

Condensed Version of Marketable Permit Report

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(This report does not necessarily reflect the views of ACUS or NYU.)

This extended summary condenses the entire report's findings and recommendations. Recommendations first appear bolded in their supporting sections, and then are cataloged together at the end of this summary. For the sake of brevity, all citations have been removed from the summary.

What Are Marketable Permits?

Marketable permits are regulatory tools designed to allocate privileges or obligations more efficiently by harnessing the market's decision-making powers. Marketable permits are intended to lower compliance costs, ease administrative burdens, and incentivize innovation more than traditional regulation. Historically, marketable permits have enjoyed bipartisan support. The administrations of Presidents Reagan, Bush (41), Clinton, Bush (43), and Obama all used marketable permits.

Regulators have often applied marketable permits to environmental policies. Multiple markets exist for traditional air pollution, including most famously the acid rain market, as well as markets for global pollutants like ozone-depleting substances and greenhouse gases. Other environmental markets include wetland and habitat banks that sell credits to project developers who need to offset their impacts to wetlands or endangered species. Many federal fisheries use tradable catch shares to let fishers operate more efficiently without racing to maximize their catch before the season ends. Water quality trading has been somewhat slower to take off, though several states have experimented with programs.

Tradable obligations for renewable energy production and energy efficiency—like markets for vehicle efficiency standards, renewable fuel credits, and interstate renewable electricity credits—target environmental goals as well as saving consumers money and reducing dependence on foreign energy.

Non-environmental marketable permit programs include the auctions and secondary trading of electromagnetic spectrum licenses, the trading (and proposed, but currently defunct, auction) of airport landing slots, and—at the state and local levels—transferable development rights, liquor license markets, and taxi medallion auctions. Other ideas for marketable permit programs considered by federal agencies or proposed by academics include transferrable permits for aircraft noise levels, tradable recycled newsprint quantity requirements, auctions for satellite congestion in space, and tradable limits to control the over-prescription of antibiotics.

Characteristics of a Prototypical Marketable Permit Program

Marketable permits depart from the prescriptive, inflexible, or highly particularized approaches often seen in traditional regulation. Traditional environmental regulation, for example, may require each individual polluter to comply with a specific standard and may even prescribe exactly which technological or operational changes sources must make to comply. Traditional licensing of access to the electromagnetic spectrum was similarly particularized and inflexible: individual applicants had to navigate complex administrative hearings, and once spectrum was assigned it was difficult to reassign.

By contrast, marketable permits rely on the market to identify the most cost-efficient way to allocate regulatory privileges or obligations. For example, under a cap-and-trade system for greenhouse gases, a regulator sets an overall maximum budget of permitted emissions per time period, but individual regulated sources to decide for themselves, based on their own abatement costs, what emissions

reductions to make and how: they can choose to emit as many tons as they can afford to buy additional permits for, or they can reduce emissions and sell any unused permits for profit. Similarly, instead of forcing regulators to divine how to allocate electromagnetic spectrum to the highest value uses, auctioning licenses and allowing re-sale entrusts the market to identify the most valuable uses.

A prototypical marketable permit scheme entails the following steps. First, a regulator determines the quantity of privileges or obligations to be allocated. Second, a regulator allocates those privileges or obligations by auction; by lottery, either for free or at a fixed price; by criteria-based rules, such as historical use of the resource, again either free or with a fixed charge; or by approving the sale of verified credits generated by third parties. Third, the regulator determines the rules for trading permits on a secondary market. Finally, the regulator monitors permit transactions and holdings, and compares permit holdings to use of the common resource to determine compliance.

Definition and Categorization of Marketable Permits

Marketable permits are *permits*: they are government-created licenses or obligations for a specific level of a particular activity. Many permits can be transferred together with the sale of a business or underlying assets. What distinguishes *marketable* permits is that they can be bought or sold independently of any real property or other interest. The markets for these permit exchanges are often regulatory creations as well and require careful oversight.

Marketable permits can be traded on primary markets, secondary markets, or both. Primary markets refer to the first transfer of permits and include auctions of allowances or licenses as well as sales of credits generated by approved third parties. Secondary markets include all subsequent transfers of the permits. Some secondary permit markets also give rise to derivatives markets, where futures and options based on the value of the underlying permits are traded.

Two main categories of marketable permits are cap-and-trade programs and credit trading programs. Though political debates often associate the term “cap-and-trade” with pollution reduction, the cap-and-trade framework applies to a range of marketable permit schemes, including allocation of a capped number of tradable licenses in electromagnetic spectrum or aerospace. In cap-and-trade programs, regulators set an absolute budget of pollutant tons or allowable fish catch or number of airport landing slots. In credit trading, regulators set a relative goal, like no net emissions increases or no net loss of wetlands, and then any new entrants seeking to increase emissions or develop over wetlands must purchase offsetting credits that are sold by third parties and verified by regulators. Cap-and-trade and credit systems can be combined. For example, in a greenhouse gas cap-and-trade program, unregulated sources may be allowed to voluntarily reduce their emissions and sell verified credits into the market.

Other market-based regulatory tools—bubbles, averaging, banking, borrowing, and regulatory fees—are sometimes grouped with marketable permits, but they are distinct and are not directly covered here.

Explicit Statutory Authorization Is Not Necessary, But May Be Desired

Many, but certainly not all, existing marketable permit programs have explicit statutory authority. Several programs currently have explicit statutory authority but once existed without it, such as the ozone-depleting substance market and wetland mitigation banking.

A number of marketable permit programs have never had explicit statutory authority, including EPA’s various trading programs for vehicle emissions, conservation banking under the Endangered Species Act, and water quality trading under the Clean Water Act. In fact, the U.S. Court of Appeals for the Ninth Circuit once strongly implied, in dicta, that the lack of explicit statutory authority for water quality trading meant it was not permitted. Nevertheless, water quality trading has continued.

Case law supports the idea that agencies can find implicit authority for market-based regulatory tools. In 1976, the Supreme Court relied on the Trade Expansion Act's broad statutory language and legislative history to conclude that the President could use license fees in addition to quotas to control petroleum imports. That case and its progeny confirm that broad language can implicitly authorize a variety of market-based tools, so long as they directly target legitimate regulatory purposes.

Though agencies may successfully rely on their discretion to interpret broad statutory language, lack of explicit authority can cause lingering uncertainty over a marketable permit program's legal status. Water quality trading's slow development is blamed partly on lack of legal certainty and clarity. **If marketable permit programs exist without explicit statutory authority, Congress should consider endorsing those programs. Agencies should communicate to Congress any legal barriers to marketable permits.**

Auctions Are Not Unconstitutional Taxes

The Supreme Court has cautioned against regulatory fees that discourage activity or put agencies "in search of revenue," for such traits are "in the nature of 'taxes'" that only Congress can levy. It could be argued that auctions for marketable permits, whether implicitly or explicitly authorized, resemble taxes.

However, properly framed, permit auctions are distinguishable from taxes. It is the cap, not the method of permit allocation, that discourages activity. Economic theory predicts that, whether auctioned or freely allocated, marketable permits will affect regulated entities' decisions the same way. The following analogy paints a clear picture: "A ticket scalper is going to charge the same amount—the going black-market price—whether he's selling a ticket that he found on the ground or a ticket that he bought. He's just going to turn more of a profit if he found it on the ground."

