Administrative Conference of the United States

MARKETABLE PERMITS:

RECOMMENDATIONS ON APPLICATIONS AND MANAGEMENT

Final Report: December 11, 2017

Jason A. Schwartz

Adjunct Professor & Legal Director at the Institute for Policy Integrity,

New York University School of Law

Table of Contents

Executive Summary

Marketable permits are regulatory tools designed to allocate privileges or obligations more efficiently by harnessing the market's decision-making powers. Evidence suggests that marketable permits lower compliance costs, incentivize innovation, and may ease administrative burdens 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. President Clinton's Executive Order 12,866 calls for agencies to assess the advantages of regulating through "economic incentives to encourage the desired behavior, such as user fees or marketable permits."

Regulators have often applied marketable permits to environmental policies. Multiple markets exist for air pollution, including most famously the acid rain market, as well as for global pollutants like greenhouse gases. Other environmental markets include water quality trading, tradable fish catch shares, and habitat banks that sell credits to project developers who need to offset their impacts to wetlands or endangered species. Tradable obligations also exist for renewable energy production and energy efficiency, like markets for vehicle efficiency standards and renewable fuel credits.

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, auctions for satellite congestion in space, and tradable limits to control the over-prescription of antibiotics.

Marketable permits are *permits*: they are government-created licenses or obligations for a specific level of a particular activity. Many kinds of 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 primary and secondary markets for these permit exchanges are often regulatory creations as well and require oversight.

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 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.

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 electromagnetic spectrum licenses. 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.

Evidence confirms that, in many regulatory applications, marketable permits allocate privileges and obligations more efficiently than traditional regulation, by allowing the market to identify and prioritize the lowest-cost abatement opportunities or the highest value use of scarce resources. For example, the acid rain market reduced costs by as much as 90% versus alternatives without tradable permits, with savings estimated at up to $1 billion annually. Marketable permit programs also likely incentivize innovation better than traditional regulation. For example, 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, marketable permits may lower long-term administrative costs compared to traditional regulation. For example, the acid rain market famously achieved nearly 100% compliance with only about 100 EPA staff.

Like traditional regulation, marketable permits may create some positive or negative distributional consequences in certain applications. For example, small, rural providers have had trouble accessing electromagnetic spectrum licenses on secondary markets, and under a program of catch shares, Alaska's halibut and sablefish fisheries endured layoffs, with small fishers and communities hit hardest. At the same time, some features and options of marketable permits can remedy distributional problems: open auctions of permits help put all firms—large, small, new, existing—on relatively equal footing, and revenue generated by auctions can, in some cases, be returned to consumers or taxpayers as dividends.

Many marketable permit programs have achieved policy goals as well as or better than prescriptive regulation. Markets' cost savings have enabled regulators to set more stringent caps than they could under prescriptive regulation, or even break a political logjam blocking any regulation. For example, many credit the acid rain market's cost savings as making dramatic cuts to sulfur dioxide pollution politically feasible. Other evidence includes that annual harvest limits in fish catch share programs are rarely exceed, while quota overruns were common before catch share programs. Many regulators believe in the benefits of marketable permits. For example, 80% of Fish and Wildlife Service staff feel that habitat banks are as or more effective at aiding species recovery than other regulatory options.

Marketable permits are more advantageous in some regulatory contexts than others. Factors to consider in deciding whether a marketable permit approach is appropriate include:

- Marketable permits work best when regulators care more about overall activity levels than the identity of actors.
    - For example, global pollutants like greenhouse gases are ideal for marketable permits because they have no localized effects. Consequently, it does not matter which individual sources or regions reduce their emissions; what matters is the aggregate reductions.
    - This is not an absolute precondition. Marketable permit programs can be effective while requiring minimum standards to prevent trades between activities with dissimilar or unintended consequences. For example, habitat banks can operate efficiently without allowing land developers to offset the impacts of paving over 10 acres of ecologically rich wetlands just by paying to create a 10-acre "two-snake mud puddle" in a completely different state. 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, as trading might inadvertently authorize spatially concentrated activity levels with undesirable consequences, such as pollution "hot spots." However, 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.
  - Regulators should consider whether distributional concerns, such as effects on small entities, new entrants, or hot spots, counsel against use of marketable permit programs. At the same time, marketable permit structures can help remedy distributional issues in certain contexts. For example, when auctions of permits are available and feasible, that choice may help protect the interests of small and new firms better than traditional regulation.
- Marketable permits work best when sufficient variation exists between permittees' compliance costs or their utilities in the resources traded.
  - For example, if it costs each regulated source of pollution the exact same to reduce a ton of emissions, there is nothing to gain from trading emissions permits. However, if one source can reduce its emissions at $1 per ton while another faces $1000 per ton costs, and if the environmental consequences are comparable regardless of which source reduces the emissions, allowing the second source to pay the first to make extra reductions achieves the same emissions level at lower overall cost than prescribing the same standard for both sources (i.e., about $2 instead of $1001 for the first two tons).
  - When the regulator has less information than the regulated entities have about compliance costs and utility differentials, marketable permit approaches may be advantageous. In the above example, if the regulator lacks information on which sources face either $1 or $1000 per ton costs, the regulator would do a poor job of prescribing individualized emissions standards. The market can more easily identify the best opportunities.
  - 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 when 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 regulation.
- Compared to prescriptive regulation, marketable permit approaches may be better able to handle regulating a large number of heterogeneous or small sources. Marketable permits may also be appropriate when regulating more sophisticated actors, like large power plants.
  - 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.
  - 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, for example. Sufficient supply and demand must exist to create a competitive and efficient market.
  - 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.
- Regulators need at least implicit regulatory authority from broad statutory language, or else explicit authority, to create a marketable permit program.
  - Regulators should also have sufficient legal authority to monitor permit markets for fraud, manipulation, and other abuses.

Even when marketable permit programs are legally authorized and are advantageous compared to traditional regulation, following some best practices for market design and oversight will increase the benefits of marketable permits.

- Clear and consistent legal standards will reduce uncertainty for market participants.
    - Several marketable permit programs do not have explicit statutory authority, including water quality trading under the Clean Water Act. Courts have expressed some concern about the lack of explicit authority. Though agencies may successfully rely on their discretion to interpret broad statutory language, **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.**
    - Courts have also at times struggled to distinguish permissible regulatory fees from unconstitutional regulatory taxes. 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.**
    - Referring to marketable permits as "property rights" may create misleading perceptions about permits' permanence or compensation for takings. At various points the Clean Air Act refers to the auctioning of "emissions rights." **Congress and agencies should avoid creating misperceptions by calling marketable permits "rights," and should instead use the language of marketable licenses or obligations.**
    - While requiring agencies always to adopt codified regulations to establish marketable permit programs would limit flexibility, lack of clear guidance from federal agencies has at times confused federal field officers, state implementers, and market participants. **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.**
- Some design features will enhance the natural cost-efficiencies or distributional benefits of marketable permits.
    - In cap-and-trade programs, regulators typically allocate permits either by auction or free allocation to historical users of the resource (a.k.a., "grandfathering"). Grandfathering can be inequitable, as it awards the regulated industry a windfall enrichment and creates barriers to new entry. **Federal agencies should opt for auctions over grandfathering to prevent windfalls and barriers to entry, and should encourage states to use an auction-and-dividend approach to return revenue to consumers and taxpayers. If auctions are not feasible, agencies should consider alternate allocation techniques.** Alternate techniques include setting aside a reserve pool of permits for new entrants; allocating pollution permits based not on historical emissions but on electricity output, to reward renewable energy generators; and community-based allocations, like the 40% of fish catch shares that New Zealand awards to the Maori, so the community can protect its own interests.
    - To better guarantee achieving the desired level of activity, **agencies should cap the total activity level, rather than just capping the rate of activity.** (For example, in a hypothetical market to control the issuance of antibiotic prescriptions, cap total prescriptions, not just the number of prescriptions a doctor can write per patient.) Similarly, **to facilitate adjusting the cap over time, 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 access to the**

market so citizens can retire credits. "Retirement ratios"—such as requiring the purchase of 11 credits to offset 10 pounds of pollution, with the extra credit "retired"—undermine a program's efficiency and should be avoided unless it is impossible to tighten the cap itself.

- **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, and establishing policies on "credit stacking" (i.e., allowing a single project to generate credits for multiple permit markets). Uncertainty trading ratios—requiring an extra cushion of credits to buffer against the risk of inaccurate calculations or unpredictable outcomes—should be based on science, consistently applied, and kept transparently distinct from any other trading ratios (like ratios to manage hot spot risks).
- **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.
- **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.

- Careful oversight of markets will help prevent fraud, manipulation, and other inefficiencies.
  - **If direct agency oversight is not efficient and self-verification is not effective to verify credits, agencies should set standards to ensure that third-party credit verifiers are qualified, insured, and conflict-free.**
  - In some marketable permit programs, robust secondary markets have been slow to develop without active involvement of regulators. For example, EPA's market for vehicle emissions provides no centralized setting for trading, and the agency does not disclose the prices of traded permits, which raises the costs of participating in the market and possibly explains initial low trading volumes. **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.
  - Though the Commodity Futures Trading Commission (CFTC) has fairly comprehensive authority over derivative markets, it has not fully exercised its authority with respect to derivatives based on permit markets. **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.
  - Neither CFTC nor any other agency has comprehensive authority to oversee secondary permit markets. However, compared to relatively unregulated "over-the-counter" transactions, secondary transactions conducted on registered exchanges are subject to some CFTC oversight. **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. Exceptions could be made for over-the-counter contracts that cannot be standardized, like forward contracts for the delivery of offset credits. **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.

- **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. "Circuit breakers," which limit how much prices can rise or fall in a given period, can also help manage price volatility caused by reasons other than fraud. **Agencies should prevent extreme price volatility by creating broad markets, allowing the banking and borrowing of permits over time, or using circuit breakers, safety valves, or reserve pools.**
- Regulators need to thoroughly track transactions and holdings. **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.**
- To balance the public's need for transparency against confidentiality concerns, **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.** 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.
- **Marketable permit regulators should develop communication policies to prevent pre-publication leaks and information asymmetries.**

Overview of Research Methodology and Scope

Research for this project began with a thorough review of the legal literature on marketable permits, as well as a more targeted review of the economic literature on the advantages, disadvantages, challenges, and past successes and failures of various marketable permit programs. Existing marketable permit programs were further identified through searches of the U.S. Code and the Code of Federal Regulations, key agency websites, and case law on the legal status of marketable permit programs. Evaluations of the economic and policy effectiveness of programs, from regulatory agencies; investigative agencies like GAO, CBO, and CRS; consultants; think tanks; and advocacy groups that were available online were reviewed. Notable state and foreign marketable permit programs were also examined when relevant. The legal authorities of the Commodity Futures Trading Commission and other potential oversight agencies to supervise federal and interstate permit markets were assessed through statutory analysis and review of the relevant literature. Informal conversations with six experts on marketable permits were also conducted.

The research and recommendations focus on factors for weighing the appropriate applications of marketable permit programs and the general management of an efficient and effective permit market. Some complex and highly context-specific issues, such as the most efficient bid structure for permit auctions, are not covered.

I. What Are Marketable Permits?

A. Overview: Characteristics of a Prototypical Marketable Permit Program

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 regulatory approaches, all while (in theory) achieving policy goals with greater certainty. They have been used most prominently to advance environmental and energy policies, though they have other applications, such as in transportation policy (addressing aerospace congestion and allocating taxi medallions) and communication policy (allocating electromagnetic spectrum).

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. Such an approach might, for instance, require each individual power plant to limit greenhouse emissions to the same numerical maximum of pollution per unit of electricity generated—regardless of whether compliance may be vastly more expensive for some plants while other plants could cheaply reduce emissions even further beyond the numerical limit. As an example in a different context, traditional licensing of access to the electromagnetic spectrum was similarly particularized and inflexible: individual applicants had to navigate long, complex administrative hearings, and once spectrum was assigned it may have been 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 marketable permit system for greenhouse gases called "cap-and-trade," a regulator would first set an overall maximum budget of permitted emissions per time period. The regulator would then initially allocate those emission allowances to the regulated sources, and may further authorize unregulated sources to generate additional "credits" or "offsets" for sale by voluntarily undertaking verified emissions reductions not otherwise required by law. Because the allowances and credits can be traded between sources, the marketable permit system empowers 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, all without (in theory) losing any regulatory benefits. Similarly, instead of forcing regulators to divine how to allocate electromagnetic spectrum to the highest value uses, by auctioning off spectrum licenses and allowing subsequent re-sales and leases, regulators entrust the market to identify the most valuable use of the resource.[1]

Though there are many variations, a prototypical marketable permit scheme entails the following steps:

- First, a regulator determines the quantity of privileges or obligations to be allocated. This determination may take the form of a cap on tons of pollution emitted or tons of fish caught per year, a baseline level of ecosystem services from wetlands or other habitat that must be maintained, or the amount of spectrum or number of airport landing slots to be allocated.

[1] *See* Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 3 (1981) (explaining market-based regulation helps ensure that firms with highest-value use of the resource will obtain the permit).

- Second, a regulator allocates those privileges or obligations. The initial allocation may be by open auction; by lottery, either for free or with a fixed price per allocation awarded; 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 unregulated sources or 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 holdings to the use of the common resource to determine compliance. For example, under a greenhouse gas cap-and-trade system, each allowance or credit authorizes the emission of one ton of greenhouse gases, and each regulated source must hold enough permits to cover its total actual emissions over the compliance period.

B. Concepts and Definitions

1. Definition and Categorization of Marketable Permits

Marketable permits are, first and foremost, *permits*: they are government-created licenses or obligations for a specific level of a particular activity. Often they ration use of common public resources like clean air, fisheries, or electromagnetic spectrum,[2] but in addition to such marketable privileges, marketable obligations also exist, like tradable requirements to produce renewable energy.[3]

What distinguishes *marketable* permits is that they can be bought or sold independently of any real property or other interest. Independent alienability is a crucial distinction, since many permits can be transferred together with the sale of a business or underlying assets. For example, if a factory previously secured a traditional, prescriptive air pollution permit to authorize its emissions, when the factory is sold the permit may transfer, too, and the permit has its own value that contributes to the overall sale price.[4] What makes marketable permits special is that they can be exchanged by themselves on markets. Those markets 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, including spot transactions and forward contracts. Some permits that are tradable on a secondary market are not allocated in the first place by a market mechanism like an auction, but rather are distributed by lottery or criteria-based rules.[5] Some permits initially allocated on a market by auction or credit sale may then have limited or no transferability on secondary markets. Some secondary permit

---

[2] Tom Tietenberg, *Tradable Permits in Principle and Practice*, *in* Moving to Markets in Environmental Regulation: Lessons from Twenty Years of Experience (Jody Freeman & Charles Kolstad eds., 2006).

[3] Kirsten Engel, *Dormant Commerce Clause Threat to Market-Based Environmental Regulation: The Case of Electricity Deregulation*, 26 Eco. L. Q. 243 (1999).

[4] Jonathan Remy Nash, *Framing Effects and Regulatory Choice*, 82 Notre Dame L. Rev. 313 (2006). A few fish quota share programs typically grouped with individually transferrable quota programs may, in fact, only allow transfer of the fish catch share along with the fishing license. *See* Katrina Wyman, *Why Regulators Turn to Tradable Permits: A Canadian Case Study*, 52 U. Toronto L.J. 419 (2002); *see also* Nat'l Marine Fisheries Serv., Catch Share Spotlights (the Bering Sea Groundfish Cooperative allows transfer of quota with vessel). Such programs, even if often called marketable permit programs, would not be included under this report's definition.

[5] Hybrid structures are also possible. For example, most acid rain permits are freely allocated, but a zero-revenue secondary auction requires holders to publicly auction 2.8% of permits each year, sold at actual bid prices (rather than at a single market-clearing price), with revenue distributed pro rata back to sellers from whom the permits were withheld, rather than to government. Jonathan Nash & Richard Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 Ecol. L. Q. 569 (2002).

markets also give rise to separate derivative markets, where futures, options, and swaps based on the value of the underlying permit are traded.

Unlike commodity or property markets, in marketable permit systems the government principally controls both supply and demand.[6] For example, in a greenhouse gas cap-and-trade system, the government controls supply by determining the cap on total emissions allowances and controls demand by legally requiring regulated sources to hold enough permits to cover their emissions. The control is never absolute: a factory could always relocate to a different jurisdiction, or a fisher to state waters, to avoid being forced into the federal market. And control over demand is always mediated by outside factors like innovation: a factory that develops the techniques to mitigate its own emissions need not enter an auction for emissions allowances. Marketable permits are usually discussed separately from other types of government sales, like auctions of government-owned oil and gas deposits, where supply is even more heavily influenced by private and international sources, though perhaps the distinction is only a matter of degrees.[7]

Two main categories of marketable permits, which can exist in combination, are cap-and-trade programs and credit trading programs. Though the term "cap-and-trade" is most often associated in political debates with pollution reduction measures, the cap-and-trade framework applies to a range of marketable permit schemes, including the allocation of a capped number of tradable licenses in electromagnetic spectrum or aerospace. In cap-and-trade programs, regulators set an "absolute baseline" by capping the budget of emissions allowances or allowable fish catch or number of airport landing slots. In credit trading, regulators set a "relative baseline": for example, regulators may set a goal of no net emissions increases or no net loss of wetlands, and then any new entrants seeking to increase air emissions or destroy wetlands must purchase offsetting credits sold by third parties that voluntarily reduce their emissions or create new wetlands.[8] Regulators must set standards to determine the number of credits that may be sold and to verify that the credits represent real mitigation.[9] Cap-and-trade and credit systems can be combined. For example, in a greenhouse gas cap-and-trade program, unregulated sources may also be allowed to voluntarily reduce their own emissions and sell verified credits into the cap-and-trade market.

2. Distinction from Other Market-Based Tools: Bubbles, Banking, and Fees

Other market-based regulatory tools, such as bubbles, averaging, and netting, are often grouped together with marketable permits.[10] These tools, common in environmental policy, allow single firms or sources, or units within such sources, to trade emission reduction requirements internally across location and time, so long as the overall average or net emissions meet the regulatory requirements. Because these approaches only involve internal, intra-firm decision-making, they raise fundamentally

---

[6] *See* James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, 53 Stanford L. Rev. 607 (2000) (citing Royal C. Gardner).

[7] A marketable permit program, wherein a central regulator determines optimal amount of tradable permits for use of a common resource, is different from scheme where all of the resource is allocated to private parties who then negotiate to achieve their optimal allocation. *See* Michael Livermore, *Reviving Environmental Protection: Preference-Directed Regulation and Regulatory Ossification*, 25 Va. Envtl. L. J. 311 (2007). Federal auctions of rights to access coal, oil, gas, and mineral deposits are not discussed in this report, even though such licenses may sometimes be transferred between parties with government approval. *E.g.*, 30 U.S.C. § 1411-1428 (Deep Seabed Hard Mineral Resource licenses may be transferred with NOAA approval).

[8] Tietenberg, *Tradable Permits*, *supra* note 2.

[9] T.H. Tietenberg, Emissions Trading: Principles and Practice 18-19 (2006, 2d ed).

[10] *See* Robert Hahn & Gordon Hester, *Where Did All the Markets Go? An Analysis of EPA's Emissions Trading Program*, 6 Yale J. Reg. 109 (1989).

different management issues compared to marketable permit systems, which create new regulatory markets and require oversight of risks like market power and price manipulation.

The same is true of banking and borrowing, which allow the temporal trading of regulatory privileges or obligations over time, such as over-complying with an emissions limit this year to generate credits to offset additional emissions in future years. While banking and borrowing can play important roles in marketable permit programs, they can also be applied under more prescriptive and particularized regulatory approaches, to allow some intra-firm, temporal flexibility about compliance decisions. Banking and borrowing are only addressed in this report to the extent they present special challenges in the market context, such as how banking may contribute to the risk of hoarding permits.

Finally, regulatory fees and marketable permits share many similar features and, at least in theory, could be somewhat interchangeable. Compare, for example, a carbon tax with a cap-and-trade program for greenhouse gases. If the government sets the carbon tax accurately, firms will pollute only up to the point when paying the tax exceeds the value of the underlying activity, thus achieving a certain limit on total pollution much the same way a cap would. Conversely, if the government sets the cap and regulatory requirements accurately, supply and demand in the cap-and-trade market will balance to reach a set price for emissions allowances, which will act very similarly to a carbon tax set at that same price. Theoretically, both fees and marketable permits share the same kinds of economic advantages over traditional, prescriptive regulation.[11]

However, many similarities break down under real-world uncertainty.[12] For example, uncertainty about abatement costs may mean that actual emissions reductions cost more than the regulator anticipated. In that scenario, a cap-and-trade program can still guarantee the desired environmental outcome by virtue of the hard cap on total emissions, but the increased demand for allowances will mean the program's total compliance costs will exceed expectations. Uncertainty over abatement costs interacts with a tax in exactly the opposite way: per-unit compliance costs will still be guaranteed because firms facing costly abatement options can opt to pay the set tax, but as more firms opt to pay the tax rather than abate, total emissions will exceed expectations. The same pattern occurs with uncertainty about future economic growth: a cap-and-trade program will continue to guarantee a limit on emissions even if demand for the polluting activities rises with economic growth; a tax, on the other hand, can not stop firms from choosing to simply pay the tax to increase emissions in order to increase output.[13] Some theories predict that marketable permits will perform better than fees in the face of imperfect enforcement;[14] some theories suggest that when marketable permit prices fluctuate too much, fees are preferable for sending the kind of consistent price signals necessary for long-term capital investments.[15] Ultimately, neither marketable permits nor fees are the unambiguously superior choice.

For the most part, this report will not discuss regulatory fees further. The "in-lieu fees" allowed for wetland mitigation are best thought of not as true fees, but as a kind of advance payment on a credit, and are discussed as such in this report. Because permit auctions can strongly resemble regulatory fees,

---

[11] *See* William Pizer, Dallas Burtraw et al., *Modeling Economywide vs Sectoral Climate Policies Using Combine Aggregate-Sectoral Models* 7 (RFF 05-08, 2003, republished as 27 Energy J. 135 (2006)) (explaining that, under certain conditions, marketable permits and taxes are "equivalent policies"); Gilbert Metcalf & David Weisbach, *The Design of a Carbon Tax* 3 (Univ. Chicago Public Law & Legal Theory Working Paper 254, 2009) (explaining the design issues are largely similar).
[12] OECD, Environmental-Related Taxes and Tradable Permit Systems in Practice (2008).
[13] Robert Stavins, Market-Based Environmental Policies: What Can We Learn from U.S. Experience (and Related Research)? 29, *in* Moving to Markets, *supra* note 2; Marshall J. Breger, Richard B. Stewart, E. Donald Elliott & David Hawkins, *Providing Economic Incentive in Environmental Regulation*, 6 Yale J. on Reg. 463 (1991) (tradable permits handle economic growth more automatically than taxes, because taxes are fundamentally rate-based, not mass-based).
[14] T.H. Tietenberg, Emissions Trading: Principles and Practice 176 (2006, 2d ed).
[15] Interview with Don Elliott.

and because courts could question whether permit auctions represent an unconstitutional tax, the legal status of auctions as compared to regulatory fees is discussed below. Regulatory fees are also distinct from user fees, which is a charge on a particular service to recoup the government's costs. User fees may be applied in conjunction with marketable permit programs to cover the costs of monitoring transactions and compliance.

It is notable that marketable permits and regulatory fees can be applied simultaneously and can interact both as complements and as substitutes. For example, the Environmental Protection Agency developed a cap-and-trade program for ozone-depleting substances, but in 1989 an excise tax was added to compensate for the windfall profits from the initial allowance allocation (see below for more on allocation options and windfalls). Eventually the tax increased enough that it, not the allowance cap, controlled production.[16] Permit markets can also be designed with features that approximate taxes. For example, regulators can set a ceiling on permit prices in an emissions allowance market or set a fixed penalty for any excess emissions once the market hits a certain price.[17] These kinds of "safety valves" on prices are discussed below.

3. Avoided Terminology: "Command-and-Control" and "Marketable Rights"

The literature comparing marketable permit programs with traditional regulatory approaches often refers to the latter as "command-and-control" regulation. This terminology seeks to draw the line between a system that flexibly lets the market decide how to allocate regulatory privileges and responsibilities, and a system that "commands" each individual regulated entity to "control" their actions in a highly prescriptive and inflexible manner. An environmental regulation that instructs each regulated source to install a particular technological or operational system of emissions control (often called a "design standard" or "work practice standard") is the stereotypical "command-and-control" regulation.

However, such prescriptive design and operational standards are relatively rare these days; environmental regulators today, when not applying market-based tools, typically prefers a more flexible "performance standard" that allows a source to achieve its individual emissions target however it sees fit. Even many technology-based regulations are not "uniformly prescriptive," but rather are tailored to individual sources.[18] Uniformly prescriptive design and operational standards are most often still applied to environmental problems when measuring a source's performance would be difficult or impossible, as with "fugitive" emissions that cannot be readily measured from the end of a smokestack. Because environmental market approaches require the regulator to monitor actual emissions against the number of permits held, marketable permits are, in fact, an unlikely alternative to the true "command-and-control" regulations applied to these hard-to-measure problems.[19]

Since even the staunchest advocates of market-based tools admit a continuing need for traditional regulation in certain circumstances, scholar David Driesen suggests avoiding the disparaging and misleading terminology of "command-and-control."[20] Others, such as Jody Freeman and Charles Kolstad, have copied that approach,[21] and this report will, too. Because what truly distinguishes marketable

---

[16] T.H. Tietenberg, Emissions Trading: Principles and Practice 10 (2006, 2d ed).
[17] Breger, Stewart, Elliott, & Hawkins, *supra* note 13.
[18] David Driesen, *Is Emission Trading an Economic Incentive Program?*, 55 Wash. & Lee L. Rev. 289 (1998) (for example, best available control technology under the Clean Air Act, and various standards under the Clean Water Act).
[19] *Id.*
[20] *Id.*
[21] Jody Freeman & Charles Kolstad, Preface, *in* Moving to Markets, *supra* note 2.

permits from traditional regulations is the specificity and rigidity about who must comply, this reports uses the terms "traditional," "prescriptive," or "particularized" regulation instead.

This report also does not follow some of the literature in referring to "marketable rights." The word "rights" implies a permanence or property status that may not apply to marketable permits (see below on property).[22] Instead, this report uses the terms "permits" or "licenses."

C. The History and Current Applications of Marketable Permits

1. The Evolution and Future of the Idea of Marketable Permits

Expanding on Ronald Coase's influential 1960 article *The Problem of Social Cost*, Thomas Crocker and John Dales developed the idea of tradable pollution permits in the 1960s.[23] The idea steadily gained proponents in academic circles and among U.S. regulatory experts through the 1970s and 1980s, with the Environmental Protection Agency beginning to experiment with tradable permits and credits for air pollution. As Richard Revesz and Michael Livermore recount, "The concept entered the [U.S.] political arena in the 1980s, when C. Boyden Gray, then a high-ranking Reagan Administration official, promoted it as a preferable approach to the traditional method of addressing air pollution."[24]

The 1990 amendments to the Clean Air Act ushered in an age of growing bipartisan political support for the idea of marketable permits. That legislation, which authorized EPA's landmark acid rain permit market, passed by overwhelming bipartisan majorities in both chambers of Congress and was signed into law by President George H.W. Bush.[25] From there the consensus grew, as did the number and range of applications.[26] For example, Presidents Bill Clinton, George W. Bush, and Barack Obama all turned to marketable permits to deal with problems of cross-state air pollution. The year 2008 was a high watermark, with both candidates for president (Barack Obama and John McCain) supporting cap-and-trade for greenhouse gas emissions. In general, President Obama's administration embraced marketable permits, applying them to greenhouse gas and interstate air pollution controls, and issuing a presidential directive to further encourage conservation banks for the mitigation of wetlands and endangered species habitat.[27] Though both Democrats and Republicans have at times resisted applying marketable permits to particular policy contexts,[28] historically marketable permits have enjoyed bipartisan support.

The new Trump administration is expected to back away from President Obama's plans for national greenhouse gas regulation and may attempt to roll back other regulatory systems that currently rely on marketable permits. However, marketable permits were long a favorite tool of Republicans, lauded for

---

[22] Breger, Stewart, Elliott, & Hawkins, *supra* note 13 (statement of Hawkins).

[23] T.H. Tietenberg, Emissions Trading: Principles and Practice 2-4 (2006, 2d ed) (Crocker first applied trading to air pollution, Dales to water pollution); Lesley McAllister, *Beyond Playing "Banker"*, 59 Admin. L. Rev. 269 (2007).

[24] Michael Livermore & Richard Revesz, *Interest Groups and Environmental Policy*, Envtl. L. 12-13 (2015).

[25] EPA, Legislative Chronology: Clean Air Act Amendments of 1990, http://www3.epa.gov/ttn/caaa/gen/chron.txt.

[26] Michael Livermore & Richard Revesz, *Interest Groups and Environmental Policy*, Envtl. L. 10-11 (2015).

[27] Presidential Memorandum, Mitigating Impacts on Natural Resources from Development, Nov. 3, 2015.

[28] For example, Congressional Republicans labeled cap-and-trade proposals for greenhouse gas emissions as "cap-and-tax" and opposed such proposals as harmful to the economy and employment. House Republicans, *A Pledge to America: A New Governing Agenda Built on the Priorities of Our Nation, the Principles We Stand for & America's Founding Values* 43 (2010). Democrats have also attacked marketable permit ideas as "taxes." A plan from George W. Bush's Federal Aviation Administration to auction off landing slots at congested New York airports, 73 Fed. Reg. 60,544 & 60.574, was labeled a "sky tax" by New York's Senator Chuck Schumer. Schumer led the Democratic charge to pass an appropriations rider temporarily blocking the auction in 2009, Omnibus Appropriations Act of 2009, and later that year the Obama administration rescinded the rule, 74 Fed. Reg. 52132 & 52134.

achieving policy goals at the lowest cost. It is possible that, under a Trump administration, marketable permits could see a resurgence, perhaps in areas where they have not yet fully flourished, like water quality trading. Regardless, marketable permit programs will continue at the state level, and federal agencies may be called upon to oversee interstate markets.

2. Overview of Existing Federal and Interstate Applications

This section provides background on the application of marketable programs to federal regulation, including marketable programs implemented by states to meet federal standards, as well as interstate applications that may necessitate some federal oversight of markets.

a) Air Pollution Markets

A number of prominent marketable permit programs exist to implement provisions of the Clean Air Act. The Clean Air Act's program to allow new sources to trade offsetting credits of "criteria"[29] pollutant reductions began in 1974.[30] Starting in 1982, EPA allowed permit trading to help phase out lead from gasoline.[31] (Technically, the lead phase-out program is no longer an "existing" program, as its goal of zero lead in gasoline has long been achieved.)

The 1990 amendments to the Clean Air Act included two significant provisions on marketable permits. First, they mandated a system of tradable sulfur dioxide emission allowances to address power plants' contributions to acid rain. For years, the acid rain program has been held up as a paradigm of market-based regulation. Despite seeing significant trading activity through much of its life, recently the acid rain market has become somewhat less important, as other regulations have partly superseded it.[32]

The 1990 amendments also explicitly authorized states to use marketable permits to implement the various federal standards they are responsible for through their "state implementation plans," or SIPs. When states fail to properly implement the Clean Air Act's standard, EPA steps in with a "federal implementation plan," or FIP. In 1994, a group of states organized a system for trading obligations to reduce nitrogen oxide emissions. EPA subsequently expanded on those efforts by proposing marketable permit solutions to problems of interstate pollution. These efforts included President Clinton's 1993 NOx SIP Call, President Bush's Clean Air Interstate Regulation, and President Obama's Cross-State Air Pollution Regulation. Various other SIPs and FIPs use marketable permit programs for visibility and other air pollution issues.[33]

The most famous (or infamous, depending on who you ask) and well-studied use of marketable permits under a SIP is the urban smog trading program administered by the South Coast Air Quality Management District as part of California's SIP. The program, known as RECLAIM, consists principally of a mandatory cap-and-trade for large sources of smog-producing pollutants, as well as related voluntary programs to generate credits from smaller "area sources" and from scraping fleets of older, heavily-polluting cars.[34]

---

[29] Criteria pollutants are the six widely emitted pollutants for which EPA sets ambient air quality standards: particulate matter, sulfur dioxide, nitrogen dioxide, ground-level ozone, carbon monoxide, and lead.
[30] E.g., 42 U.S.C. § 7503(c) (allowing offsets to comply with non-attainment new source review).
[31] 47 Fed. Reg. 49,322 (Oct. 29, 1982) (called "inter-refinery averaging").
[32] Benjamin Leard & Virginia McConnell, *New Markets for Credit Trading under U.S. Automobile Greenhouse Gas and Fuel Economy Standards* (Resources for the Future Discussion Paper 15-16, 2015).
[33] 56 Fed. Reg. 5173 (1991); *see also* 70 Fed. Reg. 58,154 (2003).
[34] Nash & Revesz, *supra* note 5.

EPA has finalized various emission standards for vehicles that allow "averaging, banking, and trading" (ABT) among and between car manufacturers.[35] However, there has been very little if any trading between manufacturers under these programs,[36] at least until the recent greenhouse gas standards for motor vehicles (discussed below).[37]

b) Climate Change and Stratospheric Ozone Markets

Because global pollutants like greenhouse gases and ozone-depleting substances have few if any localized effects, total emission reductions matter much more than which source is making those reductions. As a result, global pollutants are ideal candidates for marketable permits. Compared to applications of marketable permits to local and regional pollutants like sulfur dioxide, marketable permit programs for global pollutants may encounter fewer problems with fungibility and therefore may need fewer exchange restrictions (see below on fungibility and exchange restrictions).

In 1988, EPA created a marketable permit program for ozone-depleting chlorofluorocarbons, which included both a cap on tradable production allowances and credits for certified destructions of the harmful substances.[38]

In the second term of the Obama administration, EPA issued the Clean Power Plan standards for carbon dioxide emissions from existing coal- and gas-fired power plants. The standards, to be implemented by the states, can be achieved through marketable permits, emission taxes, or any other approaches that states prefer. EPA expected most states to either opt into regional or national cap-and-trade programs, or else defer to a federal implementation plan that would use marketable permits. The Clean Power Plan is currently being litigated before the U.S. Court of Appeals for the District of Columbia, and the new Trump administration is anticipated either to not advance implementation of the standards or to attempt to repeal the standards.

Nevertheless, greenhouse gas markets will continue to operate at the state level. Several New England states have developed the Regional Greenhouse Gas Initiative for carbon pollution for their power plants, and California has begun implementing a state-wide greenhouse gas cap-and-trade program. California's program authorizes both linking permit markets with and purchasing offsets from Canada. Federal agencies may need to supervise such interstate and international markets.

Market-based programs for vehicles' greenhouse gas emissions are discussed below, since EPA issued them jointly with the Department of Transportation's vehicle efficiency standards. Energy efficiency and renewable energy programs, while contributing to greenhouse gas reductions, are focused on more than environmental benefits, including issues like national security and consumer cost savings.

c) Renewable Energy Credits and Vehicle Efficiency Trading

In 2010, EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) finalized joint standards to regulate the greenhouse gas emissions from passenger motor vehicles and to increase the fuel efficiency requirements; similar joint proposals on heavy-duty trucks followed. Trading credits among vehicle manufacturers is permitted to achieve these standards, and EPA and NHTSA technically each operate separate trading programs. Though at first some researchers

---

[35] Heavy-Duty Engines, 55 Fed. Reg. 30,584 (1990).
[36] EPA, Manufacturer Performance Report for 2015 MY (2015).
[37] For other programs with marketable permit elements, see also the Oxygenated Gas Credit Program, 57 Fed. Reg. 47,853 (1992), and the Clean Fuel Fleet Emission Standards, 58 Fed. Reg. 32,474 (1993).
[38] T.H. Tietenberg, Emissions Trading: Principles and Practice 9 (2006, 2d ed).

expressed concerns about the limited number of transactions on the markets and the corresponding risk of monopolies forming, in recent years the markets have been relatively "active."[39]

In the Energy Policy Act of 2005,[40] Congress mandated that EPA develop a Renewable Fuel Standards (RFS) program, to require fuel importers and refiners to blend a certain proportion of renewable fuels together with any fossil fuel-based gasoline sold. Importers and refiners may purchase and blend renewable fuels directly, or they may purchase credits (called RINs, for renewable identification numbers) from generators of renewable fuels.

Many states apply similar requirements to their electricity producers. As of August 2016, 29 states, the District of Columbia, and three U.S. territories have renewable electricity standards (often called Renewable Portfolio Standards, or RPS).[41] Because states may allow interstate or even international trading of renewable energy credits or certifications (RECs), and because individual states may lack the authority to oversee adequately such interstate and international markets, federal oversight may be desired to ensure the integrity of these markets. In 2012, states on average sourced 39% of required credits from out-of-state resources (ranging from 94% in Delaware and Missouri, to 0% in New Mexico, Iowa, and Texas); some states traded with Quebec.[42]

The Department of Energy also implements requirements for state-owned fleets of vehicles and certain other large fleets to purchase a set proportion of alternative fuel vehicles. Besides direct purchases of alternative vehicles, these requirements can also be met with marketable credits. The market for credits is small, with only 13 transactions totaling 383 credits traded for model year 2014 (out of about 20,000 credits).[43]

d) Water Quality Trading

Like the Clean Air Act, the Clean Water Act has a cooperative federalism structure, and states are often responsible for implementing federally-set water quality standards. Some Clean Water Act standards are technology-based prescriptive requirements, and EPA does not currently support the use of trading programs to comply with such technology-based limits (though EPA has expressed willingness to consider in the future how even technology-based standards might be met through marketable permits).[44] Other Clean Water Act standards apply more holistically to entire bodies of water, including setting pollution budgets, or total maximum daily loads (TMDLs), for water bodies. Some states use marketable permits to comply with TMDLs and other standards. In particular, trading may be authorized both among point sources and between point sources and non-point sources. A point source, like a factory sitting on a river, is a regulated source with a measurable flow of pollution, often emitted from the end of a pipe. A non-point source, like a farm, has more diffuse, often un-measurable discharges. Because TMDLs provide a fixed cap on pollution and because non-point sources are largely unregulated, water quality trading often takes the form of a cap-and-trade program combined with a credit program.

