Applicable New York Wholesale Electricity Supplier Emissions

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Agenda

- Presentation objective
- Market design first principles
- Applicable NY Wholesale Supplier Emissions
- Emissions calculations and true-ups
- Current Emissions Reporting by NYISO Suppliers
- Emission sources and potential methods to calculate emissions rates (including examples)
  - Fossil-fuel burning resources
  - Cogeneration Facilities
  - Behind-the-meter net generation resources
  - Zero-emission resources
  - Pumped hydro and energy storage resources
  - Distributed energy resources

Presentation objective

- Outline the emissions that could be subject to the carbon charge if a carbon dioxide pricing proposal is adopted.

First principles

- **Subject emissions should be reasonably transparent and predictable**
  - Helps both suppliers and consumers understand the effect of, and respond to, the carbon charge
- **Avoid distorting dispatch decisions away from grid power that can create emissions leakage**
  - In principle, all New York generation should be charged for carbon emissions, including distributed energy resources that provide grid power
  - Practical considerations may create challenges for assessing charges on all generation
  - Thus, a sensible proposal may be to account for carbon emissions that result from providing a product or service from any supplier participating in the energy and ancillary services markets

Applicable NY wholesale supplier emissions

- "Burner tip" CO_2 emissions that can be directly tied to providing wholesale energy and ancillary services, including those associated with startups, no-load levels, and generation
- Not covered: upstream/fugitive CO_2 emissions, other greenhouse gas emissions (methane, nitrous oxide, etc.)
  - Excluding these categories from the carbon charge provides suppliers certainty, predictability, and facilitates ISO administration

Emissions calculations and true-ups

- **Relying on self-reported emissions data would enable more timely (weekly) billing, as qualified external databases are updated less frequently**
- **Periodic emissions true-ups would help ensure accurate emissions accounting**
  - Self-reported emissions would be trued up against reported emissions
  - For example, using a qualified external database (i.e., EPA's AMPD database, EIA-923)
  - Timing of information release would determine how often and when true-ups occur
- **NYISO is seeking stakeholder input on this approach, specifically:**
  - Are there better approaches to determine weekly emissions and true-ups?
  - Are there better sources of data?
  - Are there unintended consequences or risks of this approach?

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Current emissions reporting by NYISO suppliers

- The vast majority of NYISO's fossil suppliers are already subject to emissions reporting via RGGI
- The carbon pricing proposal would determine applicable emissions for resources not covered by RGGI

NYISO 2017 Generation by Resource

	Units	2017 Net Generation (GWh)	(% of total)
Fossil Generation			
> 25 MW	140	36,536	28%
< 25 MW	114	98	0%
Cogeneration	18	14,675	11%
Zero-Emitting Generation			
Nuclear	6	42,175	32%
Conventional Hydro	347	29,554	23%
Wind	22	4,219	3%
Biomass	48	3,084	2%
Solar	1	47	0%
Storage Resources			
Pumped Hydro	5	795	1%
Energy Storage	1	0	0%
NYCA Total	**702**	**131,183**	

Covered by RGGI

Mostly covered by RGGI

Sources and Notes: 2018 NYISO Gold Book, Table III-2. Biomass includes wood and/or wood waste, methane (bio gas), refuse (solid waste), and cogen burning biomass. Cogeneration units were identified based on input from NYISO staff, ABB Velocity Suite data, and other sources. All units (including cogen) > 25MW are subject to RGGI;

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Fossil emissions – example #1

- **Scenario:** Natural gas combustion turbine (NGCT) is starting up and burning fuel to reach its minimum generation level

Illustrative Calculation: Startup Emissions Costs

Fuel consumption per start	[1]	500	MMBtu
Carbon content of gas	[2]	0.06	tons CO_2/MMBtu
Applicable emissions	[3]=[1]x[2]	30	tons CO_2
Applicable carbon price	[4]	$40	$/ton
Total carbon charge	[5]=[3]x[4]	$1,200	$
Startup carbon charge	[6] = [5]	$1,200	$/start

Fossil emissions – example #2

- **Scenario:** NGCT is online and generating at a constant heat rate

Illustrative Calculation: Generation Emissions Costs

Generation	[1]	500	MWh
Heat rate	[2]	9.5	MMBtu/MWh
Fuel consumption	[3] = [1] x [2]	4,750	MMBtu
Carbon content of gas	[4]	0.06	tons CO_2/MMBtu
Applicable emissions	[5] = [3] x [4]	285	tons CO_2
Applicable carbon price	[6]	$40	$/ton
Total carbon charges	[7] = [5] x [6]	$11,400	$
Average carbon charge	[8] = [7] / [1]	$22.8	$/MWh

