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Carbon Trading for New York City's Building Sector Implementation Plan

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Carbon Trading for New York City's Building Sector: Implementation Plan[*]

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Executive Summary

This plan identifies key steps that the City would need to take to add a trading program as another compliance mechanism to Local Law 97 (LL97).

Based on direction from the Mayor's Office of Climate and Sustainability, the plan focuses on decisions the City would need to make to implement the first illustrative market design proposal that is described in the accompanying Carbon Trading Study Report (CTS Report). We call this Proposal #1.

Proposal #1 envisions that the City would centrally create credits and then allocate them to covered buildings through a combination of auctions and free distribution. Proposal #1 also envisions investing some of the proceeds from the auctions to retrofit buildings in environmental justice communities (EJCs). The other proposal described in the CTS Report (Proposal #2) assumes that regulated buildings could choose to generate credits by reducing their emissions below a baseline, which would be the lesser of buildings' LL97 limits or their 2018 emissions.[1]

The City would need to make many of the same decisions in implementing Proposals #1 and #2. However, Proposal #2 likely would be simpler for the City to implement than Proposal #1. To begin with, in light of an analysis of past legal precedents, we assume the City would seek legislative authorization from New York State to implement the auction feature of Proposal #1. In addition, Proposal #2 does not require several significant implementation steps that are necessary for Proposal #1. Of particular importance, the City would not need to develop or run an auction under Proposal #2. It also would not be allocating credits to all buildings, which means that it would not have to establish baseline levels for all buildings for credit allocation. Baselines for credit allocation would only need to be established under Proposal #2 for buildings that choose to generate credits. However, the steps the City would take to facilitate the development of a secondary market may be more important under Proposal #2 because there would be no auction to send a price signal. In addition, Proposal #2 assumes that the City moves forward with an accelerated phase out of fuel oil #4.[2]

This plan has three main parts.

Part I describes the different categories of tasks involved in implementing a trading program. Part I also provides brief case studies of the implementation of other precedent trading programs and recommends which functions the City should undertake itself and which it should outsource to third parties.

Part II identifies key issues that the City must address in rules about how the market will operate. It describes the rules that the City would need to establish to govern the initial allocation of credits, who could buy and sell credits in a trading program, and how trades would occur in the market. It also recommends steps that the City should take to prevent fraud and market manipulation, continue to center environmental justice in the implementation of the trading program, facilitate the disclosure of

[1] After 2029, buildings' 2018 emissions are adjusted to reflect the grid decarbonization. More details on this are provided in Part II, Section 1.

[2] Alternatively, the City might implement another policy to avoid a small increase in NO_x emissions in EJCs in the first LL97 compliance period compared with LL97 as is, such as a targeted program to subsidize the conversion of approximately 60 properties from fuel oil #4 to fuel oil #2. The Study did not model Proposal #2 with the alternative of a targeted subsidy program.

information to promote the development of a secondary market and to enable the public to assess the impacts of a trading program, and promote compliance.

Part III addresses several additional components of implementing a trading program. It discusses the timeline for implementing a trading program, the need for periodic review of the trading program, and strategies for stakeholder outreach about a trading program. This part also discusses what sort of budget would be needed to implement the program. A separate memorandum covers various important legal processes that the City should follow for implementation.

Ultimately, the success of many existing market-based programs operated by cities, states, federal agencies, and foreign countries should give New York City confidence that with sufficient foresight and planning, the City can successfully implement a market-based program that will achieve—and even surpass—LL97's environmental objectives.

Introduction

This plan identifies the key steps that New York City (the City) should take if it decides to implement a carbon trading program under Local Law 97 (LL97). At the direction of the Mayor's Office of Climate & Sustainability (MOC&S), the plan specifically focuses on decisions the City must make to implement the first illustrative market design proposal that is described in the accompanying Carbon Trading Study Report ("CTS Report"). We refer to this proposed market design as "Proposal #1."

Proposal #1 envisions that the City would centrally create credits and then allocate them to covered buildings via a combination of auction and free distribution. Proposal #1 also envisions investing some of the proceeds from this auction to retrofit buildings in environmental justice communities (EJCs). The other proposal described in the CTS Report ("Proposal #2") assumes that regulated buildings could choose to generate credits by reducing their emissions below a baseline, which would be the lesser of buildings' LL97 limits or their 2018 emissions.[3] The material differences between the two proposals are summarized in the table below. While this plan focuses on describing the decisions that the City would need to make to implement Proposal #1, many of the same decisions would need to be taken to implement Proposal #2.

In general, Proposal #2 likely would be simpler for the City to implement than #1 because #2 does not require several significant implementation steps that are required for #1. Of particular importance, the City would not be required to allocate credits to all buildings, which means it would not be required to establish a baseline emission level for all buildings for credit allocation. Also, the City would not have to develop or run an auction under Proposal #2. However, the steps the City would take to facilitate the development of a secondary market would be more important under Proposal #2 because there would be no auction sending a price signal. In addition, Proposal #2 assumes that the City moves forward with an accelerated phase out of fuel oil #4.[4] Part II, Section 8 further elaborates on the key differences between implementing Proposals #1 and #2.

[3] Again, buildings' 2018 emissions would be adjusted to reflect grid decarbonization after 2029.

[4] Alternatively, the City might implement another policy to avoid a small increase in NO_x emissions in EJCs in the first LL97 compliance period compared with LL97 as is, such as a targeted program to subsidize the conversion of approximately 60 properties from fuel oil #4 to fuel oil #2. The Study did not model Proposal #2 with the alternative of a targeted subsidy program.

Table 1. Overview of design elements of Illustrative Proposals #1 and #2

Design Element	Proposal #1	Proposal #2
Credit Allocation	Combination of auction-based and free allocation of credits EJC buildings get 100% free allocation up to lesser of their LL97 emission limit or 2018 emissions (adjusted for grid decarbonization after 2029); non-EJC owners get 70% for free	Buildings generate credits by emitting less than their LL97 emission limit and their 2018 emissions (adjusted for grid decarbonization after 2029)
EJC Policies	All Section 321 and NYCHA buildings are eligible for opt-in, and they are allocated credits equaling a baseline for free Auction proceeds fund 20% of cost of retrofits in EJCs EJC buildings get 100% free allocation up to lesser of 2018 emissions (adjusted for grid decarbonization after 2029) or LL97 emissions limits	All Section 321 and NYCHA buildings are eligible for opt-in, and they generate credits by reducing below a baseline Assume accelerated phase-out of fuel oil #4 by 2025
Price Floor	$50 price floor	None
Banking	Banking is allowed with a 20% annual devaluation	Banking is allowed with a 20% annual devaluation
Offset Eligibility	Offsets are not allowed in any compliance period	Offsets are not allowed in any compliance period

Part I of this plan provides a typology of the different functions involved in implementing a trading program. It also provides brief case studies of the implementation of other precedent trading programs and makes recommendations about which functions the City should undertake itself, and which it should outsource to third parties.

Part II of this plan covers key issues that the City must address in developing rules to govern private entities' participation in a trading program. In thinking about the rules that must be developed, we focus on Proposal #1.[5]

Part III of the plan addresses the timeline for implementation, the process of periodic review, and strategies for stakeholder outreach. This part also discusses what sort of budget would be needed to implement the program. A separate memorandum covers various important legal processes that the City

[5] Portions of this Implementation Plan have been drawn from a report that Jason A. Schwartz produced as a consultant for the Administrative Conference of the United States (ACUS). JASON A. SCHWARTZ, MARKETABLE PERMITS: RECOMMENDATIONS ON APPLICATIONS AND MANAGEMENT (2017), https://www.acus.gov/sites/default/files/documents/Marketable%20Permits%20Report-final.pdf. Portions of that report have been incorporated or paraphrased with permission of ACUS, but this plan does not purport to present the views, if any, of either ACUS or New York University.

should follow for implementation. Implementing a trading program will require new City legislation; we assume the City would also seek legislative authorization from New York State for an auction under Proposal #1.

Critically, while the City must make a number of decisions to implement a trading program under LL97, there is a wealth of precedent markets that it can look to in making these decisions. The recommendations in this plan draw from and cite to some of these precedent markets, including California's greenhouse gas emissions market,[6] the Regional Greenhous Gas Initiative (RGGI),[7] Tokyo's trading scheme for building emissions,[8] the inter-state Transportation and Climate Initiative (TCI)'s draft model rule,[9] various clean air markets operated by the U.S. Environmental Protection Agency (EPA), and more.[10] Many of these existing regulatory structures provide reality-tested templates that the City can use as a starting point. The City can also engage private entities that have experience operating precedent markets to assist with the tasks at hand.

Ultimately, the success of many existing market-based programs operated by cities, states, federal agencies, and foreign countries[11] should give New York City confidence that with sufficient foresight and planning, the City can successfully implement a market-based program that will efficiently achieve—and even surpass—LL97's environmental objectives.

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[6] *See* CAL. CODE REGS. tit. 17, art. 5.

[7] *See, e.g.*, N.Y. COMP. CODES R. & REGS. tit. 6, § 242.

[8] *See, e.g.*, TOKYO METROPOLITAN GOV'T, TOKYO CAP-AND-TRADE PROGRAM FOR LARGE FACILITIES 68–69 (2015) [hereinafter TMG, *Detailed Document*], https://www.kankyo.metro.tokyo.lg.jp/en/climate/cap_and_trade/index.files/TokyoCaT_detailed_documents.pdf.

[9] *See, e.g.*, *Draft Model Rule*, TRANSPORTATION & CLIMATE INITIATIVE PROGRAM (TCI-P) [hereinafter TCI Model Rule], https://www.transportationandclimate.org/sites/default/files/TCI-P-Draft-Model-Rule-March-2021.pdf. Citations in this Plan to the TCI Draft Model Rule are by page number in the PDF file.

[10] Other examples include EPA's market for renewable energy credits (known as the RIN market, which stands for "renewable identification numbers"); the federal credit market for corporate average fuel economy (CAFE) standards; California's regional clean air incentives market (RECLAIM); and Washington D.C.'s stormwater credit market.

[11] *See* SCHWARTZ, *supra* note 5, at 29–42 (detailing the evidence on the efficiency of market-based programs); *id.* at 67–70 (detailing the evidence on the successful policy performance of market-based programs).

Part I – Implementation Functions and Delegation Decisions

This part surveys the main regulatory, administrative, technical, and verification functions that must be executed to implement a carbon trading program and offers advice on which functions the City should undertake itself and which functions it should delegate to third parties. The City must also consider what specific City agency, or agencies, should be responsible for the functions that the City undertakes.

1. Categories of Market Functions

Oversight and administrative functions for a carbon trading market include three main categories: rules; administrative and technical functions; and verification. Unless otherwise noted, this plan focuses on functions that would be required to set up and support a market for credits—incremental functions *above and beyond* the basic functions needed to oversee the base-case scenario of implementing LL97 without a trading program.

Regulatory functions include the development, adjustment, and enforcement over time of the rules establishing the trading program, including the rules for initially creating and allocating credits through auctions or free allocations; the rules governing secondary market trades in these credits, and who can trade credits; and the rules to promote compliance with the rules governing the markets. These foundational rules define the basic operation of the market. The day-to-day implementation of these rules—e.g., the actual distribution of credits or tracking of them pursuant to the rules—are administrative and technical functions.

Administrative and technical functions carry out the basic operations of the market, in accordance with the established rules. These operations include administering credit auctions and facilitating financial transactions underlying these auctions; allocating the freely allocated credits; maintaining a secure registry of credits and trades; facilitating the registration of trading entities; market monitoring to prevent market power and abuse; auditing and reporting on compliance; facilitating the enforcement of penalties for non-compliance or misconduct; completing market balancing actions such as banking or price floors; training market participants; reporting on key market indicators (such as market pricing and trading volume) as well as market outcomes (such as emissions reductions); and providing other information technology services such as web hosting, server management, troubleshooting, and so forth.

Verification of emissions will be a core component of LL97 implementation with or without a trading program. Regardless of whether the City implements a trading program, it will be necessary to verify that building emissions comply with the LL97 caps on at least an annual basis. In the context of a trading program, however, verification activities might need to be more extensive. A program that allows buildings to sell credits based on reducing their emissions necessitates regular verification to ensure that buildings selling credits have indeed reduced their emissions. And the need for frequent trading and auctions might require some level of verification to occur on a quarterly or even monthly basis to provide the market with sufficient information about the overall demand for credits given buildings' emission levels. In any case, verifying building emission reductions would likely be separate, independent function carried out by accredited third parties.

Table 2. Market oversight and administrative functions

Frequency	Regulatory Functions	Administrative and Technical Functions	Verification Functions
Onetime	• Establishing rules for initial allocation of credits • Establishing rules for trading, tracking credits • Establishing rules for enforcing the rules above	• Registry development	
Ongoing Continuous		• Registry maintenance • Trader registration • Market monitoring • Contractor management • Transaction management[12] • Assessment, collection of fees and penalties • Information technology (web hosting, servers, troubleshooting, etc.)	• Emissions verification*
Ongoing Periodic	• Adjustments to trading rules	• Credit allocation • Auction administration • Verification of baselines for awarding credits to opt-in buildings • Audit, fraud and compliance monitoring • Market balancing operations (i.e. banking, price floors) • Reporting on market indicators and outcomes	
Ongoing Ad Hoc		• Training and technical assistance for traders • Enforcing rules governing the trading program • Program evaluation	• Verification of adjusted emissions baselines for buildings that substantially change occupancy type

**Asterisked actions will be required to implement base case LL97 even if trading is not implemented.*

2. Precedent Allocations of Market Functions

Precedent and similar trading systems present a variety of ways to handle the allocation of functions across public-sector and private third parties. Below, we introduce and examine the distribution of regulatory, administrative and technical, and verification functions across stakeholders in the U.S. Regional Greenhouse Gas Initiative, California's cap-and-trade program, the Tokyo Emissions Trading System (ETS), and Italy's Energy Efficiency Certificates (TEE) scheme.

[12] "Transaction management" includes financial administration services such as guaranteeing payments, facilitating currency exchange, and providing escrow services to settle auctions and facilitate pre-auction/reserve sales.

Precedent #1: The Regional Greenhouse Gas Initiative (RGGI) is the United States' first compulsory, market-based emissions reduction program for the regulation of carbon dioxide (CO_2) emissions, and it covers 203 compliance entities (large electricity generators) as of November 2020.[13] As of the time of writing, a memorandum of understanding (MOU) among the 11 states sets forth basic rules in the form the RGGI Model Rule, which informs independent rules and CO_2 Budget Trading Programs in each member state.[14] RGGI member states include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia. All administrative and technical functions are delegated to RGGI, Inc.—a private non-profit corporation with at least 5 permanent staff as of 2021.[15] RGGI, Inc. is overseen by a board of directors "composed of agency heads of energy and environmental regulatory agencies in each RGGI state."[16]

RGGI, Inc. delegates certain market registry, auction, and independent market monitoring activities to private companies. To build and run the emissions credit tracking system referred to as CO_2 Allowance Tracking System (COATS), RGGI, Inc. contracted with Perrin Quarles Associates from 2008–2010 and then SRA International since 2011. RGGI, Inc. contracted with World Energy Solutions (now owned by Enel X) to provide a live auction platform for quarterly auctions in the market.[17] RGGI, Inc. has also contracted with Potomac Economics, a market monitor for Regional Transmission Operators that operate U.S. wholesale power markets, to provide independent expert monitoring of the performance and efficiency of the RGGI market. The market monitor's responsibilities include identifying the potential for anti-competitive conduct or abuse of market power, evaluating auction clearing prices to measure market efficiency, and assessing whether auctions proceed per RGGI-determined auction rules and procedures.[18] Finally, RGGI has engaged ICF International twice to perform "program evaluation and other technical analysis" that ultimately informed significant revisions to the Model Rule in 2013 and 2017.

Regulated entities across the member states report their emissions via the EPA Emission Collection and Monitoring Plan System (ECMPS), which performs quality assurance on the emissions data before the data is released to RGGI COATS.[19] RGGI selectively allows offsets based on state rules that apply to a given facility. Facilities must verify offsets separately via RGGI COATS and must rely on independent third-party verification bodies accredited by said state.[20] During the first years of market operation, RGGI, Inc.

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[13] INT'L CARBON ACTION PARTNERSHIP, USA - REGIONAL GREENHOUSE GAS INITIATIVE (RGGI), https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=50 (last updated May 18, 2021).

[14] *Model Rule and MOU Versions,* REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/program-overview-and-design/design-archive/mou-model-rule.

[15] *RGGI, Inc. Staff*, REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/rggi-inc/staff.

[16] *Board of Directors*, REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/rggi-inc/board-of-directors.

[17] *What the Regional Greenhouse Gas Initiative's 1 Billionth Carbon Allowance Means for the Energy Industry,* ENEL X, https://www.enelx.com/n-a/en/stories/energy-efficiency-management/what-regional-greenhouse-gas-initiatives-1-billionth-carbon-allowance-means-energy-industry.

[18] *Market Monitor Reports*, REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/auctions/market-monitor-reports.

[19] *Reports: Quarterly Emissions,* REGIONAL GREENHOUSE GAS INITIATIVE, https://rggi-coats.org/eats/rggi/index.cfm?fuseaction=reportsv2.quarterly_emissions_rpt&clearfuseattribs=true.

[20] *Offsets*, REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/allowance-tracking/offsets.

engaged ICF International to advise on the development of offset verification rules and processes, and RGGI, Inc. adapted the market registry and help desk services accordingly.

Precedent #2: The California Cap-and-Trade Program started in 2012 and currently regulates the emissions of about 450 entities in California, excluding entities in linked markets in Quebec and Nova Scotia, Canada.[21] California's cap-and-trade program assigns regulatory authority as well as certain administrative and technical market functions to the California Air Resources Board (CARB) and entrusts certain administrative and technical functions to the Western Climate Initiative, Inc. (WCI, Inc.), a non-profit corporation supervised by CARB. In turn, both organizations have the authority to further delegate specific activities to private companies.

2013 legislation granted CARB, a preexisting state agency, with the authority to govern California's cap-and-trade program; to establish rules for reserve pricing, auctions, and other market policies; and to enforce rules. CARB also carries out certain administrative and technical functions: it oversees auctions handled by WCI, Inc. (see below), posts public information such as annual greenhouse gas emissions reporting and other market data, handles the relatively labor-intensive process of registering accounts for new trading entities on an ongoing basis, and periodically reviews the affiliations and conflicts and potential conflicts among trading entities.

The Western Climate Initiative, Inc. (WCI), a purpose-built non-profit corporation with about 13 permanent staff at time of writing,[22] centralizes the remaining administrative and technical functions across the participating jurisdictions of California, Quebec, and Nova Scotia—including administering the market registry, auctions and reserve pricing, financial services, market monitoring, and other administrative support.[23] WCI, like RGGI, Inc., is overseen by a board of directors composed of government representatives from California, Quebec, and Nova Scotia.

WCI, Inc. delegates certain auction-related technical activities to private companies. On behalf of WCI, Inc., SRA International developed and operates the Compliance Instrument Tracking System Service (CITSS), a system for tracking and authenticating emissions credits. IHS Markit serves as "auction administrator"—providing auction and reserve sale administrative services, as well as technical assistance to participating jurisdictions in the U.S. and Canada. WCI, Inc. contracted with Deutsche Bank to deliver financial administrative services, including supporting financial transactions associated with auctions (including processing trader financial eligibility), guaranteeing transactions, and making guaranteed

[21] CAL. AIR RESOURCES BD., OVERVIEW OF ARB EMISSIONS TRADING PROGRAM (2015), https://ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/guidance/cap_trade_overview.pdf.
[22] *Team*, WCI, INC., https://wci-inc.org/about-us/team.
[23] *Purpose*, WCI, INC., https://wci-inc.org/our-work/purpose.

payments after auctions take place.[24,25] Monitoring Analytics is contracted by WCI, Inc. to provide market monitoring services.

California's Mandatory Reporting of Greenhouse Gas Emissions regulation requires entities that emit over 10,000 $mtCO_2e$ per year to report their emissions to the state via the California Electronic Greenhouse Gas Reporting Tool (Cal e-GGRT). (Because Cal e-GGRT reporting requirements differ from those of the EPA's reporting system (which RGGI relies on), entities must complete both EPA and CARB reporting.)[26] And entities that emit over 25,000 $mtCO_2e$/yr, which participate in California's cap-and-trade program, must have their emissions verified by a third-party verification body. CARB oversees accreditation and training for these third parties.[27] (Tradeable emissions permits, which are linked to third-party verified emissions reductions, are authenticated and maintained in a credit tracking system as discussed above.)

Precedent #3: The Tokyo Emissions Trading System (Tokyo ETS), which is the only precedent market that is urban in scale and regulates large buildings, covers about 1,300 facilities in Tokyo. The Tokyo Metropolitan Government (TMG) is responsible for all regulation/governance and administrative and technical functions, which it mostly performs itself and sometimes contracts out to private third-party companies. TMG relies on independent, registered third parties to verify emissions reductions by covered buildings.

The Tokyo ETS is similar to the credit trading system contemplated in New York City insofar as it regulates building emissions, but different in that it relies mostly on implicit credit allocation with limited auctions and features trading that is generally bilateral ("over the counter").[28] The Tokyo ETS regulates emissions from covered buildings over 5,000 m^2 (53,820 ft^2) in gross floor area and over 6 million kWh annual electricity usage—approximately 1,300 buildings. Across three compliance periods, covered buildings must meet annual reduction targets by implementing emissions reduction measures or purchasing emissions credits through trading. Tokyo ETS-covered buildings that miss their reduction targets and fail to quickly remedy the overage (by reducing 1.3 times the shortage) are both fined and separately required to purchase credits off the market to account for their emissions overages.[29,30]

Under the ETS, TMG carries out rulemaking during compliance periods, including establishing base-year emissions, reduction obligations, covered facilities, and compliance factors by building type. TMG also

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[24] WCI, INC. & CAL. AIR RESOURCES BD., DETAILED AUCTION REQUIREMENTS AND INSTRUCTIONS: CALIFORNIA CAP-AND-TRADE PROGRAM AND QUÉBEC CAP-AND-TRADE SYSTEM JOINT AUCTION OF GREENHOUSE GAS ALLOWANCES (2020), https://ww2.arb.ca.gov/sites/default/files/classic//cc/capandtrade/auction/auction_requirements.pdf.

[25] *The Carbon Market: Auctions*, MINISTÈRE DE L'ENVIRONNEMENT ET DE LA LUTTE CONTRE LES CHANGEMENTS CLIMATIQUES. GOVERNMENT OF QUEBEC, https://www.environnement.gouv.qc.ca/changements/carbone/Ventes-encheres-en.htm.

[26] *Mandatory GHG Reporting - Online Reporting Tool*, CAL. AIR RESOURCES BD., https://ww2.arb.ca.gov/mrr-tool.

[27] *Mandatory GHG Reporting – Verification,* CAL. AIR RESOURCES BD., https://ww2.arb.ca.gov/verification.

[28] INT'L CARBON ACTION PARTNERSHIP, JAPAN: TOKYO CAP-AND-TRADE PROGRAM (last updated May 18, 2021), https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=51.

[29] TMG, *Detailed Document, supra* note 8, at 10.

[30] ENVIRONMENTAL DEFENSE FUND, CDC CLIMATE RESEARCH & IETA, TOKYO: AN EMISSIONS TRADING CASE STUDY (2015) [hereinafter TOKYO CASE STUDY], https://www.ieta.org/resources/Resources/Case_Studies_Worlds_Carbon_Markets/2015/tokyo_case_study_may2015.pdf.

penalizes market misconduct and fraud. TMG does not set carbon prices, nor does it set price floors/ceilings; all transactions are negotiated by market participants. However, TMG (or the Tokyo Environmental Public Service Corporation) does reserve the ability to auction or sell at a fixed price "offset credits" (such as those voluntarily generated by small buildings) to market participants to ease demand during initial trading.[31] TMG also maintains the market's credit registry—the electronic system that records credits and manages credit transactions—and TMG is responsible for data input and updates over the course of trading, publicizing non-compliant market participants, and publicizing annual reporting on building emissions reductions.[32]

Tokyo occasionally relies on third parties to complete certain administrative and technical functions. In the past, TMG has outsourced administrative and technical functions related to application and document processing, registry creation and maintenance, registry data entry, and ad hoc technical assistance to market participants.[33] Credit verification is the responsibility of independent agencies that are registered but not directly managed by TMG.[34]

Precedent #4: Italy's Energy Efficiency Certificates (TEE) scheme, also referred to as a **White Certificates (WhC) scheme**, distributes regulatory/governance functions and market administration/technical functions across two public companies owned by the Italian national government. Italy's TEE scheme contrasts with the precedents above in that it regulates energy efficiency via a market by commoditizing verified investments in energy efficiency instead of regulating emissions through tradeable permits. However, the general certificates trading model is so widespread that it remains an instructive case study on approaching the establishment of trading to meet the ultimate environmental goals of LL97. (Similar certificate schemes have also emerged in Belgium, Denmark, France, the Netherlands, Poland, Sweden, and the United Kingdom.)[35,36]

TEE, which began in 2005, is an energy efficiency obligation (EEO) scheme that requires electricity and gas distributors with more than 50,000 clients to reach increasing annual targets for energy efficiency. Italy's TEE scheme accords compliant distributors with "white certificates:" an instrument that certifies achievement of a quantum of energy savings, guarantees these savings have not been accounted for

[31] TMG, *Detailed Document, supra* note 8, at 67.
[32] TOKYO CASE STUDY, *supra* note 30.
[33] Email Interview with Satoshi Chida, Dir. of Tokyo's Cap-and-Trade Program (Mar. 12, 2021).
[34] TOKYO CASE STUDY, *supra* note 30.
[35] Paolo Bertoldi & Rezessy Silvia, European Commission, DG JRC, Institute for Energy, *Assessment of White Certificate Schemes in Europe*, AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY 22–33 (2008), https://www.eceee.org/library/conference_proceedings/ACEEE_buildings/2008/Panel_5/5_173/.
[36] Paolo Bertoldi, *Assessment and Experience of White Certificate Schemes in the European Union. JRC European Commission*, INST. FOR ENERGY & TRANSPORT (2011), https://iea.blob.core.windows.net/assets/imports/events/136/Paolo_Bertoldi.pdf.

elsewhere, and serves as a tradeable commodity.[37] Distributors are incentivized to sell certificates to other distributors that are not yet compliant with energy efficiency requirements.[38]

Management responsibilities for Italy's TEE scheme passed between a variety of agencies between 2005 and 2013 before ending up under the oversight of the Gestore dei Servizi Energetici with the support of the Gestore dei Mercati Energetici, with some additional support from other government agencies. Initially in 2005, the Italian Regulatory Authority for Energy, Networks and Environment (ARERA)—a national energy authority—managed the TEE scheme with a three-person staff. As the volume of energy efficiency project proposals and certifications increased, the National Agency for New Technologies, Energy, and Sustainable Economic Development (ENEA) took over management of evaluation and certification, devoting 15–20 Fulltime Equivalents (FTEs) to the program.[39] Starting in 2013, as the program grew to its greatest volume, Gestore dei Servizi Energetici (GSE)—a public company wholly owned by the Italian Ministry of Economy and Finance—became responsible for management, evaluation, and verification activities in support of TEE. (FTE figures are not available for GSE.) At first, GSE relied extensively on ENEA and RSE (another public company owned by GSE) to support technical certificate evaluation before largely self-performing this evaluative function as it built capacity and as market activity slowed.[40] ENEA does remain a source of technical support to GSE for evaluating energy savings and economic benefit of energy efficiency projects.[41]

While GSE performs oversight, evaluative, and verification functions, the Gestore dei Mercati Energetici (GME) implements specific market and technical functions related to the credit trading market. In 2000, during the liberalization of Italy's energy sector, GSE had established Gestore dei Mercati Energetici (GME), a public company responsible for organizing and managing Italy's wholesale power market (IPEX). While GSE verifies all certificates generated by market participants prior to their entry into a market operated by GME, GSE holds GME responsible for administering the electronic certificate trading market.[42,43] GME effectively designed the trading market and created market rules (pursuant to overarching power market rules and approval of national agency AEEGSI); GME is also responsible for managing and securing the electronic certificate exchange system, admitting market participants into the scheme, and reporting market data and outcomes to the public.[44] GME must report potentially fraudulent

[37] Bertoldi & Silvia, *supra* note 35.
[38] *About TEE*, GME, https://www.mercatoelettrico.org/en/mercati/tee/CosaSonoTee.aspx.
[39] Email Interview with Dario Di Santo, Managing Dir. of Italian Fed'n for Energy Efficiency (FIRE) (Mar. 3, 2021).
[40] Email Interview with Dario Di Santo, Managing Director of Italian Federation for Energy Efficiency (FIRE) (Mar. 3, 2021).
[41] CATAPULT ENERGY SYS., ENERGY TECH. INST., RICARDO ENERGY & ENV'T, ITALIAN ENERGY EFFICIENCY WHITE CERTIFICATE SCHEME (2018).
[42] *GME's Profile*, GME, http://www.mercatoelettrico.org/En/GME/Info/ProfiloAziendale.aspx.
[43] CATAPULT ENERGY SYS., ENERGY TECH. INST., RICARDO ENERGY & ENV'T, ITALIAN ENERGY EFFICIENCY WHITE CERTIFICATE SCHEME (2018).
[44] GME, RULES OF OPERATIONS OF THE ENERGY EFFICIENCY CERTIFICATES (WHITE CERTIFICATES) MARKET (Sep. 28, 2018) [hereinafter GME White Certificate Rules], https://www.mercatoelettrico.org/en/MenuBiblioteca/Documenti/20180215RegoleTEE_en.pdf.

behavior to GSE and other law enforcement authorities.[45] To fund management and evaluation, GME draws revenue from transaction fees associated with the market.[46]

Although GSE can allocate TEE evaluation and verification responsibilities to private third parties, it currently carries out these activities internally, and the current size of the market does not suggest GSE will contract out these activities in the near term.[47]

Table 3. Summary of the distribution of responsibility for market functions under four precedent systems

Precedent System	Regulatory Functions	Administrative and Technical Functions	Verification Functions
Regional Greenhouse Gas Initiative (RGGI)	Member state representatives	RGGI, Inc. and third-party contractors	EPA (ECMPS) Offsets verified by accredited third parties
California Cap-and-Trade Program	California Air Resources Board (CARB)	CARB, Western Initiative, Inc., and third-party contractors	EPA (ECMPS) CARB-accredited third parties
Tokyo ETS	Tokyo Metropolitan Government (TMG)	TMG and third-party contractors	TMG-registered third parties
Italian Energy Efficiency Certificates	AEEGSI, ARERA, GSE	GME with oversight from GSE.	GSE, with support of ENEA, RSE

3. Legal Constraints on Allocation of Market Functions

Legal constraints suggest that regulatory functions must be handled by a public-sector organization within the City, whereas administrative, technical, and verification functions could be delegated to a third party. Regulatory market functions include the development and adjustment of rules regulating trading as well as the enforcement of these rules. Regulatory functions can also include accreditation of third-party evaluation and verification entities. Given legal constraints, New York City would not be able to delegate regulatory functions to a private third party. (See "Legal Implementation Memo" for additional analysis.) Indeed, none of the precedent systems surveyed above delegate policymaking and accreditation activities to third-party, non-governmental organizations.

Therefore, the City could assign regulatory responsibilities to an existing agency or a new, purpose-built agency. The systems above assigned regulatory responsibilities to existing organizations (namely, to CARB,

[45] *Id.*
[46] D. Di Santo & E. Biele, *The Italian White Certificates Scheme. Case Study Prepared by FIRE for the EPATEE Project, Funded by the European Union's Horizon 2020 Programme,* EVALUATION INTO PRACTICE TO ACHIEVE TARGETS FOR ENERGY EFFICIENCY (EPATEE) (2017). https://epatee.eu/sites/default/files/epatee_case_study_italy_white_certificates_ok.pdf.
[47] Email Interview with Dario Di Santo, Managing Dir., Italian Fed'n for Energy Efficiency (FIRE) (Mar. 3, 2021).

member state governments, TMG, and GSE/GME), suggesting that empowering existing agencies with market regulatory responsibilities is a more straightforward course of action.

LL97 designates the City's Department of Buildings (DOB)—and, in particular, an Office of Building Energy and Emissions Performance—as the lead agency for overseeing implementation of LL97,[48] suggesting DOB could play a role in the oversight of regulatory (and other) functions related to implementing a carbon trading program under LL97. However, although LL97 does not specifically empower other agencies, updated legislation and trading program design could revise or parcel out responsibilities to alternative or new agencies.

4. Recommended Approach to Allocating Responsibilities

a. Criteria for Allocation

New York City should weigh a variety of criteria to determine whether and what administrative and technical elements of a carbon trading system should be administered by a City agency versus a private third party. Criteria include (a) costs to the City, (b) the degree of trust inspired in city stakeholders, (c) administrative capacity and efficiency, and (d) suitability given the unique policy elements of the contemplated trading system. This analysis assumes the City executes regulatory functions due to the legal constraints defined above.

(A) Cost to City: The impact on City resources in terms of personnel and other resources. The City should allocate functions to whatever parties can deliver the functions most efficiently and cost-effectively. Private third-party execution of specific administrative technical functions could potentially reduce City costs significantly if the City procures capable third-party experts with appropriate oversight. For instance, third parties could relatively quickly adapt existing platforms to deliver a working registry, protocol for trader registration, auctions, and other administrative and technical market functions for New York City. For the verification function, it would be cost-effective to rely on accredited third parties that would need to verify emissions for the enforcement of the base case scenario of LL97 (absent trading). Again, the City must perform regulatory functions due to legal constraints.

