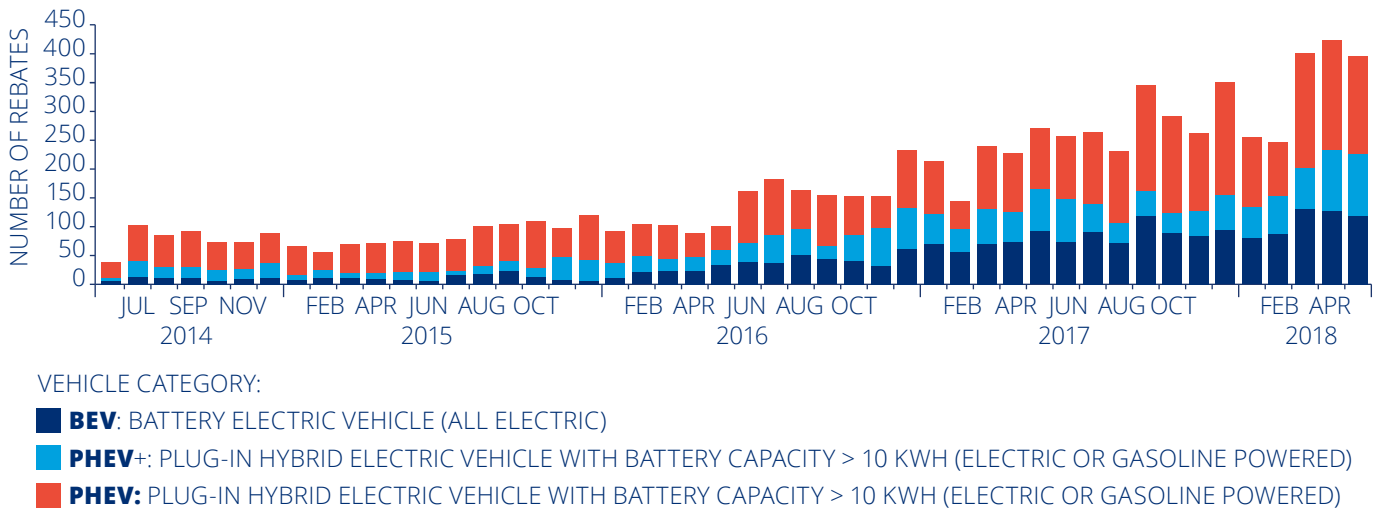
19 ISO-NE, *Enhanced Storage Participation presentation*, 2018, [https://www.iso-ne.com/static-assets/documents/2018/05/a10\\_presentation\\_enhanced\\_storage\\_participation.pptx](https://www.iso-ne.com/static-assets/documents/2018/05/a10_presentation_enhanced_storage_participation.pptx)

20 Massachusetts State Government, *Massachusetts Zero Emission Vehicle Action Plan: A Roadmap to reach 300,000 Zero Emission Vehicles on Massachusetts Roads by 2025*, 2015, <https://www.mass.gov/files/documents/2016/08/nk/massachusetts-zero-emission-vehicle-action-plan2015.pdf>

21 Ibid.

22 Natural Resources Defense Council, *Massachusetts Approves Precedential Electric Vehicle program*, 2017, <https://www.nrdc.org/experts/noah-garcia/massachusetts-approves-precedential-electric-vehicle-program>

**FIGURE 1: MOR-EV REBATES BY MONTH, JUNE 2018**



Source: <https://mor-ev.org/program-statistics>, 2018<sup>23</sup>

6,337 registered EVs.<sup>24</sup> As shown in [Figure 1](#), the Massachusetts Offers Rebates for Electric Vehicles (MOR-EV) program has become increasingly popular with rebates growing steadily month over month since 2014.

The Commonwealth has also provided financial incentives to selected public and private organizations for EVs and Level 2 dual-head charging stations.<sup>25</sup> In November 2017, as part of a rate case settlement, the DPU approved an Eversource request to put approximately \$45 million in public EV-charging infrastructure upgrades into rate base to enable widespread deployment of public, workplace, and multi-unit dwelling residence chargers. These “Eversource-side” investments were primarily for upgrades through distribution primary lateral service feeds, necessary transformer and transformer pads, new service meters, new service panels, and

associated conduits and conductors to connect each piece of equipment.<sup>26</sup>

23 MOR-EV, *MOR-EV Program Statistics*, 2018, <https://more-ev.org/program-statistics>.

24 Ibid.

25 Massachusetts State Government, *Massachusetts Zero Emission Vehicle Action Plan: A Roadmap to reach 300,000 Zero Emission Vehicles on Massachusetts Roads by 2025*, 2015, <https://www.mass.gov/files/documents/2016/08/nk/massachusetts-zero-emission-vehicle-action-plan2015.pdf>

26 Massachusetts State Government, *Order Establishing Eversource's Revenue Requirement*, 2017, [https://www.mass.gov/files/documents/2018/01/26/17-05\\_Final\\_Order\\_Revenue\\_Requirement\\_11-30-17.pdf](https://www.mass.gov/files/documents/2018/01/26/17-05_Final_Order_Revenue_Requirement_11-30-17.pdf)

# Current State of the Massachusetts Electricity Market

The Electric Industry Restructuring Act of 1997 (Restructuring Act) set the stage for Massachusetts' electric industry transformation by requiring investor-owned utilities to sell their generation and become wires-only transmission and distribution utilities. The Restructuring Act also set the Commonwealth's initial RPS. Section 11F directed the DOER to establish an RPS for all retail electricity suppliers selling electricity to end-use customers in the Commonwealth. This was initially set at 1%, increasing by 0.5% per year until it reached 4%.

In addition to restructuring in 1997, Massachusetts has passed a number of initiatives supporting various clean energy goals, including renewables and energy efficiency.

In 2008, then Governor Deval Patrick's administration expanded the Commonwealth's clean energy goals with the Green Communities Act (GCA). The GCA represented an important shift in the Commonwealth's energy policy, concentrating on several economic, environmental, and public policy objectives intended to encourage the adoption of energy efficiency and renewable energy resources. Specifically, the GCA:

- Required electric and gas utilities to develop three-year plans to acquire all cost-effective energy efficiency through a ratepayer-funded fully reconciling surcharge
- Authorized expanded NEM programs and higher caps

- Required electric utilities to enter into long-term contracts for renewable power source
- Expanded the Commonwealth's RPS requirements to increase by 1% annually<sup>27</sup> (after reaching 4% in 2009) and provided for annual remuneration payments for clean energy incentives
- Allowed electric utilities to construct and own/operate solar PV systems
- Authorized utility Smart Grid pilot programs

The GCA was amended in 2012 and 2016.<sup>28</sup> These amendments: (1) expanded the requirements for long-term contracts for renewable power, including requirements for wind power and hydroelectric solicitations; (2) increased the RPS requirements for retail electricity suppliers to 15% by 2020; and (3) required the DOER to set energy storage targets. Under the current policy, the RPS will reach 25% by 2030.<sup>29</sup>

In the decade since the initial passage of the GCA, Massachusetts built a first in the nation energy efficiency program and developed a robust clean energy industry that has resulted in more than 105,000 clean energy jobs and \$11.8 billion in Massachusetts' Gross State Product according to the MassCEC.<sup>30</sup> [Figure 2](#) shows that Massachusetts ranked number one in the ACEEE 2017 State Energy Efficiency Scorecard.

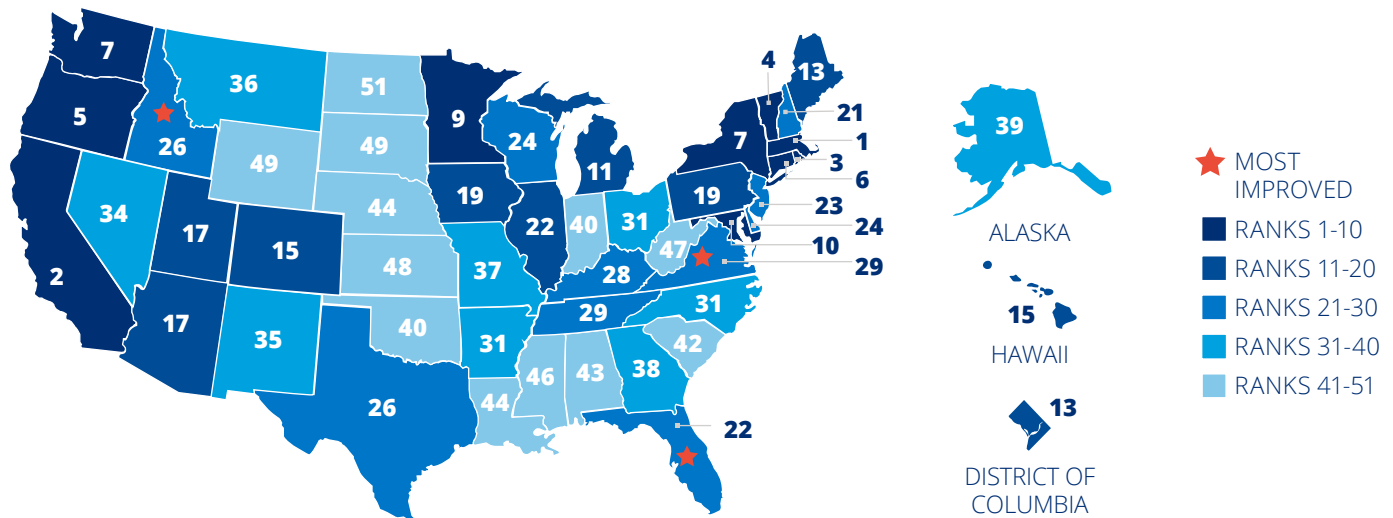
27 NECEC Institute and Mass Energy Consumers Alliance, *An Analysis of the Massachusetts Renewable Portfolio Standard*, 2017, <https://www.necec.org/files/necec/PDFS/An%20Analysis%20of%20the%20Massachusetts%20Renewable%20Portfolio%20Standard.pdf>

28 2012 Act relative to competitively priced electricity in the Commonwealth and 2016 Act to Promote Energy Diversity.

