2016 Energy Analysis Series

Part III:

A Roadmap for the Omnibus Energy Bill

March 2016

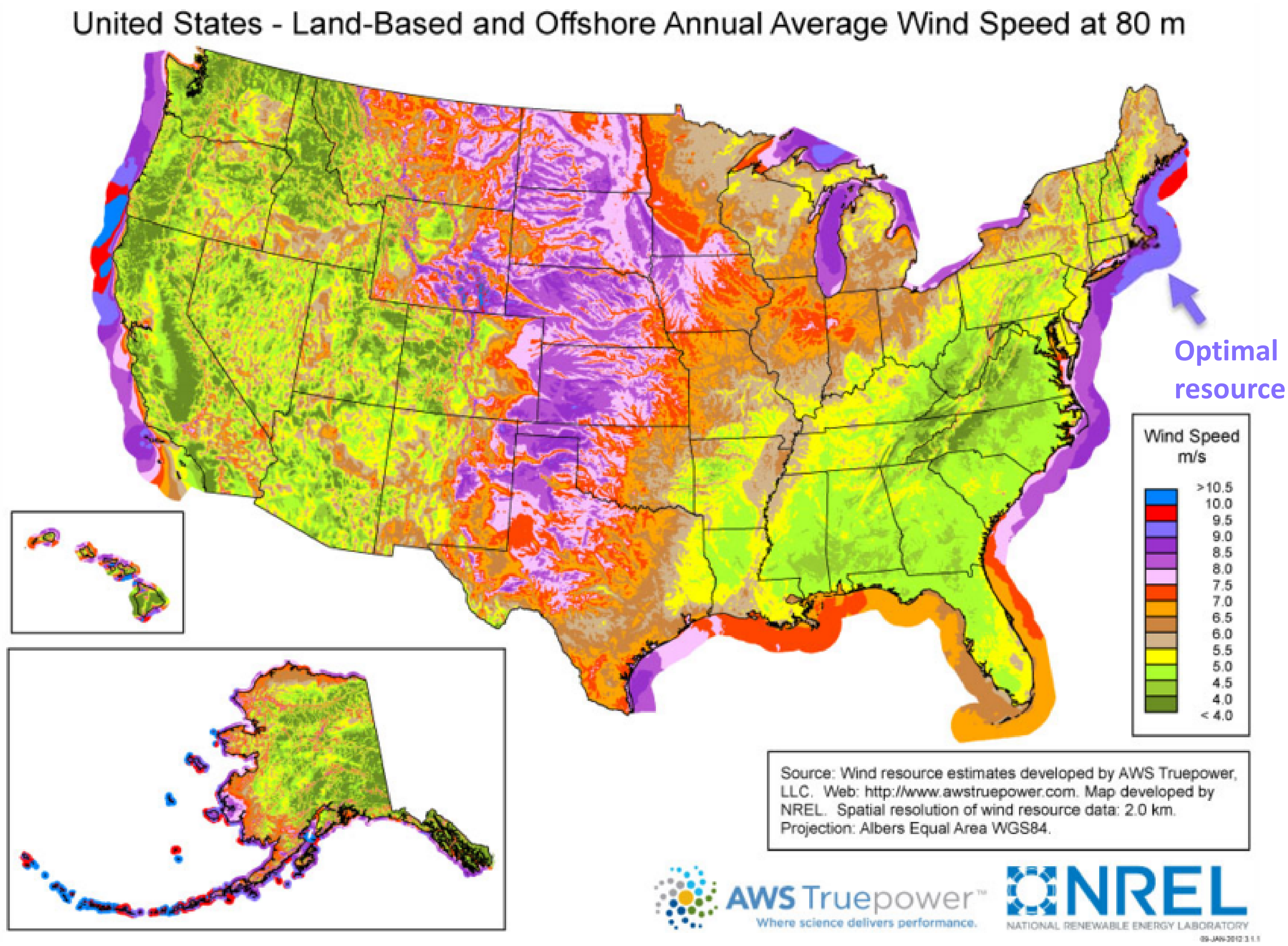
A decade from now, the electricity mix in Massachusetts could look quite different from what we see today. A new offshore wind sector could allow Massachusetts to tap a world-class resource, while generating jobs and investment in a growing industry. Solar panels on homes and businesses could provide significant quantities of clean energy. Continuing improvements in energy efficiency measures could optimize use of the power grid while reducing waste in homes and businesses. New wind farms in northern New England and New York could provide clean energy at attractive prices, and hydropower could pair with that wind to provide stable baseload power. The transition away from fossil fuels could be well under way.

