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Encouraging Recycling Using Tradeable Credits

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Many cities in the United States have found that after collecting, sorting and bundling recyclable materials, no market exists for these goods. Rather than recovering the costs incurred in collecting recyclable materials, sanitation departments either receive little for these materials, or in some cases must bear an additional cost to have the materials taken away. To address this situation, policy analysts are considering ways to stimulate markets for recyclable and recycled products. One option proposed recently in the U.S. Congress is the development of a tradeable credits program for recycled material. Similar to the air quality emissions tradeable permits program, the government would require U.S. firms to use an established amount of recyclable material in production, or purchase "recycling credits" from a firm that has exceeded recycling levels. This paper analyzes the tradeable credits program, its advantages and disadvantages, and details many difficult issues of implementation. This paper argues that such a program would provide a necessary stimulus for the development of a healthy market in recyclable and recycled products.

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INTRODUCTION

Solid waste management in the United States is undergoing a dramatic transition towards resource conservation, reuse, and recycling. Recovery of municipal solid waste has increased dramatically during the last decade and is expected to continue to grow. The U.S. Environmental Protection Agency (EPA) predicts that total recovery of waste will jump from its current level of 10 percent to between 20 percent and 28 percent by 1995, more than doubling the amount of recyclable material on the market that would compete with virgin material (Franklin Associates 1990, 73). Yet the demand by manufacturers for recycled feedstock such as newsprint, cardboard, office paper, glass, and plastic bottles continues to lag behind the supply of these scrap materials. While some recycled material markets (aluminum, post-industrial paper waste, etc.) have been mature for years, other recycled commodities (glass, newspaper, plastic resins, etc.) have had a difficult time competing for market share. The resulting imbalance between supply and demand has depressed material prices and slowed growth in the supply of recyclable materials.

Traditionally, recovered material markets have been demand driven. Metals, some kinds of paper, and other higher value materials have been sought by entrepreneurs who could profit by recovering these materials and selling them at a higher value. But greater environmental awareness and a recognition of the limits to natural resources led to recycled materials markets which are increasingly supply driven, characterized by more material gluts than shortages. While every year the markets improve, both in terms of demand and price stability, recycled material is far from being universally accepted as a feedstock.

To accommodate this increase in the amount of recyclable material without causing significant dislocations and oversupply of these materials requires innovative and global thinking. Some of the ideas that have been implemented include content legislation, subsidies for material recovery operations, "buy recycled" legislation, and product bans. These efforts were by necessity and design both piecemeal and limited in geographic scope. Yet the materials economy is not local, but regional and even national in scope; accompanying market development strategies should use an equally large-scale approach.

A successful recycling credit program will assist in the reconfiguration of our industrial processes so that they can accept byproducts (wastes) from other processes as raw materials. Ideally, these processes would become self-sufficient by feeding on each other's waste. Recovered materials would be used for the highest end-use[1] possible and then recycled into lower and lower end uses. This both maximizes the value of recovered material and minimizes overall industrial reliance on virgin materials.

What incentives can be provided to encourage the recovery of even

more materials? One proposal now being considered by Congress to stimulate demand for recycled material is the recycling tradeable credits program (McHugh 1992). This essay will discuss how the tradeable credits program might provide broader incentives, linking environmental values with the discipline of a free market economy. The article will first describe the tradeable credits program and its two variants, content-based and utilization-based credits. It will then evaluate the advantages and potential difficulties the program might face based on experience with the tradeable credits program to improve air quality. Finally, the paper identifies additional implementation guidelines and critical issues that will need to be addressed.

Tradeable Credits

In a tradeable credits system, the government would establish a threshold level of recycled content for products that firms must meet through product or process changes or purchases of credits that allow them to fall short of the threshold. If a firm exceeds the threshold, it is given credits that it may sell (at a market determined price) to those firms that failed to meet the recycled credit requirement. When done properly, permit trading creates economy-wide incentives to apply technical ingenuity to maximize material recovery without placing undue constraints on economic behavior (Project 88 1991, 55). Producers are therefore provided with incentives to implement technological innovation without fear of regulatory reprisal. In fact innovation would be rewarded.

