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Evaluation of Tire Incentive and Extended Producer Responsibility Policies

California Department of Resources Recycling and Recovery

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Summary

Conclusions

California decision makers are exploring possible changes to the state's waste tire management program. Reasons for this exploration include an impending reduction in the state tire fee from $1.75 to $1.00 per tire, industry concerns related to growing tire exports and low cost crumb rubber imports, and a range of stakeholder perspectives on how tire recycling and market development programs should evolve. This report provides a high-level overview of two distinct options: 1) Providing incentive payments to firms involved in recycling tires to help them thrive and grow; and 2) Adopting an Extended Producer Responsibility (EPR) mandate in which the tire industry would become responsible for funding and administering programs to achieve specified goals.

Both incentives and EPR offer a range of potential benefits, including increased diversion, strengthened in-state infrastructure and some relief against export-induced disruptions. However, both also have disadvantages and potential risks. For example, incentives can potentially result in over-expansion leading to further competitive pressures, and present implementation challenges like preventing fraud, projecting funding needs and the challenge of providing consistent expectations to industry about payment amounts. EPR could increase diversion, greatly reduce state costs and staffing needs, internalize end-of-life management costs into business costs, provide a level playing field for all regulated entities, and provide a stable funding source; depending on how it is structured, it might also reduce government control, stakeholder involvement and transparency. Both incentives and EPR would be likely to benefit some businesses, while having negative impacts on others.

Several U.S. states have adopted waste tire incentive programs, and waste tire EPR programs are in place in several Canadian Provinces and European countries. Each of these programs, however, is unique, and there are no clear guidelines for designing an incentive or EPR program in California. Some industry stakeholders question the need for new policies that could have a major impact on the industry, expressing that the state's infrastructure is well established and that recycling is growing steadily, if slowly. Others would welcome incentive revenue, while many have questions and need time to understand and evaluate these types of proposals.

The majority of stakeholders interviewed for this report expressed a need to better understand why state decision makers are considering incentives or EPR policies, what the goals would be and how the policies would work. While some have clear positions, many do not, and express a need for more information. Some express that CalRecycle should not make significant changes based on current funding assumptions, since they may not be sustainable as the current tire fee is due to sunset in January 2015. Given this context, SAIC concludes that decision makers should proceed cautiously. Given the wide range of possible approaches, If CalRecycle pursues these options further, then it should consider developing a more detailed straw proposal with specifics such as exactly which types of firms, activities and market segments would be eligible for payments, how much the payments would be, and the impacts on current programs. This would allow both CalRecycle and industry stakeholders to better evaluate impacts and suggest refinements.

Based on the information presented in this draft report, SAIC was asked for discussion purposes only to describe how a potential incentive program might be structured in California. The following thus is not a recommendation, but is offered to illustrate some lessons learned and key questions to consider.

Assuming that the goals of such a program would be to increase diversion through crumb rubber and civil engineering, address export concerns, and expand in-state infrastructure, then one approach to an incentive program might have the following components:

- Eligible Recipients:
    - California crumb rubber producers using California tires only with documented sales to approved end-users in or out of state
    - CA TDP Manufacturers purchasing qualifying California-produced crumb with documented product sales to customers in or out of state; and.
    - CA Civil engineering project owners purchasing qualifying California-produced TDA with documented use in approved project applications.
- Incentive Payment Amounts: $25 - $75/ton with tiered rates for different applications, with lower amounts for civil engineering and higher for fine crumb. For context, a $25-per-ton incentive (a relatively low rate compared to other programs) for civil engineering and crumb rubber applications, based on 2010 market flows, would result in total incentive payments of $3.9 annually, and this amount could grow rapidly if the policy has the desired impact of increasing flows to these segments, or if the incentive rate were higher.
- The funding mechanism should be matched to projected total plausible incentive payment costs to ensure sufficient funding and to provide reasonable expectations to industry.
- Continuation of TDP, RAC and TDA grants, and/or use of another demand-driving mechanism, except that a grant recipient should not be able to also be an incentive recipient.

