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Maryland Senate Bill 590

Study on Greenhouse Gas Emissions—Economy-Wide Cap-and-Invest Program

Committee: Senate Education, Energy, and the Environment Committee

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INTRODUCTION AND QUALIFICATIONS

I respectfully submit this testimony in an informational capacity in support of the study mandate established by Senate Bill 590. I am an independent expert whose professional experience spans more than three decades at the intersection of corporate sustainability strategy, climate data governance, multi-jurisdictional regulatory design, AI governance, and the architecture of emissions accountability systems. This includes fourteen years managing environmental and social risk frameworks for major development finance projects at the World Bank and the Inter-American Development Bank across Latin America and the Caribbean—work in which the design of measurement, reporting, and verification systems for environmental commitments was an operational responsibility with direct financial, legal, and community consequences. I have provided written expert testimony to the California Air Resources Board on mandatory climate disclosure implementation, including *Scope 3* measurement methodology, emissions data verification standards, and the integration of compliance data with corporate disclosure obligations. I have no commercial interest in any particular design outcome for Maryland’s cap-and-invest program.

My observations are offered to assist the committee and the Maryland Department of the Environment in ensuring that the study mandated by SB 590 is scoped with the operational rigor that Maryland’s statutory climate obligations—and the communities most affected by this program—deserve.

THE URGENCY OF THIS STUDY

Maryland’s *Climate Solutions Now Act* of 2022 established legally binding targets: a 60% reduction in greenhouse gas emissions below 2006 levels by 2031, and net-zero by 2045. These are not aspirational benchmarks. They are statutory obligations.

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The January 2026 modelling from the University of Maryland *Center for Global Sustainability* presents findings that should inform every aspect of how this committee considers SB 590. Under current state and federal policy, Maryland is projected to achieve approximately 42% emissions reduction by 2031—not 50% as the same team projected in 2023, and critically not the 60% the law requires. The gap has widened materially and for identifiable reasons: (1) Slower-than-projected electric vehicle adoption; (2) Delayed offshore wind development; (3) Unanticipated energy demand from data centers; (4) The Shores coal plant remaining open until 2029 rather than 2025 as planned; and (5) Federal policy rollbacks—including the suspension of *Advanced Clean Cars II* and *Advanced Clean Trucks*—accounting for an additional three percentage points of projected shortfall.

Maryland is not slightly off track. It is significantly off track, and the gap is growing. MDE’s own *Climate Pollution Reduction Plan* identified an economy-wide cap-and-invest program as a critical strategy to close this gap. Maryland’s sixteen-year participation in the *Regional Greenhouse Gas Initiative*—which has generated over \$1 billion in cumulative auction revenue reinvested in the state economy—demonstrates that Maryland has the institutional capacity, the administrative infrastructure, and the operational experience to design and run a cap-and-invest program at scale. The question before the committee is not whether such a program is feasible. The question is whether the study MDE is directed to conduct will be rigorous enough to produce a design that is durable, credible, equitable, and enforceable.

I offer five specific observations toward that end.

OBSERVATION 1: OVERBURDENED COMMUNITIES—FACILITY-SPECIFIC LIMITS REQUIRE AN EVIDENCE BASE THAT MUST BE BUILT NOW

The bill directs the study to evaluate the treatment of covered facilities located near overburdened communities—including the potential for facility-specific emissions limits more stringent than the program-wide cap. This is the most environmentally just and the most operationally complex element of the bill, and it deserves the most careful study design.

Maryland’s *Climate Solutions Now Act* provides statutory definitions of “overburdened” and “underserved” communities that are among the most precise in the country. Applying those definitions to cap-and-invest program design requires a specific and currently incomplete evidence base: (1) Facility-by-facility data linking emissions profiles; (2) Pollution burden indices; (3) Proximity to defined overburdened communities; and (4) The health outcome data that demonstrates cumulative impact. Without this data architecture, facility-specific limits cannot be fairly designed, legally defended, or equitably enforced. A covered facility near an overburdened community that faces a tighter limit than a comparable facility in a less affected area must understand—and must be able to challenge—the specific evidence basis for that differential treatment.