Compared to air pollution markets, water quality trading has developed relatively slowly. The slow development across the United States could be blamed partly on the slow development of TMDLs themselves. However, even worldwide only a few dozen active water quality trading programs exist, and

[39] EPA & NHTSA, Draft Technical Assessment Report: Midterm Evaluation, 420-D-16-900.
[40] Expanded by the Energy Independence and Security Act of 2007.
[41] Database of State Incentives for Renewables and Efficiency (DSIRE), Renewable Portfolio Standards Policies, http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2017/03/Renewable-Portfolio-Standards.pdf.
[42] NREL, Quantifying the Level of Cross-State Renewable Energy Transactions (2015).
[43] Dept. of Energy-EERE, Fleet Compliance Results for MY2014/FY2015.
[44] EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003).

globally only $32 million in water quality trades took place in 2015, compared to hundred of billions of dollars in worldwide carbon markets.[45]

The first U.S. pilot water quality trading project was at Wisconsin's Fox River in the 1980s.[46] Currently about two dozen active programs exist across 16 states.[47] Because some watersheds cross state lines, some trading programs are interstate as well,[48] like the Ohio River Basin program.[49] Yet as of 2008, only 100 point sources nationwide had participated in water quality trading, and 80% of participants were under a single program in Long Island Sound.[50] More recently, significant water quality trading programs have been developed in the Chesapeake Bay.

e) Natural Resource Mitigation Banks

The Army Corps of Engineers, in consultation with EPA, issues permits for development projects affecting wetlands, streams, and other aquatic resources. Under Section 404 of the Clean Water Act and Sections 9 and 10 of the Rivers and Harbors Act of 1899, the Corps requires permittees first to avoid impacts and then to mitigate any unavoidable effects. Such mitigation can take the form of the creation, restoration, expansion, or preservation of other aquatic resources. In the 1980s, EPA and the Corps disagreed on whether mitigation should be done exclusively on-site by the individual permittees themselves, or if off-site mitigation was also permissible.[51] By 1995, EPA and the Corps issued joint guidance on the use of wetland mitigation banks, wherein permittees purchase mitigation credits from third parties that complete verified creation, restoration, or preservation projects. Approval for "in-lieu fees" soon followed: in-lieu fees are essentially mitigation banks from which credits can be purchased, for a fee, in advance of the mitigation actually being accomplished; by contrast, mitigation banks sell credits for already-completed mitigation projects. By 2014, 52% of projects requiring mitigation used either banks or in-lieu fees rather than permittee-conducted efforts, though in terms of total acres of mitigation, permittee-responsible projects continue to outpace mitigation banks.[52] Nearly 1500 banks and in-lieu instruments have been approved.[53]

Copying the model of wetlands mitigation,[54] the Fish and Wildlife Service (FWS) implemented a conservation bank program for habitat mitigation. Section 10 of the Endangered Species Act allows FWS to grant permits for incidental harms to endangered species.[55] After permittees first try to avoid impacts, they must develop a habitat conservation plan that includes mitigation for the incidental

---

[45] Ecosystem Marketplace, State of Watershed Investment (2016); *see also* Ecosystem Marketplace/Forest Trends, State of Watershed Payments (2010) ($118 billion in regulated carbon markets).
[46] Willamette Partnership, *In It Together: A How-To Reference for Building Point-Nonpoint Water Quality Trading Programs* (2012).
[47] *Id.* (As of 2011, 24 active point-nonpoint trading programs across 16 states; 80% of programs focus on phosphorus).
[48] EPA, Water Quality Trading Toolkit (2009).
[49] Willamette Partnership, *In It Together: A How-To Reference Part 2* (2012). EPA noted in comments on the draft version of this report that the Ohio River program is currently voluntary and awaiting regulatory drivers in the form of nutrient or sediment NPDES limits.
[50] Willamette Partnership, *In It Together: A How-To Reference Part 2* (2012); *see also* Industrial Economics Inc. (IEc), Water Quality Trading Evaluation (2008, produced for EPA) (reported "limited practical success").
[51] U.S. Army Corps-Jacksonville District, Key Concepts of Mitigation Banking (2003).
[52] U.S. Army Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015) (stats for years 2010-2014); *see also* Corps-EPA, Final Rule: Compensating Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,593 (2008) (In 2005, permittee-responsible represented 60% of acres, banks 33%).
[53] U.S. Army Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015).
[54] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).
[55] Also, Section 7 of the Endangered Species Act requires mitigation for actions by federal agencies.

harms.[56] In 1995, the California Department of Fish and Game innovated the first conservation bank,[57] and FWS now allows both conservation banks and in-lieu fees for the required habitat mitigation nationwide.[58] The National Oceanic and Atmospheric Administration (NOAA) is responsible for certain endangered species permits affecting marine resources, and some regional offices of the National Marine Fisheries Service (NMFS) also allow use of conservation banks, though FWS-approved banks far outnumber NOAA-approved banks. As of January 2017, 158 conservation banks had been approved (including 23 sold-out banks and 12 banks pending approval).[59] As with wetlands, use of mitigation banks and in-lieu fees continues to lag slightly behind reliance on permittee-responsible mitigation projects for habitat conservation.[60]

Overall, the use of natural resource mitigation banks has been impressive. As of 2011, U.S. wetland, stream, and habitat conservation banking programs had $2-$3.4 billion in transactions, with 15,000 hectares traded annually.[61]

Conservation bank credits may also be used to mitigate under other programs, like the National Environmental Policy Act,[62] though few examples of such use exist.[63]

f) Tradable Fish Catch Shares

Historically, many fisheries have been overwhelmed by "derby" conditions: a race among licensed fishers to catch the allowed amount before the end of the season. Fishers were incentivized to build bigger, more expensive fleets to try to outcompete each other, and the derby conditions encouraged overfishing and unsafe conditions.[64] Catch share programs that allocate precise quotas to individual fishers can alleviate these inefficient derby conditions. Catch shares can be distributed and made tradable or can be allocated by auction (though no U.S. catch share programs currently use auctions).

The first individually transferrable quota program was established in 1990 by the Mid-Atlantic regional fishery council for catch of surfclams and ocean quahogs; today there are 16 U.S. catch share programs, with varying levels of marketability.[65] Most catch share programs are administered by regional councils; the program for highly-migratory Bluefin tuna is administered directly by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS). Environmental Defense Fund estimates that 65% of fish caught in U.S. federal waters are under catch shares.[66]

---

[56] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).
[57] *Id*.
[58] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[59] U.S. Army Corps, Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS), https://ribits.usace.army.mil/ribits_apex/f?p=107:2.
[60] Ecosystem Marketplace, State of Biodiversity Markets (2011) (In 2011, 67% of mitigation was from permittee-responsible activity, 26% from mitigation banks, and 7% from in-lieu fees).
[61] *Id*.
[62] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).
[63] *See* NMFS West Coast Region, Conservation Banking Guidance (2015). Initial searches did not reveal any examples of mitigation banking in environmental impact statements under NEPA. The National Oceanic and Atmospheric Administration and the Federal Highway Administration also use RIBITS. FERC allows off-site mitigation, but is not preferred, occurs rarely, and may not be considered trading. *See* Pub. Serv. Co. of Colo., 132 FERC P 61,224, 62,261 (2010).
[64] NOAA, Catch Share Policy (2010).
[65] NOAA, Map of Catch Share Programs by Region, http://www.nmfs.noaa.gov/sfa/management/catch_shares/about/programs_by_region.html.
[66] Katrina Wyman, *The Recovery in U.S. Fisheries*, J. Land Use (forthcoming) (admitting that may be a high estimate; another estimate is 25% of species caught in U.S. fisheries are under catch shares).

g) Markets in Other Common Resources

The Federal Communications Commission (FCC) is responsible for licensing use of the electromagnetic spectrum by television and radio broadcasters, broadband and cellular providers, and other services. FCC has been conducting auctions to distribute licenses since 1994,[67] and has been working to improve the transferability of licenses since 2003.[68] The most famous FCC auction is the ongoing broadcast incentive auction, a first-of-its-kind two-step auction wherein first broadcasters propose sale of their underutilized spectrum and then broadband providers compete to purchase the freed spectrum. Secondary markets for trading spectrum licenses are somewhat constrained, since applicants for transfer must demonstrate that the transfer serves the public interest,[69] and historically FCC only rarely allowed sublease or resale.[70] Various legal[71] and technical limits, like potential interference between users of neighboring bandwidth, sometimes block the secondary transfer of spectrum to a different use than the originally approved use.[72]

Finally, landing slots at congested airports are licensed by the Federal Aviation Administration (FAA). For purposes of this report, landing slots are most relevant for the failed attempt by FAA to auction off some landing slots at New York City-area airports. Private, secondary trades of landing slots between airline operators are also permitted, subject to FAA approval.

3. Notable Local and Foreign Applications

The most important foreign marketable permit programs fall under the United Nations Framework Convention on Climate Change. To implement its collective responsibility to reduce greenhouse gas emissions, the European Union established an Emissions Trading System (EU-ETS). The Framework Convention's Kyoto Protocol also allowed countries with emissions reduction obligations to earn credits by funding mitigation in countries that do not yet have emissions reduction obligations, through a program called the Clean Development Mechanism (CDM).[73] Both EU-ETS and CDM have experienced some issues with market management and fraud, and U.S. markets may learn important lessons by studying those examples. Foreign countries also have a host of marketable trading programs in similar applications as seen in the United States, like air and water quality or fisheries,[74] as well as some additional contexts, like the U.K.'s waste management market for municipal waste.[75] Foreign programs will be referenced in subsequent sections of this report when relevant.

At the U.S. state and local level, some of the best known examples of marketable permits are transferable development rights, liquor licenses, and taxi medallions, as well as water quantity trading.[76] These applications first are notable reminders that marketable permit structures can be used to address

---

[67] FCC, About Auctions, http://wireless.fcc.gov/auctions/default.htm?job=about_auctions.
[68] FCC, Secondary Market Initiative, http://wireless.fcc.gov/licensing/index.htm?job=secondary_markets.
[69] 47 C.F.R. § 20.22.
[70] Pablo Spiller & Carlo Cardilli, *Toward a Property Rights Approach to Communications Spectrum*, 16 Yale J. of Reg. 53 (1999).
[71] Jessica Elder, *Voluntary Incentive Auctions: The Benefits of a Market-Based Spectrum Policy*, 20 Comm. L. Conspectus 163 (2011).
[72] FCC, Connecting America: The National Broadband Plan 82 (2010) ("In many spectrum bands, the government issues exclusive flexible use licenses that allow licensees to choose what services to offer and to transfer, lease, or subdivide their spectrum rights. Many spectrum licensees, however, have inflexible licenses that limit the spectrum to specific uses.").
[73] There is also Joint Implementation, which allows trading between Annex I countries.
[74] In fact, Iceland, Canada, and other countries pioneered tradable fish catch shares long before they became popular in the United States.
[75] Breger, Stewart, Elliott, & Hawkins, *Providing Economic Incentive in Environmental Regulation*, *supra* note 13.
[76] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 38, 48-50 (1981).

policy goals beyond the environmental and energy contexts. Additionally, these local applications contain some unique structures that federal regulators can learn from. Take, for example, transferable development rights. Under this land management tool, "a property owner retains ownership of his land but sells his rights to further develop it to another landowner who can use the permit to exceed the density permitted on his land under the applicable zoning. . . . Development rights can be bought, stored or banked, and sold until they are actually used to develop a piece of property."[77] Puerto Rico has interestingly implemented transferrable development rights through a public, rather than private, market: "[T]he Puerto Rico Plan does not allow direct transfers of development rights among private property owners. Rather, the Puerto Rico Planning Board acts as buyer and seller in all development rights transfers."[78] With the government acting as middleman, undesirable transfers can be prevented, but perhaps at the expense of economic and administrative efficiency. Federal regulators should study local applications of marketable permits, and this report will draw from local case studies when useful.

4. Roads Not (Yet) Taken

Though some legal scholars have wondered whether all the good opportunities for regulatory permit markets have already been implemented,[79] a variety of other ideas for marketable permit programs have been proposed over the years.

First, some notable failures and false-starts:

- In the early 1990s, the Federal Aviation Administration (FAA) considered transferrable permits for phasing out noisy aircraft and replacing them with quieter fleets.[80] FAA indicated it would adopt a market-based approach unless public commenters opposed it—and commenters strongly opposed it. First, airport neighbors worried about a problem known as "additionality," which is whether the market inadvertently rewards behavior that would have happened anyway. These concerned neighbors noted that some aircraft operators were already on track to switch to quieter aircraft even without regulations, yet now FAA was proposing to reward them with credits that could be sold to other operators who will then phase-out their own noisy aircraft more slowly than otherwise. Even industry could not get together behind a marketable permit proposal: neither large and small carriers, nor owners and operators could agree on a design for the market. In the face of such lack of consensus support, FAA jettisoned the idea.
- In 2008, FAA issued rules on slot auctions for three heavily congested New York-area airports: LaGuardia, JFK, and Newark.[81] Up until that point, landing slots were allocated free of charge through a licensing procedure. Senator Schumer led the attack against this so-called "sky tax," alleging the auction will hurt customers' pocketbooks. Following a temporary congressional moratorium on the plan, the Obama administration rescinded the rule in 2009.[82] Landing slots continue to have some limited transferability between airlines.
- In 1990, the Army Corps of Engineers rejected the idea of marketable permits for managing shoreline degradation connected to civil works projects. The estimated administrative costs of such a program were cited as justification.[83]

---

[77] *Id.* at 37.
[78] *Id.* at 38.
[79] James Salzman & J.B. Ruhl, *supra* note 6. (wondering whether all the "low-hanging fruit" were picked early (e.g., acid rain, lead in gas), and there might be few areas left ripe for markets).
[80] *See* 56 Fed. Reg. 48,628 (1991).
[81] 73 Fed. Reg. 60,544 & 60574.
[82] 74 Fed. Reg. 52,132 & 52,134. Amazingly, the proposal to rescind only received five sets of public comments, all against.
[83] 55 Fed. Reg. 30,690 (1990).

- The original version of the Clean Air Act Amendments of 1990, as proposed by the George H.W. Bush administration, included a national trading system between fuel refiners and automobile manufacturers. The provision was deleted in congressional committee mark-ups, following opposition from environmental groups. Environmentalists were concerned about swapping the diffuse pollution of countless individual motor vehicles for the concentrated, local effects of pollution from a small number of refineries.[84] This issue of localized effects and "hot spots" comes up repeatedly in debates over marketable permit programs.
- Finally, in 2005, the George W. Bush administration's EPA issued the Clean Air Mercury Rule, which set limits on mercury emissions from power plants to be implemented by the states. The Rule encouraged inter-plant and interstate trading of emissions allowances. The Rule was vacated by the U.S. Court of Appeals for the District of Columbia in 2008, but on grounds completely unrelated to trading. Essentially, the court found that mercury emissions needed to be controlled under a different provision of the Clean Air Act than the one EPA first picked: Section 112, instead of Section 111(d). Under the Obama administration, EPA determined that Section 112 generally, and mercury emissions in particular, were not good candidates for marketable permits, and opted for a prescriptive standard instead.

Other examples of ideas for marketable permits that were briefly considered by federal agencies include an EPA task force's recommendations for tradable recycled newsprint quantity requirements[85] and battery recycling trading, as well as recommendations from the Department of Justice that EPA use auctions for an asbestos phase-down.[86] EPA currently does not support water quality trading for bio-accumulative toxics, though has expressed openness to a future pilot project.[87]

Academics have been even more creative, proposing marketable permits for: satellite congestion in space,[88] pesticides-related risk,[89] wastewater from hydraulic fracturing,[90] environmental quality relating to dams,[91] introduction of non-indigenous species,[92] and various health risks including to control antimicrobial resistance.[93] An idea has even been floated that the right to initiate a citizen suit against polluters for violations of regulatory standards should be auctioned off.[94]

D. Legal Status

[84] Breger, Stewart, Elliott, & Hawkins, *Providing Economic Incentive in Environmental Regulation*, *supra* note 13.
[85] *Id*.
[86] OECD, Emission Permits and Competition (2010).
[87] EPA, Water Quality Trading Toolkit (2009).
[88] *See* personal.colby.edu/personal/t/thtieten/tradable_permits_other.htm (Prof. Tietenberg's personal catalog of other applications of marketable permits).
[89] Breger, Stewart, Elliott, & Hawkins, *Providing Economic Incentive in Environmental Regulation*, *supra* note 13 (Stewart's proposal, noting that the idea would first require better techniques for measuring the risk).
[90] Xochitl Torres Small, *Water Use and Recycling in Hydraulic Fracturing*, 55 Nat. Res. J. 2 (2015).
[91] Dave Owen & Colin Apse, *Trading Dams*, 48 U.C. Davis L. Rev. 1043 (2015).
[92] *See* Eric Biber, *Exploring Regulatoyr Options for Controlling the Introduction of Non-Indigenous Species to the United States*, 18 Va. Envtl. L. J. 375 (1999) (but Biber also details the potential problems with such a scheme).
[93] *See* Tietenberg's personal catalog, *supra* note 88.
[94] Michael Abramowicz, *The Law-and-Markets Movement*, 49 Am. Univ. L. Rev. 327 (1999).

1. Is Explicit Statutory Authorization Required for Markets or Auctions?

a) Marketable Permit Programs Exist Under Both Explicit and Implicit Authorities

Many, but certainly not all, existing marketable permit programs have explicit statutory authority: the acid rain program;[95] various state and federal implementation plans under the Clean Air Act, including the Cross-State Air Pollution Rule[96] and the Clean Power Plan;[97] electromagnetic spectrum auctions;[98] renewable fuel standard credits;[99] and the Department of Transportation's tradable fuel efficiency requirements for vehicles[100] (though not EPA's related greenhouse gas and emissions standards for vehicles).

Several programs currently have explicit statutory authority but once existed without it:

- In 1988, two years before the Clean Air Act Amendments of 1990 added explicit authorization for trading allowances for ozone-depleting substances,[101] EPA interpreted a broad statutory mandate to "control" such emissions as authorizing a tradable allowance system.[102] That same year, the Department of Justice concluded that EPA not only had the authority to use marketable permits, but that the agency could auction off the initial allocation as well.[103] EPA ultimately did not pursue the auction option.
- Amendments to the Magnuson-Stevens Fishery Conservation and Management Act added the term "individual fishing quota" for the first time in 1996, six years after the first system of tradable catch shares was created for surfclams and quahogs.[104] Those amendments also imposed a temporary congressional moratorium on new catch share programs, which was not lifted until 2002.[105]
- Nothing in Section 404 of the Clean Water Act explicitly gives the Army Corps of Engineers the authority to allow wetland mitigation banking and in-lieu fees; indeed, only the interplay between Sections 403 and 404 even gives the Corps the general authority to require minimizing impacts to wetlands.[106] Neither does anything in the Rivers and Harbors Act of 1899 give the Corps explicit authority to allow mitigation banking for impacts to streams and other aquatic resources. Yet since the 1990s, the Corps has allowed mitigation banking, and beginning in 2008, the Corps has expressed a strong preference for banking over other approaches to mitigation for

---

[95] Clean Air Act Title IV.

[96] Clean Air Act § 110; Policy Integrity Amicus Brief in CSAPR Case 14 (2013) ("Congress Explicitly Authorized EPA and the States to Use Market Mechanisms to Address Interstate Air Pollution in Order to Achieve Environmental Goals Cost-Effectively").

[97] The authority is more indirect, through Clean Air Act § 111's reference to § 110. *See also* the non-attainment new source review program, 42 U.S.C. § 7502, and the federal ozone standards, 42 U.S.C. § 7511b.

[98] 47 U.S.C. § 309(j); FCC, About Auctions, *supra* note 67 (competitive bidding first allowed by Congress in 1993; auction authority expanded in 1997).

[99] Energy Policy Act of 2005 § 1501.

[100] *See* Energy Policy and Conservation Act, as amended by Energy Independence and Security Act.

[101] Clean Air Act title VI, § 607, as added by Pub. L. 101–549, title VI, § 602(a), Nov. 15, 1990, 104 Stat. 2660.

[102] Protection of Stratospheric Ozone, 53 Fed. Reg. 30566 (Aug. 12, 1988) (codified at 40 C.F.R. pt. 82).

[103] FTC, Comments of the Staff of the Bureau of Economics on Protection of Stratospheric Ozone (1988) (citing DOJ Comments on Proposed Rule on Protection of Stratospheric Ozone, A-87-20, Feb. 8, 1988).

[104] Nat'l Res. Council, *Sharing the Fish: Toward a National Policy on Individual Fishing Quotas* (1999). The Magnuson-Stevens Act also authorized auctions or other collection of royalties, on top of cost recovery. 16 U.S.C. § 1853a(d)-(e).

[105] Mark Fina, *Evolution of Catch Share Management*, 36 Fisheries 164 (2011).

[106] Nat'l Res. Council, *Compensating for Wetland Losses under the Clean Water Act* 64 (2001) (supplemented by § 307 of the Water Resources Development Act, which instructs the Corps to pursue "no overall net loss").

wetlands, streams, and aquatic resources.[107] In the National Defense Authorization Act of 2004, Congress implicitly acknowledged the Corps' authority for wetland mitigation banks by requiring the Corps to issue regulations "establishing performance standards and criteria for the use, consistent with section 404 of the [Clean Water Act], of on-site, off-site, and *in-lieu fee mitigation and mitigation banking as compensation for lost wetlands functions* in permits."[108] Notably, that 2004 legislation did not mention streams or other aquatic resources, even though the Corps continues to allow mitigation banks for such impacts as well.

Finally, a number of marketable permit programs have never had explicit statutory authority:

- EPA's inter-refinery trading system to help phase out lead from gasoline never had explicit statutory authority.[109] Section 211 of the Clean Air Act broadly authorizes EPA to "control or prohibit" the manufacture of fuels and fuel additives.[110]
- EPA's various "averaging, banking, and trading" programs for vehicle emissions, including for mobile source greenhouse gas emissions, has no explicit authorization in statute.[111] Section 202 of the Clean Air Act broadly authorizes EPA to develop "standards" for motor vehicle emissions.[112] (Note that the Department of Transportation's related credit trading program for fuel efficiency is specifically authorized by two energy policy statutes.[113])
- Section 169A of the Clean Air Act requires individual "sources" to install the "best available retrofit technology" to control regional haze. EPA's regulations allowed states to use marketable permits to comply with these standards if the program would achieve "greater reasonable progress" toward reducing regional haze than a prescriptive, source-specific standard would.[114] The U.S. Court of Appeals for the Tenth Circuit upheld the trading program in 2012.[115]
- Water quality trading under the Clean Water Act is not explicitly authorized, though EPA believes that the statute nonetheless provides "clear legal authority" to trade.[116] The U.S. Court of Appeals for the Ninth Circuit once strongly implied, in dicta, that the lack of either statutory or regulatory authority for water quality trading meant it was not permitted.[117] Nevertheless, water quality trading has continued. Some scholars suggest that, for cooperative federalism structures like the Clean Air Act and the Clean Water Act, explicit statutory authority is not required because states retain their plenary powers to implement the federal standards however they see fit.[118]
- There is no explicit authorization in the Endangered Species Act to allow conservation banking to achieve mitigation. Indeed, the Fish and Wildlife Service even admits that its authority to

---

[107] Corps-EPA Final Rule, Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,593 (2008).
[108] National Defense Authorization Act of 2004 § 314; Pub. L. 108–136, div. A, title III, §314(b), Nov. 24, 2003, 117 Stat. 1431. (and those regulations should "maximize available credits and opportunities for mitigation.")
[109] 47 Fed. Reg. 49,322.
[110] 42 U.S.C. § 7545(c).
[111] *See* 75 Fed. Reg. 25,412 (saying, without mentioning any statutory authority, that Averaging, Banking, and Trading (ABT) of emissions credits has been an important part of many mobile source programs under CAA Title II, both for fuels programs as well as for engine and vehicle programs).
[112] 42 U.S.C. § 7521.
[113] EISA and EPCA, *supra*.
[114] 40 C.F.R. § 51.309(d)(4)(i); WildEarth Guardians v. EPA, 770 F.3d 919, 925 (10th Cir. 2014).
[115] WildEarth Guardians v. EPA, 770 F. 3d 919 (10th Cir. 2014).
[116] EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003) (statute and regulations together provide "clear legal authority").
[117] Friends of Pinto Creek v. EPA, 504 F.3d 1007, 1012 (9th Cir. 2007).
[118] William Buzbee, *Federalism-Facilitated Regulatory Innovation and Regression*, 28 Georgetown Envtl. L. Rev. (2016).

require permits achieve no net loss of critical habitat is "limited."[119] Nevertheless, conservation banking continues to flourish.

No federal permit auction has gone into effect without explicit authority, and some scholars have questioned whether auctioning is legal without specific statutory language.[120] However, in 1988 the Department of Justice concluded that EPA could auction off permits for ozone-depleting substances, despite the lack of specific statutory language.[121] In 2008, the Federal Aviation Administration interpreted its broad statutory powers to manage property as authorizing an auction of airport landing slots. The Obama administration rescinded the rule before the auction could go into effect (it had been stayed by the D.C. Circuit pending full judicial review), but there are some legitimate questions about relying on property management powers to authorize a marketable permit program.

b) Powers to Manage Property and Charge User Fees May Be Insufficient

While the Federal Aviation Administration's landing slot auction rule was under judicial review, and before the rule was rescinded in 2009, Congress asked the Government Accountability Office (GAO) to investigate the legal basis for the auction. In 2008, GAO concluded that FAA lacked legal authority.[122] FAA had based its auction principally on the argument that a landing slot is "property" that the agency "constructs" and may "lease" for "adequate compensation."[123] Other agencies may have similar authorities to manage property in their organic statutes.[124] GAO determined, based on statutory context, that Congress had only intended to give FAA authority to manage "traditional property," such as real property. According to GAO, FAA's argument had proven too much, as it would mean the agency had been giving away millions of dollars in federal property for free for decades.[125] Moreover, because Congress gave FAA specific regulatory authority to control airspace and landings under a particular provision, GAO determined the agency could not reach into a completely unrelated provision to claim the same regulatory authority.[126]

GAO also considered whether the auction could be approved as a user fee under the Independent Offices Appropriation Act. That statutory provision declares "It is the sense of Congress that each service or thing of value provided by an agency . . . is to be self-sustaining to the extent possible," and to that end, "each agency" may "charge" a "fair" amount "based on—the costs to the government, the value of the service or thing to the recipient, public policy or interest served, and other relevant facts."[127] A previous version of the statute had clarified that "thing of value" included "any . . . privilege, authority, use, franchise, license, permit, certificate, registration or similar thing of value or utility performed, furnished, provided, granted, prepared, or issued."[128] Based on the plain language, a permit auction

---

[119] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[120] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 25 (1981)
[121] FTC, Comments of the Staff of the Bureau of Economics on Protection of Stratospheric Ozone (1988) (citing DOJ Comments on Proposed Rule on Protection of Stratospheric Ozone, A-87-20, Feb. 8, 1988).
[122] GAO, B-316796, *Federal Aviation Administration—Authority to Auction Airport Arrival and Departure Slots and to Retain and Use Auction Proceeds* (2008).
[123] 73 Fed. Reg. 60,543.
[124] *E.g.,* 20 U.S.C. § 3477 (Dept. of Education); 49 U.S.C. § 114 (TSA).
[125] *See also* Cleveland v. U.S., 531 U.S. 12 (2000). According to that case, pre-issuance, licenses have no value to the state; licenses are "purely regulatory," even if they acquire some aspects of property once owned, the state's interest "surely implicate the government's role as sovereign, not as property holder." *Id.* at 23-24.
[126] GAO, *supra* note 122.
[127] 31 U.S.C. § 9701.
[128] 31 U.S.C. § 483a. The change was to "eliminate unnecessary words," not to change the meaning.

would seem to fit within the authority to charge a "fair" amount based on "public policy" for any permit, license, or privilege.

First and foremost, GAO noted this possible statutory authority was closed to FAA because Congress annually passed appropriations riders blocking any new aviation user fees.[129] However, GAO further argued that even absent the riders, the Independent Offices Appropriation Act only authorized specific kinds of user fees: when an agency provides a service in a non-governmental capacity, it may charge market price; but when an agency acts in a regulatory capacity, the user fee can only charge government costs.[130] This interpretation of the statute is based on a pair of Supreme Court cases and their progeny. In *National Cable Association of Broadcasters v. FCC*[131] and in *FPC v. New England Power*,[132] the Supreme Court struck down agencies' use of the Independent Offices Appropriation Act to collect "fees" from regulated parties that recovered "costs for benefits inuring to the public." The Court said that reading the Act's reference to "public policy" literally would put the agency "in search of revenue," and that charging a fee to discourage activity is "in the nature of 'taxes'" that only Congress can levy.[133] Ultimately, the Court declined to rule on the "ultimate reach" of the "public policy" criterion, concluding that the only relevant factor in these cases was whether the amount charged by the agencies was consistent with the "value to the recipient" of the benefit provided.[134] The upshot of these cases, according to GAO, is that courts are "not sympathetic" to fees based on the "public policy" criterion, and a "number of lower courts," including the U.S. Court of Appeals for the D.C. Circuit, have found that the Act allows agencies to charge user fees only to recover government costs.[135] Because any revenue-raising auction would almost certainty charge more than just the administrative costs of running the auction, this interpretation of the Independent Offices Appropriation Act would not support creation of a revenue-raising auction.

However, a regulatory permit auction could be distinguished from the facts of the two Supreme Court cases. In *FPC v. New England Power*, the court found that the Independent Offices Appropriation Act could not be applied to "whole industries" including companies that had "no proceedings before the Commission during the year in question."[136] In other words, the agency was still charging every regulated entity an annual fee even though many did not receive any permits or licenses in most years. An auction of marketable permits would be distinguishable because each auction participant would receive permits for that specific year, and only be charged accordingly. In *National Cable*, the Court also distinguished an authorized fee for a permit from an impermissible tax: "A fee, however, is incident to a voluntary act, e.g., a request that a *public agency permit an applicant to* practice law or medicine or construct a house or *run a broadcast station*. The public agency performing those services normally *may exact a fee* for a grant which, presumably, bestows a benefit on the applicant, not shared by other members of society."[137] Charging an auction price for marketable permits seems analogous to this permissible scenario presented by the Court. A dissent by Justice Marshall in these cases also criticized

[129] GAO, *supra* note 122.
[130] DOJ agreed that if an auction charges market price, and not government costs, it cannot be "user fee" under IOAA, though DOJ did not ultimately issue an opinion on whether FAA's auction was legally authorized or not.
[131] 415 U.S. 336 (1974).
[132] 415 U.S. 345 (1974).
[133] *National Cable*, *supra* note 131.
[134] *Id.*
[135] Statement of Richard Hembra, GAO, before Subcomm. Hearing on EPA Ozone, 1989 (see babel/hathitrust).
[136] 415 U.S. 345.
[137] *Id.* at 340-341.

the Court for giving "undue emphasis" to the "cost to the government" factor alone without allowing the agency to weigh the other factors, such as "public policy."[138]

It is possible that, presented with an auction for regulatory permits, a future court could uphold authority under the Independent Offices Appropriations Act. However, agencies will likely have more success just relying on any broad grants of regulatory authority.

c) Authority Can Be Implicit in Broad Statutory Language

The most relevant case on finding implicit authority for market-based regulatory tools in broad statutory language is *FEA v. Algonquin SNG*.[139] The Trade Expansion Act allowed the President to "take such action . . . as he deems necessary to adjust the imports . . . [to protect] national security." In 1975, finding that a system of quotas no longer adequately controlled petroleum imports, President Ford switched to a system of license fees. A legal challenge alleged that the President only had statutory authority to adjust imports through quantitative tools like quotas, not monetary tools like fees. The Supreme Court concluded there was no reason to read the word "adjust" as limited to quotas and excluding fees.[140] The Court relied on the broad statutory language and evidence in legislative history that Congress did not intend to tie the President's hands.[141] The Court concluded with a note of warning, that its ruling would not allow the President to take any action no matter how remote the impact on imports.[142] A few years later, the U.S. District Court for the District of Columbia acted on this warning and ruled that a fee was not authorized when its purpose was not directly to control imports, but rather to raise oil prices and reduce consumption generally, with only an indirect effect on imports.[143] Together, these cases stand for the proposition that when statutory language and legislative history support a broad reading of regulatory authority, a variety of quantitative and market-based tools are implicitly authorized, so long as the tool directly targets a legitimate regulatory purpose.[144]

As one example, in 1989 Congress held hearings on whether EPA had authority to auction off emissions allowances for ozone-depleting substances under Section 157(b) of the Clean Air Act, which authorized the "control" of emissions.[145] When that section was added in 1977, Congress clearly expressed that it "does not wish to tie the Administrator's hands or confer an authority which is cumbersome or unduly difficult to use, administer, or enforce."[146] Congress further explained that "control" included any "other measures as may be necessary to assure protection for health and environment."[147] EPA interpreted "control" in 1988 to allow tradable permits for ozone-depleting substances,[148] and the agency began exploring whether an auction would also be permitted.[149] A memorandum submitted by the Department of Justice for the 1989 congressional hearing found that the scope of authority under the section was "sweeping" and further argued that Congress knew about economic incentives and

---

[138] *Nat'l Cable Television Ass'n, Inc. v. United States*, 415 U.S. 352, 359–60, (1974).
[139] 426 U.S. 548 (1976).
[140] *Id.* at 561.
[141] Statement of Richard Hembra, GAO, before Subcomm. Hearing on EPA Ozone, 1989 (see babel/hathitrust).
[142] *Nat'l Cable* at 571.
[143] 492 F. Supp. 614 (D.D.C. 1980).
[144] Statement of Richard Hembra, GAO, before Subcomm. Hearing on EPA Ozone, 1989 (see babel/hathitrust) ("Regulatory fees" may be upheld by courts either if "expressly provided" in statute or if "deemed necessary to accomplish a legitimate regulatory purpose under a broad grant of statutory authority.").
[145] Section 157(b) was later replaced by Section 615.
[146] H.R. Rep. No. 101-294 (1977).
[147] I*d.*
[148] Protection of Stratospheric Ozone, 53 Fed. Reg. 30,566 (Aug. 12, 1988) (codified at 40 C.F.R. pt. 82).
[149] Advance Notice of Proposed Rulemaking, 53 Fed. Reg. 30,604 (Aug. 12, 1988).

specifically did not prohibit them.[150] At the hearing, Senator Lieberman opined that the conclusions of that memorandum seemed sound but that Congress should make sure EPA's authority was even clearer in future legislation.[151]

Finally, states may also have implicit, relevant powers. Some statutes, notably the Clean Air Act and the Clean Water Act, rely on a structure of cooperative federalism, in which states are tasked with implementing federal standards. Because these statutes include provisions on the retention of state authority,[152] arguably states retain their plenary police powers in the absence of specific preemption. Therefore state may be able to implement their obligations under federal programs however they see fit consistent with the statute and, unless specifically prohibited, implicitly may use marketable permits.[153] It so happens that the Clean Air Act explicitly gives states authority to use marketable permits to implement many obligations;[154] the Clean Water Act does not.

One concern is that, because Congress has explicitly authorized marketable permits in one provision or one statute, by negative inference marketable permits may not be allowed when Congress has not specifically authorized them. Based on case law and the legislative histories of relevant statutes, this concern should be limited.

Generally, a court will not apply the canon of negative inference unless it is "confident" that Congress likely considered and intended to preclude the unmentioned options in that specific context.[155] In 1989, the Department of Justice argued that, since marketable permits had become such an obvious regulatory strategy for the Clean Air Act, if Congress "did not prohibit them" and "instead used general language permitting a wide scope of regulatory measures," no negative inference against market-based regulations should apply.[156] Several legal experts have similarly concluded that lack of a prohibition on marketable permits is usually sufficient to authorize marketable permits.[157]

At the same time, Congress was definitely aware that referencing certain market-based regulatory tools in one provision could accidently imply a limitation of such tools in another provision, and at least once

---

[150] Memorandum from Douglas Kmiec, Asst. Attorney General, Office of Legal Counsel, to Alan Raul, General Counsel, White House Office of Management and Budget (May 15, 1989) ("It is thus clear that Congress was cognizant of economic forms of regulation, did not prohibit them, but instead used general language permitting a wide scope of regulatory measures for the control of CFCs.").

[151] *Proposals to Control the Manufacture, Use, and Disposals of Ozone-Depleting Substances: Hearing Before the Subcomm. On Envtl. Pollution of the S. Comm. On Env't and Pub. Works*, 101st Cong. (May 19, 1989).

[152] 42 U.S.C. § 7416; 33 U.S.C. § 1370.

[153] William Buzbee, *Federalism-Facilitated Regulatory Innovation and Regression*, 28 Georgetown Envtl. L. Rev. (2016).

[154] 42 U.S.C. § 7410.

[155] For example, in *Shook v. District of Columbia Fin. Responsibility and Management Assistance Auth.*, 132 F.3d 775, 782 (D.C. Cir. 1998), the D.C. Circuit stated: "We have recognized, however, that [] maxim [of *expressio unius est exclusio alterius* (the mention of one thing implies the exclusion of another)] is often misused. Sometimes Congress drafts statutory provisions that appear preclusive of other unmentioned possibilities—just as it sometimes drafts provisions that appear duplicative of others—simply, in Macbeth's words, 'to make assurance double sure.' That is, Congress means to clarify what might be doubtful—that the mentioned item is covered—without meaning to exclude the unmentioned ones. The maxim's force in particular situations depends entirely on context, whether or not the draftsmen's mention of one thing, like a grant of authority, does really necessarily, or at least reasonably, imply the preclusion of alternatives. That will turn on whether, looking at the structure of the statute and perhaps its legislative history, one can be confident that a normal draftsman when he expressed "the one thing" would have likely considered the alternatives that are arguably precluded. For that reason, we think the maxim should be used as a starting point in statutory construction—not as a close-out bid."

[156] Memorandum from Douglas Kmiec, *supra* note 150.

[157] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 24 (1981); Dave Owen & Colin Apse, *Trading Dams*, *supra* note 91.

Congress modified a proposed amendments to the Clean Air Act to avoid that result.[158] Despite such over-abundance of caution occasionally exhibited by Congress, courts are unlikely to bar a marketable permit program on the grounds of a negative inference.