29 NECEC Institute and Mass Energy Consumers Alliance, *An Analysis of the Massachusetts Renewable Portfolio Standard*, 2017, <https://www.necec.org/files/necec/PDFS/An%20Analysis%20of%20the%20Massachusetts%20Renewable%20Portfolio%20Standard.pdf>

30 Massachusetts Clean Energy Center, *2016 Massachusetts Clean Energy Industry Report*, 2016, <http://www.masscec.com/2016-massachusetts-clean-energy-industry-report-0>

**FIGURE 2: ACEEE 2017 STATE ENERGY EFFICIENCY SCORECARD**



Source: ACEEE, 2017 State Scorecard<sup>31</sup>

To put the energy efficiency achievements in Massachusetts in perspective, New York’s recent announcement to accelerate energy efficiency

targets means that New York will achieve goals by 2025 that Massachusetts achieved in 2016.<sup>32</sup>

## RETAIL MARKET DESIGN

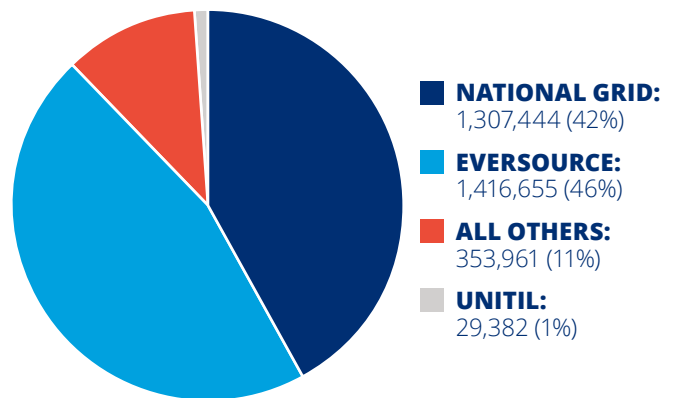
This section describes the current retail market, including customer choice and the evolving framework for DERs. As previously discussed, retail deregulation was instituted in 1997.

### RETAIL CUSTOMERS AND SALES

Eighty-eight percent of the Massachusetts retail electric customers are served by two utilities—National Grid USA (National Grid) and Eversource Energy (Eversource). The remaining customers are served by Unitil Corporation (Unitil), municipal utilities, and retail power marketers.

All three utilities (noted in [Figure 3](#)—Eversource, National Grid, and Unitil) are investor-owned utilities. Eversource is the largest electric utility in Massachusetts and has two regulated

**FIGURE 3: RETAIL CUSTOMERS BY UTILITY, 2016**



Source: EIA, 2016<sup>33</sup>

31 ACEEE, *The 2017 State Energy Efficiency Scorecard*, 2017, <http://aceee.org/research-report/u1710>

32 Utility Dive, *New York accelerates 2025 energy efficiency targets by 40%*, 2018 <https://www.utilitydive.com/news/new-york-raises-efficiency-targets-will-spend-36m-for-job-training/521863/>

33 EIA, *Sales\_Ult\_Cust\_2016* (file name), 2016, <https://www.eia.gov/electricity/data/eia861/>

utility-operating companies, NSTAR Electric and Western Massachusetts Electric Company (WMECO). National Grid also has two regulated utilities companies, Massachusetts Electric Company and Nantucket Electric Company. Until has one regulated company, Fitchburg Gas and Electric Light Company.

Overall retail electricity sales have declined slightly since 2011, decreasing by 3.77% through 2016. This decline is due in part to energy efficiency investments over the same timeframe. During this period residential sales declined by 3.8%, while C&I sales together declined by 3.74%.<sup>34, 35</sup> Retail electricity prices in Massachusetts are some of the highest in the country with Massachusetts having the second highest rates after Hawaii. The 10 states

with the highest retail electricity rates in the residential sector are provided in [Table 3](#).

## CUSTOMER CHOICE

Retail electric customers in Massachusetts have been able to choose whether they purchase electricity from their regulated distribution company or from a competitive supplier since March 1998. Customers are able to choose from a range of independent power producers (IPPs) offering different rates, energy sources, and contract terms. Massachusetts has an “opt-in” retail structure, whereby customers who do not shop for competitive rates pay a default rate referred to as “the basic service rate.”

Switching rates across customer classes have increased over time, including during the period from 2016–2018, as shown in [Figure 4](#). Residential customer migration rates to competitive supply have increased significantly from 23.2% in 2016 to 46% in 2018. Small commercial and industrial (C&I) customers currently have slightly higher switch rates of 53.5%. Large C&I customers exhibit the highest switching rates.

In a potentially important development, the Massachusetts Attorney General recently issued a report that questions the fairness of rates with retail choice in the retail electricity market for residential customers.<sup>37</sup> The DPU has yet to comment on the findings from this report.

**TABLE 3: RANKINGS OF STATES WITH HIGHEST AVERAGE RETAIL ELECTRICITY PRICES IN RESIDENTIAL SECTOR, FEBRUARY 2018 (CENTS/KWH)**

RANK	STATE	CENTS/KWH
1	HAWAII	31.52
2	MASSACHUSETTS	22.23
3	RHODE ISLAND	21.66
4	CONNECTICUT	21.59
5	ALASKA	21.11
6	NEW HAMPSHIRE	19.84
7	CALIFORNIA	19.15
8	NEW YORK	18.19
9	VERMONT	18.03
10	MAINE	16.22

Source: EIA, 2018<sup>36</sup>

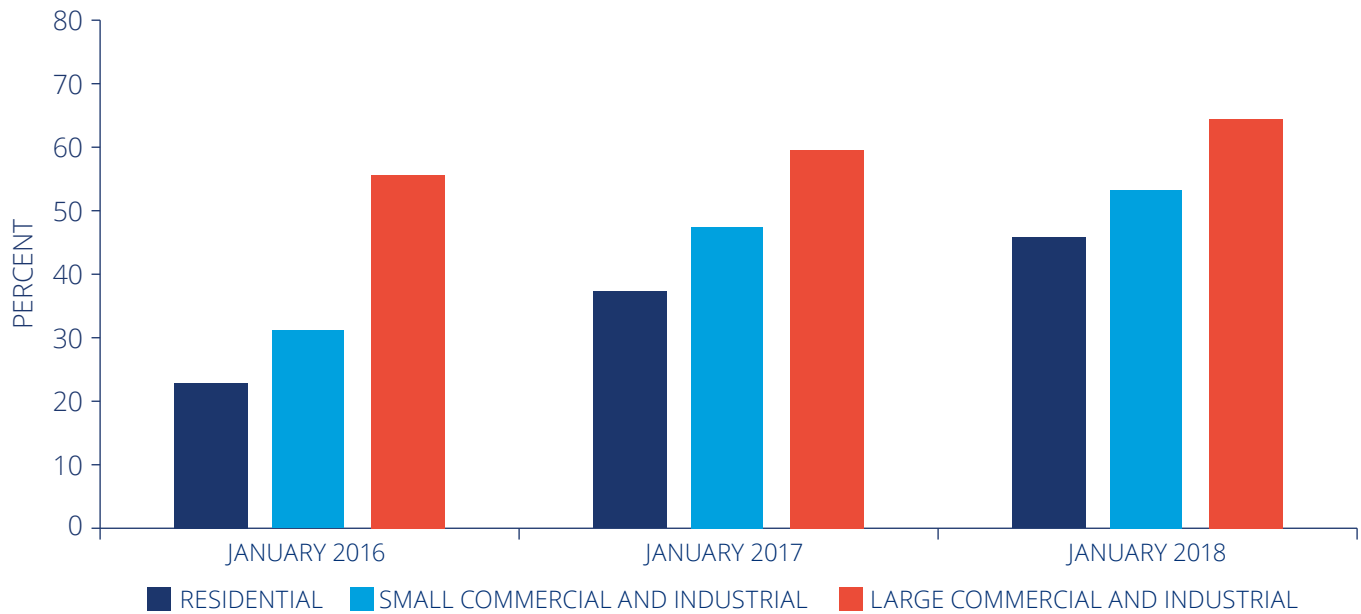
34 EIA, Full Data Tables 1-14 (file name), 2016, <https://www.eia.gov/electricity/state/massachusetts/>

35 EIA, State Electricity Profiles 2011, 2014, <https://www.eia.gov/electricity/state/archive/sep2011.pdf>

36 EIA, State Rankings: Average Retail Price of Electricity to Residential Sector, 2018, <https://www.eia.gov/state/rankings/?sid=MA#/series/31>.