The cost implications of private third-party execution depend on contract terms.[49] ***Fixed fee contracting*** is a straightforward way to pay for market setup—e.g. registry deployment, consulting for rulemaking and policy refinement—especially for complex markets featuring a variety of policy design features (e.g. price floors, auctions, etc.). ***Unit fee contracting*** that pays third parties via market transaction fees is a straightforward way to pay for ongoing market operations. In theory, this displaces financial risk from the City to third party operator(s). However, the City might need to guarantee a minimum stream of revenue to the third party, such that if transaction volume fell below a specified level, the City would pay the third party the difference. For very simple markets with minimal policy design features, a third party might bid

[48] N.Y.C. CHARTER ch. 26, § 651(a)(1) ("The duties of the office [of building energy and emissions performance] shall include, but not be limited to: 1. Overseeing implementation of building energy and emissions performance laws and policies for existing buildings, new construction and major renovations.")
[49] Interview with IHS Markit (Feb. 26, 2021).

to provide both market setup and operating services and recover setup costs over time through transaction fees when the market is running; this way, the City could mitigate the immediate cost impact of market startup.[50] The City could also combine these contracting approaches to pay for both market setup and ongoing operation, allocating costs and financial risk between the City and third parties as it sees fit and as the market will bear.

Table 4. City administration vs. private third-party administration: cost to City

City Execution (City Agency Or Non-Profit Corporation)	Private Third-Party Execution
Pros: N/A **Cons:** • City could incur significant costs associated with hiring and building internal capacity and institutional knowledge about highly specific areas (e.g. auctions, market monitoring), which could instead be purchased in the form of third-party consultants, market operators. • Significant organizational and governance changes—such as the creation of a new, purpose-built management organization—would entail additional administrative costs that are difficult to quantify.	**Pros:** • Delegating functions could generate cost savings by introducing competition and obviating some internal FTEs and internal capacity-building. • If contract pays the third party through auction proceeds or user fees, City could reduce costs upfront and partially mitigate its financial risk. **Cons:** • Fixed fee contracts for market setup or operation could limit City budgetary flexibility over time. • Unique size, complexity of City real estate market and designed trading system could limit competition, increase procurement costs, and decrease third-party appetite for risk.

(B) Stakeholder trust: The degree to which potential market participants and other stakeholders trust in the usability, efficacy, and fairness of the market. Different stakeholders could have different perspectives on the pros and cons of City execution versus third-party execution. City execution might increase some stakeholders' faith in the ability to directly affect market setup and operation via direct advocacy to City representatives, whereas substantial third-party oversight might invite concerns about a perceived lack of public accountability or a lack of channels for public advocacy to the third party. City execution might concern stakeholders that have doubts about the City's ability to effectively and efficiently stand up a complex market, which could reduce engagement with the market until trading parties become more confident in the market; these stakeholders might hold more faith in third-party execution. Finally, stakeholders might assume the City is better suited to realize market operations that result in equitable outcomes in the city's neighborhoods (e.g. environmental justice communities); a third party might lack credibility in this sense.

[50] There may be a need to verify the legal authority of a third party to charge fees for market participation in New York City.

Table 5. City administration vs. private third-party administration: stakeholder trust

City Execution (City Agency Or Non-Profit Corporation)	Private Third-Party Execution
Pros: • A completely City-run system might increase stakeholders' belief in their ability to advocate directly to City agencies for system adjustments. • When seeking or advocating for market operations that result in equitable neighborhood outcomes, stakeholders might trust the City to prioritize equity more than they would trust a third party. **Cons:** • Stakeholders might doubt the ability of the City to quickly and effectively launch a complex trading system, thus reducing interest in and use of the system in the near term.	**Pros:** • Stakeholders might have more faith in the ability of an experienced third-party administrator to seamlessly run the market, thus more eagerly engage with the market in the near term. **Cons:** • Stakeholders might doubt their ability to hold a contracted third party accountable for delivering changes they desire to the market. • Stakeholders might have less faith in the ability of a third party to realize environmental justice aims, due to a lack of familiarity with the NYC real estate market or a lack of emphasis on achieving equitable outcomes in prior contracts.

(C) Administrative capacity and efficiency: The degree to which the City and/or third parties carrying out market functions have the capacity to efficiently establish and operate all aspects of the market. Internalizing all market-related administrative and technical functions to a City agency or City-managed non-profit corporation has few advantages from the perspective of efficiency and capacity. Full internal administration could require time-consuming and administratively demanding hiring and capacity-building. Onboarding expertise in highly technical matters such as auction management, registry development, and market monitoring would be especially challenging (and costly). Moreover, the potential need to create or reorganize new, high-capacity agencies/organizations would add additional complexity to the startup process. There is also little opportunity for the City of capitalize on functions it would already be carrying out per LL97 with or without trading.

Contracting out all administrative and technical functions, or at least those that require the most specific forms of expertise or the greatest number of staff, could increase the initial speed of system setup as well as the nimbleness and flexibility of the system in operation. Precedent markets such as RGGI and California's cap-and-trade program indicate that information technology and financial services contractors already exist and that they are capable of handling administrative/technical market functions and knowledgeable about carbon trading policy in general.

Table 6. City administration vs. private third-party administration capacity and efficiency

City execution (City agency or non-profit corporation)	Private third-party execution
Advantages N/A **Risks** • Difficulty of creating and running market without third-party technical expertise could slow initial setup speed and decrease the nimbleness of market policy adjustments. • City agencies likely lack the capacity to execute all market functions currently, and robust levels of City hiring could take time. The potential need to create a purpose-built agency or non-profit corporation could further protract market startup.	**Advantages** • Contracting with capable, experienced third parties could accelerate design and execution of uniquely technical operations such as registries and auctions. **Risks** N/A

(D) Alignment with selected market design elements. The study contemplates a trading system with a variety of specific policy design elements—e.g. auctions, banking, price floors. The City is assumed to oversee all regulatory functions in the market, including the specification of design elements like auctions or price floors. But in terms of implementation—and based on the analysis of cost, stakeholder perspectives, and respective capacity above—the City and a third-party administrator might be best suited to oversee disparate elements of the market once it is defined. In general, a third-party contractor, or set of contractors, can bring the expertise and capacity to build and scale the systems and technology needed to operate highly technical activities such as auctions, centralized trading, and banking. The City, on the other hand, is far better suited to steer EJC investment policy that is funded by a trading program.

b. Recommendations and Key Takeaways

This plan recommends that responsibilities for implementing Proposal #1 be allocated between the City and third parties along the lines identified in Table 7 below.

Table 7. Allocation of oversight responsibilities on the basis of specific policy design elements for Proposal #1

Design Element	Proposal #1	City Responsibility	Third-Party Responsibility
Credit Allocation	Credits are allocated through free allocation and auctions	**Regulatory:** Definition of auction rules; establishment of baselines by building typology for explicit free allocation of credits; definition of EJCs.	**Administrative/Technical:** Auction setup and management; financial transaction management; execution and recording of credit allocation per City rules.
Environmental Justice Policies	All Section 321 and NYCHA buildings are eligible to opt in. Section 321 buildings are awarded credits for free equal to their 2018 emissions minus avoided emissions from mandatory prescriptive measures (adjusted for electricity decarbonization after 2029). NYCHA buildings are awarded credits for free equal to their 2018 emissions (adjusted for electricity decarbonization after 2029) Auction proceeds fund 20% of cost of retrofits in EJCs EJC buildings get 100% free allocation up to lesser of 2018 emissions (adjusted for electricity decarbonization after 2029) or LL97 limit	**Regulatory:** Initial establishment of baselines for credits for specific building types that opt in; definition of funded benefits for EJCs.[51] **Administrative:** Administration of funding for EJC retrofits.	**Administrative/Technical:** Scaling of all administrative and technical functions to manage buildings that opt into the trading program.
Price Floor	$50 price floor for auctioned credits (adjusted for inflation)		**Administrative/Technical:** Third parties will build City price floor into auction platform.
Banking	Banking is allowed with a 20% devaluation	**Regulatory:** Definition of banking and devaluation policies.	**Administrative/Technical:** Automatic devaluation of banked credits; recording of devaluation in the registry.
Offset Eligibility	Offsets are not allowed in any compliance period.		

[51] EJC Policy Responsibility and Delegation: Although revenue could be collected by a third party, the City is best suited to administer the funding and navigate the legal, political, and policy sensitivities of targeted neighborhood investment on the basis of environmental justice criteria. However, it is possible for the City to designate funding priorities and rules for an EJC program but to delegate the deployment of that funding, and specific administrative and technical duties related to the program, to another third party. This third party would not be the same third party assigned to administer certain administrative and technical functions of the LL97 carbon trading program.

Key Takeaways for Allocation of Responsibilities

The City must execute market regulatory responsibilities itself, but it could assign regulatory responsibilities to an existing agency—such as the Department of Buildings (DOB)—or a new, purpose-built agency. Because of the relatively lower staffing requirements associated with the development and adjustment of regulations, assigning these powers to an existing agency could be the most expedient pathway for the City.

Assignment of regulatory responsibilities to one department does not preclude the City from having a separate agency, or set of agencies, execute or contract out administrative/technical and verification functions. Some trading programs designed to incentivize environmental public goods assigned regulatory and administrative/technical functions entirely to pre-existing government agencies, such as the DC stormwater retention credit trading system, various state-run water quality trading programs, and federal programs such as the EPA's clean air markets or the NHTSA's Corporate Average Fuel Economy (CAFE) credit trading provisions. On the other hand, state-run emissions trading systems profiled above—RGGI and California's cap-and-trade program—assigned certain administrative and technical functions to purpose-built non-profit corporations, who in turned executed some responsibilities and contracted out others.

Beyond oversight from specific agencies, the City could name a trading system advisory committee, which would ensure that the trading program not only aligns with the City Charter but also advances City priorities regarding environmental sustainability, environmental justice, energy efficiency and security, housing, and public finance. This advisory group could include representatives from relevant City agencies, possibly New York State agencies, and non-governmental organizations including community-based organizations and environmental justice groups.

The City could contract out administrative and technical functions to an existing market of private third parties who have the capacity to execute highly specialized market implementation tasks. One or more City agencies could execute market administrative and technical functions without contracting them out, but the relative complexity and labor intensity of these responsibilities would pose substantial costs to the City with little upside for the City or other stakeholders. California's cap-and-trade program and RGGI contracted out many responsibilities such as credit registry setup and maintenance, auction administration, technical assistance, and some forms of market monitoring to private third-party contractors. Rather than onboard highly specific technical skillsets, New York City could likewise rely on an existing market of private professional services companies—e.g. IHS Markit, Enel X, Deutsche Bank, Potomac Energy, etc.—capable of providing such unique and highly technical services. Relying on private contractors would almost certainly decrease City costs and reduce the amount of time required to establish the most technically or technologically complex elements of a trading system.

In implementing LL97, the City will be relying on third party professionals to certify emissions data for the annual reports that buildings are required to file with the City.[52] Introducing a trading program could heighten the importance of the role of these third-party verifiers in confirming building emissions (see Part II, Section 7(b) on the need for conflict-of-interest rules to govern third-party verifiers). Given the

[52] N.Y.C. LOCAL LAW 97, § 28-320.3.7.

sheer volume of potential market participants in the City, independent, accredited third party entities that already have the capacity to verify emissions and have a firm grasp of past local laws (e.g. LL84, LL87) will play a key role. In the precedents above, the verification of credits/certificates/offsets is separated from the technical administration of the trading system.

The City should establish mechanisms to ensure transparency and equitable outcomes if it delegates administrative and technical market functions to private third parties. Third-party execution could raise stakeholder concerns about the public transparency of third-party decisions, processes, and data as well as the accountability of third parties to respond to public advocacy for changes to the market. In addition, third-party privacy requirements might limit City access and insight into market operations, data, and platforms regarded as third-party intellectual property. Finally, third-party execution might erode communities' faith in the market as a system that could deliver equitable outcomes for environmental justice communities and others, without substantial intervention and oversight by the City and non-City stakeholders. Therefore, contracts with third parties should stipulate clear requirements for transparent data sharing and regular reporting on the key performance indicators of greatest importance to the City and the public, including indicators about the degree to which market trading financial and environmental benefits are accruing equitably across New York City neighborhoods.

Part II – Rules and Principles for Implementation and Market Integrity

Proposal #1 outlines the broad parameters of a potential trading market design. It sets an allocation method that combines free allocation and auctioning credits, establishes a price floor for credits sold at auction, identifies mechanisms for driving investment towards EJCs, including allowing NYCHA buildings and those covered by Section 321 to opt in, and prohibits offsets. But this leaves open a number of questions regarding how parties will engage with each other and the regulator in the marketplace. For example, how and when will buildings receive credits? Who will be allowed to own and trade credits? And what sort of information do parties need to communicate regarding their credit holdings? These and other issues will have to be addressed in the City's implementing rules for the program. The sections below outline some the key issues that must be addressed in these rules. They proceed as follows:

Section 1 begins by describing the decisions that the City must make in developing rules regarding the creation and allocation of credits through explicit free allocation and auctions. Section 2 identifies the types of decisions that must be made about who should be allowed to participate in a trading market, and the requirements for participation. Section 3 sets out some principles that the City should follow in developing rules for the secondary market to ensure that it operates efficiently and with integrity. Sections 4 through 7 deal with the cross-cutting issues of avoiding fraud and market manipulation, promoting environmental justice, ensuring a transparent market, and ensuring compliance. Section 8 concludes by highlighting a few differences if the City were to implement Proposal #2 instead of Proposal #1.

1. Initial Credit Allocation

In Proposal #1, EJC buildings will be freely allocated credits up to the lesser of either their 2018 emissions or their emissions limit under LL97, while non-EJC buildings get 70% of such credits allocated for free; buildings will be able to trade, transfer, or bank surplus credits. After 2029, buildings' 2018 emissions will be adjusted to account for grid decarbonization. Failure to adjust the 2018 emissions in this manner could create a windfall for building owners who could see their emissions fall as the grid decarbonizes even without investing in energy efficiency improvements.[53]

In Proposal #1, Section 321 buildings that opt into the program are freely allocated credits equal to their 2018 emissions minus the anticipated savings that they receive from implementing their prescriptive measures (and adjusted for electricity decarbonization after 2029). NYCHA properties that opt in would receive credits for free equal to their 2018 emissions (adjusted for grid decarbonization after 2029). This section focuses on key questions that need to be addressed in implementing the combination of explicit free allocation and auctioning of credits that Proposal #1 recommends.

[53] In its modelling, the Study estimated the carbon intensity of electricity delivered into Zone J based on the New York Independent System Operator (NYISO) Grid in Transition Study. The Grid Study's results were calculated using Brattle's Grid Scenario Impact Model (GridSIM), which is a capacity expansion and planning model designed for analysis of highly decarbonized electric systems.

a. Explicit Allocation of Credits

This sub-section identifies and proposes options for dealing with issues related to the explicit allocation of credits. These issues and options are summarized in Table 8.

Table 8. Key issues and recommendations for implementing rules regarding credit allocation

Issue	Recommendation
How will buildings' baselines be adjusted over time?	Ensure that the baselines up to which buildings are awarded credits are adjusted over time to account for grid decarbonization.
How should buildings' baselines for awarding credits be adjusted if occupancy types change?	Consider adjusting buildings' limits for awarding credits if more than a specified percentage of the building changes occupancy types. Rules will need to align with those that DOB develops for adjusting LL97 emissions limits when occupancy types change.
How many credits should new buildings be allocated?	Allocate credits to new buildings up to the lesser of their LL97 limit or actual emissions.
How to control for the impact of inaccurate emissions data?	Consider various approaches to dealing with inaccuracies.
Which areas should be designated as environmental justice communities (EJCs)?	The City Council or a City agency will need to develop a set of criteria for identifying EJCs that respects relevant legal constraints.

i. The Importance of Baselines for Allocating Credits

Recommendation: Ensure that the baselines up to which buildings are allocated credits are adjusted over time to account for electricity grid decarbonization

In Proposal #1, buildings are allocated credits up to the lesser of their 2018 emissions or their LL97 building emissions limits; the lesser of these two is the building's "baseline" for the allocation of credits. The choice of baseline for awarding credits is important for ensuring that LL97 drives reductions in GHG emissions. Allocating buildings credits that exceed their actual emissions would be granting them credits for "hot air." As explained in the CTS Report, the Study recommends the use of the lesser of 2018 emissions or LL97 building emissions limits as the baseline for awarding credits because many buildings will not have to reduce their emissions to comply with the LL97 emissions limits in the first compliance period. Thus, allocating credits up to LL97 building limits could result in an over-allocation of credits relative to emissions. After 2029, buildings' 2018 emissions will be adjusted downward to account for grid decarbonization. As 2018 emissions are adjusted to account for decarbonization, and the LL97 emissions limits become more stringent over time, the baselines up to which credits will be allocated will decline, and buildings will be allocated fewer credits.

ii. Limits for Allocating Credits for Buildings that Change their Occupancy Types

Recommendation: Consider adjusting buildings' limits for awarding credits if more than a specified percentage of the building changes occupancy types. Rules will need to align with those that DOB develops for adjusting emissions limits when occupancy types change.

If a building's occupancy category or occupancy rate changes significantly in the future, should the City adjust the baseline up to which the building is awarded credits?

Tokyo's approach may be instructive here: Tokyo allows for buildings to change their baselines for generating credits if there is a fluctuation in emissions equal to at least 6% of baseline emissions due to a change in floor space, purpose of use, or amount of equipment; changes in business hours, production volume, or weather are not excuses for changing the baseline. Tokyo's trading program includes a detailed process for calculating an adjusted baseline for buildings that have undergone significant changes in occupancy rate or type.[54]

Importantly, any rules that the City develops to adjust baselines due to changes in occupancy type would need to track the rules that DOB develops under LL97 to adjust the emissions limits for buildings that change occupancy types. However, the City cannot rely solely on the rules developed to adjust LL97 limits in light of changes in occupancy types to determine the allocation of credits; recall that under Proposal #1, buildings would be awarded credits based on the lesser of their 2018 emissions and their LL97 limits (with non-EJC buildings receiving for free 70% of this lesser amount).

iii. Limits for Allocating Credits for New Buildings

Recommendation: Allocate credits to new buildings equal to the lesser of their LL97 limit or actual emissions.

Under Proposal #1, buildings are allocated credits based on the lesser of 2018 emissions (adjusted for grid decarbonization after 2029) or their LL97 emission limit. The City will need to develop a fair approach to allocating the free credits to new buildings to which they are entitled. For example, imagine a building already being designed, which does not currently exist but will be fully constructed and occupied in 2024. The building has no historical emissions which could serve as a basis for awarding credits, leaving only its LL97 emission limit. But the limits under LL97 were presumably set with the existing building stock largely in mind and so will likely be too lenient for new buildings, especially during the first compliance period. [55] Moreover, if the new building was already being designed with emissions-reducing improvements that it planned to incorporate regardless of the existence of a trading program, should it be allowed to earn credits from all those improvements that it had already planned on installing? Such already-planned

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[54] TMG, *Detailed Document*, *supra* note 8, at 32.

[55] The Urban Green Council's 2020 report, *Trading: A New Climate Solution for Buildings*, raised the idea of setting baselines at LL97's caps for future compliance periods rather than based on the initial compliance caps. Though this approach could be politically challenging to apply to existing buildings or buildings already in construction, it may be appropriate to consider such an approach for new buildings that have not yet been designed or constructed.

emissions reductions would not represent truly "additional" credits, in the sense of credits that would not have occurred but-for the financial incentive created by the trading program.[56] The study did not directly address this issue in its modelling because each building segment was modelled as a group without explicitly distinguishing between new and existing buildings within the segment; the total square footage of each segment grew over time, and so the associated emissions and abatement opportunities grew with the segments, but identifiable buildings were not added.

One option is to freely allocate to new buildings the credits equaling the lower of either their first-year emissions or their LL97 cap. The potential drawback to this approach is that it could discourage more energy efficient designs or behaviors for the initial construction or operation of new buildings: a new building could, for example, try to "game the baseline" by artificially increasing its energy consumption during its initial year, incentivized by the prospect of easily reducing its emissions in subsequent years and so earning profitable credits on an annual basis. New buildings could instead be required to submit verification of compliance with certain operation management standards to try to limit their ability to "game the baseline."[57]

iv. Inaccuracies and Gaps in Emissions Data

Recommendation: Consider various approaches to dealing with inaccuracies.

Under Proposal #1, credits will be freely allocated to existing buildings based on the lesser of their 2018 emissions and their LL97 building limits. This means that the City will need to use data on 2018 emissions to determine how many credits to award to buildings. While New York City has extensive data on covered buildings' emissions by virtue of LL84 and LL87, questions have been raised about the accuracy of some of this data. To the extent that data on covered or opt-in buildings contains inaccuracies, it could lead to distorted credit allocations. For example, if the existing data over-reports 2018 emissions, buildings might be allocated credits above their actual 2018 emissions (although still below their LL97 caps). If the data under-reports 2018 emissions, buildings could receive fewer credits than their 2018 emissions (provided a building's 2018 emissions are lower than its LL97 building cap and therefore the basis for awarding credits).

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[56] LL97 defines "additional" in the context of offset credits as "not already required by local, national or international regulations." N.Y.C. LOCAL LAW 97, § 28-320.3.6.2. But true additionality should go beyond whether the credit-generating action is not already legally required. *See, e.g.*, CAL. CODE REGS. tit. 17, § 95802(a) ("Additional" means, in the context of offset credits, greenhouse gas emission reductions or removals that exceed any greenhouse gas reduction or removals otherwise required by law, regulation or legally binding mandate, and that exceed any greenhouse gas reductions or removals that would otherwise occur in a conservative business-as-usual scenario."); *id.* ("Project Baseline" means, in the context of a specific offset project, a conservative estimate of business-as-usual GHG emission reductions or GHG removal enhancements for the offset project's GHG emission sources, GHG sinks, or GHG reservoirs within the offset project boundary.).

[57] Tokyo, for example, requires new buildings that want to set their baseline according to their emissions in their initial years of operation to certify compliance with certain operation management standards for setting their thermostats and times to turn off heating, cooling, or lighting. *See* TMG, *Detailed Document*, *supra* note 8, at 20.

The City might try to assess the significance of these inaccuracies, for example by assessing the extent to which there are large variations in reported emissions for a sample of buildings over a period of years (such as 2015–2018). If there are gross inaccuracies that the City determines must be taken into account in allocating credits, there are different approaches that the City might use. For example, it might award credits based on an average of building emissions over a number of historical years (e.g. 2015–2018),[58] or it might award credits based on a percentage of 2018 emissions. The City might also explore whether some baseline data could be verified by a third-party professional, based on utility bills or other data. Potentially, the City might inform buildings of their initial notional allocation, and then establish an appeals process for buildings to contest that notional allocation. Establishing such a process could have resource implications, but to reduce these, any such process might be integrated with any process that that the City establishes to challenge LL97 building limits.

Precedent trading programs also have had to deal with concerns about inaccuracies in emissions data in allocating credits. Tokyo has adopted some approaches in awarding credits in its trading program for building emissions that could help to limit the potential impact of gross inaccuracies. For existing buildings covered from the start of its trading program, Tokyo allowed the buildings to select any consecutive three-year period from 2002 to 2007, submit verified reports of annual emissions during that three-year period, and take the average annual emissions over that period as the buildings' base-year emissions.[59] Tokyo then applies a compliance factors to those base-year emissions, to determine a building's emissions reduction obligations during each compliance period. The compliance factor increases over time. If a building achieves emissions reductions in excess of its reduction obligation, it is eligible to generate credits for sale. A building's potential to generate credits is further limited to just half of its base-year emissions, seemingly to help ensure that credits are for additional reductions.[60]

The Study did not model the potential implications of adjusting credit allocations to deal with data inaccuracies in 2018 emissions data.

v. Defining Environmental Justice Communities

Recommendation: The City Council or a City agency will need to develop a set of criteria for identifying EJCs that respects relevant legal constraints.

Given that the City will differentiate between buildings in EJCs and non-EJCs in deciding how many credits to allocate to buildings for free, the City will need to define which areas of the City constitute EJCs. This

[58] Earlier years may have even less reliable data available. Incorporating earlier years into the baseline also risks creating non-"additional" credits, as it would award buildings valuable credits for actions they may have already taken in the intervening years. Bringing more recent years into the average might yield better data and avoid some of these "additionality" concerns. However, using more recent years could lead some buildings that have recently taken voluntary actions to complain that they are being punished with tighter baseline allocations compared to their more heavily polluting neighbors.

[59] TMG, *Detailed Document*, *supra* note 8, at 55.

[60] TMG, *Detailed Document*, *supra* note 8, at 55. This check may also block excessive credits from being awarded based on a temporary drop in energy consumption due to occupancy, weather, or business conditions. While such emissions reductions might be additional, they may also be due to leakage or otherwise not permanent.

can be done either by legislation or rule. As described in the CTS Report, the Study defined EJCs using two metrics, one of which measures environmental vulnerability and the other which measures social vulnerability. For the environmental criteria, we looked at the number of $PM_{2.5}$ attributable asthma emergency department visits for children.[61] For the social criteria, we looked at the high school graduation rate.[62] Communities that ranked in the bottom 40% of Neighborhood Tabulation Areas for either criteria were defined as EJCs for the purposes of this study. The Study did not presume that the City would ultimately define EJCs according to these criteria (and, in fact, MOC&S was leading a parallel process to define EJCs during the time the study was ongoing). However, it was necessary to develop a set of indicative criteria for modelling purposes. Whatever criteria the City ultimately chooses to select, the City should be mindful of the relevant constitutional and statutory restrictions that are discussed in Study's Legal Implementation Memo.[63]

b. Auction

Proposal #1 freely allocates to non-EJC buildings enough credits to cover only 70% of the lesser of their 2018 emissions (adjusted for grid decarbonization after 2029) or their LL97 limit. Thus, under Proposal #1, if any regulated buildings need additional credits that cannot be acquired through direct trade either with other buildings that have excess credits, such additional credits can be purchased at auction. Proposal #1 sets a $50 price floor, adjusted annually for inflation, for credits sold at auction. There remain a number of questions for the City to determine about how it will regulate the relevant auction. Table 9 summarizes the key issues the City or its delegate must resolve in setting up an auction and some of the options that we've identified for addressing them.

[61] Data sourced from *Environment and Air Quality Data Portal, (New York State Statewide Planning and Research Cooperative System (SPARCS)*, N.Y.C. DEP'T OF HEALTH AND MENTAL HYGIENE, https://a816-dohbesp.nyc.gov/IndicatorPublic/Subtopic.aspx?theme_code=2,3&subtopic_id=103; AMERICAN COMMUNITY SURVEY 5-YEAR SERIES (2013–2017), U.S. CENSUS BUREAU, https://a816-dohbesp.nyc.gov/IndicatorPublic/VisualizationData.aspx?id=2334,4466a0,109,Summarize; *Air Quality System*, EPA, https://www.epa.gov/aqs; Kazuhiko Ito et al., *Characterization of $PM_{2.5}$ Gaseous Pollutants, and Meteorological Interactions in the Context of Time-Series Health Effects Models,* 17 J. EXPOSURE SCI. & ENV'T EPIDEMIOLOGY S45 (2007).

[62] See CTS Report Part II for a description of why we chose these metrics for defining EJCs.

[63] For more on this point, see the Study's Legal Authority Memo.

Table 9. Key issues and recommendations for implementing auctions

Issue	Recommendation
How should bids be collected?	Consider implementing a sealed-bid, uniform-price auction format.
Should purchase limits be imposed?	Consider restricting the number of credits than an individual entity or affiliated entities can purchase at auction.
What sort of notice of auctions should be provided?	Give sufficient notice of upcoming auctions and publicize rules of auction (such as minimum purchase price).
Should there be requirements to participate in auctions?	Require parties to register to participate in the auction and to provide financial security alongside a bid.
How frequently should auctions be scheduled?	Hold auctions multiple times a year, as often as necessary and practical.
How should auctions be monitored?	Appoint an independent market monitor
Should buildings be able to consign credits for sale at auctions?	Consider allowing buildings to consign credits to the auctions for sale
How many credits should be auctioned?	Use a percentage of buildings' annual baselines for credits to define the pool of available credits, split across all auctions scheduled during a compliance year. Consider initially setting aside some portion of credits in containment reserves.

i. Bidding Format

Recommendations: Consider implementing a sealed-bid, uniform-price auction format.

Multiple formats are possible in auctioning regulatory permits.[64] Several air pollution and climate markets (like the acid rain market, RGGI, California, Draft TCI, and EU-ETS) have followed a "sealed" bidding format, in which bids remain secret; a few others (like Virginia's 2004 auction of nitrogen oxide permits) have used a "dynamic" approach involving real-time interaction between bidders and an auctioneer.[65]

Similarly, several programs (e.g., RGGI, California, Draft TCI, EU-ETS, and Virginia) have followed a "uniform price" structure, in which a market-clearing price is set based on the bids, and all successful bidders pay the same price for their credits. A few others (like the acid rain market), use a "pay-as-bid"

[64] For example, the Federal Communications Commission pioneered a so-called "incentive auction" for electromagnetic spectrum licenses, a two-step process in which broadcasters first proposed sale of their underutilized spectrum and then broadband providers competed to purchase the freed spectrum. Another idea in the literature is, instead of paying a single market-clearing price, bidders pay the highest *unsuccessful* bid, so that no single source can unilaterally affect prices by artificially raising or lowering demand. *See* THOMAS H. TIETENBERG, EMISSIONS TRADING: PRINCIPLES AND PRACTICE 157 (2d ed. 2006).
[65] Giuseppe Lopomo et al., *Carbon Allowance Auction Design: An Assessment of Options for the United States*, 5 REV. ENVTL. ECON. & POL'Y 2 (2011).

approach, in which there is a minimum market-clearing price, but all successful bidders pay what they actually bid.[66]

Overall, a sealed-bid, uniform-price auction format is a common design choice for recent air pollution and climate pollution markets.[67] Each participant can submit multiple bids during the auction's bidding period, specifying the participant's willingness to purchase different amounts of credits at different prices: for example, a participant may bid to purchase more credits if the price is lower, but fewer credits if the price rises higher. Bids are kept secret. Once all bids are received, the auction manager arranges the "bid stack," placing all bids in descending order of bid price. Starting with bids at the highest price, bids are then awarded in descending order until all credits available for auction have been awarded. The price per credit offered in the bid that receives the last available credit sets the clearing price for the auction. All successful bidders pay the clearing price, even if they bid a higher price. The $50 price floor sets the minimum acceptable bid price.[68]

ii. Purchase Limits

Recommendation: Consider restricting the number of credits that an individual entity or affiliated entities can purchase at auction.

The City might want to limit the number of credits that an entity can purchase at auction. Purchase limits prevents any entity or affiliated entities from dominating any single auction in a way that would allow them to exert undesirable market power.[69] Such purchase limits should also prevent affiliated entities from surreptitiously purchasing credits on behalf of each other in attempts to circumvent the direct purchase limit, though brokers and other financial intermediaries should be allowed to purchase credits for resale.

RGGI, the California cap-and-trade program, and South Korea's GHG emission trading program limit the allowances that a party can purchase at auction, but the EU ETS does not establish such limits.

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[66] *Id.*

[67] *See id.* at 16 (concluding that a uniform-price, sealed-bid auction may be the best format for U.S. carbon markets, to distribute allowances efficiently and create reliable price signals). For example, EU-ETS, RGGI, and the TCI Model Rules adopt this structure. Specifically, the TCI Model Rule proposes a single-round, sealed-bid, uniform price auction. TCI Model Rule, *supra* note 9, at 147.

[68] *See, e.g.*, TCI Model Rule, *supra* note 9, at 146 (noting that the reserve price also ensures that if total demand for allowances is below the supply of allowances available at the auction, the price does not drop to zero, but instead remains set at the reserve price); N.Y. COMP. CODES R. & REGS. tit. 6, § 242-1.2(b)(58), (69).

[69] *See* CAL. CODE REGS. tit. 17, § 95802(a) (defining "Auction Purchase Limit"); TCI Model Rule, *supra* note 9, at 148 (setting the purchase limit at no more than 25% of allowances at any auction, though the amount can be changed with notice).

Table 10. Limits on auction purchases in the RGGI, California, and South Korea ETSs

RGGI	California	South Korea
Limits set by state rules. In New York, bidders may not purchase more than 25% of the allowances sold at an auction.[70]	Covered entities may not purchase more than 25% of the allowances sold at an auction.[71] Other participating entities, including Voluntarily Associated Entities (VAEs),[72] may not purchase more than 4% of the allowances sold.[73]	Bidders may not purchase more than 30% of the allowances sold at an auction.[74]

The Study did not model different options for purchase limits or the potential impacts of purchase limits.

iii. Notice of Auctions

Recommendations: Give considerable notice of upcoming auctions, including the rules of the auction.

Auctions should be announced with sufficient advance notice to publicize them to all market participants.[75] The auction administrator should give sufficient public notice of the upcoming schedule of auctions over at least the next year. Notice should specify the quantity of credits that will be available at each individual auction; the applicable $50 price floor as adjusted for inflation, purchase limits, and financial security terms for each auction; and any other changes in format, prerequisites, or conditions as compared to previous auctions.

iv. Participation Requirements for Auctions

Recommendation: Require parties to register to participate in an auction, and to provide financial security alongside a bid.