The Government Accountability Office (GAO) has warned that a court may be tempted to find that an auction exceeds explicit statutory authority in order to avoid thorny constitutional questions about whether auctions are taxes.[159] However, so long as auctions are directly targeted to advance legitimate regulatory purposes, they should avoid being labelled as unconstitutional taxes.

d) Auctions Are Not Unconstitutional Taxes

Courts have sometimes struggled to differentiate illegal regulatory *taxes* from permissible regulatory *fees*.[160] Under the U.S. Constitution, only Congress has the power to levy taxes,[161] which are generally defined to include payments imposed on many citizens to raise money for a public purpose. The Supreme Court cautioned in *National Cable* against so-called "fees" that are not voluntary, that are designed to discourage activity, or that put agencies "in search of revenue," for such traits are "in the nature of 'taxes'" that only Congress can levy.[162] It could be argue that auctions for marketable permits are taxes because they are mandatory, not voluntary; they discourage activity; and they raise revenue.

However, properly framed, auctions for marketable permits are distinguishable on all these grounds. First, they are not "involuntarily" assessed on a "whole" industry in the way the Court was concerned about. The Court in *National Cable* and its sister case *FEA v. Algonquin* was most troubled by an annual, universal fee charged to each regulated entity regardless of whether it had applied for a permit or license in that particular year.[163] With an auction, only regulated entities seeking permits need to participate in the auction; those that mitigate their own emissions or purchase offsetting credits from third parties need not participate. Also, the language in *National Cable* was dicta, and other courts have come to different conclusions, arguing instead that "regulatory fees" may be "imposed by an agency upon those subject to its regulation."[164]

Second, it is the cap, not the method of permit allocation, that discourages activity. The choice between an auction or a free allocation of marketable permits itself should have little or no effect on levels of

---

[158] *See* 136 Cong. Rec. H12845 (daily ed. Oct. 26, 1990) (statement of Rep. Anderson, chair of the H. Comm. On Transportation and Infrastructure, regarding the Conference Report) ("The conferees also adopted the Senate version of Section 108(f), with some modifications. Among the modifications, the reference to road charges, tolls, parking surcharges, and other pricing mechanisms was deleted from (1)(A)(vii). *These economic strategies were deleted from this clause of Section 108(f) in order to avoid the implication that such strategies were available only* in downtown areas, or other areas of emission concentration, or during periods of peak use. Section 172 (c) of the bill establishes the general requirements for implementation plans in non-attainment areas. The general plan provisions include the use of economic incentives, such as fees, marketable permits, and auctions of emission rights . . . . The limited context for the use of such strategies suggested by Section 108(f)(1)(A)(vii) was potentially inconsistent with the general provision of the bill and was therefore removed.") (emphasis added).

[159] Statement of Richard Hembra, GAO, before Subcomm. Hearing on EPA Ozone, 1989 (see babel/hathitrust).

[160] *See*, *e.g.*, *Nat'l Cable Television Ass'n v. United States*, 415 U.S. 336, 340 (1974). The Supreme Court's recent ruling that the Affordable Care Act's penalty for not purchasing insurance fell under Congress's taxation power does not offer definitions relevant to the issue of marketable permits. Instead, the Court distinguished between a "tax" and a "penalty": a penalty may exact a heavy burden regardless of how small the infraction, while it may be reasonable to pay a small tax rather than purchase insurance; a penalty typically requires scienter, while a tax does not; a tax is collected by the IRS, while a penalty may be exacted by a regulatory agency. *Nat'l Fed. Of Indep. Businesses v. Sebelius*, 132 S.Ct. 2566, 2596 (2012).

[161] U.S. Const. art. I, § 8.

[162] *Nat'l Cable Television Ass'n v. United States*, 415 U.S. 336 (1974).

[163] FEA v. Algonquin, 426 U.S. 548 (1976).

[164] *San Juan Cellular Telephone Co. v. Public Serv. Comm'n of Puerto Rico,* 967 F.2d 683 (1st Cir. 1992).

activity.[165] Economic theory predicts that, whether auctioned or freely allocated, marketable permits will affect regulated entities' decisions the same way. Specifically, regulated entities will account for the opportunity cost of the marketable permit whether they paid for it or received it for free. 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."[166] The reasons for choosing an auction over a free allocation 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 strategic behavior,[167] facilitate price discovery, and prevent unjust windfalls that may create perverse incentives. All these features of auctions are discussed below. Finally, while an auction may raise revenue, that is not its primary intent. Rather, its primary intent is to achieve a regulatory goal most efficiently. Thus, whether explicitly or implicitly authorized by Congress, a permit auction poses no constitutional problems.[168]

Notably, Congress has distinguished between permit auctions and emissions fees. In the 1990 Clean Air Act Amendments, Congress made clear that state implementation plans could use "economic incentives such as fees, marketable permits, and auctions of emission rights."[169] However, for federal implementation plans, Congress deliberately left out "fees," authorizing only "economic incentives such as marketable permits or auctions of emissions allowances."[170] While Congress expressed concern about empowering EPA to charge "fees" that were actually undesirable and involuntary "taxes,"[171] it left EPA the power to auction allowances, suggesting any concerns about taxation do not apply to permit auctions.[172]

Ultimately, as GAO has advised, the fundamental question for whether an auction or regulatory fee is considered a "tax" is whether the primary purpose is to bring about legitimate regulatory objectives or to raise revenue.[173]

Recommendation: Agencies choosing permit auctions should emphasize any grounds not related to revenue, such as market performance, efficiency, and distributional considerations, in order to avoid potential categorization of the permit auction as an impermissible tax.

---

[165] Note that some courts have contrasted fees with taxes saying a fee "serve[s] regulatory purposes directly by . . . deliberately discouraging particular conduct by making it more expensive." *See San Juan Cellular Telephone Co. v. Public Serv. Comm'n of Puerto Rico,* 967 F.2d 683, 685 (1st Cir. 1992) (citing *South Carolina ex rel. Tindal v. Block*, 717 F.2d 874, 887 (4th Cir. 1983), *cert. denied*, 465 U.S. 1080, (1984)).

[166] Rob Inglis, *The Power Industry's Prisoner's Dilemma*, The New Republic: The Vine, Mar. 23, 2009, available at http://blogs.tnr.com/tnr/blogs/environmentandenergy/archive/2009/03/23/the-power-industry- prisoner-s-dilemma.aspx.

[167] Such as inflating your baseline before the allocation to receive a greater share.

[168] *See* Memorandum from Douglas Kmiec, Asst. Attorney General, Office of Legal Counsel, to Alan Raul, General Counsel, White House Office of Management and Budget (May 15, 1989) (discussing constitutionality of implicit authority for an auction, including the non-delegation doctrine).

[169] 42 U.S.C. § 7410.

[170] 42 U.S.C. § 7602(y).

[171] *See* H.R. Rep. No. 101-490, pt. 2 (H. Comm. on Ways and Means) (1990) (objecting to the inclusion of emissions fees in FIPs and various other provisions, because: "The [emissions] fees described are in the nature of taxes because they are not designed solely to compensate the Federal Government . . . and the fees are designed to modify the behavior. . . . In addition, these fees are in the nature of taxes because the fees are assessed with respect to behavior that is not voluntary in nature. Businesses wishing to continue to operate must pay these fees."). Note, however, that the specific attempt in the House of Representatives to strip the word "fee" failed by a vote of 170-253. 136 Cong. Rec. H2511 (daily ed. May 21, 1990) (Roll Call No. 131). The language was removed subsequently by the Senate, at the behest of the White House.

[172] Possibly Congress only intended a zero-revenue auction; but the broad language "such as" seems to provide flexibility.

[173] Statement of Richard Hembra, GAO, before Subcomm. Hearing on EPA Ozone, 1989 (see babel/hathitrust).

e) Benefits of Explicit Authorization

Even though both marketable permits generally and auctions specifically can be based on implicit statutory authorizations, explicit authorization may be preferred. As Senator Lieberman warned, without explicit statutory language, marketable permit programs and especially auctions may be subject to legal battles.[174] In such challenges, to avoid possible constitutional issues over taxation powers, courts may be tempted to read implicit statutory authority narrowly and strike down auctions on statutory grounds.[175] Any lingering legal uncertainty could cause reluctance among agencies to implement marketable permit programs and among regulated entities to participate in them.[176] In fact, the slow development of water quality trading has been blamed partly on lack of legal certainty and clarity.[177] Without statutory language on trading in the Clean Water Act, states and regulated entities have expressed confusion about how a trading program would interact with other statutory requirements, like anti-backsliding policies.[178] The U.S. Court of Appeals for the Ninth Circuit once opined in dicta that the Clean Water Act did not allow water quality trading, because there was no mention of trading in statute or regulations.[179]

Recommendation: If active marketable permit programs exist without explicit congressional authority, Congress should consider endorsing those programs. Agencies should communicate to Congress any legal barriers to marketable permits, including the need for explicit statutory authorization.[180] 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.

2. Are Marketable Permits Property Rights?

Many economists argue that marketable permits should be treated as secure property rights, to raise the return on investment and incentivize long-term investment strategies.[181] For instance, unlike in the United States, New Zealand grants its fish catch share on a permanent basis,[182] and as a result of the clearer property rights, New Zealand's share prices are higher than U.S. share prices.[183] Similarly, credit buyers need some level of guarantee that the credits they purchase will remain valid for the life of the contract despite any regulatory changes.[184]

---

[174] *Proposals to Control the Manufacture, Use, and Disposals of Ozone-Depleting Substances: Hearing Before the Subcomm. On Envtl. Pollution of the S. Comm. On Env't and Pub. Works*, 101st Cong. (May 19, 1989).
[175] Statement of Richard Hembra, GAO, before Subcomm. Hearing on EPA Ozone, 1989 (see babel/hathitrust).
[176] James Tripp & Daniel Dudek, *Institutional Guidelines for Designing Successful Transferable Rights Programs*, 6 Yale J. Reg. 369 (1989). EPA's § 157b rule opted not to go with auction because of legal concerns, 53 Fed. Reg. 30,579 (Aug. 12, 1988), but EPA also simultaneously issued an advance notice of proposed rulemaking to explore auction, 53 Fed. Reg. 30,604.
[177] EPA & USDA, *Report on 2015 National Workshop on Water Quality Markets* (2016); *see also* Willamette Partnership, *In It Together: A How-To Reference* (2012).
[178] EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003).
[179] Friends of Pinto Creek v. EPA, 504 F.3d 1007, 1012 (9th Cir. 2007).
[180] EPA has also suggested, in comments on the draft version of this report, that agencies encourages states to adopt any laws or regulations necessary to create state-level legal certainty about the marketable permit program, as Virginia has done to promote water quality trading.
[181] Tom Tietenberg, Tradable Permits in Principle and Practice, 14 Penn St. Envtl. L. Rev. 251 (2006).
[182] *Id.*
[183] *See* Richard Newell et al., *Asset Pricing in Created Markets for Fishing Quotas* (Resources for the Future Discussion Paper 05-46, 2005).
[184] World Resources Inst., *Addressing Risk and Uncertainty in Water Quality Markets* (2014).

On the other hand, many legal experts and advocates express ideological and practical concerns with treating marketable permits as property. Ideological concerns are raised about privatizing what were previously public resources.[185] The language of "property" and "rights" may introduce a mentality of entitlement that can exacerbate some perverse incentives, such as fishers disposing of all but the largest specimens of target fish to make the most of their quota.[186] Practically, regulators may need to ratchet down a cap over time and will face intense political opposition and potentially legal challenges from existing permit holders who feel their "rights" are being taken without compensation. Government may occasionally need to "confiscate" permits either to increase regulatory stringency or to invalidate fraudulent credits, even if those invalid credits were bought in good faith.[187]

Ultimately, "property" is not a monolithic concept. Rather, individual privileges—the abilities to use something or exclude others, the abilities to divide or transfer, and the duration and legal recognition of those abilities—can be mixed and matched into various property bundles. In fact, most regulatory tools (short of complete bans) give rise to some kinds of property rights: for example, if a factory has a permit for compliance with prescriptive regulation, when factory gets sold, the permit is transferred too.[188] So long as owners of marketable permits have some of the key incidents of property, like the abilities to use, exclude, sell, dispose, and pledge to creditors,[189] some measure of security in interest can be given short of "property."[190] Permits are best seen as temporary licenses to carry out a particular activity, with a conditional promise from the government that the permit will continue to have value for purposes of compliance, unless the government exercises its right to reclaim the permit.[191] Putting a price on a temporary grant of permission by itself does not convert a permit into a "right" or "property."[192]

Most scholars think it unlikely that a court would find a Fifth Amendment constitutional claim for compensation for taking permits.[193] For example, in *Members of the Peanut Quota Holders Ass'n v. U.S.*, the U.S. Court of Appeals for the Federal Circuit found that while farmers had some property interest in their peanut production quotas, there would be no compensation for takings because agricultural quotas are wholly government creations, and as such the government retains the right to withdraw them unless the statute specifies that the interest was irrevocable.[194]

---

[185] Dan Cole, Pollution & Property: Comparing Ownership Institutions for Environmental Protection (2002).
[186] Carol Rose, *The Several Futures of Property*, 83 Minn. L. Rev. 129 (1998).
[187] David Driesen, *What's Property Got to Do with It?—Review of Dan Cole's Pollution and Property*, 30 Eco. L. Q. 1003 (2003).
[188] Jonathan Nash, *supra* note 4 (arguing that even information disclosure rules and tax-based regulation give rise to certain kinds of property rights).
[189] *Id.*
[190] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[191] David Driesen, *What's Property Got to Do with It?, supra* note 187. Lee Ann Fennell has observed that permits are essentially held subject to an implicit government call option, but with an exercise price of zero and unclear terms. She recommends making the call option explicit. That way, government does not need to try to anticipate every problem, like hot spots, in ways that will inevitably erode the benefits of trading, but instead can selectively exercise call options to deal with problems if they arise. Lee Ann Fennell, *Revealing Options*, 118 Harvard L. Rev. 1399 (2005) (recommending a mechanism: permit holder states how much the permit is worth to them, pays tax based on that amount, government can recall at that valuation).
[192] Breger, Stewart, Elliott, & Hawkins, *Providing Economic Incentive in Environmental Regulation*, *supra* note 13; *see also* GAO, *supra* note 122 (arguing that the fact that a license has value does not make it "property").
[193] Mark Fina & Tyson Kade, *Legal and Policy Implications of the Perception of Property Rights in Catch Shares*, 2 Wash. J. Envtl. L. & Pol'y 283 (2012). But such takings claims are perhaps not impossible: they are most unlikely for a regulatory modification to the permit to address environmental harms, but perhaps more possible if the regulatory modification seeks, for example, to redistribute quota among different classes of fishers.
[194] *Id.* The legal analysis could be different if the government cancels a permit before the purchaser was able to take any advantage of the permit at all.

Some laws specifically disclaim any property status for marketable permits, in part to preempt any attempts to claim compensation for a takings.[195] For example, Congress explicitly stated that acid rain credits did "not constitute a property right."[196] At the same time, however, Congress also characterized acid rain credits as "quasi-property"[197] and durable, subject only to limitations or revocations by new legislation passed by Congress and signed by the President.[198] The Magnuson-Stevens Act also declares that fish catch shares are "not a right or title or interest" and may be revoked or modified at any time without compensation.[199] In fact, fish catch shares are usually defined as a percentage share of a total allowable catch, so the agency can simply change the total cap and individual permits automatically adjust without need for further legal action.[200] The FCC's statutory authority for spectrum auctions clarifies that spectrum licenses are not "ownership," and are technically only "temporary" with no presumption of renewal.[201] EPA's manual for criteria pollutant offset banks warns that if a region's environmental quality is not improving quickly enough, EPA reserves the right to place a moratorium on trades, raise the required trading ratio, or even require forfeit of all traded permits.[202]

Other laws are less precise or less consistent in characterizing the property status of marketable permits. For example, at various points the Clean Air Act refers to the auctioning of "emissions rights."[203] Courts have recognized some property-like status for landing slots in bankruptcy proceedings[204] and for fish catch shares in divorce settlements and other civil actions.[205] At the state level, this is even more common. Taxi medallions are considered personal property of the owner and, for example, are treated as part of the estate upon death.[206] Three states—Pennsylvania, Vermont, and Puerto Rico—explicitly recognize renewable energy credits as "property" in statutes or regulations, and courts in New Jersey and Connecticut have done the same.[207] Some federal courts and agencies have followed suit, with the U.S. Court of Appeals for the Second Circuit writing that "RECs are inventions of state property laws," and with EPA, the Department of Energy, and the Armed Services Board of Contract Appeals recognizing RECs as "property rights."[208]

Even if none of those legislative, judicial, or administrative bodies intended to use the word "property" in a way that would create a takings claim for compensation, terminology creates perceptions, and perceptions are important. For example, despite the specific disclaimer in the Magnuson-Stevens Act, the widespread perception among many fishers is that catch shares are their property, because shares are exclusive and transferable and because they are effectively permanent: they are renewed until

---

[195] Interview with Don Elliott (Acid rain language designed largely to prevent takings claims).
[196] 42 U.S.C. § 7651b(f).
[197] H.R. Rep. No. 101-490 pt. 1, at 366 (1990) (allowances are "quasi-property" and can be reported as "utility assets").
[198] Jonathan Nash, *supra* note 4 (per Rep. Mike Oxley, 136 Cong. Rec. E360, E3672 (daily ed. Nov. 2, 1990)).
[199] 16 U.S.C. § 1853a(b)
[200] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[201] 47 U.S.C. §§ 301, 304. But arguably that leaves open anything short of fee simple. Howard Shelanski & Peter Huber, *Administrative Creation of Property Rights to Radio Spectrum*, 41 J. L. & Econ. 581 (1998).
[202] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 19 (1981)
[203] 42 U.S.C. §§ 7410, 7502 (nonattainmnet), 7511b (federal ozone).
[204] GAO, *supra* note 122.
[205] Mark Fina & Tyson Kade, *Legal and Policy Implications of the Perception of Property Rights in Catch Shares*, *supra* note 193 (citing 161 F.3d 584 (9th Cir. 1998)).
[206] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 50 (1981)
[207] Center for Resource Solutions, Legal Basis for RECs (2015).
[208] *Id.* The U.S. Armed Services Board of Contract Appeals has said that RECs are "personal property, given their exclusive nature and transferability."

revoked, in a system known as "rolling conditional permanence."[209] Auctions could strengthen the perception—and maybe even the legal claim—of property rights in marketable permits.[210]

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

3. Do Marketable Permits Commodify Resources?

Even if marketable permits are not considered to be full "property," some critics worry that marketable permits commodify the environment, human health, and other resources in undesirable or even unethical ways. Marketable permits have even been compared to sales of indulgences in the Middle Ages.[211] Beyond vague notions of ethics, one concrete concern is that marketable permits in, for example, pollution allowances, will have negative effects on anti-pollution norms. An analogy is made to handicapped parking spaces, highlighting the difference between imposing a $100 fine for parking in a disabled space versus creating $100 permits for premium parking spaces but the physically challenged get free access. The latter, it is argued, tacitly endorses parking in handicapped spaces if you are willing to pay for it. Similarly, if marketable permits spread the conception that pollution is not "bad" but something to be bought, consequences could include reduction in anti-pollution whistle-blowing, less self-restraint, and lower compliance rates.[212]

Proponents of marketable permits argue this commodification critique overlooks that any permit with a degree of scarcity has value, whether it is marketable or not: marketability does not create value, but only makes it visible.[213] Before the introduction of markets, fishers already have the "right" to exploit by virtue of their fishing license; polluters have the "right" to pollute under some regulatory permit.[214] At least permit auctions and taxes charge something for the privilege; prescriptive regulations and allocated permits just give it away for free.[215] Perhaps regrettably, because market-based regulations is often framed by proponents as deemphasizing the role of government, and because permits are often called "allowances" rather than "restrictions," the frame plays into this commodification critique. In reality, marketable permit programs should require a substantial, active government role.[216]

4. Are the Terms Defined by Regulation, Guidance, or Case-by-Case?

A final consideration in the legal status of marketable permits is how the terms of the permits and transactions are defined: by codified legislative regulation, by interpretive rule or agency guidance, or on an ad hoc basis. Without any formality, neither regulators, regulated entities, nor the public has regulatory certainty and predictability. For permitting programs implemented by regional offices or the

---

[209] Mark Fina & Tyson Kade, *Legal and Policy Implications of the Perception of Property Rights in Catch Shares*, *supra* note 193. Plus, the federal government finances loans for small fishers with terms lasting twenty years or more, further creating perception of long-term property interests.

[210] *Id.*

[211] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181, n.3 (citing Goodin 1994).

[212] Lior Jacob Strahilevitz, *How Changes in Property Regimes Influence Social Norms: Commodifying California's Carpool Lanes*, 75 Indiana L. J. 1231 (2000).

[213] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 21, 24 (1981). Though all environmental regulation (short of a ban) could be susceptible to a "right to pollute" critique, as they all sanction some amount of pollution, the frame around market-based programs exacerbates the critiques and partly explains why some continue to prefer prescriptive regulation. Jonathan Nash, *Framing Effects and Regulatory Choice*, *supra* note 4.

[214] Katrina Wyman, *Why Regulators Turn to Tradable Permits: A Canadian Case Study*, 52 U. Toronto L.J. 419 (2002).

[215] Jonathan Nash, *Framing Effects and Regulatory Choice*, *supra* note 4.

[216] *Id.*

states, lack of formal guidance from the federal agency can lead to inconsistencies in implementation.[217] In fact, Congress instructed the Army Corps of Engineers to issue regulations on its wetlands mitigation bank program specifically to address concerns about consistency and predictability under the loose guidance documents that the Corps had issued at various points in time.[218] On the other hand, too much formality could limit a program's flexibility to adapt.

The Administrative Conference of the United States has weighed in on the formality of policy statements before. In a 1976 recommendation, the Conference advised that agencies submit even non-binding policy statements and guidance documents to public notice and comment.[219] In the preamble to a 1992 recommendation, the Conference wrote it was "concerned" about agencies issuing policy statements in lieu of regulations, as such statements may still be treated by agency staff as binding or may be "reasonably regarded by the public as binding and dispositive of the issues they address."[220] The consultant report supporting that recommendation noted that if non-legislative regulations and policy documents on standards for "approving or granting applications . . . are intended to be routinely applied, or if they are regularly applied, they of course have a practical binding effect, even though they are not legally binding."[221] Similarly, if agency interpretations and guidance are binding on the states implementing federal standards, they are in effect "binding upon private parties who must gain the states' approval of their permit applications."[222]

Ultimately, agencies adopting marketable permit programs should do so with at least a degree of formality, subject to some flexibility to facilitate adjusting the program especially in its early years.[223] Codified, legislative regulations adopted through notice-and-comment rulemaking may be most important for marketable permit programs that operate without explicit statutory language, though notably the existing programs with explicit statutory language typically also have codified regulations.[224]

Currently there is a range of formality with which agencies set up the rules for their marketable permit programs. Many of the air pollution programs were created through codified legislative regulations.[225] Fish catch share programs are designed by regional councils and codified in the Code of Federal Regulations.[226] For the wetlands mitigation bank program, the Corps and EPA originally issued joint guidance in 1995 and then, following congressional instructions, issued joint regulations in 2008, codified in the Code of Federal Regulations.[227] Numerous Corps districts developed their own regional guidance to implement the rule.[228]

On the other end of the spectrum, for years water quality trading programs operated without the certainty of any official guidance from EPA, which may partly be responsible for the slow growth of water quality trading.[229] EPA issued a water quality trading policy in 2003 and submitted the document

---

[217] WRI, *Addressing Risk and Uncertainty in Water Quality Markets* (2014).
[218] Corps-EPA Final Rule, Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,593 (2008).
[219] ACUS Recommendation 76-5.
[220] ACUS Recommendation 92-2.
[221] ACUS Consultant Report on Recommendation 92-2, *available at* http://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=3188&context=dlj
[222] *Id.*
[223] Willamette Partnership, *In It Together: A How-To Reference* (2012).
[224] *E.g.*, acid rain, fish quotas, FCC auctions, CAFE. All programs under the Clean Air Act, whether explicitly authorized or not, have regulations.
[225] *E.g.,* acid rain, lead.
[226] *E.g.*, 50 C.F.R. § 648.74 (surf clam and quahog ITQ).
[227] 73 Fed. Reg. 19,593 (2008) (codified at 33 C.F.R. 332).
[228] Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015).
[229] Andrew Wolman, *Effluent Trading in the United States and Australia*, 8 Great Plains Nat. Res. J. 1 (2003).

for public comment,[230] but ultimately it remains an un-codified policy statement. In 2007, EPA followed up with a Water Quality Trading Toolkit, offering guidance to state permit writers on developing trading programs. Still, at a 2015 joint EPA-USDA workshop on water quality markets, participants expressed a desire for more explicit authority than EPA's 2003 policy statement, to increase market confidence and participation.[231] While some states have adopted statutes or formal guidance on water quality trading, EPA has explained that states do not necessarily have to develop their own trading rules.[232] For example, North Carolina has no official policy besides a willingness to work to develop a trading program for any interested watershed group.[233] The U.S. Court of Appeals for the Ninth Circuit expressed doubt over the validity of water quality trades given that "nothing in the Clean Water Act or the regulation" provides for trading.[234] Apparently, EPA's 2003 policy statement on water quality trading was not enough for the Ninth Circuit.[235] The overall lack of formality produces a lingering uncertainty for buyers about whether trades will satisfy their legal obligations,[236] as well as confusion among regulators about how formal requirements for antibacksliding and antidegradation should apply to water quality trading programs.[237]

Conservation banks predated any national guidance from the Fish and Wildlife Service (FWS) by at least eight years.[238] Guidance was first published as notice in Federal Register in 2003, seemingly without a comment period. In 2016, FWS adopted a more formal policy statement following a public comment period, but the agency still has no codified legislative regulations on conservation banking. In 2013, the Department of the Interior's Office of Policy Analysis had recommended that FWS consider adopting codified regulations.[239] A 2016 survey of conservation bank sponsors supported (by 61%) more formal regulations, to help make bank creation easier and reduce uncertainty.[240] In this survey, conducted just before FWS's new guidance was issued, 11% of bank managers reported not being familiar with the old 2003 guidance.[241] Even more shockingly, in 2013, only 68% of surveyed FWS staff were familiar with the agency's own 2003 guidance (only 30% were "very familiar," with another 38% saying "somewhat familiar").[242]

The National Marine Fisheries Service (NMFS) also approves conservation banks for mitigation, and some NMFS regions have developed guidance on banking.[243] However, there is no national guidance from NMFS, and according to one regional office, "Presently, NMFS has no standardized way of engaging new bank proposals."[244]

---

[230] 68 Fed. Reg. 1609 (Jan. 13, 2003).
[231] EPA & USDA, Report on 2015 National Workshop on Water Quality Markets (2016).
[232] EPA, Water Quality Trading Toolkit (2009).
[233] *Id.*
[234] Friends of Pinto Creek v. EPA, 504 F.3d 1007, 1012 (9th Cir. 2007) (dicta).
[235] EPA had a potential fix to this issue on its regulatory agenda for years, *see* Letter from Inst. for Policy Integrity, to EPA, Oct. 1, 2012, http://policyintegrity.org/documents/Policy_Integrity_Final_Water_Quality_Trading_Letter.pdf, but 40 C.F.R. § 122.4(i) was never amended. *Pinto Creek* therefore leaves lingering uncertainty about legality of water quality trading.
[236] Willamette Partnership, *In It Together: A How-To Reference* (2012).
[237] IEc, Water Quality Trading Evaluation, *supra* note 50.
[238] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).
[239] DOI Office of Policy Analysis, Conservation Banking Overview (2013).
[240] DOI, Office of Policy Analysis, Results from a Survey of Conservation Bank Sponsors (2016).
[241] *Id.* (explaining managers are less likely than sponsors to deal with regulatory issues).
[242] DOI, Office of Policy Analysis, Preliminary Analysis of the Conservation Banking Program and Results from a Survey of USFWS Staff (2013).
[243] *E.g.* NMFS-Northwest Region, Guidance, Jan. 31, 2013. The West Coast Region emphasizes that it is just guidance, not a rule. NMFS West Coast Region, Conservation Banking Guidance (2015).
[244] NMFS West Coast Region, Conservation Banking Guidance (2015).

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

II. Efficiency and Distributional Consequences

Marketable permits are designed to achieve policy goals more efficiently. Before turning to whether marketable permit programs are able to achieve their policy goals (section III) and how to manage the markets (section IV), this section will first examine whether marketable permits can deliver on their promise of greater efficiency. This section examines both theoretical literature and empirical studies on the efficiency of marketable permit programs. However, it is important to bear in mind that any empirical evidence of a marketable permit program's efficiency depends on defining a counterfactual benchmark of what would have happened otherwise. Defining such benchmarks by reverse engineering the effects of a hypothetical prescriptive regulatory approach can be exceedingly difficult. Moreover, it is possible that other regulatory approaches besides markets may not have passed political muster.[245] Finally, a program's success or failure should never be judged too early, as the efficiencies of marketable permit programs can take time to develop or can disappear over time.[246]

This section also addresses potential effects of markets on small entities, new entrants, and consumers.

A. Do Marketable Permits Efficiently Lower Compliance Costs and Prioritize the Highest Value Uses of Resources?

1. Theory

A major theoretical advantage of marketable permits over traditional regulation is that market-based tools efficiently allocate privileges and obligations, lowering costs and raising value. Specifically, marketable permits programs equalize marginal compliance costs across regulated sources, by allowing the market to identify and prioritize the lowest-cost abatement opportunities. Similarly, instead of forcing regulators to divine how to allocate regulatory privileges to the highest value use of scarce resources, the market identifies the most valuable use of the permits.[247]

For example, when compliance costs vary greatly across regulated sources, uniformly prescriptive environmental standards can be counterproductively expensive.[248] If one source can reduce its greenhouse emissions at $1 per ton while another faces $1000 per ton abatement costs, requiring the same performance from both is inefficient: the same environmental gains could be achieved at lower overall cost (i.e., $2 instead of $1001 for the first two tons) by allowing the second source to pay the first to make extra reductions cheaply, at least until reaching a point when abating one more ton would cost each source the same. The flexibility of markets either lowers the total cost of achieving any given regulatory target or else, for any given total cost, achieves a more ambitious regulatory target.[249] One economic study estimated that, to achieve a 5% reduction in overall U.S. greenhouse emissions, the

[245] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181
[246] *Id.*
[247] *See* Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 3 (1981) (explaining market-based regulation helps ensure that firms with highest-value use of the resource will obtain the permit).
[248] Robert Stavins, *Market-Based Environmental Policies* 2 (RFF Disc. 98-26, 1998, republished in Paul Portney & Robert Stavins eds., *Public Policies for Environmental Protection* (2000)).
[249] *See* U.S. Office of Mgmt. & Budget, *Regulatory Impact Analysis: A Primer* 6 (2011).

marginal welfare costs of a prescriptive regulatory scheme would be 1159% higher than the marginal welfare costs of a market-based regulatory scheme designed to achieve the same overall emissions reductions.[250]

The variation of abatement opportunities drives the market's efficiency.[251] Therefore, a regulatory market's size can enhance its efficiencies, as bigger markets maximize the number of opportunities for low-cost abatement. For example, even if a particular industry emits a relatively small volume of greenhouse gases, if it offers very low-cost abatement opportunities, it could be efficient to include that industry in a broader cap-and-trade program for greenhouse gases.[252] Trades in international allowances and offsets may provide especially low-cost abatement opportunities. In modeling the possibility of economy-wide cap-and-trade legislation in 2009, EPA found that offsets would have "a strong impact on cost-containment," and that without international offsets, allowance prices would have increased 89%.[253] The ozone-depleting substance market allows international transfers with EPA approval, and California's greenhouse gas cap-and-trade program allows links with Canada.[254]

The theory behind a marketable permit program's superior efficiency begins to break down if the standard is set so stringently as to require every source to control as much as possible. At that point, there will be few if any additional trades to make, and any efficiency advantage between marketable permits and prescriptive regulations will be small.[255]

David Driesen, a prominent skeptic of marketable permits, admits that overly uniform prescriptive standards may use private sector resources inefficiently, but he argues that prescriptive standards are more efficient for administrative resources and may also have equitable advantages.[256] Smaller firms, for example, may face monitoring and transaction costs under marketable permit programs that exceeds any cost savings they might experience, and so may prefer prescriptive regulations.[257] However, considering the following empirical evidence on efficiency and the subsequent sections of this report on administrative costs and distributional effects, Driesen's critique is overgeneralized. Marketable permit programs often have significant efficiency advantages, may have administrative advantages, and do not inherently have negative distributional consequences.

2. Evidence

Evidence from economic models and empirical data suggests marketable permit programs have efficiency advantages. Reviewing the literature, economist and expert on marketable permits Tom Tietenberg concludes that, assuming adequate enforcement, trading either lowers compliance cost of

---

[250] Pizer, Burtraw et al., *supra* note 11, at tbl.3 ($277/ton versus $22/ton). The additional marginal welfare costs of performance standards over market-based regulation rise as the reduction target increases in stringency. *See id.* fig. 1.

[251] Nathaniel O. Keohane, *Cap and Trade, Rehabilitated: Using Tradable Permits to Control U.S. Greenhouse Gases*, 8 Rev. Envtl. & Econ. Pol'y 42, 49 (2009).

[252] Metcalf & Weisback, *supra* note 11, at 8.

[253] EPA, Analysis of H.R. 2454, at 3 (June 2009).

[254] California has linked with Quebec's emissions trading system. 17 Cal. Code Regs. § 95943 ("Linked External GHG ETS. Covered or opt-in entities may use compliance instruments issued by the following programs to meet their compliance obligation under this article: (a) Government of Quebec."). California has not yet extended its offset protocols to credit international projects, but its cap-and-trade laws contemplate the potential for offsets from at least Canada and Mexico. 17 Cal. Code Regs. §§ 95854, 95972(c).

[255] Bruce Ackerman & Richard Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 Colum. J. Envtl. L. 171 (1987).

[256] David Driesen, *Is Emission Trading an Economic Incentive Program?, supra* note 18.

[257] Breger, Stewart, Elliott, & Hawkins, *Providing Economic Incentive in Environmental Regulation*, *supra* note 13.

emissions reductions or increases the value of the resource.[258] For example, a study by Winston Harrington and Richard Morgenstern identified six case studies where the United States and European Union countries picked different regulatory approaches, to compare prescriptive regulation against economic incentive systems (both cap-and-trade programs and taxes). Examining the case studies on sulfur dioxide, nitrogen oxides, water point sources, leaded gas, ozone-depleting substances, and chlorinated solvents, Harrington and Morgenstern found overall evidence that economic incentives were more efficient.[259]

The following specific evidence exists for U.S. marketable permit programs:

- The Clean Air Act's program to allow new sources to trade offsetting credits of "criteria"[260] pollutant reductions, by one estimate, resulted in $5-$12 billion in compliance cost savings.[261]
- Compared to the counterfactual costs of regulating lead without trading, EPA's inter-refinery trading system for phasing out lead from gasoline saved approximately $250 million per year, or 20% of total costs.[262]
- The acid rain market achieved cost savings (versus non-trading alternatives) estimated in the range of 15-90%, or $250 million to over $1 billion annually.[263]
- For fisheries, there is evidence that transferable catch shares help create more efficiently sized fleets that extract the resource at lower cost and with greater profitability.[264] In Alaska's halibut and sablefish fisheries, for example, tradable catch shares decreased operating costs and resulted in higher prices for caught fish at the docks.[265] (However, the halibut and sablefish tradable catch share program also showed signs of increased administrative costs and negative distributional effects like layoffs and barriers to entry.)
- Evidence of efficiency in water quality trading is harder to come by. According to EPA, Virginia's nutrient trading program for stormwater phosphorous saved over $1 million.[266] Some models have predicted that traditional water quality regulation is between 12% and 200% more expensive than marketable permits.[267]
- There is anecdotal evidence that conservation banks save project applicants time and money, simplify compliance, and improve regulatory predictability.[268]

---

[258] Tom Tietenberg, *Tradable Permits in Principle and Practice*, *supra* note 181.

[259] Winston Harrington & Richard Morgenstern, *International Experience with Competing Approaches to Environmental Policy: Results from Six Paired Cases* 116, *in* Moving to Markets, *supra* note 2.

[260] Criteria pollutants are the six widely emitted pollutants for which EPA sets ambient air quality standards: particulate matter, sulfur dioxide, nitrogen dioxide, ground-level ozone, carbon monoxide, and lead.

[261] Stavins, *Market-Based Enviro. Policies*, *supra* note 248, at 7.

[262] *Id.* at 9; Robert Stavins, *U.S. Cap-and-Trade System to Address Global Climate Change* 9 (Harvard Kennedy School Reg. Pol'y Prog. Paper 2007-04).

[263] *Id.* at 7, 15; Stavins, *Market-Based Enviro. Policies*, *supra* note 248, at 7; H. Ron Chan et al., *The Net Benefits of the Acid Rain Program* 1 (RFF 15-25, 2015). As much as 5% of these savings ($1.3 billion of $20 billion in cumulative cost savings) may be ascribed specifically to the banking provisions. T.H. Tietenberg, Emissions Trading: Principles and Practice 114 (2006, 2d ed).

[264] NOAA Catch Share Policy (2010); *see also* Katrina Wyman, *The Recovery in U.S. Fisheries*, J. Land Use (forthcoming).

[265] Pew Envtl. Group, *Design Matters: Making Catch Shares Work* (2009).

[266] Ann Mills & Ellen Gilinsky, *EPA and USDA Pledge Actions to Support America's Growing Water Quality Trading Markets*, EPA Blog, Aug. 1, 2016.

[267] Bruce Ackerman & Richard Stewart, *Reforming Environmental Law: The Democratic Case*, *supra* note 255, n.11.

[268] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003); Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016). Also tellingly, in a Statement of Policy and presumably based on at least anecdotal if not empirical evidence, President Obama affirmed that conservation banks reduce timelines for developers. Presidential Memorandum, Mitigating Impacts on Natural Resources from Development, Nov. 3, 2015.

Critics of marketable permit programs dispute some of these findings. For example, Driesen argues that the millions of dollars allegedly saved by the acid rain market came not from the efficiencies of trading (which was very rare in the early years anyway, accounting for less than 4% of allowances), but rather simply because the ex ante cost estimates had been overinflated.[269] Reviews of water quality trading note that, of the 37 pilot projects and programs that have existed, 26 have not yet seen actual trades, others have very few trades, and overall there is little empirical evidence of cost savings. For example, Wisconsin's Fox River program only had 1 trade before going defunct.[270] Similar skepticism has been expressed over whether wetlands mitigation banks have really lowered the costs of mitigation.[271]

Overall, however, the weight of the evidence does suggest marketable permit programs can improve efficiency in at least certain regulatory applications.

