# Using a Carbon Price is Foundational to Cost-Effectively Meeting the Clean Generation Goals in New England

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# Benefits of a Carbon Price in the Energy Market

- Least-Cost Solution – It ensures that customers pay only for the least-cost method of achieving the states' carbon goals
- Granularity/Transparency – This approach makes visible the locational and time-varying cost of carbon emissions and thus provides a more precise signal for carbon reducing investments and behaviors
- Operational Decisions – It also provides a real-time signal as to the cost of carbon and effectively incorporates those costs into dispatch decisions
- Resource Neutral – It not only rewards zero emission resources but also affects choices between lower and higher emission resources and it provides a powerful signal to demand response, energy efficiency and energy storage
- Market Wide – It applies equally to new and existing resources to achieve reductions at the least total cost. This is especially important in preventing the displacement of existing zero carbon resources, such as nuclear, when consideration is given to state legislative mandates and the disproportional impact these contracts will have on required energy margins
- In-Market – It eliminates the risk of mitigation, which can result in over-procurement, by relying on energy market price formation itself as the tool

**A carbon price will harness the power of energy market price signals to foster innovation and investment in new technologies**



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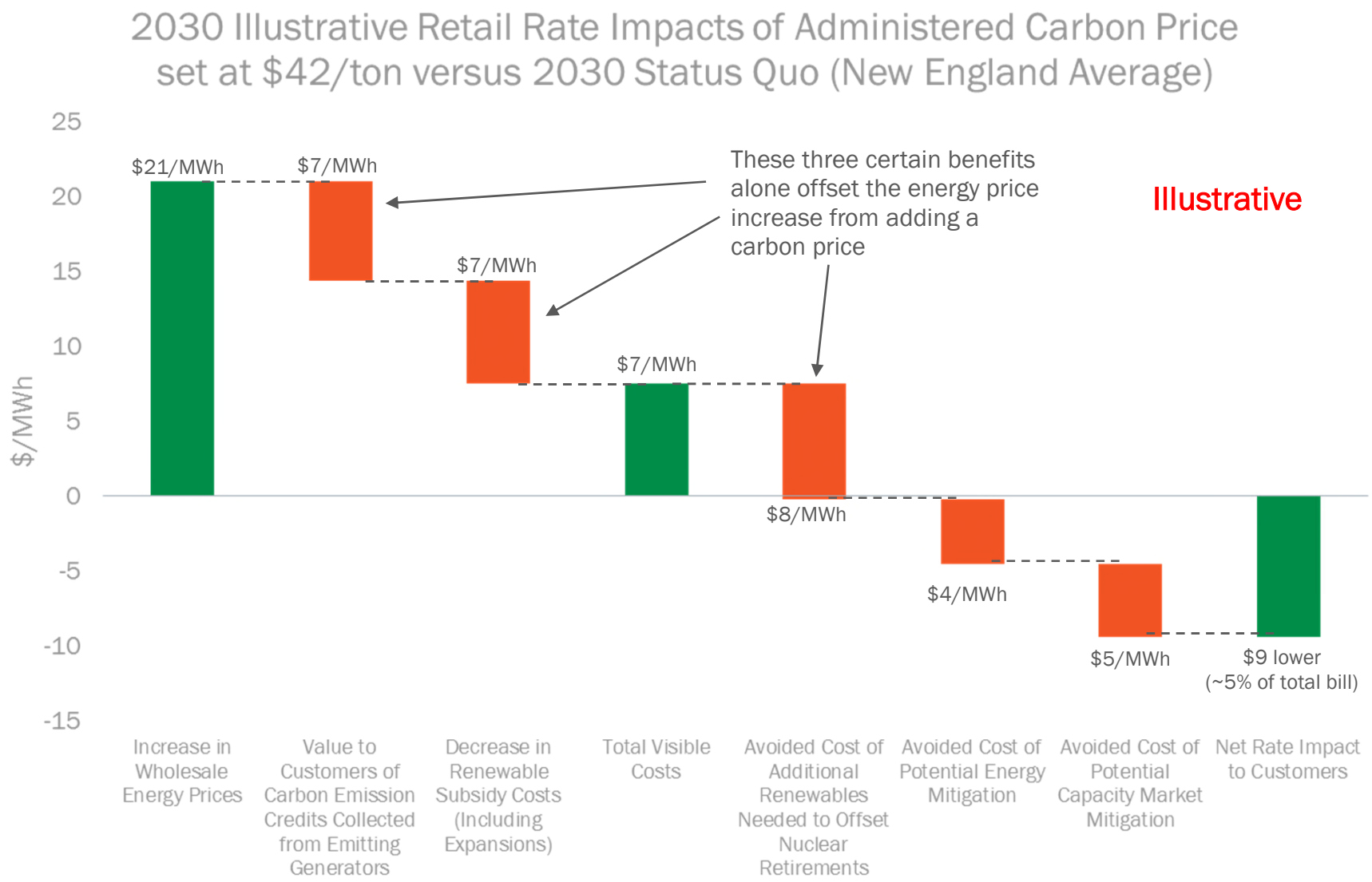
# Carbon Pricing Enhances Efficiency of All Backstop Mechanisms