Fossil resources emissions - data sources

- **Fossil suppliers currently report point-of-production CO_2 emissions and/or fuel consumption to the U.S. EPA and EIA**
- **Fossil suppliers larger than 25 MW**
  - EPA Clean Air Markets Division reports hourly plant-level emissions
  - Updated within 30 days of the end of each quarter
  - RGGI uses this data to calculate power plant emissions
- **Fossil suppliers smaller than 25 MW**
  - Suppliers >1 MW submit monthly fuel consumption data via Form EIA-923
  - Posted about 2 months after conclusion of each month
  - Would need to derive CO_2 emissions from fuel consumption data
  - Relying on EIA-923 is potentially concerning as EIA does not have deterrence actions to incentivize submission of accurate data
- **Both EPA and EIA sources would account for the fuel-specific carbon intensity by collecting either the total supplier CO_2 emissions or the total fuel consumption by type**

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Cogeneration emissions – framework

- **Wholesale cogeneration facilities provide both wholesale electric services (e.g., electric energy) and heat (e.g., steam)**
  - Accounting for carbon emissions associated with heat production in an electric-sector carbon charge could over-estimate carbon emissions associated with wholesale electric services and potentially distort dispatch signals
- **NYISO recommends only charging for emissions associated with electricity generation (not heat/steam)**
  - Consistent with an electric-sector carbon charge
  - Requires determining fuel consumption for electric vs. steam
  - EPA's AMPD database does not separately track CO2 emissions from electric vs. steam

Sources:

EIA, "Appendix C, Technical Notes, to the Electric Power Monthly," January 2018, page 17

EPA, "The Emissions and Generation Resource Integrated Database: Technical Support Document for eGRID with Year 2016 Data", February 2018, Section 3.1.2.2

Cogeneration emissions – method

- **The NYISO is seeking feedback on appropriate methods to determine electric vs. steam emissions. Potential data sources and approaches for separating emissions associated with electricity and steam generation:**
  - EIA-923: Allocates fuel consumption for electricity generation based on gross electricity generation and an efficiency factor calculated as the ratio of total output (MWh electricity, BTU steam) to total fuel input (BTU), assuming 3,412 Btu per kWh
  - EPA eGRID: Allocates total measured emissions based on EIA-923 fuel allocation and assumed efficiency factors
  - Cogenerator steam contracts and/or site specific evaluations
  - Others?

Cogeneration emissions – data sources

- Same as fossil resources data sources
- In addition to emissions data, cogeneration emissions calculations are likely to require supplemental data in order to allocate emissions to electric and steam generation

Cogeneration emissions – example

- **Scenario:** Cogeneration facility burns gas to provide both electricity and steam. Emissions accounting is based on electric component of emissions

Illustrative Calculation: Cogeneration Emissions Costs

Generation	[1]	500	MWh
Hourly fuel input	[2]	5,950	MMBtu
Percentage of fuel consumed for electricity generation	[3]	80%	%
Hourly fuel consumed for electricity output	[4] = [2] x [3]	4,750	MMBtu
Carbon content of gas	[5]	0.06	tons CO_2/MMBtu
Applicable emissions	[6] = [4] x [5]	285	tons CO_2
Applicable carbon price	[7]	$40	$/ton
Total carbon charges	[8] = [6] x [7]	$11,400	$
Average carbon charge	[9] = [8] / [1]	$22.8	$/MWh

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Behind-the-Meter Net Generation Resources

- **Tariff defined BTM:NG Resources are eligible to concurrently serve Host Load and participate in the wholesale markets**
- **Consistent with the 'first principles', the market design would count only emissions associated with the provision of wholesale energy and ancillary services**
  - In addition to emissions data, BTM:NG emissions calculations are likely to require supplemental data and methods in order to allocate emissions to net injections and Host Load
- **The emissions data source and treatment will be consistent with the BTM:NG Generator's resource type**
  - For example, fossil fuel based BTM:NG Generator emissions data will be the same as for other fossil resources. A zero-emission BTM:NG Generator would not be assessed any carbon charges.