37 “Citing aggressive sales tactics, false promises of cheaper electric bills and the targeting of low-income, elderly, and minority residents, Attorney General Maura Healey issued a report [on 3/29/18] calling for an end to the competitive electricity supply market for individual residential customers in Massachusetts.” <https://www.mass.gov/doc/comp-supply-report-final>

**FIGURE 4: PERCENTAGE OF CUSTOMERS RECEIVING COMPETITIVE ELECTRIC SUPPLY, BY CUSTOMER CLASS**



Source: Massachusetts DPU, 2018<sup>38</sup>

**NET ENERGY METERING**

The Massachusetts DPU authorized NEM beginning in 1982. Nearly all sectors of the economy are eligible for NEM<sup>39</sup> and investor-owned utilities must offer it. Municipalities are not obligated but may do so voluntarily.

A NEM customer may use any type of generating technology, regardless of whether it is a renewable technology, as long as it is smaller than or equal to 60 kilowatts (kW).<sup>40</sup> If the customer uses wind, solar, or anaerobic digestion technology, then it must be 2 MW or less for a private facility or 10 MW or less for a public facility.<sup>41</sup>

Under current NEM rules, customers receive the “average monthly market price of generation” for the net excess generation (NEG). Credits roll over monthly and may be transferred to another customer of the same utility as long as they are within the same service territory and ISO-NE load zone.<sup>42</sup>

As with all net metering programs, Massachusetts has struggled with the issue of setting limits (caps) on the amount of generation sold back to the utility and how to fairly allocate transmission and distribution costs to all customers. Since 2008, NEM has consistently grown and periodically exceeded the caps established by prior legislation. Under the

38 Massachusetts State Government, 2016, 2017, and 2018 Monthly Electric Customer Migration Data, 2018, <https://www.mass.gov/service-details/electric-customer-migration-data>

39 Includes commercial, industrial, residential, nonprofit, school, local government, state government, federal government, agriculture and institutional customers, and investor-owned utilities (i.e., Eversource, National Grid, and Unitil)

40 Massachusetts Department of Public Utilities (MA DPU), *Net Metering* (MGL c. 164, § 138; 220 CMR 18.00), 2017, <https://www.mass.gov/regulations/220-CMR-18-net-metering>

41 Massachusetts State Government, Section 138 (MGL c. 164, § 138), 2016 (last update), <https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXXII/Chapter164/Section138>

42 ScottMadden, *Massachusetts: Net Metering and Grid Modernization Plan*, 2017, [https://www.scottmadden.com/wp-content/uploads/2018/06/ScottMadden\\_EIU\\_V18\\_I1\\_2018.pdf](https://www.scottmadden.com/wp-content/uploads/2018/06/ScottMadden_EIU_V18_I1_2018.pdf)



**TABLE 4: GENERAL PROGRAM NET METERING CAPS (THROUGH MAY 1, 2018)**

<b>DISTRIBUTION COMPANY</b>	<b>PRIVATE CAP (7%)</b>	<b>PUBLIC CAP (8%)</b>
<b>NATIONAL GRID - MASSACHUSETTS ELECTRIC COMPANY</b>	359.17 MW	410.48 MW
<b>NATIONAL GRID - NANTUCKET ELECTRIC COMPANY</b>	3.50 MW	4.00 MW
<b>EVERSOURCE ENERGY - NSTAR ELECTRIC COMPANY</b>	348.46 MW	398.24 MW
<b>EVERSOURCE ENERGY - WESTERN MASS. ELECTRIC CO.</b>	59.78 MW	68.32 MW
<b>UNITIL - FITCHBURG GAS AND ELECTRIC LIGHT COMPANY</b>	7.14 MW	8.16 MW

Note: Public facilities are facilities owned by municipalities and other government entities.

Source: Massachusetts System of Assurance of Net Metering Eligibility<sup>43</sup>

most recent legislation in April 2016 (H.B. 4173), net metering caps were raised from 3% to 7% for private facilities and 8% for facilities owned by municipalities and other government entities, as shown in [Table 4](#).<sup>44</sup> Caps have already been reached by one National Grid utility, one Eversource utility, and Unitil (effective May 1, 2018).<sup>45</sup>

Under the general NEM program in Massachusetts, new customers who wish to participate in the net metering program cannot do so once the public utility fills its cap. However, this restriction does not apply to facilities with a nameplate rating<sup>46</sup> of less than 10 kW on a single-phase circuit or 25 kW on a three-phase circuit.<sup>47</sup> Public and private net metering facilities have different size limits and may generate different credit values.<sup>48</sup>

As a compromise for increasing the cap on the volume of net metering, H.B. 4173 lowers net metering rates to 60% of the retail rate for certain commercial installations and allows public utilities to implement a “monthly minimum reliability” charge for NEM solar customers to cover the cost of transmission and distribution maintenance. While this charge provides some relief to the public utilities, advocates and lawmakers agree that Massachusetts’ net metering program does not yet provide a comprehensive solution to long-term sustainable behind-the-meter solar power generation.

43 MassAcA, *Massachusetts System of Assurance of Net Metering Eligibility*, 2018, <https://app.massaca.org/allocationreport/report.aspx>

44 The cap is equal to a percentage of each electric company’s highest historical peak load, which is the most electricity consumed by the electric company’s customers at any one time.

45 ScottMadden, *Massachusetts: Net Metering and Grid Modernization Plan*, 2017, [https://www.scottmadden.com/wp-content/uploads/2018/06/ScottMadden\\_EIU\\_V18\\_I1\\_2018.pdf](https://www.scottmadden.com/wp-content/uploads/2018/06/ScottMadden_EIU_V18_I1_2018.pdf)

46 Nameplate is the maximum rated output of a generator or other electric power production equipment under specific conditions designated by the manufacturer. Installed generator nameplate capacity is commonly expressed in megawatts (MW).

47 Massachusetts DPU, *Net Metering (220 CMR 18.02, 18.07(5))*, 2017, [https://www.mass.gov/files/220\\_cmr\\_18.00\\_final\\_12-1-17\\_0.pdf](https://www.mass.gov/files/220_cmr_18.00_final_12-1-17_0.pdf)

48 Massachusetts State Government, *Net Metering Guide*, 2016, [www.mass.gov/guides/net-metering-guide](http://www.mass.gov/guides/net-metering-guide)



## RETAIL MARKET DESIGN SUMMARY

The Commonwealth of Massachusetts has a long history of leadership and innovation in clean energy. Industry restructuring was completed in 1997, at the very front end of the first wave of major regulatory reform in the United States, and the Commonwealth was an early leader in energy efficiency, establishing the frameworks

and incentives for utilities to participate in achieving industry-leading savings. By establishing favorable NEM provisions for DERs and setting aggressive RPS targets, Massachusetts has also consistently encouraged deployment of both large- and small-scale renewables.

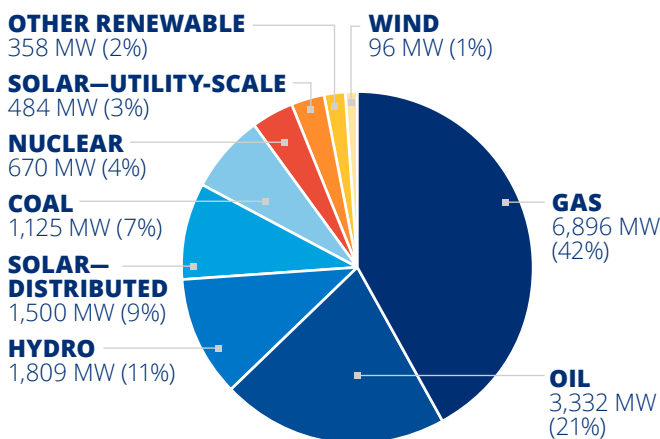
## WHOLESALE MARKET DESIGN

Wholesale market design is also a key factor in either encouraging or discouraging the adoption of DERs. Sources of wholesale power, generation planning and dispatch, and transmission planning and operations all impact retail market design. The opposite is true as well as retail market programs impact wholesale market design and operations.