The above is only a starting point for discussion, and each of these elements requires scrutiny and consideration of many important details that would define precisely who receives incentive payments and for what purpose/activities.

The specific impacts of an incentive policy are impossible to predict, given the importance of the policy details, shifting market trends and the choices made by individual incentive recipients. For example, given the very strong demand for waste tires in export markets, balers still may match or beat any price enhancements offered by processors receiving incentive payments. Similarly, given relatively flat demand for crumb and the apparent over supply of crumb rubber in the North American market (much of which is incentivized), out-of-state suppliers may match or beat price reductions offered by California producers receiving incentives. With these caveats, however, following are some of the impacts that might be expected:

Increased Diversion. Some increase in diversion through crumb and civil engineering would be likely, as California firms win market share from out-of-state firms, and as manufacturers and civil engineering contractors/owners receive a direct incentive to consider crumb use and/or switch to California sources. In contrast, diversion through TDF, ADC and exports may potentially decline.

Strengthened or Expanded Infrastructure. This is very likely for incentive recipients, as the incentives would provide a boost to cash flow, allowing firms to use funds in a variety of ways. Depending on volumes, some manufacturers may not receive significant incentive payments initially, but they would have a strong incentive to expand use of California crumb. On the other hand, if incentives inadvertently trigger an oversupply of crumb or TDA, it could lead to further price reductions and competitive pressures.

Reduced Exports. This is uncertain. Crumb and TDA producers may compete for tires from the export stream if their demand is sufficient. However, shifting flows from export to crumb or TDA will depend on sufficient demand, and the ability to successfully compete with exporters who may well respond with further pricing adjustments. Some crumb producers indicate that the main impact of exports to date is in declining tip fee revenues, not necessarily (yet) their ability to procure sufficient tire supplies.

An EPR approach tailored to California would require fewer program details than incentives, although several key issues would need to be defined. These include: definition of responsible parties; identification of measurable performance goals; definition of state oversight authority and clarification on what types of markets would be acceptable (i.e., would tire-derived fuel "count" toward diversion goals).

The remainder of this summary presents further background and details regarding current and past incentive and EPR programs, their effectiveness and impacts and a range of implementation issues. The full report then delves deeper into these issues.

Background

CalRecycle's waste tire management program has evolved over two decades, and involves a range of market development and enforcement activities aimed at achieving a 90 percent diversion rate by 2015 and ensuring all waste tires are properly managed. The program is funded by a $1.75-per-tire fee on new tire sales, of which $1.00 is allocated to CalRecycle and $0.75 to the California Air Resources Board. The current tire fee is set to be reduced to $0.75 per tire in 2015, but statute does not specify how proceeds will be divided between the two agencies. The program has successfully established an effective statewide tire collection, processing and management infrastructure. All significant noncompliant waste tire stockpiles have been abated, and accumulation of new, large stockpiles is no longer a major concern. After rising steadily throughout the 1990s, the California tire diversion rate was stagnant at approximately 72-75 percent over the past decade, until an explosion of waste tire exports to Asia and of processed TDF to Japan resulted in an abrupt jump in diversion to 81 percent in 2010.

CalRecycle does not rely upon any one market development mechanism, but rather uses a mix of grants, loans, technical assistance, demonstration projects, outreach, research and policy adjustments to address key barriers to market expansion and to catalyze investment. Some stakeholders feel the state has effectively achieved success, since all waste tires are managed and stockpiles are no longer accumulating. On the other hand, some are concerned about stagnant diversion rates and the heavy reliance on in-state TDF markets and, increasingly, waste tire export markets. Excluding all exports, TDF and alternative daily cover market segments, the estimated 2010 California tire diversion rate would drop from 81 percent to 39 percent. Some stakeholders are particularly concerned over rapidly increasing exports to Asia that are disrupting established processing infrastructure by exploiting favorable pricing. While this is reducing

disposal costs to generators, many fear the pricing levels may not be sustainable. The worst case scenario would be to see export markets decline after they had severely eroded California's established processing infrastructure. This trend is greatly reducing the tip fee revenue historically received by tire processors, as well as causing concern about the ability to secure adequate tire supplies. In addition, some California firms say it is difficult to compete with low-price crumb and tire-derived products (TDPs) imported by firms receiving incentive payments from other government programs. Moreover, out-of-state firms may also have lower operating costs than those in California, and may not have not felt been impacted by reduced tip fee revenue caused by the export market as those near the ports have.