But this future will not happen unless we update our laws and regulations. Without necessary legislative action and regulatory reforms, Massachusetts and the region will become more and more dependent on natural gas, making it impossible to achieve necessary greenhouse gas reductions and increasing the risk of price volatility, the focus of Part I of this series, *The Case Against Gas Pipelines*. Without action on solar, a thriving industry will stall, depriving the Commonwealth of valuable, local clean energy, as described in Part II, *Technology Upends the Utility Business Model.* And failing to stay at the forefront of growth sectors like offshore wind, energy storage, and grid modernization will squander significant opportunities that could improve the Commonwealth's energy system and position Massachusetts' clean tech sector to thrive in a global energy sector decarbonization estimated to unleash up to $45 trillion of investment over the next couple of decades.

The conclusion to this series focuses on the core challenge of how Massachusetts will respond to these opportunities as the legislature crafts an energy bill. The core of this all-encompassing energy omnibus bill will focus on procuring grid-scale clean energy to reduce carbon pollution and head off dangerous overreliance on natural gas. Other important elements should be folded into a comprehensive package – solar, energy storage, expansion of the renewable portfolio standard (RPS) – but most attention in the near term will focus on how to replace aging fossil fuel power plants with energy from wind and water.

Offshore Wind

Rarely is Massachusetts compared to Saudi Arabia, but in relation to offshore wind, the comparison is apt. Massachusetts has one of the best energy resources in the world: consistent, powerful winds blowing over shallow water in close proximity to major demand centers.



This phase of offshore wind development will be different from Cape Wind in a number of important ways. The tracts leased last year to major, established developers are more than twice as far from shore. More importantly, technological advances due to large scale development in Europe have caused costs to decline globally. Turbines have almost doubled in size over the last ten years, and can now catch wind far more effectively. Fewer, larger turbines translate into lower installation costs and a downward trend in prices, similar to trends for onshore wind, solar, and other renewables.

Consistent, predictable targets for offshore wind development would place Massachusetts in the slip-stream of declining costs and allow the Commonwealth to reap the advantages of being an early actor in the US market. As with other renewable energy technologies needed to achieve deep decarbonization, the question is *when*, not *if* the industry will take off. When the American offshore industry does take off the economic impacts will be significant: The U.S. Department of Energy projects that large scale offshore wind development could generate 54,000 jobs and $200 billion in economic activity by 2030. Massachusetts has the opportunity to either seize a large share of that activity, or watch it sail by.

Offshore wind development would take advantage of valuable infrastructure already in place. The Marine Commerce Terminal in New Bedford is designed for handling the massive components of offshore wind farms, and power could be tied into the grid at the soon-to-be-closed Brayton Point power plant. An offshore wind-for-coal swap could be supplemented with grid-scale batteries to store electricity for use during periods of peak demand, and efficient combined heat and power to support a diversified commercial base (sketched out in Acadia Center's Future of Brayton Point).

