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Scrap Tire Disposal: Three Principles for Policy Choice

ABSTRACT

Scrap tire disposal presents a challenging regulatory problem for many states. Proper disposal of scrap tires, either through recycling or legal landfill disposal, is difficult and costly. In an effort to address this issue, many states have chosen to develop scrap tire policies, often funded by special fees on the sale of new tires. These fees typically are used to clean up existing scrap tire piles and/or subsidize the development of markets for recycled tires. Currently, many states are in the position of evaluating the efficacy of their policies to determine if, and how, to continue funding such scrap tire programs. This article develops a set of arguments that results in three principles that can assist states in their design of scrap tire management programs. These principles give emphasis to the need for policy makers to fully understand the economic vulnerability of processors, distinguish between economic and technological limits in the expansion of uses for recycled rubber, and avoid premature sunsetting of scrap tire fees.

I. INTRODUCTION

The disposal of scrap (used) tires has proven to be a challenging regulatory problem for many U.S. states. Improper disposal, whether in landfills or by abandonment, causes a variety of fire, health, and

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environmental hazards.[1] While many alternatives to landfill disposal or abandonment of whole tires exist,[2] their economic sustainability is marginal in many cases. Thus, most states have realized the need for programs designed to create incentives for the recycling of scrap tires. Currently, many states are either considering the adoption of a scrap tire management program or are evaluating the efficacy of an existing state program to determine if, and how, to continue the operation.[3]

This article develops a set of arguments that leads to three interrelated principles which states may find useful in their efforts to assess the design of effective scrap tire management programs and policies. First, scrap tire policy must be based on a full appreciation of the reasons, both technological and market-based, that underlie the economic vulnerability of scrap tire processors. Second, in their consideration of state-financed investment programs intended to expand the market for end-users of recycled scrap tire products, policy makers should give particular attention to the vulnerabilities of the processing industry and the implications of such vulnerabilities for the nature of state programs. Finally, and in the light of the above, state policy makers are well advised to rethink the structure of sunset provisions on tire fees that fund most scrap tire management programs.

To develop these three principles, we begin in section II with an overview of scrap tire management and disposal issues in the United States, and common problems encountered in most state-sponsored scrap tire management programs. In section III we consider the economics of the scrap tire processing industry, develop reasons underlying the financial vulnerability of scrap tire processors, and suggest the nature of policies that might ameliorate these problems. In section IV we turn our attention to end-users of recycled scrap tire products; here we argue that, in the main, the thinness of end-user markets is more likely caused by product quality (reflecting technological difficulties) than by cost. Thus, the many ongoing, cost-focused, state programs that attempt to expand markets for scrap tire products may be misguided. In section V we argue that states seeking success in scrap tire management programs that will be effective in preventing the future build up of scrap tire piles may need to take a longer view than implied by present sunset provisions on the funding source of

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1. *See* Mark Phillips, *California Moves Aggressively in Managing Scrap Tire Problem*, RECYCLING TODAY, Oct. 1998, at 34, 36. *See generally* JOEL I. REISMAN, E.H. PECHAN & ASSOCS., INC., AIR EMISSIONS FROM SCRAP TIRE COMBUSTION (U.S. Envtl. Protection Agency Pub. No. EPA-600/R-97-115, 1997).

2. *See* SCRAP TIRE MGMT. COUNCIL, SCRAP TIRE USE/DISPOSAL STUDY: 1996 UPDATE 15-48 (1997).

3. *See* U.S. ENVTL. PROTECTION AGENCY, PUB. NO. EPA 530-B-93-001, STATE SCRAP TIRE PROGRAMS: A QUICK REFERENCE GUIDE (1993).

most state programs: the scrap tire fee. We offer our conclusions in section VI.