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The study should therefore include—as a *foundational component*—a systematic mapping of Maryland’s covered facility universe against the overburdened community definitions in the *Climate Solutions Now Act*. This mapping should be conducted at the census tract level, using MDE’s existing cumulative impact screening tools, and should produce a facility classification that is transparent, contestable, and defensible. The facility-specific limit framework cannot be fairly designed without it.

I would also draw the committee’s attention to an operational lesson from development finance practice that is directly applicable here. In multilateral development bank project finance, the design of differential environmental standards for communities bearing disproportionate pollution burdens—what the World Bank calls “enhanced mitigation requirements” for projects affecting vulnerable populations—is governed by a structured community engagement protocol that produces documented community consent before differential standards are applied.

Maryland’s program design should consider an analogous mechanism: Requiring that the overburdened communities whose proximity triggers facility-specific limits have meaningful input into how those limits are designed and what timelines govern their implementation. This is not simply good governance practice. It is the design choice that will determine whether facility-specific limits are seen as protective by the communities they serve, or as administratively imposed without their voice.

The study should specify the community engagement process by which facility-specific limit proposals will be developed—including the documentation required to demonstrate that affected communities have been genuinely consulted, not merely notified.

Beyond the design of facility-specific limits, the study should evaluate the framework for *ongoing cumulative impact monitoring* after the program is operational. Facility-specific limits set at program launch will reflect the emissions and health burden data available at that time. That data will change as the program operates, as industrial activity in affected areas shifts, and as health outcomes in overburdened communities evolve. A program that sets facility-specific limits without a mechanism for monitoring whether those limits are actually reducing cumulative pollution burden—and without a defined protocol for tightening limits if monitoring shows they are not achieving their protective purpose—treats environmental justice as a design feature rather than an outcome obligation.

In development finance practice, enhanced mitigation requirements for communities bearing disproportionate environmental burdens are always paired with Environmental and Social Monitoring Plans. These typically involve structured, time-bound frameworks that specify: (1) The indicators to be tracked; (2) The frequency of measurement; (3) The threshold at which adaptive management is triggered; and (4) The community reporting mechanism through which affected residents can access and contest monitoring results. Maryland’s program study should design an analogous framework for overburdened communities subject to facility-specific limits—ensuring that the protective intent of the limit-setting mechanism is matched by the accountability infrastructure needed to verify that protection is being delivered.

**OBSERVATION 2:
REVENUE INVESTMENT ACCOUNTABILITY—THE ARCHITECTURE MUST BE
DESIGNED BEFORE THE REVENUE FLOWS**

The bill directs the study to evaluate how auction revenues will be invested across a broad set of priorities: (1) Low- and moderate-income household rebates; (2) Weatherization; (3) Clean energy and efficiency programs; (4) Transportation investments; (5) Carbon removal; (6) Ecosystem resilience—including the Chesapeake Bay; (7) Community climate resilience; and (8) Workforce development.

These are the right investment priorities. But the study should also design the *accountability architecture* that ensures revenues actually reach these destinations in the amounts committed, through mechanisms that are transparent to the communities receiving them and *verifiable* by independent oversight. Revenue investment accountability is not a secondary administrative concern—it is the mechanism by which the program’s equity commitments become real rather than nominal.

The design challenge here is specific and underappreciated. Cap-and-invest auction revenues are not like dedicated tax revenues. That’s because they fluctuate with allowance prices, which in turn fluctuate due to the manner in which three variables interact: (1) Economic conditions; (2) Emissions trends; and (3) Permit market dynamics. A program that commits to investing a fixed proportion of revenue in overburdened community priorities must design for revenue variability—including automatic response mechanisms when revenue falls below commitment thresholds, and transparent reporting when investment targets are not met.