### GENERATION SUPPLY MIX

Natural gas, oil, and hydro generation fuel the Commonwealth of Massachusetts and accounted for 74% of total nameplate capacity in 2016 as shown in [Figure 5](#).<sup>49</sup>

**FIGURE 5: MASSACHUSETTS GENERATION SUPPLY MIX**



### WHOLESALE MARKET

ISO-NE serves as the balancing authority for the region with eight separate “load zones”—one each for the states of Connecticut, Maine, New Hampshire, Rhode Island, and Vermont and three for the Commonwealth of Massachusetts. As Massachusetts is part of ISO-NE, the ability of DERs in the Commonwealth to access the wholesale market is determined by ISO-NE’s market rules.

The wholesale electricity market in ISO-NE is comprised of distinct markets for different types of electricity products:<sup>50</sup>

### NEW ENGLAND CLEAN ENERGY CONNECT

In response to the Massachusetts RFP, the \$1.6B Eversource and Hydro Quebec project was selected to deliver hydropower from Canada to customers in southern New England through a 192-mile transmission line in New Hampshire. However, New Hampshire denied siting, and Massachusetts is instead moving forward with Central Maine Power’s \$950 million “New England Clean Energy Connect 100% Hydro” project.

49 EIA, *State Electricity Profiles*, 2018, <https://www.eia.gov/electricity/state/massachusetts/>

50 ISO-NE, *Energy Storage Market Participation*, 2017, <https://www.iso-ne.com/static-assets/documents/2017/04/20170411-webinar-energy-storage.pdf>

- **Energy Market:** System for purchasing and selling electricity using supply and demand to set the price, including day-ahead forward and real-time spot markets for electricity.
- **Forward Capacity Market:** Three-year forward market where resources receive compensation for investing in and delivering capacity in the capacity commitment period.
- **Ancillary Services Market:** Services that ensure the reliability of production and transmission of electricity.

As the resources that participate in ISO-NE market continue to evolve, ISO-NE modifies its market rules and system infrastructure to enable those with unique attributes to supply needed electricity products. ISO-NE stakeholders are actively engaged in shaping and amending market rules, technical performance requirements, and application processes for non-traditional resources, such as DERs.

## DERs IN THE WHOLESALE MARKET

Several types of DERs are participating in ISO-NE:

- **Aggregated Demand Resources:** This includes active demand resources, such as demand response produced by behind-the-meter load management, dispatchable distributed generation, and energy storage technologies. They are fully integrated into the wholesale market and are able to supply capacity, energy, reserve, and regulation services. Passive demand resources, such as energy efficiency measures and non-dispatchable distributed generation, are primarily designed to save electricity across many hours, but they cannot change the amount saved in response to a dispatch instruction.<sup>51</sup>
- **Solar Resources:** While there are some large-scale solar operations, the great majority of solar generation in Massachusetts is in the form of small-scale generators, such as rooftop residential and commercial systems that are

not connected to the regional high-voltage transmission system.

- **Energy Storage:** Most bulk energy storage in Massachusetts is in the form of pumped storage hydropower, which totals about 1,540 MW. However, ISO-NE reports that “battery storage projects totaling more than 400 MW of capacity have requested interconnection to the regional power system, in addition to the 20 MW of current battery storage on the system.”<sup>52</sup> Currently, storage participation rules allow battery storage to participate in all of ISO-NE’s markets, but rules do not recognize unique physical and operational capabilities of batteries.

All in front-of-the-meter DERs in Massachusetts are treated as generation resources when they meet volume and reliability criteria, and behind-the-meter DERs can participate as generation resources or as demand resources that are able to reduce load. While the primary purpose of demand resources is to reduce electricity demand, ISO-NE market rules allow demand resources composed of distributed generation or energy storage with appropriate interconnection to be compensated for energy injected into the electric system. ISO-NE also encourages non-traditional generation resources to access and participate in the New England wholesale market. While there is a 100 kW minimum size requirement for participating in the capacity market, there is no size requirement for in front-of-the meter generation resources to participate in the energy market. Demand resources must have at least 100 kW of capacity to participate in any of the wholesale markets, but they are allowed to aggregate to meet that size threshold.

ISO-NE is working to ensure the appropriate integration of these resources as they impact the real-time dispatch process and long-term management of system capacity. A number of DER-related issues are being addressed including:<sup>53</sup>

51 ISO-NE, *About Demand Resources*, 2018, <https://www.iso-ne.com/markets-operations/markets/demand-resources/about>

52 ISO-NE, *State of the Grid: 2018*, 2018 [https://www.iso-ne.com/static-assets/documents/2018/02/02272018\\_pr\\_presentation\\_state-of-the-grid\\_2018.pdf](https://www.iso-ne.com/static-assets/documents/2018/02/02272018_pr_presentation_state-of-the-grid_2018.pdf)

53 Ibid.

- **Price-Responsive Demand:** On June 1, 2018, ISO-NE launched a new price-responsive demand (PRD) structure that completes the full integration of demand response resources into the regional wholesale electricity markets. Building on the long-standing ability of demand resources to participate in the capacity market, PRD makes ISO-NE the first U.S. grid operator to incorporate demand response resources into the energy dispatch and reserve designation process along with generating resources.<sup>54</sup>
- **Intermittent Availability:** Distributed solar power generation is subject to weather conditions that can lead to rapid and sizeable swings in power output, and a greater introduction of solar power resources may increase the need for fast-starting, flexible generation resources that can take up the slack when wind and solar resources rapidly decline. This challenge is currently being addressed in part through additional reliance on gas-fired generation [see sidebar below], but recent analysis from ISO-NE points to the very real potential for Massachusetts to experience the “duck curve” effect,<sup>55</sup> similar to what is already being observed in California. ISO-NE has 2,400 MWs of solar capacity, much of which is distributed and the majority of which is in Massachusetts. As solar and wind resources approach 30% of total generation in Massachusetts, investments will need to be made to ensure that demand response and peaking generation match the load profile in real time.
- **Lack of Visibility:** Rooftop and other sources of small-scale solar generation are often installed behind-the-meter. ISO-NE currently forecasts the amount of PV generation that is expected to be installed in New England over the next 10 years, and ISO-NE estimates five-

minute PV production profiles by location. The PV production profiles are currently used to estimate the load reduction impacts of behind-the-meter PV generation on the load forecast.

- **Stable Interconnection Methods:** ISO-NE has added “ride-through” performance requirements for transmission-connected resources, which requires those resources be configured to temper low-voltage conditions that can be triggered when a transmission line or generator trips offline. Massachusetts now requires ride-through performance on distribution-connected resources, and the other states in the region are developing similar requirements.<sup>56</sup>
- **A Risk to Stable Market Prices:** Massachusetts’ efforts to foster clean energy resources have long-term implications for

## NATURAL GAS PIPELINE INFRASTRUCTURE ISSUES

The confluence of the aging coal, oil, and nuclear fleet in New England, increasing natural gas generation capacity, and lower natural gas prices from increased shale production in the Marcellus and Utica basins have driven a higher proportion of natural gas-fired generation in the region—pushing gas pipeline capacity in the region to its limits, particularly during winter months. This has had negative impacts on the usefulness of gas generation to assist in managing intermittency in some months, and it has led to a lingering dependence on switching and co-firing with oil during market constraints to maintain system reliability.

54 ISO Newswire, *Price-responsive demand explained: Q&A with Henry Yoshimura, ISO Director of Demand Resource Strategy*, 2018, <http://isonewswire.com/updates/2018/6/6/price-responsive-demand-explained-qa-with-henry-yoshimura-is.html>

55 Greentech Media, *Massachusetts is Staring Down a Duck Curve of its Own. Storage Could Help*, 2018 [https://www.greentechmedia.com/articles/read/massachusetts-is-staring-down-a-duck-curve-of-its-own-storage-could-help?utm\\_source=Daily&utm\\_medium=email&utm\\_campaign=GTMDaily#gs.NGYjYcM](https://www.greentechmedia.com/articles/read/massachusetts-is-staring-down-a-duck-curve-of-its-own-storage-could-help?utm_source=Daily&utm_medium=email&utm_campaign=GTMDaily#gs.NGYjYcM)

56 ISO-NE, *Implementation of Revised IEEE 1547*, 2018, [https://www.iso-ne.com/static-assets/documents/2018/02/a2\\_implementation\\_of\\_revised\\_ieee\\_standard\\_1547\\_presentation.pdf](https://www.iso-ne.com/static-assets/documents/2018/02/a2_implementation_of_revised_ieee_standard_1547_presentation.pdf)



ISO-NE's wholesale electricity market. ISO-NE has proposed changes in the Forward Capacity Market (FCM) to help coordinate the entry of new clean energy resources. ISO-NE is also pursuing changes necessary to ensure appropriate compensation for resources making critical contributions to reliability, such

as “providing fast response, flexible operation, and voltage and frequency support.” Finally, ISO-NE is working to measure the potential impact of new generation resources and the retirement of existing power generation resources on the region's ability to maintain a reliable supply of electricity during peak winter months.