II. SCRAP TIRE DISPOSAL AND MANAGEMENT IN THE UNITED STATES

In the late 1980s, state and local governments began to recognize the threat to public health, safety, and the environment posed by the accumulation of large piles of scrap tires.[4] By 1999 there were almost 200 million scrap tires in hundreds of scrap tire piles in the United States.[5] As seen in table 1, the largest *known* inventories of scrap tires are found in Maine, Michigan, New York, Ohio, and Pennsylvania. These five states alone contain 125 million tires, 63 percent of the total. We emphasize *known* scrap tire piles for two reasons. First, of the 49 states included in our survey,[6] 15 were unable to provide an estimate of their inventory of scrap tires in scrap tire piles. Of these 15 states, two did not have a *state* scrap tire management program (Alabama and Alaska), and three had closed a pre-existing program (Connecticut, Texas and Washington). Second, any state, even one with an existing scrap tire program, may not have yet discovered all of the scrap tire piles in the state. For example, although Georgia established an aggressive clean-up program in 1991, its Environmental Protection Division found two previously unknown piles in 1991 containing more than two million tires.[7]

Health, safety, and environmental threats from scrap tire piles derive from several sources. Whole tires can accumulate water from rainfall in their cavities, and these pools of water are prime breeding grounds for mosquitoes.[8] Tire piles can catch fire and can be very difficult to extinguish; on numerous occasions piles have burned for several months. Open air burning of tires creates dense smoke and releases a variety of pollutants into the air. Liquid by-products of combustion pollute the soil beneath the fire.[9]

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4. *See, e.g.*, Phillips, *supra* note 1.

5. *See* table 1, *infra*. The source of the information in this title is our telephone survey of administrators of state scrap tire programs. *See infra* note 6.

6. We contacted administrators of state scrap tire programs (or environmental agencies) in a telephone survey conducted during the summer of 1999. All contacts were asked to describe the nature of their program, with specific questions regarding scrap tire fees, sunset provisions for the fees, legal disposal of scrap tires, and characteristics of the scrap tire industry. We were unable to acquire information from the state of Minnesota.

7. Interview with Lon Revall, Scrap Tire Program Director, Georgia Department of Natural Resources, in Atlanta, Ga. (Aug. 30, 1999).

8. *See* Phillips, *supra* note 1, at 36.

9. *See* REISMAN, *supra* note 1.

TABLE 1: TIRES IN SCRAP TIRE PILES AND NUMBER OF PROCESSORS BY STATE FOR 1998

STATE	NUMBER OF TIRES IN SCRAP PILES	STATE	NUMBER OF TIRES IN SCRAP PILES
Alabama*	Unknown	Montana	600,000
Alaska*	Unknown	Nebraska	450,000
Arizona	Unknown	Nevada	450,000
Arkansas	2,000,000	New Hampshire*	200,000
California	Unknown	New Jersey*	10,000,000
Colorado	Unknown	New Mexico*	750,000
Connecticut*	Unknown	New York	22,000.000
Delaware*	2,500,000	North Carolina	270,000
Florida	300,000	North Dakota*	500,000
Georgia	2,000,000	Ohio**	35,000,000
Hawaii*	950,000	Oklahoma	220,000
Idaho*	750,000	Oregon	500,000
Illinois	Unknown	Pennsylvania	17,000,000
Indiana	Unknown	Rhode Island*	7,000,000
Iowa	4,000,000	South Carolina	Unknown
Kansas	Unknown	South Dakota*	920,000
Kentucky	Unknown	Tennessee	Unknown
Louisiana	250,000	Texas*	Unknown
Maine	26,000,000	Vermont*	250,000
Massachusetts	10,000,000	Utah	600,000
Maryland	Unknown	Virginia	10,500,000
Michigan	25,000,000	Washington*	Unknown
Minnesota	No Information	West Virginia*	10,000,000
Mississippi	250,000	Wisconsin*	100,000
Missouri	6,500,000	Wyoming*,***	375,000

* States that *did not* have a state-managed scrap tire management program in 1999.