B. Do Marketable Permits Better Incentivize Innovation?

1. Theory

After efficiency, the second key theoretical advantage of marketable permits over traditional regulation is that market-based tools creates a price signal that dynamically incentivizes innovation and the diffusion of knowledge.[272] For example, because an air pollution cap-and-trade market puts a price on emissions but does not otherwise constrain compliance strategies, sources are free to experiment continually and develop new, unanticipated methods of low-cost abatement. And because unused permits can be sold for profit, sources can benefit the more reductions they make. By contrast, prescriptive environmental regulations give sources little incentive to innovatively reduce emissions so much as a single ton below their required limit. Similarly, prescriptive standards frequently—yet inefficiently—pick "winners" from among existing technologies: for example, regulating vehicle emissions by mandating use of certain biofuel technologies reduces the incentive to explore other, potentially better reduction opportunities, like new mass transit options.[273] A special additional advantage of credit programs is the potential stimulation of activity and innovation in otherwise unregulated sectors.

David Driesen has thoroughly attacked this theory of innovation incentives. Driesen argues that innovation is encouraged more by a regulation's stringency and enforcement than by its form. Performance standards with predictable increases in stringency over time would, according to Driesen, produce the same drive for continuous innovation.[274] In contrast, if marketable permit programs are weaker on enforcement than traditional regulation (because it is harder to continuously monitor emissions and permit transactions than to simply check whether a source installed an approved technology), marketable permits could produce less innovation than traditional regulation.[275] However, Driesen's argument depends on the willingness of regulators either to repeatedly issue new rules to increase stringency or else to initially make predictions far into the future about what levels of

---

[269] David Driesen, *Is Emission Trading an Economic Incentive Program?, supra* note 18.
[270] James Boyd, *New Face of the Clean Water Act: A Critical Review of the EPA's New TMDL Rules*, 11 Duke Envtl. L. & Pol'y Forum 39 (2000).
[271] Tom Tietenberg, *Tradable Permits in Principle and Practice*, *supra* note 181.
[272] *Marketable Rights*, *supra* note 1, at 2-3; Gabriel Chan, Robert Stavins, et al., *The SO2 Allowance Trading System & the Clean Air Act Amendments of 1990: Reflections on Twenty Years of Policy Innovation* 23 (2012.
[273] Jack Lienke & Jason Schwartz, *Shifting Gears: A New Approach to Reducing Greenhouse Gas Emissions from the Transportation Section* 5 (Policy Integrity Brief, 2014).
[274] David Driesen, *Is Emission Trading an Economic Incentive Program?, supra* note 18.
[275] *Id.*

stringency will someday be appropriate. Marketable permit programs, on the other hand, incentivize innovation simply by tapping into the firms' profit motives, without needing to repeatedly increase the stringency of the cap.

Driesen also challenges the assumption that marketable permits uniquely encourage sources to go beyond their minimum compliance obligations: most polluters go at least slightly below their performance standards to guarantee consistent compliance (though admittedly, once regulated sources achieve an adequate compliance cushion, they have little incentive for additional reductions under traditional regulatory approaches).[276] Driesen also reminds that while any incentive to continually innovate and reduce emissions under a cap-and-trade program could reduce overall compliance costs, it will not actually decrease total emissions, since any reduction by one innovative source will allow another source to increase its emissions, back up to the level of the cap.[277]

Finally, Driesen worries that marketable permits programs will actually chill innovation. Trading incentivizes reductions first at sources with the cheapest abatement opportunities, but this low-hanging fruit may not require much technological innovation. Rather, according to Driesen, it is the reductions at the higher-cost sources that require true innovation.[278] However, as other scholars have pointed out, an exclusive focus on the very lowest hanging fruit requiring no innovation is only likely if the cap is too lenient.[279] An appropriately calibrated cap will encourage firms to look for any innovative opportunity to reduce costs.

That said, even proponents of the theory of marketable permits' innovation incentives recognize some limitations. For example, the dynamics of competition in regulated sources' underlying product markets can interfere with the incentive to innovate. Imagine several rival refineries all under the same cap-and-trade program. Innovation decreases marginal compliance costs, which decreases permit prices, which helps permit buyers but not permit sellers.[280] Because lowering permit prices will benefit any rivals who are permit buyers by lowering their production costs, some firms may strategically choose not to innovate. In such cases, traditional regulation may provide better innovation incentives: innovation under traditional regulation only lowers your own compliance costs, while innovation in a market may decrease costs for your rivals.[281] Strategic behavior can also negatively affect innovation under marketable permit programs in other ways: for example, firms may innovate out of a desire to reduce their need for permits in order to hoard permits and exercise market power.[282]

2. Evidence

Several scholars have commented on how few empirical studies have analyzed innovation under marketable permit programs.[283] The limited evidence provides somewhat weak support for the theory that marketable permit programs incentivize innovation better.[284]

---

[276] *Id.*
[277] *Id.*
[278] *Id.*
[279] Jennifer Yelin-Kefer, *Warming Up to an International Greenhouse Gas Market: Lessons from the U.S. Acid Rain Experience*, 20 Stanford Envtl. L. J. 221 (2001).
[280] T.H. Tietenberg, Emissions Trading: Principles and Practice 43 (2006, 2d ed).
[281] *Id.* at 151.
[282] *Id.*
[283] David Driesen, *Is Emission Trading an Economic Incentive Program?, supra* note 18.
[284] Harrington et al. (2004) find general, but not universal, support that market-based provide greater incentives to innovate than traditional regulation; Tietenburg reports "some support" for innovation, though not a "ringing endorsement." Tom

The clearest evidence comes from the lead phase-out and acid rain markets.[285] The lead phase-out program resulted in "measurable incentives" for diffusion of cost-saving technologies.[286] The acid rain market at least likely contributed to the operational innovation of identifying fuel switching as a cheap compliance option,[287] and some studies have found the acid rain permit market helped diffuse critical technological advances.[288]

Other examples of innovations in production include:

- By allowing trading and leasing of electromagnetic spectrum, spectrum users may arrange to share channels and voluntarily accept more interference than FCC typically allows in its direct licensing.[289]
- Under a tradable catch share program, fishers no longer have to race to catch Alaskan halibut and sablefish, leading to longer seasons and increased profitability.[290]
- The Fish and Wildlife Service asserts, though without citing empirical evidence, that conservation banking consolidates scientific expertise and financial resources into larger projects compared to small-scale mitigation by individual permittees, and economies of scale lead to the creation of even more ecosystem services and credits.[291]

C. Do Marketable Permits Save Administrative Resources?

1. Theory

Crucial administrative tasks for either marketable permits or prescriptive regulation include designing the rules, responding to new information and changing circumstances, resolving disputes with regulated entities and stakeholders, and monitoring and enforcing the standards. Marketable permits have some theoretical advantages over prescriptive regulation for these tasks and will require a very different allocation of administrative resources.

First, once the cap or baseline has been set and the rules for allocation and trading have been finalized, in theory the market in a cap-and-trade or credit program then relieves the regulators of some decision-making responsibilities. Rather than forcing regulatory agencies to decide which industries, regions, or sources will bear the abatement costs or have access to valuable public resources, the market decides for itself. While marketable permits impose some new regulatory tasks on regulators, like running auctions and registries, arguably they eliminate one of "the greatest roadblock[s] to administrative efficiency, namely that technical and economic decisions will now be made by plants" instead of by bureaucrats who inevitably have less information on the costs and benefits facing individual regulated

---

Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181; Harrington & Morgenstern, *supra* note 259, find some support, but mixed.

[285] Winston Harrington & Richard Morgenstern, International Experience with Competing Approaches to Environmental Policy: Results from Six Paired Cases 119, *supra* note 259.

[286] *Id.* at 9; Stavins, *U.S. Cap-and-Trade System*, *supra* note 262, at 9; Kerr and Newell (2003) find greater technological adoption because of trading in lead phase-out.

[287] T.H. Tietenberg, Emissions Trading: Principles and Practice 68 (2006, 2d ed) (citing Taylor et al (2005)).

[288] Chan, Stavins et al., *supra* note 272, at 25 (crediting the market with the wave of scrubber installments as well as the diffusion of low-sulfur coal mining and blending techniques).

[289] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 4 (1981).

[290] Pew Envtl. Group, *Design Matters: Making Catch Shares Work* (2009).

[291] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).

entities.[292] Historically, many federal and state agencies have been overwhelmed by the heavy information burdens of determining the best technologies for each individual industry and writing individual prescriptive permits.[293] In other words, marketable permit programs may create some new upfront administrative tasks, but may lower administrative costs over time. Besides saving administrative costs, market-based approaches may also advance rational decision-making, since the market efficiently assimilates existing information and bypasses the potential for agency bureaucrats injecting bias into permitting decisions.[294]

Critics like David Driesen challenge whether it is really more efficient to set a cap, design an allocation scheme, and create rules for trading than to simply set a uniform prescriptive standard.[295] Other scholars argue that effectively running a complex market-based scheme with few administrative resources is a myth. Markets will not function properly with only a passive regulator keeping a tally of permits. Rather, active regulators are needed to analyze and disseminate market information, and in some cases to create the platforms for trading; to coordinate with firms as a technical consultant and assist small entities and other sources in designing compliance plans; and to formulate a contingency plan in case the market fails to achieve the regulatory objective.[296] Ultimately, running a marketable permit program may be just as or more demanding for agencies than traditional regulation.[297]

Second, market systems may respond better to changing economic circumstance, like new technologies or new substitute goods, without necessarily prompting new regulatory proceedings. For example, prescriptive emissions regulation specific to each use of ozone-depleting substances would have to be repeatedly updated each time a new use for chlorofluorocarbons was discovered; a market just lets new users buy in to the existing cap. In particular, markets can automatically adjust to accommodate economic growth and the new levels of regulated activities that accompany growth; prescriptive regulation requires constant new efforts to accommodate growth without pollution increases.[298] Even Driesen admits that mass-based caps (though not rate-based marketable permits) can automatically accommodate economic growth, as the cap will incentivize additional reductions to offset any new demand for permits.[299] Additionally, by setting a clear price on the regulated activity, markets give agencies ready and accurate information on regulatory costs—information that agencies can incorporate to improve future regulatory decisions.[300]

Third, markets could ease disputes with regulated entities. Because trading lowers compliance costs, it lowers the incentive for firms to lobby or litigate for delay or to entertain noncompliance strategies: it simply may be cheaper to comply than to dispute.[301] Disappointed permit seekers may argue the cap was too stringent, but they cannot accuse the agency of individual bias or litigate each individual permitting decision as they can with prescriptive regulation.[302] Overall, market-based regulatory tools are thought to remove some of the friction between regulators and the regulated.[303] For a contrary

---

[292] Bruce Ackerman & Richard Stewart, *Reforming Environmental Law: The Democratic Case*, *supra* note 255.
[293] *Id.*
[294] Michael Abramowicz, *The Law-and-Markets Movement*, *supra* note 94.
[295] David Driesen, *Is Emission Trading an Economic Incentive Program?, supra* note 18.
[296] Lesley McAllister, *Beyond Playing "Banker"*, 59 Admin. L. Rev. 269 (2007).
[297] *Id.*
[298] Bruce Ackerman & Richard Stewart, *Reforming Environmental Law: The Democratic Case*, *supra* note 255.
[299] David Driesen, *Is Emission Trading an Economic Incentive Program?*, *supra* note 18.
[300] *Marketable Rights*, *supra* note 1, at 5-7.
[301] T.H. Tietenberg, Emissions Trading: Principles and Practice 176 (2006, 2d ed).
[302] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 5-6 (1981)
[303] Lesley McAllister, *Beyond Playing "Banker"*, 59 Admin. L. Rev. 269 (2007).

perspective, Driesen argues that complexity, uncertainty, and delay are just as likely to plague marketable permits programs, which will inevitably face disputes about baseline, creditable reductions, and market restrictions.[304]

Fourth, markets could incentivize more accurate and cheaper monitoring and could be easier to enforce. Historically, agencies spent relatively little on monitoring compliance with prescriptive environmental regulations, relied heavily on industry-reported data, and enforcement was often weak.[305] By contrast, the market can give both agencies and regulated entities an incentive to support thorough monitoring.[306] Agencies could be especially motivated in an repeated auction system, because better compliance results in higher permit demand, higher permit prices, and greater revenue for the government.[307] Regulated entities will support monitoring and enforcement because noncompliance by other parties lowers the value of the permits they hold. The cost savings afforded by a market-based system may make it easier for agencies to transfer the responsibility and expense of monitoring to regulated entities. Additional advantages may arise in particular contexts: for example, because conservation banks consolidate mitigation efforts, it is easier for agencies to monitor a small number of large sites than a large number of small, disperse sites.[308] Driesen disagrees once again with this theory of administrative resource savings, arguing that marketable permit programs in fact double the cost and challenge of monitoring, because the regulator needs to monitor both buyers and sellers of allowances and credits, instead of just the regulated source itself.[309]

On enforcement, historically prescriptive environmental permits often featured vague standards and resulted in ineffective enforcement, and penalties for violation of prescriptive regulation were similarly inconsistent and weak.[310] Enforcement by agencies and courts may be easier under market-based systems in part because of the compliance cost savings: agencies and courts are less reluctant to simply require the purchase of additional credits as a penalty, as opposed to installing expensive retrofits.

Regardless of aggregate administrative costs, marketable permits will require a different allocation of agency resources. Agencies will have to retrain staff in the theory and operation of markets.[311] Agencies may also need to hire different staff: instead of engineers who identify control strategies and negotiate permit terms, under a marketable permit program agencies might need more people who can monitor and enforce.[312] However, setting the cap or baseline and verifying that credits are additional may require much of the same expertise and administrative work as under prescriptive regulations.[313]

2. Evidence

Literature reviews find some evidence that trading eventually lowers administrative costs, but also that trading changes bureaucratic functions as monitors replace engineers and could result in some short-

---

[304] David Driesen, *Is Emission Trading an Economic Incentive Program?*, *supra* note 18.
[305] Bruce Ackerman & Richard Stewart, *Reforming Environmental Law: The Democratic Case*, *supra* note 255 (agencies spend on air monitoring 0.02% of the total estimated cost of air pollution controls)
[306] *Id.*
[307] Note that, unless given specific authority to keep revenue, individual federal agencies would have to deposit any revenue beyond covering their own expenses into the general U.S. treasury. State laws may allow individual state agencies to retain revenue.
[308] NMFS West Coast Region, Conservation Banking Guidance (2015).
[309] David Driesen, *Is Emission Trading an Economic Incentive Program?, supra* note 18.
[310] Bruce Ackerman & Richard Stewart, *Reforming Environmental Law: The Democratic Case*, *supra* note 255.
[311] T.H. Tietenberg, Emissions Trading: Principles and Practice 41 (2006, 2d ed).
[312] Tom Tietenberg, *Tradable Permits in Principle and Practice*, *supra* note 181.
[313] *Id.*

term cost increases.[314] Harrington and Morgenstern, for example, find reasonable evidence that economic incentives have a lower information burden than traditional regulation, but they find only mixed evidence that economic incentives have lowered administrative costs.[315] For example, EPA's lead trading program was so complex that unintentional violations in early years increased monitoring costs.[316] Meanwhile, though the U.S. acid rain market did have impressively low administrative costs, achieving nearly 100% compliance rates with only about 100 EPA staff,[317] administrative costs were also quite low for Germany's prescriptive regulations for sulfur dioxide from power plants.[318] Harrington and Morgenstern also point out that marketable permit programs explicitly authorized by statute, like the acid rain program, may have no advantage over prescriptive regulation for adapting to new information, because it would take an act of Congress to change the sulfur dioxide cap.[319]

Water quality trading programs reportedly can be costly to build from scratch, and unfortunately many state water quality programs are in fact built from scratch, despite the availability of models for best practices and the potential to share resources.[320]

There is some evidence that in fish catch share programs, the market can automatically adjust to socio-economic changes to the relative demand between commercial and recreational fishers.[321] Canada notably has long relied on fish catch share programs as a cost-effective way to manage a large number of fishers and fisheries in the face of inadequate technological solutions to prevent overfishing.[322] However, Alaska's halibut and sablefish tradable quota program has seen increased administrative costs.[323]

For conservation banking, it is perhaps notable that after two decades of activity, in Fish and Wildlife Service reaffirmed in 2016 its belief that conservation banking reduces the workload for its staff.[324] On the other hand, conservation bank sponsors complain about the lack of defined timeline for review, insufficient agency staff, and long review times: it reportedly takes about about 2.5 years to plan and get approval on a conservation bank, and about 40% of the time is spent waiting for FWS input.[325] Wetland mitigation banks may fare no better. While the Army Corps of Engineers contends that applicants who use a wetlands bank receive their permits about 50-120 days faster than applicants who undertake their own mitigation,[326] those figures do not account for the time spent approving the bank or in-lieu instrument in the first place. Despite codified timelines for review, approval, and oversight of wetland

---

[314] T.H. Tietenberg, Emissions Trading: Principles and Practice 71 (2006, 2d ed).
[315] Winston Harrington & Richard Morgenstern, *International Experience with Competing Approaches to Environmental Policy: Results from Six Paired Cases*, *supra* note 259, at 117.
[316] *Id.* at 126.
[317] Lesley McAllister, *Beyond Playing "Banker"*, 59 Admin. L. Rev. 269 (2007).
[318] Winston Harrington & Richard Morgenstern, *International Experience with Competing Approaches to Environmental Policy: Results from Six Paired Cases*, *supra* note 259, at 126.
[319] Though, if Congress built in safety valves to relax or increase the cap stringency based on price, a marketable permit program established by statute could still automatically respond to new information. Winston Harrington & Richard Morgenstern, *International Experience with Competing Approaches to Environmental Policy: Results from Six Paired Cases*, *supra* note 259, at 134.
[320] Willamette Partnership, *In It Together: A How-To Reference* (2012); EPA & USDA, Report on 2015 National Workshop on Water Quality Markets (2016).
[321] NOAA, Catch Share Policy (2010).
[322] Katrina Wyman, *Why Regulators Turn to Tradable Permits: A Canadian Case Study*, 52 U. Toronto L.J. 419 (2002).
[323] Pew Envtl. Group, *Design Matters: Making Catch Shares Work* (2009).
[324] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[325] DOI, Office of Policy Analysis, Results from a Survey of Conservation Bank Sponsors (2016).
[326] U.S. Army Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015) (an average of 120 days versus 177-243 days, and rising).

banks, the Corps has no quantitative data to track compliance with those deadlines,[327] and bank sponsors report that timelines are not being met.[328] The National Mitigation Banking Association says that it would prefer to sometimes get a "no" early than to have every review drag on indefinitely.[329]

D. Distributional Consequences

1. Grandfathering, Windfalls, and Barriers to Entry

In cap-and-trade programs, regulators have several options for the initial allocation of privileges or obligations: by open auction; by lottery, either for free or with a fixed price per allocation awarded; or by criteria-based rules, such as historical use of the resource, again either free or with a fixed charge.[330] The two dominant choices[331] for existing and proposed cap-and-trade programs are auctions and free allocations based at least partly on historical use of the resource. The free allocation approach is a form of "grandfathering," which, broadly defined, means giving special regulatory treatment to existing actors compared to new actors.

In theory the method for initial allocation should not affect the ultimate efficiency of the market, so long as the allocation does not create a monopoly.[332] For example, consider a greenhouse gas cap-and-trade market. As I have written previously elsewhere:

> As soon as an emissions cap is put in place, the cost of electricity and energy-intensive goods will rise, creating a price signal across the economy to save energy and move to cleaner technologies like wind and solar. This effect will take place regardless of how permits are distributed, because utility companies will account for the market value of the permits, not the purchase price. 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."[333]

However, that theory may be overstated. In reality, freely allocating valuable permits to existing actors based on their historical use of the resource increases the risk of monopoly power in the permit market and incentivizes perverse strategic behavior, like a firm artificially inflating its use of the resource in the baseline year to increase its allocation share.[334] The Federal Trade Commission has also found that, compared to auctions, grandfathering may reduce the incentive to innovate.[335] These efficiency concerns are discussed in sections below. This section focuses on a different distinction between

---

[327] *Id.*
[328] *Id.*
[329] *Id.*
[330] But setting the right fee is very difficult, it is better to auction. FTC, Comments of the Staff of the Bureau of Economics on Protection of Stratospheric Ozone (1988).
[331] Other structures are possible. For example, the acid rain market allocated almost all allowances freely, but also required sources to auction a small percentage of their allowances at a zero-revenue auction, for purposes of price discovery and to allow a vehicle for new entrants into the market.
[332] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 12 (1981)
[333] Inimai Chettiar & Jason Schwartz, *The Road Ahead: EPA's Obligations and Options for Regulating Greenhouse Gases* (2009) (citing Rob Inglis, *The Power Industry's Prisoner's Dilemma*, THE NEW REPUBLIC: THE VINE, Mar. 23, 2009, *available at* http://blogs.tnr.com/tnr/blogs/environmentandenergy/archive/2009/03/23/the-power-industry-prisoner-s-dilemma.aspx).
[334] T.H. Tietenberg, Emissions Trading: Principles and Practice 138-139 (2006, 2d ed).
[335] FTC, Comments of the Staff of the Bureau of Economics on Protection of Stratospheric Ozone (1988).

grandfathering and auctions: distributional consequences, such as windfall profits and barriers to new entry.

Regulators often choose grandfathering to avoid disruptions to the status quo, to protect returns on past investments, and to ease tensions with the regulated industry.[336] In fish catch share programs, for example, grandfathering based on fishers' catch history has been preferred in order to protect traditional fishing communities, increase fishers' returns on investment, and provide incentives for existing communities to act collectively to enhance the long-term value of the fish stock.[337] Despite specific statutory authority to auction,[338] no U.S. fish catch share program has used auctions. The fishing industry has a loud voice on regional fishery councils, and therefore such councils are unlikely to vote for an auction. The National Marine Fisheries Service directly controls the catch share program for highly migratory Bluefin tuna, but the agency specifically declined to auction quotas in order to protect past investments and minimize uncertainty that an auction would create.[339]

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, whether the ticket was initially purchased or found for free on the ground does not change the opportunity cost or the black market price; it only affects the scalper's profits. Likewise, freely allocating or auctioning greenhouse gas permits will not affect the choices firms make about their individual levels of pollution or the costs passed on to customers; it only affects the firms' profits. By contrast, with a revenue-raising auction run by the government, only the taxpayer gets a windfall enrichment.[340]

Auctions also reduce barriers to entry compared to grandfather.[341] Grandfathering is a common feature of prescriptive regulation, and new entrants face disproportionately stringent standards while existing entities are protected out of political concerns.[342] Cap-and-trade auctions and credit programs may create fewer anticompetitive barriers to new entrants to industry than prescriptive regulation.[343] For example, the cost, delay, uncertainty, and contentiousness of FCC licensing proceedings discouraged new competitors from seeking access to electromagnetic spectrum; with license auctions, they can just buy in.[344] Similarly, in credit markets, new entrants can just buy in.

By contrast, when allowances are freely allocated, new entrants must rely on the secondary market for the necessary permits to operate. Existing entities that hold the permits have an incentive not to facilitate purchases from potential new competitors. For example, there have been accusations of

---

[336] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 13 (1981)

[337] Terry Anderson et al., *Efficiency Advantage of Grandfathering*, NBER No. w161519 (2010).

[338] 16 U.S.C. § 1853a(d)-(e).

[339] 79 Fed. Reg. 71,509 (2014).

[340] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 12 (1981).

[341] Breger, Stewart, Elliott, & Hawkins, *Providing Economic Incentive in Environmental Regulation*, *supra* note 13.

[342] *See* Jonathan Nash & Richard Revesz, *Grandfathering and Environmental Regulation: the Law and Economics of New Source Review*, 101 Northwestern U. L. Rev. 1677 (2007). Also, prescriptive regulations like BAT place disproportionate burdens on new industries (i.e., more stringent because no fear of shutdown) and on more productive industries (i.e., more stringent because they can afford it); trading eliminates those disproportionate burdens. Bruce Ackerman & Richard Stewart, *Reforming Environmental Law: The Democratic Case*, *supra* note 255.

[343] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* at 4.

[344] *Id.* at 5.

collusion against new entrants in the airport landing slot market.[345] Airlines in possession of valuable landing slots, which they got for free, have an incentive to retain the slots for possible future ridership expansion, even if it means flying empty in the meantime.[346] Some regulators try to address such new entry barriers by creating a reserve pool or set-aside of allowances for new entrants. To that end, in 2011, FAA approved a trade of airport landing slots between Delta and U.S. Airways, but the agency conditioned its approval on a portion of the paired slots being auctioned to carriers who had less than 5% of the existing slots at those airports.[347] The European Union's Emissions Trading System has a set-aside pool for new entrants, as does the acid rain market, though these set-asides have never been accessed.[348] Overall, set-aside pools for new entrants remain rare in marketable permit programs.[349]

Auctions are typically considered to be politically more difficult to implement, because the benefits of auctioning are diffusely spread across all taxpayers, while the interests in favor of grandfathering are highly concentrated and often politically connected.[350] However, free initial allocations may create a constituency of concentrated interests that will politically oppose any future changes to the programs' stringency or allocations. In the long-run, auctions may make programmatic adjustments politically easier.

An alternative option to freely allocating allowances to regulated entities based on historic use is to allocate to other parties based on different criteria. For example, New Zealand gives 40% of its tradable fish catch shares to the Maori, so that the community can protect its own interests. Similarly, the Bering Sea Community Development Quota Program gave 7.5% of walleye Pollock quota to native communities.[351] In air pollution markets, some experts advocate for output-based allocations rather than historic emissions-based allocations, to reward renewable and nuclear electricity generators with allowances and to facilitate entry into the market.

Recommendation: 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.

2. Small Entities and Communities

In general, smaller entities may face special challenges in a marketable permit program. They may lack the resources for the kind of long-term planning necessary to manage risk in the market.[352] Because of economies of scale, they may have a harder time than larger sources offsetting the new monitoring costs of trading programs with the cost savings of trading.[353] They may face higher transaction costs on secondary markets and may not have the relationships with larger entities necessary to find buyers and sellers if permits are not traded on established, standardized markets. For example, even though EPA

---

[345] The accusations led FAA to propose reforms in 2015 to increase transparency and public participation, 80 Fed. Reg. 1273; however, the proposed rule was withdrawn in 2016.
[346] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 42 (1981).
[347] FAA Briefing, *Auction Opens for Slots at New York and Washington Airports*, Nov. 14, 2011, https://www.transportation.gov/briefing-room/auction-opens-slots-new-york-and-washington-airports.
[348] T.H. Tietenberg, Emissions Trading: Principles and Practice 158 (2006, 2d ed).
[349] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[350] Interview with Don Elliott.
[351] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[352] Lesley McAllister, *Beyond Playing "Banker"*, 59 Admin. L. Rev. 269 (2007).
[353] T.H. Tietenberg, Emissions Trading: Principles and Practice 182 (2006, 2d ed).

designed its inter-refinery trading system for lead in gasoline in part to help small refiners manage their costs,[354] in reality both small and new refineries faced higher transaction costs.[355] As another example, small providers in rural areas have had trouble accessing spectrum on the secondary market,[356] and the FCC reserves some spectrum for public uses, out of concern that they cannot compete in auctions.

The distributional consequences of marketable permit programs to small entities and communities have attracted the most attention in fish catch share programs. The temporary moratorium on fish catch share programs imposed by Congress was motivated largely by concerns about equity, small communities, and a potential influx of outside investors.[357] Fishers have often insisted upon various trade restrictions—sometimes over the objections of regulators—in order to protect fishing communities from outside corporate interests.[358] For example, the Alaskan halibut tradable catch share program prohibits transfers across vessel class size and requires owners to be on board for catch,[359] and many fish catch share programs have position limits designed to minimize consolidation of permits.[360] In fact, share caps and other limits to prevent inequitable concentrations are required by statute,[361] and the regional fishery councils must consider employment and the cultural framework of the fishery in their initial allocations, to protect participation of small owners. The Magnuson-Stevens Act also allows the federal government to help finance the purchase of shares by small or new fishers.[362]

Nevertheless, several fisheries have experienced distributional consequences. Alaska's halibut and sablefish fisheries endured layoffs, with small fishers and small communities hit the hardest.[363] In a survey of red snapper shareholders, though large shareholders reported being "very satisfied" with the program, small shareholders were quite unsatisfied, and the overall rating of the program's success was "tepid."[364] Small shareholders felt the program had serious inequalities and resented the creation of a "new class of 'sea lords'" who own shares but lease them out rather than fish themselves.[365] In 1990, when the first U.S. tradable catch share program began, there were 117 unique holders of Mid Atlantic quahog allocations; since then, there has been a steady decline, and as of 2013 there were only 40 unique share holders.[366] Notably, the quahog program did not historically have accumulation limits, relying instead on standard antitrust laws to protect against excessive concentration. But while existing antitrust laws may prevent monopolies, they are insufficient to prevent permit consolidation.[367]

None of this suggests that distributional consequences are necessarily worse under marketable permit programs than traditional regulations. As noted above, marketable permits allocated by auction (or by credit system) can help put all firms—existing or new, large or small—on relatively equal footing, and

---

[354] Stavins, What Can We Learn from U.S. Experience?, *supra* note 13, at 22.
[355] T.H. Tietenberg, Emissions Trading: Principles and Practice 69 (2006, 2d ed).
[356] FCC, *The National Broadband Plan* 83 (2010).
[357] Mark Fina, *Evolution of Catch Share Management*, 36 Fisheries 164 (2011); *cf.* NRC, *Sharing the Fish: Toward a National Policy on IFQs* (1999) (moratorium was because of congressional concerns about social, economic, and biological effects).
[358] Katrina Wyman, *Why Regulators Turn to Tradable Permits: A Canadian Case Study*, 52 U. Toronto L.J. 419 (2002).
[359] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181. Also, the Pacific Coast Sablefish program prohibits transfers to partnerships or corporations.
[360] For example, the Sea Scallop IFQ ownership cap is 2.5% per vessel, 5% per entity. NOAA, Economic Performance of U.S. Catch Share Programs, NMFS-F/SPO-133 (2013). The Golden Tilfeish IFQ cap is 49%. *Id.*
[361] 16 U.S.C. § 1853a(c)(5).
[362] 16 U.S.C. § 1853a(g). Such loans do exist, with terms of twenty years or more. Mark Fina & Tyson Kade, *Legal and Policy Implications of the Perception of Property Rights in Catch Shares*, *supra* note 193.
[363] Pew Envtl. Group, *Design Matters: Making Catch Shares Work* (2009).
[364] Nat'l Marine Fisheries Serv., Red Snapper IFQ Five-Year Review (2013) (survey conducted by Louisiana State University).
[365] *Id.*
[366] NOAA, Economic Performance of U.S. Catch Share Programs, NMFS-F/SPO-133 (2013).
[367] NRC, *Sharing the Fish: Toward a National Policy on IFQs* (1999).

other allocation methods can specifically address distributional concerns, such as giving catch share directly to native communities. Regulators should generally be aware of the potential for distributional effects on small entities and communities, though there is likely no one-size-fits-all solution.

3. Consumer Effects and Auction Revenue

One 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 should have no effect on consumers compared to other kinds of similarly stringent regulation or other methods of allocation. Under a greenhouse gas cap-and-trade program, it is the cap, not the trading or auctioning, that raises the cost of electricity and energy-intensive goods, and similarly stringent prescriptive regulations would have similar results. According to economic theory, consumer prices should not depend on the sunk cost of winning a bid at auction, but rather on the permit's opportunity cost, which is independent of allocation method.

Empirical evidence confirms this theory. For example, data on the cellular telephone market from 1985-1998 showed that FCC's spectrum auctions did not raise consumer prices.[368] Similarly, despite huge volatility in the price of renewable fuel credits in 2013, consumers did not experience any corresponding increases in overall retail price of transportation fuels.[369] More generally, economists have found that choosing free allocation instead of auctioning only results in transferring wealth to corporate shareholders, with little if any benefit to consumers.[370]

Even though an auction, free allocation, or prescriptive regulation might all have similar effects on consumer prices, an auction at least generates revenue that can potentially be returned to consumers by a per capita dividend. For example, any cap on greenhouse gas emissions will increase energy prices. Because lower- and middle-income households spend a larger percentage of their income on energy than higher-income households, increases in energy prices potentially have a regressive effect. By auctioning and distributing revenue back on a per capita basis, studies show that most consumers would actually come out ahead under this kind of cap-auction-dividend system.[371]

Direct dividend mechanisms typically will not be available to federal agencies implementing auctions. Unless specifically authorized otherwise by statute, the law requires all proceeds collected by federal

---

[368] Evan Kwerel, *Spectrum Auctions Do Not Raise the Price of Wireless Services: Theory and Evidence (*FCC Paper, 2000).

[369] Dallas Burkholder, OTAQ, *Preliminary Analysis of RIN Market Dynamics, RIN Prices, and Their Effects* (2015). Though retail prices of fuels with a low percentage or no renewable content may increase with high RIN prices, while the retail price of fuels with a high percentage of renewables may decrease.

[370] *Policy Options to Prevent Climate Change: Hearing Before H. Comm. on Ways and Means*, 100th Cong., 8 (2008) (testimony of Dallas Burtraw, Senior Fellow, Resources for the Future). Economic experts and President Obama called for a 100% auction of all greenhouse gas allowances under a legislative cap-and-trade program, decrying any free allocation of permits as an industry giveaway. *See* Robin Bravender, *Economists Assail Industry's Push for Free Allowances*, E&E DAILY NEWS, Apr. 9, 2009. *But see* Ben Geman & Mike Burnham, *Obama Admin. Courting Moderate Senate Democrats*, E&E DAILY NEWS, Apr. 8, 2009 (noting Obama may be flexible on his call for a 100% auction).

[371] *See* Dallas Burtraw et al., *The Incidence of U.S. Climate Policy: Where You Stand Depends on Where You Sit* 36 (Res. for the Future Discussion Paper No. 08-28, 2008), *available at* http://www.rff.org/RFF/Documents/RFF-DP-08-28.pdf. This is true even before they change their behavior to save energy, which for lower-income Americans might not be financially feasible right away. The regional disparities from a cap with revenue distribution are also not large. *Id.* Recognizing the fairness of distributing auction revenue to the public, President Obama has voiced this policy preference. OMB, A NEW ERA OF RESPONSIBILITY, *supra* note 23, at 21. The President's budget proposed that, of the auction proceeds from a cap-and-trade system for greenhouse gases, $150 billion would be used to fund clean energy technologies, and the balance would be "returned to the people, especially vulnerable families, communities, and businesses to help the transition to a clean energy economy." *Id.*

agencies to be deposited into the general treasury of the United States,[372] except perhaps enough to cover administrative expenses.[373] Agencies most likely could not avoid this result by designating some non-profit third party to run the auction and distribute revenue.[374] Still, general treasury deposits could ultimately lighten the overall tax burden, and this result remains preferable to a free windfall for regulated entities. Notably, states are not under such constraints, including states implementing federal standards under a cooperative federalism statute like the Clean Air Act, and so states could dividend auction revenue back to consumers. And as seen with some fish catch share programs, it may be possible to allocate allowances to affected communities and let them put the allowances up for auction.

Recommendation: Federal agencies should opt for auctions and should encourage states to use an auction-and-dividend approach.

III. Policy Effectiveness

Do marketable permits maintain or exceed the required regulatory protections, or do they fall short and generate negative externalities?

A. Currency and Exchange Restrictions: Fungibility, Externalities, Uncertainty

In general, marketable permits work best when regulators care more about the total amount of activity than about who is undertaking the activity.[375] Global pollutants like greenhouse gases present the paradigmatic case for marketable permits because they are particularly flexible on the questions of "who, what, where, and when."[376] Greenhouse gases mix freely in the global atmosphere, have long lifespans, and affect global climate through their accumulated stock concentrations rather than through emissions flows. Because greenhouse gases have no localized effects, it does not matter which industries, sources, or regions reduce their emissions.[377] After adjusting for relative potencies, to some extent it also does not matter much which greenhouse gas variety is mitigated: carbon dioxide, methane, nitrous oxide, or highly-potent fluorinated gases. Similarly, at least within periods of a few years, to some extent it does not matter much when greenhouse emissions are abated, lending the market a degree of temporal flexibility that allows it to adjust to fluctuating compliance costs over time without sacrificing environmental benefits.[378] With greenhouse gases, essentially all that matters is identifying the optimal overall emissions cap for each period of years; the market then sorts out for itself who can achieve which emissions reductions at the lowest compliance cost. In short, a cap-and-trade market can exchange tons of carbon dioxide-equivalent emissions as a highly fungible kind of currency.

---

[372] *See* Miscellaneous Receipts Act, 31 U.S.C. § 3302 (2008).

[373] *See* IOAA, 31 U.S.C. § 9701(a) ("It is the sense of Congress that each service or thing of value provided by an agency (except a mixed-ownership Government corporation) to a person (except a person on official business of the United States Government) is to be self-sustaining to the extent possible."). It is less clear whether EPA could keep enough to cover all its expenses relating to climate change regulation.

[374] "Government agencies cannot escape responsibility for failing to perform their statutory duties by hiring private parties to perform those duties." *Thomas v. Network Solutions*, 176 F.3d 500, 510 (D.C. Cir. 1999).

[375] *Marketable Rights*, *supra* note 1, at 9.

[376] Stavins, *U.S. Cap-and-Trade System*, *supra* note 262, at 31.

[377] In other words, allowing sources to trade greenhouse gas permits across sectors and regions does not create "hot spots" of localized pollution. Allowing greenhouse gas markets could change the distribution of co-benefits from the reduction of co-pollutants.

[378] Stavins, *U.S. Cap-and-Trade System*, *supra* note 262, at 31.

Complete fungibility rarely exists for other kinds of currencies in common marketable permits programs.[379] As Salzman and Ruhl have detailed, currencies that inadequately control for non-fungibility across space, type, or time may allow externalities to bleed out of the market.[380] For example, in RECLAIM's car scraping program, the fact that refinery emissions are concentrated, more carcinogenic, and spike at irregular times, while vehicle emissions are geographically diffuse, less carcinogenic, and fluctuate over regular 24-hour periods, meant that reductions in vehicle emissions were imperfectly fungible spatially, temporally, and by type with increased refinery emissions.[381] Without any additional regulatory controls, allowing trading between vehicle and refinery emissions to proceed on the false assumption that they are interchangeable ton for ton would generate unintended, negative externalities: instead of a diffuse population being exposed to somewhat dangerous pollution from cars, a concentrated population might be exposed to more highly dangerous pollution from refineries.