Content-Based Recycling Credits

The two recycling credits systems that have been proposed are the content-based recycling credits and utilization-based recycling credits. In applying a content-based system, the first step is taken by the federal government, which sets recycled content percentage goals for manufacturers to meet. Then those manufacturers which exceed the goals can sell credits from their excess use of recycled feedstock to those manufacturers whose use of recycled feedstock falls short of the goals. The government would ratchet up the recycling goals on an annual basis. This system directly subsidizes manufacturers that use recycled feedstock, and penalizes those that do not. For example, if a 30 percent content goal for newsprint is set, then a 100 ton-per-day (TPD) newsprint manufacturer who uses 50 TPD of old newsprint earns credits for 20 TPD of recycled newsprint. It may then sell this 20 TPD credit to another newsprint manufacturer who has fallen short of its content requirement.

Content-based recycling credits systems are most appropriate for products that can be used as a feedstock for remanufacturing the same product[2] (e.g. old newsprint (ONP) remanufactured into new newsprint). The

current Resource Conservation and Recovery Act (RCRA) reauthorization legislation, proposes such systems for recycled newsprint and lead batteries (42 U.S.C. § 6901 (1982 & supp. III 1985)).

The content-based system grew out of the air quality emissions tradeable credits program that has been implemented in some regions of the United States. Some of the advantages of content-based credits are that they:

- Contain the program within a **single industry**, enabling self-regulation with minimal government oversight;
- Favor multi-plant corporations which **encourages trading between plants**;
- Favor manufacturers that **already use recycled feedstock**; and
- Achieve **"highest end use"** recycling where recovered products are remanufactured into the original product.

The primary disadvantage is that content-based credits are feasible only for homogeneous industries producing a few simple products.

Utilization-Based Recycling Credits

As with content-based systems, the government must first establish a recycling goal for the targeted product. State-approved recovery facilities that recover the targeted material would then sell credits to the manufacturers of that product. Different credit values could be given for different types of recovery processes — glass recovered for bottle cullet may receive one credit per ton recovered, while glass recovered for glassphalt may receive 1/2 credit per ton recovered.

In the case of tires, the government may set a 20 percent recycling goal. Then tire manufacturers would have to purchase credits representing 20 percent of the tires they sold in a given year. For example, if a tire manufacture sells 100,000 tons of tires annually, it must purchase credits worth up to 20,000 tires. These credits could be generated internally by the manufacturer's own recovery programs or would be bought from retreaders, recyclers, incinerators, and other eligible third parties which recover tires.

Utilization-based credits systems are applicable to materials that are remanufactured mostly by "processors" and similar "third parties" rather than the product's manufacturers. This system favors third-party recyclers and encourages manufacturers to set up their own internal recycling systems.

A utilization-based system has a variety of advantages over the content-based system. It can be more easily scaled up and applied to a whole industry or economy. It has fewer technical difficulties in dealing with complicated production processes and can more effectively accommodate major technical changes within the industry. The flexibility and overall

utility that this approach affords primarily comes from its capability as a system that can serve large-scale needs. The broad application of the program, however, presents both advantages and disadvantages.
The strengths are that the system:

- Forces **the producers most in need of incentives to participate** in a tradeable credits system;
- Allows manufacturers the **technical freedom** to change products or production processes;
- Strengthens the recovery and processing infrastructure by providing **financial support for targeted materials**; and
- **Reduces the price of recycled feedstocks** to manufacturers.

Its primary drawbacks, however, are that the system:

- Forces **all producers, including those unsuited to the incentives** (e.g. industry manufacturing goods from a wide variety of feedstocks like automobiles), **to participate** in the credits system;
- Requires **sophisticated material monitoring** to track accurately recycled feedstock within the system; and
- Relies on an administratively complex **national credit market** for efficient trading.

To administer and enforce such a system, a standards body could be developed that might be modeled after the American Society of Testing and Materials (ASTM). This administrative body would also require technical, financial, and economic expertise to handle industrial complaints about infeasible content requirements. As a potential commodity, credits could well develop into a quasi-independent market where puts and calls are traded as well as actual credits.

While both systems are likely to be effective, a content-based approach may provide a more focused approach for policy implementation. For instance, this approach allows credit programs to be aimed directly at a limited selection of markets over time. Although a utilization-based approach is more a comprehensive and even elegant approach to credit implementation, it would also require a great deal more administrative and political resources.