** Ohio reports between 30 and 40 million tires in scrap tire piles.

*** Wyoming's 250,000 to 500,000 tires are in piles located at landfills.

In response to these potential problems, many states have formed scrap tire management programs that are intended to accomplish two primary goals: to clean up existing scrap tire piles, and to assure that scrap tire piles will not accumulate in the future.[10] Most states have adopted laws with appropriate sanctions that make the disposal of scrap tires at locations other than at state-approved sites illegal.[11] These sites are typically either a

10. For example, Georgia's enabling legislation for a scrap tire management program provides that "It is...the intent of the General Assembly that every effort be undertaken to ensure the proper management of scrap tires from the point of generation to the ultimate point of reuse, recycling, or disposal and that every effort be made to ensure that, where possible, they be reused or recycled rather than being disposed." GA. CODE ANN. § 12-8-21(f) (1996).

11. Information obtained from telephone survey. *See supra* note 6.

scrap tire processing facility or other collection facilities, such as bins and cages that are provided by state or local governments.

Most concede that landfill disposal of scrap tires is undesirable.[12] The problem with landfill disposal of whole tires is that they will almost always slowly rise to the surface as the contents of the landfill settle. Moreover, potentially serious environmental problems can arise as a result of the leaching of toxic residues from tires into the surrounding soil and, ultimately, groundwater. In principle, a properly designed landfill with a double liner and a leachate system will capture these substances, but once captured they in turn must be disposed of.[13] Despite these problems, however, a number of states lack alternatives to landfill disposal, and scrap tires are placed in monofills or mixed-use landfills. Monofills, landfills used exclusively for the disposal of scrap tires, will typically require that tires be shredded or cut into pieces;[14] some states impose similar requirements for mixed-use landfill disposal. Monofills are generally intended to store tires until such time as recycling becomes economically feasible. Only 14 of the 49 states in our survey allow for unrestricted landfill disposal of scrap tires.[15] All other states ban landfill disposal of scrap tires,[16] restrict landfill disposal to monofills,[17] or only allow disposal of tires that have been cut into pieces or shredded.[18]

The ban on landfill disposal of tires combined with the efforts to clean up tire piles would seem to suggest a formula for solving a state's scrap tire problem. However, there are three common problems that have been encountered in most state scrap tire management programs that prevent or limit their success. These are high failure rates for new scrap tire processing facilities, reflecting an industry whose economic viability appears to be problematic; a general failure of programs that are designed to expand end-uses of scrap tire products; and state legislators that, seemingly impatient with observed program failures, allow scrap tire fees used to finance scrap tire management programs to sunset over relatively short, five- to six-year periods.[19] These three problems are given detailed attention below.

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12. *See, e.g.*, SCRAP TIRE MGMT. COUNCIL, *supra* note 2, at 8.

13. For related discussions, see Richard Donovan et al., *Scrap Tire Utilization in Landfill Applications*, *in* PROCEEDINGS OF WASTECON 1996, at 353, 364-70 (Solid Waste Ass'n of N. Am., Pub. No. GR-G 0034, 1996).

14. *See, e.g.*, N.C. DEP'T OF ENV'T & NATURAL RES., SCRAP TIRE MANAGEMENT REPORT FY 1996-97, at 17 (1997).

15. *See* table 2.d, *infra*.

16. Twelve states. *See* table 2.a, *infra*.

17. Eight states. *See* table 2.b, *infra*.

18. Fifteen states. *See* table 2.c, *infra*.

19. Information obtained from telephone survey. *See supra* note 6.

TABLE 2: STATES ALLOWING LANDFILL DISPOSAL OF SCRAP TIRES FOR 1999

2.a Landfill Disposal Banned	**2.c General Landfill, Cut and/or Shredded**
Hawaii	Arkansas
Iowa	California
Maine	Delaware
Maryland	Florida
Mississippi	Georgia*
Nebraska	Idaho
Pennsylvania	Illinois
Rhode Island	Louisiana
Utah	Massachusetts
Vermont	Missouri
Wisconsin	New Hampshire
Wyoming	New York
2.b Monofill Only	Oregon
Alabama	South Dakota
Arizona	Washington
Colorado	**2.d General Landfill, No Restrictions**
Kansas	Alaska
Montana	Indiana
North Carolina	Kentucky
Ohio	Michigan
West Virginia	Nevada
	New Jersey
* Landfill disposal of processed scrap tires allowed *only* with specific state agency permission.	New Mexico
	North Dakota
	Oklahoma**
** While landfill disposal of whole tires is not legally banned in Oklahoma, such disposal is discouraged.	Connecticut
	South Carolina
	Tennessee
	Texas
	Virginia