- Carbon pricing can provide a complete and efficient solution to achieving carbon reductions without the need to rely on backstop mechanisms
- However, carbon pricing and other mechanisms such as RPS, contracts or an FCEM are not mutually exclusive
  - To prevent sudden consumer impacts, it may not be feasible to immediately incorporate the level of carbon pricing necessary to cover the cost of investment in new zero-carbon generation
- From a consumer perspective, carbon pricing is not an additive expense but should allow REC prices, contract rates or FCEM prices to be proportionally lower
  - Future contracts can include a mechanism to offset contract rates with carbon price benefits dollar for dollar
- Because the benefits of carbon pricing can be attained with or without these other mechanisms it should be thought of as a foundation upon which these other mechanisms can be layered to the extent they demonstrate merit

**In terms of cost-effectiveness, a carbon price captures the benefits of market efficiency leaving policy makers indifferent between the status quo (i.e., procuring renewables via contracting/RECs) and an FCEM-like construct**

# Carbon Pricing Can Decrease Consumer Costs




Assumptions: 0.47 short ton per MWh marginal emission rate; 0.17 short ton per MWh average emission rate; baseline REC price of $35/REC; capacity market mitigation requires that additional non-subsidized capacity resources equal to UCAP value of subsidized resources be purchased.



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# The Three Most Easily Quantifiable Benefits Alone are Enough to Make the Cost of a Carbon Price Neutral for Customers

- Adding a carbon price to the present status quo of procuring renewables via contracting/RECs is cost neutral to consumers when we consider only three of the offsetting benefits:
  - Carbon revenues collected from emitting resources offset about a third of the energy price impact of carbon
  - Reduced cost of renewable procurement (via either RECs or long-term contracts) offsets another third of the energy price impact
  - Avoiding nuclear retirements, which will very likely occur if the status quo renewable expansion is undertaken without a carbon price, offsets another third of the energy price impact
- Building from this cost-neutral position, however, a carbon price adds additional benefits relative to the status quo:
  - Increased emission reductions at no additional cost to consumers from coal/oil-to-gas redispatch, improved demand-side incentives, and better carbon-reduction incentives for new build and existing generators and storage
  - Improved energy price formation and market efficiency relative to status quo due to reduction in incentives to bid negative or inflexibly
  - Reduction or elimination of the potential cost to consumers due to of mitigation of out-of-market contracts (and potential over-procurement) in both capacity and energy markets.