Benefits of the Tradeable Credits Program

Regardless of the variant adopted, the tradeable recycling permits system constitutes an effective incentive to economically achieve recycled content standards. Recycling credits will also work quite well in conjunction with other recycled materials market development measures. But there are a number of important strengths that the recycling credits system provides to encourage recycling. Specifically, recycling credits:

- **Provide a financial incentive to end-users of recycled materials.** Recycled material credits provide additional revenue for those operations

that efficiently recover materials, and extract additional costs for those that do not. Accordingly, manufacturers are encouraged to meet and exceed the amount of material recovery beyond the designated threshold.

- **Allow manufacturing facilities that do not use sufficient quantities of recycled feedstock to continue to operate.** "Command and control" minimum content requirements often force firms that cannot meet the environmental requirements to shut down. Under a credits system, however, manufacturing facilities that do not use recycled feedstocks may buy credits instead.
- **Form a financial cushion for recyclers when the economy is weak.** By providing an income source that is not tied to commodity prices, credits offset the severe price dips that recycled materials often experience. This reduces the risk of collectors and processors of recycled materials, and increases the willingness of lending institutions, venture capitalists, and entrepreneurs to invest in the recycling supply infrastructure.
- **Lower the costs of recycled materials for end-users.** By increasing per-unit revenues, credits will spur the supply of recycled feedstock; lower prices that result will make recycled feedstocks even more attractive to manufacturers.

Lessons from the Air Quality Credits Market

Experience with the air quality credits markets provides valuable insights into how best to design a credits system. While practical limitations have appeared, air quality credits trading schemes have been efficient in the achievement of their goals. Still, the credits program is criticized by various sectors. Many environmentalists and regulators are suspicious of market driven environmental regulation. Industrialists, on the other hand, argue that adjustments to the market in this case are not necessary. Legislators have been vulnerable to the lobbying of both industrialists and environmentalists for these reasons. (Dwyer 1992, 59-77). Finally, many regulators have also struggled with the difficulties of administering the credits programs (Dudek and Palmisano 1988, 217-56).

Several lessons about the implementation of a successful recycling tradeable credits system may be learned from the air quality credits example. In some ways the air quality credits market underperformed their expectations. For example:

- **Fewer trades** were consummated than predicted by modelers. Although the trading activity was considerable, more restrictive regulation and higher than anticipated transaction costs dampened overall market activity.
- **Modeled costs** included only the construction of new facilities, but did not anticipate the retrofitting of older facilities. Cost estimates for retrofitting proved to be considerably more difficult.

• **Uncooperative regulatory authorities** limited the scope of credit trading through inconsistent administration of the program and resistance to regulatory innovation.
• **Shortages of emissions banks**[3] considerably reduced the value of credits. Without emissions banks, firms are unable to retain credits for future use.
• **Weak emissions standards** reduced incentives to introduce technological innovation. If targets are easy to achieve, firms are unlikely to undertake capital intensive technical innovation programs (Tietenberg 1991, 100-5).

Clearly there is insight to be gained from the air quality emissions program.

Development of a feasible credits trading program requires that an efficient market in tradeable exist. The four conditions that have been identified as most critical for a successful recycling tradeable program are:
• **Universal Compliance** with recycled content regulations must be achieved. Every regulated firm must participate fully for the program to achieve threshold goals. Equally important, threshold standards must be set high enough to make it necessary for each firm to participate in the market.
• **Transaction Costs** for the credits must be minimized to ensure efficient trading. It is critical that the cost structure of the market be understood well enough to assess the potential transaction costs. If higher costs are unavoidable, credit brokers should be encouraged to take over market management. The market must also have the administrative structure to ensure that regulators do not purposely or inadvertently interfere with the functioning of the credit trading. This interference would inevitably raise transaction costs and detrimentally affect the trading market.
• **Market Competitiveness** must be maintained. Credit prices should reflect the internal costs and benefits of using secondary materials versus credit costs. Appropriate market behavior will be stimulated by creating "credit banks" where accumulated credits can be carried from one time period to the next. This in turn will promote trading by ensuring a long-term market in credits. Price setting behavior by any single firm or group of firms should be actively discouraged.
• **Market Longevity** must also be guaranteed in order to ensure the long-term value of internal capital investments and recycling credits. Actors must be confident that the market will continue to function and provide ready access to both buyers and sellers of credits. Longevity will be promoted by ensuring cooperative regulators and by developing a "credit bank" that will allow credits to retain their value from period to period. Additionally, the market should be verifiable and regulated to ensure that credit fraud does not become a problem (Project 88 1991, 58-60).