To participate in auctions, entities should first satisfy the basic registration requirements for participation in the market, including full disclosures about affiliations with other market participants. See Part II, Section 2 below for more details on the basic registration requirements. As described below in Part II, Section 2, broad participation rules that allow brokers and financial intermediaries to enter the market

[70] N.Y. COMP. CODES R. & REGS. tit. 21, § 507.8.
[71] CAL. CODE REGS. tit. 17, § 95911(d)(2)(A).
[72] Voluntarily Associated Entities (VAEs) are defined as those that are not identified as covered or opt-in covered entities, but that may apply to participate in the market. This includes individuals that do not meet the requirements to qualify as a covered or opt-in covered entity, but that wish to "purchase, hold, sell, or voluntarily retire compliance instruments;" entities "operating an offset project or early action offset project;" and entities providing clearing services who only temporarily possess compliance instruments, in order to clear transactions between two separate entities. CAL. CODE REGS. tit. 17, § 95814(a)(1).
[73] CAL. CODE REGS. tit. 17, § 95911(d)(2)(B).
[74] INT'L CARBON ACTION PARTNERSHIP, KOREA EMISSIONS TRADING SCHEME, https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=47 (last updated May 18, 2021).
[75] *See* TCI Model Rule, *supra* note 9, at 145 (Announce at least the next four auctions, and always give at least 45 days' notice of any calendar changes).

are desirable.[76] For example, smaller or less sophisticated buildings may rely on brokers to help them navigate the auction and buy credits on their behalf (though rules like purchase limits should ensure that brokers cannot aggregate credits for so many buildings as to wield market power).[77]

Beyond registration requirements to open general accounts for trading, registration to participate in an auction may bring additional financial and disclosure requirements.[78] Auction participants must provide sufficient financial security to cover the bids they plan to make, so that if a bidder's offer is accepted but the bidder subsequently fails to pay for the credits, the financial security would be forfeited to cover those bids.[79] Existing emissions auctions also often impose a few additional restrictions on participation, such as requiring applicants to disclose if they have been investigated for violating any rule associated with any commodity markets or exchanges,[80] and prohibiting anyone from participating if they have provided misleading information or violated any rules during past auctions.[81]

The processes for registration and bidding should be as clear and straightforward as possible, to minimize participation costs. Some surveys of participants in existing emissions auctions, like California's, suggest that there can be a learning curve to participation, but the process can be made manageable.[82]

v. Market Monitor

Recommendation: Appoint an independent market monitor.

An independent market monitor should be retained to observe each auction for collusion, market power, price manipulation, or any other activity that undermines the efficiency and performance of the auction.

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[76] *See, e.g.*, REGIONAL GREENHOUSE GAS INITIATIVE, CO2 ALLOWANCE AUCTIONS: FREQUENTLY ASKED QUESTIONS (Jan. 10, 2017), https://www.rggi.org/sites/default/files/Uploads/Auction-Materials/38/RGGI_CO2_Allowance_Auction_FAQs_Jan_10_2017.pdf (noting that all eligible parties, including brokers, can participate in auctions); POTOMAC ECONOMICS, MARKET MONITOR REPORT FOR AUCTION 52 (2021), https://www.rggi.org/sites/default/files/Uploads/Auction-Materials/52/Auction_52_Market_Monitor_Report.pdf (noting that compliance-oriented entities and investors with compliance obligations together purchased 65% of allowances auctioned, implying that investors without compliance obligations purchased the remaining 35%, and listing Morgan Stanley Capital Group among the bidders).

[77] Similarly, even if non-regulated financial entities were excluded from the auction, some buildings may be partly owned by financial institutions, and large buildings may step into any void created by the direct exclusion of non-regulated financial players by taking on the roles of hedgers and market-makers.

[78] Beyond the general regulatory requirements to be eligible for the auction, rules may preserve the right for individual auction notices to set additional participation limits. *See, e.g.*, TCI Model Rule, *supra* note 9, at 151.

[79] TCI Model Rule, *supra* note 9, at 150–51 (to participate in a specific auction, qualified bidders must provide financial security (bond, cash, certified funds, or letter of credit), in a form described in auction notice). California, for example, uses Deutsche Bank as a financial services administrator. *See* CAL. AIR RESOURCES BD., CAP-AND-TRADE AUCTIONS AND RESERVE SALES: FINANCIAL SERVICES ADMINISTRATION (2019), https://ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/auction/forms/financial_services_administration_faq.pdf.

[80] TCI Model Rule, *supra* note 9, at 148–49 (also requiring disclosure of any indictments or convictions of any member, officer, or affiliate of the entity).

[81] *Id.* at 150.

[82] *See* Chios Carmody, *A Guide to Emissions Trading Under the Western Climate Initiative*, 43 CAN.-U.S. L.J. 148, 271 (2019) ("Two survey participants feel that purchasing allowances at WCI auctions is generally straightforward. However, there is a learning curve to understanding the overall auction process and how it works. Becoming a qualified bidder can be a bureaucratic process but, once registered, it is a clear process.").

RGGI's market monitor analyzes its auctions and the secondary market for RGGI allowances for the exercise of market power, among other concerns.[83] California's cap-and-trade program also has an independent market monitor and a market surveillance committee.[84] The market monitors in RGGI and the California cap-and-trade programs are limited to producing reports and making recommendations; the markets monitors—and the market surveillance committee in California—are not authorized to act to directly address market power issues that they identify.

vi. Auctioning Credits on Consignment

Recommendations: Consider whether covered buildings or opt-in buildings could consign credits to the auction for sale.

In Part III, Section 4 of this plan, the idea of default, automatic enrollment is raised, in which buildings could choose to have excess credits automatically sold for them, or to automatically buy necessary credits. Auto-enrollment has been very effective in many contexts, such as retirement savings. One way to implement such automatic enrollment in the context of an auction would include allowing buildings to consign their excess credits to the auction for sale.

There are some existing trading programs with similar features. Notably, while Tokyo does not allocate allowances through an auction, it does have the option of taking credits generated by small and mid-size facilities, which are transferred to the government for resale, and offering such credits through either a fixed price or a uniform price auction.[85] As another example with some analogies, in California's cap-and-trade program, utilities are freely allocated allowances that they must consign to the auction for sale.[86] The consigning utilities agree to accept the auction settlement price for allowances sold,[87] and California has procedures for how to split earnings among consigning utilities in case supply exceeds demand at an auction and not all allowances are sold.[88] The U.S. acid rain market also featured a zero-revenue auction that sold a portion of regulated entities' allocated allowances. Acid rain allowances were allocated to sources freely, but each source was required to put 2.8% of their allowances up for auction. The program also allowed permit holders to use auctions to sell additional allowances on consignment beyond the required minimum 2.8%.[89] Earnings generated from the auction were distributed back to those sources, not to the government (hence the term "zero-revenue auction").[90]

Such an arrangement may be appealing to buildings with credits for sale looking to minimize transaction costs. However, if the demand for credits at an auction drops below the supply of credits at that auction,

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[83] *Market Monitor Reports*, REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/auctions/market-monitor-reports.
[84] *Market Monitoring: Market Notices,* CAL. AIR RESOURCES BD., https://ww3.arb.ca.gov/cc/capandtrade/marketmonitoring/marketmonitoring.htm.
[85] TMG, *Detailed Document*, *supra* note 8, at 67.
[86] CAL. AIR RESOURCES BOARD, GUIDANCE FOR ALLOWANCE CONSIGNMENT TO AUCTION (2019), https://ww2.arb.ca.gov/sites/default/files/classic//cc/capandtrade/auction/consignment_guidance.pdf.
[87] CAL. CODE REGS. tit. 17, § 95910(d).
[88] CAL. CODE REGS. tit. 17, § 95911(f).
[89] However, many power plants with excess credits preferred to use the secondary marketplace. *See* TIETENBERG, *supra* note 64, at 11.
[90] *See id.*

or if the price of credits on the secondary market is significantly below the auction's price floor, this kind of a consignment arrangement could face some practical challenges and inefficiencies.

vii. How Many Credits Should Be Auctioned?

Recommendation: Use a percentage of buildings' annual baselines for credits to define the pool of available credits, split across all auctions scheduled during a compliance year. Consider initially setting aside some portion of credits in containment reserves.

As explained above, EJC buildings get all their credits for free; non-EJC buildings get credits equaling 70% of the lesser of their 2018 emissions (adjusted for grid decarbonization after 2029) and their LL97 building limit, and must buy the rest of their credits from the auction or other building owners. These freely allocated credits will minimize (and in many cases eliminate) LL97 costs to building owners, who will be able to emit at least 70% of baseline emissions for free. The remaining 30% of their emissions can be addressed through credit purchases or investments in carbon abatement (securing the additional benefit of lower energy bills) or other compliance options under LL97. The supply of additional credits to be auctioned is the remaining 30% of regulated buildings' emissions that are not freely allocated to those buildings through the free distribution of credits. The Study determined that at least 30% of non-EJC credits should be auctioned based on analyzing the share of credits that need to be auctioned to make the $50 price floor effective in accelerating cost-effective carbon abatement. If more than 70% of the total credits were allocated for free, there is a strong likelihood that LL97 would spur little or no investment to reduce carbon emissions prior to 2030 when LL97 limits are set to tighten. If a larger share of credits were sold in auction, the trading regime would be similarly effective at spurring carbon reductions and would produce a larger revenue stream to the City that could be applied toward investments in EJCs or other policy priorities.

It will be necessary to translate the global 30% guideline into an amount of credits to be auctioned in any given year. This can be done by calculating the amount of credits that equals 30% of the annual baseline (for credits) for each individual non-EJC building and aggregating it into the annual auction supply.

Given the 30% was determined using modeling that has uncertain inputs, it may be advisable to build additional flexible mechanisms into the auction format, in order to fine-tune the amount of credits available for auction as needed to prevent undesirably high compliance costs or undesirably low abatement actions. Some existing auctions have implemented additional controls to keep compliance costs and total emissions reductions within an acceptable range, and to ensure price floors remain binding. A cost containment reserve, for example, can help protect market participants from unexpectedly high costs. In such a reserve, the regulator preemptively withholds a small percentage of total credits to be auctioned (such as 10% of an annual cap). If the auction's clearing price exceeds a pre-determined threshold, the regulator can release some portion of reserve credits to expand the total pool of credits available at that auction. This allows bids submitted at lower prices to instead determine the auction clearing price and allows the auction to clear with a relatively small volume of additional credits released.[91] If enough low-cost abatement opportunities exist that the auction price does not rise too high,

[91] In RGGI, the cost containment reserve has been triggered twice, though the price triggers were set relatively low at the time in both cases.

the cost containment reserve also helps accelerate decarbonization by reducing the total available allowances. If not enough low-cost abatement opportunities materialize and so bidders request a high volume of credits at increasingly high prices, the cost containment reserve acts as a release valve to mitigate the risk of high-cost outcomes at auction. Similarly, an emissions containment reserve can help ensure that regulated entities do not purchase too many credits at a very low price without first making low-cost emissions reductions, effectively maintaining a price floor.

Besides containment reserves, a few additional mechanisms can set limits on the auction price or quantity of credits available at auction. Both RGGI and California incorporate a reservation price or floor price in their auctions, representing the minimum price that they are willing to accept to sell an allowance. For unsold permits, RGGI retires all unsold allowances, whereas California carries forward up to 25% of unsold allowances and retires them only if they remain unsold in the next two quarterly auctions.[92] Proposal #1 includes a $50 price floor (adjusted for inflation). The Study did not model cost or emissions containment reserves or other mechanisms for providing greater control over prices.

c. Mechanics of Initial Allocation

Table 11. Key issues and recommendations for initial allocations

Issue	Recommendation
Should credits be issued with serial numbers and vintage years?	Assign unique serial numbers to credits to identify the year of creation and other key features, and to allow for tracking to prevent double counting.
When should credits be initially allocated?	Schedule initial allocations early, to promote market confidence and liquidity. Schedule auctions as frequently as practicable to allow for flexibility and disrupt attempts to corner the market.

i. Issue Credits with Serial Numbers and Vintages

Recommendations: Assign unique serial numbers to credits to identify the year of creation and other key features, and to allow for tracking to prevent double counting.

When credits are initially allocated either for free or by auction, they should be given unique serial numbers for purposes of tracking and identifying the year of creation. Serial numbers with year identifiers are fairly common among existing trading programs.[93] Some other programs incorporate other information into their serial numbers, such as the region or source of the emissions reduction that generated the credit.[94] Assigning credits on a per-metric-ton-CO_2-equivalent basis likely makes the most

[92] For example, see RGGI and the TCI Model Rules; N.Y. COMP. CODES R. & REGS. tit. 6, § 242-1.2(b)(39)–(40).
[93] *E.g.*, CAL. CODE REGS. tit. 17, § 95802(a) (defining "serial number"); N.Y. COMP. CODES R. & REGS. tit. 6, § 242-6.4(b); 40 C.F.R. § 96.53(c); TCI Model Rule, *supra* note 9, at 56; *but see* TMG, *Detailed Document*, *supra* note 8, at 71 (explaining that serial numbers identify region, rather than year, though credit types and expiration date are also recorded along with the serial numbers).
[94] For example, DC's stormwater program tracks the project that created the credit through the serial number.

sense to simplify tracking and trading; doing so will require the City to adopt a rule for rounding emissions calculations up or down to the nearest ton.[95]

Tracking each individual credit by serial number allows for more thorough oversight but can create data management burdens depending on the number of credits being tracked. In EPA's clean air markets, for example, the agency typically tracks blocks of allowances rather than storing each individual allowance in its system, to cut down on data management burdens. However, other programs track each individual credit by serial number, using a single integrated database to track each credit as it is created, traded, submitted for compliance, and retired. Careful accounting practices can help ensure unambiguous ownership of each individual credit and so prevent double counting.

ii. Timing of Initial Allocations

Recommendations: Schedule initial allocations early, to promote market confidence and liquidity. Schedule auctions as frequently as practicable to allow for flexibility and disrupt attempts to corner the market.

Proposal #1 envisions that credits are created centrally and then are allocated to buildings via a combination of auctions and free distribution. This approach raises a key question: when should such initial allocations occur?[96]

To promote market confidence and liquidity, it is helpful if there are credits to transact from the very beginning of the market's existence. Doing so does put some risk on buildings if they underestimate their emissions and sell too many of their allocated credits, especially in the program's first year, when buildings will still be learning. But scheduling subsequent auctions near the compliance deadlines will allow buildings to make up for initially underestimating their own credit needs.

Therefore, to promote market confidence and liquidity, credits should be allocated as early as possible during, or even in advance of, the first compliance period. Allocation before the first compliance period should be feasible since credits will be allocated based on the lesser of buildings' 2018 emissions and LL97 building limits. Similarly, any initial auction should be scheduled as early as possible. Subsequent auctions should be scheduled with sufficient frequency. If there is a sufficient volume of total credits to ensure a robust market, more frequent auctions could give participants greater flexibility to adjust their buying and selling strategies from sale to sale, and may disrupt coordinated attempts to corner the market.[97] More frequent auctions may also allow participants to respond with more flexibility to any seasonal fluctuations in energy usage. However, if the frequency of auctions reduces the number of credits sold per auction,

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[95] *See, e.g.*, 40 C.F.R. § 86.1865-12(k)(1) (requiring the rounding of credits and debits to the nearest whole number).

[96] INTERAGENCY WORKING GROUP FOR THE STUDY ON OVERSIGHT OF CARBON MARKETS (IWG), REPORT ON THE OVERSIGHT OF EXISTING AND PROSPECTIVE CARBON MARKETS 12–13 (2011) [hereinafter IWG OVERSIGHT REPORT] ("[W]hen to introduce into commerce those allowances that are associated with future years' emission limits. Although allowances associated with a given year's emission limit certainly need to be introduced before entities face compliance obligations for that year, some or all allowances associated with that year's emission limit could be introduced years in advance.").

[97] WESTERN CLIMATE INITIATIVE, AUCTION DESIGN WHITE PAPER (2010) (more auctions also improve liquidity and may make it easier for small firms to participate).

the smaller market size could increase the risk of manipulation. Auctions can be held multiple times per year, as often as is necessary and practical.[98]

2. Market Participation

Another key question for the City is: which types of entities should be allowed to buy and sell credits in an auction or secondary market? This section sets out some guidelines for the City to follow is establishing participation rules.

As a matter of general principle, allowing broader participation in the market promotes liquidity and may even help advance the policy's environmental objective by increasing demand for credits. However, narrower rules for participation may make the market easier to manage and could minimize certain risks of manipulation. Regardless of the level of participation allowed, regulators likely need to monitor the corporate affiliations and other relationships between market participants to prevent collusion or other types of manipulation. Table 12 summarizes these decisions the City must make regarding market participation and our recommendations for addressing these decisions.

Table 12. Key issues and recommendations for implementing rules regarding participation

Issue	Recommendation
What sort of registration procedures or principles should be followed?	Streamline registration procedures as much as possible but require sufficient disclosures to, *inter alia*, identify the relationships between market participants. Consider also applying registration fees, at least for non-regulated market participants.
Can brokers, market makers, and financial entities participate in the market?	Allow for broad participation of financial entities and other private parties but consider setting tighter position limits, higher registration fees and more disclosure obligations on non-regulated entities.
What other entities may participate in the market?	Considering allowing public participation, including NGOs, and some level of voluntary retirement of credits. Consider limits on foreign participation.
Any special rules for buildings that opt-in?	Require opt-in buildings to indicate their intent to opt-in to the program sufficiently far in advance to allow regulators to conduct necessary verifications.

[98] *See* TCI Model Rule, *supra* note 9, at 145.

a. Registration Requirements for Market Participants

Recommendations: Registration should be as straightforward and streamlined as possible, while still collecting all the disclosures necessary to ensure market integrity. Carefully monitor affiliations between market participants, including among building owners and building managers. Consider registration fees for non-regulated participants.

Market-based regulatory programs typically either automatically create accounts for covered entities or require eligible market participants to apply for various kinds of allowance accounts.[99] General accounts let market participants purchase, hold, and trade allowances and credits. Compliance accounts let regulated entities designate which allowances or credits will be submitted for compliance, and so retired from the market. A single market participant could have multiple accounts. For example, while LL97 requires owners to submit annual compliance reports about individual covered buildings,[100] and so it may make sense for each covered building to have its own compliance account,[101] a single owner of multiple buildings may be allowed to have a single general account from which to manage its overall credit holdings. Limiting the number of total accounts may help regulators monitor market data and enforce position limits, either on the number of credits that can be held in total or purchased at an individual auction.[102]

Registration requirements for the creation of general accounts allow the regulator to monitor for relationships between affiliated market participants that could create the potential for collusion or other market manipulations, and more broadly allow regulators to check the criminal history or credit risks of market participants. To the extent that buildings use complicated corporate structures or creative names to obscure actual ownership, registration requirements that uncover real-world relationships between buildings become even more important.

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[99] Additional more specialized account types may also exist. *See, e.g.*, CAL. CODE REGS. tit. 17, § 95831(a)(1) (granting each registered entity at most one holding account, one limited use holding account, one compliance account, one annual allocation holding account, and one exchange clearing holding account); TMG, *Detailed Document, supra* note 8, at 68–69 (indicating the three types of accounts: compliance accounts, trading accounts, and surrender accounts); N.Y. COMP. CODES R. & REGS. tit. 6, §§ 242-6.1, 6.2 (under RGGI, New York creates a compliance account for each source, and any person can apply for a general account to hold and transfer allowances); 40 C.F.R. §§ 96.50, 96.51 (under EPA's NOx air market, each source received a compliance account and an overdraft account, and any person could request a general account to hold and transfer allowances).

[100] N.Y.C. LOCAL LAW 97, § 28-320.3.7.

[101] Alternatively, the City could consider letting owners aggregate their compliance obligations across all of their buildings and operate a single compliance account. *See, e.g.*, CAL. CODE REGS. tit. 17, § 95831(a)(1) (granting each registered entity at most one holding account, one limited use holding account, one compliance account, one annual allocation holding account, and one exchange clearing holding account); CAL. CODE REGS. tit. 17, § 95830(a) (allowing qualified registrants, including covered entity, opt-in entity, or voluntarily associated entity, to apply for only one set of accounts). Allowing compliance on an aggregated basis would need to be aligned with LL97, which contemplates compliance on a building-by-building basis.

[102] *Compare* CAL. CODE REGS. tit. 17, § 95830(b)(3)(A) *with* CAL. CODE REGS. tit. 17, § 95830(c)(1)(I) (allowing certain direct corporate associations to register for a consolidated account; otherwise, they have to allocate their holding limits and purchase limits among accounts). Regulators may also close extraneous accounts after a period of non-use. *See, e.g.,* 40 C.F.R. § 96.57.

In California's cap-and-trade program, CARB has several staff members who review registration applications and conduct "know your customer" checks, with several additional staff members monitoring market activities both inside and outside the auction. Tracking possible affiliations and relationships between the hundreds of regulated entities, offset developers, and financial players in California's market is seen as essential to ensure the market's efficiency and integrity. Applicants must disclose[103] their corporate structure; the names of directors, officers, certain partners, and anyone with sufficient ownership stakes; all direct or indirect corporate associations, including with unregistered entities that participate in related markets (such as energy and derivatives markets);[104] the names of employees with knowledge of current or expected emissions or allowance holdings; and the name of the designated account representative who, on penalty of perjury, certifies that they have decision-making authority over the account and that all information submitted is true and complete.[105]

CARB scrutinizes indicia of control and other associations between market participants, including through the common use of the same consultants or advisors,[106] and if a single entity actually controls multiple parties, that single parent entity must be the registrant.[107] Associated entities are subject to shared position limits. All key information, including changes in corporate associations, must be promptly updated by the registered participants,[108] or else access to allowance accounts may be restricted or revoked.[109] CARB is also empowered to ask any follow-up questions necessary to complete its review of the application, such as requiring the submission of partnership agreements or agreements between the registrant and other market participants. California also has adopted clear rules on the continuation of compliance obligations, and the need to promptly update corporate affiliations, in the event of merger, acquisition, or any other transfer of ownership to a successor entity.[110]

Furthermore, individuals can access allowance accounts only after complying with CARB's "know your customer" check, which requires disclosure of the employment relationship with the registered entity, proof of an open bank account, and disclosure of any recent felony convictions.[111] The account tracking

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[103] CAL. CODE REGS. tit. 17, § 95830(e).

[104] CAL. CODE REGS. tit. 17, § 95833(b)(4) (requiring disclosure of association with unregistered entities that participate in related markets, including those that purchase/sell GHG instruments, natural gas, oil, or electricity, or derivatives/swaps thereof).

[105] CAL. CODE REGS. tit. 17, § 95832(a), (d). *See also, e.g.*, N.Y. COMP. CODES R. & REGS. tit. 6, §§ 242-2.1, 2.6 (New York requires a single account representative plus an alternate and delegates, to have legally binding authority in all matters pertaining to the trading program).

[106] CAL. CODE REGS. tit. 17, § 95833(a)–(b).

[107] CAL. CODE REGS. tit. 17, § 95830(b)(3)(B).

[108] CAL. CODE REGS. tit. 17, § 95833(e); *see also, e.g.*, N.Y. COMP. CODES R. & REGS. tit. 6, § 242-6.2(b)(3)(iv) (requiring, under RGGI, updated applications within 30 days of change in ownership interest in allowances).

[109] CAL. CODE REGS. tit. 17, § 95830(e).

[110] CAL. CODE REGS. tit. 17, § 95835(b).

[111] CAL. CODE REGS. tit. 17, § 95834. For covered entities, individuals becoming account representatives or agents can provide such documentation to their employer instead of to CARB, and the registered entity can then attest to CARB that the individual meets the requirements. *Id.* at § 95834(c). For a similar approach, see TCI Model Rule, *supra* note 9, at 35: ownership must be updated within 30 days of change, but new owners are deemed to be bound by the actions and inactions of the authorized account representative even if the new owner is not yet included. *See also* 40 C.F.R. § 86.1865-

system for California's cap-and-trade program (called the Compliance Instrument Tracking System Service, or CITSS), also has its own user terms and conditions for access.[112]

Many other markets have similar, if sometimes less comprehensive, registration requirements as California. Tracking affiliations between market participants is a common focus, and often affiliated entities must share a common position limit on either the total number of credits that can be held, the number of credits that can be purchased at a time, or both.[113] Failure to track affiliations may complicate a regulator's efforts to prevent inequitable consolidations of allowance holdings or collusion.[114] Regulators or market monitors may also need to check if any brokers are holding allowances on behalf of other entities in hidden client-specific sub-accounts as a way to circumvent position limits; regulators can also try to curb such practices directly.

The registration process can be burdensome both for the applicants and for the reviewing entity. The City should aim for a process that is as straightforward and streamlined as possible, while still collecting all the disclosures necessary to ensure market integrity.[115] In their market for building emissions, Tokyo registers accounts for covered buildings for free, but charges a registration fee (and may charge a renewal fee) to open trading accounts for any market participants other than covered facilities.[116] Such registration fees both can help the regulator cover some of their expenses and can discourage frivolous applications. Tokyo

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12(k)(8)(iv)(B) (for EPA's vehicle regulation program of averaging, banking, and trading, any purchase or merger automatically transfer the outstanding debits to the controlling entity); *compare* 49 C.F.R. § 536.8(c) (under CAFE market, manufacturers must inform NHTSA of allocation of credits and resolution of liabilities in the case of a division, divestment, or successor).

[112] CAL. CODE REGS. tit. 17, app. B.

[113] *See, e.g.,* EPA, OVERVIEW OF THE E15 RVP/RIN MARKET REFORM RULE (2019), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100XQMX.pdf. EPA will publish the names of parties that exceed thresholds on its website and will not consider such information to be confidential. *Id.;* 40 C.F.R. § 80.1402.

[114] For example, the grouper-tilefish catch share program has difficulty tracking total holdings by owner, since "currently it is not possible to link ownership of a shareholder account to ownership of a dealer account, as accounts may be held under different names. . . . Individual units of allocation cannot be tracked in the system (e.g., the same pounds may be transferred multiple times)." NAT'L MARINE FISHERIES SERV., 2014 GROUPER-TILEFISH IFQ ANNUAL REPORT (2015). This problem was first flagged by the Government Accountability Office (GAO) in 2002. GAO expressed concern that the National Oceanic and Atmospheric Administration was underestimating the consolidation of permits in the fishing industry, because the agency could not identify links between different holders who were actually part of a single corporation or family business. U.S. GOV'T ACCOUNTABILITY OFF., GAO-03-159, BETTER INFORMATION COULD IMPROVE PROJECT MANAGEMENT (2002).

[115] A survey of participants in California's cap-and-trade program, for example found some "difference of opinion" about whether CITSS registration was "straightforward" or not, "but all participants agreed that it is burdensome. The many necessary steps and requirements to register—especially those related to the registration of complex corporate structures—means that CITSS registration becomes quite difficult for companies with many subsidiaries. One particular difficulty some participants have experienced is the requirement to get proof of identity from a bank or financial institution. The sense expressed by participants was that a bank is not an appropriate authority from which to get this proof and many banks did not understand what was required of them." Chris Carmody, *A Guide to Emissions Trading under the Western Climate Initiative,* 43 CAN.-U.S. L.J. 148 (2019).

[116] TMG, *Detailed Document*, *supra* note 8, at 69.

also charges a moderate fee to issue a certificate of an account's credit volume, for an account holder to present to their transaction partner.[117]

b. Eligibility of Brokers, Market Makers, and Financial Entities

Recommendations: Allow broad participation of financial entities and other private parties, to facilitate liquidity and stability, to allow parties to manage their risks, and to lower transaction costs. Consider setting tighter position limits, higher registration fees, or additional disclosures for non-regulated market participants than for buildings.

Many existing regulatory markets—including EPA's clean air markets, California's cap-and-trade program,[118] RGGI, and others—allow non-regulated entities to participate in the market, such as brokers and financial entities. There are various reasons to allow such non-regulated entities to participate. Brokers, consultants, and even speculators enter a market seeking profit, but they also provide much-needed liquidity and lower transaction costs; by collecting and bringing information to the market, they may also enhance price discovery.[119] Brokers may be crucial to facilitate the participation of smaller covered entities that might not be able to navigate the market easily. Besides financial entities, the commercial tenants of covered buildings may also want to enter the market to help manage their own exposure to passed-through compliance costs.[120] Energy management professionals and banks may want to participate in the market to better integrate credits into the financing of retrofit projects.[121] Firms that produce abatement technologies and clean energy companies face financial exposure to changes in carbon allowance prices, and may want to participate in the market to hedge their risks.[122] In general, broader markets with more participants facilitate price discovery, help with liquidity, and decrease the risk of price manipulation.[123] The Federal Trade Commission has in the past generally advised making regulatory markets open to all participants, since involving third parties lets markets transfer risk to those best able to absorb it.[124]

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[117] *Id.* at 71. This may be a way to help facilitate some kinds of trades, by pre-verifying the credits exist in the account; account holding information may otherwise only be publicly available on a monthly basis.

[118] *See also e.g.*, CAL. CODE REGS. tit. 17, § 95814(a) (allowing the participation of entities providing clearing services, if registered with CFTC as a qualified derivatives clearing organization).

[119] IWG OVERSIGHT REPORT, *supra* note 96, at 23.

[120] URBAN GREEN COUNCIL, TRADING: A NEW CLIMATE SOLUTION FOR BUILDINGS 23 (2020) [hereinafter Urban Green], https://www.urbangreencouncil.org/sites/default/files/trading_report_urban_green_2020.pdf. ("Commercial tenants can account for 60 percent or more of a building's energy use, but owners are ultimately responsible for compliance with carbon caps. New leasing provisions will likely emerge that attempt to bridge this gap by passing carbon caps or potential penalties on to tenants. Allowing commercial tenants to own, buy, and sell credits could enable innovative solutions to this challenging divide and incentivize tenant actions to reduce emissions.") Tokyo allows tenants in midsize buildings to apply to generate their own offset credits.

[121] *Id.* at 23.

[122] IWG OVERSIGHT REPORT, *supra* note 96, at 15.

[123] CENTER FOR CLIMATE AND ENERGY SOLUTIONS (C2ES), MARKET OVERSIGHT UNDER THE CLEAN POWER PLAN (2016); POTOMAC ECONOMICS, ANNUAL REPORT ON THE MARKET FOR RGGI CO_2 ALLOWANCES: 2019 (2020).

[124] U.S. FED. TRADE COMMISSION, COMMENTS OF THE STAFF OF THE BUREAU OF ECONOMICS ON PROTECTION OF STRATOSPHERIC OZONE (1988).

Some markets do try to limit participation to covered entities only,[125] and some stakeholders have expressed fears that allowing financial entities into regulatory markets will lead to excessive speculation and volatility that will undermine the market's integrity.[126] However, EPA has not seen any such excessive speculation in its clean air markets.[127] Similarly, while CARB has seen more financial players entering its market recently, with thorough registration requirements and careful monitoring, CARB has prevented collusion or other manipulations between such new players. (The section above on general eligibility and registration offers more details on how CARB checks for indicia of control and other relationships between market participants and how it conducts its "know your customer" checks—all of which apply to financial players entering the market as well as to regulated entities.).

Moreover, trying to exclude non-covered financial entities from the market can quickly devolve into an arbitrary exercise of drawing blurry lines. This is because some owners of covered facilities may also be financial entities themselves. This is likely true of New York City's real estate market, where various financial institutions may have significant ownership interests in covered buildings. Even if all traditional speculators could be shut out from a regulatory market, some covered entities may then try to fill that role to provide the needed liquidity and enable hedging. For example, while EPA expects that the only parties without renewable fuel volume obligations who will hold renewable fuel credits in the "RIN"[128] market (i.e., the market for renewable fuel credits) are the middlemen in fuel transactions like blenders,[129] there have been accusations that some of these actors behave as speculators. The trouble is, such entities may not be as experienced or as effective as speculators are at absorbing risk, and as a result, market stability could actually decline in the absence of non-covered financial players.[130]

Instead of exclusion, there are other ways to manage the participation of non-covered entities in the market. Tighter position limits on holding or purchasing credits can be set for non-covered entities, to prevent excessive speculation or hoarding[131] (with the same caveat as above that some financial players may also be owners of covered entities). California requires any registrant that provides consulting services to other market participants to have a notarized, verified conflict of interest policy, to prevent

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[125] In EPA's vehicle greenhouse gas program, third parties may facilitate trades but only manufacturers can hold credits and transact. But for NHTSA's CAFE credit program, manufacturers can designate any party as a recipient of credits, and such parties will receive an account from NHTSA. 49 C.F.R. § 536.5(b).

[126] Excessive speculation can result in bubbles and price decoupling, as price no longer tracks mitigation costs and becomes inflated, distorted, or manipulated. IWG OVERSIGHT REPORT, *supra* note 96, at 20, 23. Furthermore, some environmental advocates argue that too much liquidity undermines the goals of an emissions market: as the cap tightens, it is supposed to be harder to find a seller, to provide incentive to make extra reductions.

[127] Around 2008, when EPA promulgated a large regulatory change (CAIR) that changed how allowances would count toward compliance, which happened to coincide with a recession, the confluence of events drove some financial players into EPA's clear air markets; but the resulting price volatility was short-lived.

[128] RIN stands for renewable identification number.

[129] *Annual RIN Sales/Holdings Summary*, EPA, https://19january2017snapshot.epa.gov/fuels-registration-reporting-and-compliance-help/annual-rin-salesholdings-summary_.html (listing categories as: importers, exporters, refiners, and parties without a renewable volume obligation (for example, renewable producers, fuel marketers, and fuel blenders)).