Eliminating all non-fungibilities may be practically impossible. As Salzman and Ruhl remark, nobody will trade identical blue marbles, and the whole point of a market is to take advantage of heterogeneity.[382] More complex currencies, like trading in units of cancer risk in the above RECLAIM example, could resolve some externalities, but at a heavy informational burden on agencies and attendant increased transaction costs, making the market less efficient.[383] Some critics of marketable permit programs note that designing sufficiently comprehensive currencies may be impossible: arguably, no expert could authoritatively answer whether one acre of wetland provided the same ecosystem services as another,[384] and regulators are unlikely to have the financial resources or technical expertise to judge the relative values of highly heterogeneous environmental assets like habitat and water quality.[385] To these critics, non-fungibility suggest marketable permits may not be appropriate in such contexts.

In reality, most marketable permit programs have accepted the fungibility problems of simple currencies like tons of pollution and acres of wetland, and address the resulting externalities by adopting restrictions on who can trade, where and when they can trade, and at what exchange rate they can trade.[386] Unfortunately, too many exchange restrictions will create risks of market imperfections, like thin, inactive markets, which undermine the efficiency of the program.[387]

Trading ratios can address *known* differences in impacts across space, time, or type.[388] However, uncertainty about fungibility and externalities creates its own challenges for a marketable permit program. Some imperfect fungibilities as to "who" can be dealt with through restrictions on market participation, such as restricting foreign ownership.[389] Other issues, like national security concerns over ownership of electromagnetic spectrum, can likely only be addressed through institutional reviews. Options for such exchange restrictions and institutional reviews are discussed in the following sections.

---

[379] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181 (Permit fungibility is frequently a "myth".)
[380] James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, *supra* note 6.
[381] *Id.*
[382] *Id*.
[383] *Id*.
[384] David Driesen, *Trading and Its Limits*, 14 Penn. St. Envtl. L. Rev. 169 (2005).
[385] James Boyd, Dennis King & Lisa Wainger, *Compensation for Lost Ecosystem Services: The Need for Benefit-Based Transfer Ratios*, 20 Stanford Envtl. L. J. 393 (2001).
[386] James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, *supra* note 6.
[387] *Id.*
[388] Willamette Partnership, *In It Together: A How-To Reference Part 2* (2012).
[389] The Magnunson-Stevens Act ,16 U.S.C. § 1853a(c), prohibits foreign ownership. CFC trading rule allows international transfers with EPA approval.

1. Spatial Issues and Hot Spots

One of the most common critiques of environmental marketable permit programs relates to spatial fungibility: namely, hot spots.[390] The concern is that by allowing certain sources to purchase credits and emit more than they would otherwise under a prescriptive standard, localized increases in emissions of either the target pollutant or co-pollutants could disproportionately affect certain populations. Depending on wind patterns and other factors, localized hot spots could occur even if the sources buying credits are not themselves geographically concentrated.[391] As Richard Revesz and Jonathan Nash point out, having disproportionate concentrations of pollution in some regions may be welfare maximizing or not, depending on the shape of the pollutant's damage function; but from a distributional perspective, concentrations are usually undesirable.[392] In short, it seems unfair to make residents of one region trade their environmental and health benefits against another population's.[393]

Economic theory puts forward one reason to expect hot spots absent any exchange restrictions. Correlation between higher abatement costs and higher damages—which would lead to hot spots as the highly damaging sources choose to buy allowances rather than abate given their high compliance costs—may be more likely than having high emissions where the costs can be easily absorbed.[394] There has been some sporadic evidence of marketable permits resulting in hot spots, as with RECLAIM's credit program that allowed trading diffuse mobile source pollution for concentrated stationary pollution.[395]

However, in general, there is not much evidence that hot spots have materialized in marketable permit programs.[396] For example, some worried the acid rain program would cause hot spots, as especially dirty power plants in the Midwest would choose to buy allowances rather than reduce their emissions. In fact, the acid rain program's much feared hot spots did not develop, nor did hot spot arise in NOx trading.[397] The acid rain market may have even benefited the most vulnerable regions.[398] More than just good luck, it makes some intuitive sense that the cheapest abatement opportunities (i.e., the abatement opportunities that markets will prioritize) might be found among the largest sources, which tend to be the sources located were the biggest environmental problems are.[399]

Nevertheless, concerns about hot spots have given rise to many proposed restrictions on trades. The acid rain market restricted trades that would result in violations of national ambient air quality standards,[400] though the program did not specify a mechanism for achieving this goal.[401] For air pollution markets, the three common exchange restrictions motivated by hot spots are: preventing inter-zonal

---

[390] Dan Farber, *Pollution Markets and Social Equity*, 39 Ecol. L. Q. (2012).
[391] Jonathan Nash & Richard Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 Ecol. L. Q. 569 (2002).
[392] *Id.*
[393] Breger, Stewart, Elliott, & Hawkins, *Providing Economic Incentive in Environmental Regulation*, *supra* note 13.
[394] Byron Swift, *U.S. Emissions Trading: Myths, Realities and Opportunities*, 20 Nat. Res. & Envt. 3 (2005) (citing Stavins, *Correlated Uncertainty & Policy Instrument Choice*, 30 J. Envtl. Econ. & Mgmt. 218, 229-30 (1996).
[395] Richard Drury et al., *Pollution Trading and Environmental Injustice*, 9 Duke Envtl. L. & Pol'y Forum 231 (1999).
[396] Byron Swift, *supra* note 394.
[397] A. Denny Ellerman, *Are Cap and Trade Programs More Environmentally-Effective Than Conventional Regulation?* 55, *in* Moving to Markets, *supra* note 2.
[398] Winston Harrington & Richard Morgenstern, *International Experience with Competing Approaches to Environmental Policy: Results from Six Paired Cases*, *supra* note 259, at 128.
[399] Ellerman, *Are Cap and Trade Programs More Environmentally-Effective Than Conventional Regulation?*, *supra* note 397, at 53.
[400] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[401] Some states developed specific tools: for example, New York restricts upwind acid rain trades. James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, *supra* note 6.

trades; changing the currency to units of environmental degradation instead of tons; and imposing offset ratios. Revesz and Nash explain why none of these solutions is optimal. Partitioning the market into several geographic zones will not solve all spatially differentiated impacts, and reducing the size of the markets increases the risk of market power and blocks some otherwise efficient trades from taking place. Moreover, allocating the "correct" number of permits to each zone could be administratively challenging. Trading in environmental degradation units essentially creates separate markets at each individual air quality monitoring station. In addition to the resulting market thinness—exacerbated by the fact that each source would have to simultaneously obtain all needed permits at every receptor point, since not having one permit would block the emission and render all purchased permits worthless—multiple markets entail substantial supervision costs for the agency and transaction costs for industry. Finally, offset ratios add complexity for both regulators and participants, because a permit would convey different rights to different holders at different times, depending on the ratio dictated by environmental quality factors unique to each source's location.[402] Revesz and Nash develop a fourth option as their preferred solution: emissions trades would be conducted online subject to a computerized model of local air quality effects, and trades would be constrained only if the model predicted the exchange would cause local air quality to exceed standards.[403] Ultimately, Congress seems to have responded to hot spot concerns with the acid rain program by just increasing the stringency of the standard: "it was understood [by Congress] that the greater the overall size of the reduction, the more indifferent society could be to the spatial impacts of trades."[404]

With the exception of global pollutants like ozone-depleting substances,[405] many existing marketable permit programs have adopted various restrictions to prevent externalities relating to spatial fungibility. RECLAIM limited trading to within designated zones, and other programs restrict trading across airsheds.[406] Water quality trading is limited to within watersheds, regulators can annul trades that lead to destructive localized pollution,[407] and ratios may be applied to adjust for how different locations of discharge can have different effects on water quality. Many state-based renewable electricity standards restrict eligible credits to within neighboring states.[408] For conservation banking, mitigation must be in locations identified in landscape-scale conservation plans,[409] though some spatial flexibility is allowed if the overall benefit to the species warrants it.[410] According to the Army Corps of Engineers, trades between urban and rural wetlands are not favored, but are sometimes unavoidable.[411]

---

[402] Jonathan Nash & Richard Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 Ecol. L. Q. 569 (2002).
[403] *Id.*
[404] I*d.*
[405] There is unrestricted trading across airsheds for CFCs, *see* 42 U.S.C. § 7671f(a).
[406] James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, *supra* note 6 (for example, trading programs for NOx or VOCs); *see* 42 U.S.C. § 7503(c)).
[407] Andrew Wolman, *Effluent Trading in the United States and Australia*, *supra* note 229; *see also* EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003). EPA supports trading for total phosphorus and total nitrogen and sediment load, but other pollutants would be subject to higher level of case-by-case scrutiny, implicit concern is hot spots; in particular, EPA does not currently support trading in bioaccumulative toxics, but is open to a pilot project. *Id.*; EPA, Water Quality Trading Toolkit (2009).
[408] NREL, *Quantifying the Level of Cross-State Renewable Energy Transactions* (2015) (or within ISO). California limits percent of out-of-state credits allowed (in 2012, actual trades were at 28% out-of-state). *Id.*
[409] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[410] *See* NMFS West Coast Region, Conservation Banking Guidance (2015).
[411] Corps-EPA Final Rule, Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,593 (2008).

2. Temporal Issues and Banking/Borrowing

Temporal issues that must be resolved in designing marketable permit programs include whether permits are perpetual or have fixed lives, and whether allowances and credits can be banked for use in future years or borrowed from future years to satisfy compliance today. More permanency encourages long-term investment decisions, while fixed lives make it easier for agencies to adjust supply and for participants to rethink their market strategies.[412] Shorter permit lifespans also means less is at stake with any individual transfer, which may reduce the need for rigorous agency scrutiny of each transfer.[413]

Banking can be crucial to letting regulated sources hedge against permit price volatility and unexpected economic changes. On the other hand, current regulated activities may not be perfectly fungible with regulated activities far in the future, as with the emission of bioaccumulative toxins. Banking can also increase the incentive for noncompliance, because any permits not cashed in at end of the year for compliance still have value in future years.[414] There was some evidence from the lead phase-down program that banking led to noncompliance in early years, but at the same time, the evidence further suggests that banking was crucial to the program's efficiency and therefore environmental success.[415]

Agencies employ a range of practices to manage temporal flexibilities. For EPA's regulation of vehicle emissions, each vintage-year credit can be held for a fixed duration of about 10 years,[416] while for EPA's renewable fuel standard, RINs can only be banked for one compliance year.[417] NOx trading programs have limited too much banking of allowances in any one period.[418]

For wetland and conservation banking, a major distinction between banks and in-lieu fee instruments is the timing of mitigation. With banks, mitigation is verified before credits are sold to allow a project to proceed with harm to the habitat; with in-lieu fees, mitigation is not necessarily achieved in advance, and credits purchased may represent more of a promise for future mitigation.[419] The Fish and Wildlife Service has stated a preference for advance mitigation, and when that is not possible the agency recommends increasing the trading ratio to reflect any temporal species losses.[420] The Army Corps of Engineers has addressed similar concerns about in-lieu fees and the timing of mitigation by limiting the number of advance credits that can be sold and requiring in-lieu instruments to be operated by local governments or nonprofit groups, not by for-profit businesses.[421]

3. Type and Value Issues

Does a ton of pollution mitigated present the same carcinogenic risks as the additional ton of pollution it offset? Can one pollutant be traded for another?[422] Does an acre of wetlands newly created provide the

---

412 Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 10-11 (1981)
413 *Id.* at 11.
414 T.H. Tietenberg, Emissions Trading: Principles and Practice 179 (2006, 2d ed).
415 *Id.*
416 EPA, Manufacturer Performance Report for 2015 MY (2015).
417 EPA, RINs under the Renewable Fuel Standard Program, https://www.epa.gov/renewable-fuel-standard-program/renewable-identification-numbers-rins-under-renewable-fuel-standard.
418 Jonathan Nash & Richard Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 Ecol. L. Q. 569 (2002).
419 Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
420 *Id.*
421 Corps-EPA Final Rule, Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,593 (2008).
422 Don Elliott and Gail Charnley have called for trading among different pollutants where benefits of reduced risk are clear (cited in Salzman and Ruhl, *supra* note 6). Cross-pollutant trading works for greenhouse gases and CFCs. Some restrictions on

same ecosystem services as the acre of wetlands destroyed in its place? Do fish catch share programs increase the bycatch and discarding of non-target species,[423] or do conservation banks inadvertently degrade non-target species?[424] Different type- and value-fungibility issues crop up in each marketable permit application, and responses vary widely as well.

EPA has long had a generic policy for air pollution trading that trades must be environmentally equivalent,[425] though the agency does not clearly specify how that is to be achieved in every case. By contrast, the rules for wetland mitigation banks do not explicitly require replacement of lost social value.[426] In general wetland banking tries to replace the exact function of the wetland, while conservation banking tries to offset the impact to the endangered species.[427] The Army Corps has a preference for in-kind mitigation, especially for hard to replace wetlands like bogs, fens, and vernal pools, but does allow out-of-kind mitigation between different kinds of wetlands.[428] Conservation banking must be in-kind for the species, but it could involve trading different habitat types if the species outcome is the same.[429]

Fish and Wildlife Service policy states that habitat credits should be measured in the same terms as the impacts: acre for acre, family group for family group.[430] The Corps' 2008 regulation tried to move wetland mitigation banks away from proxies like acres and toward functional assessments to quantify credits and debits.[431] However, most habitat and wetland mitigation banks continue to rely on simply currencies, like acres (sometimes with trading ratios), rather than complex currencies like functional value or species family groups.[432] Acreage-based trades may be weighted for quality and value, and ratios can either increase or decrease the number of acres to be mitigated: for example, a loss of two acres of low-quality habitat may only need 1 high-quality credit.[433] Unfortunately, there are no simple, off-the-shelf valuation tools for measuring biophysical or functional site characteristics of wetlands or habitat, let alone for comparing the relative economic values of the habitat being traded.[434]

---

cross-pollutant trading appear in EPA's 1996 draft framework on watershed-based trading (1996), but more recently EPA supports cross-pollutant trading for oxygen-related pollutants if adequate information is available on impacts. EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003).

[423] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.

[424] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).

[425] James Salzman & J.B. Ruhl, Currencies and the Commodification of Environmental Law, *supra* note 6 (citing 51 Fed. Reg. 43,814 (Dec. 4, 1986)).

[426] James Boyd, Dennis King & Lisa Wainger, *Compensation for Lost Ecosystem Services*, *supra* note 385.

[427] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).

[428] Corps-EPA Final Rule, Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,593 (2008).

[429] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016). Ninth Circuit caselaw prevents using non-critical habitat credits to offset effects to critical habitat. *See* NMFS West Coast Region, Conservation Banking Guidance (2015).

[430] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).

[431] Corps-EPA Final Rule, Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,593 (2008).

[432] James Boyd, Dennis King & Lisa Wainger, *Compensation for Lost Ecosystem Services*, *supra* note 385 (In 1992, of 46 wetlands banks, 20 used functional assessments, 26 used rough acreage-based trading ratios); *see also* James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, *supra* note 6 (of 36 banks established after 1994, simply currencies, like acres, continue to dominate). As of 2003, the most common metric for conservation banking was acreage; some banks used acreage plus multipliers; number of species is the least common metric. Stratus Consulting for Northwest Fisheries Science Center, NOAA, A Nationwide Survey of Conservation Banks (2003).

[433] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).

[434] James Boyd, Dennis King & Lisa Wainger, *Compensation for Lost Ecosystem Services*, *supra* note 385.

4. Institutional Review Mechanisms

The preceding three sections discussed various non-fungibilities and the exchange restrictions some agencies apply to all trades to compensate for resulting externalities. Another option is, instead of universal restrictions, case-by-case reviews. Not only could case-by-case reviews address externalities, but they can also prevent unfit parties from acquiring permits.[435] However, a "gatekeeper"[436] with power to reject trades case-by-case increases transaction costs, and presents problems of false positives, overcorrection, and invalidation of good trades.[437] For example, when EPA originally insisted on ex post review of trades for criteria pollutants offsets, fewer than half the trades took place compared to states with no ex post review.[438] Some agencies continue to exercise a gatekeeper role. The Fish and Wildlife Service must approve all credit transactions for use in any Endangered Species Act permit, and the Service also approves all conservation bank operations.[439]

There are several other models of institutional review. The government could act as a market middleman and take charge of all buying in selling: for example, Puerto Rico's Planning Board acts as buyer and seller in all exchanges of transferable development rights.[440] Trading programs could provide for public comment and review on all individual trades, but the transaction costs would likely undermine an efficient market.[441] A more targeted approach could allow citizens to flag certain trades for review by an independent panel of scientific experts and public interest group, though transaction costs could still be prohibitive.[442] Finally, there could be greater judicial accountability for permit transactions. Judicial review of permits are usually quite deferential, but an agency could shift burdens of proof onto the applicant, or Congress could grant liberal citizen suit rights;[443] once again, transaction costs and uncertainty would be high.[444]

B. Setting a Cap and Adaptive Management

A prerequisite for a marketable permit program is sufficient information for regulators to set a cap or baseline.[445] The slow development of watershed-specific pollution loading limits (TMDLs), for example, is a major reason for the slow development of water quality trading.[446] The cap must be sufficiently stringent both to achieve the policy objective and to facilitate an active market; if the cap is too weak, there will not be enough demand for allowances to support a market.[447] For example, the Regional

---

[435] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 17-18 (1981) (also preventing undue market concentration, though position limits can also do that).
[436] *Id.* at 16.
[437] Salzman & Ruhl, *supra* note 6.
[438] *Id.*
[439] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[440] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 38 (1981).
[441] Salzman & Ruhl, *supra* note 6.
[442] *Id*.
[443] Robert Glicksman, *Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development*, 62 Kansas L. Rev. 943 (2014).
[444] Salzman & Ruhl, *supra* note 6.
[445] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[446] EPA & USDA, Report on 2015 National Workshop on Water Quality Markets (2016).
[447] Willamette Partnership, *In It Together: A How-To Reference* (2012).

Greenhouse Gas Initiative's cap proved to be too weak in the face of changing economic conditions, and for most of the program's existence the cap has not been a binding constraint on emissions.[448]

1. Capping Total Activity Levels Is Often More Efficient Than Capping Rates

The choice of capping either total activity or the rate of activity arises most often in the context of air and water pollution markets, though the question does 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.[449] For simplicity, since the choice does occur most often in the pollution context, this section will assess mass-based caps (hard limits on total emissions) versus rate-based systems (limits instead on emission per unit of activity). The economics literature shows that mass-based cap-and-trade systems offer more efficient and predictable reductions than rate-based trading schemes.[450] By placing a hard cap on total emissions, a mass-based trading program puts a price on every ton emitted. A rate-based trading program, by contrast, raises the cost of only some emissions—namely, those in excess of the relevant performance standard. Emissions below the performance standard remain implicitly subsidized under a rate-based approach. Because sources do not have to internalize the externalities of their pollution emitted below the rate, total emissions will end up inefficiently high. As demand for the regulated activity increases, under a rate-based systems sources can continue to meet their required limit per unit of activity while increasing their overall activity, resulting in more emissions. For example, with population and economic growth, drivers will travel more miles in their motor vehicles and burn more gasoline, and transportation emissions will rise even with a rate-based standard in place.[451]

A similar problem results from the "rebound effect."[452] For example, regulating vehicles' emissions through a rate-based standard prompts manufacturers to build cars that consume less gasoline per mile. Consumers therefore need less gasoline to drive a mile. As the cost of driving each mile falls, consumers begin driving more miles, and overall emissions slightly rebound.[453] Rebound can occur in any sector where regulation prompts sources to improve the efficiency of their activities, including in the electricity sector.[454] Mass-based caps avoid the rebound effect.

A mass-based cap-and-trade program is also easier to administer, particularly with respect to allowing credits into the market, such as from energy efficiency projects, renewable energy, or early action

---

[448] Interagency Working Group on Carbon Market Oversight, *Report on the Oversight of Existing and Prospective Carbon Markets* n.11 (2011).

[449] *See* Richard D. Smith & Joanna Coast, *Controlling Antimicrobial Resistance: A Proposed Transferable Permit Market*, 43 Health Policy 219 (1998)).

[450] *See* Jan-Tjeerd Boom & Bouwe R. Dijkstra, *Permit Trading and Credit Trading: A Comparison of Cap-Based and Rate-Based Emissions Trading Under Perfect and Imperfect Competition*, 44 Envtl. Res. Econ. 107, 131 (2009) ("[U]nder perfect competition, [rate-based] credit trading always leads to higher abatement costs than [mass-based] permit trading."); Carolyn Fischer, *Combining Rate-Based and Cap and Trade Emissions Policies* 8 (Resources for the Future, Discussion Paper 03–32, 2003) ("Given an equivalent emissions rate (or permit price), total emissions will be higher [in a rate-based trading system] than with [mass-based trading]."). *See also* Policy Integrity Comments on Federal Plan and Model Rules, http://policyintegrity.org/documents/PolicyIntegrity_CommentsonFederalPlanandModelRules.pdf.

[451] *See* U.S. Energy Info. Admin., Ann. Energy Outlook 2013 tbl.18, available at http://www.eia.gov/ forecasts/ aeo/data.cfm#co2emsec (showing 2025 transportation emissions under "High Economic Growth" scenario).

[452] 77 Fed. Reg. at 62,716.

[453] Some studies suggest that a 10% increase in fuel efficiency for automobiles would likely result in a 1-2% increase in vehicle miles traveled. See Nat'l Res. Council, *Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards* 19 (2002).

[454] *See* 80 Fed. Reg. at 64,745 (noting the possibility of rebound for power plants but expressing confidence that other provisions in the Clean Power Plan will prevent it).

credits.[455] Take the example of a carbon permit market for power plant emissions. Successful energy efficiency projects decrease electricity demand and reduce aggregate emissions, but they have no effect on the rate at which generators emit carbon. Renewable energy production reduces the demand for fossil fuels, but likewise has no effect on the emissions rate of fossil fuel-fired sources. Integrating efficiency efforts or renewable energy credits into a rate-based program therefore requires EPA and states to make complex predictions about the degree to which a particular renewable or efficiency investment will reduce fossil fuel demand below the business-as-usual baseline. A mass-based program simply caps emissions, requires sources to hold a permit for every ton of greenhouse emissions, and lets the market decide whether power plants will reduce emissions by improving the efficiency of their coal-fired units or by investing in energy efficiency programs or renewable generation to offset their own demand.

Note that, depending on the nature of the problem to be address, a rate-based system could be more effective. For example, in the context of a market for antibiotic prescriptions, if the problem is that the aggregate number of prescriptions is too high, then a total cap is most effective appropriate; but if the problem is that a few prescribers or patients abuse the system and get too many prescriptions, then a rate-based limit may be more appropriate.

Recommendation: Agencies should strongly consider capping the total activity level, rather than just capping the rate of activity.

2. Features of a Market-Based System Can Increase Stringency

The cost savings offered by marketable permit programs may enable regulators to set a more stringent cap than they could under prescriptive regulation, or may even break a political logjam blocking any regulation at all. Though it may not always happen, the cost savings of trading can be channeled back into more stringency:[456] for any given total compliance cost that is politically acceptable, marketable permits can achieve greater stringency than traditional regulation. A set cap may also achieve targets with greater certainty and transparency versus technological design standards, which are prone to both under- and over-compliance.[457]

Some evidence bears out these theories. Economists have specifically credited the acid rain market's cost savings as making dramatic cuts to sulfur dioxide pollution both possible and politically feasible.[458] The lower costs predicted from trading were also instrumental in negotiating more stringent limits for ozone-depleting substances and California's RECLAIM program, as well as a faster phase-out timeline for lead in gasoline.[459] EPA claims that trading similarly helped it increase stringency earlier for vehicle emissions standards.[460] The institution of tradable catch shares has sometimes, though not always, resulted in lower total allowable catches.[461]

---

[455] Rate-based also makes it harder to process early action credits, because early action is not a permanent rate change. T.H. Tietenberg, Emissions Trading: Principles and Practice 17 (2006, 2d ed).
[456] David Driesen, *Is Emission Trading an Economic Incentive Program?*, *supra* note 18.
[457] Robert Stavins, *U.S. Cap-and-Trade System to Address Global Climate Change* 10 (Harvard Kennedy School Reg. Pol'y Prog. Paper 2007-04).
[458] Dallas Burtraw & Erin Mansur, *The Effects of Trading and Banking in the SO_2 Allowance Market* 20 (Res. for the Future, Disc. Paper 99-25, 1999), http://www.rff.org/documents/RFF-DP-99-25.pdf.
[459] Tom Tietenberg, Tradable Permits in Principle and Practice *supra* note 181.
[460] EPA, Manufacturer Performance Report for 2015 MY (2015).
[461] Tom Tietenberg, Tradable Permits in Principle and Practice *supra* note 181.

Marketable permit programs can also easily be designed to advance policy goals by requiring trading ratios greater than 1:1. For example, Maryland's water quality trading program has adopted a retirement ratio of 1.1:1, meaning that for every 10 pounds of pollution emit, 11 offset credits must be purchased, with 10% of all credits bought automatically retired.[462] Similarly, EPA conditioned its approval of a regional cap-and-trade for haze in southwestern states on achieving "greater reasonable progress" in reducing regional haze compared to a non-market approach.[463] Though such retirement ratios can advance policy goals, they undermine efficiency by blocking otherwise efficient trades. Unlike trading ratios used to manage externalities or uncertainties, a retirement ratio imposes an artificial premium on the cost of off-site reductions compared to on-site reductions. When the off-site reductions are cheaper than on-site reductions, but not by more than the artificial premium imposed by the retirement ratio, an otherwise efficient trade will be blocked, resulting in continued reliance on the most costly on-site abatement.[464] If it is important for the marketable permit program to affirmatively advance policy goals beyond even the outcomes prescriptive regulations would achieve, increasing the overall stringency of the cap may be preferable to selectively distort the market through retirement ratios. Note, however, that if a regulator is unable to tighten the cap directly (as, for example, with some state-run water quality trading programs subject to caps set at the federal level by EPA), the regulator may consider whether the tradeoff between efficiency and policy goals justifies a retirement ratio.

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.[465] Other programs have declined to allow such public participation. The National Oceanic and Atmospheric Administration believes, based on the legislative history of Magnuson-Stevens Act, that Congress did not intend for tradable fish share to become a mechanism to reduce the harvest by letting non-fishers buy and retire quota.[466]

Recommendation: To use the advantages of the market structure 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 unless the regulator cannot tighten the cap directly.

---

[462] WRI, *Addressing Risk and Uncertainty in Water Quality Markets* (2014). EPA briefly considered requiring a 1.5:1 ratio for purposes of affirmatively improving water quality, Revisions to the National Pollutant Discharge Elimination System Program and Federal Antidegradation Policy in Support of Revisions to the Water Quality Planning and Management Regulation, 64 Fed. Reg. 46,058, 46,063 (Aug. 23, 1999), but ultimately abandoned the proposal, Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revisions to the Water Quality Planning and Management Regulation, 65 Fed. Reg. 43,586, 43,640 (July 13, 2000) ("the offset requirement, as proposed, is not the best mechanism to achieve progress in impaired waters in the absence of a TMDL").

[463] Final Rule, Approval and Promulgation of State Implementation Plans; Wyoming, 77 Fed. Reg. 73,926, 73,927 (Dec. 12, 2012); Final Rule, Approval, Disapproval and Promulgation of State Implementation Plans; Utah, 77 Fed. Reg. 74,355, 74,357 (Dec. 14, 2012); Final Rule, Approval and Promulgation of State Implementation Plans; New Mexico, 77 Fed. Reg. 70,693, 70,695 (Nov. 27, 2012); Final Rule, Approval and Promulgation of State Implementation Plans; City of Albuquerque-Bernalillo County, 77 Fed. Reg. 71,119, 71,121 (Nov. 29, 2012).; see also 40 C.F.R. § 51.309(d)(4)(i); upheld by WildEarth Guardians v. EPA, 770 F.3d 919, 925 (10th Cir. 2014). NAAQS offsets also require affirmative progress on air quality through a greater than 1:1 offset ratio.

[464] Policy Integrity Letter on Water Quality Trading, *supra* note 235.

[465] Tom Tietenberg, Tradable Permits in Principle and Practice *supra* note 181.

[466] NOAA, Catch Share Policy (2010).

3. Adjusting the Cap

Caps can be designed in advance with a predetermined increase in stringency over time, as with the lead phase-out market. If new and unexpected information about costs, benefits, changing economic conditions, or technological innovation indicates that the stringency of the cap needs to be adjusted, regulators have several options. To make the cap more stringent, a straightforward but expensive option would be for the regulator to purchase and retire allowances off the market.[467] Lowering the cap directly will remain a politically challenging option, though perhaps no more so than increasing the stringency of prescriptive regulations.[468] One way to short-circuit some of the political opposition to lowering a cap is by allocating relative allowances instead of absolute allowances. For example, fish permits typically define a percentage share of total allowable catch, so the agency can change cap without triggering legal recourse by permit holders.[469] Changing the cap under a marketable permit program may also be easier than under prescriptive regulation because marketable permits typically have shorter lifespans than traditional permits:[470] a firm that has to buy permits at auction every year will have fewer reliance expectations about a total cap.

If a cap turns out to be overly stringent and needs to be relaxed, regulators can create more rights and trust the market to allocate them efficiently.[471] Such an action may seem politically costless, but in fact owners of existing permits could complain that the agency is diluting the value of their permits.[472] Such complaints from existing permit owners will likely be no louder than the complaints of firms that already complied with prescriptive regulation and so oppose any relaxation to the standard that might make it cheaper for new competitors to enter the market.

Recommendation: To facilitate adjusting the cap over time, agencies should consider allocating percentages of a cap, rather than allocating absolute subunits of a cap.

4. Exemptions

Prescriptive regulations are often riddled with exemptions to address distributional effects on small businesses or other specific regions or sources, and exemptions weaken the overall effectiveness of regulation.[473] By contrast, few if any exemptions are sought under marketable permit programs, because it is often cheaper to just comply with the marketable permit program than to spend money seeking an exemption with no guarantee of securing it.[474] In fact, regulators are unlikely to grant exemptions under a marketable permit program because, unlike with prescriptive regulation, there are no cases special compliance hardships, as every regulated entity faces same permit price.[475]

---

[467] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 6 (1981).
[468] *Id.* at 6-7 (under prescriptive regulation, very difficult analytically and politically to decide which firms should lose their licenses).
[469] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181. Relative shares have also been proposed, though not implemented, for air markets. *Id.*
[470] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 22 (1981).
[471] *Id.* at 7.
[472] *Id.* at 22.
[473] *Id.* at 11.
[474] Ellerman, *Are Cap and Trade Programs More Environmentally-Effective Than Conventional Regulation?*, *supra* note 397, at 53.
[475] *Id.*

5. Uncovered Sources

Besides the stringency of a cap, another key issue for whether a cap will achieve its policy outcome is coverage and leakage. Coverage and leakage concerns arise most often in the context of air and water pollution, though they may also occur in other policy contexts. Take, for example, the hypothetical market for antibiotic prescriptions: if human prescriptions are regulated but veterinary or agricultural uses of antibiotics are not, those unregulated sectors could create challenges. However, given that these problems are most prominent in the environmental context, this section will discuss pollution markets.

First, an unexpected, exogenous increase in demand at an unregulated sector could undermine all other emissions reductions.[476] Second, emissions can "leak" from regulated to unregulated sectors.[477] For example, if a greenhouse gas cap-and-trade covers only large power plants but not other fossil fuel combustion, unregulated sources may begin to generate their own electricity on-site, or residential and commercial heating may switch from electricity to heating oil.[478] Similarly, water quality trading effectively puts the cleanup costs of nonpoint sources on point sources, which may respond by preemptively trying to be categorized as nonpoint themselves, making pollution harder to control.[479]

To some extent, any regulatory design needs to consider coverage and leakage. Critics of marketable permit programs like David Driesen, however, worry that marketable permit programs will increase resistance to future regulation of uncovered sources, since the market gives uncovered sources a profit motive to protect their future potential to generate credits by avoiding new legal obligations.[480] On the other hand, from a practical perspective, technological, administrative, and political limitations would prevent many categories of uncovered sources from being regulated by prescriptive standards. If they are not generating credits under a marketable permit program, they very well may not be making any affirmative progress. Under a credit program, uncovered sources are making reductions and innovating the new technologies that may make future regulation possible. Moreover, the cost savings of generating credits from cheap abatement opportunities at uncovered sources can be channeled back into making the cap more stringent.

6. Effect of Allocation Options on Policy Outcomes

Marketable permits have value, and that value sometimes can be recaptured and directed back toward the policy objectives. For example, revenue from a greenhouse gas auction could be invested back in clean energy and energy efficiency projects. Unfortunately, without specific statutory authorization to retain proceeds, federal agencies will usually be required to deposit auction revenue into general treasury. States, on the other hand, can and do direct auction revenue toward policy outcomes. States in the Regional Greenhouse Gas Initiative, for example, funnel some auction revenue to low-energy

---

[476] Stavins, *U.S. Cap-and-Trade System*, *supra* note 262, at 18

[477] Joseph Aldy & William Pizer, *Issues in Designing U.S. Climate Change Policy*, 30 Energy J. 179, 187 (2009); Stavins, *U.S. Cap-and-Trade System*, *supra* note 262, at 18.

[478] Similarly, pairing a market with mass-based caps for existing power plants under the Clean Power Plan with rate-based command-and-control regulation for new power plants created the risk of leakage caused by generation shifting from existing to new sources. EPA addressed this leakage risk by requiring states to develop plans to prevent such leakage, 80 Fed. Reg. at 64,823, creating administrative burdens and market complications that could be avoided under a unified Section 115 approach.

[479] Carol Rose, *The Several Futures of Property*, *supra* note 186.

[480] David Driesen, *Is Emission Trading an Economic Incentive Program?*, *supra* note 18.

investments. Another option would be allocating some permits on an output-basis to renewable electricity generators, thereby providing additional financial support for the policy objective.[481]

C. Setting Baselines and Verifying Credits

Credit programs need to ensure that credits are, for lack of a better word, real.[482] Obviously, credits should not be fraudulent, but "real" signifies a higher bar,[483] as explored below.

1. Additionality and Gaming the Baseline

Credits must be measured against a realistic baseline 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 an aircraft operator had always planned to switch to quieter aircraft even without a rule, allowing that operator to earn noise reduction credits for switches that would have happened away will undermine the program's overall effectiveness.

Questions of additionality and realistic baselines have been raised in a number of programs. In air pollution markets, overinflated baselines are said to produce "hot air." For example, in RECLAIM's car-scraping credit program, not only were many of the dirty cars destroyed for credits already at the end of their useful lives,[484] but inaccuracies in the baseline models may have inflated the allocation of allowances and credits.[485] Similarly, with vehicle efficiency credit programs, some credits are currently being awarded to firms that have historically and voluntarily over-complied with their regulatory standards anyway.[486] The United Nation's Clean Development Mechanism for greenhouse gas reductions is infamous for outright fraud over matters of additionality, with some firms purposefully manufacturing highly potent greenhouse gases just to earn credits by destroying them.[487] For conservation banks, the main additionality question is whether the habitat being preserved to earn credits was really under any immediate danger of development.[488] Courts will likely give agencies discretion in defining the baseline year and making determinations about additionality.[489]

A related risk, which may occur either in credit programs or cap-and-trade programs, is parties trying to "game" the baseline. For example, it can take years of public debate to develop a fish catch share program. Because fish shares are typically awarded based on historical catch, there is a risk of incentivizing new entrants into the fishery or an increased harvest by fishers in advance the program's establishment, in order to win a larger share of the valuable allocation.[490] This scenario highlights the importance of setting a firm baseline and picking the right baseline year. If the baseline year is after

---

[481] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 14 (1981).
[482] *See, e.g.*, Offset Quality Initiative, *Ensuring Offset Quality* (2008).
[483] *See id.*; Cong. Budget Office, *The Use of Offsets* (2009).
[484] Robert Glicksman, Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development, *supra* note 443; Richard Drury et al., *Pollution Trading and Environmental Injustice*, *supra* note 395.
[485] Richard Drury et al., Pollution Trading and Environmental Injustice, *supra* note 395.
[486] Leard & McConnell, *supra* note 32. The authors argue that because early banked credits will expire and stringency will increase, over-crediting will not be a long-term problem.
[487] Robert Glicksman, Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development, *supra* note 443.
[488] Stratus Consulting for Northwest Fisheries Science Center, NOAA, A Nationwide Survey of Conservation Banks (2003).
[489] *See* Citizens Against the Refinery's Emissions v. EPA, 643 F.2d 183, 186-87 (1981) (ruling that EPA had discretion to approve of 1977, a year of high demand, as the baseline for a criteria offset under a state implementation plan).
[490] NRC, *Sharing the Fish: Toward a National Policy on IFQs* (1999).

announcement of the marketable permit program, strategic actors may try to game the baseline. On the other hand, if a baseline is set too early, it may not reflect recent voluntary actions like voluntary emission reductions, and so may result in hot air. Another way to prevent additionality problems is to clearly set minimum baseline requirements: for example, for water quality trading, non-point sources usually need to follow state-set best management practices as a baseline requirement before they can begin to generate additional credits.[491]

2. Quantification and Certainty

Credits must be quantifiable and certain. Measuring credits can often be a challenge, as the variety of credit-generating projects makes it difficult to apply standardized tools.[492] Yet credit generators will need clear standards and established tools so they can calculate their ability to produce credits.[493] Often the necessary off-the-shelf tools do not exist, though some agencies are working toward them. In 2016, EPA and USDA agreed to develop a list of pre-approved tools for calculating water quality credits.[494]

Direct monitoring of activity to measure credits will frequently be infeasible. For example, it is very difficult to measure reduced pollution flows and water quality improvements from non-point sources of water pollution: after all, a major reason they are considered "non-point" and are largely unregulated is because of the difficulty measuring their discharge.[495] Instead, regulators may calculate credits by developing site-specific models or applying pre-determined rates based on best professional judgment, such as assuming so many pounds of water quality credits per acre of cover crops planted on a non-point farm. However, there is a tradeoff between the simplicity, predictability, and accuracy of such methods.[496]

The science of water quality and ecosystem services is so complex that inevitably there will be some degree of uncertainty about credits. Will a newly created, still immature wetland site really provide comparable flood protection as the mature wetland being destroyed? Trading ratios can be applied to adjust for such uncertainty, requiring more credits than even the best available quantification tools would 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 of emissions; some water quality programs have uncertainty ratios as high as 3:1.[497] Applying conservative assumptions to credit calculations may also be appropriate.[498]

3. Leakage and Permanence

Credits must represent some degree of permanence and guaranteed execution. If a reforestation project earns carbon credits based on the assumption that the trees planted will sequester carbon for decades or centuries, but several years into operations a fire decimates the reforested area, the credits sold years ago suddenly do not reflect real reductions. A related question, discussed briefly above with the issue of temporal fungibility, is whether credits can be sold before their mitigation project has been implemented and the reductions have been certified.[499] Wetland banks, for example, must fully

---

[491] Willamette Partnership, *In It Together: A How-To Reference* (2012).
[492] Byron Swift, *U.S. Emissions Trading: Myths, Realities, and Opportunities*, 20 Nat. Res. & Envt. 3 (2005).
[493] EPA & USDA, Report on 2015 National Workshop on Water Quality Markets (2016).
[494] *Id.*
[495] Willamette Partnership, *In It Together: A How-To Reference Part 2* (2012).
[496] *Id.*
[497] WRI, *Addressing Risk and Uncertainty in Water Quality Markets* (2014).
[498] EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003).
[499] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 13.

implement their mitigation before selling credits, while in-lieu fee instruments can sell some number of credits in advance of implementation.