The reasons to choose auctions over free allocations relate to distributional concerns and market management, not a desire to modify behavior. Compared to free allocations, auctions lower barriers to new entry, avoid the risk of market power, and prevent unjust windfalls. Finally, while an auction may raise revenue, that is not its primary intent, which is to achieve a regulatory goal most efficiently. To preemptively protect the legal status of permit auctions in future litigation, **agencies should emphasize the market management and distributional reasons for choosing auctions besides raising revenue, to avoid potential categorization of the permit auction as an impermissible tax.**

Avoiding the Misperception of Marketable Permits as "Property Rights"

Many economists argue that marketable permits should be treated as secure property rights, to incentivize long-term investment strategies. Many legal experts and advocates express ideological and practical concerns with treating marketable permits as property. Ideological concerns are raised about privatizing previously public resources or commodifying the environment and human health. Practically, regulators may need to ratchet down a cap over time and could face intense political opposition and legal challenges from existing permit holders who feel their "rights" are being taken without compensation. Ultimately, marketable permits are best seen as temporary licenses for a particular activity, with some privileges of property but subject to the government's right to reclaim the permit.

Some laws specifically disclaim marketable permits' property status, to prevent permit holders from seeking compensation if government rescinds their permits. Other laws are less precise or less consistent. At various points the Clean Air Act refers to the auctioning of "emissions rights." EPA and the Department of Energy have sometimes referred to renewable energy credits as "property rights."

Congress and agencies should avoid creating misperceptions by calling marketable permits "rights," and should instead use the language of marketable licenses or obligations.

Standardized Agency Guidance on Permit Markets Is Preferable to Ad Hoc Administration

The terms of marketable permits may be defined by codified legislative regulation, interpretive rule, agency guidance, or on an ad hoc basis. Without any formality, neither regulators, regulated entities, nor the public enjoys certainty or predictability. For programs implemented by regional offices or the states, lack of official guidance from the federal agency leads to inconsistent implementation. On the other hand, too much formality could limit a program's flexibility to adapt.

Some agencies establish marketable permit programs through codified regulations, such as for fish catch share programs and the wetlands bank program. On the other hand, for years water quality trading programs operated without any official guidance. EPA issued a water quality trading policy in 2003 through public notice and comment, but ultimately it remains an un-codified policy statement. The U.S. Court of Appeals for the Ninth Circuit has doubted the validity of water quality trades given that "nothing in the Clean Water Act or the regulation" provides for trading; EPA's 2003 policy statement was not enough for the court. At a 2015 EPA workshop, participants blamed water quality trading's slow development partly on legal uncertainty and expressed a desire for more explicit authority.

As another example, the Fish and Wildlife Service first published guidance on habitat banking in 2003, following by a 2016 policy developed with public notice and comment, but the agency still has no codified regulations on banking. A 2016 survey of bank sponsors supported (by 61%) more formal regulations, to reduce uncertainty. Shockingly, in 2013, only 68% of surveyed FWS staff were familiar with the agency's own 2003 guidance (only 30% "very familiar"; another 38% "somewhat familiar").

Guidance on marketable permit programs should minimally go through public notice and comment, and agencies should consider codifying regulations to resolve lingering uncertainty or inconsistencies.

Efficiency and Distributional Consequences

Do marketable permits lower compliance costs, ease administrative burdens, and incentivize innovation more than traditional regulation, and do they have special distributional consequences?

Marketable Permits Lower Compliance Costs and Prioritize Highest Value Uses

A major theoretical advantage of marketable permits over traditional regulation is the efficient allocation of privileges and obligations. Marketable permits allow the market to identify and prioritize the lowest-cost abatement opportunities or the highest value use of scarce resources. For example, when compliance costs vary greatly across regulated sources, uniformly prescriptive environmental standards are counterproductively expensive. If one source can reduce its greenhouse gas emissions at \$1 per ton while another faces \$1000 per ton costs, requiring the same performance from both is inefficient. Allowing the second source to pay the first to make extra reductions achieves the same emissions level at lower overall cost (i.e., \$2 instead of \$1001 for the first two tons).

Economic models and empirical data confirm this efficiency advantage. Compared to the counterfactual costs of prescriptive regulation, EPA's inter-refinery trading system for phasing out lead from gasoline saved approximately \$250 million per year, or 20% of total costs. The acid rain market achieved cost savings (versus non-trading alternatives) estimated in the range of 15-90%, or up to \$1 billion annually. In Alaska's halibut and sablefish fisheries, the introduction of tradable catch shares decreased operating costs and resulted in higher wholesale prices for fish. And considerable anecdotal evidence suggests conservation banks save project applicants time and money on their endangered species mitigation. Overall, marketable permit programs can improve efficiency in many regulatory applications.

Marketable Permits Incentivize Innovation

Another theoretical advantage over traditional regulation is that market-based tools create price signals that dynamically incentivize innovation. For example, because pollution markets put a price on emissions but do not otherwise constrain compliance strategies, sources can experiment continually and develop new, unanticipated methods of low-cost abatement. And because unused permits can be sold for profit, sources benefit the more reductions they make. An additional advantage of credit programs is stimulating activity and innovation in otherwise unregulated sectors.

Few empirical studies have analyzed innovation under marketable permit programs. The limited evidence is somewhat weak but suggests marketable permit programs incentivize innovation better than traditional regulation. For example, the lead phase-out program helped propagate cost-saving technologies, and the acid rain market stimulated operational innovations. The trading and leasing of electromagnetic spectrum licenses has helped users develop novel arrangements, such as sharing channels and voluntarily accepting more interference than FCC typically allowed in its direct licensing. Finally, conservation banking consolidates scientific expertise and financial resources into larger mitigation projects compared to small-scale offsets by individual permittees, and economies of scale lead to the creation of even more ecosystem services and credits.

Marketable Permits May Lower Long-Term Administrative Costs

Marketable permits have some theoretical advantages over traditional regulation on administrative tasks and may require a different allocation of bureaucratic resources. First, rather than forcing regulatory agencies to decide which industries, regions, or sources will bear the abatement costs or have access to valuable public resources, under a cap-and-trade or credit program, the market decides for itself. While marketable permits impose some new regulatory tasks on regulators, like running auctions and registries, over time they may lower administrative costs.

Additionally, market systems may respond better to changing economic circumstance. For example, pollution markets automatically adjust to economic growth and accompanying emissions; prescriptive regulation requires constant new efforts to accommodate growth without pollution increases. Markets could also ease disputes with regulated entities by lowering compliance costs: it simply may be cheaper to comply than to dispute. Finally, markets could improve monitoring and enforcement. Regulated entities will support monitoring and enforcement to protect the value of their permits, because noncompliance by others reduces the demand for and price of permits. Agencies and courts may be more willing to enforce a market program by simply requiring the purchase of permits as a penalty, as opposed to forcing installation of expensive retrofits to comply with traditional regulations.

That said, effectively running a complex market scheme with few administrative resources may be unrealistic. Markets will not function properly if regulators only passively tally permits. Rather, active regulators must analyze and disseminate market information, and sometimes create trading platforms; coordinate with firms as a technical consultant and assist small entities in designing compliance plans; and formulate contingency plans in case the market fails to achieve regulatory objectives. Ultimately, running a market program may be just as or more demanding for agencies than traditional regulation.