[130] *Id.*

[131] *See, e.g.*, CAL. CODE REGS. tit. 17, § 95911(d)(2)(A)–(B) (setting a purchase limit of 25% of allowances offered for covered entities and opt-in entities, but a limit of 4% for voluntarily associated entities).

their use for personal gain of any market information learned through their consulting services.[132] Tokyo limits non-covered participants in its emissions market to a single trading account, to simplify management.[133] Tokyo also sets a registration fee (and possibly annual renewal fees) to create a trading account for any market participants, while covered entities can register for free.[134] New York City would need to consider whether LL97's existing provision for setting a schedule of fees for filing reports,[135] or other existing laws, grant sufficient authority to set such fees for the registration and the creation of accounts to hold credits, or whether additional legal authority would be necessary to set fees for non-covered entities.

Table 13. Eligible market participants in RGGI, California, and Tokyo ETSs

RGGI	Any party who holds a RGGI COATS account may hold and trade allowances.[136] Parties who meet certain registration requirements may register to open an account, which must be approved by the reviewing state.[137] Participation in auctions may be limited to parties who can demonstrate financial security.[138] In New York, auction participants may include owners of covered units in the state, owners of covered units in other participating states, owners of fossil fuel-fired generation units in other states, brokers, environmental groups, and financial and investments institutions.[139]
California	Any covered entities, opt-in covered entities, and Voluntarily Associated Entities (VAEs)[140] who meet certain registration requirements may participate in the market.[141] Certain entities are restricted from holding compliance instruments, including accredited offset verifiers, verification bodies, and offset project registries.[142]
Tokyo	Covered facilities (corporations or individuals); legal entities (including non-covered corporations, et cetera, but excluding any foreign entity that does not possess an office or a branch in Japan); account managers; persons eligible to receive offset credits; and heirs of the trading account holder are the only entities eligible to open a trading account and therefore participate in the market.[143]

[132] CAL. CODE REGS. tit. 17, § 95814(a)(3). *See also* CAL. CODE REGS. tit 17, § 95814(a)(7) (preventing the employees of covered entities from registering as voluntarily associated entities).
[133] TMG, *Detailed Document*, *supra* note 8, at 69.
[134] *Id.*
[135] N.Y.C. LOCAL LAW 97, § 28-320.10.
[136] *RGGI COATS*, REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/allowance-tracking/rggi-coats.
[137] RGGI CO2 ALLOWANCE TRACKING SYSTEM, RGGI-COATS FREQUENTLY ASKED QUESTIONS (FAQS) (2020), https://rggi-coats.org/eats/rggi/index.cfm?fuseaction=home.faq&clearfuseattribs=true.
[138] N.Y. COMP. CODES R. & REGS. tit. 21, § 507.8(e).
[139] N.Y. COMP. CODES R. & REGS. tit. 21, § 507.8(b).
[140] *See supra* note 72 for the definition of VAEs.
[141] CAL. CODE REGS. tit. 17, §§ 95811–95814.
[142] CAL. CODE REGS. tit. 17, § 95814(b).
[143] TMG, *Detailed Document, supra* note 8, at 69.

c. Eligibility of Other Participants

Recommendations: Consider allowing public participation and some level of voluntary retirements of credits. Consider appropriate limits on the participation of foreign entities.

Another market feature that can affirmatively further the program's policy goals is fully open participation rules that allow members of the public to buy credits.[144] By allowing anyone to participate in the market, public-minded groups or citizens can purchase and retire emission allowances, as they sometimes have in the acid rain market.[145] (See Part II, Section 7(h) on retiring credits.). California allows some amount of voluntary retirements in its cap-and-trade program,[146] and RGGI states may allow for voluntary retirements associated with the purchase of renewable energy,[147] as well as the voluntary retirement of sold allowances.[148]

A final consideration for participation is whether foreign entities should be limited or otherwise managed. The purchase of allowances by foreign entities could raise certain legal issues or the need to conduct due diligence under various laws designed to limit tax abuse, corrupt practices, or money laundering.[149] However, seeking to limit foreign ownership of credits under a trading program in New York City might raise practical issues as some covered buildings might be owned by foreign entities, and trying to exclude foreign participation could raise legal issues as well.

d. Eligibility of Opt-In Buildings

Recommendation: Section 321 and NYCHA buildings that seek to opt in to (or to opt back out of) the market should be required to give the City sufficient notice to conduct necessary checks regarding their emissions, including to confirm that the mandated prescriptive measures have been implemented.

Under Proposal #1, Section 321 buildings that opt into the program are freely allocated credits equal to their 2018 emissions minus the anticipated savings that they receive from implementing their prescriptive

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[144] *See, e.g.*, TCI Model Rule, *supra* note 9, at 47 (allowing any entity to request a general account). A few other marketable permit programs have declined to allow public participation. For example, the National Oceanic and Atmospheric Administration believes, based on the legislative history of Magnuson-Stevens Act, that Congress did not intend for tradable fish shares to become a mechanism to reduce the harvest by letting non-fishers buy and retire quota. U.S. DEPT. OF COMMERCE, NAT'L OCEANIC & ATMOSPHERIC ADMIN., CATCH SHARE POLICY (2010), https://static1.squarespace.com/static/56c65ea3f2b77e3a78d3441e/t/56ccf69762cd94e237371f32/1456273047389/Tab+08b_Attach+1_NOAACatchSharePolicy.pdf.

[145] TIETENBERG, *supra* note 64.

[146] CAL. CODE REGS. tit. 17, § 95922(d) (limiting voluntary retirements to 10,000 allowances per year).

[147] *See, e.g.*, N.Y. COMP. CODES R. & REGS. tit. 6, § 242-5.3(d) (allowing applications from the sponsor of a voluntary renewable energy purchase to retire allowances, up to a maximum amount of allowances allocated to a special account each year, upon documentation of renewable energy purchase by retail customers).

[148] *See Allowance Distribution,* REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/allowance-tracking/allowance-distribution (showing <1% of cumulative allowances have been retired after sale, though 10% of allowances were unsold and subsequently retired by the RGGI states).

[149] *See* CARB, CAP-AND-TRADE AUCTIONS AND RESERVE SALES: FINANCIAL SERVICES ADMINISTRATION 1–2 (2019), *available at* https://ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/auction/forms/financial_services_administration_faq.pdf?_ga=2.41561698.1565981224.1600270007-1673980903.1594156430 (offering advice on complying with the Foreign Account Tax Compliance Act, Foreign Corrupt Practices Act, and anti-money laundering laws).

measures (their 2018 emissions are also adjusted for electricity decarbonization after 2029). NYCHA properties that opt in would receive credits for free equal to their 2018 emissions (as adjusted for electricity decarbonization after 2029). Buildings that opted in would be able to sell credits if their emissions fell below the amount of credits that they were freely allocated.

It is important to adjust the baselines up to which buildings that opt in are allocated credits to reflect electricity decarbonization because building emissions will likely drop naturally as the energy grid decarbonizes. Those external trends in decarbonization should be factored into buildings' baselines, rather than allowing buildings that took no additional actions to sell credits.

When should buildings be allowed to opt-in? Timing should be scheduled to allow the regulator to conduct a full review of the application, to ensure the opt-in building understands and is able to meet its compliance obligations, and to ensure the accuracy of the baseline emissions level that will be used to allocate credits to the building.[150] Under LL97, Section 321 buildings will use registered design professionals to certify their compliance with required prescriptive measures by 2025.[151] In California's cap-and-trade program, for example, voluntary opt-in entities must seek approval to opt-in by March 1 of the year before they want to begin their participation in the market, including being subject to compliance obligations.[152] And to opt back out, the entity must apply by September 1 of the year it wants to be its last year of compliance; at the end of the compliance period, buildings opting out must first fulfill their prior compliance obligations and surrender any remaining allocated allowances.[153]

Additional issues that the City would need to consider are whether and how Section 321 and NYCHA buildings that opt into the market should be allowed to opt out of the market again at some future point. In the modelling for the Study, buildings could opt in and out, but the data suggests that it would be rare for a building to opt out once it opted in. If the City decides to allow buildings to opt out once they have opted in, the City might wish to require buildings to commit to being in the program for a certain amount of time to reduce the administrative burden of dealing with buildings opting in and out.

Buildings seeking to opt into the market should generally be expected to comply with all the same registration requirements as covered buildings. Monitoring corporate affiliations, shared management relationships, or changes in ownership will be just as important for opt-in building as for covered buildings.

3. Secondary Market Rules and Derivatives

In addition to establishing rules governing who can trade in the market, the City will need to establish other rules to ensure that secondary markets operate with environmental integrity and efficiency.[154] This section describes key steps the City should take and rules it should develop to regulate the secondary market.

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[150] The baseline emissions level for Section 321 buildings will be its 2018 emissions (adjusted for grid decarbonization after 2029) minus the anticipated savings from prescriptive measures. The baseline emissions level for NYCHA buildings will be the 2018 emissions (adjusted for grid decarbonization after 2029).

[151] N.Y.C. LOCAL LAW 97, § 28-321.3.1.

[152] CAL. CODE REGS. tit. 17, § 95813.

[153] *Id.*

[154] Secondary markets refer to transactions after the initial allocation.

Notably, a market for derivative instruments may also develop as regulated entities and other market participants look to hedge their risks and make strategic investments. Though the City need not take direct responsibility for facilitating or monitoring a derivatives market, instances of fraud, manipulation, and volatility in the derivatives market can spill over and affect either an auction system or a secondary market. Therefore, the City should also pay attention to the development of any derivatives tied to the emissions credits in its trading program. Table 14 summarizes these issues and some of the options that we've identified for addressing them.

Table 14. Key issues and recommendations implementing rules regarding secondary markets and derivatives

Issue	Recommendation
How can the City facilitate the development of a secondary market?	The City should publish information on buildings' emissions, participants' credit holdings, and transaction prices
How should the City track the transfer and trade of credits?	Establish a tracking system that requires the submission of details on trades, including prices, within a short time of the trade's execution. Block trades that are not accompanied by appropriate paperwork, that would violate a party's holding limits, or that are based on manipulative practices.
Should the City add additional mechanisms for dealing with price volatility if it opts for a centralized exchange?	Authorize the market manager to use "circuit breakers" if credits are traded on a centralized exchange.
How will liability be determined in cases where credits that were traded are invalidated after being submitted for compliance?	Consider establishing a clear default rule about whether buyers or sellers are responsible for invalidated credits.
How should program administrators deal with the potential for a derivatives market to emerge?	The market manager should establish an informal relationship with the CFTC if a related derivatives market emerges.

a. Bilateral Trades, Information Publication, and Centralized Platforms

Recommendations: The City should publish enough information on buildings' emissions, participants' credit holdings, and transaction prices to enable the identification of potential buyers and sellers and facilitate transactions. If the City wants to pursue a default program through which buildings could more automatically buy or sell credits, the City may need to facilitate the development of a more centralized exchange platform.

Types and Channels of Secondary Market Trades

The two main categories of transactions on secondary markets are spot sales, which are sales for immediate delivery of credits, and forwards, which set a fixed price for future delivery of credits.[155]

Secondary transactions can be accomplished through a variety of channels. Bilateral trading allows direct negotiation between buyer and seller, possibly mediated by a broker. Aggregators and clearinghouses convert credits with variable prices and risk[156] into a more uniform currency. For example, an aggregator could help finance efficiency improvements at multiple opt-in buildings to generate credits, which the aggregator could then sell at a fixed price.[157] Clearinghouses act as an intermediary between buyers and sellers and guarantee performance in the event of default. A buyer and seller could reach an agreement with some customized terms but still transact through a clearinghouse, which for a fee will assume the risk in case a party to the transaction cannot fulfill their side of the bargain.[158] Exchanges automatically match buyers and sellers in standardized transactions, and typically provide clearing services or incorporate the functions of a clearinghouse as well. Transactions not conducted on centralized platforms like clearinghouses or exchanges are called "over-the-counter."[159]

Over-the-counter sales directly negotiated bilaterally entail numerous transaction costs for buyers and sellers: researching the market and determining the going price, finding a trading partner, negotiating terms, handling paperwork and payments, and enforcing the contract.[160] For smaller or less sophisticated entities that lack preexisting connections with potential trading partners or that buy or sell credits infrequently, search costs and learning curves can be significant in a purely bilateral market.[161] Brokers, aggregators, and clearinghouses help minimize some of those transaction costs. Exchanges have the

[155] Secondary transactions can also include repurchase agreements and short sales. IWG OVERSIGHT REPORT, *supra* note 96, at 14.

[156] Risk may come for instance from the possibility that credits generated by, for example, opt-in buildings and initially verified may subsequently be invalidated. Which party bears the risk in case of invalidation is discussed below, in the subsection on liability.

[157] This sort of arrangement happens in some water quality trading programs, for example. *See In It Together: A How-To Reference,* WILLAMETTE PARTNERSHIP, (July 30, 2012), https://willamettepartnership.org/how-to-reference-building-water-quality-trading-programs/.

[158] This may be especially important, for example, with contracts that set terms for the future delivery of credits.

[159] IWG OVERSIGHT REPORT, *supra* note 96, at 14.

[160] TIETENBERG, *supra* note 64, at 40. Also cost of optimizing decision between abatement and buying permits.

[161] Marshall J. Breger et al., *Providing Economic Incentive in Environmental Regulation*, 8 YALE J. REGUL. 463 (1991).

lowest transaction costs:[162] contract terms are standardized, prices are transparent, buyers and sellers are matched automatically. In some ways, exchanges can be run like an auction system. Exchanges are also highly transparent and so facilitate monitoring of the market by regulators, other market actors, and the public.[163] Centralized exchanges may also adopt rules on position limits and other protocols to ensure fair trading.[164] However, those advantages come at the cost of the customization of terms available in over-the-counter transactions.

How Regulators May Promote Secondary Market Trading

Regulators must determine how involved to become in facilitating the creation and operation of secondary markets. For large programs with sufficient value to attract intermediaries and market makers, secondary markets may "emerge quickly . . . with no need for government assistance."[165] For example, the European Union's Emissions Trading System (EU ETS) did not explicitly provide for the creation of secondary markets, yet such markets materialized and flourished. Similarly, while the acid rain program allowed permit holders to use the structure of the zero-revenue auction to sell additional allowances beyond the required minimum 2.8%,[166] the bilateral, over-the-counter market remained "vastly more important" for the secondary sale of allowances.[167] Brokers facilitated acid rain transactions by maintaining price information and matching buyers and sellers.[168] In RGGI, secondary trades happen over the counter or, as with trades connected with futures contracts, on exchanges. Some brokers active in the RGGI market, like CBL Markets, also offer some of the structure of an exchange.

However, in other programs, robust secondary markets have been slow to develop without active involvement of regulators. For example, EPA and the Department of Transportation's trading programs for vehicle emissions and efficiency provide no centralized setting for trading to take place, which historically made price discovery difficult and possibly limited the number of transactions that occurred, especially in early years.[169]

Regulators can facilitate secondary transactions in a variety of ways. Some market administrators provide only minimal support in finding a trading partner. For example, the PJM Interconnection—a regional transmission organization that coordinates wholesale electricity through thirteen states—has a website entitled "How Do I Sell RECs?," which recommends advertising renewable electricity credits for sale on

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[162] Andrew Wolman, *Effluent Trading in the United States and Australia*, 8 GREAT PLAINS NAT. RES. J. 1 (2003).
[163] Lesley McAllister, *Beyond Playing "Banker,"* 59 ADMIN. L. REV. 269 (2007).
[164] MARK JICKLING & LARRY PARKER, CONG. RES. SERV., REGULATING A CARBON MARKET: ISSUES RAISED BY THE EUROPEAN CARBON AND U.S. SULFUR DIOXIDE ALLOWANCE MARKETS 30 (2008).
[165] *Id.* at 28.
[166] TIETENBERG, *supra* note 64, at 11.
[167] ROBERT N. STAVINS, MARKET-BASED ENVIRONMENTAL POLICIES: WHAT CAN WE LEARN FROM U.S. EXPERIENCE (AND RELATED RESEARCH)? 23 (2003); *see also* JICKLING & PARKER, *supra* note 164, at 17.
[168] Jonathan Nash & Richard Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 ECOL. L. Q. 569 (2002).
[169] BENJAMIN LEARD & VIRGINIA MCCONNELL, NEW MARKETS FOR CREDIT TRADING UNDER US AUTOMOBILE GREENHOUSE GAS AND FUEL ECONOMY STANDARDS (2017).

their bulletin board.[170] In other markets, the administrators provide more detailed information to facilitate secondary trades. For example, while sales of Washington D.C.'s stormwater credits must be privately negotiated over the counter,[171] the city facilitates sales by hosting a public database that lists key information: sellers' available credit amounts, offer prices, and contact information; interested buyers' desired prices and contact information; the names of aggregators, investors, and contractors that can help buildings generate credits; and information on the expected demand for credits based on regulatory requirements and the past purchase of credits.[172] More generally, the publication of emissions data and credit holdings enables private brokers to proactive identify those entities that need more credits and those that have credits to sell—thereby capitalizing on brokers' financial incentives in order to create an active secondary market.[173] Finally, it is possible for regulators to more directly help establish and operate an exchange for secondary trades.[174]

Disclosing details on the price of allowances sold in past transactions helps with price discovery, lowering a barrier to entry that may otherwise hinder smaller, less sophisticated entities' participation in the market. At the same time, however, too much transparency may carry a cost for the market participants, as reporting specific transactions and prices could reveal confidential business information about a firm's costs to trading partners, competitors, and the public.[175] Without unnecessarily revealing confidential information or creating anti-competitiveness risks, regulators should act as information aggregators, collecting information on trade prices and volumes across auctions, secondary markets, and derivative markets, and publishing enough information to facilitate efficient decisions by market participants. While gathering and distributing this kind of information might seem challenging, it likely can be automated in the digital era.

To facilitate the participation in the market of smaller or less sophisticated buildings, the City may want to create a default program through which buildings would automatically buy additional credits when they are needed for compliance and sell excess credits that are not needed for compliance. If this default

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[170] Or working with an aggregator or broker or using an exchange platform. *How Do I Sell RECs?*, PJM, https://www.pjm-eis.com/getting-started/how-do-I-sell-recs.aspx.

[171] *Selling SRCs*, D.C. DEPT. OF ENERGY & ENV'T, https://doee.dc.gov/node/1284026 ("Stormwater Retention Credit (SRC) prices are privately negotiated and DOEE does not set a market price."); *see also Surface and Groundwater System (SGS)*, D.C. DEPT. OF ENERGY & ENV'T, https://octo.quickbase.com/up/bjkxxcfcp/g/rb7/eg/va/levels.html?sitelevel=2&pagerecord=89&userrole=Everyone%20On%20the%20Internet&combProf=1 ("Interested buyers should contact sellers directly to negotiate trades. Prices listed on this page are identified by the SRC owner but may be negotiated.").

[172] *Surface and Groundwater System: How Many SRCs Do You Want to Purchase?*, D.C. DEPT. OF ENERGY & ENV'T, https://octo.quickbase.com/up/bjkxxcfcp/g/rb7/eg/va/levels.html?sitelevel=2&pagerecord=89&userrole=Everyone%20On%20the%20Internet&combProf=1; *Surface and Groundwater System: SRC Demand – Projects Using Purchased SRCs,* D.C. DEPT. OF ENERGY & ENV'T, https://octo.quickbase.com/up/bjkxxcfcp/g/rb7/eg/va/levels.html?sitelevel=2&pagerecord=93&userrole=Everyone%20On%20the%20Internet; D.C. Dept. of Energy & Env't, *Surface and Groundwater System: Interested Buyers List,* https://octo.quickbase.com/up/bjkxxcfcp/g/rb7/eg/va/levels.html?sitelevel=2&pagerecord=111&userrole=Everyone%20On%20the%20Internet; *Surface and Groundwater System (SGS)*, D.C. DEPT. OF ENERGY & ENV'T, https://octo.quickbase.com/up/bjkxxcfcp/g/rb7/eg/va/levels.html?sitelevel=2&pagerecord=117&userrole=Everyone%20on%20the%20Internet.

[173] For example, EPA lists brokers that can facilitate sales in its clean air markets. *Allowance Markets*, EPA, https://www.epa.gov/airmarkets/allowance-markets.

[174] EPA, WATER QUALITY TRADING TOOLKIT FOR PERMIT WRITERS (2009) (EPA says a water quality trading exchange would "likely" have to be either operated or overseen by a state agency).

[175] IWG OVERSIGHT REPORT, *supra* note 96, at 23; Breger et al., *supra* note 161.

arrangement cannot be implemented through an auction system—for example, because the auction does not allow for the consignment of credits (see above, Part II, Section 1(b)(vi), on consignment), or because an auction with enough credits is not scheduled close enough to the compliance deadline—the City may need to facilitate the development of a more centralized secondary marketplace where such transactions could take place by default and with more automation.

b. Tracking Transfers and Trades

Recommendations: The City should require the near real-time submission of details on trades, including the serial numbers of the credits traded, and the prices and any non-monetary contract terms affecting price. Trades submitted with inadequate paperwork, that would violate a party's holding limits, or that are based on manipulative practices, should be blocked. The tracking system should include a straightforward mechanism for unwinding errors in the submission of trade details.

The serial numbers assigned to credits when they are issued are crucial for tracking credits as they are transacted and ensuring that credits are not double counted when submitted for compliance. Most trading programs have a database to track credits as they are allocated, transferred, traded, and submitted for compliance or retirement.

Whether credits are transferred internally between buildings within a single owner's multiple properties, or traded between two separate entities, in order to track a credit as it changes hands, the City should require the submission of certain information relating to the transaction. Among existing trading programs,[176] it is most common to require submission of the amount of credits being exchanged, the serial numbers for those credits, and the account numbers or other identifying information for both the buyer and seller. Many but not all existing trading programs require the submission of additional information about the nature of the transaction, including credit price[177] and the involvement of brokers or other third-parties. Submissions on prices should include sufficient detail to describe any non-monetary terms of the contract that may affect the price of the traded credits.[178] Many trading programs require both parties to an exchange to submit reports, which can then be checked against each other to ensure all information matches before credits are actually moved between accounts in the database. Transactions carried out on a centralized trading platform or exchange may have more standardized reports that can be automatically submitted to the market administrator. Some existing programs, like California's cap-and-

[176] *See, e.g.*, CAL. CODE REGS. tit. 17, § 95921 (requiring entities to submit transfer requests for both over-the-counter sales for immediate or future delivery, as well as for exchange agreements, including the price); N.Y. COMP. CODES R. & REGS. tit. 6, § 242-7.1 (transfers must submit details on date and purchase/sale price); 49 C.F.R. § 536.5(c)(1) (in the vehicle efficiency credit market, NHTSA now requires use of a standardized credit template form); 40 C.F.R. § 96.60 (requiring simply the submission of accounts, serial numbers, and signatures to transact NO_x credits); *Renewable Identification Numbers, (RINs) under the Renewable Fuel Standard Program,* EPA, https://www.epa.gov/renewable-fuel-standard-program/renewable-identification-numbers-rins-under-renewable-fuel-standard (noting that transaction records must match for RINs to be transferred).

[177] *See, e.g.,* CAL. CODE REGS. tit. 17, § 95921 (requiring submission of price information, or listing the price as zero in the case of internal transfers).

[178] *See, e.g.*, 49 C.F.R. § 536.5(c)(1) (requiring disclosure of non-monetary terms affecting the price).

trade program, also retain the authority for the market administrator to ask for any supplemental information on individual transfers, such as submission of the underlying contract.

In many existing markets, unwinding transactions to correct errors is a common and important occurrence. The original submissions detailing a transaction may have included typographical errors in the amount or serial numbers of credits, or a seller may subsequently realize that for the sake of managing their own accounting practices and tax burdens, such as through a last-in/first-out accounting system, they need to change exactly which credits are being transferred. The database system to track credits should include a straightforward process to unwind any harmless errors in transaction documents.

Regulators should establish when secondary market trades of credits must be reported. While some existing regulatory market programs do not require real-time reporting of transactions and instead only require transaction reports upon submission of the associated credits at the end of a compliance period,[179] the failure to track transactions in real time has led to errors and confusion in some other markets.[180] Real-time tracking of secondary transactions facilitates market monitoring as well as the information disclosures necessary to help with price discovery and public scrutiny.

Transfers and trades should be subject to at least a basic ministerial review, much of which could be automated. Trades should be blocked if all required information is not submitted, if the records submitted by the various transacting parties do not match, or if the transfer would violate an entity's credit holding limit.[181] Several existing trading programs also block a regulated entity from selling credits if it has an outstanding deficit in its compliance obligation that has not yet been satisfied.[182] The City should also retain the authority to review trades and to block any trades involving manipulation or deceptive practices, attempts to corner the market, or reliance on false or misleading material information.[183] Reserving these authorities would not obligate the City or its contractors to review and approve every individual trade; but if the City's market monitor identified a problematic pattern of trading, individual trades could then be scrutinized further and, when appropriate, retroactively invalidated by the City.

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[179] EPA, MANUFACTURER PERFORMANCE REPORT FOR 2015 MY (2015) (explaining that vehicle manufacturers do not report transactions as they occur, but only at the end of the compliance period); *see also* JONAS MONAST, ENV'T LAW INST., CLIMATE CHANGE AND FINANCIAL MARKETS: REGULATING THE TRADE SIDE OF CAP AND TRADE, (2010), https://nicholasinstitute.duke.edu/sites/default/files/publications/climate-change-and-financial-markets-regulating-the-trade-side-of-cap-and-trade-paper.pdf (explaining that while the acid rain market does not require reporting until the compliance deadline, many transactions are reported in real time).

[180] For the renewable fuel market, EPA originally tracked credits "on excel spreadsheets" checked once at the end of the year; the "practicalities of tracking a national credit scheme" in this manner was "fraught with errors." RINALLIANCE, MAKING THE RIN PROGRAM WORK (2011). The agency's solution to this problem was the EPA Moderated Transaction System. The System requires online submission of transaction records by each trading partner and offers immediate validation of status of the credits, for a more a real-time accounting. *Id.*; *Renewable Identification Numbers (RINs) under the Renewable Fuel Standard Program*, EPA, https://www.epa.gov/renewable-fuel-standard-program/renewable-identification-numbers-rins-under-renewable-fuel-standard.

[181] *See, e.g.*, CAL. CODE REGS. tit. 17, § 95921(i).

[182] *See, e.g.*, 40 C.F.R § 86.1865-12(k)(7)(i) (setting this limit under EPA's averaging, banking, and trading program for vehicle emissions).

[183] *See, e.g.*, CAL. CODE REGS. tit. 17, § 95921(f)(2).

Blockchain technology could be further investigated as a potential means of tracking credits. However, as explained in Part I, there are existing registries in precedent markets that New York City could adopt that track credits without blockchain. And while decentralized management of tracking transactions may have some security advantages, it also has disadvantages: it may be harder, for example, to unwind a transaction to correct a simple typographic error if doing so requires navigating a decentralized tracking system, whereas the City or its contractor could easily make such a correction to a database under its own control. The computer computations required to validate and verify transactions by blockchain may also require a significant amount of energy,[184] which could be counter to the energy reduction goals of the trading program. It is unclear that the benefits of using blockchain to track credits would exceed the added complexity given the existence of tracking systems that could be adapted for use in the City.

c. Managing Price Volatility in a Centralized Exchange

Recommendation: Authorize the market manager to utilize "circuit breakers" if credits are traded on a centralized exchange.

Market participants typically desire a degree of certainty regarding credit prices. Price volatility can occur in marketable permit programs due to unexpected increases in demand or reductions in supply. For example, in 2000, California's energy crisis caused demand to spike, and RECLAIM allowance prices rose twenty-five times; consequently, regulated sources exceeded the overall nitrogen oxide cap by 19%.[185] Price volatility creates financial risks in both regulatory permit markets and related commodity markets, increases the risk of noncompliance, and decreases confidence in the market system.

LL97 and Proposal #1 include some mechanisms to help prevent price spikes. The $268 penalty that LL97 establishes acts as a de facto price ceiling. The possibility under Proposal #1 to bank credits for use in a future period should help mitigate price fluctuation as well. Proposal #1 also includes a price floor, which narrows the price band further.

In addition to these mechanisms, if credits are traded on a centralized exchange, the City should consider authorizing the market manager to utilize "circuit breakers" to limit how much prices can rise or fall in given period. The New York Stock Exchange, for example, uses circuit breakers to halt trading for a particular period of time (such as a day) if there is an extreme price swing over a short period (such as 20%).[186]

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[184] *See Blockchain and the Environment,* EURO. ENV'T AGENCY (Oct. 28, 2020), https://www.eea.europa.eu/publications/blockchain-and-the-environment.

[185] McAllister, *supra* note 163. Cheap credits in RECLAIM's early years may have habituated firms to low prices, causing them to fail to plan for future contingencies.

[186] CONG. BUDGET OFF., EVALUATING LIMITS ON PARTICIPATION AND TRANSACTIONS IN MARKETS FOR EMISSIONS ALLOWANCES (2010). *See also* NYSE, MARKET-WIDE CIRCUIT BREAKERS FAQ (2020), https://www.nyse.com/publicdocs/nyse/NYSE_MWCB_FAQ.pdf.

d. Liability

Recommendation: The City should consider establishing a default rule on whether buyers or sellers are responsible for making up any shortfall in the submission of valid credits for compliance, in case credits that were traded subsequently are invalidated.

If all required documentation of a transaction is submitted and credits are transferred between accounts but, subsequently, those credits are discovered to have been awarded in error or by fraud, what happens? If the credits have not yet been submitted for compliance, the contract between the buyer and seller should include terms to address such circumstances. Typically, market administrators do not get involved in adjudicating private legal disputes arising under the contracts for transaction credits.[187] The contracts may also contain sufficient terms assigning responsibility in the event that such subsequently invalidated credits were already submitted to meet an entity's compliance obligations. However, the City may also wish to create some default rules for assigning responsibility in case a credit that was purchased and submitted for compliance is later discovered to not represent a real, additional emissions reduction. Establishing clear default rules on liability can help reduce uncertainty and so facilitate the market.[188]

Several existing trading programs adopt a "buyer beware" approach to purchasing credits or offsets. Under such systems, if a credit turns out to have been awarded in error or by fraud, the party that purchased the credit is responsible for making up for any shortfall in the number of valid credits submitted for compliance.[189] In other programs, the credit seller bears the responsibility by default.[190] The choice of whether the buyer or seller bears responsibility by default likely matters less than setting a default rule one way or the other; parties can always contract around the default rule.

e. Derivatives

Recommendations: The market manager should establish an informal relationship with the CFTC if a related derivatives market emerges.

"A derivative contract is a financial instrument whose value is based on, or derived from, the value of an underlying asset, commodity, or measurable event."[191] Species of derivative contracts include futures, options, and swaps.[192] Such contracts do not necessarily involve the actual transfer of allowances. However, future contracts can provide for near-term delivery of allowances and, because marketable

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[187] *See, e.g.*, N.Y. COMP. CODES R. & REGS. tit. 6, § 242-6.2(b)(4)(iii).

[188] *See* Katelyn Roedner Sutter, *California's Experience with Buyer Liability Shows How Aviation Can Help Ensure Environmental Integrity*, EDF (May 1, 2020), https://blogs.edf.org/climate411/2020/05/01/californias-experience-with-buyer-liability-shows-how-aviation-can-help-ensure-environmental-integrity/.

[189] *See, e.g.*, 49 C.F.R. § 536.8(f)–(g) (holding the receiving manufacturer responsible); EPA, Water Quality Trading Policy, 68 Fed. Reg. 1,609 (Jan. 13, 2003) (clarifying that the credit buyer remains ultimately responsible for meeting any emissions limits); RINALLIANCE, *supra* note 180 (explaining that RIN purchasers are responsible for the integrity of the credits they buy).

[190] *See, e.g.*, 40 C.F.R. §§ 86.1865-12(k)(9)(iii), (l)(2)(viii).

[191] IWG OVERSIGHT REPORT, *supra* note 96, at 15.

[192] Forwards are sometimes included in the classification as well. However, because forward contracts are typically over the counter and more likely to involve the actual transfer of credits, forwards are often classified as a secondary transaction, not a derivative. *Id.* at 42.

allowances and credits are more uniform and easily transferable than many other commodities, future contracts can serve as "very close economic substitutes" to secondary market transactions.[193] In the EU ETS, for example, "futures are not only used for hedging strategies, but as a [direct] means of buying or selling allowances."[194]

Derivatives are used for hedging and speculation. Hedging allows the transfer of market risks to parties more capable of assuming it. For example, regulated entities anticipating a future need for permits and worried about price volatility may want to hedge against potential price spikes; entities with banked allowances may want to hedge against falling prices, to protect the value of their permits. Non-regulated entities may also need to hedge their risks. For example, under a greenhouse gas cap-and-trade system, firms that produce abatement technologies may face financial exposure from carbon price changes,[195] and clean energy providers may wish to hedge against falling prices to ensure wholesale electricity prices do not dip and hurt their profits.[196] Distinct from hedging, speculation involves attempting to earn profit by anticipating price movements or taking advantage of a perceived mispricing.[197]

Derivatives can be traded on exchanges or bilaterally over the counter. Exchanges offer a centralized marketplace for buyers and sellers to meet and enter into highly standardized contracts. Exchanges manage the risk of default by requiring the deposit of some collateral to participate (also known as "margin requirements"), and typically provide for centralized clearing through a clearinghouse, which acts as an intermediary to guarantee performance.[198] Exchanges also often have position limits, to prevent excessive speculation. Standardizing contract terms can help reduce transaction costs and promote market liquidity, and help exchanges maintain high levels of transparency, which both facilitates price discovery by market actors as well as oversight by regulators and the public.[199]

On the other hand, over-the-counter transactions allow parties more customization and innovation in contract terms. For example, in the EU ETS, exchange-traded futures contracts were limited to three-to-five year durations; if a utility wanted to lock in allowance prices for a decade or more, it needed over-the-counter derivatives.[200] Some regulated entities may also feel they can negotiate better prices over-the-counter than what is set on exchanges; to the extent that is true, over-the-counter may lower overall compliance costs.[201] Historically over-the-counter trades have also avoided the capital costs of margin requirements.[202] Margin requirements can tie up cash, complicating participation for smaller firms and for entities like utilities that need to invest heavily in capital improvements.[203] However, the Dodd-Frank Wall

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[193] *Id*. at 33–34.
[194] *Id*. at n.27.
[195] *Id.* at 15.
[196] *Id*. at 38.
[197] *Id*. at 16–17.
[198] *Id.* at 19.
[199] *Id.* at 18–19.
[200] PEW CTR. ON GLOBAL CLIMATE CHANGE, CARBON MARKET DESIGN AND OVERSIGHT (2010).
[201] *Id.*
[202] IWG OVERSIGHT REPORT, *supra* note 96, at 18–19.
[203] PEW CTR. ON GLOBAL CLIMATE CHANGE, *supra* note 200.