Maryland’s own RGGI experience provides both a model and a cautionary note. The state’s RGGI *Strategic Energy Investment Fund* has been one of the most successful revenue deployment mechanisms of any RGGI participant—but its annual deployment has also been subject to budget pressures and legislative diversions that periodically redirected funds away from their intended climate purposes.

An economy-wide program generating substantially larger revenues than RGGI must be designed with stronger ring-fencing, more granular investment tracking, and more accessible public reporting than the current RGGI framework provides.

The study should evaluate: (1) The governance structure for investment decisions—including the degree to which affected communities have decision-making authority rather than merely advisory roles; (2) The reporting and verification requirements that document investment outcomes, not just expenditures; and (3) The enforcement mechanism when investment commitments are not met. A program whose revenue commitments are unverifiable is a program whose equity promises are unenforceable. The study must address this *before* the program is designed.

OBSERVATION 3: THE DATA GOVERNANCE ARCHITECTURE OF A LINKED PROGRAM

The bill directs the study to evaluate whether Maryland’s program should link to the California-Quebec cap-and-trade system and/or to Washington State’s *Climate Commitment Act* program. The benefits of linkage are well-documented: larger, more liquid allowance markets reduce compliance costs, stabilize allowance prices, and improve the program’s resilience to economic volatility. These benefits are real and the study should take them seriously.

However, there is one critical development that occurred after SB 590 was drafted and that the study must explicitly address: Washington State’s *Climate Commitment Act*—named in the bill as a potential linkage partner—was repealed by voter initiative in November 2024 and is currently being wound down. The practical linkage universe available to Maryland at the time of the study may therefore be limited to the California-Quebec system. The study should assess this changed landscape directly, evaluate whether California-Quebec linkage alone provides sufficient market liquidity and price stability to meet Maryland’s program objectives, and consider whether other emerging program jurisdictions—including potentially federal program developments—should be evaluated as prospective future linkage partners.

Important to note is that linkage always creates a transboundary *data governance* challenge that the existing cap-and-invest literature has systematically underexamined, and that the study must address explicitly. Here’s why:

When linked programs allow covered entities to use allowances from any linked jurisdiction to satisfy compliance obligations in any other, the environmental integrity of the linked system depends entirely on the comparability of the emissions data produced by each jurisdiction’s measurement, reporting, and verification framework. An allowance generated in California and surrendered for compliance in Maryland is an equivalent unit only if the tonne of CO₂ it represents was measured, reported, and verified to equivalent standards in both jurisdictions. Where MRV standards diverge—in how facility emissions are calculated, what monitoring equipment is required, how data gaps are filled, and how third-party verifiers are accredited—the allowances traded between systems do not represent equivalent climate outcomes. Linkage produces price efficiency at the cost of environmental accounting integrity.

The current MRV landscape for a Maryland linkage evaluation is specifically complex. Maryland’s covered facilities currently report under RGGI’s MRV protocols, which were designed for electricity generating units and are not directly applicable to the transportation, buildings, and industrial sectors that an economy-wide program would newly cover. California’s MRV requirements for these sectors are more developed and more prescriptive than RGGI’s—but they were designed for California’s specific facility universe, regulatory authority, and enforcement infrastructure. Washington’s program had been operating for only three years before the repeal and its MRV framework was still maturing.

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The study should specifically evaluate: *first*, the current areas of divergence between RGGI protocols, California-Quebec MRV requirements, and (if resuscitated) Washington’s verification standards for the sectors Maryland would newly cover; *second*, the governance mechanism by which compliance disputes involving cross-jurisdictional allowances would be adjudicated—including what data authority governs when Maryland’s and a linked partner’s MRV systems produce different emissions figures for the same covered entity; and *third*, the minimum data quality and independent verification standards that Maryland should require of covered facilities as a precondition for linkage eligibility.

This is not a design detail to be resolved after the program is established. The data governance architecture of a linked program must be designed before the linkage agreement is executed—because once allowances are flowing across jurisdictions, retrofitting MRV harmonization requirements is administratively and legally extremely difficult. Maryland has the opportunity in this study to define the data standards it will insist upon, rather than simply accepting the design choices of its prospective link partners.