The evidence is somewhat mixed: the acid rain market famously achieved nearly 100% compliance with only about 100 EPA staff, while catch share programs have increased administrative costs in some fisheries. Overall, trading can eventually lower administrative costs, but in the short term may increase costs or require reallocating resources and staff. For example, instead of engineers to identify control strategies and negotiate permit terms, a market might require more dedicated monitors and enforcers.

Unlike Free Allocations, Auctions Avoid Windfalls and Barriers to Entry

In cap-and-trade programs, regulators can allocate permits by open auction; by lottery, either for free or at a fixed price; or by criteria-based rules, such as historical use of the resource, again either free or at a fixed charge. Auctions and free allocations based on historical use are the most common choices.

Free allocation is a form of “grandfathering,” which, broadly defined, means giving special regulatory treatment to existing actors compared to new actors. Grandfathering arguably protects returns on past investments and eases tensions with the regulated industry. In fish catch share programs, for example, regulators prefer free allocations based on catch history to protect traditional fishing communities and incentivize existing fishers to act collectively to enhance the fish stocks’ long-term value.

However, grandfathering can be inequitable, as it awards the regulated industry a windfall enrichment and creates barriers to new entry. Returning to the ticket scalper analogy used above, whether the ticket was initially purchased or found for free on the ground does not change the black market price; it only affects the scalper’s profits. Likewise, freely allocating versus auctioning greenhouse gas permits will not affect firms’ compliance decisions or the costs passed on to customers; the choice only affects the firms’ profits. By contrast, with a revenue-raising auction, only the taxpayers get a windfall.

Auctions also reduce barriers to entry compared to grandfather. For example, the cost and uncertainty of FCC proceedings once discouraged new competitors from seeking spectrum licenses; with auctions, they just buy in. When allowances are freely allocated to historic users, new entrants must rely on secondary markets for the permits necessary to operate. Existing entities have little incentive to sell permits to potential new competitors. For example, new entrants accuse large airlines of colluding to hoard landing slots. Regulators may address entry barriers by setting aside allowances for new entrants. In 2011, when Delta and U.S. Airways wanted to swap landing slots, FAA approved the trade on the condition that a portion of slots would be auctioned to small and new carriers.

An alternative to free allocations for regulated entities based on their historic use is allocating to others based on different criteria. For example, New Zealand gives 40% of fish catch shares to the Maori, so the community can protect itself. In air pollution markets, some experts advocate allocations based on output rather than historic emissions, to reward renewable energy generators and facilitate new entry.

Agencies should opt for auctions over grandfathering to prevent windfalls and barriers to entry. If auctions are not feasible, agencies should consider alternate allocation techniques, like set-asides for new entrants, output-based allocations, and community-based allocations.

Small Entities, Consumers, and Auction Revenue

Small entities may face challenges in marketable permit programs. They may lack the resources for long-term planning to manage market risks. They may face higher transaction costs on secondary markets or lack the relationships needed to find buyers and sellers if permits are not traded on centralized exchanges. For example, though EPA designed its trading system for lead in gasoline in part to help small refineries manage costs, in reality small and new refineries faced higher transaction costs. Similarly, small, rural providers have trouble accessing electromagnetic spectrum on secondary markets. The distributional consequences of fish catch share programs have attracted much attention. Alaska’s halibut and sablefish fisheries endured layoffs, with small fishers and communities hit hardest. Small red snapper fishers resent the creation of a “new class of ‘sea lords’” who own shares but lease them rather than fish themselves. **Regulators can use position limits to minimize the consolidation of permits.**

None of this suggests that distributional consequences are necessarily worse under marketable permit programs than traditional regulations. As noted above, auctions help put all firms—large, small, new,

existing—on relatively equal footing, and other allocation methods can specifically address distributional concerns, like giving catch share directly to native communities. Regulators must study the potential distributional effects of marketable permit programs, though there is likely no one-size-fits-all solution.

Another distributional concern raised about marketable permits is that by charging regulated entities for permits they once received for free, those costs will be passed on to consumers. However, economic theory suggests that the marketability or auctioning of permits has no effect on consumers compared to other kinds of similarly stringent regulation. Under a greenhouse gas cap-and-trade program, it is the cap, not the trading or auctioning, that raises the cost of electricity, and similarly stringent prescriptive regulations would have similar results. Empirical evidence confirms this theory. FCC’s spectrum auctions did not raise consumer prices for cellular telephone service, and consumers did not experience changes in the retail price of gasoline despite huge volatility in the price of renewable fuel credits.

Though auctions, free allocations, and prescriptive regulation might all have similar consumer effects, auctions at least generate revenue that can be returned to consumers. Direct consumer dividends typically will not be available to federal agencies as the law generally requires agencies to deposit proceeds into the general U.S. treasury (except enough to cover administrative expenses). Still, general treasury deposits ultimately lighten the overall tax burden—a preferable result to a free windfall for regulated entities. Notably, state agencies may not be subject to such constraints and may be able to dividend auction revenue back to consumers. **Federal agencies should opt for auctions and should encourage states to use an auction-and-dividend approach.**

Policy Effectiveness

Do marketable permits achieve the desired regulatory objectives without unintended consequences?

Preventing Unintended Consequences through Exchange Restrictions and Reviews

Marketable permits work best when regulators care more about total activity levels than who is acting. Global pollutants like greenhouse gases are ideal for marketable permits because they are so flexible on the questions of “who, what, where, and when.” Greenhouse gases mix in the global atmosphere, have long lifespans, and affect global climate through accumulated concentrations rather than individual emission rates. Because greenhouse gases have no localized effects, it does not matter which industries, sources, or regions reduce their emissions: regulators can set the cap and let the market sort out who can achieve which reductions at the lowest compliance cost.

Other permit markets may require exchange restrictions or institutional reviews to prevent trades between dissimilar outcomes. For example, California’s RECLAIM program let refineries offset their emissions by funding the scrapping of highly polluting cars. However, refinery emissions are locally concentrated, more carcinogenic, and spike at irregular times, while vehicle emissions are geographically diffuse, less carcinogenic, and peak at rush hour. Allowing trades without restrictions on the assumption that vehicle and refinery emissions are interchangeable ton-for-ton would generate unintended, negative consequences: instead of exposing a diffuse population to somewhat dangerous vehicle emissions, increased refinery emissions could expose a concentrated population to highly dangerous pollution. A more complex system, like trading in levels of cancer risk rather than in tons of emissions, could theoretically resolve these problems, but with heavy informational burdens and transaction costs. Instead, most marketable permit programs keep simple currencies like tons of pollution or acres of wetland, and address any unintended externalities through restrictions on who can trade, when they can trade, and at what trading ratio. Unfortunately, too many exchange restrictions create the risk of thin, inactive markets, which undermines the program’s efficiency.