III. THE ECONOMICS OF THE SCRAP TIRE RECYCLING INDUSTRY

The initial source of scrap tires is usually the new tire retailer. Typically, for every new tire that is sold, a used, scrap tire exists that must be disposed. The generator of a scrap tire—the retailer—*must pay* the

processor to accept his scrap tires;[20] this payment is referred to as a tipping fee. The processor then recycles the scrap tires in one way or another, generally through the production of tire chips (one-inch to two-inch pieces of tire with varying amounts of wire) or crumb rubber (finer, powder-like tire substance, free of wire). The product is then shipped to the end-user, often a user of tire-derived fuel (TDF), an alternative to traditional fuels. The processing phase is the focus of this analysis, as this is the stage where the tire is actually recycled or turned into an alternative use.[21]

The scrap tire processing industry is a young industry, and the technology for processing tires is undergoing constant change. The technology for chip production has undergone considerable change over just the last two to three years.[22] Currently, there does not yet exist a reliable technology capable of consistently producing high quality tire chips (small chips of uniform size that are free of metals and other non-rubber materials). Similar conditions plague crumb rubber processing. While technologies for producing high quality crumb rubber—a *consistent*, fine-grain product with no contaminants—do exist, their costs remain quite high.[23] A large percentage of business failures in the processing industry are producers of low-grade crumb rubber. At present, there appears to be considerable excess capacity in facilities designed to produce low-end crumb rubber.[24]

Scrap tire processing in the United States is presently dominated by chip production.[25] Thus, the economics of this industry are primarily determined by the costs and revenues of processors. In terms of costs, the chip processor's costs are subject to economies of scale; that is, over some range unit costs decline as the level of production increases. For a chip processor operating at a scale of five to eight million tires per year, unit

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20. Alternatively, in some cases the generator contracts with an independent carrier. The generator pays the carrier a fee. The carrier, in turn, must pay a tipping fee to the processor who accepts the tires.

21. Information based on the authors' interviews with processors and haulers in Georgia.

22. *See* A.T. KEARNEY, SCRAP TIRE MGMT. COUNCIL, SCRAP TIRE USE/DISPOSAL STUDY 2-1 to 2-28 (1990).

23. *See* John R. Serumgard, *Ground Rubber and Civil Engineering Markets for Scrap Tires*, *in* MUNICIPAL AND SOLID WASTES: PROBLEMS AND SOLUTIONS 125, 126 (Robert E. Landreth & Paul A. Rebers eds., 1997); FED. HIGHWAY ADMIN., U.S. DEP'T OF TRANSP., PUB. NO. FWHA-SA-95-056, CRUMB RUBBER MODIFIER (CRM) IN ASPHALT PAVEMENT 4-9 to 4-10 (1995).

24. *See* Serumgard, *supra* note 24, at 26-27; Telephone Interviews with Mr. Michael Blumenthal, Executive Director, Scrap Tire Management Council (Summer, 1999).

25. *See* SCRAP TIRE MGMT. COUNCIL, *supra* note 2, at 3.

delivered costs for producing tire chips are approximately $0.65 per passenger tire equivalent (PTE).[26]

The processor's revenue derives from two sources: the sale of tire chips and the tipping fee. The delivered price of tire chips received by the processor is only some $0.10 per PTE, revenue sufficient to cover only some 15 percent of the processor's costs. TDF prices received by processors have been steadily declining over recent years, reflecting a grim reality faced by processors: TDF prices are determined by conditions that are beyond the processor's control. Coal is the usual substitute for TDF, and coal prices have been steadily declining over recent years. Most TDF users are only willing to pay for TDF at a rate of 50 percent of the cost of coal. The discount of TDF prices relative to coal prices reflects the fact that TDF uses typically require more equipment and management than coal.[27]