# New Investment in a Market Construct

- Investors always prefer certainty over risk, and a tariffed carbon price provides the certainty investors need to support investment and efficient contracting
- Markets are cost minimizing and place the risk of being more expensive than the alternative on those who are in the best position to manage the cost
- Relying upon markets, therefore, necessarily requires a trade off between providing immediate certainty for investors and creating incentives that will promote innovation and cost minimization
  - Market participants' willingness to take risk and innovate continues to be substantial notwithstanding this rapidly changing, cost-declining market
- The IMAPP process is designed to attain a cost-effective policy outcome through markets relative to the status quo. While more regulated, resource-planning driven approaches can provide greater certainty around resource investment, they will be inherently less efficient without a carbon price
- Looking at the task from this perspective, carbon pricing is an elegant solution that uses the efficiency of markets to effectuate state goals for carbon emission reductions at a lower cost to consumers

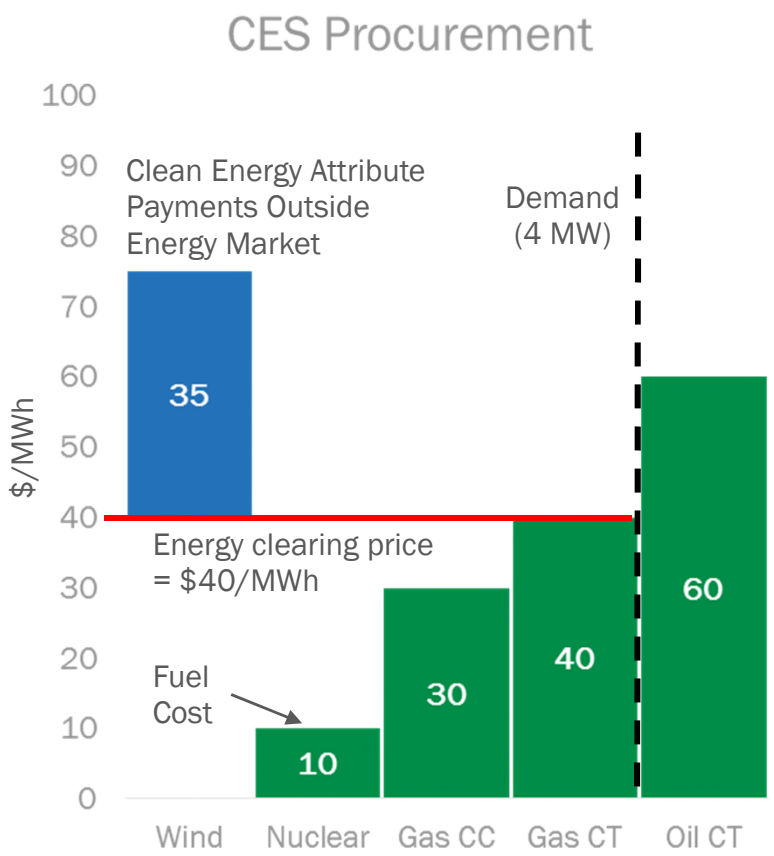
## Recommended Next Steps

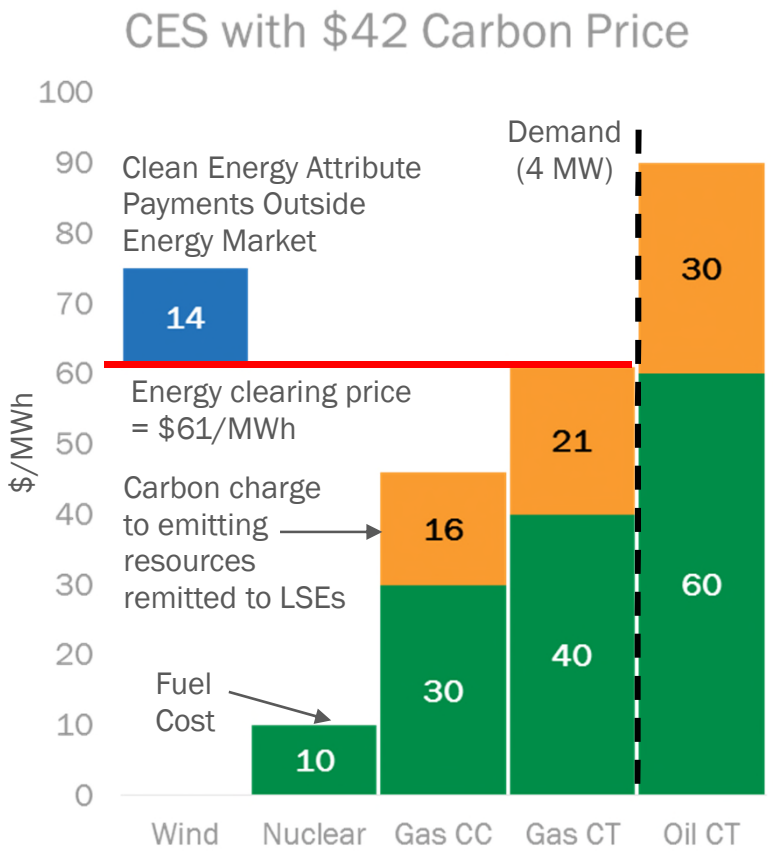
- Continue work on refining proposals that have not reached the needed level of development
- Permit proponents of carbon price proposal to address NESCOE concerns, including potential cost-mitigation measures