Trades with geographically dissimilar effects are commonly feared in markets for local and regional pollutants. By allowing sources to purchase credits and emit more than they would under prescriptive standards, localized increases in emissions could create “hot spots” that disproportionately affect sensitive populations. Despite some sporadic evidence, in general there is little proof that markets exacerbate hot spots. Nevertheless, many marketable permit programs have preemptively adopted restrictions on trading permits or credits outside designated zones. Regulators may also apply trading ratios, with more permits or credits required to offset increased activity at a potential “hot spot.” Finally, in some markets, automatic reviews by computerized models could potentially detect and block only trades that would cause hot spots. However, any case-by-case reviews conducted not by computers but by humans—agency regulators, public review, or the courts—will increase transaction costs and risk false positives and the invalidation of otherwise good trades.

Capping Total Activity Levels Is More Effective Than Capping the Rate

The choice of capping either total activity or the rate of activity arises most often in pollution markets, though the question can occur in other policy contexts. For example, in a proposed market to control the issuance of antibiotic prescriptions, it is the difference between capping total prescriptions or just capping the number of prescriptions a doctor can write per patient. In any context, a cap on total activity offers more efficient and predictable results than rate-based trading. For example, by placing a hard cap on total tons of air emissions, a mass-based trading program guarantees a set pollution level. By contrast, under a rate-based system, if demand for the regulated activity increases, sources can continue to meet their required limit per unit of activity while increasing their overall activity, resulting in more emissions. Rate-based programs are also harder to administer. **Agencies should cap the total activity level, rather than just capping the rate of activity.**

Features of Marketable Permit Programs Can Help Agencies Increase Regulatory Goals

The cost savings offered by marketable permits may enable regulators to set more stringent caps than they could under prescriptive regulation, or may even break a political logjam blocking any regulation at all. Many credit the acid rain market’s cost savings as making dramatic cuts to sulfur dioxide pollution politically feasible. The lower costs predicted from trading were also instrumental in negotiating more stringent limits for ozone-depleting substances and a faster phase-out timeline for lead in gasoline.

Another market feature that can affirmatively further the program’s policy goals is open participation rules. By allowing anyone to participate in the market, public-minded groups or citizens can purchase and retire emission allowances, as they often do in the acid rain market.

Some programs tweak trading ratio to advance policy goals. For example, Maryland’s water quality trading program adopted a retirement ratio that requires purchasing 11 credits to offset 10 tons of pollution. Though such retirement ratios advance policy goals, they undermine efficiency by blocking otherwise cost-saving trades. If regulators want marketable permit programs to affirmatively advance policy goals beyond even the outcomes that prescriptive regulations could achieve, increasing the overall stringency of the cap is preferable to selectively distorting the market through retirement ratios.

To use the market’s advantages to enhance policy effectiveness, agencies should focus on fine-tuning the cap’s stringency in light of cost savings and should allow open access to the market so citizens can retire credits. Retirement ratios undermine a program’s efficiency and should be avoided.

Adjusting the Cap

Caps can be set to automatically increase stringency over time: EPA's market to phase out lead from gasoline steadily worked toward a cap of zero. New information about costs, benefits, or economic conditions could necessitate manually adjusting the cap. Lowering the cap directly could prove politically challenging, especially if regulated entities come to expect free permit allocations. Allocating relative allowances instead of absolute allowances could partly short-circuit political opposition. For example, fish permits typically define a percentage share of total allowable catch, so the agency can change the overall cap without altering each individual fisher's percentage. **To facilitate adjusting the cap, agencies should consider allocating percentages of a cap, rather than allocating absolute subunits of a cap.**

Setting Baselines and Verifying Credits

Credit programs must ensure credits are real. First, credits must be measured against realistic baselines and must be "additional." The baseline scenario predicts what the credit generator would have done but-for the opportunity to generate credits. An "additional" credit reflects actions that would not have occurred without the financial incentive provided by the regulatory market. If aircraft operators already planned to switch to quieter aircraft even without a rule, allowing the operators to earn noise reduction credits for switches that would have happened away will undermine the program's overall effectiveness.

A related risk, which may occur either in credit programs or cap-and-trade programs, is parties trying to "game" the baseline. For example, years of public debate may precede a fish catch share program. If shares will be awarded based on historic catch, new fishers may enter or existing fishers may increase their harvest in advance the program's establishment, to win a larger share of the valuable allocation. This scenario highlights the importance of setting a firm baseline and picking the right baseline year.

Credits must be quantifiable and certain. Measuring credits can be a challenge, as the variety of credit-generating projects impedes standardized tools. Direct measurement of activity will frequently be infeasible. For example, regulators cannot calculate water quality credits by measuring pollution reductions at non-point sources: after all, they are called "non-point" because they lack an identifiable point (like a pipe) from which to measure discharges. Instead, regulators may calculate credits by developing site-specific models or applying standard rates based on professional judgment. Still, the complex science of water quality inevitably leaves uncertainty about whether credits reflect real reductions. Trading ratios can adjust for uncertainty, requiring more credits than even the best available quantification tools predict are needed to offset the licensed action. For example, a common uncertainty ratio for water quality trading is 2:1, requiring at least two credits to offset a single ton.

Credits must not be double counted. Careful accounting practices should thoroughly track transactions and ensure unambiguous ownership of credits. "Credit stacking" raises further risks of double counting. Credit stacking occurs when a single project produces credits for multiple markets: for instance, if a wetlands mitigation bank also sequesters carbon dioxide. The concern is: would the wetland project not have generated those additional carbon credits but-for the opportunity to stack credits? The Fish and Wildlife Service allows stacked credits to offset only a single development project's effects (e.g., a single project with both wetland and carbon effects); the credits cannot be unbundled to mitigate multiple projects. On the other hand, the National Marine Fisheries Service has no clear policy on stacking.

Voluntary markets also create double counting risks. Unregulated entities may seek voluntary credits, like airplane passengers purchasing carbon offsets to address their personal climate impacts. Regulators of mandatory permit markets need to monitor voluntary markets to prevent the same credit from being sold in both markets. Another risk with voluntary markets is that buyers and sellers could agree to low-quality standards to govern any unofficial, early trading program. These early, low-quality standards may

then anchor the discussion about trading rules for a subsequent regulatory permit market, leading to the ultimate adoption of weak standards for verifying the quality of regulatory credits.

Agencies should have clearly defined criteria for credit approval, to ensure credits are “real.” Credit approval systems should not reward behavior that would have happened anyway (“additionality”), should allow for predictable and repeatable calculations, should address uncertainty, and should avoid double-counting. Credit approval programs should include procedures for selecting clear baselines, developing predictable and pre-approved calculation tools, applying consistent standards for uncertainty ratios, and establishing policies on credit stacking. Uncertainty trading ratios should be based on science, consistently applied, and kept transparently distinct from any other trading ratios (like ratios to manage hot spot risks) rather than merged into a single combined ratio.

Standards for Third-Party Verifiers

Deciding who conducts credit verification requires balancing several factors. Some property owners, like farmers, may be reluctant to allow government access for inspections. Agency resources may be limited. Self-verification may be selectively appropriate, if procedures can be standardized, agencies can impose strong penalties for false reporting, and citizen suits are available to help police noncompliance.