The most policy-relevant economic characteristic of chip processors is the second revenue source, the tipping fee. Over recent years tipping fees have averaged approximately $0.65 per PTE, compared to $0.10 received for the recycled product. Thus, the bulk of a chip processor's revenues is derived from tipping fees. [28] These economic conditions allow for a profit margin on the order of 15 percent, a marginal operation by most industry standards. However, the tipping fee is not only the processor's primary source of revenue, it is also his or her primary source of uncertainty. The level of tipping fees is determined by the market forces of supply and demand.[29] Low barriers to entry in processing encourage the entry of new firms, which, along with economies of scale, drives the tipping fee down. This trend, in turn, threatens the continued viability of processing firms. The potential source for future competition for scrap tires (and, therefore, depressed tipping fees) comes from technologically improved producers of high grade crumb rubber.[30] As suggested above, the production of high-

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26. *See* Michael Blumenthal, *Scrap Tire Market Analysis*, BIOCYCLE: JOURNAL OF WASTE RECYCLING, Sept. 1997, at 70, 72-73; Michael Blumenthal, *Tires*, *in* THE MCGRAW-HILL RECYCLING HANDBOOK 18.1, 18.6 (Herbert F. Lund ed., 1993); Neil N. Eldin & Julian A. Piekarski, *Scrap Tires: Management and Economics*, 119 J. ENVTL. ENGINEERING 1217, 1222-30 (1993).

27. *See* RONALD G. CUMMINGS ET AL., GA. DEP'T OF NATURAL RES., GEORGIA'S SCRAP TIRE MANAGEMENT PROGRAM: AN ASSESSMENT OF ECONOMIC AND ENVIRONMENTAL VIABILITY 4 (1998).

28. Other minor sources of revenues might also accrue to the processor, such as income from sale of scrap metal from wheels and waste wire.

29. A handful of states, e.g., West Virginia, have considered a state concession for waste tire pickup that effectively insulates the processor from competitive pressures. *See supra* note 6.

30. *See generally* Hope Pilsbury, *Markets for Scrap Tires: An EPA Assessment*, RESOURCE RECYCLING, June 1991, at 19; Michael Blumenthal, *Growing Markets for Scrap Tires*, BIOCYCLE, Oct. 1997, at 53, 53; MT. AUBURN ASSOCS., INC. & NORTHEAST-MIDWEST INST., DEVELOPING

grade crumb rubber is technologically limited, not market-limited. If, or when, technology advances substantially reduce costs for producing high-grade rubber, crumb producers could monopolize the market for scrap tires. This follows from the fact that prices for high-grade crumb are quite high, ranging between $0.49–$0.58 *per pound* ($980–$1,160 per ton)[31] compared with the $10 per ton received by chip producers. With such prices, technologically advanced crumb producers could accept tires at minimum, or even negative tipping fees, thereby pricing chip producers out of the market.

To summarize the above, scrap tire processors producing tire chips operate on thin margins given today's technology and are almost totally reliant on tipping fees as a source of revenue. The future prospects for crumb rubber are unclear. The market for low-grade crumb is already saturated and offers little in the way of promise for future growth. High-grade crumb production is limited by technology at the present, although there now exist several new technologies that are promising. Promise of technological breakthroughs in the high-grade crumb industry is an enormous source of uncertainty for chip producers.[32]

IV. END-USERS OF RECYCLED SCRAP TIRES: PROBLEMS FOR PUBLIC POLICY

In an effort to promote in-state recycling of scrap tires, many states have looked to the expansion of demand for scrap tire products as a means for attracting investment in scrap tire processing facilities.[33] Indeed, almost half (21)[34] of the 49 state programs we surveyed indicated that they had such programs in place, but few indicated satisfaction with their programs in terms of achieving the goal of expanding the processing industry within

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MARKETS FOR RECYCLABLE MATERIALS: POLICY AND PROGRAM OPTIONS, (U.S. Envtl. Protection Agency, Grant No. X818723-01-0, 1993).