There is little doubt that implementation of air emissions tradeable credits program has resulted in tremendous savings to utilities that have

taken advantage of the system. Analysis of the EPA's program indicates that potential savings to utilities have ranged from $500 million to $12 billion. Given an investment of approximately $10 million, the cost savings have returned a considerable payoff to the investment (Dudek and Palmisano 1988, 217-56). Most of these savings have directly benefited utilities and their customers. Recycling credits hold similar potential to generate large benefits.

Additional Implementation Guidelines

The planner should anticipate potential problems in implementing a credits trading system. Past experiences with air emissions credits trading and other recycling efforts suggest that the program must strike a delicate balance between strictness and freedom. A healthy credit trading market requires a clear and simple set of rules that are easily interpreted by credit buyers and sellers, as well as by market regulators. There should be no confusion over which materials and products are affected by regulations.

The recycled material threshold must be chosen carefully. If the threshold is set too low, no credit trading will be induced. Yet if the threshold is set too high, it will have a dislocating and destructive effect on the industry it is regulating (Tietenberg 1991, 94). National waste disposal and recovery data should provide valuable assistance in developing the appropriate threshold.

Recycled content thresholds could be chosen based on the actual performance of a particular industry in a given year, and then increased incrementally to "lead" the industry in the desired direction. Goals set only slightly ahead of end-market performance have relatively little advantage over a laissez-faire approach yet entail the same overhead costs as an appropriately designed program. Regular readjustment of the goals would permit considerable market fine-tuning.

Recycled materials can be used in a variety of ways by end-users. Thus, the definition of what counts as a credit is important as well. Utilization-based credits allow the system administrators to value some types of recycling above others. For example, tires recovered for fuel might be assigned only one-half credit per tire, while tires recovered for retreading might be assigned a full credit. Similarly, old newsprint (ONP) used for animal bedding may be given a different credit value than ONP used for newsprint. In any case, a fair method of allocation of credits needs to be researched to minimize unfair benefit or harm to different producers or recyclers of goods.

In the same vein, the program should seek to minimize harm to manufacturers who use recycled feedstock for "low or no value" uses as they are vulnerable to significant declines in the supply of recycled feedstocks. For example, cellulose insulation manufacturers may lose their

supply of waste paper if the credit system shifts newspaper to newsprint mills. However, such shifts should be encouraged, because they represent higher material end uses.

It might be necessary to tailor recycling tradeable credits programs to different industries. It is unlikely that a single recycling credit system could be designed that would perfectly fit all target industries at all times. While careful attention should be paid to keeping the system as simple and universal as possible, it might be best to let the threshold vary among products depending on the availability of recycled materials, and the state of available recycling technologies.

If credits are to have the confidence of a traditional marketplace, fraud should be clearly illegal and punishable. Administrative agencies should have the right to "audit" and police any market actor. The consequences of abusing the system should be very high, with penalties such as fines (that fund the enforcement activities) and strict regulatory impositions.

Where possible, credit requirements should be simplified for different industries with distinct feedstock needs. For example, a ton of recovered newsprint should be given the same credit-value as a ton of recovered cardboard. This will greatly ease monitoring and tracking requirements, and provide maximum flexibility to the targeted industries. U.S. importers of targeted materials should also have to prove recycled material content or purchase recycling credits. By contrast, in order to avoid crippling export industries, production destined for overseas markets should be exempted from the recycling credit requirements. Together, these measures should provide a "level playing field" for all market players.

Because industry resistance may impede recycling tradeable credits programs for some target materials, their cooperation is key to long-term success. The administrative costs for the credits market will be substantially reduced if industry groups are willing to help make the system work and provide an important buffer between regulators and manufacturers.

Unresolved Issues

There are a number of critical issues for recycling credits programs that still need to be researched and resolved. First, before implementing the tradeable credits program, it must be determined that such a program is needed. Some industries have claimed that government intervention is unnecessary as recycling rates have increased significantly over the last few years, despite the general economic slowdown. They argue that the market is working as it should—low prices for recycled feedstock and increased demand for "green" products are encouraging more manufacturers to use recycled feedstock. For example, despite popular opinion to the contrary, the market for old newsprint has and will continue to improve markedly due to governmental legislation and recycled material market dynamics.

