



memo

To: NEPOOL Participants Committee Working Session
From: Market Development
Date: March 11, 2021
Subject: Developing a Straw Net Carbon Pricing Framework

At the PC working session in February on Pathways to a Future Grid, the ISO outlined key components associated with a net carbon pricing framework.¹ This document seeks to build upon those materials and provide stakeholders with more design detail about a potential straw net carbon pricing framework to be evaluated as part of the ISO's pathways analysis.

The ISO puts forth an approach for the straw framework that we believe serves as a sensible starting point for the design. This approach uses three criteria for specific design elements it is considering in the straw framework:

- i. Choose design options that more closely align with sound market design principles and allow the region to decarbonize in a cost-effective manner;
- ii. Put forth a net carbon framework that is conducive to quantitative modeling;
- iii. Where possible, choose design options that are consistent with those in the FCEM framework, thus more easily allowing for apples-to-apples comparisons.

Observe that there may be instances where these criteria are not all in harmony. In such cases, the criteria may not offer clear guidance on how to model a design element thus requiring the ISO and stakeholders to consider the tradeoffs between these criteria when choosing a design approach.

If the New England region ultimately were to consider market rule changes to introduce a net carbon pricing mechanism, the pathways analysis may provide some guidance about potential design parameters and their expected outcomes. However, as with FCEM, a process to further flesh out design details, more comprehensively assess implementation questions, and draft market rules would still be needed and would involve additional time and effort. Such work is outside the scope of this phase of the pathways project.

¹ See, for example, slides 20-22 of the ISO's presentation materials, available at [https://nepool.com/wp-content/uploads/2021/02/ISO New England Pathways Kickoff 2-18-2021 final.pdf](https://nepool.com/wp-content/uploads/2021/02/ISO_New_England_Pathways_Kickoff_2-18-2021_final.pdf).

We look forward to stakeholder comments and reactions to the ISO’s views regarding these straw net carbon pricing framework elements, and anticipate that this document will be updated during the pathways process to reflect stakeholder feedback and further ISO analysis.

1. Overview of straw net carbon pricing framework

Table 1 below summarizes the key design elements that we envision for the straw net carbon pricing framework. Column [a] highlights the design question and column [b] then offers the ISO’s current thinking. Finally, column [c] specifies the section in this document where the topic is discussed further.

Table 1: Summary of Potential Straw Framework Elements			
	[a] Design Question	[b] Approach in Straw Framework	[c] Section
A. Product definition			
[1]	What is the product in this framework?	Suppliers pay for each unit of carbon they emit to generate electricity	2
B. Settlement			
[2]	What is the settlement structure for sellers?	Pay carbon price for each unit of carbon emissions from electricity generation	3
[3]	How are revenues from carbon price distributed?	Allocated to RTLO across all states	3
C. Interaction with existing programs			
[4]	How does a carbon price interact with existing state programs such as RECs	To be determined with stakeholder input. There are two possible paths: (i) a carbon price does not interact with these programs, which are assumed to continue; (ii) the carbon price framework replaces the existing state programs.	4

Compared to the straw FCEM design, this summary includes fewer open design elements because net carbon pricing is a less novel concept that has been employed in numerous settings. For example, a net carbon price is more well-defined and widely understood, and it does not require the development of a forward procurement of the relevant product or the determination of a non-compliance penalty rate.

However, there remain outstanding design elements to consider. Most notably, as with the FCEM framework, we must determine whether the existing state programs would continue with the introduction of a net carbon price framework, or if this new market would replace the existing state programs. This design question is outlined in row [4] of Table 1.

2. Product definition

Under a net carbon price,² the product is defined as carbon emissions arising from electricity production. While the current discussions around FCEM have not yet landed on a crisp product definition around clean energy certificates that could be procured, this product definition is simple and transparent. Carbon emissions can be measured, and carbon markets have been used in New England and elsewhere. For example, the Regional Greenhouse Gas Initiative (RGGI) represents a carbon emissions market that

² The term “net” reflects the fact that revenues collected from generators are rebated to load. This is discussed further in section 3.

includes the six New England states as well as New York and several states in the Mid-Atlantic. To limit the scope of work for these modeling efforts and to allow for more sensible comparisons between market design frameworks, we propose to limit the carbon market to the electricity sector.³

One design question with any carbon pricing market is which value to fix. That is, should the carbon price be fixed, which ensures a constant price per unit of carbon emissions and allows the total quantity of emissions to float? Or should carbon emissions be fixed (i.e., “capped” as in a cap-and-trade system), which instead sets a maximum carbon emissions quantity and allows the price associated with carbon emissions to float? While these two approaches may have different practical implications, for purposes of modeling a conceptual framework for the pathways efforts, we do not believe it is critical to specify one approach over the other, as quantitative analysis of net carbon pricing can provide information on both approaches.

There are a number of product definition details and questions that would require further consideration if the region were to develop net carbon pricing market design and may there necessitate additional discussion during the pathways discussions. These include questions relating to the treatment of carbon emissions from resources outside of New England that import energy into the region, carbon emissions from resources in New England that export energy out of the region, and carbon emissions from resources that are behind-the-meter. We look forward to working with stakeholders to develop sensible approaches to these questions for purposes of the pathways modeling efforts.