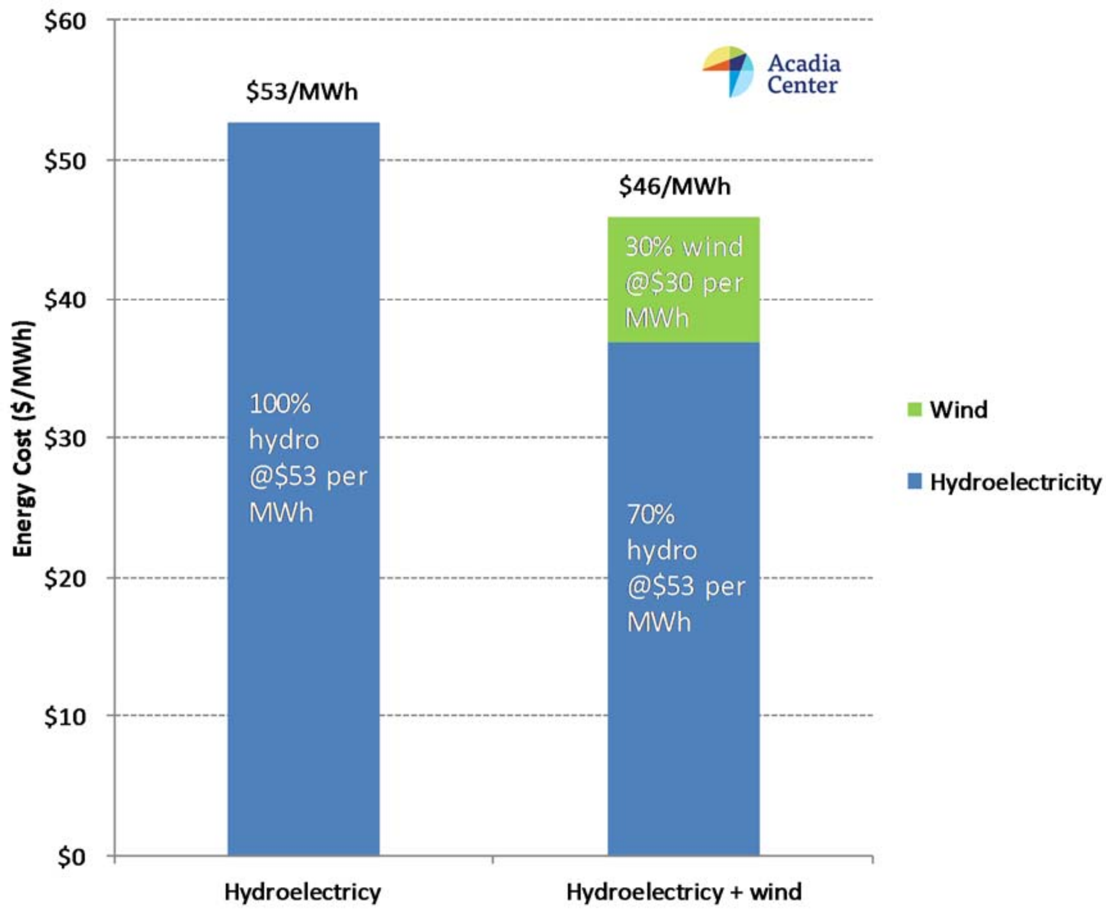
Onshore Wind and Hydroelectricity

As outdated coal, oil and nuclear plants go offline, onshore wind and hydroelectricity can provide new sources of clean energy with zero fuel costs. The Baker Administration's proposed bill S.1965 would enable utilities to procure hydroelectricity with the option to include wind or other renewables. This only gets us part of the way there: for reasons elaborated in Acadia Center's Optimizing Energy Procurement, legislation must *require* bundled purchases of wind and hydroelectricity to maximize benefits.

Reduce Total Costs

Requiring a combination of wind and hydro would provide Massachusetts with a 2 for 1 solution: cheaper compliance with the Renewable Portfolio Standard (RPS) and wind energy at attractive prices. In order to comply with RPS utilities pay wind developers for Renewable Energy Certificates (RECs), covering a portion of the wind developers' costs and allowing them to sell energy at below-cost rates. This was evident in Massachusetts utilities' 2013 contracts for energy and RECs, bundled together for under $80/MWh. If similar prices for wind are offered in future procurements, Massachusetts would receive RECs (currently valued at $50.00/MWh), while effectively purchasing energy for $30/MWh. When cheaper wind energy is blended with hydroelectricity – which will likely be offered around average wholesale prices (~$53/MWh over the last three years) – the blended price of energy comes down. For example, a mix of 30% wind power at $30/MWh and 70% hydroelectricity at $53/MWh would provide a blended mix of $46/MWh; compared with $53/MWh for 100% hydroelectricity.

Cost of Hydroelectricity vs. Wind & Hydroelectricity



It bears noting that under the RPS, Massachusetts' utilities will have to supply an increasing portion of energy from renewables (11% in 2015, rising by 1% annually) regardless of the requirements of legislatively authorized procurements. But since procurement provides an opportunity to comply with the RPS at lower cost – by facilitating onshore wind development – it will be hard to justify *not requiring* a minimum share of RPS-eligible resources in procurement.

Optimizing Clean Energy Resources (and Avoiding Pipelines)

Pairing wind and hydro can additionally provide a reliable, year-round resource that avoids the need for redundant generation and gas pipelines. When the wind is not blowing, hydroelectricity can provide power, and when less hydroelectricity is available due to seasonal variations in water levels, wind can help make up for any shortfall. Bundled clean energy projects that are able to provide reliable power year round – particularly during winter months – will reduce reliance on natural gas- and oil-fired power plants that would otherwise be needed to meet peak winter demand, and would undermine the case for subsidizing $8 billion in overbuilt pipelines.

Additional transmission may be needed to move wind and hydroelectricity from remote locations to load centers, and while investing in these projects can be worthwhile in light of climate and consumer benefits, ratepayers should only pay for as much transmission as needed. The current transmission planning and financing system does not reduce consumer costs but rather provides incentives for companies to overbuild transmission lines.

High returns that utilities can earn on transmission create pressure on utilities to maximize shareholder returns through transmission expenditures. For example, the rating agency Morningstar recently described transmission as a "key component" of Eversource's growth plan. Minimizing transmission costs and reforming the way the region plans and finances transmission deserves significant attention if we are to have the lowest cost power grid in the future.