Responding to these forces, publishers have switched from entirely virgin paper stock to stock with a substantial amount of post-consumer recycled material. As a result, by the end of 1992, total newsprint production capacity in North America will have increased by nearly one million tons, with approximately 90 percent of it capable of using recycled fiber (Frey 1991, 33-42). This success leads one to question whether a credits system is required at all.

A credits system overlaid on the existing market economy may change the efficient outcome of transactions within that system. Efforts should be made to limit these changes so that they do not become distortions resulting in misallocation of resources and counterproductive decisions (such as manufacturers shifting from recyclable products for which they must purchase credits to non-recyclable products outside the credit system). In order to develop a successful trading system, the dynamics of the market and the practical effects of credits require detailed examination.

The credits system must keep pace with technological innovation to prevent manufacturers from unfairly benefiting or hurting from the credits system requirements. There is particular concern that high value materials will divert innovation, resources and effort away from lower value materials. These interactions are complicated and probably cannot be anticipated. The best way to protect against such difficulties might be to establish a strong administrative institution to react to changes and alter the system efficiently and effectively. Monitoring will require a subtle compromise between excessive oversight, which may lead to higher transaction costs, and excessive freedom which could tempt manufacturers to buy and sell fraudulent credits.

Tradeable credits programs have only worked when the government has independently verified key information. For example, tradeable credits for the phase-out of leaded gasoline was successful in part because the government knew the production levels of leaded and unleaded gasoline by major manufacturers. Tradeable credits programs for emissions of some air pollutants are successful because the government operates an independent monitoring program. The critical pieces of information needed to make the recycling tradeable credits program successful have yet to be identified.

Recycling credits are valuable only to the extent that there is a gap between the actual and "desirable" demands for recycled feedstock. Therefore, unless recycling thresholds are periodically raised upwards, credits will tend to be the most valuable at the beginning when the demand gap is largest. Yet, the overall program aim is to use the credits as an aid in transitioning from an entirely virgin material dependent economy to one that allows virgin materials to compete on a even footing. Therefore the importance of recycling credits should diminish as recycled feedstock becomes more completely integrated into the industrial community.

Actual policy initiatives will have to balance the tension created by the need to preserve market legitimacy and value while simultaneously phasing the system out.

Conclusion

Environmental regulation is at a crossroads. On one hand, the United States has twenty years of experience with aggressive federal leadership and focus on major air and water quality issues. On the other hand, while improvements have come, the monetary costs have been high, so economic considerations demand that any new environmental regulations include a cost minimization component.

Market-based regulatory efforts provide a partial answer. In theory at least, these measures can adjust market decisions to reflect more "true cost" resource allocations. This market reallocation will help to rationalize resource use within industry. A recycling tradeable credits system will both provide an efficient regulatory mechanism and help place a cost on the externalities of waste. Together, this will increase material recovery.

The challenges of implementing a recycling credits system will require much creativity, persistence, cooperation and willingness to experiment from all participating parties. If recycling credits systems are allowed to evolve they will help harmonize public sector goals with private sector actions. They provide a critical step toward embracing an ecology of industry that promotes a more sustainable pattern of resource expenditure.

The use of recycling credits to promote development of recycled materials markets contributes to the rational development of a sustainable economy. Not only will the credits system directly increase industry's access to recycled resources for production, it will also work with the economy rather than against it to reduce overall dependence on virgin materials. Adopting this type of approach as an overall resource-use ethic neatly addresses the resource limitations that constrain both our use of virgin materials for production and valuable landfill area for waste disposal.

Notes

[1] The goal of highest end-use seeks to ensure that recovered materials are used as the highest value raw material possible. For instance in paper recycling, recovered ledger grade office paper would go for the production of other ledger grade paper rather than box board for cereal boxes.

[2] The first step of a content-based system is taken by the federal government, which sets recycled content percentage goals for manufacturers to meet. Then those manufacturers which exceed the goals can sell credits from their excess use of recycled feedstock to those manufacturers whose use of

recycled feedstock falls short of the goals. The government would increase the recycling goals on annual basis.

For example, if a 30 percent content goal for newsprint is set, then a 100 ton-per-day (TPD) newsprint manufacturer who uses 50 TPD of ONP earns credits for 20 TPD of recycled newsprint. It may then sell this 20 TPD credit to another newsprint manufacturer who has fallen short of its content requirement.

[3] Emissions banks are institutional structures that facilitate the trading of credits by allowing companies to carry credits over from one period to another. In the case of recycling, these would be called recycling banks and used for analogous purposes.

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