To address these concerns, some California decision makers and stakeholders have expressed interest in the potential application of incentive policies – specifically, direct monetary incentive payments – as part of California's waste tire management system. To help inform consideration of options, CalRecycle tasked SAIC to prepare this report providing a high-level overview of incentive programs, including past experience with similar policies, effectiveness in increasing diversion, industry impacts and implementation issues. Because of CalRecycle's interest in promoting extended producer responsibility for a range of products, and because tire EPR programs in Canada include incentive payments, SAIC was asked to include consideration of EPR as well, though the focus of the report is on incentives.

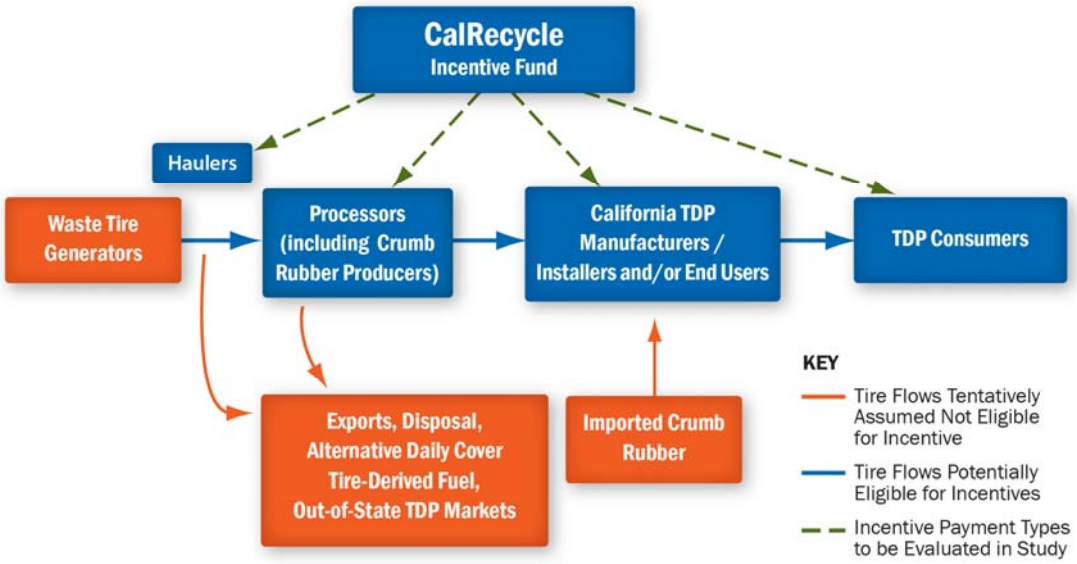
Definition of Incentive and EPR Policies

For the purposes of this report, "incentive policy" means direct monetary incentive payments, usually on a per-ton basis, made to specified entities for certain types of recycling activities. Figure ES-1 (on the following page) illustrates how a tire incentive program could work, with payments made from a CalRecycle-managed fund based on submitted claim forms documenting the amount of recycled material handled, subject to specific conditions and controls intended to ensure that only targeted materials and activities benefit, while others do not. Theoretically, payments could be made to entities throughout the recycling chain (as is the case in some Canadian EPR programs), although similar programs identified in nine U.S. states make payments only to processors and/or end-users, usually defined as crumb rubber producers, cement kilns and other facilities burning tire-derived fuel (TDF) or civil engineering projects using tire-derived aggregate (TDA). In this report crumb rubber producers are considered processors and there is a focus on tire-derived product (TDP) manufacturers as end users, along with the other end users as defined in other states. California currently has incentive programs in place for plastics and electronic waste recycling.