## WHOLESALE MARKET DESIGN SUMMARY

NE-ISO has taken important steps to plan for and integrate DERs into the wholesale market. Aggregated demand resources are fully integrated into the wholesale market, while non-dispatchable DERs can be compensated for energy injected into the system. FERC's 2018 order requiring

ISOs/RTOs to devise and implement rules that recognize unique characteristics of storage in the near term represents an important step for wholesale market participation. About 16% of New England's capacity consists of DERs (vs. 9% for Massachusetts as stated above).<sup>57</sup>

## UTILITY BUSINESS MODEL

Investor-owned utilities in Massachusetts remain wires-only transmission and distribution utilities, but their regulatory and business model has undergone a series of changes, from performance-based ratemaking (PBR) and deregulation in the 1990s to decoupling<sup>58</sup> in the 2010s. Municipal utility systems and cooperatives in the Commonwealth were not required to restructure and they still serve as traditional vertically integrated utilities with both generation and transmission assets.

It is important to note that CCA<sup>59</sup> has gained popularity as a mechanism by which communities may choose alternative commodity suppliers. While this should have minimal impact on the wires-only utilities, they do provide yet another

supply alternative in addition to the retail energy service providers serving the Commonwealth.

The Massachusetts DPU has two primary regulatory mechanisms through which it sets performance goals for the electric distribution companies: (1) annual service quality (SQ) reports and (2) energy efficiency proceedings.

The DPU established service quality standards to ensure that the quality of customer service did not deteriorate with the implementation of a new model of ratemaking or PBRs. Starting in 2016, the service quality standards shifted from preventing performance deterioration to requiring improved service quality. The electric distribution companies file their annual service quality reports every year on March 1.

57 ISO-NE, *Participation of DER Aggregations in Markets Operated by RTOs/ISOs: Docket Number RM18-9-000* (filing before FERC), 2018, <https://www.ferc.gov/CalendarFiles/20180410100927-Yoshimura,%20ISO%20New%20England.pdf>

58 Pursuant to DPU Docket 07-50-A in 2008, the Massachusetts DPU issued an order calling for revenue decoupling by electric and natural gas distribution companies. Previously, distribution companies' revenues were tied to sales, creating an incentive to sell more electricity to earn more revenue. Decoupling separates the distribution companies' revenues from changes in consumption. <https://database.aceee.org/state/utility-business-model>

59 CCAs are not-for-profit corporations that aggregate a customer base—usually, but not always, in a specific city or region—and provide electricity on the retail level. Seven states, including Massachusetts, allow for the formation of CCAs. The aggregating organization can purchase electric power directly in wholesale markets, but it still retains the incumbent utility for distribution, metering, and billing. An overview of CCAs in the context of the 51st State can be found in this SEPA article: <https://sepapower.org/knowledge/community-choice-aggregation/>.

An electric company's performance is measured in two categories: (1) customer service and satisfaction and (2) safety and reliability. Penalties are either company-specific or assessed according to the "Glide Path Method," where the penalty threshold shifts from a company-specific benchmark in three-year intervals to reach a common statewide target in 10 years. See [Table 7](#) and [Table 8](#) Performance Metrics in the appendix for more detail.

## PERFORMANCE INCENTIVE METRICS

Massachusetts also instituted performance incentive regulations in 2015 to encourage the development of energy efficiency initiatives. Three-year plans prepared by wires utilities for DPU approval include a proposed mechanism to provide an incentive to distribution companies based on

their success in meeting or exceeding certain performance goals.

The utilities collect performance incentive dollars when their evaluated performance meets the following levels:

- Design-level performance is defined as 100% of a utility's projected benefits and net benefits.
- Exemplary performance is defined as 125% of design-level performance.
- Threshold performance requires the achievement of 75% of design-level performance by component.

The cap for the total possible performance incentives earned across all components is 125% of design-level performance.

## UTILITY BUSINESS MODEL SUMMARY

Massachusetts underwent retail deregulation in 1997, which left investor-owned utilities as wires-only businesses. Since restructuring, retail choice (including CCAs) has been in effect for electric customers, providing them with additional supply options. The DPU requires performance goals to ensure reliability, safety, and customer service performance goals are met, and it uses

performance incentive metrics to reward energy efficiency achievements. Decoupling has removed a potential disincentive for utility implementation of efficiency programs. Aside from retail deregulation, the utility business model has not changed significantly due to the introduction of DERs.<sup>60</sup>

## RATES AND REGULATION

Massachusetts uses a traditional cost of service ratemaking approach with historical test years. Additionally, the DPU has authorized the use of several cost recovery mechanisms, including energy efficiency, renewable energy, uncollectibles expense, incremental capital investment, and transmission expenses. In 2007, the DPU directed all utilities to implement full decoupling in order to facilitate energy efficiency programs.<sup>61</sup> To date,

the Commonwealth has not moved away from traditional cost of service ratemaking, as it has incorporated non-traditional resources or DERs.

### RATE STRUCTURES

Almost 50% of retail customers have opted for an alternative energy service provider; the remainder take basic service (i.e., default service) from their electric distribution utility.

60 Massachusetts DPU, *Investigation by the Department of Public Utilities Upon its Own Motion into Time Varying Rates* (D.P.U. 14-04), 2014, <http://www.synapse-energy.com/sites/default/files/Comments-Time-Varying-Rates-14-025.pdf>

61 Massachusetts DPU, *Order Establishing Eversource's Rate Requirement*, (D.P.U. 17-05), 2017, [https://www.mass.gov/files/documents/2018/01/26/17-05\\_Final\\_Order\\_Revenue\\_Requirement\\_11-30-17.pdf](https://www.mass.gov/files/documents/2018/01/26/17-05_Final_Order_Revenue_Requirement_11-30-17.pdf)



## Pricing Options to Electric Customers

Residential or small C&I basic service customers have two pricing options—one fixed and one variable:

- **Fixed-price option:** price remains fixed for six months
- **Variable-pricing option:** price changes monthly

The default option is the six-month fixed-price option, and customers must contact their utility to opt-in to the variable price option.

Medium or large C&I basic service customers also have two pricing options:

- Variable-pricing option, where the price changes each month
- Three-month fixed-price option, where the price remains constant for three months

The default option is variable-pricing, and customers must contact their utility to opt-in to the fixed-price option.

## Time-Varying Rates

On January 23, 2014, the DPU opened an investigation into time-varying rates (TVRs). In that regulatory order, the DPU stated that TVRs will:

- Allow customers, assisted by new technologies (e.g., advanced meters, in-home displays, programmable thermostats, load control devices), to respond to the actual varying cost of electricity
- Reduce peak energy and capacity market costs
- Reduce costs to individual customers
- Increase system efficiencies and support the distribution system by reducing peak demand
- Provide incentives for distributed resources, such as solar PV generation, electricity storage, EVs, and targeted energy efficiency and demand response<sup>62</sup>

The DPU proposed that basic service be changed from its current flat rate structure to a time-varying pricing structure. Customers may opt-out of TVRs and into a flat rate structure with a peak-time rebate (PTR) component.

Electric distribution companies were required to address TVRs in their Grid Modernization Plans (GMPs) submitted in 2015. Eversource and National Grid included TVRs in their proposed plans on an opt-in basis. Though both companies moved forward while awaiting final approval of their GMPs, serious questions remain about the feasibility of implementing TVRs with the existing AML, which is limited. In May 2018, the DPU issued a final decision on the GMPs, resulting in the TVR requirement being placed on hold. This order is discussed in more detail in the following sections.

## THE EVERSOURCE RATE CASE—INDICATION OF THINGS TO COME?

From the mid-1990s to the mid-2000s, the electric utilities operated under price cap PBR plans, but those were terminated when the utilities implemented decoupling. In January 2017, Eversource Energy proposed revenue cap PBR mechanisms in its general rate case for NSTAR Electric and Western Massachusetts Electric, and the rate case decision in late 2017 provides a view on the DPU's priorities.

The PBR mechanism works in conjunction with the decoupling mechanism, whereby the decoupling mechanisms target revenue is set by the PBR mechanism. The DPU approved the PBR mechanism with some modifications and directed the utility to propose performance metrics.<sup>63</sup> It includes:

- An annual rate adjustment, pursuant to a revenue cap formula (unaffected by the number of customers), which would be a substitute for its traditional capital cost recovery mechanism

<sup>62</sup> Massachusetts DPU, *Investigation by the Department of Public Utilities on its own Motion into Modernization of the Electric Grid* (D.P.U. 12-76-B), 2014, <http://www.raabassociates.org/Articles/MA%20DPU%2012-76-B.pdf>

<sup>63</sup> Massachusetts DPU, *Order Establishing Eversource's Rate Requirement*, (D.P.U. 17-05), 2017, [https://www.mass.gov/files/documents/2018/01/26/17-05\\_Final\\_Order\\_Revenue\\_Requirement\\_11-30-17.pdf](https://www.mass.gov/files/documents/2018/01/26/17-05_Final_Order_Revenue_Requirement_11-30-17.pdf)

- Five-year performance targets, intended to reduce the number of base rate cases
- Performance metrics, to be determined, focused on improvements to customer service and engagement, reductions in system peak, and progress toward climate adaptation and GHG reduction
- An earnings sharing mechanism with a 200-basis point deadband: incremental earnings of 200 basis points or more above allowed return on equity (10%) will be shared—75% to ratepayers and 25% to Eversource

Importantly, the DPU found that the PBR was more likely than current regulation to advance the

Department's goals of safe, reliable, and least cost energy service, while also promoting the objectives of economic efficiency, cost control, lower rates, and reduced administrative burden.