A related data governance question that the study should address concerns the treatment of *emissions-intensive, trade-exposed industries*. The bill directs MDE to evaluate how EITI sectors are treated in program design—a question with significant competitive implications for Maryland’s manufacturing, chemical, and industrial base. The evidence base for determining which industries qualify for EITI treatment, and at what protection level, is itself a data quality and verification question that deserves explicit study scope. EITI classifications are frequently made using sector-wide economic and emissions *proxies* rather than facility-specific verified data—a methodology that can both over-protect industries that are less exposed than their sector averages suggest and under-protect facilities that are more exposed. Maryland’s study should specify (1) that EITI eligibility determinations be grounded in *facility-level* verified emissions and economic data, (2) that the methodology be transparent and publicly documented, and (3) that eligibility be subject to periodic reassessment as market conditions and emissions profiles change. We must recognize that an EITI framework built merely on sector proxies is an EITI framework that serves industrial lobbying interests rather than the competitive protection rationale that justifies it.

OBSERVATION 4: AI-ASSISTED EMISSIONS MEASUREMENT—GOVERNANCE REQUIREMENTS FOR MODERN MRV SYSTEMS

Modern cap-and-invest MRV systems increasingly rely on computational tools to generate the compliance data on which allowance obligations are determined. These include: (1) Continuous emissions monitoring systems; (2) AI-assisted calculation engines; (3) Satellite-based remote sensing for methane and CO₂ detection; (4) Machine-learning models for facility-level emissions estimation; and (5) Algorithmic gap-fill methodologies when monitoring equipment malfunctions or when data is missing. These technological approaches improve emissions monitoring coverage, reduce reporting burden, and can detect emissions that self-reporting

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would miss. The study should evaluate their incorporation into Maryland’s MRV framework as a design priority.

However, these same tools introduce a governance challenge that the study must also address in parallel: When a covered facility’s compliance obligation is determined in whole or in part by an AI-assisted or algorithmically-derived emissions calculation, the facility must be able to understand, verify, and—where it has grounds—challenge that calculation.

If the pathway from raw sensor data, satellite observation, or modelled estimate to a final compliance-determining emissions figure is not transparently documented *and independently auditable*, the compliance determination rests on an evidentiary foundation that cannot be examined by the regulated entity, its counsel, or MDE’s own enforcement staff.

This is not a theoretical risk. AI-assisted monitoring systems incorporate data processing steps, imputation methodologies, and model-generated estimates whose internal logic may be opaque to everyone except the system’s developer. In the context of a cap-and-invest program, where a facility’s compliance determination directly affects its financial obligations—and where non-compliance carries legal and financial penalties—the inability to audit an AI-generated compliance figure is a due process problem, not merely an administrative one.

The study should evaluate and recommend: (1) What algorithmic transparency and technical documentation requirements Maryland should impose on MRV systems used by covered facilities or third-party verifiers; (2) What right a covered facility should have to receive a human-readable, step-by-step explanation of any AI-generated or algorithmically-derived compliance determination; (3) What independent audit pathway MDE should maintain to verify AI-generated emissions calculations without relying solely on the verifier’s assertion; and (4) What standards should govern the use of AI-generated gap-fill estimates when primary monitoring data is unavailable, including maximum allowable gap durations and mandatory disclosure thresholds.

These requirements are not novel. The right to meaningful challenge of a compliance determination is a foundational principle of American administrative law, and AI-generated compliance figures should be no exception. Even the EU’s *AI Act*—currently entering its high-risk compliance phase for AI systems used in consequential regulatory determinations—provides a directly applicable governance model for transparency, technical documentation, human oversight, and audit rights in exactly this category of AI application.

Maryland need not wait for federal AI governance standards to incorporate these protections into its program design. Embedding them at the design stage is both administratively simpler and legally more defensible than retrofitting them after compliance disputes arise.