Extended producer responsibility (EPR) policies assign industry (typically brand owners) with responsibility, under the oversight of an appropriate governmental agency, for funding and operating end-of-life management programs for targeted products, and with achieving specified diversion rates or other goals. Although there are no tire EPR programs in the U.S., California has considered EPR programs for a variety of products, and CalRecycle is currently in the early stages of implementing policies covering carpet and paint. EPR has been implemented extensively outside of the U.S. for many products, and tire EPR programs operate throughout Canada and Europe, for example. In these programs, a non-governmental producer responsibility organization (PRO) is typically formed to implement programs on behalf of most or all responsible brand owners, and typically these programs involve payments to entities throughout the recycling chain in a manner similar to government incentive programs, and/or direct contracting with firms to provide needed scrap tire management services. CalRecycle's *Overall*

Framework for an Extended Producer Responsibility System in California also identifies the need for oversight by an appropriate government agency, for example, to review and approve industry stewardship plans, ensure a level playing field among businesses, and generally to adopt and enforce rules in a way that ensures effectiveness and equity among all industry players. Figure ES-1 illustrates how an incentive payment system for waste tires might be structured in California.

Figure ES-1
Incentive Payment Flow Chart



Past Experience with Incentives and EPR

The California Plastics Market Development Incentive Program (AB 1149, Chapter 486, Statutes of 2011) is designed to increase use of plastics in-state. Funded by $10 million per year in unredeemed deposit revenue through the Beverage Container Redemption Value Program (CRV), the program offers up to $150 per ton to California certified plastic reclaimers and approved manufacturers who submit matching documentation demonstrating that a stated quantity of CRV material from the state's beverage redemption program was sent from the reclaimer ("certified entity") to the in-state product manufacturer. This matching documentation element means that a processor is only eligible for incentive payments for material that is shipped to an in-state manufacturer who also applies for the incentive payment. No other identified program requires that the firm a processor ships material to must also apply for the incentive payment. This element facilitates review of claims since once the processor's claim is verified, the manufacturer's matching claim can simply be checked against it. It also helps ensure that only California materials are covered since the manufacturer's material supplies are already scrutinized independent of its claim submission. The program has apparently been successful in increasing use of collected plastics by in-state processors, and inducing some product manufacturers to shift from virgin to recycled feedstock. The number of participants has grown

since the program launched in 2007, and use of CRV PET by California reclaimers and manufacturers, for example, more than doubled to over 800 million containers in FY2010-11, equivalent to over 34,000 tons of material, or about 15 percent of the number of containers recycled. Reportedly, the plastics incentives have been included in business plans of at least two plastic recycling firms that have recently opened facilities in California, and may have contributed to the planned launch of a new bottle-to-bottle recycling facility in California. While plastic exports have declined since the plastics market incentive program began, over 80 percent is still exported either to other countries or domestic processors, mainly in the Southeast.

The California Electronic Waste Recycling Program (Chapter 526, Statutes of 2004) is funded through a retail fee on certain types of monitors and display devices, and provides per-pound payments to approved collectors and recyclers (i.e., dismantlers who ship separated plastic, wire, display devices to other processors for recycling). The program's main goals are to establish an effective collection infrastructure to ensure proper management of CRT and other display devices. The program has achieved this goal, with the number of collectors and recyclers growing substantially since the program's implementation. The program does not have a market development component and is currently challenged by a lack of processing capacity for CRT glass as manufacturers have shifted to flat screen technologies. During earlier periods, the program triggered aggressive competition among processors for supplies of covered E-waste, including funneling payment revenues downstream to collectors and even generators, a situation not desired or envisioned by the program's design. The program has resulted in recovery of additional types of E-waste in addition to the covered devices, due to customer demand.