Credits also must not cause "leakage." Leakage occurs, for example, if a project earns carbon credits by preventing deforestation in one region, yet ultimately the same level of logging or deforestation simply shifts to another region. Monitoring for leakage can be a challenge, as it potentially involves tracking global activities in the relevant industries.

4. Double Counting: Stacked and Voluntary Credits

Credits must not be double counted. Largely this can be addressed through careful accounting practices, thoroughly tracking credit transactions and ensuring unambiguous ownership of credits.

The concept of credit stacking also raises some risks of double counting. Credit stacking occurs when a single project can produce credits for multiple markets: for instance, if a wetlands mitigation bank also provides endangered species habitat and sequesters carbon dioxide.[500] Credit stacking potentially can help reluctant credit sellers enter the market with more confidence, since they can hedge against the risk of not enough demand in a single marketable permit program, thus making nascent markets more economically viable.[501] Another argument in favor of credit stacking is the potential that providing value in multiple resources will make a credit project more sustainable over time.[502] The ability to engage in multi-pollutant stacking is strongly desired by water quality traders.[503]

The double-counting concern with credit stacking is essentially one of additionality: would the wetland credit project not have generated those additional carbon credits but-for the opportunity to stack credits, or is the market inefficiently rewarding behavior that would have happened anyway?[504] The Fish and Wildlife Service has addressed this issue by allowing stacked credits to be used only to compensate for the effects of a single development project; the credits cannot be unbundled to compensate multiple projects. For example, if endangered frog habitat credits and wetland credits are bundled, the stacked credits can offset a single project that also has impacts on both endangered frogs and wetlands, or they can offset either individual impact from a single project, but they cannot offset endangered frog and wetland impacts separately at two different projects.[505] On the other hand, the National Marine Fisheries Service does not have a clear policy on stacking. Its West Coast region supports multi-resource banking, but says it is the responsibility of the banker to ensure that credits are not double counted.[506]

Voluntary credit markets also create the potential for double counting.[507] For both greenhouse gases and renewable energy,[508] unregulated entities may seek voluntary credits: airplane passengers purchasing carbon offsets to address their personal contributions to climate change, or businesses buying renewable energy credits for P.R. value. Regulators of mandatory marketable permit programs need to monitor voluntary markets to prevent the same credit from being sold in both markets. Regulators may also need to make adjustments to their marketable permit program based on

---

[500] Royal Gardner & Jessica Fox, *Legal Status of Environmental Credit Stacking*, 40 Ecol. L. Q. (2013).
[501] NMFS West Coast Region, Conservation Banking Guidance (2015).
[502] *Id.*
[503] EPA & USDA, Report on 2015 National Workshop on Water Quality Markets (2016).
[504] *See* J.B. Ruhl et al. Stacking Ecosystem Services, 12 Frontiers of Eco. & Env't 186 (2014).
[505] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[506] NMFS West Coast Region, Conservation Banking Guidance (2015).
[507] NREL, REC Tracking Systems: Costs and Verification Issues (2013).
[508] For example, the Chicago Climate Exchange operated a voluntary carbon offset program. Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 10 (CCX operated from 2003 to 2010).

interactions with voluntary markets. For example, both the Regional Greenhouse Gas Initiative and California's cap-and-trade program for greenhouse gases have provisions to adjust their emissions caps downward to account for voluntary purchases of renewable energy credits.[509] A buyer of a renewable energy credit expects the purchase to fund the reduction of carbon emissions from the electricity sector, but unless the cap is adjusted, the electricity sector will continue to emit up to the level of the cap no matter how many renewable credits are purchased voluntarily. (The Federal Trade Commissions has established policies to ensure that voluntary environmental credits are real.)

5. Other Risks

An additional requirement for credits is sometimes sought by advocates: credits should not inflict ancillary harms.[510] For example, some the methane released from coal mines can be captured and used to generate greenhouse gas credits, but some mine methane capture techniques can risk explosions, putting miners in danger.[511] However, relying on credit verification programs to address all ancillary harms could inefficiently block some credit opportunities. When other regulators have the authority to address these potential ancillary harms directly (as the Mine Safety and Health Administration does in the previous example), it may be preferable to rely on those regulatory authorities rather than distort the credit market. On the other hand, when no such authority exists—as with the risk of conservation banking inadvertently degrading non-target, non-endangered, and unprotected species[512]—some verification that the credit does not produce significant, foreseeable ancillary harms may be appropriate.

Some marketable permit programs allow credits to be generated in foreign countries. For example, California's cap-and-trade program for greenhouse gases allows certain carbon offsets from Canada and Mexico. International credits could represent especially low-cost opportunities,[513] but ensuring ongoing quality could be more difficult.[514]

There is a risk that, in a marketable permit program, buyers and sellers could collude to work against regulators and lower credit quality requirements. Unlike conventional markets, in permit markets buyers and sellers are not so much competing against each other as they are competing against the regulator, who is trying to protect public interest. For example, in wetlands trading, both buyer and seller could earn more profit if the regulator lets them trade commercial development on high-quality mangroves in exchange for protecting a "two-snake mud puddle."[515] Buyers and sellers can work together to exploit uncertainty and lobby for lower quality standards, and asymmetric information between buyers and sellers on one hand and regulators on other could allow cheap, low-quality credits to undercut high-quality, more expensive credits and force them out of the market.[516] This scenario heightens the need for clear, strong quality assurance checks. Credits should have to meet clearly defined criteria and should not be approved on an ad hoc basis.[517] For example, the fact that the

---

[509] NREL, REC Tracking Systems: Costs and Verification Issues (2013).
[510] *See, e.g.*, Offset Quality Initiative, Ensuring Offset Quality (2008).
[511] *See* Harworth Power Ltd., CMM Flaring (2007), http://www.epa.gov/cmop/docs/cmm_conference_sep07/uk_coal_flaring.pdf.
[512] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).
[513] EPA, Analysis of H.R. 2454, at 3 (June 2009).
[514] *See, e.g.*, Michael W. Wara & David G. Victor, *Working Paper: A Realistic Policy on International Carbon Offsets* (April 2008), http://pesd.fsi.stanford.edu/sites/default/files/WP74_final_final.pdf (discussing the potential of "laundered" international offsets).
[515] Dennis King, *Managing Environmental Trades: Lessons from Hollywood*, 32 ELR 11317 (2002).
[516] *Id.*
[517] *Id.*

National Marine Fisheries Service has no standardized protocol for approving conservation banks could become problematic.

A related risk is that buyers and sellers will agree to low-quality standards to govern any unofficial, voluntary, or early trading program.[518] These early, low-quality standards may then anchor the discussion about trading rules for the marketable permit program, leading to the ultimate adoption of weak standards for verifying the quality of regulatory credits.

Recommendation: 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 not incentivize strategic gaming of the system, 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.

6. Quality Assurance Tools

Primary quality assurance tools include third-party verifications, regular audits to ensure permanence, and trading ratios to address uncertainty. Credit generation may also be restricted to certain categories: for example, most state water quality trading only allows non-point farms, and not other non-point landowners, to generate credits,[519] and California's cap-and-trade has designated approved offset categories (reforestation, livestock, mine methane).[520]

Initial approval of credit generators can be time-consuming for agencies. Unlike the Army Corps of Engineers, the Fish and Wildlife Service (FWS) does not have timelines for approving conservation bank plans. Despite the agency's policy to make bank reviews a priority,[521] bank sponsors complain of delays.[522] FWS has promised that any bank agreeing to more conservative trading ratios and promising to achieve a net gain for the endangered species (rather than just no net loss) will receive an expedited review.[523] Meanwhile, even with timelines for review at the Corps, bank sponsors indicate timelines are not being met.[524] The National Mitigation Banking Association says that it would prefer to sometimes get a "no" early than to have every review drag on.[525]

Deciding who conducts credit verification requires balancing several factors. Some property owners, like farmers, may be reluctant to allow government officials onto their property to conduct verification inspections.[526] Agencies resources and expertise are also relevant considerations. Self-verification could be an appropriate alternative in certain circumstances,[527] such as when verification procedures can be

---

[518] *Id.*
[519] Willamette Partnership, *In It Together: A How-To Reference* (2012).
[520] California Air Resources Board, Compliance Offset Program, https://www.arb.ca.gov/cc/capandtrade/offsets/offsets.htm.
[521] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[522] DOI, Office of Policy Analysis, Results from a Survey of Conservation Bank Sponsors (2016).
[523] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[524] U.S. Army Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015).
[525] *Id.*
[526] Willamette Partnership, *In It Together: A How-To Reference Part 2* (2012).
[527] One example of total self-verification is the small alternative fuel vehicles program. The Department of Energy's website instructs regulated parties to, "after locating a buyer or seller, print and complete the Proof of Credit Transfer form," which simply asks for number of credits exchanged and notes that parties are responsible for truthfulness and subject to prosecution for violations. Dept. of Energy-EERE, Standard Compliance: Guidelines to Help State and Alternative Fuel Provider Fleets Meet Their Energy Policy Act Requirements (2014).

standardized, agencies can impose strong penalties for false reporting, and citizen suits are available to help agencies police noncompliance.[528] If neither direct agency oversight nor self-verification are appropriate, agencies will need to rely on third parties for verification. For example, EPA uses third party engineering reports to verify production of renewable fuel credits.[529] (One third-party verifier has creatively proposed a fourth option: crowd-sourced verification for certain contexts, like monitoring urban stormwater by smartphone photographs.)[530]

Relying on third parties for credit verification has some advantages: third parties may have more individualized knowledge of the practices being implemented, may have an easier time charging fees for inspections, and can staff up or down more flexibly than an agency in response to changing transaction volumes. At the same time, the agency risks that the third party will not accomplish the agency's mission. Third parties need minimum education and experience requirements, and may also need specialized training and accreditation.[531] Third parties also needs liability insurance, dispute resolution system, and system for protecting confidential information.[532] Agencies will need rules to ensure third parties do not develop conflicts of interest.[533] Third party verifiers have a financial incentive to brand themselves as "market advocates" and encourage sub-par trades.[534] Conflict of interest rules need to go beyond preventing direct financial stakes in water quality trading.[535] Conflicts can develop over time, for example if the same reviewer depends on the same projects year after year for revenue. Agencies could require that verifiers rotate every few years or could randomly assign reviewers to projects.[536] Ultimately, when relying on third parties, agencies will need to retain some oversight and final decisionmaking authority and the ability to resolve disputes.[537]

The timing of verification is another key decision. Some credits require ongoing reviews of quality and performance. Ongoing reviews could be applied annually with the same rigor as the initial approval, or the frequency and rigor could be reduced, with a focus on specific quality criteria or spot checks of projects selected randomly or based on risk.[538] Remote inspections, as through aerial images or other technology, may be useful in some contexts and may reduce the costs of ongoing verification procedures.[539]

Some programs do not have mandatory pre-approvals of credits, but instead only check credits' validity when they are cashed in for compliance obligations, which creates some risk for buyers of having invalid credits.[540] For example, EPA's policy on renewable fuel credits is generally "buyer beware": the industry is responsible for its own quality control and integrity, and any buyer of fraudulent credits will be on the hook to replace them. EPA has developed a voluntary Quality Assurance Program, through which EPA-approved third parties provide quality checks.[541] The voluntarily program provides buyers with some

---

528 Willamette Partnership, *Verification in Markets for Water Quality and Habitat* (2014).
529 RIN Alliance, *Making the RIN Program Work* (2011).
530 Willamette Partnership, *Verification in Markets for Water Quality and Habitat* (2014).
531 *Id.*
532 *Id.*
533 Willamette Partnership, *In It Together: A How-To Reference Part 2* (2012).
534 Dennis King, *Managing Environmental Trades: Lessons from Hollywood*, *supra* note 515.
535 Nat'l Network on Water Quality Trading, *Building a Water Quality Trading Program* (2015).
536 Willamette Partnership, *Verification in Markets for Water Quality and Habitat* (2014).
537 Nat'l Network on Water Quality Trading, *Building a Water Quality Trading Program* (2015).
538 Willamette Partnership, *Verification in Markets for Water Quality and Habitat* (2014).
539 *Id.*
540 Breger, Stewart, Elliott, & Hawkins, *Providing Economic Incentive in Environmental Regulation*, *supra* note 13.
541 EPA, Approved Quality Assurance Plans and Q-RIN Pathways, https://www.epa.gov/fuels-registration-reporting-and-compliance-help/approved-quality-assurance-plans-and-q-rin-pathways.

affirmative defense in case of invalid credits, and instead the third party verifier carries the liability for invalid credits.[542] For example, in January 2017, EPA filed a notice of intent to revoke Genscape as a quality assurance provider, alleging that Genscape had verifying millions of fraudulent renewable fuel credits.[543] Nevertheless, most renewable fuel credits (as of 2015, 88%) do not go through this voluntary quality assurance program.[544]

Sufficiently stringent verification checks will limit the number of credits entering the market. For example, the California Air Resources Board could have authorized about 62.5 million offset credits from 2013 through February 2016 for its greenhouse gas cap-and-trade program.[545] The Board, however, approved only about 38.5 million credits through mid-March 2016 as meeting the state's standards,[546] likely indicating a natural limit on the number of high-quality, low-cost offset opportunities. Indeed, California has taken offset quality quite seriously, having recently concluded an investigation into 4.3 million offsets for quality violations and invalidated 89,000 credits as faulty or fraudulent.[547]

Recommendation: If direct agency oversight of credits is not efficient and if self-verification is not effective, use of third-party verifiers may be appropriate. Such third-party verifiers should be qualified, insured, and free of conflicts.

D. Responsibility and Compliance

How effective a marketable permit program will be at achieving its policy goal may depend on what happens in the event of a failure.[548] Key questions include: does the credit buyer or seller have the liability, what contingency plan is in place for unexpected events, what upfront financial guarantees of performance are required, what compliance monitoring or audits are required, and how will violations be enforced?

1. Liability, Performance Guarantees, and Contingencies

Some marketable 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, under EPA's water quality trading policy, if a credit seller does not deliver the expected pollution offsets, the buyer becomes responsible for complying with any default, on-site emissions limits established in the permit.[549]

---

[542] Byron Bunker, Compliance Division Director, OTAQ, *RIN Fraud and Compliance* (2015).
[543] EPA, Civil Enforcement of RFS Program, https://www.epa.gov/enforcement/civil-enforcement-renewable-fuel-standard-program. Genscape must retire valid RINs to replace fraudulent ones they verified (i.e., Genscape has to replace, not buyers)
[544] Byron Bunker, Compliance Division Director, OTAQ, *RIN Fraud and Compliance* (2015).
[545] By state law, covered sources may count offsets toward compliance for eight percent of annual allowance budgets. *See* BGC ENVTL. BROKERAGE SERVS., CALIFORNIA CARBON CAP AND TRADE OFFSETS OVERVIEW: REGULATIONS AND TRADING 12 (2011), http://www.climateactionreserve.org/wp-contenduploads/2009/05/BGCCarbon-Offsets-Market-Overview.pdf. The potential offset budget for years 2013 and 2014 collectively was 26.8 million credits. Id. The potential offset budget for years 2015-2017 is 91.8 million credits total, which, on average, is about 2.55 million credits per month. Id. From the start of 2013 through the end of February 2016, therefore, the potential offset budget was 26.8 million [years 2013 and 2014] + 30.6 million [year 2015] + 5.1 million [January and February 2016] = 62.5 million. *See id*.
[546] CAL. AIR RES. BD., ARB OFFSET CREDITS ISSUED 1 (updated March 9, 2016), https://web.archive.org/web/20160317072216/http://www.arb.ca.gov/cc/capandtrade/offsets/issuance/arb_offset_credit_issuance_table.pdf
[547] Gloria Gonzalez, *Despite Market Outcry, California Voids Some Carbon Offsets*, Ecosystem Marketplace, Nov. 14, 2014.
[548] Lesley McAllister, *Beyond Playing "Banker"*, 59 Admin. L. Rev. 269 (2007) (Trading requires rigid compliance policy with adequate sanctions.).
[549] EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003).

Similarly, industry is responsible for quality control and integrity of renewable fuel credits,[550] and fraudulent renewable fuel credits must be replaced by the buyers, often at great cost.[551] EPA runs a voluntary quality assurance program for renewable fuel credits, which gives buyers some affirmative defense against civil liability.[552] On the other end of the spectrum, under the Army Corps' wetland mitigation banking and the Fish and Wildlife Service's conservation banking, liability for noncompliance transfers from the buyer to the bank sponsor upon purchase of a credit.[553] However, this policy is not applied consistently among the agencies responsible for various conservation bank programs: the West Coast Region of the National Marine Fisheries Service reports that, for users of its conservation banks, responsibility for adequate mitigation stays with permit applicant.[554]

Credit programs do not always clearly assign liability in the event of acts of nature.[555] According to a 2003 survey of conservation banks, many bank agreements did not specify what happens in event of natural catastrophe, no bank agreements included insurance policies for natural catastrophes, and management endowment funds typically do not include contingency funds for acts of nature.[556] Unassigned risks fall by default on the public.[557]

When buyers retain liability, they have several options for managing that risk. They could seek insurance, either from third parties or through an agreement to share liability among an association of buyers.[558] Consistent with any regulatory limits, buyers can negotiate with credit sellers to allocate responsibilities and provide remedies through a contract.[559] Finally, some credit aggregators assume some of the risk of project failure, and they may manage that risk by diversifying their credit projects and possibly self-insuring by holding some percentage of credits in reserve.[560]

Financial guarantees can provide some certainty over performance. The Fish and Wildlife Service encourages conservation banks to set aside a bond, endowment, or surety to cover future management costs sufficient to guarantee future performance.[561] Similarly, the Federal Communication Commission requires a refundable deposit to bid in an auction,[562] to prevent winning bids from entities that may actually lack the financing to purchase the spectrum.[563]

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. Marketable permit programs have several options for advance planning to handle contingencies. EPA's water quality trading policy recommends that states consider establishing centralized reserve credit pools from which buyers can purchase additional credits during

---

[550] RIN Alliance, Making the RIN Program Work (2011).
[551] Energy & Environmental Law Adviser, *CFTC and EPA Sign MOU on Renewable Fuel Markets*, Mar. 23, 2016.
[552] EPA finalized this rule in July 2014.
[553] Willamette Partnership, *In It Together: A How-To Reference Part 2* (2012).
[554] NMFS West Coast Region, Conservation Banking Guidance (2015).
[555] FWS 2003 guidance undear on acts of nature; 2016 guidance.
[556] Stratus Consulting for Northwest Fisheries Science Center, NOAA, A Nationwide Survey of Conservation Banks (2003).
[557] Dennis King, *Managing Environmental Trades: Lessons from Hollywood*, *supra* note 515.
[558] Willamette Partnership, *In It Together: A How-To Reference* (2012) *& Part 2*; Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[559] Willamette Partnership, In It Together: A How-To Reference Part 2 (2012); WRI, Addressing Risk and Uncertainty in Water Quality Markets (2014).
[560] WRI, Addressing Risk and Uncertainty in Water Quality Markets (2014).
[561] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).
[562] FCC, About Auctions, *supra* note 67.
[563] Michael Abramowicz, *The Law-and-Markets Movement*, *supra* note 94 (some high bidders lacked financing, hoped to attract it by winning).

an end-of-year compliance deadline to make up for unanticipated shortfalls.[564] Many water quality trading programs do apply uncertainty ratios or reserve credits in anticipation of potential calculation errors, project failures, or unanticipated events like floods.[565] For example, the Ohio River trading program requires all projects to hold 10% of credits in reserve.[566] Some fish catch share programs allow short-notice online transfers for fishers coming in to dock with larger than expected catch, so they have an alternative to illegal dumping.[567]

Recommendation: Agencies should establish clear rules for liability and responsibility for acts of nature. Performance bonds are one useful tool.

2. Compliance Monitoring

Scholars and advocates agree that marketable permit programs require sophisticated compliance monitoring to succeed, though many of the monitoring requirements are similar to needs of traditional regulatory tools as well.[568] Notable skeptic of marketable permit programs David Driesen has suggested that the market structure can exacerbate the difficulties of monitoring. According to Driesen, monitoring compliance with prescriptive environmental regulations is often a relatively simple matter, such as checking that a firm installed an approved technological solution. This may be an overgeneralization, as Driesen readily acknowledges that most environmental standards are not technological design standards but rather performance standards, and even equipment standards still require monitoring to ensure proper operation. Nevertheless, according to Driesen, a marketable permit program requires regulators to monitor double the number of sites (both buyer and seller), and to monitor even more broadly to ensure credits are additional, are not double counted, and do not leak.[569] A failure of monitoring may be doubly detrimental in an environmental market as compared to prescriptive regulation, as a cheating source both emits more and gets away with selling credits that allow pollution increases elsewhere.[570]

There are some theoretical reasons to believe that monitoring will be easier to implement successfully under a marketable permit program.[571] Auction revenue creates a special incentive for agencies to invest in monitoring and enforcement, to ensure that noncompliance rates do not drive down permit prices and reduce total revenue.[572] Similarly, permit holders themselves may support monitoring to prevent cheating by others that would depreciate their investment: better monitoring increases the costs of noncompliance, which increases demand for permits, which increases the value of excess permits held by compliant firms.[573] Moreover, because marketable permit programs can lower overall compliance costs, agencies may be less reluctant to impose costly monitoring requirements on regulated entities. The anticipated lower costs of the acid rain market may have helped justify the

---

[564] EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003); *see also* WRI, *Addressing Risk and Uncertainty in Water Quality Markets* (2014).
[565] Willamette Partnership, In It Together: A How-To Reference (2012) & Part 2.
[566] Willamette Partnership, In It Together: A How-To Reference Part 2 (2012).
[567] Tom Tietenberg, Tradable Permits in Principle and Practice *supra* note 181.
[568] Lesley McAllister, *Beyond Playing "Banker"*, 59 Admin. L. Rev. 269 (2007).
[569] David Driesen, *Is Emission Trading an Economic Incentive Program?*, *supra* note 18.
[570] *Id*.
[571] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181 (concerning better monitoring spurred by trading: a "number of errors in pre-existing emission registries [were] brought to light by the need to create accurate registries for [tradable permit] schemes.")
[572] Bruce Ackerman & Richard Stewart, *Reforming Environmental Law*, *supra* note 255.
[573] *Id.*; Jennifer Yelin-Kefer, *supra* note 279.

requirement for power plants to fund continuous emissions monitoring.[574] The Magnuson-Stevens act also requires some fisher-funded monitoring activities in conjunction with catch share programs.

The practical challenges of monitoring vary from context to context. Non-point sources generating water quality credits by definition have no fixed point (like a pipe) at which to monitor discharges, and determining watershed loadings is highly complex.[575] Programs with heterogeneous and small sources, like RECLAIM, complicate creating uniform data reporting and auditing, since the data required for verification may vary from source to source.[576] The Department of the Interior's Office of Policy Analysis raised questions about the adequacy and funding of monitoring and enforcement for conservation banks.[577]

On the other hand, arguably it has been easier for agencies to monitor a fewer number of large conservation bank sites rather than numerous smaller permittee-implemented mitigation projects. Additionally, in the past some permittee-responsible mitigation projects have been "greenwashed," since it is cheaper for a project developer to hire a landscaper to make a site appear like it has preserved habitat rather than invest in the scientific experts needed for meaningful restoration.[578] Large conservation banks allow efficient consolidation of scientific expertise, and would be significantly harder to "greenwash." In one survey, a plurality of Fish and Wildlife Service staff felt monitoring at conservation banks was adequate and better than monitoring at permittee-responsible mitigation.[579]

After the initial approval of credits, ongoing performance must also be monitored. Some water quality programs only spot check a small percentage of projects, while other require third-party audits on all credits annually or every few years.[580]

3. Enforcing Compliance

Economic theory predicts that regulated entities will not comply when the value of noncompliance outweighs the penalty for noncompliance multiplied by the chance of detection and enforcement. By reducing compliance costs, marketable permit programs could lower the incentive for firms to entertain noncompliance strategies. Compliant sources may support strict enforcement, because noncompliance by other actors lowers the value of their allowances. In the wreckfish fishery and other catch share programs, fishers more readily cooperate with enforcement officials, recognizing that illegal fishing reduces the value of their quota.[581] In fact, the National Research Council has recommended that fish catch quotas include the right to civil action against other fishers whose noncompliance or other unlawful actions adversely affect the marine resource and reduce the value of the quotas.[582]

Furthermore, agencies and courts may be less reluctant to enforce a marketable permit program than a prescriptive regulation with higher compliance costs: it is much easier for an agency or court to direct a noncompliant source simply to buy additional permits, compared to forcing a source to install expensive retrofit technologies to comply with prescriptive regulation.[583] On the other hand, because markets

---

[574] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181, at n.13.
[575] James Boyd, New Face of the Clean Water Act, *supra* note 270.
[576] Lesley McAllister, Beyond Playing "Banker", 59 Admin. L. Rev. 269 (2007).
[577] DOI Office of Policy Analysis, Conservation Banking Overview (2013).
[578] James Salzman & J.B. Ruhl, Currencies and the Commodification of Environmental Law, *supra* note 6.
[579] DOI, Office of Policy Analysis, Preliminary Analysis of the Conservation Banking Program and Results from a Survey of USFWS Staff (2013) (but most did not know).
[580] WRI, Addressing Risk and Uncertainty in Water Quality Markets (2014).
[581] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181 (citing OECD 1997).
[582] NRC, Sharing the Fish: Toward a National Policy on IFQs (1999).
[583] T.H. Tietenberg, Emissions Trading: Principles and Practice 176-177 (2006, 2d ed).

create a profit incentives, a marketable permit program could increase the incentives for noncompliance, since any allowances that a firm does not need to cash in for compliance can be resold for a profit.[584] Marketable permit programs may also exacerbate the negative outcomes of noncompliance. Noncompliance lowers demand for allowances or credits and so reduces permit prices, and with lower prices other firms will choose to increase their activity and buy permits rather than mitigate.[585] Though the cap in a cap-and-trade system would still limit the overall level of activity, lower permit prices due to noncompliance could undercut the incentive to innovate.

For proper compliance incentives, both the expected cost of underreporting (probability of detection multiplied by the fine for lying) and the fine for the violation must be greater than the permit price.[586] However, "penalties that are unrealistically high may be counterproductive if authorities are reluctant to impose them."[587] Penalties can be a fixed amount or related to the allowance price, such as a requirement not only to pay a penalty for noncompliance but to compensate for missing allowances by buying new allowances at market price.

The acid rain market is famous for its near 100% compliance rates.[588] The program features a stiff and certain penalty of $2000 per excess ton (in 1990 dollars; the penalty is fixed to inflation), plus a requirement to submit a plan for how those excess emissions will be offset in future years, and EPA deducts allowances equal to the excess tonnage from the firm's free allocation for the following year.[589] (Others suggest that the 100% compliance figure really refers to the lack of exemptions granted under the program.[590]) 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 compliance period to the total emissions registered by the Continuous Emissions Monitoring Systems (CEMS).[591] The NOx trading programs have also seen relatively high rates of compliance.[592]

Other markets have more mixed compliance and enforcement records. Several fish catch share programs have seen enforcement costs rise.[593] Some markets lack the clarity of the acid rain program's noncompliance 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.[594] In the lead phase-down program, the strong incentive to bank allowances in the early years may have contributed to initial noncompliance. Increased audits and stiffer penalties in subsequent year—as well as publicizing those enforcements—helped deter additional violations and brought the program into compliance.[595] With the RECLAIM program, calculation errors, missing data, and uncertainty about consequences due to case-by-case sanction determinations contributed to initial noncompliance rates of 4-15%.[596] RECLAIM also significantly exceeded the nitrogen oxide cap during California's energy crisis as demand

---

584 Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
585 T.H. Tietenberg, Emissions Trading: Principles and Practice 171 (2006, 2d ed).
586 *Id.* at 175.
587 Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
588 Lesley McAllister, Beyond Playing "Banker", 59 Admin. L. Rev. 269 (2007).
589 Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 9.
590 Ellerman, Are Cap and Trade Programs More Environmentally-Effective Than Conventional Regulation?, *supra* note 397, at 51.
591 Jennifer Yelin-Kefer, *supra* note 279.
592 T.H. Tietenberg, Emissions Trading: Principles and Practice 182 (2006, 2d ed).
593 Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181 (citing OECD 1997).
594 Leard & McConnell, *supra* note 32.
595 T.H. Tietenberg, Emissions Trading: Principles and Practice 179, 181 (2006, 2d ed).
596 Lesley McAllister, Beyond Playing "Banker", 59 Admin. L. Rev. 269 (2007).

for electricity spiked. However, some evidence suggests that noncompliance rates during such periods of extreme demand might have been even worse under a prescriptive approach that lacked RECLAIM's market flexibilities.[597]

Recommendation: Marketable permit programs need clear, adequate sanctions, ideally including both penalties and plans for coming into compliance.

E. Ancillary Benefits

Beyond achieving primary policy objectives, some special features of marketable permits may also generate additional benefits.

For example, without conservation banking, developers and permittees seeking to destroy wetlands or endangered species habitats would have to undertake mitigation themselves, often attempting to replace lost habitat with small-scale efforts on their individual sites. This piecemeal approach can result in small, unconnected habitats, which may technically replace the lost acreage or ecosystem services. However, conservation banking can consolidate mitigation efforts into establishing larger, connected habitat reserves.[598] Biological economies of scale mean that these larger habitats deliver more environmental benefits than the sum of their parts, and the consolidated scientific expertise brought to bear at these unified mitigation sites may lead to better management.[599]

Tradable fish quota programs have the potential to reduce the incidental killing of non-target species. For instance, fishers with licenses for other species may incidentally catch red snapper; historically, such bycatch has often been discarded, unceremoniously dumped back into the ocean with little chance of survival. But when fishers have the ability to go online quickly and buy catch share for red snapper to cover their bycatch, such discards decrease.[600] More generally, without catch share programs, fishers only see value in caught fish; with catch share programs, fishers have an interest in fish still in the water. Consequently, tradable fish quota programs may make fishers better stewards of the resource, though it is unclear whether leaseholders of catch shares will have the same incentive as share owners to preserve the long-term health of the fishery. Some fisheries also report improved safety conditions as tradable catch shares replace the chaotic race-to-fish derby conditions, as well as longer fishing seasons as fishers no longer race to catch as quickly as possible.[601]

Marketable permits programs can even be designed to incentivize co-benefits. For example, trading ratios for conservation banking or water quality trading could be tweaked to reward projects that deliver co-benefits, such as non-point water quality projects that also benefit endangered species.[602] Similarly, a percentage of allowances could be set aside for allocation to fishers with the lowest bycatch.[603]

Finally, the revenue generated by marketable permit programs can provide ancillary benefits. For example, to the extent society desires to support farming communities, conservative banks and water quality trading programs can provide an attractive income stream for farmers and other landowners,

---

[597] T.H. Tietenberg, Emissions Trading: Principles and Practice 182 (2006, 2d ed).
[598] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016); *see also* James Salzman & J.B. Ruhl, Currencies and the Commodification of Environmental Law, *supra* note 6.
[599] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).
[600] Nat'l Marine Fisheries Service, 2014 Gulf of Mexico Red Snapper IFQ Annual Report (2015).
[601] Pew Envtl. Group, Design Matters: Making Catch Shares Work (2009) (Alaska halibut and sablefish).
[602] Willamette Partnership, In It Together: A How-To Reference Part 2 (2012).
[603] NRC, Sharing the Fish: Toward a National Policy on IFQs (1999).

and some claim that such arrangements even improve relationships between rural and urban communities.[604] When the government auctions off permits, the revenue can be redirected either to mitigate distributional issues or to further promote the policy objectives. For example, auction revenue from carbon cap-and-trade programs has been used to invest further in the low-carbon energy economy and to support low-income communities.[605] However, only state governments and federal agencies specifically authorized to deposit fees into special accounts could directly control auction revenue; without specific authorization, federal agencies would need to deposit auction revenue into the general treasury.[606]

F. Policy Performances

Many marketable permit programs have achieved their policy goals as well or better than prescriptive regulation likely could have. As discussed above when reviewing the empirical evidence of the market's efficiency advantages, care must be exercised in drawing conclusions from studies comparing the effectiveness of a market to a hypothetical counterfactual regulatory system, as well as judging a program's success or failure too early.[607] Furthermore, the causes of effectiveness or ineffectiveness should not be conflated: the environmental effectiveness of the Renewable Fuel Standards has been widely questioned, but due to the lifecycle emissions of ethanol[608] and rate-based nature of the cap,[609] not because of the program's trading elements. Additionally, in some contexts prescriptive regulations might not have been politically feasible, and so absent a market solution no policy goals would have been advanced.[610]

As summarized previously, there is some evidence that use market tools increased the stringency of regulatory programs. Economists have specifically credited the acid rain market's cost savings with making dramatic cuts to sulfur dioxide pollution both possible and politically feasible.[611] The acid rain market also achieved its emissions targets ahead of schedule.[612] The lower costs predicted from trading were also instrumental in negotiating a more stringent limits for ozone-depleting substances and California's RECLAIM program, as well as a faster phase-out timeline (by perhaps as much as six years[613]) for lead in gasoline.[614] EPA claims that trading similarly helped it increase stringency earlier for vehicle emissions standards.[615] The institution of tradable catch shares has sometimes, though not always, resulted in lower total allowable catches.[616]

---

[604] Willamette Partnership, In It Together: A How-To Reference (2012); FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003).
[605] Evidence from RGGI.
[606] *See supra*.
[607] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[608] Ignacy Sachs, U.N. Conf. on Trade & Dev., *The Biofuels Controversy* (2007).
[609] If the total demand for fuel increased—as some projections predict—total emissions will continue to rise. *See* Lienke & Schwartz, *supra* note 273.
[610] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[611] Dallas Burtraw & Erin Mansur, *The Effects of Trading and Banking in the SO_2 Allowance Market* 20 (Res. for the Future, Disc. Paper 99-25, 1999), http://www.rff.org/documents/RFF-DP-99-25.pdf.
[612] *Id.* at 7, 15; Stavins, *Market-Based Enviro. Policies*, *supra* note 248, at 7; H. Ron Chan et al., *The Net Benefits of the Acid Rain Program* 1 (RFF 15-25, 2015).
[613] Winston Harrington & Richard Morgenstern, International Experience with Competing Approaches to Environmental Policy: Results from Six Paired Cases, *supra* note 259, at 122-123.
[614] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[615] EPA, Manufacturer Performance Report for 2015 MY (2015).
[616] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.

Some general studies of environmental markets have found no environmental degradation resulting from major trading programs.[617] Harrington and Morgenstern's comparative study finds "mixed" evidence of policy effectiveness, though it notes that the acid rain market's strong compliance record suggests the program has been highly effective.[618] Ellerman concludes that the acid rain market, the NOx trading programs, and even the much maligned RECLAIM program performed better on environmental outcomes than prescriptive regulation would have.[619] Ellerman identifies several features of the markets that contributed to policy effectiveness. First, the markets achieved strong reductions in the early years, accelerated by voluntary banking; prescriptive regulations would not have seen any voluntary early compliance actions. Second, there were no widespread exemptions or waivers or cap relaxations under the market programs; prescriptive regulations are often riddled with exemptions. Third, Ellerman alleges that implementation of prescriptive regulations would have been delayed by litigation, though it is possible the acid rain market only avoided major litigation because key decisions had been made in statute by Congress, not by agencies.[620] Nitrogen oxide emissions under RECLAIM did exceed the cap in one year during an energy crisis, but Ellerman argues prescriptive regulation would have fared no better.[621]

Allowing the public to participate in markets by purchasing and requiring credits, as with the acid rain market, directly advances the policy objectives. Retirement ratios, frequently seen with water quality trading,[622] can do the same, though at the expense of the program's efficiency, as discussed above.