- Once all proposals have been developed, request that the ISO conduct a cost-benefit analysis of each proposal
- Proceed with planned October 23 legal review of all proposals
- Goal: identify the proposal that best balances the functioning of wholesale markets and cost to consumers while providing the states with the flexibility to meet their needs

# Appendix - Summary

- Carbon price reduces the costs of clean energy attributes
- Market wide benefits of carbon pricing
- Carbon price correctly values carbon emissions by time and location
- Carbon price reduces or eliminates energy market distortions

# By moving a portion of compensation to the energy market, a carbon price reduces the cost of clean energy attributes




| | Gross Margin (Excluding Capacity): | | | | |
|---|---|---|---|---|---|
| | Energy | Attribute | Carbon | Fuel | Total |
| Wind | 40 | 35 | 0 | 0 | 75 |
| Nuclear | 40 | 0 | 0 | (10) | 30 |
| Gas CC | 40 | 0 | 0 | (30) | 10 |
| Gas CT | 40 | 0 | 0 | (40) | 0 |

| | Gross Margin (Excluding Capacity): | | | | |
|---|---|---|---|---|---|
| | Energy | Attribute | Carbon | Fuel | Total |
| Wind | 61 | 14 | 0 | 0 | 75 |
| Nuclear | 61 | 0 | 0 | (10) | 51 |
| Gas CC | 61 | 0 | (16) | (30) | 15 |
| Gas CT | 61 | 0 | (21) | (40) | 0 |



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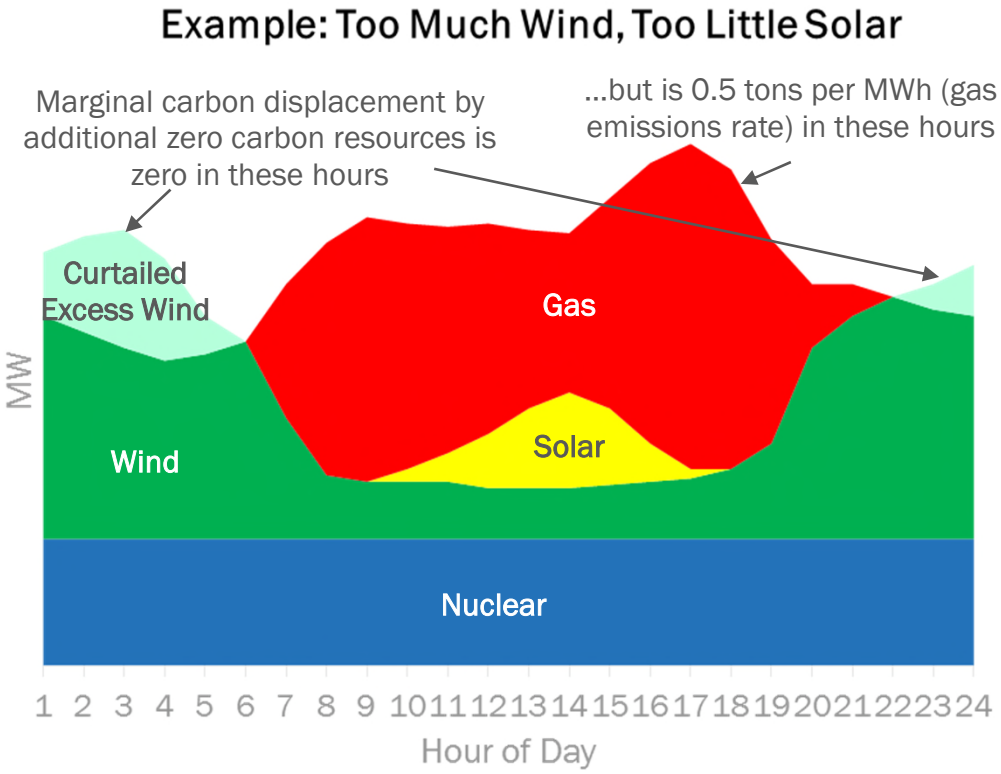
# A price on carbon creates incentives for additional carbon-reducing actions