**OBSERVATION 5:
INTEGRATION WITH CORPORATE CLIMATE DISCLOSURE OBLIGATIONS—
DESIGNING FOR THE WHOLE INFORMATION ARCHITECTURE**

Maryland’s covered entities under an economy-wide cap-and-invest program—its largest industrial emitters, utilities, fuel suppliers, and commercial buildings operators—are the same organizations that are simultaneously subject to a growing body of mandatory climate disclosure obligations: (1) ISSB-aligned sustainability reporting standards now operative or formally adopted in the European Union, United Kingdom, Australia, Japan, and Canada; (2) The EU’s *Corporate Sustainability Reporting Directive* and its associated *European Sustainability Reporting Standards* for the many Maryland-based corporations with European operations or supply chain relationships; and (3) The disclosure expectations of international institutional investors and lenders for whom climate-aligned reporting is increasingly a condition of capital access.

These parallel obligations all require facility-level, verified emissions data. The MRV framework Maryland designs for its cap-and-invest compliance system will generate precisely this data—for every covered facility, every year, verified by an accredited third party. The question the study should address is whether that compliance data can be designed to serve both purposes simultaneously: cap-and-invest compliance and corporate disclosure, without duplicate measurement, duplicate verification, and duplicate reporting at the facility level.

The integration case is strongest—and most consequential—for *Scope 3* emissions accounting. Many of Maryland’s largest covered facilities are upstream suppliers, fuel distributors, or industrial producers whose direct facility emissions appear simultaneously as their own *Scope 1* compliance obligations and as the *Scope 3* upstream emissions of their corporate customers and business partners. A cap-and-invest MRV system that produces facility-level verified emissions data in a structured, interoperable format can become the data foundation for accurate *Scope 3* accounting across Maryland supply chains—reducing the measurement inconsistency and verification gap that currently makes *Scope 3* figures the least reliable element of corporate climate disclosure.

This integration does not require redesigning the cap-and-invest program. It requires designing the MRV data architecture from the outset with disclosure compatibility in mind. That would mean: (1) Standardized data formats; (2) Structured reporting templates; and (3) Public accessibility of verified facility-level emissions data. California’s Air Resources Board has moved in this direction with its *Mandatory Greenhouse Gas Reporting* regulation, which produces a publicly accessible facility-level emissions database that is used both for compliance purposes and as the primary data source for *Scope 3* accounting by California-linked supply chains. Maryland’s program design should evaluate this model explicitly and consider how it can be improved upon.

The study should specifically address: (1) The data format and accessibility standards that would make Maryland’s MRV data interoperable with major corporate disclosure frameworks,

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including ESRS, ISSB S1/S2, and the SEC climate disclosure rule; (2) The governance framework for public access to verified facility-level emissions data; and (3) The potential for Maryland to establish itself as a leader in integrated climate data infrastructure—producing compliance data that simultaneously serves regulatory, investor, and supply chain accountability purposes.

CONCLUSION

Senate Bill 590 creates the legislative foundation for a study that is genuinely consequential for Maryland’s legal obligations, economic future, and the communities that bear the greatest burden of its industrial emissions. The five design dimensions I have addressed—(1) overburdened community evidence architecture and engagement, (2) revenue investment accountability, (3) transboundary data governance for a linked program, (4) AI-assisted MRV governance, and (5) integration with corporate disclosure obligations—are not arguments for or against the program itself. They are specific operational design questions where investing rigor during the study phase will produce a more credible, more equitable, more durable, and more legally defensible program when it is ultimately implemented.

Maryland’s emissions gap is real, legally mandated to close, and growing under current policy conditions. The cap-and-invest study is the right mechanism to design the most powerful tool available to close it. The committee’s support for this bill—and its direction to MDE to conduct the study with the operational depth these design questions require—will determine whether Maryland’s program becomes a national model for equitable, data-driven, administratively rigorous climate policy, or an instrument whose ambition exceeds its accountability architecture.

I am available to provide supplementary analysis or respond to questions from committee members or MDE staff on any aspect of these observations.

Respectfully submitted,
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