Between 1988 and 1998, nine U.S. States implemented tire incentive programs, mainly with a goal of cleaning up illegal tire stockpiles and developing in-state processing infrastructure and end-uses (Appendix E). Four of these programs were allowed to sunset after making varying levels of progress towards this goal (Idaho, Oregon, Texas and Wisconsin), while five state programs are ongoing (in Colorado, Louisiana, Oklahoma, Utah and Virginia). No two of these programs were defined exactly alike, and each one has important nuances that complicate making broad generalizations. Key differences involve the types of eligible firms and market segments, incentive payment amounts, whether out-of-state firms are eligible, terminology and the subtleties of each program's rules. With the exception of Texas, the incentive states were all quite small compared to California. Also, in contrast to California's focus on crumb rubber and prohibition on promoting TDF, all the state incentive programs covered TDF users, and crumb rubber is currently a major market in only three of the five active programs.

Each program had some success in developing in-state markets and infrastructure, including helping to establish TDF as a viable end use, which in most cases has continued to this day. However, there were also some failures, and in some cases the infrastructure and market gains made during the incentive programs collapsed after the program sunset. Idaho now has only one relatively small processor and relies on firms in Washington and Oregon. Oregon's tire diversion rate has fallen from 98 percent during the incentive program to about 33 percent. The programs did help to kick-start TDF, which is now a well-established market, although some TDF users have contracted or even closed recently, mainly due to the economic downturn. Texas and Wisconsin, however, now have well-established tire management infrastructure with growing crumb rubber capacity that developed well after their incentive programs sunset.

Tire EPR programs have been considered in California previously. In July 2004, CalRecycle (then the California Integrated Waste Management Board) sponsored a Tire Stewardship Forum,

facilitated by the Product Stewardship Institute (PSI). Subsequent to this Forum, the PSI developed a Tire Stewardship Action Plan[1] calling for a multi-stakeholder dialog; however, no further action to implement the plan was made. While PSI maintains a web page on tire stewardship, no further activity to explore a tire EPR program was identified. The California Product Stewardship Council has not identified tires as a top priority at this time.

Tire EPR programs are in place in five Canadian Provinces: British Columbia, Alberta, Manitoba, Saskatchewan and Ontario. Although they define themselves as product stewardship programs, they each include key elements of producer responsibility, including funding and administration of direct contracts, direct payments or other mechanisms designed to manage tires and achieve program goals. In Ontario, for example, payments to tire dealers acting as collectors and haulers are intended to cover operational expenses and a reasonable profit, while incentive payments to processors and TDP manufacturers are relatively high compared to those in the U.S., and are intended to both cover expenses and make the firms more financially robust and competitive, with the aim of expanding use of tires in new, growing end uses. The programs have generally succeeded in ensuring proper management of tires and in developing a very robust crumb rubber production infrastructure. End-use demand has lagged crumb production, however, and significant quantities of crumb are exported into U.S. markets. These incentive recipients may use payment revenue for any number of purposes, including to reduce their selling price to be more competitive in selling their end products. Another reason for low-price crumb sales is an apparent over supply of crumb rubber relative to demand in North America, with at least two U.S. firms reportedly offering relatively low prices for crumb rubber delivered to locations throughout the continent.

Information and informed perspectives on European tire programs are more challenging to obtain than for North American programs, because some organizations have limited information available in English, and it can be difficult to identify appropriate players able to discuss trends in English. However, a 1999 European Union encouraged member states to espouse the "polluter pays" principal, and to ban whole tire disposal in landfills. The European Tyre and Rubber Manufacturers Association (ETRMA) reports that the EU nations where a producer responsibility system has been operating for over 10 years have recovery rates of 100 percent and have eliminated all stockpiles. As in the U.S., TDF is a well established market in Europe, with about 38 percent of all waste tires being used in "energy recovery" applications. Countries with EPR programs in place include: Belgium, Estonia, Finland, France, Greece, Hungary, Italy, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden and Turkey. In contrast, countries with other tire systems have had more mixed success. Six countries have implemented what ETRMA defines as "market based" systems, in which legislation states objectives but not who will be responsible for ensuring objectives are met. These include: Austria, Bulgaria, Croatia, Germany, Ireland and Switzerland. The UK has a free market program in place but collectors and processors have to report to national authorities, therefore ETRMA suggests that this hybrid program could be considered a "managed free-market" system. ETRMA defines the "tax" system as a system in which a government agency is responsible for the recovery and recycling of tires at the end of their life. There is a tax levied on tire production, which is passed on to the customer. This is considered to be, in effect, an "intermediate" system in that the producers pay a tax to the State, which is responsible for managing the recovery of