If neither direct agency oversight nor self-verification is appropriate, agencies will need to rely on third parties. Third parties may have specialized expertise, may have an easier time charging inspection fees, and can staff up or down more flexibly than agencies in response to changing transaction volumes. However, the agency risks that the third party will not accomplish the agency’s mission. Third parties need minimum education and experience requirements, or specialized training and accreditation. Third parties also need liability insurance, dispute resolution systems, and systems for protecting confidential information. Agencies must ensure third parties do not develop conflicts of interest. Third-party verifiers have a financial incentive to brand themselves as “market advocates” and encourage sub-par trades. Conflicts can develop over time, for example if the same reviewer depends on the same projects every year for revenue. Agencies could require that verifiers rotate every few years or could randomly assign reviewers to projects. Ultimately, when relying on third parties, agencies need to retain some oversight.

If agency oversight is not efficient and self-verification is not effective to verify credits, agencies should set standards to ensure that third-party verifiers are qualified, insured, and conflict-free.

Responsibility for Performance and Contingencies

Some credit programs have a “buyer beware” policy: if a credit generator does not perform—either intentionally, such as fraud, or unintentionally, such as unexpected acts of nature or miscalculation—the buyer retains responsibility for compliance. For example, fraudulent renewable fuel credits must be replaced by buyers, often at great cost. In contrast, under the Fish and Wildlife Service’s conservation banking policy, liability for noncompliance transfers from the buyer to the bank sponsor upon purchase of a credit. However, this policy is not applied consistently among the agencies responsible for conservation banking: the National Marine Fisheries Service’s West Coast Region reports that, for users of its conservation banks, responsibility for adequate mitigation stays with permit applicant. Credit programs do not always clearly assign liability in the event of acts of nature. According to a 2003 survey of conservation banks, many bank agreements did not specify what happens in event of natural catastrophe, most banks had no contingency funds of insurance policies for acts of nature.

Imposing monetary fines after the fact for violations or even penalizing noncompliance by increasing the stringency of obligations in future years may not truly compensate for any environmental or other policy losses suffered in the meantime. EPA’s water quality trading policy recommends that states consider

establishing centralized reserve credit pools from which buyers can purchase additional credits during an end-of-year compliance deadline to make up for unanticipated shortfalls. For example, the Ohio River trading program requires participants to hold 10% of credits in reserve for contingencies. Financial guarantees can provide some certainty of performance. The Fish and Wildlife Service encourages conservation banks to set aside a bond, endowment, or surety to cover future management costs.

Agencies should establish clear rules for liability and responsibility for acts of nature. Performance bonds and reserve pools may be useful tools.

Enforcing Compliance

By reducing compliance costs, marketable permit programs could lower the incentive for firms to entertain noncompliance. Compliant sources may support strict enforcement, because noncompliance by other actors lowers the value of their allowances. In the wreckfish catch share program, fishers more readily cooperate with enforcement officials, recognizing that illegal fishing reduces their shares' value.

The acid rain market is famous for near 100% compliance. The program features stiff, clear penalties (\$2000 per excess ton in 1990 dollars, fixed to inflation), plus a requirement to submit a plan for how those excess emissions will be offset in future years, and EPA deducts allowances equal to the excess tonnage from the firm's allocation for the following year. The acid rain market has high levels of detection and almost self-executing enforcement by virtue of two linked tracking systems: allowance holdings are tracked by EPA's Allowance Management System and are compared at the end of the year to the total emissions registered by the Continuous Emissions Monitoring Systems (CEMS).

Other markets have more mixed compliance and enforcement records. Several fish catch share programs have seen enforcement costs rise. Some markets lack the clarity of the acid rain program's penalties: for example, noncompliance with EPA's vehicle emission programs could result in penalties as high as \$37,500 per car, though much uncertainty remains. **Marketable permit programs need clear, adequate sanctions, ideally including both penalties and plans for coming into compliance.**

Policy Performances

Many marketable permit programs achieve policy goals as well or better than prescriptive regulations likely could. As summarized above, markets' cost savings may enable regulators to set more stringent caps than they could under prescriptive regulation, or even break a political logjam blocking any regulation. Many credit the acid rain market's cost savings as making dramatic cuts to sulfur dioxide pollution politically feasible. The lower costs predicted from trading were instrumental in negotiating more stringent limits for ozone-depleting substances and a faster phase-out of lead from gasoline.

Other evidence includes that annual harvest limits in fish catch share programs are rarely exceeded, because catch shares programs generally include increased monitoring. For the Gulf of Mexico red snapper fishery, before establishing tradable catch shares, the fishery saw quota overruns in 11 of 17 years; since the program, no quota overruns have occurred. The Fish and Wildlife Service (FWS) reports that conservation banking often achieves net benefits to endangered species habitat. In a 2013 survey, 62% of FWS staff felt banks were generally effective at aiding species recovery, and another 18% felt banks did as well as other mitigation options; only 8% felt banks were ineffective. Because conservation banks require mitigation to be completed before selling credits, banking may provide more certain environmental benefits than permittee-responsible, on-site mitigation, which does not necessarily have to be completed in advance of the habitat impacts.

Not everyone agrees with this rosy depiction of marketable permit programs' policy effectiveness. The effectiveness of wetland banking and water quality trading have faced particularly blistering critiques. In

2008, an EPA consultant reported that of over twenty-five water quality trading programs, “very few” could claim any significant gains to water quality. Several environmental law experts question whether wetland banking has improved the environment at all. Limited agency resource for enforcement may be partly to blame. On the other hand, the Army Corps of Engineers argues that any effectiveness problems at wetlands banks would be the same or worse at permittee-responsible mitigation, because of greater uncertainty; at least banks achieve some compensation before the destruction.

To some extent, the public and researchers lack the data to analyze the success of environmental markets. EPA has called for periodic assessments of the environmental and economic effectiveness of water quality trading, though it is not clear this has taken place. In 2015, the Army Corps conducted a retrospective review of the administration of its wetland banking rule, but not of ecological outcomes. **Agencies should release any non-confidential data that would help the public gauge a market’s policy effectiveness, and should periodically assess both the policy and economic effectiveness of a program.**

Market Integrity and Oversight

Facilitating Secondary Markets

Secondary markets refer to transactions after the initial allocation, including sales and leases. Not every marketable permit system provides for secondary transfers. Notably, neither wetland nor habitat credits can be resold or traded after the initial purchase from the credit bank.

Secondary transactions can occur through various channels. Bilateral trading involves direct negotiation between buyer and seller, which entails numerous transaction costs: researching the market and determining the going price, finding a trading partner, negotiating terms, handling paperwork and payments, and enforcing the contract. Brokers, aggregators, clearinghouses, and exchanges help minimize some of those transaction costs. Aggregators and clearinghouses convert credits with variable prices and quality into a more uniform currency. For example, an aggregator may pay farmers to install various pollution control techniques to generate water quality credits, which the aggregator sells at a fixed price. Clearinghouses act as intermediaries between buyers and sellers and guarantee performance in the event of default. Centralized exchanges have the lowest transaction costs, as they automatically match buyers and sellers in standardized transactions at transparent prices. Exchanges’ transparency also facilitates oversight. However, those advantages come at the cost of the customization of terms available in “over-the-counter” transactions conducted outside of exchanges.

In some marketable permit programs, robust secondary markets have been slow to develop without active involvement of regulators. For example, EPA and the Department of Transportation’s markets for vehicle emissions and efficiency provide no centralized setting for trading, raising transaction costs and possibly explaining the initial low trading volumes. With electromagnetic spectrum licenses, because of interference between neighboring channels, transferring spectrum from one use (television broadcast) to another (wireless carriers) can be difficult without coordination. The Federal Communications Commission is currently running a two-step “incentive auction” wherein the Commission acts as intermediary between broadcasters with underutilized spectrum and wireless providers seeking additional spectrum, allowing the Commission to “repack” channels to minimize interference.