Street Reform and Consumer Protection Act requires margins and clearing even for some kinds of over-the-counter derivatives,[204] as well as reporting certain details on over-the-counter swaps.[205]

Derivatives have been used most actively in air pollution and renewable energy markets. As of 2010, exchange-traded derivatives for RGGI were valued at $2 billion; for the acid rain market, $0.7 billion; and for the EU ETS, $71 billion (not counting the significant number of over-the-counter derivatives).[206] There has also been strong interest in derivatives to hedge against the tremendous price volatility experienced in the renewable fuel standard market.[207]

CFTC has authority to monitor derivative markets, whether trades are conducted over the counter or on exchanges;[208] the extent to which it exercises that authority for derivatives associated with regulatory permit markets remains a somewhat open question. For example, CFTC has not established position limits for carbon market derivatives or other environmental commodity derivatives. Because fraud, manipulation, or volatility in a derivatives market can spill over and affect the markets for the underlying commodity, the administrators of permit markets should monitor developments in derivatives markets, even if they are not directly responsible for their oversight. RGGI's market monitor, for example, monitors the relevant derivatives markets as well as the secondary markets and auctions. An informal relationship with CFTC may be beneficial.

4. Fraud and Market Manipulation

Designing a market to prevent fraud[209] and price manipulation is essential; if such distortions were to occur, they would not only undermine economic efficiency but also erode confidence in the market and therefore discourage participation.[210] Notably, market fraud or manipulation, if it occurs, might violate various existing state or federal laws.

Many existing marketable permit programs—including the federal acid rain market, the federal cross-state air pollution market, California's cap-and-trade program, RGGI, the CAFE market, and others—have

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[204] IWG OVERSIGHT REPORT, *supra* note 96, at 19.
[205] *Id.* at 21.
[206] *Id.*
[207] *CME Group Announces New Futures Contracts for Renewable Identification Numbers (RINs),* CME GROUP (Apr. 25, 2013), http://investor.cmegroup.com/news-releases/news-release-details/cme-group-announces-new-futures-contracts-renewable.
[208] *Id*. at 51.
[209] Here, fraud refers to fraud by market participants. Regulatory markets could also attract outside criminal activity. For example, EU-ETS experienced some issues with hacking and value-added tax fraud, but these incidents were more like outside criminal activity than market manipulation. Those issues related to poor design of their tracking system, and technological solutions have addressed those issues. Other markets, like RGGI and California's cap-and-trade program, have not reported incidents with hacking or other crimes.
[210] IWG OVERSIGHT REPORT, *supra* note 96.

seen very little to no fraud or manipulation.[211] However, some other market-based regulatory programs have experienced some fraud and manipulation, especially in their early years.[212]

The following table summarizes the main recommendations in this section for designing a trading program to avoid fraud and market manipulation.

Table 15. Key issues and recommendations for preventing fraud and market manipulation

Issue	Recommendation
How should the City prevent fraud and price manipulation in the market?	Appoint a market monitor. Limit the number of credits that a party can purchase at an auction. Require entities to regularly report the number of credits they hold and disclose their relationship to other market participants. Prohibit the trading of credits if based on fraud or market manipulation.

Recommendations: Appoint a market monitor. Limit the number of credits that a party can purchase at an auction. Require entities to regularly report the number of credits they hold and disclose their relationship to other market participants. Prohibit the trading of credits if based on fraud or market manipulation.

There are several steps that New York City should take to minimize the likelihood of fraud or market manipulation.

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[211] 80 Fed. Reg. 64,965, 64,977 (Oct. 23, 2015) ("The EPA has over 20 years of experience implementing emissions trading programs for the power sector and based on that experience, believes the potential or likelihood of market manipulation is fairly low."); JICKLING & PARKER, *supra* note 164, at 30–31 (on the acid rain market). C2ES, *supra* note 3 (on RGGI); POTOMAC ECONOMICS, ANNUAL REPORT ON THE MARKET FOR RGGI CO_2 ALLOWANCES: 2019 9–10 (2020) (finding no evidence of anti-competitive conduct or material concerns with the auction). California has invalidated illegitimate offset credits. *See, e.g.*, Gloria Gonzalez, *Despite Market Outcry, California Voids Some Carbon Offsets*, ECOSYSTEM MARKETPLACE (Nov. 14, 2014), https://www.ecosystemmarketplace.com/articles/despite-market-outcrycali
fornia-voids-carbon-offsets/.

[212] *See* CONG. BUDGET OFF., *supra* note 186, at 6 n.11 (reporting that in 2001, an individual "engaged in manipulative fraud, stealing millions" in California's RECLAIM program); Richard Drury et al., *Pollution Trading and Environmental Injustice*, 9 DUKE ENVTL. L. & POL'Y FORUM 231 (1999) (reporting fraud in RECLAIM); Peter Cramton & Jesse Schwartz, *Collusive Bidding: Lessons from the FCC Spectrum Auctions*, 17 J. REG. ECON. 229 (2000) (reporting that in the mid-1990s, before the Federal Communications Commission tweaked its auction design, there were allegations of firms colluding through bid signals to manipulate the price). For example, the federal government's renewable fuel standard market has endured repeated allegations of fraud and price manipulation, and millions of fraudulent renewable fuel credits have been detected and invalidated. SUSAN LAFFERTY & DAVID MCCULLOUGH, SUTHERLAND LLP, EPA'S RENEWABLE FUEL STANDARD: WHAT TO EXPECT IN 2014 (2014) (referencing 140 million invalid credits). Several credit producers have also been charged with wire fraud, money laundering, and violations of the Clean Air Act. Robert Glicksman, *Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development*, 62 KANSAS L. REV. 943 (2014); *see also CFTC and EPA Sign MOU on Renewable Fuel Markets*, ENERGY & ENV'T LAW ADVISER (Mar. 23, 2016), https://www.energyenvironmentallawadviser.com/2016/03/cftc-and-epa-sign-memorandum-of-understanding-on-renewable-fuel-markets/ (owner of Clean Green Fuel found guilty of wire fraud, money laundering, and Clean Air Act violations).

- **Appoint a market monitor**. As mentioned above, RGGI and California's cap-and-trade program have market monitors. RGGI's market monitor analyzes the secondary market for RGGI allowances, as well as auctions, for the exercise of market power, among other concerns.[213] The California cap-and-trade program also has an independent market monitor and a market surveillance committee.[214] The market monitors in RGGI and California's cap-and-trade program are limited to producing reports and making recommendations; the markets monitors—and the market surveillance committee in California—are not authorized to act directly to address market power issues that they identify. Merely appointing a market monitor may deter manipulation because it signals to market actors that resources are being devoted to surveillance.[215]
- **Limit the number of credits that a party can purchase at auction**. See Part II, Section 1 above for more on proposed purchase limits at auctions.
- **Require entities to regularly report the number of credits that they hold**: Transparent information on holdings can help prevent large, sophisticated players from exploiting information asymmetries with smaller or less sophisticated firms.[216] Depending on the requirements and structure for credit accounts, the City or its market manager may be able to assess much of the relevant information from account holdings in the database. However, if the database does not already include easily accessible information on whether multiple accounts and multiple buildings are owned by common owners, on which credits are being banked for future years rather than sold or submitted near term, or other important information, the City may want to require additional reporting.
- **Require market participants to disclose their relationship to other market participants:** Regulators can require comprehensive disclosures on relationships between market participants to monitor potential hoarding, manipulation, or market power across multiple affiliated entities. This is especially important in the context of the New York City real estate market given that many, if not most, property owners create individual LLCs for each large building, which makes it difficult to identify the full suite of properties that are under common control. (See Section 6 for more details on the relevant disclosures that other markets have required, and recommendations for disclosures in a trading market in New York City).

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[213] *Market Monitor Reports,* REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/auctions/market-monitor-reports.
[214] *Market Monitoring*, CAL. AIR RESOURCES BD., https://ww3.arb.ca.gov/cc/capandtrade/marketmonitoring/market monitoring.htm.
[215] *See* TCI Webinar (Mar. 25, 2021); s*ee also* TCI Model Rule, *supra* note 9, at 152–53 (advising states to use market monitors to check for collusion, market power, price manipulation, and efficient prices).
[216] JICKLING & PARKER, *supra* note 164, at 31; *see also* TCI Webinar, *supra* note 215 (reporting that liquidity and transparency in RGGI have helped avoid manipulation, since a well-functioning market has some natural resistance to manipulation).
On the use of the terms "small," "large," and more or less "sophisticated" firms through this Plan: note that building size and the sophistication level of owners may not necessarily align; large buildings, for example, may be owned by tenant-run co-op boards.

- **Prohibit the trade of credits if based on manipulative or deceptive practices, or on the falsification or concealment of material facts**.[217] More broadly, the City should also consider explicitly making manipulative, misleading, and deceptive practices in the carbon trading market unlawful and subject to penalty.[218]

The tools described above are used by several existing market-based programs.[219] On the other hand, the general lack of evidence of any fraud or manipulation that EPA has seen in its acid rain and cross-state air pollution markets has given EPA confidence to not feel the need to aggressively monitor its markets in real time.[220]

The City also should consider taking other steps to prevent fraud and market manipulation, such as limiting the number of credits that any single entity can hold. If participants in regulatory markets are able to amass market power, they could unduly influence the market's efficiency to their advantage. For example, firms may hoard allowances to inflate the price and simultaneously take forward positions that will require other market participants to make future deliveries of allowances back to the firm; the firm with market power can then dictate the price for satisfying those forward positions.[221] Firms may also try to manipulate the permit market as a way to punish rivals in a product market. By driving up permit prices, firms could increase their rivals' production costs and reduce their share of the product market.[222] For example, building owners in New York City could in theory hoard credits with the intent not only of driving up permit prices but ultimately of increasing competitors' costs in the real estate market.

Standard antitrust laws may be sufficient to handle some such risks of market power,[223] and auctions, which Proposal #1 envisions, lower the risk further.[224] Even so, many regulators of other markets have taken some deliberate steps to preempt any remaining risks of hoarding and market power by imposing position limits on the purchase, holding, and/or banking of allowances.[225] For example, the Federal

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[217] *See, e.g.*, CAL. CODE REGS. tit. 17, § 95921(f)(2).

[218] *See, e.g.*, TCI Model Rule, *supra* note 9, at 153 (recommending states adopt such language making it unlawful for a bidder to use any manipulative, misleading, or deceptive practice in connection with its application or purchase of allowance, including but not limited to any practice that contravenes existing federal or state law).

[219] *E.g.*, TCI Model Rule, *supra* note 9, at 152–53 (advising states to use market monitors to check for collusion, market power, price manipulation, and efficient prices).

[220] For example, in proposing a federal implementation plan under the Obama Administration's Clean Power Plan, EPA had little concern for preventing market manipulation, though it did propose exploring the idea of a third-party monitor. 80 Fed. Reg. 64,965, 64,977 (Oct. 23, 2015).

[221] JICKLING & PARKER, *supra* note 164.

[222] TIETENBERG, *supra* note 64, at 150.

[223] PROJECT ON ALTERNATIVE REGULATION, MARKETABLE RIGHTS: A PRACTICAL GUIDE TO THE USE OF MARKETABLE RIGHTS AS A REGULATORY ALTERNATIVE 20 (1981).

[224] *Id.* at 20; *see also* TIETENBERG, *supra* note 64, at 155 (citing Robert W. Hahn, *Designing Markets in Transferable Property Rights: A Practitioner's Guide, in* BUYING A BETTER ENVIRONMENT. COST-EFFECTIVE REGULATION THROUGH PERMIT TRADING (1983)).

[225] What constitutes "hoarding" and, relatedly, the appropriate level at which to set position limits, will vary from market to market. Regulators will need consider the number of allowances, the number of market participants, the concentration in the underlying real estate market, the amount of credits that could be generated at once through retrofitting, any goals for preventing inequitable concentrations that fall short of monopoly power, and other factors in setting appropriate position limits.

Communications Commission limits stockpiling and speculative trafficking in its electromagnetic spectrum auctions,[226] and California's cap-and-trade program for greenhouse gases has both purchase and holding limits.[227] However, RGGI has purchase but not holding limits. Private exchanges for the secondary trading of allowances and credits may also set their own purchase limits.

Different position limits could be set for regulated entities versus other market participants. A less interventionist option is position accountability triggers, which simply require a permit holder wishing to exceed a certain threshold of allowances to submit to additional reporting and oversight.[228] A more proactive option—and one that the Federal Trade Commission has in the past recommended to EPA—is retaining the right for the regulator to actively take back any credits that are being hoarded.[229]

The Study did not analyze the potential under Proposal #1 for market power to be exercised in the trading market (by real estate or other actors) or the real estate market. Additional research would be necessary to determine if there is a risk of market power justifying the implementation of holding limits under Proposal #1, and if so, what the holding limits should be.

5. Environmental Justice

The carbon trading study sought to center concerns about environmental justice. To that end, both Proposal #1 and Proposal #2 incorporate a several design elements that are intended to amplify the benefits that LL97 would generate for EJCs and ensure that there is no increase in local pollution in EJCs in any year under a trading scenario compared to LL97 without trading. Proposal #1 allocates buildings in EJCs credits equaling the lesser of their 2018 emissions (adjusted for grid decarbonization after 2029) and LL97 building limits while non-EJC buildings receive only 70% of the lesser of these two levels and must buy any remaining credits that they require. Proposal #1 also uses a portion of the auction proceeds to invest in retrofits of EJC buildings. Section 321 and NYCHA buildings would be allowed to opt into the program, which would drive greater investment towards EJCs because these buildings are concentrated in EJCs.

The City will need to take certain targeted steps to implement these EJC policies. As an initial matter, the City will need to define which areas constitute EJCs, as indicated in Section 1(a)(v) of Part II. It also will need to design and implement a program to fund retrofits in EJCs using auction proceeds (see Section 5(a) below) and adopt rules to allow Section 321 and NYCHA buildings to opt into a trading program (see Section 2(d) of Part II).

There also are important steps that the City should take in implementing a trading program to ensure that EJCs and the City as a whole have information about the effects of the implementation of a trading program on EJCs, to enable EJ groups to participate in the oversight of a trading program, and to ensure that the impacts of trading on EJCs continue to be considered as adjustments are made to the program over time. This section brings together several proposals in this plan to accomplish these goals. These

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[226] PABLO SPILLER & CARLO CARDILLI, TOWARD A PROPERTY RIGHTS APPROACH TO COMMUNICATIONS SPECTRUM (1997).
[227] CAL. CODE REGS. tit. 17, §§ 95802(a) (purchase limit), 95920 (holding limit).
[228] CONG. BUDGET OFF., *supra* note 186. In 2019, EPA adopted such measures for the RIN market.
[229] FTC, COMMENTS OF THE STAFF OF THE BUREAU OF ECONOMICS ON PROTECTION OF STRATOSPHERIC OZONE (1988). Such a policy could be justified on the grounds that hoarding undermines the market's integrity, which in turn undermines the policy objective.

recommendations are summarized in Table 16. In addition, the City should consult with environmental justice groups about approaches to ensuring that environmental justice remains a priority in implementing a trading program.

Table 16. Key issues and recommendations concerning environmental justice

Issue	Recommendation
How should the City design the program to invest in retrofits in EJCs?	Identify retrofit measures that are eligible for subsidization and criteria for eligibility. Establish protocols for delivering funding.
How should the City ensure that there is public information about the impacts of the trading program on EJCs?	The City should adopt transparency requirements and conduct periodic reviews to allow the public to assess the program's actual impacts on EJCs over time.
How might environmental justice stakeholders be involved in overseeing the trading program?	The City should establish a Trading System Advisory Committee that includes representatives from environmental justice groups.
How should the City retain access to information needed to assess the impacts of trading if it outsources some functions to third parties?	Contracts with third parties should stipulate clear requirements for transparent data sharing and regular reporting on key performance indicators

a. Targeted Subsidy Program

Recommendation: Identify retrofit measures that are eligible for subsidization and criteria for eligibility. Establish protocols for delivering funding.

In order to use auction proceeds to invest in EJC building retrofits as Proposal #1 envisions, the City will need to identify a list of eligible measures or criteria that measures must meet in order to be eligible for subsidy. The City should work with local building engineers, experts in energy efficiency and representatives of EJCs, among others, to identify the appropriate measures or criteria. The City will also need to establish a process for earmarking auction proceeds that are designated for investment in EJC building retrofits. As discussed in the CTS Report, we do not believe that there is a concrete legal impediment to earmarking, however the relevant City agency will need to consult the City Law Department to develop and the appropriate procedure.

b. Transparency about Impacts of Trading in EJCs

Recommendations: The City should use transparency requirements and periodic program reviews to allow the public and independent analysts to assess the program's actual impacts on EJCs over time.

The Study's goals included designing a trading program that would generate more investment in EJCs than LL97 without trading and would not increase any local pollutant in EJCs in any given year compared to LL97 without trading.

To ensure that these goals are realized, it will be necessary to make certain that information is publicly available about the impacts of the trading program on EJCs and non-EJCs.

This plan recommends that the City regularly release information on buildings' GHG emissions, credit holdings, credit transactions and the geographic distribution of trades, among other matters.[230] Depending on the level of granularity at which this data is released, the information could help to shed light on the geographic distribution of GHG emission reductions and credit trades from a trading program. However, by itself, this information will not be sufficient to provide a picture of the impacts of the trading program on investment in EJCs or local air quality in EJCs.

Given the intensity of analysis required, the impacts of the trading program on investment and local air quality in EJCs are likely best analyzed as part of periodic reviews of the trading program that should be conducted before the onset of each compliance period to allow for timely program adjustments.[231] These reviews, which should be conducted with input from stakeholders, including environmental justice groups, should include analysis of output metrics and key performance indicators for the trading program. With respect to environmental justice, such metrics and indicators might include the following:[232]

- Change in local pollutants by EJC status
- Change in GHG emissions by EJC status
- Total investment in Section 320 and Section 321 properties by EJC status
- Trade revenue flows to EJCs
- Geographic distribution of credit trades
- Change in tenant and owner energy costs by EJC status
- Participation in the trading program by square foot by EJC status

Consultations with stakeholders might suggest other factors that should be analyzed, as well as how to refine the factors to provide information relevant to addressing public concerns with the trading program.

The periodic reviews should make recommendations as appropriate for addressing any adverse findings about the impacts of the trading program on EJCs and increasing the benefits of the trading program for EJCs.

c. Trading System Advisory Committee

Recommendation: The City should establish a Trading System Advisory Committee to provide public input into the operation of the trading market. The Committee should include representation from environmental justice groups.

The City should establish a Trading System Advisory Committee to ensure that the trading program is implemented in a transparent manner that advances the City's goals, including the City's environmental justice goals. This advisory committee should include representatives of environmental justice groups and other constituencies within and outside the City government. It should provide advice and

[230] See Part II, Section 3(a) & Part II, Section 6(c).
[231] See Part III, Section 2 (the City should consider linking the timing of program evaluations to the timing of LL97 compliance periods).
[232] See also the list of output metrics and key performance indicators for reviews of the trading program in Part III, Section 3(b); and the discussion of disclosures that the City should require of participants and that the City should make in Part II, Section 6 (b) & (c).

recommendations to, and receive information from, the City agency charged with implementing the trading program.

d. Retention of Access to Information from Third Parties

Recommendation: Contracts with third parties should stipulate clear requirements for transparent data sharing and regular reporting on key performance indicators.

As explained in Part I**,** third-party execution of certain administrative and technical functions could raise stakeholder concerns about the public transparency of third-party decisions, processes, and data as well as the accountability of third parties to respond to public advocacy for changes to the market. In addition, third parties might seek to limit City access and insight into market operations, data, and platforms regarded as third-party intellectual property. Finally, third-party execution might erode communities' faith in the market as a system that could deliver equitable outcomes for environmental justice communities and others, without substantial intervention and oversight by the City and non-City stakeholders. Therefore, contracts with third parties should stipulate clear requirements for transparent data sharing and regular reporting on the key performance indicators of greatest importance to the City and the public, including indicators about the degree to which market trading financial and environmental benefits are accruing equitably across New York City neighborhoods.

6. Disclosures

This plan includes several recommendations for disclosure requirements to promote market liquidity, center environmental justice, avoid market manipulation, promote compliance, and more. This section reviews the key types of information that we suggest that the City require parties to disclose to the City, and that the City disclose to the public. Table 17 summarizes these disclosure-related issues and some of the options that we've identified for addressing them.

Table 17. Key issues and recommendations regarding disclosures

Issue	Recommendation
What should market participants be required to disclose to the City?	Market participants should be required to disclose information on all secondary transactions, including prices, and to maintain records for several years.
What should the City be required to disclose to the public?	The City should disclose adequate and sufficiently timely information on credit transactions, holdings of credits, and regulated buildings' emissions. The City also should provide information on the geographic distribution of trades and credit holdings, among other matters so that the public can assess the implications of the trading program for environmental justice. The City should publish information on compliance status and enforcement status to further encourage compliance.
How should the City protect against information leaks or misuse of data?	Require those with access to market data to clear various criminal and financial checks. Provide trainings and checks on staff with access to sensitive market information.

a. Principles for Disclosures

Recommendations: Minimize compliance costs by keeping registration and disclosure requirements for market participants as simple and clear as possible, and by providing special outreach to smaller entities. Tailor information disclosures to the needs and risks of the market, to balance the facilitation of price discovery against confidentiality and competitiveness concerns. Release periodic, aggregated information on market activity. Periodically evaluate the market's economic and environmental effectiveness, and impacts on environmental justice communities, and disclose the results.

Regulators, market actors, and the public all have different needs for information on transactions in permit markets. Market participants need accurate and timely information on prices and credit availability to make appropriate decisions about whether to purchase credits, as well as regular information on emissions levels to gauge overall demand for credits. They also need information on the past volume and price of trades and other market fundamentals in order to project future supply and demand. Such information may not be widely available if the regulator does not require disclosures and disseminate summary information, since private exchanges may consider allowance price data to be proprietary and charge a fee for access.[233]

On the other hand, too much transparency may carry a cost for the market participants, both in terms of paperwork burdens and because reporting specific transactions and prices could reveal confidential business information about a firm's costs to trading partners, competitors, and the public.[234] Besides protecting information they deem confidential, regulated entities will also want assurances that the data they report is secure from hacking, and that the market information published by the government is accurate.

[233] *See* JICKLING & PARKER, *supra* note 164, at 29. But note that under various laws, including LL84 (2009), at least some information on buildings' energy efficiency investments may already be disclosed.
[234] IWG OVERSIGHT REPORT, *supra* note 96, at 23; Breger et al., *supra* note 161.

Certain market design features may change the kinds of information that market actors need disclosed or kept private. For example, in the context of an auction, disclosure of individual account holdings could allow other market actors to discern which specific regulated entities are long or short in their holdings, which could undermine the auction's efficiency or even allow certain kinds of collusion between market actors. Similarly, speculators can take advantage of very rich market data to anticipate and attempt to manipulate future prices.

The level of public disclosure of market data therefore should be tailored to the type of market, to avoid creating any competitiveness issues. Of course, the regulator and any third-party market monitors can collect and analyze additional market information that is not disclosed to the public, in order to use the information to detect fraud, hoarding, or manipulation.

The public needs information to assess and comment on both the rules establishing a trading program and the performance of that program. While too much public transparency risks revealing confidential business information,[235] if all information on trading is considered confidential, it is difficult for the public to gauge the program's effectiveness and impacts, including its impacts on environmental justice communities.[236] Every marketable permit program must confront this balancing act.[237]

With input from stakeholders, regulators should conduct and make public periodic assessments of environmental and economic effectiveness of their regulatory markets.[238] (See the discussion of recommendations for periodic public reviews of the trading program in Part II, Section 5(b) & Part III, Section 3.)

b. Disclosure from Participants to the City

Recommendations: Collect information, including prices, for all secondary market transactions. Require market participants to maintain records for several years.

Adequate disclosures about credit holdings, credit transactions, relationships between market participants, and buildings' emissions are essential for monitoring and enforcement. (See Part II, Section 2(a) on disclosures during registration.) To monitor the market for collusion, manipulation, market power, and fraud, the City, its market administrators, and its independent market monitor will all require a certain amount of relatively real-time information. Some necessary disclosures could contain confidential business information, and the City should protect confidential business information to the extent required by law.[239] If certain administrative entities do not require certain categories of information to execute their assigned administrative tasks, such information could be selectively siloed from them; though

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[235] IWG OVERSIGHT REPORT, *supra* note 96, at 23.
[236] TIETENBERG, *supra* note 64, at 9 (describing the example of the ozone-depleting substance market).
[237] *See, e.g.*, NAT'L NETWORK ON WATER QUALITY TRADING, BUILDING A WATER QUALITY TRADING PROGRAM (2015) (on privacy issues in disclosing the location of credit-generating water quality projects).
[238] *See, e.g.*, EPA, Water Quality Trading Policy, 68 Fed. Reg. 1,609 (Jan. 13, 2003) (calling for periodic assessments); 16 U.S.C. § 1853a(c) (calling for programmatic reviews of fish catch shares every 5 to 7 years).
[239] *E.g.*, CAL. CODE REGS. tit. 17, § 95921(c) (documentation on trade/transfer agreements will be treated as confidential business information to the extent permitted by law).

broader access to data among the various regulatory and administrative entities may facilitate a more holistic review of potential market manipulations or violations.

Disclosure and record-keeping requirements should be streamlined enough to minimize compliance costs and to not discourage participation in the market; but such requirements should also be thorough enough to deliver the necessary information and convey the gravity of the record-keeping requirements. In addition to regular reporting requirements, many existing trading programs require covered entities and market participants to maintain records for a number of years.[240] The length of record-keeping requirements should be at least consistent with the length of time during which the City can order an audit of an entity's past market activity.

When credits are exchanged in over-the-counter secondary transactions, it can be more difficult to get accurate information. For example, in some tradable fish catch share programs, many transaction records include no price information or report unreasonably low prices,[241] or the prices reported by the buyers and sellers do not match.[242] Unreasonably low prices could be because of reporting errors, reluctance to enter price information, gifts, transfers to related accounts, package deals containing non-monetary terms, or unrecorded bartering.[243] Industry feedback suggests that privacy concerns may lead some fishers to deliberately misreport prices.[244] The City could face similar challenges in collecting data about credit transactions between buildings. The City will need to carefully design information collection forms and systems to encourage accurate reporting about prices and other key information. The City should provide instructions for how buildings should record price information when transferring credits between related accounts or as part of package deals that may contain other terms besides a monetary price. Submissions can be required of both parties to a transaction to enable cross-checks to ensure the information is consistent and accurate.

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[240] *E.g.*, N.Y. COMP. CODES R. & REGS. tit. 6, § 242-1.5(e) (covered entities must keep records for at least 10 years); 40 C.F.R. § 80.1454 (RIN market participants must keep records for five years on prices, transaction types, holdings, affiliations, and so forth).

[241] In the grouper-tilefish program in 2014, 33% of share transaction records had no price information or reported unreasonably low prices, like $0.01 per pound (the number was 52% for allowance transactions). NAT'L MARINE FISHERIES SERV., 2014 GROUPER-TILEFISH IFQ ANNUAL REPORT (2015).

[242] 31% of share transactions had mismatched information reported by the buyers and sellers. NAT'L MARINE FISHERIES SERV., 2014 GROUPER-TILEFISH IFQ ANNUAL REPORT (2015).

[243] *Id*. The regional council for that fishery added a "reason for transaction" reporting requirement, but in 2014, 17% of share transactions and 46% of allowance transaction declined to state the nature of the transaction. *Id*.; *see also* NAT'L MARINE FISHERIES SERV., 2014–2015 GULF OF MEXICO RED SNAPPER IFQ ANNUAL REPORTS.

[244] NAT'L MARINE FISHERIES SERV., RED SNAPPER IFQ FIVE-YEAR REVIEW (2013).

c. Disclosures from the City to the Public

Recommendations: The City should disclose adequate and sufficiently timely information on credit transactions, holdings of credits, and regulated buildings' emissions to facilitate price discovery, track aggregate supply and demand of credits, and plan other efficient market activity. The City also should provide information on the geographic distribution of trades and credit holdings, among other matters, so that the public can assess the environmental justice implications of the trading program. The City should publish information on compliance status and enforcement status to further encourage compliance.

Market participants require adequate and sufficiently timely information on transactions and holdings of credits, as well as regulated buildings' emissions, to facilitate price discovery, track aggregate supply and demand of credits, and plan other efficient market activity. The general public requires adequate and sufficiently timely information to monitor the overall economic and environmental impacts of the program, including on EJCs. But neither group likely requires the same level of real-time, party-specific, fully detailed information on individual transactions that the market administrators and monitors will require. Instead, the City or market administrators can aggregate to some level the information they release on individual credit transactions and other market features in order to protect confidential information and ensure that the availability of overly rich data does not enable collusion or other manipulations.[245] However, it is important that the City provide information on the geographic distribution of trades and credit holdings, among other matters, so that the public can assess the environmental justice implications of the trading program (see also Part II, Section 5 for more extensive discussion of the information required to assess the impacts of the trading program on EJCs).

i. Examples from Other Markets

Various existing markets have struck the balance between confidentiality and transparency in different ways. Washington D.C.'s stormwater credit market, for example, posts online summary statistics on total sales and average prices, as well as some price details on individual sales (but without names).[246] In RGGI, parties have found it to be essential to have monthly data on emissions, in order to gauge demand and so plan their strategies for bidding in the next auction.[247] On the other hand, EPA's database for its clean air markets, the Allowance Management System, does not record the prices of allowances bought or sold.[248]

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[245] *See, e.g.,* CAL. CODE REGS. tit. 17, § 95921(e) (striking a balance on the timely release of information versus maintain confidentiality); 49 C.F.R. § 536.5(e)(1) (in the vehicle efficiency credit market, NHTSA periodically publishes credit holdings, but does not publish any individual transactions and does not respond to any individual requests for updated balanced from any party other than the account holder).

[246] *Surface and Groundwater System (SGS): Average SRC Prices – Recent Trades*, D.C. DEPT. OF ENERGY & ENV'T, https://octo.quickbase.com/up/bjkxxcfcp/g/rb7/eg/va/levels.html?sitelevel=2&pagerecord=90&userrole=Everyone%20On%20the%20Internet.

[247] Interviews. *See also* TCI Model Rule, *supra* note 9, at 153 (within 10 days of auction, publish the clearing price and total number of allowances sold).

[248] JICKLING & PARKER, *supra* note 164, at 10.

In California's cap-and-trade program,[249] CARB is careful to give notice of what information will be released and when, and to release the same kinds of information at predictable periods around the same time in relation to the timing of auctions and compliance periods. CARB releases aggregated information on market transactions but does not release specifics on individual entities' holdings. CARB does release covered entities' emissions information after it is verified, and following the end of each compliance period, entities' compliance status is released. Publication of compliance status and enforcement proceedings can help encourage compliance, by creating a fear of public shaming.

ii. Market-Moving Information

Recommendation: The City and market administrators should develop communication policies to prevent pre-publication leaks and information asymmetries.

Like CARB, other market regulators have also found good reason to be consistent and careful in the type and timing of information releases, because such information can move markets. For example, in the early years of the EU ETS, leaks regarding the stringency of the cap and measurements of firms' existing emissions may have allowed some traders to profit off nonpublic information.[250] Similarly, a study of the acid rain market suggests that price volatility correlated with both EPA and Congressional announcements on potential permanent changes to the regulatory scheme as well as with day-to-day announcements, such as notices of enforcement.[251]

The federal agencies responsible for generating the kind of statistics, forecasts, and policies that move financial markets, like the Federal Reserve and the Bureau of Labor Statistics, have developed procedures to prevent pre-publication leaks and information asymmetries.[252] For example, requiring market participants to check agency websites continually or rely on press coverage for new information creates opportunities for some participants to learn and trade on information before others.[253] Financial regulators typically release pre-announcements or announce new policies at pre-scheduled times. The EU ETS has copied such approaches, and now releases pre-announcements and has new procedures to control leaks.[254] Clear communication strategy is essential for market regulators, just as it is for central banks,[255] since "noise" can create inefficient price volatility.[256]

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[249] Interviews. For the kinds of information CARB releases, see CAL. AIR RESOURCES BD., CALIFORNIA'S CAP-AND-TRADE PROGRAM: PUBLICLY AVAILABLE INFORMATION, https://ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/public_info.pdf (last updated Mar. 2019); *Cap-and-Trade Program Data,* CAL. AIR RESOURCES BD., https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/cap-and-trade-program-data; *see also* a criticism of shortcomings in publicly available information early in California's program, SEVERIN BORENSTEIN ET AL., REPORT OF THE MARKET SIMULATION GROUP ON COMPETITIVE SUPPLY/DEMAND BALANCE IN THE CALIFORNIA ALLOWANCE MARKET AND THE POTENTIAL FOR MARKET MANIPULATION (2014), https://ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/simulationgroup/msg_final_v25.pdf.