[1] The Final Plan is available at: http://productstewardship.us/displaycommon.cfm?an=1&subarticlenbr=198.

scrap tires, including paying collectors and processors with the revenues collected via the tax. Denmark and the Slovak Republic have tax systems in place to manage scrap tires.

Evaluation of Incentive Policies

As exemplified by some of the programs described above, incentive policies have demonstrated potential to strengthen infrastructure and end uses for recycled material, but also have important drawbacks and potentially severe risks regarding industry impacts. In practice, the actual impacts will depend heavily on market trends and some very important implementation details, such as who is eligible for incentive payments and the level of the incentive payment. .

Advantages of Incentives

Proponents cite a number of advantages of incentives, including:

Effective in strengthening processing and end-use infrastructure. Incentive payments increase cash flow, making recipients generally more resilient and providing them with options to address growth barriers. They can use funds, for example, to help secure tires currently flowing to export or other markets, to reduce product prices to gain market share, or to invest in R&D, expand capacity, or marketing materials. As described briefly above and in more detail in Section 2, there are several examples of incentive programs helping to strengthen and/or build infrastructure. State programs initially were focused on building a brand new infrastructure in the 1980s and 90s, to remediate stockpiles and establish basic processing and end-uses for annually generated tires, mainly TDF and civil engineering. Some are evolving to focus on crumb, especially Utah. Incentive programs implemented under EPR in Ontario and British Columbia have strengthened or expanded crumb rubber capacity and increased demand for crumb by in-province manufacturers, although large quantities of crumb are still exported.

Helps Achieve High diversion. Incentive states generally have achieved high diversion, at least while the incentive programs were in place. Utah's tire diversion approaches 100 percent with 63 percent flowing to crumb rubber and 37 percent to TDF. Virginia's rate also approaches 100 percent, with 43 percent flowing to TDF and 55 percent to civil engineering). Ontario diverts over 95 percent of tires to recycling applications, with no reliance on TDF (which is not allowed under their program unless no other options exist).

Leveling the playing field with out-of-state firms. Some stakeholders emphasize incentives are needed to help California firms compete with out-of-state crumb rubber and TDP producers that may: benefit from incentive payments; have lower operating costs; and/or may not have suffered reduced collection revenues caused by low cost exports. They argue incentives can help California firms win market share inside and outside of California, thereby increasing demand for California crumb rubber.

Help established California firms compete with export markets. Incentive payments provide processors a source of revenue that can be used to compete to secure tires from export flows or other markets. Or, incentive payments can make up for reduced tip fee revenues caused by export-induced competition.

Assist companies in expanding or siting new facilities. Incentive revenue can be used to help motivate or justify expansion or citing of new facilities. This has been cited in connection with the California plastics program and the Ontario program, for example.

Enhanced viability and more flexible, targeted use of State funds by private firms. Recipients can apply the incentive proceeds in a very flexible way as circumstances dictate, for example, to help secure tire supplies, reduce prices, increase marketing, develop new products or other firm-specific market development activities. Incentive payments strengthen the general profitability, competitiveness and vitality of recipients by enhancing cash flow. Some argue this is more directly beneficial than assistance services provided through CalRecycle's TBAP program, low-interest loans or other state programs.

Disadvantages of Incentives

In contrast to the above advantages opponents cite the following disadvantages of incentive payment programs:

Unsustainable benefits and dependence on government programs. Some argue that incentive benefits may be tenuous and disappear if the policy goes away, and that some firms' existence will depend directly on the continuation of the program. This was apparently the case for processing infrastructure and for certain end-uses in the four tire incentive programs that sunset. However, it is difficult to tease out cause-and-effect with incentives, as some states, like Texas, (and California) have developed effective processing infrastructures and diverse end uses without incentives.