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Zero-emission resources

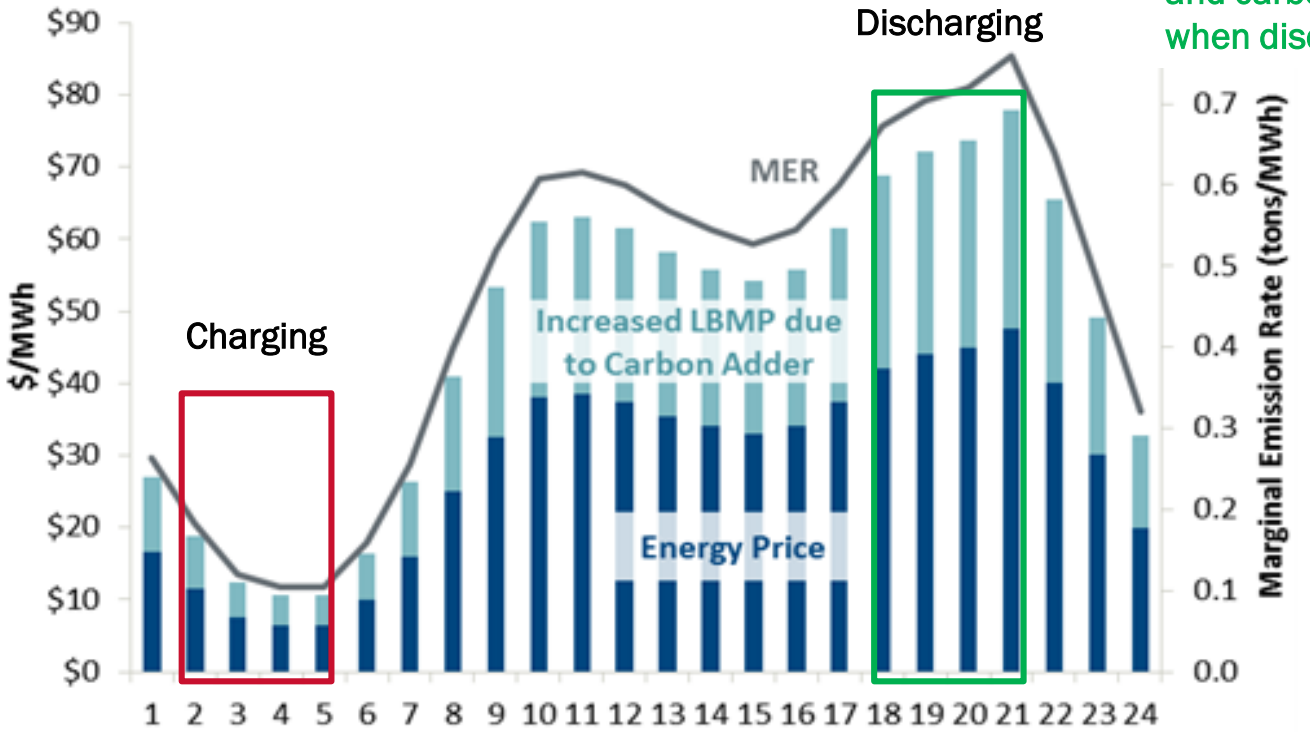
- **Resources with zero point-of-production CO_2 emissions would not be assessed a carbon charge**
  - This includes nuclear, conventional hydro, wind, and solar
- **Biomass, biogas, liquid biofuel, and associated resources would be treated consistent with New York State regulations on eligible biomass and biofuels**
  - Resources that qualify for zero-emission treatment under State regulations would not be charged for point-of-production emissions
  - Establishes consistency with treatment of biomass and biofuels as renewable resources under the Renewable Energy Standard (RES)

Pumped hydro and storage

- **Do not produce CO_2 emissions and therefore would not incur a carbon charge**
  - These resources would pay for the emissions associated with the marginal generation when drawing power from the system through the market prices
  - When generating, pumped hydro and storage (including DERs) would not produce any additional point-of-production emissions, and so would not be charged
  - Plants would have an economic incentive to charge during low cost hours, accounting for both fuel and emissions costs, and discharge during high cost hours

Pumped hydro and storage - example

Earns energy price and carbon adder when discharging



Pays for energy price and carbon adder when charging

Distributed Energy Resources & Other Resources

- **Distributed Energy Resources (DER)**
  - DER that emit CO2 would be assessed carbon charges on all wholesale net injections
    - Less than 0.5% of 2017 wholesale energy supplier electricity production in the NYCA came from fossil resources <25 MW, so total generation has a small impact on overall outcomes
    - NYISO may need to request fuel consumption and generation data associated with net injections generation from resources <1 MW, as these resources are not required to report fuel consumption to EIA
    - Another option would be to assume a standard emission rate for all fossil DG net injections generation; may be less burdensome on small resources
  - DER that do not emit CO2, including Storage based DERs, would be treated similarly to the Pumped Hydro and Storage slides discussed above
- **Are there additional resource types we need to account for?**

Feedback?

- Questions and/or comments can be sent to IPP_feedback@nyiso.com

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system

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