Further, regulators approved the Monthly Minimum Reliability Charge (MMRC) proposed by Eversource. This MMRC includes a mandatory demand charge, higher monthly customer charges, and lower per kWh charges for new rooftop solar customers and aligns with MMRC legislation discussed earlier in this paper. The demand charges are controversial, and solar energy advocates will be watching to see what impacts this mechanism will have on solar development in Massachusetts.

## RATES AND REGULATION SUMMARY

Massachusetts uses traditional cost of service regulation, and the DPU authorizes the use of several cost recovery mechanisms for renewable energy, energy efficiency, transmission expenses, and incremental capital investments. In 2007, Massachusetts implemented decoupling to encourage energy efficiency programs. Both residential and non-residential customers have

both fixed-price and variable-pricing options. While TVRs have been an area of focus, they have not been implemented due to the lack of supporting infrastructure. Eversource's recent rate case provides an indication of where the DPU may focus going forward, including PBR and the implementation of MMRC.

## ASSET DEPLOYMENT AND INFORMATION TECHNOLOGY

### GRID MODERNIZATION PLANS

In October 2012, the DPU opened a proceeding on grid modernization (D.P.U. 12-76). In 2014, the DPU became one of the first state commissions to require all electric distribution companies to prepare comprehensive 10-year GMPs. The goal was to create a "cleaner, more efficient, and reliable" electric system that will also move the Commonwealth forward toward its "clean energy goals by maximizing the integration of solar, wind, and other local and renewable sources of power."<sup>64</sup>

The Order required the utilities to file GMPs outlining how each proposed to make measurable progress toward the following grid modernization objectives:

1. Reducing the effects of outages
2. Optimizing demand, which includes reducing system and customer costs
3. Integrating distributed resources
4. Improving workforce and asset management

<sup>64</sup> Massachusetts DPU, *Investigation by the Department of Public Utilities on its own Motion into Modernization of the Electric Grid* (D.P.U. 12-76-B), 2014, <http://www.raabassociates.org/Articles/MA%20DPU%2012-76-B.pdf>



In the GMP filings, each distribution company was required to include a five-year short-term investment plan (STIP) that detailed an approach to achieving AMI<sup>65</sup> within five years of the DPU's approval of the GMP. However, if the company's business case did not justify deployment of AMI within that time period, the company had the option of recommending an alternative extended timeframe. Each company's AMI plan had to include the following:

- Collection of interval usage data in near real time, usable for settlement in ISO-NE's energy and ancillary services markets
- Automated outage and restoration notification
- Two-way communication between the customer and the electric distribution company
- Communication and control of appliances (with customer's permission)

[Table 5](#) provides a comparison of differences and similarities between each utility's plans submitted in 2015.

In May 2018, the DPU issued a final decision that refined its 2014 grid modernization order objectives. The order approves a plan to invest \$220 million in grid modernization technologies on the distribution system over the next three years. The investments will increase automation and situational awareness, and they will also enable volt/VAR (VVO) optimization.<sup>66</sup> The DPU stated that these improvements will help reduce the effects of power outages and improve storm restoration, as well as improve an electric distribution company's ability to integrate DERs onto the electric grid and increase renewable energy, EVs, and energy storage.<sup>67</sup> [Table 6](#) shows the grid-facing investments proposed by each utility in 2015, which the DPU pre-authorized in its May 2018 decision.

**TABLE 5: GRID MODERNIZATION PLANS: A COMPARISON**

	EVERSOURCE ENERGY	NATIONAL GRID	UNITIL
<b>PLAN DIFFERENCES</b>	<ul style="list-style-type: none"> <li>■ Positioned as an incremental plan (IGMP) focused on keeping development costs reasonable, countering some DPU objectives</li> <li>■ <u>No</u> full AMI deployment</li> <li>■ <u>Opt-in</u> to TVRs</li> <li>■ Only <u>one</u> plan was submitted</li> </ul>	<ul style="list-style-type: none"> <li>■ Full AMI deployment after investment to upgrade the base of their substations; in other words, preparing for AMI deployment</li> <li>■ <u>Opt-out</u> with a default TVR</li> <li>■ <u>Four</u> different plans were submitted; contention is that no additional filings should be required</li> <li>■ Waiting on DPU to select one of four plans before updating the cost estimates/analysis</li> </ul>	<ul style="list-style-type: none"> <li>■ Proposed Investments with net benefit with acceptable rate impacts</li> <li>■ <u>Opt-in</u> to TVRs and AMI</li> <li>■ Only <u>one</u> plan submitted</li> </ul>
<b>PLAN SIMILARITIES</b>	<ul style="list-style-type: none"> <li>■ All companies have a short-term (five-year) investment plan and a 10-year plan.</li> <li>■ All companies recognize the need for investments in current facilities and equipment before investing in deploying AMI.</li> </ul>		

Source: Massachusetts DPU filings, ScottMadden analysis, 2018

65 AMI is defined as: (1) the collection of customers' interval usage data, in near real time, usable for settlement in ISO-NE's energy and ancillary services markets; (2) automated outage and restoration notification; (3) two-way communication between customers and the electric distribution company; and (4) with a customer's permission, communication with and control of appliances.

66 Volt/VAR is the process for managing and optimizing voltage and reactive power simultaneously

67 Massachusetts State Government, *Department of Public Utilities Issues Order to Modernize Commonwealth's Electric Grid*, 2018, <https://www.mass.gov/news/department-of-public-utilities-issues-order-to-modernize-commonwealths-electric-grid> (date retrieved: 5/20/2018).

**TABLE 6: PRE-AUTHORIZED BUDGETS AND INVESTMENTS OUTLINED IN THE DPU GMP ORDER, MAY 2018**

	EVERSOURCE ENERGY	NATIONAL GRID	UNITIL
<b>PRE-AUTHORIZED BUDGET</b>	\$133 Million	\$82 Million	\$4.4 Million
<b>SPECIFIC INVESTMENTS AUTHORIZED</b>	<ul style="list-style-type: none"> <li>▪ Distribution management systems</li> <li>▪ Advanced load flow analysis</li> <li>▪ WVO</li> <li>▪ Overhead automated feeder reconfiguration</li> <li>▪ Underground automated feeder reconfiguration</li> <li>▪ Advanced sensing</li> <li>▪ Communications</li> </ul>	<ul style="list-style-type: none"> <li>▪ WVO</li> <li>▪ Advanced distribution automation</li> <li>▪ Feeder monitors</li> <li>▪ Communications and information/operational technologies</li> <li>▪ Advanced distribution management system</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enterprise mobile damage assessment tool</li> <li>▪ Outage management system integration with AMI</li> <li>▪ Feld area network</li> <li>▪ SCADA</li> <li>▪ WVO</li> <li>▪ Advanced distribution management system</li> <li>▪ DER analytics visualization platform</li> </ul>

Source: Massachusetts DPU, 2018<sup>69</sup>

The DPU found that the combination of foundational grid-facing investments in advanced sensing, SCADA,<sup>68</sup> distribution management systems, load flow analytics, advanced communications, WVO, and automated feeder reconfiguration or advanced distribution automation will bring direct benefits to customers and make measurable progress toward achievement of grid modernization objectives.<sup>70</sup>

This order deferred a decision on deployment of AMI. Instead, the DPU said it will continue to explore with stakeholders how to cost effectively implement this technology.<sup>71</sup> Table 6 provides a summary of pre-authorized budgets and investments outlined in the DPU GMP Order

issued in May 2018. Installing smart meters for every residential ratepayer would cost \$1.5 billion for full deployment, and the DPU has instead opted to establish a process that will likely result in using smart meters in situations where they would render the highest benefits for the least cost.<sup>72</sup> The DPU did a thorough examination of the costs and benefits of a utility’s GMP plans submitted in 2015 and found that the anticipated benefits of a utility’s proposed customer-facing grid modernization investments (including AMI) did not justify the costs and, therefore, did not pre-authorize any of those investments.<sup>73</sup>

68 Supervisory control and data acquisition (SCADA) is a control system architecture that uses computers, networked data communications, and graphical user interfaces for high-level process supervisory management to interface with process plants and other machinery.