Other evidence of the effectiveness of marketable permit programs includes:

- In 2015, several water quality trading programs were phased out as cleanup goals were met.[623] Other still active programs have had notable successes. EPA has recorded the following successes in water quality trading: in Long Island Sound, nitrogen removal was achieved ahead of the TMDL target; in the Lower San Joaquine River, selenium loading decreased in six of seven years; in the Southern Minnesota Beet Sugar Cooperative, trading resulted in more than double the required phosphorus reductions; in North Carolina's Neuse River Basin, the total nitrogen combined estuary loading was 50% of the allocation; and in Oregon's Clean Water Services program, trading significantly increased the pace and quantity of riparian restoration.[624]
- NOAA claims that annual harvest limits in fish catch share programs are rarely exceed, because catch shares programs generally include increase monitoring.[625] For the Gulf of Mexico red snapper fishery in particular, before establishing tradable catch shares, the fishery saw quota

---

[617] Ellerman, Are Cap and Trade Programs More Environmentally-Effective Than Conventional Regulation?, *supra* note 397 (citing Burtraw & Mansur 1999 and Swift 2000).
[618] Winston Harrington & Richard Morgenstern, International Experience with Competing Approaches to Environmental Policy: Results from Six Paired Cases, *supra* note 259, at 122-123.
[619] Ellerman, Are Cap and Trade Programs More Environmentally-Effective Than Conventional Regulation?, *supra* note 397, at 48.
[620] *Id.* at 50, 52.
[621] Prescriptive rate-based regulations might not have even registered an increase in total emissions if rate was never exceeded and sources just upped their output, and the retrofits that would have been necessary to have prevented the exceedance would have been very costly. *Id.* at 57.
[622] Maryland's water quality trading retirement ratio is 1.1:1, i.e. 10% of all credits bought are automatically retired. WRI, Addressing Risk and Uncertainty in Water Quality Markets (2014). Also, Offset ratios can be designed to explicitly to promote policy goals, as with NAAQS offsets, more than 1:1. Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[623] Ecosystem Marketplace, State of Watershed Investment (2016).
[624] EPA, Water Quality Trading Toolkit, Appendix A (2009) (but also noting that in Wisconsin Red Cedar, water quality improvement, if any, was unknown).
[625] NOAA, Economic Performance of U.S. Catch Share Programs, NMFS-F/SPO-133 (2013).

overruns in 11 of 17 years (from 1990-2006); since establishing the program, no quota overruns have occurred,[626] and the ratio of landed fish to discarded fish improved by three to four times.[627] Katrina Wyman concludes that, while there is no empirical evidence of direct causation, "the health of U.S. fish stocks has significantly improved in roughly the past decade," and catch share programs may be partly responsible.[628] There is some empirical evidence that catch shares promote better stewardship of the resource among fishers, and that fisheries with tradable catch shares are less likely to collapse.[629] The cost savings and increased profitability generated by the market system may also help fishers more readily accept the harvest limits necessary for rebuilding stock.[630]

- The Fish and Wildlife Service (FWS) reports that conservation banking is "generally perceived as successful" and often achieves net benefits to endangered species habitat.[631] Similarly, President Obama conclusively stated that mitigation banks lower long-term risk to the environment.[632] In a 2013 survey, 62% of FWS staff felt banks were generally effective at aiding species recovery, and another 18% felt banks did about as well as other mitigation options; only 8% felt banks were generally ineffective.[633] 57% of FWS staff felt additional species or habitats could benefit from banks.[634] 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.[635]
- The record for permittee-responsible wetland mitigation in the 1980s was abysmal: one study found that 34% of the proposed mitigation [by acreage] had not been constructed, and that 93% of applicants were not in compliance.[636] In 2001, the National Research Council concluded that the goal of no net wetlands loss was not being achieved under permittee-responsible mitigation, and that mitigation banks could offer advantages.[637]

Not everyone agrees with this rosy depiction of marketable permit programs' policy effectiveness. Most prominently, Driesen argues there is little empirical evidence that trading has produced environmental results superior to traditional regulation.[638] In particular, Driesen asserts that a prescriptive approach to the lead phase-down would have produced the same result more quickly than trading.[639] The effectiveness of wetland banking and water quality trading have also faced blistering critiques. In 2008, a consultant hired by EPA reported that of over twenty-five water quality trading pilots and programs,

---

[626] Nat'l Marine Fisheries Serv., Red Snapper IFQ Five-Year Review (2013).
[627] Pew Envtl. Group, Design Matters: Making Catch Shares Work (2009).
[628] Katrina Wyman, The Recovery in U.S. Fisheries, J. Land Use (forthcoming). Worldwide: Analysis of 20 IFQs in several countries found that 12 populations improved, while 8 continued to decline, though unclear whether improvement or declines could be traced to IFQ or just to development of strict catch share limits and other larger management plans. Pew Envtl. Group, Design Matters: Making Catch Shares Work (2009).
[629] Katrina Wyman, The Recovery in U.S. Fisheries, J. Land Use (forthcoming).
[630] *Id.*
[631] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[632] Presidential Memorandum, Mitigating Impacts on Natural Resources from Development, Nov. 3, 2015.
[633] DOI, Office of Policy Analysis, Preliminary Analysis of the Conservation Banking Program and Results from a Survey of USFWS Staff (2013).
[634] Id.
[635] DOI, Office of Policy Analysis, Preliminary Analysis of the Conservation Banking Program and Results from a Survey of USFWS Staff (2013).
[636] 1991 FDER Study, cited by Corps-Jacksonville.
[637] NRC, Executive Summary (2001).
[638] David Driesen, Is Emission Trading an Economic Incentive Program?, *supra* note 18.
[639] *Id.*

"very few" could claim any significant impact on water quality.[640] Several environmental law experts question whether wetland banking has improved the environment at all.[641] As of 2003, the literature suggested that the wetlands program had failed to achieve its goal of "no net loss."[642] Limited agency resource for enforcement may be partly to blame.[643] On the other hand, the Army Corps 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.[644]

To some extent, the public and researchers do not have access to the ecological data necessary to analyze the success of conservation banking[645] and other environmental markets. For example, under various habitat mitigation programs, some ecological performance data is collected by agencies, but it is not comprehensively or easily accessible on the credit tracking website used by the Army Corps, the Fish and Wildlife Service, and the National Marine Fisheries Service.[646] EPA has called for periodic assessments of environmental and economic effectiveness of water quality trading,[647] though it is not clear this has taken place. The Magnunson-Stevens Act requires programmatic reviews of fish catch shares every five to seven years,[648] and fisheries are conducting such reviews. In 2015, the Army Corps did a retrospective review of the administration of its wetland banking rule, but not of ecological outcomes.[649] Also in 2015, the Corps began efforts to make mitigation plans and ecological monitoring reports more publicly available on the website (RIBITS.usace.army.mil) that it, the Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration all use to track habitat credits.[650]

Recommendation: 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.

IV. Market Integrity and Oversight

A. Creating a Market

1. Auctions

The distributional and policy consequences of various methods for initially allocating allowances and credits are discussed above. In particular, procedures for approving credits for primary sale are discussed in Section III.C, and the distributional consequences of freely allocating, or grandfathering, permits according to historic use of the resource are discussed in Section II.D. Some additional

---

640 IEc, Water Quality Trading Evaluation, *supra* note 50. Note that the data is ten years old and predates EPA's water quality trading toolkit, which gave state regulators concrete guidance. EPA also commented, on the draft version of this report, that some water quality trading programs are designed specifically to include only a limited number of sources, and so a "significant" effect on overall water quality is not necessarily surprising; additionally, EPA commented that the difficulty with verifying credits is a relevant factor in this 2008 study's claims.

641 Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.

642 *Id.*

643 *Id.*

644 Corps-EPA Final Rule, Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,593 (2008).

645 DOI, Office of Policy Analysis, Results from a Survey of Conservation Bank Sponsors (2016).

646 *Id.*

647 EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003).

648 16 U.S.C. § 1853a(c)

649 Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015).

650 *Id.*

advantages and disadvantages of auctions versus grandfathering, in terms of market power, price discovery, and other oversight issues, are discussed below.

Some auction design issues, like the best bidding structure to prevent market manipulation,[651] are too complex to cover in this report, and likely there are no one-size-fits-all solutions to those issues. As the Federal Trade Commission has recommended, auctions, whether for airport landing slots or electromagnetic spectrum, need to be tailored to the unique context.[652] However, a few additional points about creating and running auctions bear mentioning here.

First, an auction can be revenue generating for the government or not. Revenue management is discussed above, in Section II.D.3. A zero-revenue auction combines some traditional features of an auction with some of the objectives of grandfathering. The acid rain program features a zero-revenue auction. Acid rain allowances are allocated freely, but each source is required to put 2.8% of their allowances up for auction. Revenue generated from the auction is distributed back to those sources, not to the government. Because there is an auction, price discovery is facilitated and new entrants have a clear path to enter the market; but because it is zero-revenue, existing regulated entities' past investments are not threatened and political opposition is less than with a revenue-generating auction.[653] The acid rain's auction has historically been relatively efficient and successful.[654]

Second, regulators must determine the frequency of auction. If there is sufficient volume to ensure a robust market, more frequent auctions could give participants greater flexibility to adjust their buying and selling strategies from sale to sale, and may disrupt coordinated attempts to corner the market.[655] However, if the frequency of auctions reduces the number of allowances sold per auction, the smaller market size could increase the risk of manipulation.[656] Other auction design features, such as bidding structure, could affect the risk of market power.[657]

Finally, regulators can operate and supervise auctions themselves or enlist third parties. For thirteen years, the Chicago Board of Trade conducted the acid rain program's zero-revenue auctions. It did so without compensation and was not allowed to charge a fee. In 2006, the Board decided to stop running the auction, and EPA now conducts auctions directly.[658] Both the Regional Greenhouse Gas Initiative and California's cap-and-trade program use an outside company to evaluate auction data to ensure there is no manipulation.[659]

---

[651] Peter Cramton & Jesse Schwartz, Collusive Bidding: Lessons from the FCC Spectrum Auctions, 17 J. Reg. Econ. 229 (2000).
[652] FTC Comments to FAA, Notice 08-04 (2008).
[653] Zero revenue auction grandfathers the value of permits but lets the market freely allocate the uses of permits. Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 13-14 (1981). NRC recommended one for fish quotas, as way to ensure price discovery and let new entrants in to an otherwise grandfathered system. NRC, Sharing the Fish: Toward a National Policy on IFQs (1999).
[654] T.H. Tietenberg, Emissions Trading: Principles and Practice 11 (2006, 2d ed).
[655] Western Climate Initiative, Auction Design White Paper (2010) (more auctions also improves liquidity and may make it easier for small firms to participate).
[656] EDF Comments to CFTC (2010).
[657] Certain auction designs may decrease risk of market power, like instead of paying a single market-clearing price, you pay the highest unsuccessful bid, then no source could unilateraly affect prices by artificially raising/lowering demand, though could still with collusion with other sources. T.H. Tietenberg, Emissions Trading: Principles and Practice 157 (2006, 2d ed). FCC auction structure lead to some inefficient allocations, see Posner & Wilde.
[658] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 11.
[659] Center for Climate and Energy Solutions (C2ES), Market Oversight under the Clean Power Plan (2016).

2. Secondary Markets

Secondary markets refer to transactions after the initial allocation. The two main categories of transactions on secondary markets are spot sales, which are sales for immediate delivery of the allowance or credit, and forwards, which set a fixed price for future delivery of the allowance or credit.[660] Secondary transfers may be permanent sales or lease arrangements.[661]

Not every marketable permit system provides for secondary transfers. Notably, neither conservation or wetland credits can be resold or traded after the initial purchase from the credit bank.[662] But the initial sale of such habitat credits strongly resembles secondary market transactions, with buyers and sellers searching for trading partners. For example, exchanges and clearinghouses are starting to be used for conservation banking.[663]

Secondary transactions can be accomplished through a variety of channels. Bilateral trading allows direct negotiation between buyer and seller, possibly mediated by a broker. Aggregators and clearinghouses convert credits with variable prices and quality into a more uniform currency. For example, an aggregator may pay farmers to install best management practices to generate water quality credits, which the aggregator then sells at a fixed price.[664] Clearinghouses act as an intermediary between buyers and sellers and guarantee performance in the event of default. Exchanges automatically match buyers and sellers in standardized transactions. Transactions not conducted on exchanges are called "over-the-counter."[665]

Sales directly negotiated bilaterally entail numerous transaction costs for buyers and sellers: researching the market and determining the going price, finding a trading partner, negotiating terms, handling paperwork and payments, and enforcing the contract.[666] For smaller and less sophisticated entities without preexisting connections with potential trading partners, search costs can be significant in a purely bilateral market.[667] Similarly, smaller credit sellers that generate credits more infrequently may have difficulty gaining credibility about the validity of their credits.[668] Brokers, aggregators, and clearinghouses help minimize some of those transaction costs. Exchanges have the lowest transaction costs:[669] contract terms are standardized, prices are transparent, buyers and sellers are matched automatically. Exchanges are also highly transparent and so facilitate monitoring of the market by regulators, other market actors, and the public.[670] However, those advantages come at the cost of the customization of terms available in over-the-counter transactions.

Regulators must determine how involved to become in facilitating the creation and operation of secondary markets. For large programs with sufficient value to attract intermediaries and market makers, secondary markets may "emerge quickly . . . with no need for government assistance."[671] For

---

[660] Also repurchase agreements and short sales. Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 14.
[661] NOAA, Economic Performance of U.S. Catch Share Programs, NMFS-F/SPO-133 (2013).
[662] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
[663] Id.
[664] Willamette Partnership, In It Together: A How-To Reference (2012).
[665] Interagency Working Group on Carbon Market Oversight, *supra* note 448, at 14.
[666] T.H. Tietenberg, Emissions Trading: Principles and Practice 40 (2006, 2d ed). Also cost of optimizing decision between abatement and buying permits.
[667] Breger, Stewart, Elliott, & Hawkins, Providing Economic Incentive in Environmental Regulation, *supra* note 13.
[668] *Id.*
[669] Andrew Wolman, Effluent Trading in the United States and Australia, *supra* note 229.
[670] Lesley McAllister, Beyond Playing "Banker", 59 Admin. L. Rev. 269 (2007).
[671] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 28.

example, the European Union's Emissions Trading System did not explicitly provide for the creation of secondary markets, yet such markets materialized and flourished. Similarly, while the acid rain program allowed permit holders to use the structure of the zero-revenue auction to sell additional allowances beyond the required minimum 2.8%,[672] the bilateral, over-the-counter market remained "vastly more important."[673] Brokers facilitated acid rain transactions by maintaining price information and matching buyers and sellers.[674]

However, in other programs, robust secondary markets have been slow to develop without active involvement of regulators. For example, EPA and the Department of Transportation's trading programs for vehicle emissions and efficiency provide no centralized setting for trading to take place, which has made price discovery difficult and possibly limited the number of transactions that occur.[675] With electromagnetic spectrum licenses, because of interference issues caused by neighboring channels, transferring spectrum from one use (such as television broadcast) to another (like 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, which enables the Commission to "repack" channels to minimize such interference.

Regulators can facilitate secondary transactions in a variety of ways. Some agencies provide only minimal support in finding a trading partner. For example, the National Marine Fisheries Service advises interested buyers and sellers of Bluefin tuna shares either to e-mail the agency's customer service department to be added to a list of interested buyers and sellers, or else to download a list of initial quota allocations (though the list does not reveal the amount of share held or whether the holder has an interest in selling).[676] The PJM Interconnection—a regional transmission organization that coordinates wholesale electricity through thirteen states—has a website entitled "How Do I Sell RECs?," which recommends advertising renewable electricity credits for sale on their bulletin board.[677] In addition to privately-run exchanges, exchanges can also be operated directly by regulators.[678]

One difficulty for water quality trading is point sources that are potential credit buyers and sources that are potential sellers do not necessarily receive their permits simultaneously, and so they 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.[679] As ACUS has previously defined, "In general permitting, an agency issues a permit that defines and approves a category of activity on its own initiative, and allows entities engaging in that activity to readily take advantage of the

---

[672] T.H. Tietenberg, Emissions Trading: Principles and Practice 11 (2006, 2d ed).
[673] Stavins, What Can We Learn from U.S. Experience?, *supra* note 13, at 23.; *see also* Mark Jickling & Larry Parker, Cong. Res. Serv., *Regulating a Carbon Market: Issues raised by the European Carbon and U.S. Sulfur Dioxide Allowance Markets* 17 (2008).
[674] Jonathan Nash & Richard Revesz, Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants, 28 Ecol. L. Q. 569 (2002).
[675] Leard & McConnell, *supra* note 32.
[676] NMFS, IBQ Program and Electronic Monitoring Reminders, Oct. 15, 2015.
[677] Or working with an aggregator or broker, or using an exchange platform. PJM, How Do I Sell RECs?
[678] EPA, Water Quality Trading Toolkit (2009) (EPA says a water quality trading exchange would "likely" have to be either operated or overseen by a state agency).
[679] EPA & USDA, Report on 2015 National Workshop on Water Quality Markets (2016). EPA has long supported use of watershed general permits to facilitate trading. EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003).

permit."[680] General permitting tends to be appropriate when "[t]he agency does not need to tailor permits to context-specific instances of the activity,"[681] which would also be true for such a water quality market: what matters is the total discharges into the watershed by a category of point sources, and not the individual activity level of any one actor.

Finally, regulators must decide whether to require pre-approval of transfers. As discussed above in Section III.A., exchange restrictions can be implemented automatically through computer modeling or through case-by-case reviews.

Recommendation: Regulators should consider whether they can address barriers to efficient secondary transactions, for example by facilitating price discovery. EPA should encourage states to consider using general permits to facilitate water quality trading.

3. Derivatives

"A derivative contract is a financial instrument whose value is based on, or derived from, the value of an underlying asset, commodity, or measurable event."[682] Species of derivative contracts include futures, options, and swaps. Such contracts do not necessarily involve the actual transfer of allowances. However, future contracts can provide for near-term delivery of allowances and, because marketable allowances and credits are more uniform and easily transferable than many other commodities, future contracts can serve as "very close economic substitutes" to secondary market transactions.[683] On the European Union's Emissions Trading System, for example, "futures are not only used for hedging strategies, but as a [direct] means of buying or selling allowances."[684]

Derivatives are used for hedging and speculation. Hedging allows the transfer of market risks to parties more capable of assuming it. For example, regulated entities anticipating a future need for permits and worried about price volatility may want to hedge against potential price spikes; entities with banked allowances may want to hedge against falling prices, to protect the value of their permits. Non-regulated entities may also need to hedge their risks. For example, under a greenhouse gas cap-and-trade system, firms that produce abatement technologies may face financial exposure from carbon price changes,[685] and clean energy providers may wish to hedge against falling prices to ensure wholesale electricity prices do not dip and hurt their profits.[686] Distinct from hedging, speculation involves attempting to earn profit by anticipating price movements or taking advantage of a perceived mispricing.[687]

Some advocates worry that excessive speculation in derivative markets creates unnecessary risks of market manipulation and will undermine the effectiveness and efficiency of the marketable permit program.[688] Some have pushed for bans on derivatives of marketable permits, arguing that predictable increases in stringency and provisions for contingencies will ensure a clear price path and so minimize

---

[680] https://www.acus.gov/sites/default/files/documents/recommendation-2015-4-designing-federal-permitting-programs_3.pdf at 2.
[681] *Id.* at 6. Note that not all the factors weighing in favor of general permits align with the features of marketable permits.
[682] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 15.
[683] *Id.* at 33-34.
[684] *Id.* at n.27.
[685] *Id.* at 15.
[686] *Id.* at 38.
[687] *Id.* at 16-17.
[688] Michelle Chan, Friends of the Earth, *Smaller, Simpler, and More Stable: Designing Carbon Markets for Environmental and Financial Integrity* (2009).

the kinds of price risks that derivatives are designed to hedge against.[689] Others point out that a ban on U.S. derivatives based on marketable permits could simply prompt covered entities to hedge their risks in less transparent markets. For example, to hedge risks in carbon markets, covered sources may simply enter derivative markets in energy commodities or derivative markets based outside the United States.[690] Excessive speculation may be better addressed by requiring derivatives to be traded on exchanges, with position limits.

Derivatives can be traded on exchanges or bilaterally over-the-counter. Exchanges offer a centralized marketplace for buyers and sellers to meet and enter into highly standardized contracts. Exchanges manage the risk of default by requiring the deposit of some collateral to participate (also known as "margin requirements"), and typically provide for centralized clearing through a clearinghouse, which acts as an intermediary to guarantee performance.[691] Exchanges also often have position limits, to prevent excessive speculation. Standardizing contract terms can help reduce transaction costs and promote market liquidity, and help exchanges maintain high levels of transparency, which both facilitates price discovery by market actors as well as oversight by regulators and the public.[692]

On the other hand, over-the-counter transactions allow parties more customization and innovation in contract terms. For example, in the European Union's Emissions Trading System, exchange-traded futures contracts were limited to three-to-five year durations; if a utility wants to lock in allowance prices for a decade or more, it needs over-the-counter derivatives.[693] Some regulated entities may also feel they can negotiate better prices over-the-counter than what is set on exchanges; to the extent that is true, over-the-counter may lower overall compliance costs.[694] Historically over-the-counter trades have also avoided the capital costs of margin requirements.[695] Margin requirements can tie up cash, complicating participation for smaller firms and for entities like utilities that need to invest heavily in capital improvements.[696] However, the Dodd-Frank Wall Street Reform and Consumer Protection Act requires margins and clearing even for some kinds of over-the-counter derivatives,[697] as well as reporting certain details on over-the-counter swaps.[698]

Environmental Defense Fund has argued that all allowances and derivatives in carbon markets should be traded on registered exchanges to facilitate effective market oversight.[699] "Our extensive consultation with a range of experts…leads us to conclude that the benefits of allowing over-the-counter trades (even if cleared) would be very small related to the costs in terms of lost transparency."[700] However, Environmental Defense Fund admits that contracts for the development of offsetting credits may be too hard to standardize to put exclusively on exchanges, given the wide variety of credit-generating projects

[689] *Id.*
[690] CBO, Evaluating Limits (2010).
[691] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 19.
[692] *Id.* at 18-19.
[693] Pew Ctr. on Global Climate Change, Carbon Market Design and Oversight (2010).
[694] *Id.*
[695] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 18-19.
[696] Pew Ctr. on Global Climate Change, Carbon Market Design and Oversight (2010).
[697] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 19.
[698] *Id.* at 21.
[699] EDF, Comments to CFTC (2010).
[700] *Id.*

and uncertainty about project approval and performance.[701] Credit markets, therefore, may need some level of over-the-counter trading.[702]

Derivatives have been used most actively in air pollution and renewable energy markets. As of 2010, exchange-traded derivatives for the Regional Greenhouse Gas Initiative were valued at $2 billion; for the acid rain market, $0.7 billion; and for the European Union's Emissions Trading System, $71 billion (not counting the significant number of over-the-counter derivatives).[703] There has also been strong interest in derivatives to hedge against the tremendous price volatility experienced in the renewable fuel standard market.[704]

B. 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. The working group was chaired by the Commodity Futures Trading Commission (CFTC), and further composed of officials from EPA, the Department of Agriculture, the Department of the Treasury, the Securities and Exchange Commission, the Federal Energy Regulatory Commission, the Federal Trade Commission, and the Energy Information Administration.[705] In 2010, this group issued its report and concluded that while CFTC should have the authority for "comprehensive oversight" of derivative markets relating to carbon allowances, primary and secondary markets "will not be subject to the same comprehensive oversight,"[706] since "[n]o set of laws currently exists that apply a comprehensive regulatory regime" specifically to primary and secondary permit markets.[707]

CFTC likely does have sufficient authority to monitor derivative markets effectively, whether trades are conducted over-the-counter or on exchanges;[708] whether it exercises that authority for marketable permit programs remains an open question. For derivatives traded on exchanges, CFTC has thorough oversight, and exchanges must publish certain trading information, giving CFTC the data it needs to detect fraud or manipulation.[709] The Dodd-Frank Act strengthened CFTC's oversight of over-the-counter transactions as well. For example, CFTC can require swaps to be cleared and reported.[710] CFTC also has authority to impose position limits on both exchange-traded and over-the-counter derivatives to prevent excessive speculation.[711] However, CFTC has not established position limits for carbon market derivatives or other environmental commodity derivatives. At least some allowance transactions and most offset credits will qualify for CFTC's so-called "forward exclusion" from the definition of "swap."[712] In fact, the strong similarities between regulated futures contracts and unregulated forwards could make it easy for some transactions to evade oversight.[713] Certain activities by "commercial hedgers"—

---

[701] *Id.*; *see also* Pew Ctr. on Global Climate Change, Carbon Market Design and Oversight (2010).
[702] Instead of banning over-the-counter, could require registry and tracking and raise transaction fees on trades that do not clear. CBO, Evaluating Limits (2010).
[703] *Id.*
[704] CME Group, Announces New Futures Contracts for RINs, Apr. 25, 2013.
[705] § 750.
[706] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 51.
[707] *Id.* at 42.
[708] *Id.* at 51.
[709] *Id.* at 44.
[710] *Id.* at 47.
[711] *Id.* at 45.
[712] Joshua Schneck & Jonas Monast, Financial Market Reform and the Implications for Carbon Trading (2011).
[713] Leo Mensah, Missed Opportunity: Excluding Carbon Emissions Markets from Comprehensive Oversight, 38 Wm. & Mary Envtl. L. & Pol'y Rev. 795 (2014).

that is, non-financial entities using swaps to hedge against commercial risk, which would likely include any regulated entity using derivatives under a permit market to manage their exposure to price volatility—are exempt from CFTC's broadest authorities.[714] Nevertheless, CFTC has the statutory authority to eliminate many of these exemptions and to provide comprehensive oversight of derivatives in permit markets.

Oversight of primary and secondary markets will largely depend on the statutory authority of the individual agencies implementing marketable permit schemes. Arguably, the spirit of the Dodd-Frank Act was to ensure no market falls wholly outside regulatory authority. Some experts encourage agencies to aggressively read their statutes to find authority over any un-regulated secondary markets. However, these experts also caution that acquiring expertise in market oversight takes time and resources.[715]

The Federal Trade Commission (FTC) and the Department of Justice have some general authorities relevant to oversight of primary and secondary markets. FTC has general authority to act against unfair, anticompetitive, and deceptive practice affecting commerce.[716] However, despite their antitrust responsibilities, the FTC and Justice Department have had limited involvement with marketable permit programs. FTC issued guidance to combat deceptive practices only in the *voluntary* carbon offset and renewable energy certificate markets.[717]

CFTC has broad enforcement authority to pursue manipulation of a commodity's price in interstate commerce, and some authority to obtain information on holdings and secondary transactions of traders who also participate in regulated futures markets.[718] But "absent specific action by Congress, neither CFTC nor any other federal agency may have any authority to routinely monitor trading in the secondary markets."[719] CFTC only rarely brings enforcement actions for fraud in spot markets, as legislative history does not suggest Congress intended CFTC to have a huge role in secondary markets.[720]

CFTC also has authority to surveil any spot trading voluntarily conducted on registered exchanges.[721] For example, CFTC oversees trading of allowances for the Regional Greenhouse Gas Initiative and the acid rain market on exchanges like the Chicago Climate Futures Exchange.[722] Regulated exchanges also partly police themselves, with rules on position limits and to ensure fair trading.[723] Banning over-the-counter secondary transactions and requiring all trades to be on exchange might, therefore, strengthen federal oversight of marketable permit programs (as well as improve transparency and price discovery). However, such a ban would erase the flexibility and potential cost savings of over-the-counter trading, and 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.[724]

---

[714] In 2012, CFTC voted to exempt non-financial commodities, including environmental commodities from "swap," including carbon forwards. McGuireWoods, Legal Alert, July 11, 2012.
[715] Interview by Author.
[716] Interestingly, the Deep Seabed Hard Minerals Act is one of the few (or only) statutes to specifically provide DOJ/FTC the opportunity to review the antitrust implications of permit transfers.
[717] OECD, Emission Permits and Competition (2010).
[718] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 43.
[719] *Id.* at 43.
[720] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market n.20.
[721] *See* CFTC, Market Surveillance Program, http://www.cftc.gov/IndustryOversight/MarketSurveillance/CFTCMarketSurveillanceProgram/index.htm.
[722] *Id.*; Jonas Monast, Climate Change & Financial Markets: Regulating the Trade Side of Cap and Trade, 40 ELR 10051 (2010).
[723] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 30.
[724] Jonas Monast, Climate Change & Financial Markets, *supra* note 722.

Testifying at a 2009 congressional hearing, witnesses from the Nicholas Institute for Environmental Policy Solutions at Duke University, the Chicago Mercantile Exchange, Exelon, and Iowa Farm Bureau all agreed that CFTC may be best positioned to try to comprehensively oversee permit markets.[725] However, there is similar consensus that CFTC would need additional authority to provide effective oversight. It is notable that all the legislative proposals in 2009-2010 for a national greenhouse gas cap-and-trade program would have granted CFTC or other agencies additional oversight authorities; existing authorities are likely insufficient.

Recommendation: CFTC should monitor any active derivative markets relating to regulatory permits and exercise its statutory authority when necessary to prevent fraud and manipulation. 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.

C. Fraud and Manipulation

Fraud and price manipulation not only undermine economic efficiency, but also erode confidence in the market.[726] Some marketable permit programs, like the acid rain market, have seen very little fraud or manipulation.[727] The acid rain market's lack of manipulation can be explained because there are relatively few regulated entities and they are largely major utilities, all of which have the same information on energy prices and weather forecasts. Under such conditions, it is difficult for one party to develop an information advantage and defraud another party.[728] Similarly, no manipulation to date has been detected in the Regional Greenhouse Gas Initiative.[729]

However, different markets with heterogeneous entities and asymmetrical information could face greater risks of fraud and manipulation.[730] In 2001, California's air pollution market suffered through a Ponzi scheme.[731] In the mid-1990s, before the Federal Communications Commission tweaked its auction design, there were allegations of firms colluding through bid signals to manipulate the price.[732]

The renewable fuel standard 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.[733] Several credit producers have been charged with wire fraud, money laundering, and violations of the Clean Air Act.[734] In March 2016, the owner of a biodiesel company received ten years in prison and a $138 million

---

[725] *Id.*

[726] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 24.

[727] 80 Fed. Reg. at 64,977 ("The EPA has over 20 years of experience implementing emissions trading programs for the power sector and based on that experience, believes the potential or likelihood of market manipulation is fairly low.")

[728] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 30-31.

[729] C2ES, *supra* note 659.

[730] "A system with numerous interrelated markets" versus a single market "may have some markets in which only one or a few polluters participate, leading to inefficiencies resulting from market concentration." Nash & Revesz, *supra* note 5 (quoting Hahn & Noll at 120).

[731] CBO, Evaluating Limits (2010); *see also* Richard Drury et al., Pollution Trading and Environmental Injustice, *supra* note 395 (outright fraud in RECLAIM).

[732] Peter Cramton & Jesse Schwartz, Collusive Bidding: Lessons from the FCC Spectrum Auctions, 17 J. Reg. Econ. 229 (2000).

[733] Susan Lafferty & David McCullough, Sutherland LLP, EPA's Renewable Fuel Standard: What to Expect in 2014 (2014).

[734] Robert Glicksman, Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development, *supra* note 443; see also Energy & Environmental Law Adviser, CFTC and EPA Sign MOU on Renewable Fuel Markets, Mar. 23, 2016 (owner of Clean Green Fuel found guilty of wire fraud, money laundering, and Clean Air Act violations).

restitution penalty for selling sixty million bogus renewable fuel credits.[735] Between 2013 and 2016, EPA has taken eleven civil enforcement actions.[736] In January 2017, EPA placed a quality assurance provider on notice for allegedly verifying verifying millions of fraudulent renewable fuel credits.[737]

In addition to such fraud, there have been allegations of price manipulation in the renewable fuel credit market. In 2013, Senator Grassley identified market manipulation as the cause of a dramatic spike in prices for renewable fuel credits, and the *New York Times* investigated Wall Street speculators' exploitation of the market.[738] In 2016, the Renewable Fuels Association asked for EPA and the Commodity Futures Trading Commission to investigate the market for price manipulations by those seeking to erode confidence in the program, who hope to lobby for reforms or a complete repeal of the renewable fuel standard.[739] Also 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 blenders sell credits preferentially to speculators instead of refineries, allowing speculators to hoard credits until the price increases. Icahn likened the market to a cocaine cartel, quoting the CEO of a refinery as saying, "if Pablo Escobar were alive, he wouldn't be doing coke, he'd be trading RINs [renewable fuel credits]."[740] Other industry experts question whether there is any evidence for Icahn's allegations.[741]

Tools to manage fraud and abuse include position limits, accountability provisions, reporting requirements, and effective surveillance.[742] Transparent price information can prevent large, sophisticated players from exploiting information asymmetries with smaller firms.[743]

D. Volatility

Price volatility can occur in marketable permit programs even without fraud or manipulation, due to unexpected increases in demand or reductions in supply. For example, in 2000, California's energy crisis caused demand to spike, and RECLAIM allowance prices rose twenty-five times; consequently, regulated sources exceeded the overall nitrogen oxide cap by 19%.[744] Cheap credits in RECLAIM's early years may have habituated firms to low prices, causing them to fail to plan for future contingencies.[745] Conservation bank prices range $1836 to $400,000 per credit due to scarcity of certain kinds of credits in certain areas.[746] Most notoriously, in 2013, some renewable fuel categories saw credit prices increase 2500% over a six month period.[747]

Volatility creates financial risks in both regulated markets and related markets, increases the risk of noncompliance, and decreases confidence in the market system. Too much volatility can even lead to

---

[735] Energy & Environmental Law Adviser, CFTC and EPA Sign MOU on Renewable Fuel Markets, Mar. 23, 2016.
[736] EPA, Civil Enforcement of RFS Program.
[737] *Id.* Genscape must retire valid RINs to replace fraudulent ones they verified (i.e., Genscape has to replace, not buyers)
[738] Sutherland, *supra* note 733 (2014).
[739] Letter from Renewable Fuels Assoc., to EPA and CFTC, Aug. 1, 2016.
[740] Laura Blewitt & Zachary Mider, Icahn Calls on EPA to Fix "Mother of All Short Squeezes," Bloomberg, Aug. 15, 2016.
[741] Dallas Burkholder, OTAQ, Preliminary Analysis of RIN Market Dynamics, RIN Prices, and Their Effects (2015).
[742] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 20.
[743] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 31.
[744] Lesley McAllister, Beyond Playing "Banker", 59 Admin. L. Rev. 269 (2007).
[745] Id.
[746] DOI Office of Policy Analysis, Conservation Banking Overview (2013). For just vernal pools in California, range is $50,000 to $325,000
[747] Progressive Fuels Ltd., RIN Pricing and Opportunities, Aug. 26, 2013. One type increase from just a few cents to over a dollar per credit. Dallas Burkholder, OTAQ, Preliminary Analysis of RIN Market Dynamics, RIN Prices, and Their Effects (2015).

"demoralization," as businesses stop trying to predict future prices, which undermines the incentives for innovation and planning created by long-term price signals.[748]

Regulators can manage price volatility with several tools. "Circuit breakers" limit how much prices can rise or fall in given period.[749] Safety valves can set maximum prices or release reserve credits into the market in case of emergencies or demand spikes.[750] For example, the Department of Transportation sets a fine for exceeding fuel efficiency standards, which acts as a price cap in the efficiency credit market.[751] Authorizing the banking and borrowing of allowances also helps mitigate against price volatility:[752] borrowing credits from future years can dampen price spikes,[753] 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.[754] 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.[755] Any individual regulated sector can experience unexpected compliance costs as economic conditions change; a broader market offers more flexibility, better absorbs price volatility, and so increases certainty for regulated parties and investors.

E. Thinness, Hoarding, and Monopolies

Thin markets occur when transaction costs are so high or covered entities are defined so narrowly that not enough potential buyers and seller participate to support a robust market.[756] For example, too many exchange restrictions will thin the market.[757] Every marketable permit program must balance the complexity of currency design, the number of exchange restrictions to mitigate remaining externalities, and market thickness.[758] Thin markets increase the risk of market power like monopolies and monopsonies and, by limiting the number of trading opportunities, restrict the market's overall efficiency. Without enough actors to provide competitive prices, trading will not generally deliver on its promise of cost-effective solutions.[759] Economists, like Tom Tietenberg, usually argue to err on the side of thicker markets and deal with any remaining externalities on an ad hoc basis.[760]

Firms with market power can unduly influence the market's efficiency to their advantage, moving the price and quantity of permits traded away from the optimal equilibrium that balances true supply and demand. Firms may hoard allowances to inflate the price. To corner a market, a firm can amass a large inventory of allowances and simultaneously take future or forward positions that will require other

---

[748] Interview with Don Elliott.
[749] CBO, Evaluating Limits (2010).
[750] Safety valve as a pre-defined penalty that can be paid on emissions over the cap in event of emergency, different than noncompliance penalty. Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[751] Leard & McConnell, *supra* note 32.
[752] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 35.
[753] *Id.* at 36.
[754] *Id.* at n.11.
[755] Stavins, *U.S. Cap-and-Trade System*, *supra* note 262, at 19; Nash & Revesz, *supra* note 5, at 616, 630.
[756] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 9 (1981)
[757] T.H. Tietenberg, Emissions Trading: Principles and Practice 160 (2006, 2d ed).
[758] James Salzman & J.B. Ruhl, Currencies and the Commodification of Environmental Law, *supra* note 6.
[759] Nash & Revesz, *supra* note 5 (citing T.H. Tietenberg 61-62 (1965)); *see also* Congressional Research Service, Regulating a Carbon Market: Issues Raised by the European Carbon and U.S. Sulfur Dioxide Allowance Markets (2008) (warning of market power in illiquid markets).
[760] James Salzman & J.B. Ruhl, Currencies and the Commodification of Environmental Law, *supra* note 6.

market participants to make future deliveries of allowances back to the firm; the firm with market power can then dictate the price for satisfying those forward positions.[761]

Besides trying to extract monopoly rent from the permit market, firms may also try to manipulate the permit market as a way to punish rivals in a product market. By driving up permit prices, firms can increase their rivals' production costs and reduce their share of the product market.[762] For example, firms could hoard spectrum licenses with the intent not of driving up permit prices but rather of preventing competition in broadcast markets.[763] However, many permit markets will not contain a large number of direct competitors in the output market. For example, it is unlikely for multiple businesses competing in the same product market to be located in a given airshed or watershed. The permit market is, therefore, likely a poor vehicle to try to wield anti-competitive power in the product market.[764] Moreover, standard antitrust laws may be sufficient to handle these risks.[765]

Market power can be difficult to detect. It remains unclear whether the hoarding of renewable fuel credits by certain banks helped cause the 2013 price spike.[766] Similarly, the market for trading emissions credits among passenger vehicle manufacturers is relatively thin, with only about twenty car manufacturers actually subject to the regulation. In this constrained market, market thinness and the lack of transparency about buyers' offer prices and sellers' asking prices likely were responsible, among other factors, for the dearth of trades between companies in early years.[767] Additionally, since only six car manufacturers hold nine of every ten permits, the lack of trades may be due to a monopoly-like attempt to restrict permit supply in the market's initial years to drive up permit prices in later periods.[768] However, as stringency has increased over time, the vehicle emissions market has become thicker: through the year 2013, only 2.6 million credits total had been traded cumulatively, but in 2014, another 7.2 million were traded, and in 2015, 10.2 million were traded.[769] The number of buyers and sellers has likewise increased.[770]

One market with a real risk for monopoly power was the ozone-depleting substance market. The Federal Trade Commission calculated the market's Herfindahl-Hirschmann Index: a metric of market competition with a scale of 0 to 10,000, with any score over 1500 signifying a risk of market power. The ozone-depleting substance market scored 2958. The Federal Trade Commission recommended that EPA retain the right to take back any credits being hoarded.[771] In the conservation banking context, some banks have a de facto monopoly on certain types of credits in certain areas (though of course permittees could always implement their own mitigation).[772]

In general, though, market power has not been a significant issue in most permit markets. In some marketable permit programs, the accumulation of allowances is unlikely to generate monopoly-type

---

[761] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 33.
[762] T.H. Tietenberg, Emissions Trading: Principles and Practice 150 (2006, 2d ed).
[763] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 20 (1981)
[764] T.H. Tietenberg, Emissions Trading: Principles and Practice 157 (2006, 2d ed).
[765] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 20 (1981)
[766] Robert Glicksman, Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development, *supra* note 443.
[767] Leard & McConnell, *supra* note 32, at 2, 7, 15, 26.
[768] *Id.* at 28.
[769] EPA, Manufacturer Performance Report for 2015 MY (2015); *compare* EPA, Manufacturer Performance Report for 2014 MY.
[770] In 2015, there were 5 sellers and 7 buyers, up from 3 and 3 in 2013. EPA, Manufacturer Performance Report for 2015 MY.
[771] FTC, Comments of the Staff of the Bureau of Economics on Protection of Stratospheric Ozone (1988).
[772] Stratus Consulting for Northwest Fisheries Science Center, NOAA, A Nationwide Survey of Conservation Banks (2003).

powers, either because of the high number of market participants (as with air markets) or because the underlying good is a globally competitive market (as with fish).[773] Regulators have also often preempted the risk of hoarding and market power by imposing position limits, either on the purchasing or the holding of allowances, including the total banking of allowances.[774] For example, the Federal Communications Commission limits stockpiling and speculative trafficking,[775] and California's cap-and-trade program for greenhouse gases has both purchase and holding limits.[776] Exchanges also typically set their own purchase limits.