31. Prices quoted on the Internet by Recycler's World (visited Nov. 30, 2000), <http://www.recycle.net/Rubber/granule/xv132000.html>.

32. This may not be the case if new crumb technologies benefit from the use of tire chips as feeder stock. Under these conditions, chip producers might prosper with producers of crumb rubber. *See supra* text accompanying notes 12 & 14.

33. *See* WILLIAM SHEEHAN, GEORGIA ENVIRONMENTAL POLICY INSTITUTE, TIRES AND GLASS: MARKETS FOR RURAL GEORGIA 2-7 (1995); David Riggle, *Finding Markets for Scrap Tires*, BIOCYCLE, March 1994, at 41.

34. Alabama, Arizona, Arkansas, California, Colorado, Florida, Illinois, Iowa, Mississippi, Missouri, Nebraska, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Utah, Virginia, and Wyoming.

their state.[35] Our analyses of scrap tire management programs in the southeastern United States, along with discussions with industry leaders in a number of western states lead us to believe that failures in these programs may be the result of a misunderstanding of the basic limitations facing processors as well as end-users.

Consider first the factors that limit the expansion of markets for the most important use of tire chips: TDF as a source of supplementary fuel. Primary users of TDF are cement kilns, paper mills, and, to a very limited extent, electric power plants.[36] Cost is not the major limitation on this use. Indeed, as indicated above in section III, TDF costs are $10 per ton *or less*. Limits on TDF uses arise from users' concerns with changes in air emissions that can attend the adoption of TDF,[37] as well as, in the case of cement kilns, changes in product quality and volume. Expansion of TDF use beyond the small set of currently permitted users in most states is limited by the type of boiler technology in place, as many boilers are designed to burn fuel in powders (pulverized coal), liquids (oil), or gaseous (natural gas) forms. In many cases, the expansion of TDF uses is also inhibited by environmental regulations.[38]

Some of these problems could be ameliorated, and the use of TDF expanded, but the relevant limitation is *technological*, not costs.[39] This is to say that expansion in boiler uses of TDF would be facilitated by technological advances allowing for the consistent production of high quality chips free of wire and other foreign material. Crumb rubber is used as raw material for a variety of products, including rubber mats and packaging, paint, and acrylic coatings. Currently, crumb rubber is added to the binder in asphalt in Arizona, California, and Florida. Such applications are expensive, but offer the prospect of savings due to increased pavement durability. At present, whether or not rubber-modified asphalt is more durable than regular asphalt remains an open question.[40] Other applications

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35. States indicating the prevalence of inadequate markets in the face of end-use-expanding programs include Arkansas, California, Colorado, Iowa, Mississippi, North Carolina, and Ohio.

36. *See generally* SCRAP TIRE MGMT. COUNCIL, *supra* note 2. Cement kilns are typically able to use whole tires because of their size and the manner in which fuels and materials move through them. The chemical process within a kiln makes use of the energy content of the rubber and the iron content of the steel belts and beads; therefore, whole tire use in a cement kiln is economical. *See* Michael H. Blumenthal & Edward C. Weatherhead, *The Use of Scrap Tires in Rotary Cement Kilns*, *in* MUNICIPAL SOLID WASTES: PROBLEMS AND SOLUTIONS 105 (Robert E. Landreth & Paul A. Rebers eds., 1997).

37. *See* REISMAN, *supra* note 1, at 30-35.

38. *See id.*; SCRAP TIRE MGMT. COUNCIL, *supra* note 2.

39. *See generally* SHEEHAN, *supra* note 33; Goodyear Tire & Rubber Co., Scrap Tire Recovery: An Analysis of Alternatives (Jan. 1998) (unpublished brochure, on file with authors).

40. *See generally* FED. HIGHWAY ADMIN., *supra* note 23.

of crumb rubber are in various coatings and in other rubber products, including the manufacture of new tires.[41] Common to virtually all of these *potential* uses of crumb rubber is the supposition that crumb rubber can be produced with a consistent degree of quality at reasonable prices. Of course, the definition of reasonable will vary from one application to the next. The point, however, is that the limiting factor for achieving these conditions is once again technological, not cost per se. Given these conditions, state programs that attempt to expand their scrap tire processing industry via investments focused simply on cost reduction are likely to be doomed to failure.