Potential to trigger over-expansion and production. Some stakeholders fear an incentive program could trigger a "free-for-all" in which many firms from inside and outside the state set up California operations specifically to benefit from the incentives. This could lead to severe overcapacity that exacerbates competition for tire supplies, reductions in tip fee revenues and competitive pressures, the very issues the incentives are intended to overcome. While this has not been a big issue in small states, it has occurred, especially in larger jurisdictions like Texas, and with attractive incentive rates like Ontario. California's large size could exacerbate this concern. Its population of 38 million is 80 percent as large as the 47 million people residing in the 14 other North American jurisdictions identified with tire incentive or EPR programs. However, having a significant barriers to entry relative to incentive payments (e.g., tiered structure so that relatively low-value material receives a lower incentive rate than highly processed crumb), ensuring material must be sold before it is eligible for an incentive payment, and not allowing mobile processors to be eligible to incentive payments (unless perhaps affiliated with a permanent in-state location) are methods used to mitigate this impact.

Implementation challenges. The main implementation challenge is minimizing fraud, including the potential for payment claims to be based in part on out-of-state tires, or for product not sold into an approved market (assuming that is a requirement). CalRecycle has stepped up efforts to audit TDP grants, but some are still concerned that out-of-state tires sometimes are used in grant-funded projects. Another implementation challenge is the potential for total claim amounts to abruptly increase due to increased market activity. This makes predicting funding needs difficult, and can potentially cause a funding shortfall that may require reducing payments. A lack of certainty over future payments is a significant concern of incentive recipients in some current programs, and can reduce the full potential of the policy.

State picks winners and losers. Incentive systems promoting some end uses over others (such as crumb or certain civil engineering applications over TDF, ADC or exports) will benefit some

firms over others. (It must be noted that, by their nature, recycling market development programs seek to promote certain industry practices over others.)

Unintended consequences inevitably result. Incentive payment programs may negatively impact non-incentivized markets that would otherwise be viable on their own, such as TDF. Incentives can lead to competition for tires that could potentially exacerbate current pressures in this regard.

Inefficiencies can result. Incentives are not necessarily efficient in achieving their desired results. For example, they may: pay for existing and new activities that may occur without incentives; benefit host states at the expense of firms in other areas; have unintended consequences that can reduce or even negate their intended benefits; and may promote high-volume, low-value end-uses at the expense of higher value ones. A $25-per-ton California incentive to processors and in-state end users covering crumb rubber and civil engineering applications in 2011 would have resulted in $3.85 million in incentive payments, based on the amount of tires used in those applications in that year (without, of course, the assistance of incentives).. Also, if TDF is excluded, an incentive policy could exacerbate tire supply concerns currently being experienced by some TDF users, even though TDF has the potential to use increasing amounts of tires independently of state support.

Evaluation of EPR Policies

EPR programs are not, per se, market development policies, but they can have beneficial impacts on recycling infrastructure and markets. Like incentive policies, however, there are also risks and potential drawbacks. Many tire EPR programs include an incentive payment element similar to that described above, and to this extent the same evaluation above applies, in addition to the following points. Depending on the EPR legislation and strategies employed by the PRO, implementing a tire EPR policy in California holds the potential for far-reaching impacts on costs, revenues and market opportunities throughout the supply chain.

Advantages of EPR

Advantages of EPR programs relative to increasing diversion include:

Expansion of processing infrastructure. Canadian and European EPR programs have been successful in ensuring a sufficient infrastructure for tire processing and establishing end uses. Because of British Columbia's and Ontario's reliance on incentives this outcome is described in more detail above.

Industry organizations can exploit business acumen and supply chain relationships. Industry organizations have options for providing collection, processing, and manufacturing that state agencies do not have. For example, since they are contracting with and providing funds to firms throughout the recycling supply chain, they can establish terms of service that incentivize or require certain recycling practices.