[250] *Id.* at 7.

[251] CLAUDIA HITAJ & ANDREW STOCKING, MARKET EFFICIENCY AND THE U.S. MARKET FOR SO2 ALLOWANCES (CBO Working Paper, 2014).

[252] JICKLING & PARKER, *supra* note 164, at 35.

[253] HITAJ & STOCKING, *supra* note 251.

[254] *Id*.

[255] *Id.*

[256] *Id.*

The City should also consider whether and to what extent various information can be withheld from public requests submitted under various information disclosure laws, due to the market-sensitive nature of the information.

d. Checks on Information Access

Recommendations: Provide trainings to, and checks on, staff with access to sensitive market information to prevent leaks or misuse of the data for personal gain.

As some of the examples above demonstrate, information can move markets. Various individual employees working for the City, market administrators, and market monitors (and, to a lesser extent, third-party verifiers of emissions) will have some level of access to valuable market information. Consequently, the City needs to set standards for how market information will be managed among its own employees and at the various contractors it relies on to execute different market functions.

In managing California's cap-and-trade program, CARB requires those with access to market data to clear various criminal and financial checks. Those employees also undergo trainings to learn how to handle confidential and market-moving information to prevent leaks. The City should consider adopting similar protocols.

7. Compliance and Enforcement

LL97 establishes legal rules to ensure compliance with the building emissions limits that it creates. The law requires building owners to annually file reports, certified by a registered design professional, that they are in compliance, or not in compliance, with their limits.[257] DOB is to prescribe by rule the contents of the required report. If a trading program were added to LL97, the trading program would be one of a number of options that buildings could use to comply with their LL97 building limits. Thus, compliance with the trading program will need to align with compliance under LL97 generally. Table 18 summarizes some key decisions the City will likely have to make related to compliance in implementing a trading program.

Table 18. Key issues and recommendations for implementing rules regarding compliance and enforcement

Issue	Recommendation
What changes are needed regarding emissions reporting?	Ensure alignment with underlying LL97 rules on emissions reporting. Consider requiring more frequent reporting than annual reporting if the market does not develop more transparency about GHG emissions on its own.
How should the City ensure that third-party verifiers do not have a conflict of interest?	Develop certification standards and require verifiers to have internal rules to prevent conflicts of interest. Consider limiting how often an individual building or the owner of multiple properties can use the same verifier.
How should the City promote full compliance?	Integrate the careful tracking of emissions, credit holdings, and market activity. Identify potentially non-compliant buildings and facilitate their participation in the market by, for example, guiding them through their compliance options in advance of the deadline.

[257] N.Y.C. LOCAL LAW 97, § 28-320.3.7.

How should credits, including banked credits, be surrendered for compliance obligations?	Set up a default system to deduct credits from regulated entities' compliance accounts. Specify a default order of priority for credits to be identified and deducted, according to their age.
How should the potential to buy credits affect the treatment of requests for adjustments to emissions limits and variances from penalties?	Restrict owners' ability to seek adjustments to emission limits and reductions in the penalty in light of the flexibility that the trading program creates for owners to buy credits.
When should buildings be required to surrender credits?	Ensure that there is an interlude between when buildings' emissions and credit needs are known with reasonable accuracy, and when credits must be surrendered.
What penalties should be introduced for failure to comply, and for what circumstances?	Ensure that material misstatements in submissions relating to market participation are penalized. Consider requiring the submission of additional credits as a penalty for excess emissions.
Should entities be allowed to retire credits?	Allow regulated entities and non-regulated entities to purchase and retire credits.

a. Emissions Reporting

Recommendation: Ensure alignment between protocols developed to verify emissions for trading purposes and the relevant underlying LL97 rules. Consider whether more frequent emissions reporting is appropriate to facilitate the market's assessment of the supply of and demand for credits if the market does not develop more transparency about emissions on its own.

The Importance of Reliable GHG Emissions Data

LL97 will require reliable data on building emissions to ensure compliance with the law's building limits. Many questions about how building emissions will be reported and verified will remain until the City finalizes implementation rules for LL97 in 2023.

Introducing a trading program may increase the importance of collecting reliable emissions data from buildings to ensure compliance with LL97 building limits. Research indicates that regulated entities that are compliant and have enough or extra credits will support strict monitoring compliance and enforcement, because any non-compliance by other actors decreases the demand for credits and so risks lowering the value of compliant firms' credits.[258] On the other hand, a market-based approach can sometimes increase the incentives for noncompliance, since any credits that a firm does not need to cash in for compliance can be resold for a profit.[259] Noncompliance lowers demand for credits and so reduces credit prices, and with lower prices other firms will choose to buy credits rather than mitigate.[260] However, it is important to note that introducing a trading program into LL97 might encourage some buildings that otherwise might not have complied with their building limits to comply, by lowering their cost of

[258] McAllister, *supra* note 163.
[259] TIETENBERG, *supra* note 64.
[260] *Id.*

compliance. With the addition of a trading program, a firm emitting above its limits will have the option of buying credits (as well as the other options that LL97 allows for compliance with building limits). Regardless, introducing a trading program, like LL97 without a trading program, requires careful compliance monitoring and sufficient penalties to motivate compliance.[261]

The Frequency of Emissions Reporting

A trading program may need more frequent reporting of buildings' emissions levels than the annual reporting that LL97 requires, so the market can assess the likely supply of, and demand for, credits on a more regular basis. The market may incentivize buildings to provide such information on their own, or private brokers or exchanges may try to aggregate such data.

Notably, some private actors likely already have the technology to track (or at least estimate) their GHG emissions more frequently than annually. There are a variety of private energy and emissions tracking systems, many in wide use by NYC building owners and managers (including some systems developed and owned by building owners). These systems could be used for tracking on more granular time scales of energy use and resulting emissions.

Technological developments may soon enable more private parties to track (or at least estimate) their GHG emissions more frequently than annually. Smart meters are being widely deployed across NYC by ConEdison.[262] All ConEdison electric, gas and district steam customers (other than those who refuse installation and pay an extra monthly fee) are expected to have smart meters in place by 2022, including all direct metered tenants in multifamily buildings.[263] Smart meters provide much more granular energy consumption and demand information (down to every 15 minutes or even less) for electricity, natural gas, and district steam consumers. This more granular data could be used to track/estimate GHG emissions more frequently than annually.

The LL97 Advisory Board and Working Group are also discussing options for compliance with LL97 that if adopted likely would result in at least some buildings engaging in highly granular GHG emissions reporting (perhaps as specific as hourly emissions linked to building loads and real-time emissions rates).

While many building owners may be spurred by technological and market developments and the implementation of LL97 to track their GHG emissions more frequently than annually, owners might consider such GHG emissions data to be proprietary and charge a fee for access.[264] If buildings do not move to track their GHG emissions with greater frequency, or if they decide to keep this information private, there might be a rationale for the City to require more frequent disclosures and dissemination of GHG emissions to enable market actors to estimate the demand for, and supply of, credits. On the other hand, more frequent mandatory disclosures may be burdensome or impractical, and may be unnecessary

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[261] McAllister, *supra* note 163 (nothing that trading requires a rigid compliance policy with adequate sanctions).

[262] See CONEDISON, SMART METERS, https://www.coned.com/en/our-energy-future/technology-innovation/smart-meters.

[263] CONEDISON, DISTRIBUTED SYSTEM IMPLEMENTATION PLAN § 2.11 [Advanced Metering Infrastructure] (2020), https://www.coned.com/-/media/files/coned/documents/our-energy-future/our-energy-projects/distributed-system-implementation-plan.pdf.

[264] *See* JICKLING & PARKER, *supra* note 164, at 29. But note that under various laws, including LL84 (2009), at least some information on buildings' energy efficiency investments may already be disclosed.

if enough buildings provide enough information voluntarily. The City or its market managers and monitors will need to assess whether additional emissions reporting is desirable or practical.

Blockchain for Emissions Tracking?

When specifying ever more granular data on shorter time scales, accounting for both onsite emissions and potential purchases of offsite renewable energy, there is a much larger amount of data involved, and greater chance for error. Some have argued that blockchain provides a more secure and reliable path for ensuring data authenticity.[265] Blockchain provides a digital ledger system that can link a variety of different transactions through a distributed ledger and has been used in some cases for peer-to-peer energy trading. A group of NYC building owners subject to LL97, and interested in the trading system, have formed a "Blockchain Pilot Consortium," led by KPMG. The Consortium is interested in attributing real-time onsite energy usage to renewable energy sources, validated via blockchain.[266] This may be one methodology that could be considered as an alternate path for the trading system. However, the sophisticated technology required for both building energy monitoring and other parts of the trades may not be affordable or accessible to many trading market participants. If so, the Blockchain Pilot Consortium (or any other alternate trading paths) would need to handle all administrative functions, including any required error correction and tracking issues that may be identified following transactions. Note, however, some of the potential downsides of blockchain discussed above (see Part II, Section 3(b)).

b. Third-Party Verifiers and Conflicts

Recommendation: Develop certification standards and require verifiers to have internal rules to prevent conflicts of interest. Consider limiting how often an individual building or the owner of multiple properties can use the same verifier.

LL97 already envisions that regulated buildings will use registered design professionals to certify their annual emissions reports,[267] and that Section 321 buildings will use registered design professionals to certify their compliance with required prescriptive measures by 2025.[268] Ensuring that such third-party verifiers are qualified and have no conflicts of interest will be important under LL97 whether or not a trading program is implemented. However, the introduction of a trading program would increase the importance of the verification process. Certifications may be used to help to determine the baseline emissions up to which Section 321 buildings will be allocated credits for free, because these buildings will receive credits for free equaling their 2018 emissions minus the anticipated savings from their required prescriptive measures. Some buildings seeking to sell credits based on having reduced their emissions using energy conservation measures might seek to certify their emission reductions in order to safeguard against the risk of future invalidation and so increase the marketability of their credits. Also, certifiers

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[265] KPMG, BUSINESS AND THE ENVIRONMENT: CLIMATE ACCOUNTING YOUR STAKEHOLDERS WANT TO SEE (2020), https://advisory.kpmg.us/content/dam/advisory/en/pdfs/2020/climate-accounting-your-stakeholders-want-to-see.pdf.
[266] Video interview with Alec Salitkoff, JP Morgan Chase; Arun Ghosh, Venki Kumar, KPMG U.S. Blockchain. February 26, 2021.
[267] N.Y.C. LOCAL LAW 97, § 28-320.3.7.
[268] N.Y.C. LOCAL LAW 97, § 28-321.3.1.

would be one tool to guard against the incentive that a trading program might create to over-report the number of credits a building has for sale.

With the increased importance of their role and the profits at stake, some third-party verifiers may have a financial incentive to brand themselves as "market advocates" and facilitate the allocation of non-"additional" credits.[269] Other verifiers may be tempted to use information they gain through their services to their own advantage by entering the marketplace themselves. Conflict of interest rules therefore need to go beyond preventing direct financial stakes in revenue from the credits.[270] Conflicts can develop over time, for example if the same reviewer repeatedly depends on the same buildings or the same building owners for their income. To mitigate this risk, the City could limit how often verifiers can serve the same buildings or the same building owners, or even could explore a process for randomly assigning qualified verifiers.[271] Ultimately, when relying on third parties, the City will need to retain some oversight and final decision-making authority and the ability to resolve disputes.[272]

Many existing trading programs have developed conflict of interest rules and other minimum qualification standards for third-party verifiers, especially in the context of reviewing offset credits.[273] The City can use such rules as a template.

c. Identifying Non-Compliance

Recommendations: Integrate the careful tracking of emissions, credit holdings, and market activity. Pursue full compliance by identifying potentially non-compliant buildings and facilitating their participation in the market by, for example, guiding them through their compliance options in advance of the deadline. Publicize enforcements.

As a matter of general principle, less non-compliance translates into more emissions reductions. Therefore, the goal of any market-based regulatory program should be full compliance and not the collection of penalties from non-compliance.[274] Achieving that goal starts with having reliable data on buildings' actual emissions, in order to assess compliance. Ongoing tracking of emissions, allowance holdings, and trades is essential for regulators in market-based programs to detect any fraud, manipulation, market power, or other abuses, and to more generally secure compliance.

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[269] Dennis King, *Managing Environmental Trades: Lessons from Hollywood, Stockholm, and Houston*, 32 ENVTL. L. REP. 11,317 (2002).

[270] NAT'L NETWORK ON WATER QUALITY TRADING, BUILDING A WATER QUALITY TRADING PROGRAM (2015).

[271] WILLAMETTE PARTNERSHIP, VERIFICATION IN MARKETS FOR WATER QUALITY AND HABITAT (2014).

[272] NAT'L NETWORK ON WATER QUALITY TRADING, *supra* note 270.

[273] *E.g.*, TCI Model Rule, *supra* note 9, at 100 (conflict of interest standards for verification bodies); N.Y. COMP. CODES R. & REGS. tit. 6, § 242-10.6 (requiring license, education, experience, liability insurance, lack of financial relationship, internal conflict of interest protocols, and so forth); CAL. CODE REGS. tit. 17, § 95802(a) (defining "conflict of interest"); 40 C.F.R. § 80.1471 (conflict of interest standard in the RIN market).

[274] N.Y.C. LOCAL LAW 97, § 28-320.6 applies a maximum penalty of $268 per ton for each excess emission above a building's annual limit, as reported under § 28-320.3.7; that subsection defines emissions in excess of a building's emissions limit as being "not in compliance." § 28-320.3.7(2). Thus, penalties are best understood as fines for non-compliance, rather than an alternate compliance mechanism. § 28-320.3.7(2).

It is particularly helpful if the systems for emissions tracking and allowance tracking are integrated, or at least interoperable.[275] This does not necessarily mean that there needs to be a single system/database for both tracking emissions and tracking allowance holdings and trades. But if they are separate systems, they need to be interoperable, with data like building IDs coded the same way so emissions and allowance holdings are easily comparable. Similarly, it is helpful if the database can integrate information on other ways of complying, such as through the purchase of RECs under LL97, so the City or its program manager can seamlessly assess buildings' compliance status. Regulators may also need to monitor transactions in related markets, including any derivative markets and related commodity markets, as price spikes or manipulation attempts could potentially spill over from one market into another.[276]

But to repeat, full compliance—not the assessment of penalties—should be the goal. Therefore, the regulator should not be aiming to catch entities with their accounts short of the allowances they need to cover their emissions; rather, the regulator should proactively identify firms that are in danger of falling out of compliance and facilitate their participation in the regulatory market so that they can come into compliance. For example, while EPA's clear air markets involve many large and sophisticated entities that can reliably manage their own compliance, smaller municipal power companies subject to EPA's regulatory programs may need assistance. To that end, in advance of deadlines for the submission of allowances, EPA may run hypothetical compliance scenarios so the agency can identify and proactively contact any regulated entities in danger of being out of compliance, to guide them through their market-based compliance options.

d. Submission of Banked and Other Credits for Compliance

Recommendations: Create a default system for deducting credits to satisfy compliance obligations. Specify a default order of priority for credits to be identified and deducted, according to their age.

Under Proposal #1 (and #2), banked credits are scheduled to reduce in value by 20% per year. Including a clear designation of the year in which a credit was created in the system for numbering or otherwise identifying credits will help credit holders, credit buyers and sellers, and the regulator all keep track of the value of various credits according to their age.

The City should consider designating by rulemaking a default system through which credits will be deducted from regulated entities' compliance accounts. Many existing programs allow regulated entities

[275] The lack of integration has created challenges in water quality trading. EPA's historical data tracking systems for water quality have not been structured to also track trades: instead, manual adjustments were required to reflect any transactions. For example, a credit seller would report the sum of its actual discharge plus any credits sold as its reported discharge, and the tracking system would have to confirm that sum is greater than or equal to that firm's individual pollution limit. EPA, WATER QUALITY TRADING TOOLKIT (2009).

[276] For example, there is a risk that derivative markets tied to U.S. allowances could be hosted by foreign jurisdictions, possibly including countries with lax oversight. *See* CONG. BUDGET OFF., *supra* note 186; Monast, *supra* note 179. Regulatory markets and private markets interact. For example, the European Union's Emission Trading System proved that greenhouse gas allowance prices will be linked to the price of other energy commodities, and traders will pursue arbitrage strategies involving simultaneous transactions on both markets. JICKLING & PARKER, *supra* note 164, at 2; *see also* IWG OVERSIGHT REPORT, *supra* note 96, at 31 ("significant interactions between carbon markets and markets for fossil fuels").

to designate by serial number which specific credit they want to submit for their compliance obligations each year, but also specify a default order of priority, typically in chronological order starting with the oldest available credits or by a first-in/first-out ordering.[277]

e. Interactions with LL97 Exemptions

Recommendations: Take advantage of the flexibility the trading program provides to restrict owners' ability to seek hardship exemptions and reductions in the penalty.

Introducing a trading program makes it less likely that regulated entities will need to seek hardship exemptions, and many marketable permit programs see far fewer exemptions sought.[278] Because market-based approaches lower marginal compliance costs, often it may be cheaper to comply with the marketable permit program than to spend money seeking an exemption with no guarantee of securing it.[279] Furthermore, regulators are less likely to need to grant exemptions under a marketable permit program since, unlike with prescriptive regulation, there are no cases of special compliance hardships in a market program. Instead, in a market program, every regulated entity has the same option of paying a relatively uniform price to obtain the credits it needs to comply.[280]

The features of market-based compliance options would interact with several of LL97's existing exemptions. For example, LL97 allows buildings to seek adjustments to their emissions limits if certain unachievable capital improvements would be "necessary for strict compliance."[281] When credits are available for purchase, specific capital improvements will typically not be "necessary for strict compliance," making such adjustments hard to justify.[282] Indeed, complying "to the maximum extent practicable"[283] would require buildings to turn to the market to purchase any available credits before seeking an adjustment. Thus the addition of a trading program to LL97 should reduce the number of adjustments from buildings' emissions limits, which should translate into greater emissions reductions and environmental progress.

Similarly, by lowering the costs of compliance, a market-based approach to LL97 will both reduce buildings' incentives for non-compliance and reduce the mitigating factors that might otherwise warrant a penalty reduction. LL97 allows variances from the maximum penalty of $268 per metric ton based on factors like a building's "good faith efforts to comply."[284] With the addition of a trading program, only if a

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[277] *See, e.g.*, TCI Model Rule, *supra* note 9, at 58–59; 40 C.F.R. § 96.54(c).

[278] PROJECT ON ALTERNATIVE REGULATION, MARKETABLE RIGHTS: A PRACTICAL GUIDE TO THE USE OF MARKETABLE RIGHTS AS A REGULATORY ALTERNATIVE 11 (1981).

[279] A. DENNY ELLERMAN, ARE CAP AND TRADE PROGRAMS MORE ENVIRONMENTALLY EFFECTIVE THAN CONVENTIONAL REGULATION? 51–53 (2003) (noting, for example, the few exemptions sought under the acid rain program).

[280] *Id.*

[281] N.Y.C. LOCAL LAW 97, § 28-320.7(1.1), (2.1).

[282] This is true both for adjustments otherwise allowed when a legal or physical constraint blocks the capital improvements, as under subsection 1.1, or when the cost of the capital improvement would prevent a reasonable financial return, as under subsection 2.1.

[283] N.Y.C. LOCAL LAW 97, § 23-320.7.

[284] N.Y.C. LOCAL LAW 97, § 28-320.6.1(1).

building first tried to purchase allowances and credits could the owner claim a good faith effort to comply before exceeding the emissions limit. And provided the market includes some tools to minimize price volatility, buildings would have trouble claiming that their non-compliance through failure to purchase sufficient credits was due to "unexpected and unforeseeable events."[285] (Buildings could still seek penalty variances based on other factors, like financial resource constraints, or the needs of critical health and safety operations.[286]) By making it harder to justify reducing penalties below $268 per ton, a trading program will increase compliance and so reduce overall emissions. Furthermore, with a trading program, the punishment for non-compliance can potentially include not just monetary fines, but the submission of additional credits in future periods as well, which can more than offset the environmental damage caused by the non-compliance.[287]

f. Timing of Compliance

Recommendations: Ensure that there is an interlude between when buildings' emissions and credit needs are known with reasonable accuracy, and when credits must be surrendered.

Another key decision that the City will have to make is when to require owners to surrender credits for excess emissions relative to their building limits.

Under LL97, annual compliance reports for each calendar year—which show emissions versus the building's applicable limits and are certified by a registered design professional—are due the following May 1.[288] The deadline for submission of credits due could similarly be set for the May 1 following each calendar year-based compliance period.[289] Aligning those two deadlines would work best if the compliance reports due May 1 are simply the final, official reports and if, in fact, both owners and the City can estimate buildings' emissions and need for credits with reasonable accuracy in advance of May 1. For purposes of transparency and liquidity, market participants may need reasonable estimates of aggregate emissions on a quarterly or monthly basis, in order to gauge overall demand for credits. If reasonable building-specific estimates cannot be made before the May 1 reporting deadline, then there should be a gap between when buildings' need for credits is known with reasonable accuracy and when the submission of credits is due.

In most existing regulatory markets, there is some period of time between the end of the compliance period and the deadline for submitting allowances.[290] This interlude, which usually spans at least a few

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[285] N.Y.C. LOCAL LAW 97, § 28-320.6.1(4).

[286] N.Y.C. LOCAL LAW 97, § 28-320.6.1(5)–(6).

[287] *Compare* TCI Model Rule, *supra* note 9, at 59 (indicating that the regulator shall "deduct . . . three times the number of . . . excess emissions"), *id.* at 7 (defining "deduction" as "permanent withdrawal . . . or retirement") *with* CAL. CODE REGS. tit. 17, § 95857 (the compliance obligation for untimely surrender is four times the excess emissions, 3/4 of which will reenter the auction upon submission, so as not to reduce the overall cap).

[288] N.Y.C. LOCAL LAW 97, § 28-320.3.7. Extensions are allowed under N.Y.C. LOCAL LAW 97, § 28-302.3.7.1.

[289] *See, e.g.*, N.Y.C. LOCAL LAW 97, § 28-320.3.1 (specifying emissions limits applicable to specific calendar years); § 28-320.3.7 (requiring compliance reports for each calendar year).

[290] N.Y. COMP. CODES R. & REGS. tit. 6, § 242-1.2(b)(18) (2020) (by March 1st, or the next business day, following the end of the relevant control period or interim control period); N.Y. COMP. CODES R. & REGS. tit. 6, § 242-4.1 (by March 1st following each

months, allows regulated entities to settle any final market transactions necessary to obtain the allowances they need for compliance. The period also allows time for regulators to identify those entities in danger of being out of compliance, in order to reach out to them and facilitate their coming into compliance. The chance for regulated entities to return to the market to come into compliance during this period minimizes the need for variances and exemptions, such as adjustments to buildings' emissions limits.

Some regulatory markets allow for the submission of market-based compliance instruments over a period of several years, rather than requiring the full submission of allowances each year. For example, under New York's rules implementing RGGI, control periods span three calendar years, with the first two years of each control period serving as "interim" control periods.[291] Similarly, in California's cap-and-trade program, the full compliance period spans three calendar years,[292] and while a certain portion of allowances may be due in each individual annual compliance period, the full amount of allowances is not due until after the end of the full three-year period.[293] The inter-state Transportation & Climate Initiative's model rule is structured similarly.[294]

In market-based programs that do not allow for borrowing from future compliance periods (neither of the illustrative proposals allow borrowing), the multi-year compliance period structure gives regulated entities a degree of temporal flexibility. Such temporal flexibility can help prevent price volatility, help entities manage their risk of seasonal fluctuations, and allow regulated entities to pursue longer-term compliance strategies that may further minimize costs,[295] without sacrificing greenhouse gas emission reductions.[296] On the other hand, a multi-year compliance period requires that both buildings and the City carefully track their credit needs from year to year, less regulated entities reach the "balloon payment" of credits due at the end of the period with a significant shortfall of credits. Similarly, a multi-year compliance period could increase the need for the City to carefully track changes in corporate ownership and bankruptcy, to ensure that the full compliance obligations from the entire multi-year period transfer

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control period, submit a compliance certification report, identifying the serial numbers of allowances, and identifying any change in facts that form the basis of certification); TCI Model Rule, *supra* note 9, at 7 (allowance transfer deadline is June 1 after the end of the relevant control period, or the following business day). Under the Acid Rain Program, the allowance transfer deadline is 60 days after the end of that year (March 1 in most years and February 29 in leap years), while under the CSAPR and CSAPR Update trading programs, the allowance transfer deadline is March 1 after the end of that year. *See Allowance FAQs*, EPA, https://www.epa.gov/airmarkets/allowance-faqs (last updated Mar. 5, 2021).

[291] N.Y. COMP. CODES R. & REGS. tit. 6, § 242-1.2(b)(37).

[292] CAL. CODE REGS. tit. 17, § 95802(a). "Compliance Period" means the three-year period for which the compliance obligation is calculated for covered entities.

[293] CAL. CODE REGS. tit. 17, § 95856. Timely surrender of compliance instruments is by November 1 of the calendar year *following* the year for which the obligation is calculated (for both annual compliance and full compliance obligations).

[294] TCI Model Rule, *supra* note 9, at 11 (three-year control periods).

[295] Regulated entities will also value the option of not having to keep capital tied up in allowances every year.

[296] Greenhouse gas emissions have a degree of fungibility over time, as the marginal climate damages from emissions do not change much from one year to the next. While a ton of emissions released today starts contributing to climate damages immediately, a ton of emissions emitted next year may be marginally more damaging, as the climate and economic systems will be more stressed in the future. Over the span of just two or three years, these competing effects likely cancel out.

to any successor entity, and to ensure that a building does not fully evade multiple years' worth of compliance obligations through bankruptcy.[297]

The Study assumed the annual compliance period in LL97 and did not model the implications of a multi-year compliance period. Changing the compliance period would require amending LL97.

g. Penalties

Recommendations: Ensure that material misstatements in any submissions relating to market participation are penalized. Consider requiring the submission of additional credits as a penalty for excess emissions.

LL97 currently provides for a maximum penalty of $268 per metric ton of extra emission that the building reports. LL97 also sets penalties for "knowingly" making a "material false statement in a report or other submission."[298]

The City will need to consider whether these provisions—and any other existing legal authorities that could perhaps be applied to violations of LL97—provide adequate authority to set the necessary penalties. In particular, the City should consider whether and how it might require the submission of additional credits as a penalty for excess emissions, either instead of or in addition to any monetary penalties. The City should also consider whether and how it might penalize not just "knowing" materially false statements, but negligent false statements as well. And the City should clarify that material misstatements in any submissions to register for market participation or in any paperwork associated with participation in auctions or reporting secondary trades, as well as failure to provide timely updates on such submissions, can also constitute a violation.

Finally, the City should clarify liability in the event of a fraudulent or otherwise erroneous credit trade. Common approaches to assigning liability for the emissions in such circumstances is discussed above, in the section on Secondary Markets.

For proper compliance incentives, both the expected cost of underreporting (that is, the probability of detection multiplied by the fine for false reporting) and the fine for violating the emissions limit must be greater than the permit price.[299] Penalties can be a fixed amount or related to the allowance price. One approach is to combine a monetary penalty with an additional requirement to compensate for each ton of excess emissions by buying an extra—or multiple extra—allowances at market price.[300] Several existing market-based programs require the submission of multiple extra allowances as a penalty for non-

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[297] *See* In re La Paloma Generating, Co., et al., 2017 WL 5197116 (Bankr. D. Del. 2017), in which a Delaware judge found that following a bankruptcy, without very specific regulatory language (which California did not have in place at the time), the company did not have a successor obligation.

[298] N.Y.C. LOCAL LAW 97, § 28-320.6.3.

[299] However, "penalties that are unrealistically high may be counterproductive if authorities are reluctant to impose them." TIETENBERG, *supra* note 64, at 175.

[300] This approach bears some similarity to carryback or borrowing provisions, which essentially allow entities to submit additional allowances in the future to make up for past non-compliance. *See, e.g.*, 49 C.F.R. § 536.7 (carryback provisions under the CAFE market).

compliance, in addition to any fines or penalties assessed through administrative or judicial actions.[301] Those additional allowances assessed as a penalty can then either be returned to the auction, so as not to reduce the overall cap on emissions, or can be retired from the market,[302] so as to more than offset any environmental damage caused by the initial non-compliance.[303]

For example, under California's cap-and-trade program, all submissions[304] about account registration, account status, and compliance are made under penalty of perjury.[305] Excess emissions carry monetary penalties as well as a requirement to submit enough allowances to cover four times the excess emissions.[306] Any discrepancies, omissions, or misreporting that results in a *de minimis* underreporting of emissions (less than 5%) can be excused, but any material misstatements that results in a more substantial underreporting are strictly penalized, and reports can be retrospectively audited for up to 8 years.[307] The accounts of voluntary market participants can be suspended or revoked for violations, and the accounts of covered and opt-in entities can be restricted for violations.[308] California retains the right to impose additional penalties under its health and safety codes as well.[309] To date, California can boast a stellar compliance rate.[310]

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[301] For clean air markets, compliance requires one allowance to offset the excess emission, one allowance as a penalty, plus a discretionary civil penalty per ton per day. EVOLUTION MKTS., CROSS-STATE AIR POLLUTION RULE (CSAPR): 2015 REBOOT (2014), https://www.evomarkets.com/content/news/reports_4_report_file.pdf.

[302] CAL. CODE REGS. tit. 17, § 95857 (the compliance obligation for untimely surrender is four times the excess emissions, 3/4 of which will reenter the auction upon submission, so as not to reduce the overall cap).

[303] *See* TCI Model Rule, *supra* note 9, at 59 (indicating that the regulator shall "deduct . . . three times the number of . . . excess emissions"); *id.* at 7 (defining "deduction" as "permanent withdrawal . . . or retirement").

[304] California asserts jurisdiction over relevant persons by virtue of interacting with the trading program. CAL. CODE REGS. tit. 17, § 96010.

[305] CAL. CODE REGS. tit. 17, § 95832(d). Each submission concerning the account is submitted by an account representative on penalty of perjury.

[306] CAL. CODE REGS. tit. 17, § 95857: untimely surrender. Compliance obligation for untimely surrender is four times the excess emissions (3/4 of which will reenter the auction upon submission, so it doesn't reduce the overall cap). Failure to satisfy the obligation leads to penalties (§ 96014) on top of the obligation continuing. *See also* CAL. CODE REGS. tit. 17, § 96014 (separate violation for each compliance instrument that has not been surrendered; separate violation accrues every 45 days after end of untimely surrender period).

[307] CAL. CODE REGS. tit. 17, § 95802(a). "Material misstatement" shall have the same meaning as ascribed to it in section 95102(a) of MRR. CAL. CODE REGS. tit. 17, § 95102(a) ("Material misstatement" means any discrepancy, omission, or misreporting, or aggregation of the three, identified in the course of verification services that leads a verification team to believe that the total reported covered emissions (metric tons of CO2e) or reported covered product data contains errors greater than 5%, as applicable, in an emissions data report). CAL. CODE REGS. tit. 17, § 95858: if emissions are underreported by less than 5%, no further action taken. If emissions are underreported by more than 5%, determined by audit or other information within 8 years, then entity must surrender additional compliance instruments at next compliance event. *See also* CAL. CODE REGS. tit. 17, § 96014 (violation to submit any information that falsifies or conceals a material fact, makes any false statement or representation, knowingly uses any false document, or omits any material facts; "material fact" is any that could probably influence a decision).

[308] CAL. CODE REGS. tit. 17, § 96011.

[309] CAL. CODE REGS. tit. 17, § 96012 (any violation may be enjoined pursuant to health and safety code § 41513); CAL. CODE REGS. tit. 17, § 96013 (any violation (as specified in § 96014) may be penalized under health and safety code § 38580, factoring in criteria from § 42403(b)).

[310] TCI Webinar, *supra* note 215 (reporting 100% compliance at all seven compliance events held to date).

Similarly, under its RGGI program,[311] New York treats each excess ton as a separate violation,[312] and excess emissions require three times the deductions of allowances (and offset credits cannot be submitted to cover excess emissions).[313] The requirement to submit multiple additional allowances to cover excess emissions is in addition to any other fine or penalty for the same violation, and New York needs to wait for the resolution of administrative or judicial actions for fines before deducting additional allowances.[314] For the purposes of fines, each day of excess emissions can be a separate violation.[315]

In other regulatory markets, careful monitoring of emissions and clear, stiff penalties have contributed to high compliance rates. For example, the acid rain market is famous for its near 100% compliance rates, thanks to both its emissions tracking system and its penalty structure.[316] The program features a stiff and certain penalty of $2000 per excess ton (in 1990 dollars; the penalty is fixed to inflation), plus a requirement to submit a plan for how those excess emissions will be offset in future years.[317] By comparison, uncertainty about penalties and consequences in other regulatory markets has at times undermined market participation rates[318] and contributed to noncompliance.[319] Similarly, whereas lax penalties can lead to noncompliance in regulatory markets, strengthening penalties and publicizing enforcement may promote compliance.[320]

h. Retiring Credits

Recommendation: Allow regulated entities and non-regulated entities to purchase and retire credits.