The Fix

Policymakers can optimize clean energy purchases by requiring a minimum percentage of RPS-eligible resources in each procurement. Setting a minimum level for RPS-eligible resources would lead project proponents to put forward optimal project designs that reduce energy costs, facilitate RPS achievement, maximize energy output, and minimize transmission expenditures. The capacity factor of wind varies over the year, but is approximately 30% on average, and a procurement optimized to balance wind and hydroelectricity would thus contain 30% wind, supported by 70% hydroelectricity. Requiring minimum shares of RPS resources in each *procurement* does not preclude a project proponent from submitting a hydro-only project alongside a complementary project for RPS-eligible resources. It would, however, require demonstration that separate projects transmitting wind and hydroelectricity compare favorably to blended projects on overall costs.

Minimizing Environmental Impacts

Even clean energy can have local impacts, and Massachusetts ratepayers' dollars should promote projects that avoid, minimize, and mitigate adverse effects to the greatest extent practical. For offshore wind, environmental impacts were taken into account in designating lease areas, and offshore turbines and subsea transmission will be further reviewed under federal and state law. The various components of onshore projects – hydro reservoirs, wind farms, and related transmission – will be reviewed by host jurisdictions, but even after these reviews Massachusetts customers will face a wide array of projects with different characteristics. Impacts of different proposal features – new vs. existing reservoirs, overhead vs. buried transmission lines – must be included alongside cost and reliability in a rigorous evaluation and selection process.

Economies of Scale

Distributed energy resources will provide an increasing share of our energy needs in the future, but grid scale renewables will also be needed. These projects will benefit from economies of scale that can bring down costs and make significant dents in GHG emissions.

Concerns about market impacts of grid-scale procurement are over-stated. The main proposals for hydro (and potentially wind) procurement – the Baker Administration's bill S.1965, and Senator Downing's bill S.1757 – each call for up to 18.9TWh of energy and related transmission, which could amount to two large or a number of smaller projects. Bill H.2881 from Rep. Pat Haddad would solicit 8.5TWh from offshore wind developers spread out over 15 years, likely resulting in a series of medium-sized (300MW-400MW) projects. Together, these procurements would amount to 22% of New England's energy mix. This quantity provides a prudent hedge against natural gas, which, absent steps to rebalance the mix, will provide 57% of New England's electricity by 2024, exposing the region to significant risk when gas prices shift.

Owners of existing power plants have warned that low energy prices resulting from clean energy procurements could lead to additional power plant retirements or stifle construction of new capacity, but this is both an inaccurate attribution and a good 'problem' to face. Low energy prices are due to currently low gas prices, because gas power plants set the price for energy the majority of time in New England. Furthermore, consumers are unlikely to complain about low energy prices. The design of New England's two-part energy market will ensure that sufficient capacity exists to ensure reliability. ISO-NE's Forward Capacity Market (FCM) pays existing power plants to be available when needed, and FCM payments – which are provided three years in advance – allow developers to finance and build new capacity. The recently-concluded Forward Capacity Auction 10 showed that the FCM is operating well, providing sufficient capacity at prices even lower than anticipated. If low energy prices lead to additional retirements of uncompetitive power plants, capacity markets will drive the development of any replacement supplies needed to back up renewables.

Tying It All Together

Massachusetts and the region need to reduce GHG emissions, stabilize costs, and adapt to technologies that are disrupting the energy landscape. Over-sized, subsidized natural gas pipelines go the wrong direction, locking in dependence on a single fossil fuel, and increasing risks of climate change and price volatility. Offshore wind and bundled procurement of wind and hydroelectricity better match Massachusetts' near-term needs by diversifying an increasingly imbalanced energy mix and reducing emissions.

Beyond near-term procurements, the fundamental shift in the electric sector will require more radical revisions. The transition from centralized power stations and a passive, one-way grid to distributed resources and a dynamic, networked grid requires fundamental democratization of the energy system. Small-scale solar producers and homeowners who efficiently manage energy demand must be fairly compensated for energy services they provide. New technologies such as energy storage and smart meters must be allowed to compete with conventional infrastructure and create a foundation for new breakthroughs.

In 1886 the development of the nation's first alternating current grid in Great Barrington put Massachusetts at the forefront of energy innovation. We now have an opportunity to replicate past success and prepare for an equally innovative future.

Peter Shattuck is Massachusetts Director and Amy Boyd is Senior Attorney at Acadia Center, a non-profit, research and advocacy organization committed to advancing the clean energy future. *Installments in this analysis series are also available at: http://acadiacenter.org/document/2016-energy-analysis-series/*