V. PREMATURE SUNSETTING OF SCRAP TIRE FEES

Twenty-six of the 49 states surveyed for this study have a state-sponsored scrap tire management program funded by a scrap tire fee that is effectively added as a tax to the purchase of new tires.[42] The scrap tire fee in 12 of these states will sunset over the next six years.[43] Seven states had programs that have been closed as a result of the sunsetting of their tire fee and the attendant loss of funding.[44] Sixteen states[45] have seemingly never had a state program, but several have programs of one kind or another that are administered by local government entities (for example, the city of Albuquerque in New Mexico has been attempting to promote the recycling of scrap tires for several years).[46]

States that have sunset provisions for scrap tire fees have generally set the expiration date at about five years. We wish to argue that a successful scrap tire management program will most likely require a much longer time horizon. In doing so our argument is aimed at the tenure of the scrap tire management program; our focus on the scrap tire fee simply reflects the fact that most states have tied their management program to funding provided solely by that fee.

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41. For additional details on the various costs and uses of scrap tires, see Mary B. Sikora, *Options for Managing and Marketing Scrap Tires, in* HANDBOOK OF SOLID WASTE MANAGEMENT 9.129 (Frank Keith ed., 1994).

42. *See* table 3, *infra.*

43. Arizona, Arkansas, California, Colorado, Georgia, Maryland, Mississippi, Missouri, North Carolina, Ohio, South Carolina, and Utah.

44. Connecticut, Idaho, Oregon, Rhode Island, Texas, Washington, and Wisconsin.

45. Alabama, Alaska, Delaware, Iowa, Mass., Michigan, Montana, New Hampshire, New Jersey, New Mexico, New York, North Dakota, South Dakota, Vermont, West Virginia, and Wyoming.

46. For an overview of state programs, see U.S. ENVTL. PROTECTION AGENCY, *supra* note 3.

TABLE 3: STATUS OF SCRAP TIRE FEES BY STATE FOR 1999*

I. States with Scrap Tire Fees, No Sunset		**III. States That Have Allowed Fees to Sunset**	
Florida		Connecticut	1997
Hawaii		Idaho	1998
Illinois		Oregon	1998
Indiana		Rhode Island	1997
Kansas		Texas	1998
Kentucky		Washington	1994
Louisiana		Wisconsin	1997
Maine		**IV. States with No Fees, No *State* Programs**	
Nebraska			
Nevada		Alabama	
Oklahoma		Alaska	
Pennsylvania		Delaware	
Tennessee		Iowa	
Virginia		Massachusetts	
III. States with Scrap Tire Fees, *Scheduled* Sunset Date		Michigan	
		Montana	
Arizona	2003	New Hampshire	
Arkansas	2003	New Jersey	
California	2000	New Mexico	
Colorado	2002	New York	
Georgia	2005	North Dakota	
Maryland	2000	South Dakota	
Mississippi	2001	Vermont	
Missouri	2004	West Virginia	
North Carolina	2003	Wyoming	
Ohio	2006	*We have no program information for the state of Minnesota.	
South Carolina	2002		
Utah	2000		

Based on our experiences with scrap tire management programs in the southeast, the case for extending sunset provisions rests on three primary considerations. First, success in achieving common legislative goals of scrap tire management programs requires the involvement of local and county governments throughout a state, and these local and county programs are typically financed by the scrap tire fee. This follows from the fact that incentives for illegal disposal of scrap tires are likely to be strongest in more rural areas that are distant from scrap tire collection facilities. The existence of aggressive enforcement, as well as education programs at the local level, is a basic prerequisite to a successful scrap tire management program.