As noted in Section 2 of Part II, one of the benefits of open participation rules for the market is that they allow public-minded groups or citizens to purchase and retire emission allowances, which can indirectly tighten the cap. This has often happened, for example, in the acid rain market, though the total number of allowances retired this way has typically not been substantial.[321] Similarly, if the resources exist, a

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[311] The TCI Model Rule has a similar structure. TCI Model Rule, *supra* note 9, at 59: for excess emissions, deduction of three times the number is required; plus additional fines or penalties. Each day and each metric ton is a separate violation. The pendency of any administrative or judicial action or challenge does not prevent the regulatory agency from initially requiring triple deductions for excess emissions. *Id* at 60.

[312] N.Y. COMP. CODES R. & REGS. tit. 6, § 242-1.5(c)(3)–(4)

[313] N.Y. COMP. CODES R. & REGS. tit. 6, §§ 242-1.5(d), 242-6.5(d).

[314] N.Y. COMP. CODES R. & REGS. tit. 6, § 242-6.5(d).

[315] *Id.*

[316] McAllister, *supra* note 163.

[317] JICKLING & PARKER, *supra* note 164, at 9.

[318] For example, the lack of clarity on penalties in EPA's vehicle emissions trading program—in which penalties could be as high as $37,500 per car, but uncertainty around variances remains—may have contributed to the initially low participation rates in that market. *See* LEARD & MCCONNELL, *supra* note 169.

[319] With the RECLAIM program, calculation errors, missing data, and uncertainty about consequences due to case-by-case sanction determinations contributed to initial noncompliance rates of 4–15%. McAllister, *supra* note 163.

[320] In the lead phase-down program, the strong incentive to bank allowances in the early years may have contributed to initial noncompliance. Increased audits and stiffer penalties in subsequent year—as well as publicizing those enforcements—helped deter additional violations and brought the program into compliance. TIETENBERG, *supra* note 64, at 179, 181.

[321] TIETENBERG, *supra* note 64.

regulator itself could purchase and retire allowances off the market.[322] Auction revenue could in theory be channeled toward such a purpose, though there are also many other ways to invest the revenue from an auction back in to clean energy and energy efficiency projects that would further advance the City's objectives, and under Proposal #1, auction revenue would be used to finance retrofits in buildings in EJCs.

8. Implementing Proposal #2 versus Proposal #1

Based on direction received from MOC&S, this plan focuses on the steps required to implement Proposal #1. Many of the same tasks required to implement Proposal #1 would also have to be undertaken to implement Proposal #2. However, two key features of the implementation of a trading program would differ if Proposal #2 were implemented rather than Proposal #1: initial credit allocation and environmental justice policies.

In general, Proposal #2 avoids several significant implementation steps that are required for Proposal #1 (such as allocating credits to all buildings and running an auction) and would therefore be simpler for the City to implement. However, the steps the City would take to facilitate the development of a secondary market may be more important in Proposal #2 because there would be no auction to send a price signal.

In addition, Proposal #2 assumes that the City accelerates the phase out of fuel oil #4.[323]

Initial Credit Allocation

If Proposal #2 were implemented, the City would neither explicitly allocate credits to all buildings each year for free nor auction them off. Because there would be no auctions, the City would not need to seek State legislation to minimize the legal risk of implementing an auction (as the City may want to do under Proposal #1). It also would not need to go through the process of developing an auction or contracting with a third party to do so.

Under Proposal #2, covered buildings would choose whether to generate credits. Buildings choosing to do so would generate credits by emitting less than either their 2018 emissions (adjusted for electricity grid decarbonization after 2029) or their LL97 building emissions limits, whichever is more stringent. Buildings that can comply with their LL97 limits and wish to avoid the learning curve and transaction costs of participating in the trading market need not enter the market, even if they could otherwise generate excess credits for sale.

The same concerns that have been raised about the accuracy of buildings' self-reported data for 2018 emissions that are discussed in Part II, Section 1(a)(iv) in relation to setting the baseline for allocation of credits under Proposal #1 also would need to be addressed in implementing Proposal #2. However, the number of buildings for which these concerns might need to be addressed might be smaller under

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[322] PROJECT ON ALTERNATIVE REGULATION, MARKETABLE RIGHTS: A PRACTICAL GUIDE TO THE USE OF MARKETABLE RIGHTS AS A REGULATORY ALTERNATIVE 6 (1981). Directing auction revenue toward such purposes may require specific legal authority.

[323] Alternatively, the City could implement another policy to avoid a small increase in NO_x emissions in EJCs in the first compliance period, such as a targeted program to subsidize fuel switching from fuel oil #4 to fuel oil #2 in approximately 60 properties in EJCs. The Study did not model Proposal #2 with the alternative of a targeted subsidy program.

Proposal #2, because it would only be necessary to define baselines for those buildings that are interested in generating credits, instead of needing to set baselines for all buildings as under Proposal #1.[324] The administrative costs of the City or its third-party contractor could be lower if fewer buildings choose to generate credits under Proposal #2 than would be allocated credits under #1.

However, the steps that the City would take to facilitate the development of a secondary market may be more important in Proposal #2 because there would be no auction to send a price signal. Without an auction to offer credits for sale on a level playing field open to all covered buildings, the secondary marketplace will be relatively more important. It may be challenging for smaller or less sophisticated buildings that need to purchase credits, or that want to sell credits, to navigate the secondary marketplace, especially without the price signals that would come from an auction. Thus, the steps that this plan recommends that the City or third-party contractor undertake to facilitate a secondary market, such as publishing information about credit transactions to support price discovery and helping smaller less sophisticated entities to navigate the market, may take on added significance under Proposal #2.

Environmental Justice Policies

The City would not necessarily need to define EJCs to implement Proposal #2, because there would be no difference between the way credits would be generated for buildings in EJCs and non-EJCs, and there would not be auction proceeds to fund retrofits in EJCs. It would still be important for the City to have a way to monitor the environmental justice impacts of trading and so the City would need to develop protocols for tracking these impacts. However, so long as the City is only identifying EJCs for the purpose of gathering information about program impacts and not for the purpose of varying program benefits (e.g., by distributing more credits to buildings in certain areas for free), the definition should be subject to less legal scrutiny.

As under Proposal #1, Section 321 and NYCHA buildings could opt into a trading program under Proposal #2, but the mechanism through which they would obtain credits would be slightly different. While under Proposal #1 the City would explicitly allocate credits to these buildings up to a baseline, under Proposal #2 these buildings would generate credits by reducing below that baseline.

Proposal #2 assumes that the City moves forward with an accelerated phase out of fuel oil #4 under the Clean Heat Law to avoid any increase in NO_x emissions in EJCs in the first compliance period compared with LL97 without a trading program.[325]

The City would not implement a program to fund retrofits in EJCs under Proposal #2 because, as already mentioned, there would not be an auction to fund such a program.

[324] Recall that in implementing Proposal #1, the City would explicitly allocate credits to all buildings up to the lesser of their 2018 emissions or LL97 emission limits. (Non-EJC buildings would get credits equaling only 70% of the lesser of their 2018 emissions or LL97 emissions limits.).

[325] Alternatively, the City could pursue another policy to avoid a small increase in NO_x emissions in EJCs in the first compliance period compared with LL97 as is, such as a targeted program to subsidize fuel switching from fuel oil #4 to fuel oil #2 in approximately 60 properties in EJCs. The Study did not model Proposal #2 with a targeted subsidy program.

Part III – Additional Implementation Steps

This Part reviews the timeline for when the City should take action to implement the trading program, provides information for developing a budget to implement the program, and provides guidance on conducting periodic reviews and stakeholder outreach.

1. Budget

This section reviews the costs associated with some precedent emissions trading systems and suggests takeaways for the City to consider in developing a developing a budget to implement a trading program. The section also touches on the sources and uses of revenues associated with emissions trading systems. However, it is important to note that many aspects of New York City's contemplated trading system—namely the potential number of market participants and the specific combination of certain market design elements (e.g. price floors, banking, etc.)—are *sui generis*. It is therefore impossible to use precedent systems to estimate the precise cost of establishing and operating Proposal #1. Finally, this section contemplates the costs the market poses to participants, which lie outside the scope of costs to the City yet still potentially influence market performance.

This section will generally frame market costs in terms of their **frequency of occurrence**—onetime, ongoing, or ad hoc—and the associated **function**—regulatory, administrative and technical, or verification.

- **Onetime functions** including initial regulatory design and rulemaking, the development of a registry for credits, and establishing a baseline for the allocation of credits over time, will require onetime upfront investments.
- **Ongoing continuous functions**, as well as functions that must be executed predictably (e.g., quarterly auctions, annual reporting) can be considered ongoing investments. Continuous and especially frequent activities such as registry maintenance, market monitoring, and information technology might require steady outlays year after year. Periodic or occasional functions—such as periodic program evaluation, or market regulatory adjustments at the end of the first, second, and third compliance periods—can be anticipated in advance but will not involve steady, yearly costs.
- **Ad hoc functions**, such as the enforcement of penalties for fraud or misconduct, or the training and technical assistance for building owners (which will depend on how many and what type of owners decide to participate and opt into the market over time), are more difficult to predict but are likely to occur, especially in years where there is high market participation.

Table 19. Market oversight and administration functions, in the context of budgeting

Budget Category	Frequency	Regulatory Functions	Administrative and Technical Functions	Verification Functions
Onetime investments	***Onetime***	Rulemaking to establish trading program	Registry Development	
Ongoing investments *Costs that may be relatively straightforward to budget on an annual or multi-year basis (after system setup and stabilization).*	***Ongoing Continuous***		Registry Maintenance Trader registration Market monitoring Contractor management Transaction management[326] Assessment, collection of fees and penalties* Information technology (web hosting, servers, troubleshooting, etc.)	
	Ongoing Periodic	Adjustments to baselines for allocating credits (for example, as LL97 limits increase and the electricity grid decarbonizes) Adjustments to trading rules	Auction administration Audit, fraud monitoring, compliance monitoring* Market balancing operations (e.g. banking, price floors) Reporting on market indicators and outcomes	Emissions verification* Verification of participants
Ad Hoc Costs *Costs that are difficult to predict and budget on a regular basis.*	***Ongoing Ad Hoc***		Administration of enforcement rules Building owner training and technical assistance	Verification of adjusted emissions baselines for buildings that substantially change occupancy type

**Asterisked actions will be required to implement LL97 even if a trading system is not implemented.*

a. Budget Case Studies

This section of the plan revisits the precedent systems introduced in Part I—RGGI, the California's cap-and-trade program, the Tokyo ETS, and Italy's Energy Efficiency Certificates (TEE) scheme—to walk through available information on precedent ***costs*** and ***revenues***.

Precedent #1: The Regional Greenhouse Gas Initiative (RGGI). RGGI regulates the emissions of 203 entities across 11 member states.[327] All market administration and oversight costs associated RGGI can be sorted into regulatory, administrative and technical, and verification-related categories.

Regulatory costs are difficult to parse because the 11 RGGI member states undertake the necessary rulemaking activities to implement the program, based on the model RGGI rule. Thus, a considerable amount of the staff time involved in translating the model RGGI rule into legal requirements is likely borne at the state level. RGGI is governed by a board of directors consisting of two directors from each RGGI member state that oversee the market regulatory functions outlined above. Board members are *ex officio*, holding their titles by virtue of their state-level appointments, and they are not separately compensated for their board responsibilities.

Administrative and technical market function costs are routed through RGGI, Inc., created in 2007. RGGI, Inc. tax filings, including annual 990s and CHAR500s, detail year-to-year expenditures on specific market functions as well as other operating costs:

- **Upfront costs.** In 2008, its first year of full operation, RGGI, Inc. incurred third-party costs related to "development and execution of auction platforms for allowances" and the completion of two auctions, development of "a database, user guide, and public reporting capability to track emissions and allowance transfers occurring in participating states," and development of "techniques to monitor carbon dioxide allowance market activity" and the execution of two market monitoring reports.[328] Compared to ongoing expenditures (below), upfront costs associated with system development were not significant.
- **Ongoing costs.** Between 2008 and 2019, RGGI, Inc. paid between 6 and 8 internal staff, including an executive director, during any given year. RGGI, Inc. incurred costs ranging from $1.5M to $2.2M per year. Annual costs associated with administrative and technical functions are largely stable over time. A contract with World Energy Solutions, Inc. (owned by Enel X) orders four auctions per year for a relatively stable fee ranging from $317K-$420K per year. In addition, market monitoring services provided by Potomac Economics cost similar amounts year-to-year, producing one annual market monitor report, four quarterly auction reports, and four quarterly reports on secondary market

[326] "Transaction management" includes financial administration services to support auctions or bilateral trading, such as guaranteeing payments, facilitating currency exchange, and providing escrow services to settle auctions and facilitate pre-auction/reserve sales.

[327] INT'L CARBON ACTION PARTNERSHIP, USA - REGIONAL GREENHOUSE GAS INITIATIVE (RGGI), https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=50 (last updated May 18, 2021).

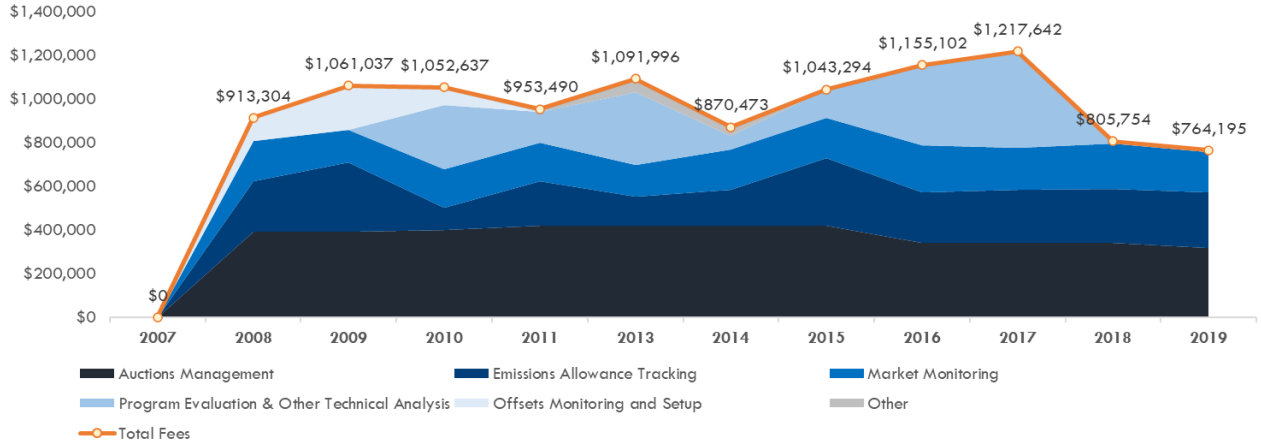
[328] 2008 IRS Form 990, *available at RGGI, Inc. Documents,* REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/rggi-inc/documents.

activities per year.[329] Costs associated with emissions credit tracking and management of the RGGI CO2 Allowance Tracking System (COATS) are more variable year-to-year.[330]

- **Ad hoc costs.** The only significant ad hoc cost RGGI, Inc. has incurred was related to program evaluation services provided by ICF International, amounting to $1.77M in total from 2010 to 2019. These costs were highly uneven. They peaked in 2013 and 2017,[331] which corresponds to the completion of major program reviews in February 2013 and December 2017, each of which resulted in substantive modifications to the RGGI Model Rule—the corpus of rules that specify market oversight and administration.[332]

Verification function costs are largely the burden of the EPA and individual polluters participating in RGGI**.** Polluters also bear the burden of paying for the verification of offsets by submitting periodic offsets verification reporting to RGGI COATS. RGGI, Inc. invested about $370,000 upfront in offsets monitoring and setup in 2008–2010. Ongoing costs associated with tracking verified offsets are generally encompassed in base "emissions allowance tracking" costs.

Figure 1. RGGI, Inc. annual expenditures on third-party functions (2007–2019)



[329] *Document Library,* POTOMAC ECON., https://www.potomaceconomics.com/document-library/page/3/?filtermarket=RGGI.

[330] 2008–2019 990s, *available at RGGI, Inc. Documents,* REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/rggi-inc/documents.

[331] *Id.*

[332] *Model Rule and MOU Versions,* REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/program-overview-and-design/design-archive/mou-model-rule.

Table 20. RGGI, Inc. (stabilized) annual expenditures 2018, 2019[333]

Cost Item	Description	2018	2019
Total Personnel Costs	1 Executive Director, 5 full-time staff	**$785,568**	**$735,065**
Third-Party Consulting/Contracting			
Auctions Management	World Energy Solutions, Inc. (Enel X)	$340,000	$317,500
Emissions Allowance Tracking	SRA International, Inc.	$246,730	$254,324
Market Monitoring	Potomac Economics, Ltd.	$208,506	$184,125
Program Eval. & Other Tech. Analysis	ICF Resources	$7,984	$7,056
Offsets Monitoring and Setup	ICF Resources	$0	$0
Other		$2,534	$1,190
Subtotal: Third-Party Contracting		**$805,754**	**$764,195**
Other Professional Services	Legal, accounting, payroll, IT, etc.	**$153,123**	**$129,539**
Other Operating Expenses	Office rent & expenses, travel, etc.	**$102,182**	**$94,835**
		$1,846,627	**$1,723,634**

With respect to RGGI revenues, RGGI-related state energy investments and RGGI, Inc. have drawn on two sources of revenue to support regulatory as well as market administrative and technical functions: public-sector starter grants, and annual member state contributions that are largely supported by annual auction revenues.

From 2007 to 2009, RGGI, Inc. received about $11,800 from the NYS Department of Environmental Conservation (DEC) to support legal filing costs and just over $800,000 in startup funding from the New York State Energy Research and Development Authority (NYSERDA) to front administrative, legal, and technical setup costs. (The original agreement allowed RGGI, Inc. to receive up to $3.0M in its first 18 months of operation in consideration for the corporation locating its headquarters in New York State.)[334]

Otherwise, state-level auction revenues far exceed the ongoing costs of market oversight and administration. RGGI states have individual discretion about how to invest auction proceeds. Since 2008, states as a whole have pledged only 1% of auction proceeds to RGGI, Inc. and another 5% of auction proceeds to state-level administrative costs.[335] The balance of auction proceeds support energy efficiency, clean and renewable energy, GHG abatement, and direct bill assistance investments under the purview of each state. State contributions to RGGI, Inc net out the corporation's operating costs. The only "profit" RGGI, Inc. records year-to-year is investment income.

[333] Detailed third-party consulting/contracting costs since 2007 are available in the Appendix.

[334] 2008 NYS CHAR 500, *available at RGGI, Inc. Documents,* REGIONAL GREENHOUSE GAS INITIATIVE, https://www.rggi.org/rggi-inc/documents.

[335] REGIONAL GREENHOUSE GAS INITIATIVE, THE INVESTMENT OF RGGI PROCEEDS IN 2018 (2020), https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2018.pdf.

Precedent #2: California Cap-and-Trade. Market administration and oversight costs associated with California's cap-and-trade program likewise fall into regulatory, administrative/technical, and verification categories.

Regulatory costs are again difficult to understand in detail due to a lack of granular data on the precise annual expenditures of CARB in terms of FTEs and discrete cap-and-trade program activities.[336] Apart from CARB, the Western Climate Initiative, Inc. (WCI, Inc.) is overseen by a board of *ex officio* directors from government offices of California, Quebec, and Nova Scotia, who are not directly compensated for their time on the board.

Administrative and technical market functions are allocated between CARB and the Western Climate Initiative, Inc. (WCI, Inc.). As stated above, CARB is responsible for a number of resource-intensive functions: overseeing auctions handled by WCI, Inc. (see below), posting public information such as annual greenhouse gas emissions reporting, registering accounts for new trading entities on an ongoing basis, and periodically monitoring the connections and potential conflicts among trading entities. Although granular budget data by CARB program is not available publicly, these activities do clearly require dedicated FTEs. Multiple staff across various CARB divisions—such as the Air Quality Planning and Science Division, the Enforcement Division, and the Information Services Division—are likely involved at least part-time in supporting administrative and technical functions for the California cap-and-trade program.

For those functions executed or paid for by WCI, Inc, filings and procurement records offer detail on year-to-year expenditures on these specific functions and other operating costs.

- **Upfront costs.** In 2012, its first year of real operation, WCI, Inc. paid contractor SRA International $473,212 to host and develop a carbon credit tracking system. They paid ICF International $111,160 to establish a help desk for participating polluters. These combined upfront costs are notably lower than the year-to-year stabilized operating costs incurred by the market in later years (below).
- **Ongoing costs.** The majority of WCI's subcontracted costs (over 80%) (and possibly a significant portion of CARB's administrative costs) are associated with maintenance of the California cap-and-trade program's credit registry, the Compliance Instrument Tracking System Service (CITSS). SRA International administers the CITSS, and IHS Markit Group handles quarterly auctions—with oversight from both CARB and WCI, Inc. The costs for these contracted services varied significantly over time, hitting a peak in 2017 ($3.2M) before subsiding through 2019. Financial administration and transaction management services for reserve sales are handled by Deutsche Bank for variable annual fees between $160K-$420K. Market monitoring services provided by the firm Monitoring Analytics are relatively consistent year-to-year at about $70K/year.

[336] As stated above, CARB oversees auctions handled by WCI, Inc., posts public information such as annual greenhouse gas emissions reporting and other market data, handles the relatively labor-intensive process of registering accounts for new trading entities on an ongoing basis, and periodically reviews the affiliations and conflicts and potential conflicts among trading entities.

It is important to note that WCI, Inc. rebid contracts with SRA International and IHS Markit multiple times between 2012 and 2019, which may help explain the high level of year-to-year variation in the cost of their contracted services.

- **Ad hoc costs.** WCI, Inc. has incurred two, related major ad hoc costs, $198,181 associated with a system audit in 2017–2018 and $371,744 related to technology and information systems advisory services in 2019. The system audit, completed by Gelder, Gingras & Associates, uncovered opportunities to improve processes and systems that support registration, credit tracking, and compliance functions of the cap-and-trade program.[337] The subsequent contract, awarded to KAI Partners, built on the findings of the system audit to evaluate information technology improvements across all functions of the cap-and-trade program.[338]

Verification costs are born by CARB, which administers the California Electronic Greenhouse Gas Reporting Tool (Cal e-GGRT) and runs an accreditation and training program for third parties that verify emissions for participating facilities**.**

Table 21. WCI, Inc. annual expenditures 2018–2019[339]

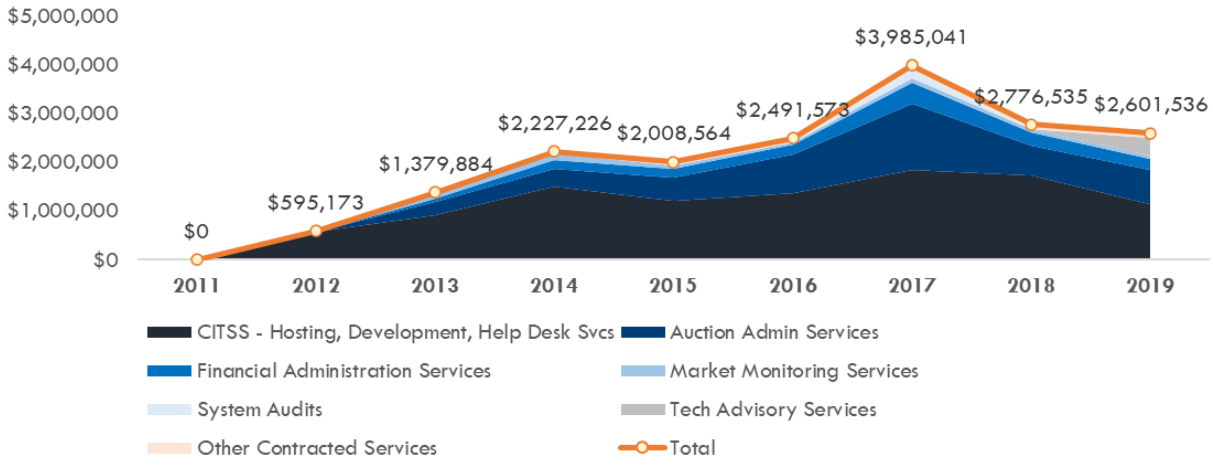
Cost Item	Description	2018	2019
Total Personnel Costs	1 Exec Director, ~6 full-time staff	$636,385	$648,983
Third-Party Consulting/Contracting			
CITSS – Development & Help Desk	SRA International; ICF International	$1,733,213	$1,133,789
Auction Admin Services	IHS Markit Group	$618,867	$705,068
Financial Administration Services	Deutsche Bank	$257,050	$231,300
Market Monitoring Services	Monitoring Analytics	$60,385	$62,483
System Audits	Gelder, Gingras & Associates	$15,259	$0
Tech Advisory Services	KAI Partners	$0	$371,744
Other Contracted Services	*Various*	$91,761	$97,152
Subtotal: Third-Party Contracting		**$2,776,535**	**$2,601,536**
Other Professional Services	Legal, accounting, payroll, IT, etc.	**$205,861**	**$163,935**
Other Operating Expenses	Office rent & expenses, travel, etc.	**$186,172**	**$174,598**
		$3,804,953	**$3,589,052**

[337] WCI, INC., CITSS INFORMATION TECHNOLOGY ASSESSMENT (June 28, 2017), https://wcitestbucket.s3.us-east-2.amazonaws.com/amazon-s3-bucket/documents/en/contracts-and-procurements/contract-citssassessment-20170621-en_redacted.pdf.

[338] WCI, INC., STANDARD AGREEMENT: ENTERPRISE ARCHITECTURE SERVICES (2018), https://wcitestbucket.s3.us-east-2.amazonaws.com/amazon-s3-bucket/documents/contract-kaipartnersenterprisearchitectureservices-20181011-en_redacted.pdf.

[339] Detailed third-party consulting/contracting costs since 2011 are available in the Appendix.

Figure 2. WCI, Inc. annual expenditures on third-party functions (2011–2019)



With regard to revenues, CARB's activities are generally funded by state appropriations from the general fund and other special funds. The non-profit WCI, Inc. draws all its revenue from the participating jurisdictions of California, Nova Scotia, and Quebec. It allocates the costs of auctions, registry maintenance, other technical functions, and personnel and other direct costs on a pro rata basis to each jurisdiction based on each jurisdiction's use of said functions.[340]

In terms of the uses of cap-and-trade auction proceeds, California's auction revenue flows into the Greenhouse Gas Reduction Fund (GGRF), which the state uses to fund a variety of continuous appropriations (e.g. high-speed rail, affordable housing), administrative commitments, backfilling revenue shortages, and a wide variety of discretionary spending priorities. Auction proceeds have been highly variable since 2012.[341] However, they have exceeded the annual costs of regulatory and administrative and technical functions by multiple orders of magnitude during every year of market operation.

Precedent #3: The Tokyo Emissions Trading System (ETS). The costs associated with the Tokyo ETS are driven by both internal oversight by the TMG and outsourced administrative and oversight functions. While Tokyo's actual expenditures to start and maintain the program are confidential, the number of internal and external staff required to run the program is a helpful proxy for cost.[342]

Regulatory function costs include internal staff time for oversight of the entire program, which is managed by 5 internal staff.

Administrative and technical market functions are outsourced to two "help desks," one which largely manages administrative functions for the program, including annual reports, technical advice, and general questions, and the second which is dedicated to emissions trading, including data input, trade questions,

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[340] WCI, INC., 2021 BUDGET AND PROJECTIONS FOR 2022 (2020), https://wcitestbucket.s3.us-east-2.amazonaws.com/amazon-s3-bucket/documents/budget-2021andexpenses2022-20201021-en.pdf.

[341] CAL. AIR RESOURCES BD., CALIFORNIA CAP-AND-TRADE PROGRAM: SUMMARY OF PROCEEDS TO CALIFORNIA AND CONSIGNING ENTITIES (2021), https://ww2.arb.ca.gov/sites/default/files/2020-09/proceeds_summary.pdf.

[342] Information regarding the staff required to set up and operate the program was provided by Tokyo Cap and Trade Program Director Satoshi Chida.

and managing questions for account holders. The first help desk includes 20–30 staff and the second is run by 2–4 staff, although these numbers vary by trade volume each year.

- **Upfront costs** included the development of an electronic registry system, which was built (and continues to be maintained) by a third party. The upfront and year 1 costs to establish the call centers and process applicants were similar to the ongoing operational costs of paying for the call centers to manage the administrative and technical market functions each year.
- **Ongoing costs** include administrative costs, trading support and operations, evaluation and compliance, and registry system maintenance. As described above, these functions are primarily managed by the help desk using a total of 20–34 staff each year. However, the TMG internal staff dedicated to the trading program are responsible for overall oversight and the final approval of all functions.

With respect to revenues, TMG executes auctions only occasionally. Therefore, the majority of system-related revenues originate from account creation fees, credit authentication fees, and fines for non-compliance. These revenues do not come close to accounting for the full costs of the cap-and-trade system.[343]

Precedent #4: Italy's Energy Efficiency Certificates (TEE) scheme. Like in Tokyo, the costs to run Italy's TEE scheme are not publicly available; however, the number of individuals needed to run each aspect of the program is a helpful proxy for understanding startup and operating costs.[344]

Regulatory function costs are primarily incurred in-house, as GSE manages the program and GME (fully owned by GSE) manages the TEE exchange. GSE does award responsibilities to third parties depending on the size of the program. However, TEE is primarily managed in-house at time of writing. The internal staff needed to manage the program has changed as market activity has fluctuated over time.

Administrative and technical market functions of the exchange have also been managed by GSE and GME, with some technical assistance from the energy authority (ARERA). The primary administrative and technical functions are regulation, oversight, and management of applicants admitted to the market, management of the Market Information System, management of trading sessions, and verification of compliance.[345]

- **Upfront Costs** were composed of the establishment of the Market Information System and the staff required to manage the program (3 people from ARERA originally managed the program).
- **Ongoing Costs** have fluctuated significantly based on the GSE and GME staff required to run the program and the exchange. As they took on the evaluation process, these public companies were able to run it with about 15–20 full-time individuals, including administrative functions. At its peak, 15,000 proposals per year required 40–50 individuals for technical evaluation.

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[343] Email Interview with Satoshi Chida, Director of Tokyo Cap and Trade Program (Mar. 12, 2021).

[344] Information regarding staffing, costs, and revenue for the TEE (WhC) program was provided by the Italian Federation for Energy Efficiency.

[345] GESTORE MERCATI ENERGETICI, RULES OF OPERATION OF THE ENERGY EFFICIENCY CERTIFICATES (WHITE CERTIFICATES) MARKET (2018), https://www.mercatoelettrico.org/En/MenuBiblioteca/Documenti/20180215RegoleTEE_en.pdf.

With respect to revenues, GSE is funded in part by fees collected as part of their TEE market services as well as through subsidies from the national government. It is not apparent to what extent fees alone are able to account for ongoing market operating costs.

b. Costs for market participants

Although outside the scope of costs to the City, it is important to consider the administrative and transaction costs borne by buildings owners as well. If these costs are high, it would discourage participation, especially among smaller buildings, and decrease the economic efficiency of the market. For the purposes of this section, discussion is restricted to additional costs above and beyond those that would be incurred under LL97 without trading.

To date, precedent emissions trading programs have entailed manageable administrative and transaction costs compared to the scale of credits and penalties. The EPA's federal Acid Rain Program involved transaction costs that equaled only 0.1% of the cost of a credit.[346] That said, an emissions trading program under LL97 could pose some unique challenges because the program would not only cover large entities, as other trading programs have, but also smaller buildings, which typically have fewer resources and less capacity than larger entities. And while the administrative burden and sophistication required to participate regularly in credit auctions, effectively identify opportunities for advantageous trades, or bank credits would be negligible for large real estate owners, they could be challenging for less sophisticated participants, such as the owners of a multifamily condo building. Indeed, one of the advantages of Proposal #2 is that buildings can choose not to participate in a trading program at all. However, under Proposal #1 (and #2), market participants such as aggregators might also emerge to facilitate small buildings' participation in the trading market, as we have seen in other contexts such as demand response markets. Moreover, the City might consider offering expanded levels of technical assistance to support certain low-capacity buildings.

Overall, it is important to note that market participation costs would almost certainly pale in comparison to the cost of penalties for entities that exceed their annual emissions caps and must pay a penalty for non-compliance.

c. Takeaways and Conclusions

Cost Structures

New York City can follow the lead of precedent U.S. systems in the way it categorizes and bids out third-party technical and administrative functions, although the actual startup and operating costs associated with each category will vary. The case study programs bundled many of the same third-party market functions into specific contracts. Specifically, RGGI and California's cap-and-trade program treated (a) development and maintenance of a credit tracking system, (b) handling of auctions, (c) execution of market monitoring, and (d) performance of program audits/evaluations as separate and independent contracted functions—in California's case, with substantial oversight and administrative support from CARB. New York City can likely budget out and procure these services discretely as well. That said, RGGI

[346] Sam Napolitano, et al., *The U.S. Acid Rain Program: Key Insights from the Design, Operation, and Assessment of a Cap-and-Trade Program*, 20 ELECTRICITY J. 47, 51 (2007).

and California's cap-and-trade program, show significant variation in the actual year-to-year costs associated with subcontracted registry maintenance, auctions, and associated financial services. Since 2014, California's subcontracted costs ranged from $2.2-$4.0M, and RGGI's subcontracted costs ranged from $0.8M-$1.2M.