While a price on carbon provides incentives for zero-carbon resources, it is a broad-reaching solution that provides incentives for other carbon-abatement sources not addressed by a clean energy procurement:

- Incentivizes redispatch in favor of lower emitting generators (such as gas CCGTs) over higher carbon generators (such as coal and oil)
- Provides appropriate price signals for nuclear to remain in the market
- Correctly prices the emission attributes of power imports
- Creates incentives that favor high efficiency, low-emissions technologies for new builds, uprates and retrofits versus resources with higher emissions rates
- Provides correct emissions-related price signals sent to consumers in favor of energy efficiency and other consumer-side emissions abatement measures, particularly in conjunction with smart meter technology
- Provides immediate incentives for emerging zero/low carbon technologies which may not be covered by the procurement
- Provides correct emission-related price signals for investment in, and dispatch of, storage resources, particularly if carbon price is incorporated into ISO unit commitment decisions
- Provides correct emission-related price signals for behind-the-meter zero-carbon generators, with appropriate rate design

# Zero-carbon resources are not necessarily equivalent and a carbon price correctly values the differences




| | Marginal Carbon Passthrough Rate | Energy Uplift from $42/ton Carbon Price |
|---|---|---|
| Solar | 0.50 tons/MWh | $21/MWh |
| Nuclear | 0.35 tons/MWh | $15/MWh |
| Wind | 0.20 tons/MWh | $8/MWh |

The resource with the most marginal carbon abatement (solar) correctly receives the biggest benefit from the carbon price.

- Not all zero-carbon resources are equal in terms of their carbon abatement. Depending on production profile and existing supply stack there may be significant differences
- A carbon price correctly values these differences while a clean energy procurement on its own does not
- When a carbon price and FCEM are combined, resources with superior carbon abatement will be better compensated in the energy market, and thus will be able to offer more competitive bids in the FCEM



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# A carbon price reduces or eliminates energy market distortions

- Payments for energy production which do not flow through the energy market create an incentive for distorted energy market bids
  - For example, with a $35/MWh REC price, a wind generator is paid the energy price plus $35, and additionally generates a production tax credit worth another $35 in pre-tax terms for each MWh it produces
  - This generator will make money even with an energy price of negative $69/MWh, and will thus have an incentive to bid negative $70/MWh in the energy market to ensure it runs and receives its non-energy production-based payments
  - This effect is further compounded if instead of a REC-style attribute payment the resource receives a fixed contract price – the incentive in this instance will be to bid the negative of the contract price (plus the production tax credit) into the energy market
  - If state-supported resources are built in large enough quantities these distorted bidding incentives can create significant problems for the efficient commitment and dispatch of generating resources
- A carbon price reduces or eliminates the need for non-energy production-based payments, and thus diminishes or eliminates these potential problems