Position limits to protect against market power can be derived from formulas based on elasticities and other factors. However, regulators may want to go beyond the minimum limit necessary to prevent market power, in order to prevent inequitable concentrations short of monopolies, or to further other management goals.[777] For example, most fisheries score low on the Herfindahl-Hirschmann Index for market concentration: the red snapper fishery's scores were all below 190 (recall that anything under 1500 suggests no market power).[778] Yet most fish catch share programs have position limits. These limits are designed more to protect traditional fishers and communities than to prevent true monopolies.

Several other regulatory tools besides position limits can minimize the risk of market power and ensure sufficiently thick markets. Monopoly risk is less common in auctions.[779] Regulators can reserve a supply of allowances to be sold at set price in case of hoarding. Position accountability triggers would simply require a permit holder wishing to exceed a certain threshold of allowances to submit to additional reporting and oversight.[780] Regulators can help minimize transaction costs and ensure adequate participation by supporting or operating brokerages or exchanges.[781] Finally, credit generators will be reluctant to spend money generating credits if they are not confident that sufficient market demand will exist to sell their credits at a profit. To counteract uncertainty for would-be market participants about whether supply or demand will exist, regulators can support the use of clearinghouses, which guarantee performance and so lower risk for buyers and sellers.[782]

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

F. Speculators and Other Participants

Regulators must decide whether to restrict market participation to regulated entities or to allow in third parties and the general public. Brokers and market makers enter a market seeking profit, but they also provide much-needed liquidity and lower transaction costs. Hedgers may be looking either to profit on speculation or to offset financial exposure. For example, the firms that produce abatement technologies and clean energy companies do not have a compliance obligation under a greenhouse gas cap-and-

---

[773] Tom Tietenberg, Tradable Permits in Principle and Practice, *supra* note 181.
[774] EDF Comments to CFTC (2010).
[775] Pablo Spiller & Carlo Cardilli, Toward a Property Rights Approach to Communications Spectrum, *supra* note 70.
[776] C2ES, *supra* note 659
[777] Lee Anderson & Mark Holliday, Nat'l Marine Fisheries Serv., *The Design and Use of Limited Access Privilege Programs* (2007).
[778] Nat'l Marine Fisheries Serv., Red Snapper IFQ Five-Year Review (2013).
[779] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 20 (1981); see also Hahn (1983), cited in Tietenberg 2006 at 155.
[780] CBO, Evaluating Limits (2010).
[781] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 21 (1981)
[782] Also government guarantee to purchase any unsold credits in early years. WRI, Addressing Risk and Uncertainty in Water Quality Markets (2014).

trade, but face financial exposure to changes in carbon allowance prices.[783] Advocacy groups and the general public may even want to enter a market to purchase and retire credits to promote environmental objectives. Broader markets with more participants facilitate price discovery, help with liquidity, and decrease the risk of price manipulation.[784] The Federal Trade Commission generally advises making market open to all participants, since involving third parties lets markets transfer risk to those best able to absorb it.[785]

On the other hand, excessive speculation can result in bubbles and price decoupling, as price no longer tracks mitigation costs and becomes inflated, distorted, or manipulated.[786] Some environmental advocates argue that too much liquidity undermines the goals of an emissions market: as the cap tightens, it is supposed to be harder to find a seller, to provide incentive to make extra reductions.[787] However, participation restrictions that shut out speculators will raise transaction costs and may be hard to enforce. For example, several large investment banks already own power plants and transmission facilities, and even if shut out of an air pollution market as speculators they could enter it as regulated entities.[788] In fact, participation restrictions may ultimately not address the risk of excessive speculation. If speculators are shut out, some covered entities will try to fill that role to provide liquidity and enable hedging. These entities will likely not be as experienced or as effective as speculators are at absorbing risk, and as a result, market stability will decline.[789] For example, while EPA expects that the only parties without renewable fuel volume obligations who will hold renewable fuel credits are the middlemen in fuel transactions like blenders,[790] there have been accusations that some of these actors behave as speculators. Instead of participation restrictions, position limits and price circuit breakers may be better tools to address the risk of excessive speculation.

Marketable permit programs vary widely on participation restrictions. Anyone can participate in the acid rain market,[791] and the public has used this openness to occasionally purchase and retire credits. By contrast, in EPA's vehicle greenhouse gas program, third parties may facilitate trades but only manufacturers can hold credits and transact.[792] The ocean quahog catch share program allows the transfer of permits to anyone *eligible* to own a Coast Guard-approved vessel regardless of actual vessel ownership—essentially, any U.S. citizen or corporation may participate.[793] In the Gulf of Mexico Red Snapper catch share program, 32% of all accounts, holding 28% of shares, were "public participants" without a commercial fishing permit.[794] Other fish catch share programs restrict transfers to maintain character of the fishery,[795] such as blocking purchases by partnerships or requiring quota holders to be on board the vessel using the quota. Conservation mitigation markets typically allow a range of actors to

---

[783] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 15.
[784] C2ES, *supra* note 659.
[785] FTC, Comments of the Staff of the Bureau of Economics on Protection of Stratospheric Ozone (1988).
[786] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 20, 23.
[787] Michelle Chan, *supra* note 688.
[788] CBO, Evaluating Limits (2010).
[789] *Id.*
[790] EPA, Annual RIN Sales/Holdings Summary (listing categories as: importers, exporters, refiners, and parties without a renewable volume obligation (for example, renewable producers, fuel marketers, and fuel blenders)).
[791] Jonathan Nash & Richard Revesz, Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants, 28 Ecol. L. Q. 569 (2002).
[792] EPA, Manufacturer Performance Report for 2015 MY (2015).
[793] NOAA, Economic Performance of U.S. Catch Share Programs, NMFS-F/SPO-133 (2013).
[794] Nat'l Marine Fisheries Serv., 2014 Gulf of Mexico Red Snapper IFQ Annual Report (2015).
[795] NMFS, Catch Share Spotlight: Alaska Halibut/Sablefish IFQ.

qualify as credit bank sponsors:[796] as of 2013, 73% of banks were private commercial, 5% were government sponsored, and only 2% were operated by non-profit organizations.[797]

G. Information and Communication

Regulators, market actors, and the public all have different needs for information on transactions in permit markets.[798] Categories of information include prices and quantities of bids and actual transactions; total number of allowances and credits in circulation; demand for allowances; and aggregate trading activity and the distribution of allowances across classes of participants.[799]

1. Information for the Regulators: Tracking Transaction

Regulators need to track transactions and permit holdings to detect fraud, manipulation, market power, and abuse, and to enforce compliance. This section surveys some of the tracking tools used by regulators in sample contexts, and identifies some programs where important information may not be available.

EPA uses the Allowance Management System (formerly called the Automated Tracking Service) to track trades in air pollution markets. The System numbers and serializes each individual allowance. It is not a trading platform itself, and so market participants manually record transfers either as they occur or retroactively upon submitting the allowance in question for compliance.[800] Total allowance holdings in accounts on the Allowance Management System are checked against the Emissions Tracking System (ETS).[801] The System does not record the prices of allowance bought or sold, or derivative transactions like options.[802] Similarly, EPA and the Department of Transportation seemingly do not require reporting of prices for their vehicle emissions and efficiency markets, and manufacturers do not report transactions as they occur, but only at the end of the compliance period.[803]

For the renewable fuel market, EPA originally tracked credits "on excel spreadsheets" checked once at the end of the year; the "practicalities of tracking a national credit scheme" in this manner was "fraught with errors."[804] The agency's solution was the EPA Moderated Transaction System. The System requires online submission of transaction records by each trading partner and offers immediate validation of status of the credits, for a more a real-time accounting.[805]

For state-based renewable electricity credits, ten separate tracking systems more or less follow the boundaries of regional transmission organizations or independent system operators.[806] A unique identification number is given to each megawatt-hour generated.[807] The Department of Energy's

---

[796] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2003) (Conservation banks can be publicly sponsored, privately sponsored, or run by entrepreneurial third parties).
[797] DOI Office of Policy Analysis, Conservation Banking Overview (2013).
[798] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 15.
[799] *Id.* at 15.
[800] Acid rain, reporting is not required until compliance deadline, but in fact many report in real time, and information (without price) is posted online. Jonas Monast, Climate Change & Financial Markets, *supra* note 722.
[801] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 10.
[802] *Id*.
[803] EPA, Manufacturer Performance Report for 2015 MY (2015).
[804] RIN Alliance, Making the RIN Program Work (2011).
[805] *Id.*; EPA, RINs under the Renewable Fuel Standard Program.
[806] NREL, Quantifying the Level of Cross-State Renewable Energy Transactions (2015).
[807] EPA, How is Renewable Energy Tracked?

National Renewable Energy Laboratory reportedly does not have data from all tracking systems on the number of banked credits in each state,[808] suggesting some gaps in the data exist.

The Regional Greenhouse Gas Initiative tasks an independent third party with monitoring the performance of auctions and the secondary market.[809]

At least some fish catch share programs require reporting of transaction information, including prices. However, in the grouper-tilefish program in 2014, 33% of share transaction records had no price information or reported unreasonably low prices, like $0.01 per pound (the number was 52% for allowance transactions). Another 31% of share transactions had mismatched information reported by the buyers and sellers.[810] Unreasonably low prices could be because of reporting errors, reluctance to enter price information, gifts, transfers to related accounts, package deals containing other terms, or unrecorded bartering.[811] The regional council for that fishery added a "reason for transaction" reporting requirement, but in 2014, 17% of share transactions and 46% of allowance transaction declined to state the nature of the transaction.[812] Some unusually high prices were also reported, but the National Marine Fisheries Service does not fully disclose them in its annual reports.[813] Industry feedback suggests that privacy concerns may lead some fishers to deliberately misreport prices.[814]

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)."[815] This problem, largely still unresolved, was first flagged by the Government Accountability Office (GAO) in 2002. GAO expressed concern that the National Oceanic and Atmospheric Administration was underestimating the consolidation of permits in the fishing industry, because the agency could not identify links between different holders who were actually part of a single corporation or family business.[816] In 2014, the National Oceanic Atmospheric Administration's inspector general found that the Pacific sablefish catch share program did not track individual permits and was using paper-based records subject to error.[817]

The Army Corps of Engineers developed the Regulatory In-Lieu Fee and Bank Information Tracking System (RIBITS) to monitor wetland mitigation credits and debits.[818] The Fish and Wildlife Service and the National Oceanic and Atmospheric Administration also use RIBITs to track conservation banking.[819] In 2013, the Department of the Interior's Office of Policy Analysis raised questions about whether RIBITS collected and published enough data.[820] As of 2015, the Corps has been working to make data entry more timely and to integrate mitigation plans and monitoring reports.[821]

---

808 NREL, Quantifying the Level of Cross-State Renewable Energy Transactions (2015).
809 Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 9.
810 Nat'l Marine Fisheries Serv., 2014 Grouper-Tilefish IFQ Annual Report (2015).
811 *Id*.
812 *Id*.; *see also* Nat'l Marine Fisheries Serv., 2014 & 2015 Gulf of Mexico Red Snapper IFQ Annual Reports.
813 Nat'l Marine Fisheries Serv., 2014 Grouper-Tilefish IFQ Annual Report (2015).
814 Nat'l Marine Fisheries Serv., Red Snapper IFQ Five-Year Review (2013).
815 Nat'l Marine Fisheries Serv., 2014 Grouper-Tilefish IFQ Annual Report (2015).
816 GAO, Better Information Could Improve Project Management, GAO-03-159 (2002).
817 Dept. of Commerce Office of Inspector General, Review of NOAA Catch Share Program (2014).
818 https://ribits.usace.army.mil/ribits_apex/f?p=107:2
819 Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).
820 DOI Office of Policy Analysis, Conservation Banking Overview (2013).
821 Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015).

The Corps has also suggested that states could use RIBITS to track state-based water quality trading programs.[822] Historically, EPA has had two water quality permit data tracking systems (PCS[823] and ICIS), but neither is structured to actually track trades: instead, manual adjustments are required to reflect any transactions. For example, a credit seller would report the sum of its actual discharge plus any credits sold as its reported discharge, and the tracking system would have to confirm that sum is greater than or equal to that firm's individual pollution limit.[824] Some states assign water quality credits a unique serial number and vintage year, like the Ohio River trading program;[825] 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.[826]

Finally, though some information on marketable permit holdings and transactions may be included in public financial statements, inconsistent accounting practices make it hard to compare such statements. Are allowances zero basis, fair value, or revenue? Are they intangible assets, inventory, current assets, or deferred expenses? According to the International Carbon Action Partnership, such inconsistent accounting practices increase the risk of risk of laundering and fraud.[827]

Recommendation: Marketable permit programs should assign unique serial numbers to allowances and credits. Registries should track the status of each allowance and credit[828] 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.

2. Information for Market Actors: Price Discovery

Market participants need accurate information on prices and allowance availability to make appropriate decisions about whether to purchase allowances.[829] "Transparent and timely information about current and future market clearing prices" is "a condition for achieving low costs."[830] Besides market participants, other actors—like developers of abatement technologies—need market data, for example to determine a strategy for developing and deploying new abatement technologies.[831]

However, too much transparency has a cost, as even reporting transactions and prices could reveal confidential business information about a firm's technology and costs to trading partners, competitors, and the public.[832] Speculators can take advantage of rich market data to anticipate and attempt to manipulate future prices.

Ideally there should be a single authoritative source of price information that brings together data from both secondary and derivative markets and puts all players on equal informational footing. Many commodity spot markets look to futures exchanges for current price information.[833] Exchanges might

---

822 *Id.*
823 PCS has been fully discontinued.
824 EPA, Water Quality Trading Toolkit (2009).
825 Nat'l Network on Water Quality Trading, Building a Water Quality Trading Program (2015).
826 *Id.*
827 International Carbon Action Partnership (2013).
828 Nat'l Network on Water Quality Trading, Building a Water Quality Trading Program (2015) (status of each credit: pre-implementation, implemented, verified, active, retired, suspended). Registries need to track whether quotas are encumbered with a lien, otherwise risk of transferring to purchaser without knowledge. NRC (1999).
829 Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 22.
830 *Id.* at 7.
831 *Id.* at 28.
832 *Id.* at 23.; Breger, Stewart, Elliott, & Hawkins, Providing Economic Incentive in Environmental Regulation, *supra* note 13.
833 Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 29.

charge fees for access to real-time, proprietary price data, and both the Securities and Exchange Commission and the Commodity Futures Trading Commission have grappled with balancing public access to information against the exchanges' interest in not giving away proprietary information for free.[834] Without reliable information on prices, buyers and sellers will have difficulty coming to terms, reducing the number of trades and limiting the market's efficiency. There may be a role for regulators to play as "information brokers."[835]

In several air pollution markets, poor price discovery has hindered trading, and EPA often makes no effort to facilitate price discovery. EPA's Allowance Management System, for example, does not include price information, which contributes to uncertainty.[836] In the lead phase-out trading program, a much greater proportion of large refiners traded than small refiners, perhaps because of informational and other 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.[837] Inadequate information about the market probably also contributed to RECLAIM's price spike in 2000, as the relatively smaller sources that populated the RECLAIM program probably needed more help navigating the market than larger sources would have, such as the power plants operating in the acid rain market.[838] Similarly, because EPA does not disclose the how many renewable fuel credits are traded by whom, it is difficult to discern whether the price spike of 2013 was due to banks hoarding credits.[839] By contrast, EPA has called for the source, quantity, and price of water quality trades to be publicly posted online,[840] though states largely have not followed through on that.

Neither EPA nor the Department of Transportation reports prices for trades in vehicle emissions and efficiency markets, and the Department of Transportation does not report any information on trading activity.[841] Researchers have been able to pull indirect evidence of prices by comparing non-compliance settlement agreements with SEC filing statements on sources of revenue,[842] but that hardly works for real-time price discovery.

Transaction data for fish catch shares is equally spotty. For grouper, tilefish, and snapper, the National Marine Fisheries Service's South-East Regional Office posts an "unofficial compilation" of shareholder information with contact and number of shares, but warns it may contain errors.[843] Alaska's sablefish and halibut program posts current information on the amounts of quota held by individual permittees[844] and summarizes a "description of transfers" but does not list prices.[845] Various annual reports on catch share programs contain similar summary statistics on transfers, but no details of actual trades.[846] In the National Oceanic and Atmospheric Administration's 2010 catch share policy, the agency promised to

---

[834] *Id.* at 29.
[835] Project on Alternative Regulation, *Marketable Rights: A Practical Guide to the Use of Marketable Rights as a Regulatory Alternative* 15 (1981).
[836] Jennifer Yelin-Kefer, *supra* note 279.
[837] Breger, Stewart, Elliott, & Hawkins, Providing Economic Incentive in Environmental Regulation, *supra* note 13.
[838] Lesley McAllister, Beyond Playing "Banker", 59 Admin. L. Rev. 269 (2007).
[839] Robert Glicksman, Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development, *supra* note 443.
[840] EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003).
[841] Leard & McConnell, *supra* note 32. NHTSA reports that since 2011, six manufacturers have traded 151 million CAFÉ credits, but does not disclose specifics and nothing in real time. EPA & NHTSA, Draft Technical Assessment Report: Midterm Evaluation, 420-D-16-900.
[842] Leard & McConnell, *supra* note 32.
[843] Nat'l Marine Fisheries Serv., FOIA IFQ Shareholders.
[844] IFQ Halibut and Sablefish Permits and Licenses, alaskafisheries.noaa.gov.
[845] Alaska Sablefish and Halibut, Number and Description of QS/IFQ Transfers for Year 2016.
[846] Nat'l Marine Fisheries Serv., 2014 Grouper-Tilefish IFQ Annual Report (2015).

help prevent uninformed transactions by establishing a source of authoritative market information and an exclusive central registry for permits.[847] In fact, the Magnuson-Stevens Act required such a central registry by 1997.[848] Yet at least as of 2013, "there is no Central Registry System in place."[849]

EPA has received "positive feedback from the regulated industry that the publication of Renewable Fuel Standard data helps inform compliance planning."[850] Nevertheless, price information for renewable fuel credits are only available through third parties for a fee,[851] and EPA's data on sales and holdings, meant to be updated annually, does not seem to have been updated since early 2015.[852] In state-based renewable electricity markets, credit prices "can be difficult to determine without the assistance of a broker, and even then, available information only indicates the transactions made by one broker."[853] Only a few jurisdictions (Maryland, Pennsylvania, and DC) require disclosure of renewable electricity credit prices.[854]

The Federal Communications Commission's spectrum auctions are conducted online and results are publicly available in near real-time.[855] 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 was blocking secondary trading.[856] FCC's License Search now lets buyers look for leasing opportunities,[857] 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.[858]

Recommendation: Without revealing proprietary information or too much confidential business information, regulators should act as information brokers, collecting information on trade prices and volumes across secondary and derivative markets, to facilitate price discovery.

3. Information for the Public: Transparency and Participation

The public needs some ability to assess and comment on both the rules establishing a trading program and the implementation of that program. To some critics, marketable permit programs are more opaque than traditional regulation, obscuring how much firms are allowed to pollute and how much they are actually polluting.[859] To proponents Bruce Ackerman and Richard Stewart, marketable permits programs advance democratic goals better than traditional regulation, since a market-based environmental regulatory approach will focus political debate on the level of desired environmental quality rather than on arcane technical questions.[860]

---

[847] NOAA Catch Share Policy (2010).
[848] Magnuson-Stevens Act § 305.
[849] NMFS, Electronic Monitoring White Papers, Feb. 15, 2013.
[850] EPA, Annual RIN Sales/Holdings Summary (last updated Apr. 1, 2015).
[851] Argus, RIN Prices, http://www.argusmedia.com/methodology-and-reference/key-prices/argus-rin-prices/.
[852] EPA, Annual RIN Sales/Holdings Summary (last updated Apr. 1, 2015).
[853] Dept. of Energy-EERE, REC Prices.
[854] *Id.*
[855] FCC, About Auctions, *supra* note 67.
[856] Michele Farquhar & Ari Fitzgerald, Legal and Regulatory Issues Regarding Spectrum Rights Trading, 27 Telecomm. Pol'y 527 (2003).
[857] FCC, Secondary Markets Initiative.
[858] Reboot.FCC.gov.
[859] Andrew Wolman, Effluent Trading in the United States and Australia, *supra* note 229.
[860] Bruce Ackerman & Richard Stewart, Reforming Environmental Law: The Democratic Case, *supra* note 255.

In the past, some agency guidance on marketable permit programs has not been submitted for public comment (see Section I.D.4). Even when rules for marketable permit programs have been submitted for public comment, they are sometimes short on details, as the Federal Trade Commission pointed out in critiquing the Federal Aviation Administration's 2008 effort to create an auction for airport landing slots.[861] Other programs require rigorous public input for their creation. A new fish catch share program in New England or the Gulf or Mexico, for examples, requires a two-thirds vote approval on referendum to current permit holders, following public hearings and public comments.[862]

In terms of monitoring transaction information, too much public transparency risks revealing confidential business information.[863] However, if all information on trading is considered confidential, as with the ozone-depleting substance market, it is difficult for the public to gauge the program's effectiveness.[864] Every marketable permit program must confront this balancing act. 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. Different programs have resolved this matter differently: the Ohio River Basin trading program withholds project location, while Florida's water quality trading programs disclose the identity of both buyer and seller.[865]

Ultimately, 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. While regulators need full, real-time access to a range of transaction data to uncover manipulations,[866] and market actors may need regular information to facilitate price discovery, the public's needs are not as great. Weekly disclosure of aggregate holdings and transaction data without information on individual actors or trades is likely sufficient, supplemented perhaps by more detailed and individualized disclosures of holdings on a one-quarter delay (in line with the SEC's quarterly disclosures of material information).[867] For example, the Commodity Futures Trading Commission publishes weekly reports on derivative transactions, enough information to let the public gauge the overall level of trading.[868] More transparency could raise the risk of excessive speculation and collusion,[869] and could reveal confidential business information.

Because detailed, real-time public disclosures on individual trades may not be beneficial, public comments on individual trades may also not be appropriate, let alone practical. Most marketable permit programs do not provide for public comments on individual transactions. For example, while public notice and comment must be provided on Clean Water Act discharge permits, if the general conditions for trades are detailed in the permit, EPA does not require additional notice and comment on subsequent specific trades.[870] Most state-run water quality trading programs provide for comments only on trading plans, not individual trades.[871] Similarly, the Fish and Wildlife Service's 2016 policy on

---

[861] FTC Comments to FAA, Notice 08-04 (2008).
[862] 50 C.F.R. § 600.1310.
[863] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 23.
[864] T.H. Tietenberg, Emissions Trading: Principles and Practice 9 (2006, 2d ed).
[865] Nat'l Network on Water Quality Trading, Building a Water Quality Trading Program (2015).
[866] Accusations of collusion against new entrants and uncertainty about value in the airport landing slot market led FAA to propose reforms in 2015 to increase transparency and public participation, 80 Fed. Reg. 1273; rule withdrawn in 2016.
[867] Jonas Monast, Climate Change & Financial Markets, *supra* note 722.
[868] Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 27.
[869] EDF Comments to CFTC (2010).
[870] EPA, Water Quality Trading Policy, 68 Fed. Reg. 1609 (Jan. 13, 2003).
[871] Wisconsin water quality trading sends trading plans for comment; Pennsylvania provides notice and comment after complete proposal is submitted; Minnesota only provides comment on trades occurring outside of an approved plan, regular

conservation banking provided for stakeholder participation in landscape-scape planning but not necessarily for individual permits and transactions.[872] When endangered species act permits do go through public notice and comment, details may be limited: for example, a recent request for comments on an application for an Endangered Species Act Section 10 permit mentions that credits would be bought from an approved bank but does not specify which bank, how many credits, or what trading ratios may apply.[873]

Many of the data gaps facing market actors discussed above are the same for the general public: data on prices, for example, often is unavailable. In some cases, market actors may have access to additional data for a fee. For example, while RIBITS does not disclose price and other market data about conservation and wetland banking, some third parties have started collecting proprietary information which they sell to interested parties.[874] Meanwhile, "very little ecological and economic data on conservation banks is freely available to the public."[875] Even the data available on RIBITS is not easily accessible in a user-friendly manner for average citizens: it has restricted access and is partly encrypted,[876] though the Army Corps has been working to improve accessibility in recent years.[877]

Recommendation: Agencies should consider implementing a system of weekly or quarterly public disclosures, which generally should be adequate to provide the general public with sufficient information to assess the marketable permit program's efficiency and effectiveness.

4. Information on Related Markets

Regulators need to monitor international markets and related private markets as well.

Some state-based marketable permit programs have international links. Even if allowance trading is not linked internationally, there is a risk that derivative markets tied to U.S. allowances could be hosted by foreign jurisdictions, possibly including countries with lax oversight.[878] Regulators also need to ensure that firms do not attempt to escape position limits by holding some assets abroad, in a scheme known as the "London loophole." The Commodity Futures Trading Commission has an information-sharing agreement with the United Kingdom,[879] though it does not specifically address permit markets and derivatives, and it does not cover other countries. Regulators need to coordinate with other countries to effectively monitor large, valuable permit markets, like greenhouse gas markets.

Regulators also need to monitor related private markets. Regulatory markets and private markets interact. For example, the European Union's Emission Trading System proved that greenhouse gas allowance prices will be linked to the price of other energy commodities, and traders will pursue arbitrage strategies involving simultaneous transactions on both markets.[880] Excessive speculation in private markets—as is widely suspected in the energy markets—could lead to distortions that will spill

---

permits do not go through comments. Nat'l Network on Water Quality Trading, Building a Water Quality Trading Program (2015).

[872] Notice of Final Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).

[873] 81 Fed. Reg. 62,758 (Oct. 12, 2016),

[874] like EcoBlue Analyst DOI, Office of Policy Analysis, Results from a Survey of Conservation Bank Sponsors (2016). EcoBlue charges $199 for report

[875] DOI, Office of Policy Analysis, Results from a Survey of Conservation Bank Sponsors (2016).

[876] Robert Glicksman, Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development, *supra* note 443.

[877] Ecosystem Marketplace, State of Biodiversity Markets (2011).

[878] EDF Comments to CFTC (2010).

[879] CBO, Evaluating Limits (2010); Jonas Monast, Climate Change & Financial Markets, *supra* note 722.

[880] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 2 (2008).

over to the permit market.[881] Interactions between conservation permit markets and real estate markets could also give rise to undesirable arbitrage opportunities. As Salzman and Ruhl show, if the real estate underlying some credit-generating acres is priced more cheaply than others, the resulting arbitrage could irreversibly damage certain kinds of habitat located on cheaper real estate.[882]

5. Intra-agency Communication and Resource Sharing

Ideally, a federal agency will set the tone for its staff, regional offices, or state implementers to execute a trading program. In practice, support for trading programs varies across different levels of government and different staff positions. The National Marine Fisheries Service has no official guidance on conservation banking, leaving regional offices like the West Coast to develop their own approaches.[883] Conservation banks reported general lack of support and varying levels of support across local Fish and Wildlife Service officials;[884] likely ecological conditions are not the only reason why California—where conservation bank first began—is home to 76% of all conservation banks.[885] Shockingly, in 2013, only 68% of surveyed Fish and Wildlife staff were familiar with the Service's own 2003 guidance: only 30% "very familiar," with another 38% claiming to be "somewhat familiar."[886] Many Fish and Wildlife field officers personally viewed conservation banks positively, but were unsure whether the regional and national offices really supported banking.[887] Stakeholders report that support for water quality trading varies by EPA regional office and by state, and—at least as of 2008—was particularly spotty among legal counsel and permit writers.[888] Miscommunications between regional EPA offices and state agencies regarding the scope of trading programs has led to confusion.[889] Similarly, while the Army Corps has an established preference for mitigation banks over fees or permittee-responsible,[890] many wetland bank sponsors indicate that district officials will only approve banked credits for small wetlands offsets and are reluctant to approve banked credits for large mitigation projects.[891] Bank sponsors feel that many districts hold banks to higher standards and advise permit applicants that on-site, permittee-responsible mitigation is the cheaper and preferred options.[892]

The Fish and Wildlife Service'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.[893] 61% of Fish and Wildlife staff responsible for supervising conservation banks reportedly have no formal training on conservation banks.[894]

---

[881] Id. 2; *see also* Interagency Working Group on Carbon Market Oversight, Report, *supra* note 448, at 31 ("significant interactions between carbon markets and markets for fossil fuels").
[882] Salzman & Ruhl, *supra* note 6.
[883] NMFS West Coast Region, Conservation Banking Guidance (2015).
[884] Stratus Consulting for Northwest Fisheries Science Center, NOAA, A Nationwide Survey of Conservation Banks (2003).
[885] DOI Office of Policy Analysis, Conservation Banking Overview (2013).
[886] DOI, Office of Policy Analysis, Preliminary Analysis of the Conservation Banking Program and Results from a Survey of USFWS Staff (2013).
[887] Id.
[888] IEC, Water Quality Trading Evaluation, *supra* note 50.
[889] Id.
[890] Corps-EPA Final Rule, Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19,593 (2008).
[891] Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015).
[892] Id. Corps disagrees and says that in some regions, bank credits are simply not available always. Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015).
[893] DOI, Office of Policy Analysis, Results from a Survey of Conservation Bank Sponsors (2016). See also 2013 survey. DOI, Office of Policy Analysis, Preliminary Analysis of the Conservation Banking Program and Results from a Survey of USFWS Staff (2013).
[894] Id.

Lack of sharing of information and resources between field offices and states is a missed opportunity for efficiency. Poor information sharing between Fish and Wildlife field offices has been reported,[895] and states have asked for more training and support from EPA on water quality trading.[896] EPA has encouraged states to share resources to support water quality trading, like a single credit registry serving multiple markets,[897] but such sharing has not yet materialized. Trading programs can be costly to build from scratch, yet many states continue to reinvent the wheel. A 2015 workshop on water quality trading recommended reducing start-up costs for states on water quality by standardizing design and sharing resources, and EPA and USDA agreed in 2016 to pursue a national registry platform for credits.[898] EPA's EnviroAtlas now includes locations of water quality trading programs, and more pointedly EPA supported Maryland's development of a credit registry platform designed to work throughout the Chesapeake Bay watershed, with other states in that watershed having been consulted and showing interest in joining.[899]

Some federal agencies do provide training to regional and local officials. From 2008-2009, the Army Corps and EPA held six workshops to train federal and state officials about wetland mitigation banking, and many districts developed their own workshops for staff and the public.[900] The National Oceanic and Atmospheric Administration has pledged sharing technical expertise, administrative support, and assistance with outreach about catch share programs to the regional fishery councils.[901] The Federal Communications Commission hosted numerous trainings on its novel broadcast incentive auction.

Recommendation: 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.[902] Federal agencies should provide clear guidance on trading policy to regional and state officials, including through trainings. Public trainings are also useful.[903]

6. Inter-Agency Communication

Regulators need to share information and resources to streamline credit approvals, to ensure consistent monitoring of markets for manipulation, and to avoid reinventing the wheel.

Credit approvals may implicate the jurisdictions of multiple agencies. For example, wetland credits must not violate endangered species act standards. Fish and Wildlife Service staff report that poor coordination with other federal agencies contributes to delayed reviews of conservation banks.[904] Similarly, wetland mitigation bank sponsors report that interagency reviews are repetitive and accuse the Army Corps of failing to exercise its authority as chair of the interagency review process to make decisions.[905] The Corps has begun working to improve review times by clarifying responsibilities on interagency teams and by standardizing tools and practices.[906] Interagency coordination will become

---

[895] Id.
[896] EPA & USDA, Report on 2015 National Workshop on Water Quality Markets (2016).
[897] Id.
[898] Id.
[899] These details come from EPA's comments on the draft version of this report.
[900] Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015).
[901] NOAA Catch Share Policy (2010).
[902] Id.
[903] FCC has trainings, EPA holds regular training course on water quality trading. IEC, Water Quality Trading Evaluation, *supra* note 50.
[904] DOI, Office of Policy Analysis, Preliminary Analysis of the Conservation Banking Program and Results from a Survey of USFWS Staff (2013).
[905] Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015).
[906] Id.

even more important if credit stacking increases, as agencies will need to work together to detect double counting.[907]

Some agencies have been working to share resources. EPA and the Department of Agriculture have partnered on water quality trading, given the prominent role of farmers as non-point source credit generators. The two agencies coordinate on outreach, share information on rule developments that might affect water quality trading, and collaborate on developing tools and informational resources.[908] The Army Corps is working to integrate RIBITS data with Fish and Wildlife Service and EPA databases.[909]

Finally, agencies need to share information to ensure consistent protection against manipulation across interconnected markets. Regulators with oversight authority over primary and secondary permit markets need to coordinate with the Commodity Futures Trading Commission (CFTC) on derivative markets, with regulators that may oversee related commodity markets, like the Federal Energy Regulatory Commission, and with the Federal Trade Commission and the Department of Justice on antitrust matters.[910]

On March 15, 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.[911] The memorandum provides structure to the relationship, to help avoid duplicative information requests, coordinate investigative and enforcement activities, prevent further sharing of data beyond CFTC, allow direct access to databases, protect proprietary information, and assign responsibility for handling congressional or court subpoenas and Freedom of Information Act requests.[912] CFTC also has an information-sharing agreement with the Federal Energy Regulatory Commission.[913] However, CFTC does not have memoranda of understanding with EPA on other markets besides renewable fuel credits, or with other agencies responsible for marketable permit programs.[914]

CFTC has a history of turf wars and infighting with both the Securities and Exchange Commission and the Federal Energy Regulatory Commission.[915] As the financial crisis triggered by manipulation of credit default swaps made painfully clear, a system of multiple regulators, none with complete authority, can hamper efforts to monitor and manage systemic risk.[916] Too many regulators could lead to inconsistent standards, and sophisticated market actors will take advantage of inconsistencies through a kind of "regulatory arbitrage."[917]

The Dodd-Frank Act contained some provisions on inter-agency communications. The statute established an Office of Financial Research to end the stove-piping of information between different regulators, but reportedly the Office has yet to live up to its mission. The Act also created an Interagency Working Group on Carbon Oversight, chaired by CFTC: the working group satisfied its charge to issue a report on the oversight of carbon markets, and subsequently disbanded. Finally, the Act created an Energy and Environmental Markets Advisory Committee within CFTC, but the Committee has only met

---

[907] Royal Gardner and Jessica Fox, Legal Status of Environmental Credit Stacking, 40 Ecol. L. Q. (2013).
[908] USDA Press Release, #0226.13, 12/3/13 (summarizing 11/18/13 partnership agreement).
[909] Corps, Institute for Water Resources, The Mitigation Rule Retrospective (2015).
[910] For example, NOAA is authorized to consult with other federal agencies on information collection to determine any anti-competitive, price collusion or price fixing. 16 U.S.C. § 1853a(c).
[911] EPA-CFTC, Memorandum of Understanding on RFS Data, Mar. 15, 2016.
[912] Id.
[913] Press Release, Jan. 2, 2014.
[914] GAO, Carbon Trading: Current Situation and Oversight Consideration for Policymakers (2010).
[915] EDF Comments to CFTC (2010).
[916] GAO, Carbon Trading, *supra* note 914.
[917] EDF Comments to CFTC (2010).

three times since its creation and no panel has been on an obviously environmental market-specific topic.[918] The Congressional Research Service has recommended an "umbrella group . . . to prevent regulatory gaps or conflicts" in environmental permit markets, modeled on President Reagan's Working Group on Financial Markets.[919]

Recommendation: Regulators should explore additional memoranda of understanding with agencies responsible for markets related to permit markets. In particular, the regulators of permit markets should develop relationships with CFTC to coordinate investigative and enforcement activities.

7. 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 stringency of the cap and measurements of firms' existing emissions may have allowed some traders to profit off nonpublic information.[920] Similarly, a study of the acid rain market suggests that price volatility correlates with both EPA and Congressional announcements on potential permanent changes to the regulatory scheme as well as with day-to-day announcements, such as notices of enforcement.[921]

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.[922] For example, requiring market participants to check agency website continually or rely on press coverage for new information creates opportunities for some participants to learn and trade on information before others.[923] 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.[924] Clear communication strategy is essential for market regulators, just as it is for central banks,[925] since "noise" can create inefficient price volatility.[926]

Recommendation: Marketable permit regulators should develop communication policies to prevent pre-publication leaks and information asymmetries.

---

[918] Advisory Committee website.
[919] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 37-38.
[920] *Id.* at 7.
[921] Claudia Hitaj & Andrew Stocking, Market Efficiency and the U.S. Market for SO2 Allowances (CBO Working Paper, 2014).
[922] Mark Jickling & Larry Parker, CRS, Regulating a Carbon Market 35.
[923] Claudia Hitaj & Andrew Stocking, *supra* note 921.
[924] *Id*.
[925] *Id.*
[926] *Id.*