Costs associated with internal direct staffing could remain low for New York City if the City outsourced the majority of functions to third parties. The decision to outsource substantial technical and administrative market functions to third-party contractors allowed RGGI governments and RGGI, Inc. non-profit operations to remain quite lean, which could be the case for New York City as well if it decides to outsource nearly all aspects of administrative and technical market support. In the case of California's cap-and-trade program, the Tokyo ETS, and Italy's TEE scheme, Internal (Public/Non-profit) staffing levels were higher because the cities/states subcontracted out relatively few market functions.

The City could also scale internal staffing resources over time to accommodate the volume of credits as needed. Tokyo and Italy both relied on additional external technical support early on with a leaner internal staff and adapted the number of internal staff over time both in response to internal capacity-building and also fluctuations in the number of market participants each year.

Building owners will have to bear the costs of emissions verification with or without a trading system, but verification costs will likely increase under a trading system. LL97 already requires independent, third-party verification of buildings' emissions compared to their building emission caps under LL97.[347] However, under a trading program, it is possible that reporting would have to take place more frequently—such as monthly or quarterly instead of annually, in order for the market to have access to the information it needs on the overall supply and demand for credits. Any increase in reporting frequency would likely introduce additional participation costs for covered building owners.

It is possible the City could save some startup and operation costs by disallowing offsets. The illustrative market proposals that the study has developed do not allow offsets. Thus, implementing either of these proposals would avoid the need for DOB to develop rules for offsets and to monitor the use of offsets, possibly generating a cost savings (LL97 as is allows offsets with limits). It is difficult to disentangle the costs of overseeing offsets from the costs of credit verification and tracking in precedent systems such as California's cap-and-trade program and RGGI, but they are not negligible. RGGI, Inc. reported spending at least $370,536 on "offsets monitoring and setup" in the first three years of RGGI operation. And it is possible ongoing offset monitoring costs continued but that RGGI, Inc. reported them under a different expense category (e.g. "emissions allowance tracking") after 2010 (See *Appendix: Budget Detail for RGGI and WRI*).

NYC's trading program would include a far greater number of market participants than precedent systems, suggesting that ongoing administrative and technical costs could far exceed those mentioned

[347] *See* N.Y.C. LOCAL LAW 97, § 28-320.3.7.

in the implementation plan. As stated above, RGGI regulates about 200 entities.[348] California's cap-and-trade program regulates about 450 entities.[349] The Tokyo ETS, which is the only precedent that is urban in scale and regulates large buildings, covers about 1,300 facilities. In comparison, Section 320 of LL97 alone covers over 11,000 properties. Therefore, although initial program setup costs might be comparable in scale to those of precedent systems, it is possible that the sheer number of covered building owners would substantially escalate ongoing costs related to training and technical assistance, market monitoring, registry maintenance, auctions, and other activities.

New York City might expect to incur varied operating costs year to year, especially in initial years as building owners determine their compliance strategies. As building owners decide whether and how they intend to participate in auctions, the price of administering auctions might understandably fluctuate. However, in later years, owner behavior might stabilize, making certain technical or administrative costs more predictable over time. Apart from building owner behavior, major market changes could lead to short-term volatility in operating costs. The substantial increase in the pool of participating buildings—as through a large number of buildings opting into a trading program —could increase the City's management and oversight costs. The end of one compliance period and the beginning of another might also prompt a spree of trading activity among buildings given the new emissions caps in force.

Among precedent systems with year-to-year cost information available, it is possible that annual variation had to do with fluctuations in the number of entities participating in trading or with occasional, large expenditures on program evaluation contracts. In RGGI, market registry maintenance costs (for RGGI COATS) were relatively volatile, although RGGI's agreement with World Energy Solutions (Enel X) minimized volatility in the cost of quarterly auctions. California's cap-and-trade program, on the other hand, incurred highly volatile technical and administration costs nearly across the board, including registry, auction, and financial administrative services costs. There could be a variety of reasons for this volatility, including expansions or contractions in the number of entities participating in trading—e.g. new states joining RGGI, plants coming online or offline in California or among any of the RGGI states, etc. In addition, both programs incurred highly specific costs—for obvious reasons—when it came time to evaluate program operations or the performance of internal information systems.

Sources of Funding for Implementation

New York City could request non-City government funding during its initial start-up years. Other programs' technical and administrative startup costs were paid for by state-related government grants (NYSERDA for RGGI, Inc.; CARB for WCI, Inc.) before it was possible to generate revenues via auctions or fees. New York City might expect to allocate or request startup funds to support any carbon trading system for up to 2–3 years of initial setup and operation until revenues associated with auctions and trading begin to account for a growing share of system revenues. In particular, a concerted and credible strategy to

[348] INT'L CARBON ACTION PARTNERSHIP, USA - REGIONAL GREENHOUSE GAS INITIATIVE (RGGI), https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=50 (last updated May 18, 2021).

[349] CAL. AIR RESOURCES BD., OVERVIEW OF ARB EMISSIONS TRADING PROGRAM (2015), https://ww2.arb.ca.gov/sites/default/files/classic//cc/capandtrade/guidance/cap_trade_overview.pdf.

generate benefits for EJCs through the carbon trading system might satisfy the requirements of significant New York State or other government funding.

Periodic auction proceeds could serve as a source of revenue that could potentially exceed system operation costs depending on demand and auction pricing. After system stabilization, which occurred within one year in U.S. case studies above, auction proceeds far exceeded the costs of program operation. New York City, depending on trading volume and auction pricing, could quickly yield revenues from the carbon trading system, which could account for public-sector and non-profit management costs, third-party contracted costs, and other City priorities—including those that align with delivering energy efficiency to EJCs. However, for policy reasons, it might be difficult for the City to specifically earmark auction revenues to cover the costs of running a trading market.

Other market revenue sources will probably not yield substantial additional revenue, but they are an opportunity to incentivize efficient market behavior. Based on precedent markets, the City should not expect to achieve substantial proceeds from alterative revenue sources, such as user charges, transaction fees, charges for opening accounts, or fines for non-compliance. Notably, these revenue sources were nominal or non-existent in RGGI and the California cap-and-trade markets. In the Tokyo ETS, which makes sparing use of auctions, the Tokyo Metropolitan Government levies a combination of minimal registration fees, moderate credit certification fees, and fines that can be quite onerous (at least greater than the price of permits at any given time). However, this suite of charges and penalties does not come close to accounting for the total costs of market operation. Given that LL97 authorizes DOB to set fees for filing reports, it is conceivable that this authority might be expanded under legislation needed to implement a trading program in order to allow fees to cover some of the costs to administer a trading program.

Fees and penalties can still play an important role in efficient market operation if designed thoughtfully. In general, user charges such as transaction fees and application fees should minimize the burden on covered buildings and opt-in buildings in order to incentivize full participation in the market, though separate fees could be set for non-regulated market participants such as financial entities. Fees to make trades or participate in auctions should be nominal or nonexistent in order to maintain the appeal of credits as a liquid asset and sustain market integrity, though again different fee schedules could be set for buildings versus non-regulated market participants. Penalties for non-compliance, fraudulent behavior, or negligent reporting should be stringent and significantly higher than the value of permits; rather than viewed as a source of revenue, these penalties should guide market actors to invest in energy conservation measures or participate in the carbon trading system.

Private sector funding. The City could explore whether one or more financial institutions would be interested in developing an exchange for trading carbon credits as a business development opportunity.

The potential variability of annual operating costs, coupled with the potential variability of auction revenues, suggests New York City should diversify revenue streams for operating the carbon trading market. Ideally, New York City would be able to rely entirely on auction proceeds to fund program operations. However, both barriers to earmarking auction funds and variability in auction proceeds year over year suggest that the City will likely need to identify other funding sources. If auction proceeds are low for a given period, New York City could benefit from a relatively stable source of funding—besides user charges and penalties—that would sustain a basic level of system operations. Relatedly, the City's

contracts to third parties might have to pledge a minimum amount of revenue to contractors that oversee the market registry and quarterly auctions in order to reduce those third parties' private financial risk. Therefore, an alternative, minimum source of funding would likely come from a public source, although the City could potentially decline use of this funding during periods with sufficiently high system revenues.

2. Timeline for Implementation

This section briefly outlines a potential, high-level timeline for implementation based on the implementation of precedent systems. Certain actions are difficult or impossible to time, namely the time required to legally authorize the carbon trading system. LL97 specifies three compliance periods, starting in 2024: Period 1 (2024–2029), Period 2 (2030–2034), and Period 3 (2035–2050). However, the timeline below is agnostic about whether the introduction of the City's contemplated carbon trading system would align with the start of the first compliance period under LL97.

Table 22. Timeline for implementation of carbon trading system

Phase	Estimated Duration	Actions
Legal Authorization & Market Design	Unknown	**Trading legalization** ▪ Align on a final design of the carbon trading market to confirm steps needed for city/state-level legal authorization. ▪ Pass new NYC legislation, and receive State authorization if deemed necessary to establish an auction **Market research and design** ▪ Complete market design based on study. ▪ Complete market research to identify potential third-party contractors, draft RFPs, and confirm procurement timeline.
System Administrative Setup	1–2 years	**Baselines for credit allocation and emissions reporting and verification** ▪ Determine baselines for allocating credits (the lesser of 2018 emissions or LL97 building limits). ▪ Ensuring that emissions reporting and verification processes developed to implement LL97 are adapted to the needs of a trading program. ▪ Update emissions reporting technology and protocols if needed. **Trading market implementation, initial oversight, and outreach** ▪ Allocate oversight of market regulatory and admin/technical functions to NYC agencies or non-profit corporation(s). Create new corporation(s) if required. ▪ Procure third-party contractors to run certain administrative and technical market functions. ▪ Perform outreach, capacity-building, training for building owners, other market participants, and the general public. **Other trading policymaking** ▪ Design ancillary programs funded by trading/auction revenues, e.g. investments in EJCs.

Phase	Estimated Duration	Actions
System Technical Setup	1 year	**Rollout of market technical functions and support** ▪ Create registry of carbon credits. ▪ Create auction platform. ▪ Activate other supportive professional and technical services (e.g. information technology, financial administrative services and transaction support, help desk services, translation services, etc.). ▪ Continue outreach, capacity-building, and training for building owners, other market participants, and the general public—including building owners that opt into the market.
System Operation	Ongoing	**Market operations** ▪ Execute annual or quarterly or other periodic auctions, facilitate trading. ▪ Continue outreach, capacity-building, and training for building owners, other market participants, and the general public—including building owners that opt into the market. ▪ Execute/oversee all other ongoing continuous, periodic, and ad hoc regulatory, administrative and technical, and verification market functions. **Other Policymaking** ▪ Fund and execute ancillary programs with auction revenues, e.g. investments in EJCs.

Implementation timeline key takeaways

There are substantial advantages to introducing a carbon trading system, and holding a potential auction, prior to or at the start of the first LL97 compliance period in 2024. Introducing a functioning market in advance of the first LL97 compliance period will allow covered building owners and other market actors some time to start to discover the price of credits relative to energy conservation measures (ECMs) and the LL97 penalty for non-compliance ($268/mt$CO_2$e). This advance period would enable market actors to devise ECM investment plans in advance that would reflect the additional efficiencies created by a market. Contrariwise, introducing a functioning market much later into the first LL97 compliance period might reduce the early environmental and financial benefit of the market to the City and market actors. Furthermore, to promote market actors' confidence in the market and permit liquidity early on, it will be ideal if there are permits to transact from the very beginning of the market's existence. Therefore, it might behoove the City to schedule an auction of credits as early as possible.

There are risks and unknowns associated with the process of securing City/State-level legal authorization for the contemplated carbon trading market, which could cause delays. These risks and unknowns are addressed in detail in the "Legal Implementation Memo," which is a separate document.

Market technical functions such as carbon registries, auction platforms, market monitoring, and financial transaction support could be set up relatively quickly. Precedent systems such as RGGI and the California's cap-and-trade program were able to quickly procure third-party contractors that had the

capacity to set up complex credit tracking systems, auction platforms, market monitoring protocols, financial administration, and associated rules within a year.

The City should consider linking the cadence of market program evaluations to the timing of LL97 compliance periods. Completing or contracting out a retrospective evaluation of market activity and performance ahead of the end of compliance periods 1 and 2 could help the City thoughtfully finalize or revise emissions coefficients, emissions thresholds, penalties for emissions above the cap, and other legal parameters in a way that is not only reflective of the City's environmental goals but also responsive to positive or negative behavior witnessed in the market to date. Comprehensive program evaluations contracted by RGGI, Inc., for example, informed substantial changes in "the Model Rule," the corpus of rules that organize market functions and behavior. (Also see "Recommendations for Periodic Evaluation and Adjustment" in Part III, Section 3 below).

Clear communication about the timeline for implementation and broadcasting the possible cadence of significant regulatory amendments or updates, is integral to securing the confidence of market actors. To make significant emissions reduction investments on the basis of the present and expected value of carbon credits, regulated entities and other market actors require certainty about the long-term existence and function of a market. Therefore, broadcasting clear timelines for the implementation of, and possible updates to, the market will increase the likelihood that market actors utilize the market early in order to further their emissions reductions. The alternative is that risk-averse market actors under-invest in credit-generating energy conservation measures or opt out of the market altogether.

The City could frontload third-party market administration capacity as trading volume increases, but it might consider downsizing external capacity and internalizing some functions as the market matures. Under Italy's TEE scheme, market management and certificate verification responsibilities shifted among ARERA, ENEA, and GSE between 2005 and 2013. Each agency repurposed existing staff or onboarded new resources to manage TEE verification over time, depending on the level of certificate generation and trading occurring in the market; a mature market in the late 2010s allowed GSE to eventually reduce program FTE staffing.[350] Based on this trajectory, the City might plan substantial third-party contracting overseen by lean City-level regulatory and governance support during compliance periods that are expected to feature the highest volumes of trading or greatest levels of non-compliance. In the long term, however, the City could plan to deescalate contractors and/or internalize some market administrative and technical functions, if doing so is judged to be cost-effective and advantageous to the City later.

3. Recommendations for Periodic Evaluation and Adjustment

As the City drafts its initial rules, additional and unforeseen implementation issues will likely arise that the original rules do not clearly address or that necessitate adjustments over time.[351] California, for example,

[350] Email Interview with Dario Di Santo, Managing Director, Italian Federation for Energy Efficiency (FIRE) (Mar. 3, 2021).
[351] *See, e.g.*, In re La Paloma Generating, Co., et al., 2017 WL 5197116 (Bankr. D. Del. 2017) (indicating that California's initial rules for its cap-and-trade program did not sufficiently and explicitly speak to compliance obligations during the sale of covered entity following bankruptcy).

has amended its cap-and-trade rules roughly every year, especially early on. New York City should therefore plan to occasionally update implementing regulations and to offer regulated entities and other stakeholders ongoing guidance and interpretations. It also should plan to periodically engage in programmatic review of the trading program to assess whether it is achieving its objectives without undesirable consequences. Doing so will require a commitment of future staff and budget resources.[352]

Periodic evaluation and adjustments of carbon trading markets should be handled by an oversight body. Evaluation and adjustments are typically made by the entity that governs the system, based on feedback from market participants, technical third parties and other stakeholders.

Evaluation: Evaluation is a formal or informal periodic review of key performance indicators (KPIs), compliance issues, and technical/reporting issues in the carbon trading program. In some cases, evaluation is mandated and defined by the enabling legislation, such as in California's cap-and-trade program. In other cases, evaluation occurs at the discretion of the oversight body, such as the Tokyo Municipal Government (TMG) in the case of the Tokyo ETS. Evaluation can include both ad hoc regulatory amendments to deal with specific implementation issues that arise and systemic, planned periodic reviews, such as the effects of the trading program on environmental justice communities.

Adjustment: Adjustments include changes in rules, methodologies, or incentives to promote better outcomes (e.g. increase market participation, decrease emissions more quickly, incentivize certain compliance pathways) and/or improve the process for market participants and governing and oversight bodies (e.g. improved calculation methodologies, easier reporting).

a. Evaluation and Adjustment Case Studies

Precedent and similar credit trading systems present a variety of ways to handle evaluation and periodic adjustments:

Precedent #1: The Tokyo CO2 Emissions Reduction Program (CERP) and Tokyo Green Building Program:[353] The CERP program has been revised twice to date. First, in conjunction with the launch of Phase 2 in 2005, the CERP introduced a mechanism that could inform emission reduction plans and provide guidance to covered facilities. Facilities would submit their plans, which would be evaluated and made publicly available. Those facilities then received a rating and were required to reduce emissions accordingly. Second, in 2010 concurrent with the launch of the Tokyo ETS, the CERP was revised to cover small and medium-size facilities in addition to large ones. The Tokyo Green Building Program implemented a rating and reporting system to measure buildings' environmental performance and clarify options for businesses. In 2010 they also made it mandatory to consider the introduction of renewable energy.

[352] Note that some of the recommendations made in this plan to "the City" or "the regulator" could apply to or be carried out by an agent or contractor of the City. The delegation of responsibilities to third parties is discussed in Part I of this plan.
[353] TOKYO CASE STUDY, *supra* note 30.

- **Responsible entity:** TMG has implemented the revisions to the programs, based in part on reporting and feedback from participants as well as verification entities.
- **Evaluation methods:** The TMG released multiple surveys to participants.
- **Timing:** In general, revisions have been made during the launch of new compliance periods.

Precedent #2: Italy's Energy Efficiency Certificates (TEE) scheme:[354,355] The evaluation and adjustments of this scheme have included adjustments to harmonize the regulatory framework, create a fairer incentive landscape, and improve the technical reporting mechanisms. The system has gone through three major reviews: first, the National Agency GSE launched an overall review of the technical rule of the mechanism and modified the guidelines; the second review (2013) defined electricity and gas distribution companies' energy savings targets for the years 2013–2016 and included guidelines to standardize the level of investment incentive provided by government policies; and the third revision (2017) defined the energy savings targets for the years 2017–2020. They abolished certain incentives and also considerably lowered the minimum thresholds of eligibility for a project.

- **Responsible entity**: The Ministry of Economic Development sets up the annual savings targets and defines and updates the regulatory framework, as well as updates the Guidelines. The National GSE is responsible for the management, evaluation, and certification of savings related to specific projects.
- **Evaluation methods**: Their evaluation has relied heavily on the implementation of a technical reporting system to establish strong baseline data for each participant. To facilitate evaluation, the GSE requires that participants submit a Project and Measurement Program Proposal (PMPPs), to be approved by GSE. These proposals must be submitted through a web platform to facilitate evaluation.
- **Timing**: Energy savings targets are established at the beginning of each compliance period. Additional programmatic evaluation has also occurred at the beginning of compliance periods.

Precedent #3: California Cap-and-Trade Program: The program has been amended seven times to date since 2011. The program was also subject to significant design changes in response to AB 398.[356] The existing legislation requires CARB to update the California Climate Change Scoping Plan every five years and provide annual reports to various committees of the Legislature and the Board. These are

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[354] RICARDO ENERGY & ENV'T, ITALIAN ENERGY EFFICIENCY WHITE CERTIFICATE SCHEME: RETHINKING DECARBONISATION INCENTIVES – POLICY CASE STUDIES (2018), https://esc-non-prod.s3.eu-west-2.amazonaws.com/2018/10/Italy-White-Certificate-Scheme-Case-Study-FINAL.pdf.

[355] D. Di Santo & E. Biele, *The Italian White Certificates Scheme: Case Study Prepared by FIRE for the EPATEE Project, Funded by the European Union's Horizon 2020 Programme*, EVALUATION INTO PRACTICE TO ACHIEVE TARGETS FOR ENERGY EFFICIENCY (EPATEE) (2017), https://epatee.eu/sites/default/files/epatee_case_study_italy_white_certificates_ok.pdf.

[356] *FAQ Cap-and-Trade Program: Environmental Justice Communities and Local Air Pollution*, CAL. AIR RESOURCES BD., https://ww2.arb.ca.gov/resources/documents/faq-cap-and-trade-program.

opportunities for review of the cap-and-trade program's progress in meeting the 2030 target.[357] CARB may retain third-party contractors to support periodic evaluation.

- **Responsible entity**: The California Air Resources Board (CARB)
- **Evaluation methods**: Changes to the program were completed through a public process with workshops, written comment periods, and Board hearings with oral arguments. For changes to the cap-and-trade regulation itself, there is a separate process with statutory mandates for specific types of economic and environmental analyses and public process prior to Board consideration.
- **Timing**: Update the Scoping Plan every five years, with annual reports to the Legislature and the Board.

b. Evaluation and Adjustment Key Takeaways

Responsible entities: Periodic evaluation and adjustments require entities that are responsible for both ongoing and periodic functions, some of which overlap with technical and regulatory functions in a carbon trading scheme.

- The primary governing entity of an NYC carbon trading scheme will likely be the best positioned to perform periodic evaluation and adjustment, in close coordination with entities responsible for verifying the data and gathering and monitoring the data.
- The primary governing entity will need to coordinate with any third parties responsible for emissions and credit verification or market administration in order to gather feedback for evaluation.
- The primary governing entity should be assisted and advised by a committee of stakeholders and have the option of drawing on third-party contractors as necessary to assist with the analysis.

Evaluation Process: *Ongoing evaluation* of the trading program should be used to respond to changing market conditions and technology, the evolving regulatory landscape, unforeseen challenges for regulators and market participants, impacts on environmental justice communities and other stakeholders, and other developments. *Periodic programmatic evaluation* of the trading program is important for assessing whether the trading program is achieving its objectives without undesirable consequences. Such programmatic evaluations should likely be undertaken prior to the onset of a new LL97 compliance period to enable adjustments to be made in anticipation of the new period. For example, a programmatic review should be undertaken before the 2024-2029 period is finished to enable changes to be made in advance of the 2030-2034 period. Periodic programmatic evaluation could assess the effects of the trading program using output metrics and key performance indicators. These would provide various guidelines for assessing the performance of the trading program, and its impacts citywide, on EJCs and for market participants, among others.

[357] INT'L CARBON ACTION PARTNERSHIP, USA - CALIFORNIA CAP-AND-TRADE PROGRAM, https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=45 (last updated May 18, 2021).

Table 23. Recommended evaluation and adjustment categories

Category	Description
Areas of Adjustment	• Emissions coefficients and grid assumptions based on decarbonization • Emissions limits in later phases • Policy design, including explicit free allocation, auction design, price floor levels, devaluation rate for banked credits, cost and emissions containment reserves, subsidy programs • Calculation methodologies • Reporting standards and methodologies
Output Metrics	• Square footage participating in trading, by coverage and EJC status • Credit prices • Abatement measures taken by EJC status • Annual net costs for a typical building owner by EJC status • Payback time for upfront investments by EJC status
Key Performance Indicators	• Change in local pollutants citywide and by EJC status • Change in GHG emissions citywide and by EJC status • Change in building owners' net costs citywide and by EJC status • Total investment in Section 320 and Section 321 properties citywide and by EJC status • Trade revenue flows by EJC status • Geographic distribution of credit trades • Change in tenant and owner energy costs citywide and by EJC status • Change in public expense for additional electricity kWh saved

The City should adopt mechanisms for periodic review of the LL97 emissions caps, whether or not it proceeds with trading. Periodic review of the building emissions limits is important irrespective of whether a trading program is adopted. The main reason that RGGI did not drive emissions reductions in the early years is because policymakers overestimated what business as usual emissions would be over the next decade and therefore set the cap at a level that ended up being too generous relative to actual emissions to induce savings. The emissions limits that the City Council established in LL97 are vulnerable to similar miscalculations, especially given the dramatic decline in retail and commercial occupancy since the COVID-19 pandemic and significant reductions anticipated in the emissions intensity of the electricity sector. If the LL97 building emissions limits end up being above business-as-usual emissions, the law will not drive change with or without a trading system and will not be worth the administrative costs involved with monitoring compliance. Notably, the addition of a trading program to LL97 can help justify adjusting the caps over time. By lowering the marginal costs of compliance and creating a profit incentive for regulated buildings and opt-in buildings to innovate and reduce emissions so that they can sell credits, a trading program will generate compliance cost savings that can help justify setting even lower limits as "feasible and in the public interest" in future compliance periods.[358]

[358] N.Y.C. LOCAL LAW 97, § 28-320.3.2; *accord* § 28-320.3.4-3.5.

4. Outreach and Training

a. Outreach

Training and outreach about a trading program will occur after authorizing legislation has been established and market design is solidified. Training and outreach for the trading program should be coordinated with DOB's strategy for rolling out base case LL97 implementation and regulating compliance among building owners, given that a trading program would be an additional option for complying with LL97 building limits.

While it will be important to have a comprehensive outreach and training program to educate various types of stakeholders about the trading program, it is useful to remember that building owners that expect to exceed their caps will have an incentive to buy credits rather than pay fines under LL97. Outreach and training about the trading program could enhance knowledge of the potential benefits of buying (and selling) credits. In particular, if an owner is projected to exceed her LL97 emissions limit for a year, the City could proactively reach out and notify the owner of an alternative compliance pathway involving buying credits at a lower price than the penalty. This alternative could once again be offered if an owner does exceed her allocated emissions despite the advance notification.

In communicating with owners regarding the opportunity to participate in a trading program, the City should simplify the process as much as possible to reduce the information burden it imposes on owners. One potential way to simplify the process would be to give regulated building owners a binary check-the-box option to participate in the trading market; this approach could be structured so that owners who exceed their LL97 limits automatically purchase credits in lieu of paying penalties and owners who have excess credits have their credits sold into the market and receive a payment from the market manager. This "check-the-box" approach would be particularly effective if the form was sent at a point when the decision was top of mind or more tangible, like when an owner is charged their first fine. This has been demonstrated in retirement savings[359] as well as simplifying the process for claiming the Earned Income Tax Credit among likely-eligible taxpayers.[360]

Another, even simpler, approach is to create a default of automatic enrollment, which owners would have to opt out of if they wished to have more control over their buying and selling behavior to make strategic choices (for example, by banking credits). The auto-enrollment could apply to both purchasing and selling or just purchasing (with the idea that no one could be made worse off by being defaulted into purchasing; an asymmetrical auto-enrollment program would need to be managed to avoid a flood of purchasers without as many sellers may drive up the price). Auto-enrollment has been shown to be effective in retirement savings,[361] and there are many other well-documented applications, such as for voter registration and organ donation.

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[359] John Beshears et.al., *Simplification and Saving (*Nat'l Bureau of Econ. Rsch., Working Paper No. 12659, 2006), http://www.nber.org/papers/w12659.

[360] Saurabh Bhargava & Dayanand Manoli, *Psychological Frictions and the Incomplete Take-Up of Social Benefits: Evidence from an IRS Field Experiment,* 105 AM. ECON. REV. 3489 (2015).

[361] Brigitte C. Madrian & Dennis F. Shea, *The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior*, 116 Q. J. ECON. 1149 (2001).

b. Target Audiences

Training materials (and audiences) will likely range from technical to broadly informational. Primary target audiences for training include:

- Building owners, C-suite executives who occupy strategic roles and have authorizing power on spending.
- Building operators, who manage day-to-day operations of individual properties.
- Owners and operators of "opt in" buildings—Section 321 buildings—that may require additional technical assistance with reporting or navigating the process of opting into the market.
- Leadership and building operators for the New York City Housing Authority, to the extent that NYCHA buildings are interested in opting into the market.
- Building owners and tenants in covered, participating and opt-in buildings situated in environmental justice communities, who may require assistance with reporting, navigating the process of opting into the market, or accessing benefits purveyed through an EJC investment program funded by auction revenue
- Engineers and consulting firms, who will be helping owners understand different options for LL97 compliance.
- Real estate industry trade groups such as REBNY, NYC Council of Coops and Condos, Rent Stabilization Association, and others.
- Organizations such as Urban Green Council, Building Energy Exchange, ASHRAE-NY, and AIA-NY.
- Relevant community-based organizations (CBOs) and resident advocacy organizations such as the New York City Environmental Justice Alliance, WE ACT for Environmental Justice, Community Voices Heard, GOLES, Chhaya CDC, and Green Worker Cooperatives.
- Partners in promoting energy efficiency and building emissions reductions, such as NYSERDA, ConEd, National Grid, NYCEEC and others.
- Housing regulators, local community development organizations, community boards and other organizations that are regularly in touch with key building decision making stakeholders.

APPENDIX: Budget Details for RGGI and WCI

Figure 1. RGGI, Inc. Annual Expenditures on Third-Party Functions (2007–2019)

Cost Item	2008	2009	2010	2011	2013	2014	2015	2016	2017	2018	2019
Auctions Management	$390,000	$393,000	$399,920	$420,000	$420,000	$420,000	$420,000	$340,000	$340,000	$340,000	$317,500
Emissions Allowance Tracking	$232,593	$315,856	$102,314	$202,994	$130,743	$163,162	$306,661	$233,337	$243,972	$246,730	$254,324
Market Monitoring	$184,662	$148,901	$176,540	$176,085	$147,820	$186,190	$185,740	$211,837	$192,000	$208,506	$184,125
Program Evaluation			$293,652	$141,108	$332,060	$61,248	$127,833	$364,635	$437,069	$7,984	$7,056
Offsets Monitoring and Setup	$103,400	$198,700	$68,436								
Other	$2,649	$4,580	$11,775	$13,303	$61,373	$39,873	$3,060	$5,293	$4,601	$2,534	$1,190
Total	**$913,304**	**$1,061,037**	**$1,052,637**	**$953,490**	**$1,091,996**	**$870,473**	**$1,043,294**	**$1,155,102**	**$1,217,642**	**$805,754**	**$764,195**

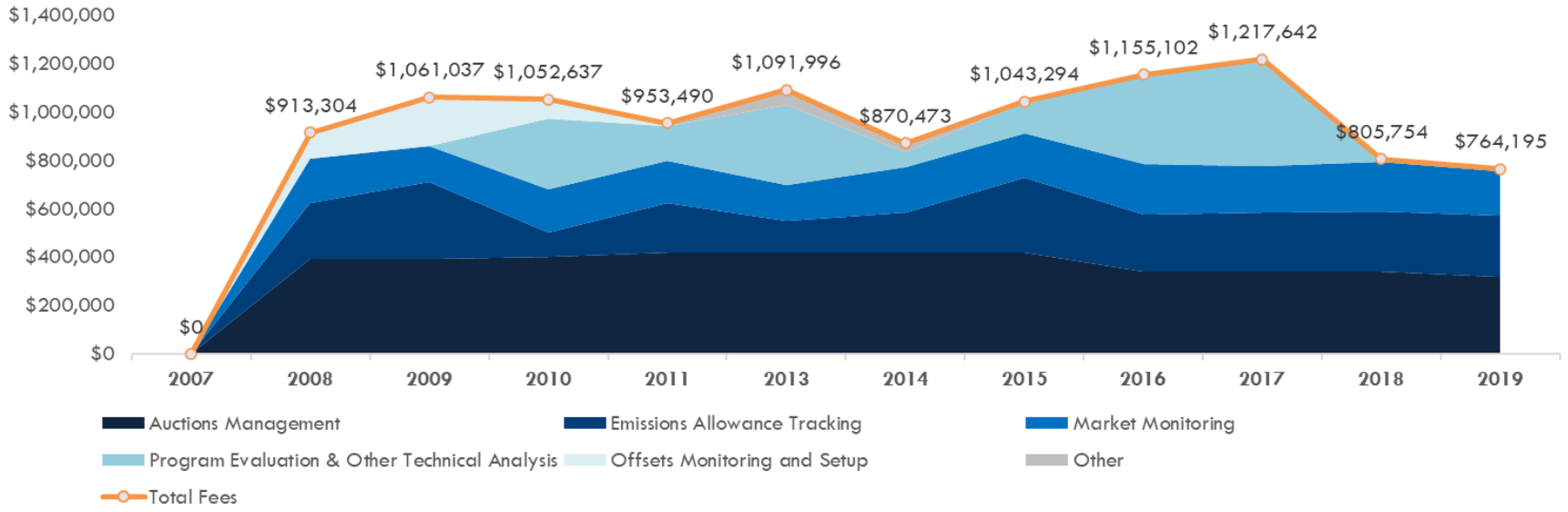

Figure 2. WCI, Inc. Annual Expenditures on Third-Party Functions (2011–2019)

	2011	2012	2013	2014	2015	2016	2017	2018	2019
CITSS - Hosting, Development, Help Desk Svcs	$0	$584,372	$925,183	$1,510,373	$1,199,548	$1,356,710	$1,844,979	$1,733,213	$1,133,789
Auction Admin Services	$0	$0	$260,841	$362,962	$477,883	$793,242	$1,354,099	$618,867	$705,068
Financial Administration Services	$0	$0	$63,453	$167,673	$189,985	$206,934	$421,900	$257,050	$231,300
Market Monitoring Services	$0	$0	$72,483	$139,225	$67,338	$63,398	$92,307	$60,385	$62,483
System Audits	$0	$0	$0	$0	$0	$0	$182,922	$15,259	$0
Tech Advisory Services	$0	$0	$0	$0	$0	$0	$0	$0	$371,744
Other Contracted Services	$0	$10,801	$57,924	$46,993	$73,810	$71,289	$88,834	$91,761	$97,152
Total	**$0**	**$595,173**	**$1,379,884**	**$2,227,226**	**$2,008,564**	**$2,491,573**	**$3,985,041**	**$2,776,535**	**$2,601,536**