Second, intensive and extensive systems for tracking scrap tire manifests[47] are required if a state is to assure that scrap tire carriers are properly licensed and are in fact taking scrap tires to approved collection facilities.[48] Additionally, such tracking is necessary to enforce other scrap tire policies, such as maximum inventory levels typically imposed on generators and processors. Absent such programs that are *visible* to those affected by the programs, the success of any scrap tire management program becomes problematic.[49]

Our third and final argument against the premature sunsetting of scrap tire fees concerns the clean up of scrap tire piles. Many times the five- to six-year life given to scrap tire management programs is inadequate for the purpose of cleaning up existing scrap tire piles; moreover, absent a continuing program, new scrap tire piles may accumulate. Looking at the *known* existing scrap tire piles given in table 1 that are located in states that have allowed their scrap tire fee to sunset,[50] we see that at least four states (Idaho, Oregon, Rhode Island, and Wisconsin) seemingly allowed their fee to sunset *before* scrap tire piles had been eliminated. Indeed, it appears that Rhode Island, which allowed their fee to sunset in 1997, still has seven million tires in piles. Of states that have allowed their fee to sunset, only Texas indicates the re-emergence of new scrap tire piles.[51] However, other states with sunsetted fees simply indicated that they were unsure as to whether or not new piles were accumulating.

VI. CONCLUDING REMARKS

The scrap tire industry is extraordinarily complex and faces many uncertainties. For a state's scrap tire management program to succeed, policy choices must necessarily rely on a detailed assessment of the markets for scrap tires and scrap tire products. The details of such an evaluation undoubtedly will vary tremendously across individual states, so one would expect state policies to vary significantly. However, we suggest three principles for assessing policy options that we feel apply to most, if not all,

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47. A scrap tire manifest is similar to a bill of lading used in most transportation activities.

48. Such assurance can be provided by comparing the manifest copy held by the scrap tire generator with the copy held by the processor.

49. Visibility in this context refers to the program manager making sure that scrap tire generators, carriers, and processors are aware that the manifest system is actually being used for tracking purposes. The importance of these activities was stressed by Mr. Lon Revall in our personal interviews with him. *See* Interview with Lon Revall, *supra* note 7.

50. *See* table 3, *infra*.

51. Information obtained from telephone survey. *See supra* note 6. For a general discussion of the Texas program, see Jane Scheidler, *Tire Recycling in Texas–Eliminating Illegal Sites and Developing Markets*, *in* PROCEEDINGS OF WASTECON 1997, at 357 (Solid Waste Ass'n of N. Am., Pub. No. GR-G 0035, 1997).

states. First, scrap tire policy must be based on a full appreciation of the reasons that underlie the economic vulnerability of scrap tire processors. Processors are faced with the unusual situation of deriving most of their revenue from the *inputs* (via tipping fees) into their production process, rather than the outputs. The stability of these tipping fees as a source of revenue is uncertain given the potential advances in crumb production. Alternatively, processors could focus on reducing costs as a means to insure greater profitability. However, as discussed earlier, costs are not the issue so much as technological limitations.

Second, in their consideration of state-financed investment programs intended to expand the market for end-users of recycled scrap tire products, policy makers should give particular attention to the vulnerabilities of the processing industry and the implications for such programs. Again, as with the economics facing the processors, the *primary* issue with the expansion of end-use markets relates to technology, not costs. Currently, there have been insufficient advances in developing a *quality* product for end market use. Hence, investments intended to encourage end uses, such as the purchase of chips for playground surfaces, are likely to fail if wire-free chips are difficult to produce.

Finally, state policy makers are well advised to rethink the structure of sunset provisions on tire fees that fund most scrap tire management programs. Enforcement and tracking are ongoing features necessary for the success of a scrap tire management program. Eliminating funding for these features will result in a resurgence of the problem. In addition, the experience of many states has been that initial expectations as to the extent of cleanup underestimated the number of tire piles that were later found to exist. Eliminating funding prior to completing cleanup efforts results in a job half done.[52]

The market conditions in any one state will vary according to factors such as the percentage of population in rural versus urban areas, the types of end-use industries in the state, and the political attitudes toward the recycling of scrap tires. However, we hope that the principles offered above will assist in designing a program that satisfies the individual needs of any particular state.

52. Information obtained from telephone survey. *See supra* note 6.