Market participants need accurate information on prices and allowance availability to make appropriate decisions about their compliance options. Yet, too much transparency has a cost: reporting transactions and prices could reveal confidential business information about a firm’s technology and costs to competitors. Speculators can take advantage of overly rich market data to attempt to manipulate future prices. However, without reliable price information, buyers and sellers will have difficulty coming to

terms, reducing the number of trades and the market's efficiency. In the lead phase-out program, a greater proportion of large refineries traded than small refineries, likely because of transaction costs: prices were treated as highly confidential by most market participants and were not reported, leading to increased search costs to discover the price. Neither EPA nor the Department of Transportation reports prices for trades in vehicle emissions and efficiency markets, which contributed to past market thinness.

The Federal Communications Commission's spectrum auctions are conducted online and results are publicly available in near real-time. However, similar information is not always available to facilitate secondary transactions. Historically, neither industry nor FCC had sufficient information on who had spectrum and what they were doing with it; poor record-keeping and disclosure blocked secondary trading. FCC's License Search now lets buyers look for leasing opportunities, but the Spectrum Dashboard, a way for buyers and citizens to search who owns spectrum and how it is being used, never advanced beyond its beta release and has not been updated since 2014.

One difficulty for water quality trading is sources that are potential credit buyers and sources that are potential sellers do not necessarily receive their permits simultaneously, and so enter the market at different times. The lack of synchronicity makes it harder for buyers and sellers to find each other. A recent EPA-USDA workshop on water quality trading raised the idea that states could use "general permits" to establish pollution caps for groups of similar sources watershed-wide, and allow such sources to trade among themselves to achieve net pollution reductions.

Regulators should consider whether they can address barriers to efficient secondary transactions, for example by facilitating price discovery. Without revealing proprietary or confidential business information, regulators should act as information brokers, collecting and disseminating data on trade prices and volumes. Regulators can also help minimize transaction costs and ensure adequate market participation by supporting or operating brokerages or exchanges. EPA should encourage states to consider using general permits to facilitate water quality trading.

Oversight of Primary, Secondary, and Derivative Markets

The Dodd-Frank Wall Street Reform and Consumer Protection Act established an interagency working group to investigate the oversight of carbon markets, chaired by the Commodity Futures Trading Commission (CFTC). In 2010, this group concluded that while CFTC has authority for "comprehensive oversight" of derivative markets relating to carbon allowances, "[n]o set of laws currently exists that apply a comprehensive regulatory regime" to primary and secondary permit markets.

CFTC likely does have sufficient authority to monitor derivative markets effectively; whether it exercises that authority for marketable permit programs remains an open question. For example, CFTC has not established position limits for carbon market derivatives or other environmental commodity derivatives. Some advocates worry that excessive speculation in derivative markets will create unnecessary risks of market manipulation. However, a ban on permit derivatives could simply prompt covered entities to hedge their risks in related markets (like using energy derivatives to hedge against risks in air pollution markets) or in foreign derivative markets. Excessive speculation may be better addressed by requiring derivatives to be traded on exchanges, with position limits. Exchanges' standardized contract terms also promote transparency and facilitate oversight. However, contracts for developing offset credits may be too hard to standardize to put exclusively on exchanges, given the wide variety of credit-generating projects and uncertainty about project performance. Credit derivatives, therefore, may need some over-the-counter trading. **CFTC should monitor active derivative markets relating to regulatory permits and exercise its authority to prevent fraud, manipulation, and excessive speculation.** CFTC should set position limits for active permit derivatives or require permit derivatives be traded on exchanges. An exception could be made for derivatives of offset credits.

Oversight of primary and secondary markets may depend on the statutory authority of the individual agencies implementing marketable permit schemes. Some experts encourage agencies to read their statutes aggressively to find authority over any un-regulated secondary markets. However, these experts also caution that acquiring expertise in market oversight takes time and resources.

CFTC has authority to surveil secondary transactions conducted on registered exchanges. For example, CFTC oversees the Regional Greenhouse Gas Initiative's allowances traded on the Chicago Climate Futures Exchange. Regulated exchanges also police themselves, with rules on position limits and to ensure fair trading. Banning over-the-counter secondary transactions and requiring all trades to be on exchanges could strengthen oversight—though at the loss of over-the-counter trading's flexibility and cost savings. In particular, contracts for variable credits and offsets may be difficult to standardize sufficiently to place on regulated exchanges. One compromise could be allowing over-the-counter transactions only for types of contracts not likely to be traded on exchanges.

CFTC should consult with other agencies on the oversight of secondary permit markets, and should identify to Congress any need for additional statutory authorities to regulate permit markets. Agencies should presumptively limit secondary trading of allowances and credits to exchanges, as appropriate and consistent with their legal authority. An exception could be made for over-the-counter contracts that cannot be standardized, like forward contracts for the delivery of offset credits.

Addressing Fraud, Monopolies, and Speculation Through Position Limits and Other Tools

Fraud and price manipulation not only undermine economic efficiency, but also erode confidence in the market. The renewable fuel credit market has been especially plagued by both real and perceived fraud. As of 2014, at least 140 million invalid or imaginary renewable fuel credits have been generated. In 2016, investor Carl Icahn (who owns 82% of an independent refinery) called for EPA and the Federal Trade Commission to investigate the “rigged” renewable fuel market for “secret deals” wherein fuel blenders sell credits preferentially to market speculators instead of to refineries, allowing speculators to hoard credits until the price increases. Icahn likened the market to a cocaine cartel, saying, “if Pablo Escobar were alive, he wouldn't be doing coke, he'd be trading RINs [renewable fuel credits].” Other industry experts question whether there is any evidence for Icahn's allegations.

Thin markets occur when transaction costs are so high, exchange restrictions are so stringent, or regulatory coverage is so narrow that not enough potential buyers and seller participate to support a robust market. Thin markets increase the risk of market power, like monopolies. Firms with market power can hoard permits and drive up permit prices for their own profit, or can manipulate the permit market to punish rivals in a product market. For example, firms could hoard spectrum licenses with the intent not of driving up permit prices but rather of preventing competition in broadcast markets. Market power has not been a major issue in most permit markets, perhaps because regulators often impose position limits on the purchasing, holding, and banking of allowances. Auctions further reduce the risk of monopoly power, and regulators can reserve a supply of allowances to be sold in case of hoarding.

Regulators must decide whether to restrict market participation to regulated entities or to allow in third parties and the general public. Brokers, market makers, and speculators enter a market seeking profit, but they also provide much-needed liquidity and lower transaction costs. On the other hand, excessive speculation can result in bubbles. However, if third-party speculators are shut out completely, covered entities may simply fill that role. Position limits may better address the risk of excessive speculation.

Regulators should adopt position limits on purchasing and holding marketable permits, or employ other tools to adequately prevent monopolies, excessive speculation, and other manipulations.

Additional tools include careful auction design, reporting requirements, transparent price information, effective surveillance, and price circuit breakers (discussed more below).