69 Massachusetts DPU, *Order 2018 (15-120, 15-121, 15-122)*, 2018

70 Ibid.

71 Commonwealth, *Baker Goes Slow on Smart Meters*, 2018, [https://commonwealthmagazine.org/energy/baker-goes-slow-on-smart-meters/?utm\\_source=Sailthru&utm\\_medium=email&utm\\_campaign=Issue:%202018-05-11%20Utility%20Dive%20Newsletter%20%5Bissue:15290%5D&utm\\_term=Utility%20Dive](https://commonwealthmagazine.org/energy/baker-goes-slow-on-smart-meters/?utm_source=Sailthru&utm_medium=email&utm_campaign=Issue:%202018-05-11%20Utility%20Dive%20Newsletter%20%5Bissue:15290%5D&utm_term=Utility%20Dive)

72 Massachusetts DPU, *Order 2018 (15-120, 15-121, 15-122)*, 2018

73 Ibid.

## ASSET DEPLOYMENT AND INFORMATION TECHNOLOGY SUMMARY

The DPU's 2014 grid modernization order required each distribution utility to include a five-year short-term investment plan that detailed a variety of measures to reduce outages, optimize demand, integrate DERs, and improve workforce and asset management through a combination of "grid-facing" and "customer-facing" measures. The 2014 order additionally required utilities to include their approach to achieving AMI. In May 2018, the DPU issued a final decision that refined

its 2014 grid modernization objectives, authorizing \$220 million in grid-facing only technologies. Authorized investments include IT-related investments, such as distribution automation, and supporting systems, such as SCADA and advanced distribution management systems (ADMS). The DPU's 2018 decision delays the deployment of AMI, and the DPU says it will continue to explore with stakeholders how to cost effectively implement this technology.

# Degrees of Transformation in Massachusetts

The discussion above based on the swimlanes (retail market design, wholesale market design, utility business models, rates and regulation, asset deployment, and information technology) provides an overview of the "state of play" in

Massachusetts. The doctrines below help assess these policies and developments in terms of the degree of transformation the state has undergone, particularly as it relates to the integration and optimization of DERs.

## DOCTRINE 1: PROMOTE EFFICIENCIES

*A primary goal of the market should be to promote efficiencies in the production, consumption, and investment in energy and related technologies.*

Massachusetts has demonstrated progress in many areas of efficiency. In terms of energy efficiency, the Commonwealth ranked number one for the seventh year in a row in the ACEEE 2017 Energy Efficiency Scorecard. From requirements for utilities to provide efficiency programs dating back to deregulation in 1997 to the GCA that continues to drive savings through ambitious energy efficiency goals, the Commonwealth has demonstrated a long history of successfully encouraging energy efficiency.

Additionally, the proposed "Clean Peak Standard" for utilities will increase the use of clean energy during times of high demand that are also carbon

intensive. These policies demonstrate focus and intentionality on efficiency and clean energy.

There are a number of factors that will likely impact the Commonwealth's ability to promote further efficiency in electricity consumption. Decisions made in the grid modernization proceeding may limit the Commonwealth's ability to move these objectives forward. The Commonwealth generally lacks AMI—one of the primary tools that utilities in other states are using to assist their customers in managing energy consumption and costs.

In other markets, the utilities are engaging customers by providing access to data about their usage and thereby enabling them to make different usage decisions. The lack of AMI will prevent customers from managing their energy usage based on pricing information.

While the new DPU order issued in May 2018 puts off a decision on the purchase of smart meters, the DPU is leaving this open for future consideration. The DPU has said that grid-facing upgrades, such as ADMS, automation, and volt/VAR optimization,

will enable further DER growth. Compared to the DPU’s 2014 grid modernization order, the latest order represents a more gradual progression toward DER integration and optimization in Massachusetts.

<b>DOCTRINE 1: PROMOTE EFFICIENCIES</b>			
<b>CURRENT SOLUTIONS</b>	<b>INCREMENTAL CHANGES</b>	<b>TRANSFORMATIVE CHANGES</b>	
<b>PROMOTE ENERGY EFFICIENCY</b>		<ul style="list-style-type: none"> <li>▪ Utilities are wires only and revenues are decoupled, eliminating utility disincentives to invest in energy efficiency</li> <li>▪ Energy usage history is available to customers through the Green Button Initiative</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ranked #1 in the ACEEE Energy Efficiency Scorecard for progress on efficiency policies and programs that save energy while benefiting the environment and promoting growth; the state is a leader in this field</li> </ul>
<b>PROMOTE SYSTEM EFFICIENCY</b>	<ul style="list-style-type: none"> <li>▪ Limited pricing structures for consumers</li> <li>▪ Postponed investments in AMI</li> </ul>		
<b>INVESTMENT IN ADMS</b>		<ul style="list-style-type: none"> <li>▪ DPU’s final decision on utility GMPs authorizes investments in distribution management systems, distribution automation, and WO</li> </ul>	

Source: Smart Electric Power Alliance and ScottMadden, 2018

**DOCTRINE 2: CLEARLY DEFINE ROLES**

*The role of the utility, as a public service entity, should be clearly defined so that all market participants can understand their roles in enabling customer options in a fair, transparent, and non-discriminatory manner.*

The Commonwealth restructured its retail market in 1997. This enabled investor-owned utilities to become wires-only distribution companies and created ISO-NE to operate the regional power system in the Northeast. It also implemented wholesale markets, while ensuring open access to transmission lines. Thus far, the role of utilities versus other stakeholders in Massachusetts has been relatively clear and well-established.

Massachusetts has a long-standing practice of using cross-functional stakeholder groups to accomplish innovative goals.

Going forward, roles may become more challenging to clarify, particularly as new third-party entrants become eligible to take on roles in DER planning, development, and aggregation. There is some debate among the distribution companies about which products and services they would be best-suited to provide and which should be fulfilled by the broader marketplace.

## DOCTRINE 2: CLEARLY DEFINE ROLES

CURRENT SOLUTIONS	INCREMENTAL CHANGES	→	TRANSFORMATIVE CHANGES
<b>UTILITY STRUCTURE</b>	<ul style="list-style-type: none"> <li>Investor-owned utilities are distribution wires only</li> </ul>		<ul style="list-style-type: none"> <li>Utilities participate in ISO-NE</li> </ul>
<b>DETERMINATION OF UTILITY ROLES AND RESPONSIBILITIES</b>	<ul style="list-style-type: none"> <li>Role of new third-party aggregators likely needs further clarification as the aggregation rules are finalized</li> </ul>		<ul style="list-style-type: none"> <li>Well-established practices of cross-functional stake-holder groups</li> <li>CCAs allow residents and small businesses to aggregate and switch from basic service to cleaner energy</li> </ul>

Source: Smart Electric Power Alliance and ScottMadden, 2018

## DOCTRINE 3: PRINCIPLES OF RATEMAKING

*Rate structures should provide transparent cost allocation that supports a sustainable revenue model for utility services providing a public good.*

The cost allocation methodology for determining rates is appropriate on the basis that utilities have been able to recover their costs. In 2007, decoupling went into effect to facilitate energy efficiency programs, which represented the first step for the Commonwealth to implement measures in the GCA and set the stage for aggressive expansion of energy efficiency, demand response, combined heat and power, and renewable generation. The Commonwealth also re-authorized PBR with the approval of Eversource's PBR mechanism in January 2018. Massachusetts has been proactively evaluating rates, including making incremental increases in NEM caps over the years. In a 2016 bill (H.B. 4173) passed to increase NEM caps, NEM credits were reduced to 60% of the full retail rate for commercial facilities, and utilities are allowed to charge a MMRC for net metered solar customers to cover grid costs.

The Commonwealth has not implemented some of the more innovative structures currently proposed in other states, such as formulaic distribution rates (e.g., Illinois) or earnings adjustment mechanisms

(e.g., New York), to drive grid modernization investment or further integration of DERs.

DOCTRINE 3: PRINCIPLES OF RATEMAKING			
CURRENT SOLUTIONS	INCREMENTAL CHANGES	—————>	TRANSFORMATIVE CHANGES
<b>PRINCIPLES OF RATEMAKING</b>	<ul style="list-style-type: none"> <li>Traditional cost of service ratemaking remains in place with cost recovery mechanisms for energy efficiency, renewable energy, incremental cap investments, and transmission expenses</li> </ul>	<ul style="list-style-type: none"> <li>Recent reauthorization of PBR</li> <li>Earn return on energy efficiency investments</li> </ul>	
<b>DETERMINATION OF PRINCIPLES OF RATEMAKING</b>		<ul style="list-style-type: none"> <li>Net metering has been in place since 1982 with increasing caps over the years</li> </ul>	
<b>ENHANCED ASSURANCE OF COST RECOVERY</b>	<ul style="list-style-type: none"> <li>Cost allocation methodology has been sufficient for utilities to recover costs through rates</li> </ul>	<ul style="list-style-type: none"> <li>Approval of MMRC in Eversource case</li> <li>Decoupling began in 2008 to promote energy efficiency investments</li> </ul>	

Source: Smart Electric Power Alliance and ScottMadden, 2018

### DOCTRINE 4: FOSTER CUSTOMER CHOICE

*Customers should be presented with a variety of rate and program options that expand their choice of and access to energy-related products and services, and that are simple, transparent, and create stable value propositions.*

State programs and mandates (retail deregulation, energy efficiency) have provided choices to customers; however, utility offerings are limited. All electricity customers in Massachusetts have choices relating to price and renewable content of the energy they purchase through retail choice either by directly choosing an alternative electric provider or by enrolling in a CCA program, where applicable. However, residential, commercial, and industrial customers of all sizes have only two pricing options—a variable price option and a fixed rate option for longer-term consistency of rates. Since 1982, Massachusetts’ investor-owned utilities have been required to offer net metering in nearly all sectors of the economy, which has helped increase solar PV levels, but there is an absence of time-of-use rates providing price signals to

residential customers to inform them about when to modify their solar exports to the grid. Time-based pricing options exist for some customers in non-residential sectors, but this capability is very limited in the residential sector. Expanding more dynamic-pricing options in the near term without AMI remains uncertain.