3. Settlement and cost allocation

a. Settlement for energy suppliers

With a net carbon price, energy suppliers are charged a cost based on carbon emissions from producing electricity. Thus, a participant’s total cost associated with the carbon price is equal to the product of the carbon price and the total carbon emissions and we expect suppliers to reflect this new cost in their energy offer price.⁴

This will have two primary effects that will be considered in the modeling efforts. First, it will tend to reorder the energy market supply stack so that non-emitting and lower emitting resources are more likely to sell energy. Second, it will increase the net revenues for non-emitting and lower emitting resources, as these resources incur lower costs associated with carbon emissions than the marginal resource that sells energy. This will reduce the missing money for such resources, and may therefore make them more likely to enter or remain in the New England market relative to current market rules. Both of these effects will reduce the region’s carbon emissions by displacing electric generation from higher emitting resources with that from lower emitting resources.

b. Revenue allocation

³ In theory, this carbon market could be expanded to other sectors of the economy, but such a framework is outside the scope of the pathways work.

⁴ This would be similar to how, under current market rules, carbon-emitting generators would include any carbon costs associated with RGGI in their energy market offer price.

Unlike an FCEM framework where the payments made to clean resources result in charges to load, a net carbon pricing framework collects revenues from carbon emitting generators which are then rebated to load.

While there are several ways to distribute any revenues collected from carbon-emitting suppliers, we propose for stakeholder consideration allocating these revenues on a pro-rata basis to all Real-Time Load Obligation (RTLO) in New England.⁵ Under such an approach, the rebate to each MWh of RTLO during the delivery period would be constant across states, and would be equal to the product of net carbon price and the average carbon emissions per MWh of energy produced for the relevant delivery period. This approach is illustrated using a simple example.

Imagine that the carbon price is \$50 per ton of carbon emissions and that there are three resources that provide energy during the delivery period. Resource A is renewable and generates 175 MWh of energy. Because it does not emit carbon, it does not incur a carbon charge. Resource B is an efficient combined cycle resource that produces 250 MWh of energy and emits 0.5 tons of carbon per MWh. Finally, resource C is a less efficient peaking resource that produces 75 MWh of energy, with 1 ton of carbon emissions for each MWh produced.

Table 2: What Technologies Are Awarded Clean Energy Certificates?				
	Rate of Carbon Emissions <i>Tons/MWh</i>	Energy Generated <i>[MWh]</i>	Total Carbon Emissions <i>Tons</i>	Carbon Charges <i>\$</i>
Resource A	0	175 MWh	0	\$0
Resource B	0.5	250 MWh	125	\$6,250
Resource C	1	75 MWh	75	\$3,750
Total		500 MWh	200	\$10,000

In this example, the three resources emit a total of 200 tons of carbon during the delivery period for which they are charged \$10,000 (200 tons × \$50/ton). This revenue would then be distributed back to the 500 MWh of load from this delivery period on a pro-rata basis. Thus, the rebate to load during this period would be equal to \$20 per MWh (\$10,000 / 500 MWh).

4. Interaction with existing state programs (RECs, etc.)

Much like with the FCEM, there are two broad approaches for the interaction between a net carbon pricing framework and the existing state environmental programs.⁶

⁵ Whether these charges are administered by the ISO or another entity, the precise manner and frequency by which the rebates are distributed, and the process to “true up” any deviations that occur if expected load differs from realized load would need to be determined for a fully developed proposal, but may not be critical for the purpose of modeling the straw framework.

⁶ As the straw net carbon price framework is developed, we may also consider how it accounts for existing long-term PPA contracts that have already been executed to meet state environmental objectives. Furthermore, the straw framework could consider how the net carbon price interacts with RGGI, though it is not clear if this determination is important for the purpose of the modeling work.

Approach 1: The carbon price does not interact with the existing state programs. Under this approach, the existing state renewable energy programs would persist and resources that can provide renewable energy would continue to be compensated for these environmental attributes. Thus renewable resources may receive increased energy market revenues via the net carbon price, and they would also continue to receive additional revenues for their environmental attributes associated with these state policies.

Approach 2: The net carbon price replaces the state programs. Under Approach 2, the net carbon pricing framework would replace the existing state environmental programs. As such, resources would no longer be directly compensated for providing renewable energy via renewable energy certificates. Rather, non-emitting resources (and lower emitting resources) would be compensated via larger energy market revenues than they receive under current market rules, where no such carbon price is in place.

We seek stakeholder input on the preferred approach to this design element for net carbon pricing. Moreover, we believe it is prudent to pursue consistency between this framework and the FCEM framework. This would require that the modeling of both frameworks either assumes that i) the existing state programs remain or ii) they are eliminated. Such an approach will better allow for an apples-to-apples comparison of these frameworks and is more likely to facilitate productive evaluation of their relative outcomes and merits.