Managing Price Volatility with Circuit Breakers, Banking and Borrowing, and Broad Markets

Price volatility can occur in marketable permit programs even without fraud or manipulation, due to unexpected increases in demand or reductions in supply. Most notoriously, in 2013, some renewable fuel categories saw credit prices increase 2500% over a six-month period.

Regulators can manage price volatility with several tools. “Circuit breakers” limit how much prices can rise or fall in given period. Safety valves can set maximum prices or release reserve credits into the market in case of emergencies or demand spikes. Authorizing the banking and borrowing of allowances also helps mitigate against price volatility: borrowing credits from future years can dampen price spikes, and banking for future compliance obligations can help maintain market activity during periods of low prices, such as in years when caps do not prove to be binding on emissions. Finally, by defining a broader program that covers more regulated entities under a single market, regulators diversify the portfolio of permit seekers, reducing the risk of unexpectedly high costs in an isolated sector.

Agencies should prevent extreme price volatility by creating broad markets, allowing banking and borrowing, or considering the use of circuit breakers, safety valves, or reserve pools.

Regulators Need to Thoroughly Track Transactions and Holdings

Regulators need to track transactions and permit holdings to detect fraud and manipulation and to enforce compliance. Several tracking systems for existing permit markets lack crucial data. For example, EPA has two water quality permit data systems, but neither actually tracks trades or prices. Some states assign each water quality credit a unique serial number, like the Ohio River trading program; other programs, like Florida’s Lower St. Johns trading program, only track credits linked to projects as a group, not individually, which makes it more difficult to split use of credits and to prevent double counting.

At least some fish catch share programs require reporting of transaction information, including prices. However, in the grouper-tilefish program in 2014, 33% of transaction records had no price information or reported unreasonably low prices, like \$0.01 per pound. Another 31% of records had mismatched information reported by buyers and sellers. Industry feedback suggests that privacy concerns may lead some fishers to deliberately misreport prices. The grouper-tilefish program also 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).”

Marketable permit programs should assign unique serial numbers to allowances and credits. Registries should track the status of each allowance and credit in as close to real time as practical, as well as transaction prices and each account’s total holdings. That does not necessarily mean such information should be publicly disclosed in real time.

Regulators need to monitor international markets and related private markets as well. Even if U.S. permit markets are not directly linked to international markets (some are), regulators need to ensure that firms do not attempt to escape position limits by holding assets abroad, in a scheme known as the “London loophole.” The Commodity Futures Trading Commission has an information-sharing agreement with the United Kingdom, though it does not specifically address permit markets, and it does not cover other countries. Regulators also need to monitor private markets likely to interact with permit markets. 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.

Balancing the Public's Need for Transparency Against Confidentiality

Too much transparency risks revealing confidential business information, but if all information on trading is considered confidential, it is difficult for the public to gauge the program's effectiveness. For example, if water quality trading programs reveal the location of credit-generating projects, it could raise privacy concerns for farmers and other landowners; but without location information, the public may not feel confident that the credits reflect real reductions.

The public likely does not need real-time data or highly specific information on individual participants to evaluate the overall market's efficiency and effectiveness. Weekly disclosure of aggregate holdings and transactions is likely sufficient, supplemented perhaps by more detailed and individualized disclosures of holdings on a one-quarter delay. For example, the Commodity Futures Trading Commission's weekly report on derivative transactions is enough to let the public gauge the overall level of trading. **Agencies should implement a system of weekly disclosures of aggregate market information, to allow the general public to assess the marketable permit program's efficiency and effectiveness.**

Intra-Agency Communication and Resource Sharing

Federal agencies should set a consistent tone on trading programs for their staff, regional offices, and state implementers. Support for existing trading programs varies across different levels of government and different staff positions. For example, conservation bank sponsors report varying levels of support across local Fish and Wildlife Service (FWS) officials. Shockingly, in 2013, only 68% of surveyed FWS staff were familiar with the agency's own 2003 guidance on conservation banking: only 30% were "very familiar," with another 38% claiming to be "somewhat familiar." Many field officers personally viewed conservation banks positively, but were unsure whether the regional and national offices really supported banking. FWS's approvals of conservation banks are frequently delayed by poor coordination between federal, regional, and local officials, as well as insufficient staffing, inadequate training, and lack of management support. 61% of FWS staff responsible for supervising conservation banks reportedly have no formal training on conservation banks.

Poor sharing of information and resources between field offices and states, reported at FWS field offices and for other regulators, is a missed opportunity for efficiency. States have asked EPA for more training and support on water quality trading. EPA has encouraged states to share resources on water quality trading, like a single credit registry serving multiple markets, but such sharing has not yet materialized. A 2015 workshop recommended standardizing water quality market designs, and EPA agreed in 2016 to pursue a national registry platform for credits.

When possible, regulators should pursue economies of scale in management, for example by spreading the costs of credit registries over multiple species or multiple fisheries. Federal agencies should provide clear guidance on trading policy to regional and state officials, including through trainings. Public trainings are also useful.

Inter-Agency Coordination

Credit approvals may implicate the jurisdictions of multiple agencies. For example, wetland credits administered by the Army Corps of Engineers must not violate EPA's water quality standards or FWS's endangered species standards. FWS staff report that poor coordination with other federal agencies

contributes to delayed reviews of conservation banks. Interagency coordination will become even more important if credit stacking increases, as agencies will need to work together to detect double counting.

Agencies need to share information to ensure consistent protection against manipulation across interconnected markets. Too many regulators could lead to inconsistent standards, which sophisticated market actors can use to their advantage. In 2016, EPA and CFTC signed a memorandum of understanding on sharing information on renewable fuel credit trading. The agreement tasks CFTC with advising EPA and reviewing market data for fraud, abuse, and violations. The memorandum provides structure to the relationship, to help avoid duplicative information requests and coordinate investigative and enforcement activities. However, CFTC does not have memoranda with EPA on other permit markets, or with other agencies responsible for permit markets. Notably, the Congressional Research Service has recommended an “umbrella group . . . to prevent regulatory gaps or conflicts” in environmental permit markets. **Permit market regulators should explore additional memoranda of understanding with related agencies. In particular, permit market regulators should develop relationships with CFTC to coordinate investigative and enforcement activities.**

Market-Moving Communications

Statements and actions from regulators can move permit markets. For example, in the early years of the European Union’s Emissions Trading System, leaks regarding the cap’s stringency may have allowed some traders to profit off nonpublic information. Similarly, a study of the acid rain market suggests that price volatility correlates with both EPA and Congressional announcements on potential regulatory changes as well as with day-to-day announcements, such as notices of enforcement.

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. For example, financial regulators typically release pre-announcements or announce new policies at pre-scheduled times. The European Union’s Emissions Trading System has copied such approaches, and now releases pre-announcement and has new procedures to control leaks. **Marketable permit regulators should develop communication policies to prevent pre-publication leaks and information asymmetries.**

Factors to Weigh in Considering Use of Marketable Permits

This section distills factors that regulators should consider in deciding whether a marketable permit approach is appropriate for a specific regulatory context.