At the wholesale level, the options for DERs to participate in that market are expanding, and ISO-NE is actively working on a variety of issues—from price responsive demand to intermittent availability, lack of visibility, interconnection methods, and market prices—to ensure the appropriate integration of DERs. Behind-the-meter resources can be aggregated to participate in the wholesale market or be paid for providing energy. The recent FERC order on storage and ISO-NE’s proactive engagement to implement this order will drive further integration of that resource. Aggregation of DERs will likely continue to evolve in ISO-NE (as in other markets).





While both Massachusetts and ISO-NE each provide some options for customers looking to deploy DERs and/or participate in the wholesale market, these options are not as robust as

California's, which has a mechanism through which both dispatchable and non-dispatchable behind-the-meter resources can participate in the wholesale market.

<b>DOCTRINE 4: FOSTER CUSTOMER CHOICE</b>			
<b>CURRENT SOLUTIONS</b>	<b>INCREMENTAL CHANGES</b>	<b>TRANSFORMATIVE CHANGES</b>	
<b>RATE ALTERNATIVES OFFERED TO CUSTOMERS</b>	<ul style="list-style-type: none"> <li>Retail choice has been in place since 1997; however, this may end in the near future for residential customers</li> </ul>	<ul style="list-style-type: none"> <li>Time-based pricing options are limited to customers in non-residential sectors</li> </ul>	
<b>MULTIPLE ENERGY PROGRAMS OFFERED TO CUSTOMERS</b>	<ul style="list-style-type: none"> <li>CCA</li> </ul>		

Source: Smart Electric Power Alliance and ScottMadden, 2018

## Conclusion

Massachusetts has laid the groundwork for continued and steady progress toward a cleaner, more modernized electric grid. The Commonwealth has been a leader in energy efficiency for many years and has demonstrated leadership in advancing clean energy through notable initiatives, such as the GCA and SMART. By establishing favorable NEM policies for DERs and setting aggressive RPS targets, Massachusetts has consistently encouraged deployment of both large- and small-scale renewable energy technologies. There is great interest and available funding to develop more energy storage, but deployment levels to date are limited. DERs are able to participate in the wholesale market, but issues remain related to limited visibility to behind-the-meter DERs, making dispatch and capacity-planning challenging.

The Commonwealth has well-established, well-functioning stakeholder forums that have successfully facilitated several major changes in the market to date. Massachusetts, additionally,

has strong incentives for investments in efficiency, paired with decoupling, which have laid a foundation for meeting and exceeding goals in recent years.

The Massachusetts DPU's 2014 grid modernization order represented an innovative customer-centric approach with the focus on AMI and TVRs. In spite of this earlier focus, the DPU's recent May 2018 order put the deployment of AMI and other customer-facing investments on hold. The Commonwealth's limited AMI implementation may constrain potentially positive market developments, including innovative rate design and DER-related product offerings. Regarding customer choice, while retail deregulation enables customers to choose their retail electricity provider, that choice may be insufficient if rate offerings do not include time-variant options.

Some states have put particular emphasis on the integration and optimization of DERs. In places like New York and California, this focus has included proceedings related to valuing DERs on the grid,



identifying beneficial locations, implementing non-wires alternatives with DERs, and sharing of data with DER developers that enable them to select optimal locations for implementation. Other proceedings have pushed utilities to make DER interconnection processes more streamlined. Pilots in both states have focused on how to integrate DERs into the distribution system (and some cases in the wholesale markets) and demonstrate the benefits they can provide under certain use cases.

While Massachusetts has seen high numbers of DERs, the state has not pursued the integration and optimization of DERs through similar proceedings. While these initiatives may come in the future, the state thus far has not focused on the technical aspects of DER deployment, interconnection, and locational value in the same way that New York and California have. As such, this paper suggests that the Commonwealth ranks lower in terms of “degrees of transformation” than other jurisdictions.

The Commonwealth has made significant progress to date on advancing clean energy, increasing economic development, and reducing impacts of GHG emissions, but questions remain about whether recent legislative and regulatory initiatives will enable innovation to support further DER deployment. With significant large-scale renewable deployment in the region and some of the highest retail rates in the country, decision makers in the Commonwealth may well be evaluating how to get the “biggest bang for the buck” in terms of GHG reductions and clean energy. The recent GMP order provides a path for the electric utilities to implement grid modernization investments that will increase automation and visibility on the grid as well as enable further DER deployment.

If the Commonwealth elects to focus on the integration and optimization of DERs, it should consider piloting some of the programs seen in New York, California, and Illinois, which are focusing analyses and protocols to better utilize and value DERs as part of the distribution system.

## THINGS TO WATCH

- Continued favorable treatment of energy efficiency and other demand-side resources. Will current models/structures support continued growth?
- The future of TVR. Smart meters enable TVRs, but it remains unclear how more dynamic, time-based rates will unfold.
- 2020 Energy storage targets. Will Massachusetts meet the targets in time?
- Impact of MMRC. Massachusetts DPU recently approved Eversource’s proposal for mandatory demand charges, higher monthly customer charges, and lower per kWh charges for energy supplied back to the grid for NEM customers. Will this have a significant impact on DERs?
- Despite the DPU’s decision to delay AMI deployment, will it decide to implement this technology in the future?
- Will the recently introduced/proposed Clean Peak Standard lead to more energy storage?

Source: SEPA and ScottMadden, 2018

# Appendix

**TABLE 7: PERFORMANCE METRICS FOR ELECTRIC COMPANIES**

**CUSTOMER SERVICE AND SATISFACTION**

METRIC	YEARS APPLICABLE	DESCRIPTION	PENALTY
<b>SERVICE APPOINTMENTS KEPT AS SCHEDULED</b>	2016–2018	Each Company shall report the percentage of scheduled Service Appointments met by Company personnel on the same day requested. Service Appointment data shall be compiled and aggregated monthly.	Maximum penalty is 0.375% of Company Annual Revenues
	Beginning 2019	Each Company shall report the percentage of scheduled four-hour and all-day Service Appointments Kept as Scheduled. Service Appointment data shall be compiled and aggregated monthly. Each Company shall report Service Appointment data annually.	Maximum penalty is 0.375% of Annual Company T&D Revenues
<b>CUSTOMER COMPLAINTS</b>	2016–2018	The DPU will compile and aggregate monthly the frequency of Consumer Division Cases per 1,000 residential customers and provide the compilation to the Companies on a monthly basis.	Maximum penalty is 0.75% of Annual Company T&D Revenues
	Beginning 2019	The frequency of the Customer Complaints per 1,000 residential customers, compiled and aggregated on a monthly basis.	Maximum penalty is 0.5% of Annual Company T&D Revenues
<b>CUSTOMER CREDIT CASES</b>	Reporting begins 2016; penalties begin 2019	The frequency of the Customer Credit Cases (payment and arrearage management plans, inability to pay, shutoff notices, and terminations) per 1,000 residential customers, compiled and aggregated on a monthly basis.	Maximum penalty is 0.025% of Annual Company T&D Revenues

Source: Massachusetts DPU, Order 2016 (12-120-D), 2016

**TABLE 8: PERFORMANCE METRICS FOR ELECTRIC COMPANIES**

**RELIABILITY AND SAFETY**

<b>METRIC</b>	<b>YEARS APPLICABLE</b>	<b>DESCRIPTION</b>	<b>PENALTY</b>
<b>SAIDI</b>	Beginning 2016, with Glide Path thresholds adjusting every three years until 2025	Each Electric Company shall measure SAIDI and SAIFI on an annual basis.	Maximum penalty is 0.6875% of Annual Company T&D Revenues for each SAIDI and SAIFI
<b>SAIFI</b>	Beginning 2016, with Glide Path thresholds adjusting every three years until 2025	Each Electric Company shall measure SAIDI and SAIFI on an annual basis.	
<b>CKAIDI</b>	Beginning 2016	Each Electric Company shall identify the 5% of Circuits or Feeders in its service territory with the most Interruptions (i.e., duration and frequency) as measured by CKAIDI and CKAIFI. Electric Companies that do not incur SAIDI or SAIFI penalties in a given year must evaluate whether CKAIDI and CKAIFI penalties apply.	Maximum penalty is 0.28125% of Annual Company T&D Revenues for each CKAIDI and CKAIFI
<b>CKAIFI</b>	Beginning 2016		

Source: Massachusetts DPU, Order 2016 (12-120-D), 2016



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