- **Nature of the problem**
 - To use marketable permits, the problem must be amenable to control through permitting. Regulators must be able to clearly define the privileges or obligations being assigned, and need sufficient information about the problem to set caps or baselines at rational levels.
 - Marketable permits work best when regulators care more about overall activity levels than the identity of actors. This is not an absolute precondition; marketable permit programs can be effective while requiring minimum standards to prevent trades with unintended consequences. However, if too many trade restrictions or review requirements become necessary, the market loses its efficiency. Some permit categories, like occupational licenses, that require individualized regulatory approvals should not be marketable.
 - Some experts disfavor the application of marketable permits to highly localized problems, where trading might create “hot spots.” On the other hand, the hot spots much feared in

existing air pollution markets largely did not materialize, and several strategies exist to prevent transfers that would create disproportionate hot spots.

- **Nature of the regulated entities**
 - Marketable permits work best when sufficient variation exists between permittees' compliance costs or their utilities in the resources traded.
 - When the regulator has less information than the regulated entities about compliance costs and utility differentials, marketable permit approaches may be advantageous.
 - Marketable permit approaches may be better able to handle regulating a large number of heterogeneous or small sources, compared to prescriptive regulation.
 - Regulators should be reasonably confident that enough regulated entities will want to participate in a market. A "build and they will come" assumption has not worked well in water quality trading. Sufficient supply and demand need to exist to create a robust, competitive market, in which risks of market power are minimized. Sufficient participation is also crucial to produce the cost and utility differentials that drive the market's efficiency.
 - Ideally, permittees should be sufficiently sophisticated and knowledgeable about their choices to make efficient decisions in the market. If a market contains small sources that will trade infrequently, regulators may need to provide training and technical assistance.
- **Legal authority**
 - Regulators need at least implicit regulatory authority from broad statutory language, or else explicit authority, to create a marketable permit program.
 - Regulators should have sufficient legal authority to monitor permit markets for fraud, manipulation, and other abuses.
- **Additional factors**
 - Regulators should consider whether distributional concerns, such as effects on small entities, new entrants, or hot spots, counsel against use of marketable permit programs.
 - Marketable permit programs may work better when covered entities do not compete directly in product markets, or at least are unlikely to be tempted to use the permit market to influence the product market in anti-competitive ways.
 - The case for markets initially rises with increasing stringency, because the potential for large cost savings increase as compliance becomes more expensive. However, at the point where increased stringency demands every source to comply maximally, there will be little room left for efficient trades. With low abatement costs and very high monitoring costs, prescriptive regulation may be more efficient than market-based.

Catalog of Recommendations

- **Legal Authority**
 - If marketable permit programs exist without explicit statutory authority, Congress should consider endorsing those programs. Agencies should communicate to Congress any legal barriers to marketable permits. The Office of Management and Budget's annual report to Congress on the costs and benefits of regulation, and the "recommendations for reform" section of those reports, may provide an appropriate vehicle for such communications.
 - Agencies should emphasize the market management and distributional reasons for choosing auctions besides raising revenue, to avoid potential categorization of the permit auction as an impermissible tax.
 - Congress and agencies should avoid creating misperceptions by calling marketable permits "rights," and should instead use the language of marketable licenses or permits.

- Guidance on marketable permit programs should minimally go through public notice and comment, and agencies should consider codifying regulations to resolve lingering uncertainty or inconsistencies.
- **Caps and Allocation Options**
 - Agencies should opt for auctions over grandfathering to prevent windfalls and barriers to entry, and federal agencies should encourage states to use an auction-and-dividend approach. If auctions are not feasible, agencies should consider alternate allocation techniques, like set-asides for new entrants and output- or community-based allocations.
 - Agencies should cap the total activity level, rather than just capping the rate of activity. To facilitate adjusting the cap, agencies should consider allocating percentages of a cap, rather than allocating absolute subunits of a cap.
 - To use the market's advantages to enhance policy effectiveness, agencies should focus on fine-tuning the cap's stringency in light of cost savings and should allow open participation so citizens can retire credits. Retirement ratios undermine efficiency and should be avoided.
- **Credit Verification**
 - Agencies should have clearly defined criteria for credit approval, to ensure credits are "real." Credit approval systems should not reward behavior that would have happened anyway ("additionality"), should allow for predictable and repeatable calculations, should address uncertainty, and should avoid double-counting. Credit approval programs should include procedures for selecting clear baselines, developing predictable and pre-approved calculation tools, applying consistent standards for uncertainty ratios, and establishing policies on credit stacking. Uncertainty trading ratios should be based on science, consistently applied, and kept transparently distinct from any other trading ratios (like ratios to manage hot spot risks) rather than merged into a single combined ratio.
 - Agencies should set standards to ensure that third-party verifiers are qualified, insured, and conflict-free.
- **Liability and Compliance**
 - Agencies should establish clear rules for liability and responsibility for acts of nature. Performance bonds and reserve pools may be useful tools.
 - Marketable permit programs need clear, adequate sanctions, ideally including both penalties and plans for coming into compliance.
- **Market Efficiency and Oversight**
 - Regulators should address barriers to efficient secondary transactions, for example by facilitating price discovery. Without revealing proprietary or confidential information, regulators should act as information brokers, collecting and disseminating data on trade prices and volumes. Regulators can also help minimize transaction costs and ensure adequate market participation by supporting or operating brokerages or exchanges. EPA should encourage states to consider using general permits to facilitate water quality trading.
 - CFTC should monitor active derivative markets relating to regulatory permits and exercise its authority to prevent fraud, manipulation, and excessive speculation. CFTC should set position limits for active permit derivatives or require permit derivatives be traded on exchanges. An exception could be made for derivatives of offset credits.
 - CFTC should consult with other agencies on the oversight of secondary permit markets, and should identify to Congress any need for additional statutory authorities to regulate permit markets. Agencies should presumptively limit secondary trading of allowances and credits to exchanges, as appropriate and consistent with their legal authority. An exception could be made for over-the-counter contracts that cannot be standardized, like forward contracts for the delivery of offset credits.

- Regulators should adopt position limits on purchasing and holding marketable permits, or employ other tools to adequately prevent monopolies, excessive permit consolidation, excessive speculation, and other manipulations. Additional tools include careful auction design, reporting requirements, transparent price information, and effective surveillance.
- Agencies should prevent extreme price volatility by creating broad markets, allowing banking and borrowing, or using circuit breakers, safety valves, or reserve pools.
- Marketable permit programs should assign unique serial numbers to allowances and credits. Registries should track the status of each allowance and credit in as close to real time as practical, as well as transaction prices and each account's total holdings. Regulators need to monitor international markets and related private markets as well.
- **Information, Resource Sharing, and Communication**
 - Agencies should release any non-confidential data that would help the public gauge a market's policy effectiveness, and should periodically assess both the policy and economic effectiveness of a program.
 - Agencies should implement weekly disclosures of aggregate market information, to allow the general public to assess the marketable permit program's efficiency and effectiveness.
 - When possible, regulators should pursue economies of scale in management, for example by spreading the costs of credit registries over multiple species or multiple fisheries. Federal agencies should provide clear guidance on trading policy to regional and state officials, including through trainings. Public trainings are also useful.
 - Permit market regulators should explore additional memoranda of understanding with related agencies. In particular, permit market regulators should develop relationships with CFTC to coordinate investigative and enforcement activities.
 - Marketable permit regulators should develop communication policies to prevent pre-publication leaks and information asymmetries.