Industry can often act more nimbly and with fewer restrictions than government agencies. PROs are often able to make decisions, update bylaws, and negotiate contracts on a tighter timeframe, adjust fees, and often with fewer restrictions. For example, they can issue RFPs for services and negotiate with service providers to optimize costs and results, typically more quickly and with fewer restrictions than government entities can

EPR internalizes recycling costs into business costs, and may have more stable funding than government programs. In many instances EPR programs have been implemented to help develop or strengthen a collection and processing infrastructure that a municipal or state program might not have the ability to fund, or to fund fully. Many also believe that having consumers pay for the end-of-life management of a product upon purchase (whether an explicit cost or hidden) is more equitable and helps consumers understand that proper material management has a cost.

Minimizes government administration and staffing. Since EPR programs are administered by industry, state staffing and expenses are minimized. The state role mainly involves oversight and ensuring accountability for the mandate, based on specifics in the enabling legislation. Some view this as a positive, while some may view it as a negative.

Disadvantages of EPR

Some potential drawbacks of EPR programs include:

Potential to negatively impact some market players. PROs administering EPR programs may choose to provide payment programs that are open to all qualifying firms, in effect an open market that is framed by the PRO's terms and conditions (as in British Columbia). Another option is for PROs to directly contract with firms to provide needed services. In either case, some established firms may see new opportunities and grow, while others may lose existing customers and see reduced opportunities.

Potential disruptions to market prices. As with incentive programs, EPR programs can disrupt market pricing relative to "free market" programs. This can have the result of triggering below-market pricing which disrupts competitiveness outside of the host jurisdiction, essentially "de-valuing" the material and products. For example, there have been reports of low cost crumb rubber from Germany being sold throughout the U.S., similar to reports in California of competition with incentivized crumb production from Canada and other U.S. states.

Reduced government control and transparency. Depending on the statutory mandate for an EPR program, there may well be less transparency in decision making and other factors compared to CalRecycle's focus on public process, and government and/or stakeholders may have less authority or input on strategic decisions.

Focus on lowest cost solutions. If a PRO is not precluded from doing so by enabling legislation, it could choose to pursue the lowest cost solutions, potentially having a detrimental impact on established industry. For example, a PRO could maximize exports in lieu of developing in-state markets for tire-derived material.

PROs cannot implement policy and enforce regulations. PROs generally exert control over the supply chain through contracting and program rules, but cannot directly influence government policies.

Implementation Considerations

Implementation "details" can have a huge influence on the diversion effectiveness and industry impacts that an incentive or EPR policy might have. Following are several key issues that decision makers should consider, along with some lessons learned from past experience.

What should be the goals of a new incentive or EPR policy?

Most state tire incentive policies were adopted many years ago, with the goal of establishing processing infrastructure and cleaning up illegal tire piles, issues that California has already grappled with. U.S. EPR advocates have also focused on the goal of establishing basic infrastructure, as well as broader goals related to incentivizing design for environment and internalizing environmental costs while shifting funding from government to industry. In contrast, proponents of incentives in California have focused mainly on the goals of increasing diversion, addressing the issue of competing with low-value waste tire exports, strengthening crumb rubber production and expanding and diversifying demand for recycled tire materials and products. Some state programs such as the tiered incentives in Utah and Oklahoma have been adapted over time to focus more on similar goals, as have Canadian tire EPR programs, especially in Ontario and British Columbia. Decision makers should consider these differences in goals in examining past experience with incentives and EPR. Related goals raised by stakeholders include promoting the "highest and best use" for tires (though this is defined differently), ensuring equity across the industry and seeking to use state resources as efficiently as possible.

If implemented, who should be eligible to receive incentive payments?

SAIC was asked to consider the pros and cons of providing tire incentive payments to haulers, processors, TDP manufacturers/installers and/or TDP consumers. If incentives are implemented, there are strong arguments for including processors and certain TDP manufacturers and other end users. Processors hold a key position in the market place, in effect directing tires to specific market segments, and California crumb producers argue they could boost sales if they were equipped to compete better with imported crumb, both in California and elsewhere.

California's focus on market expansion and diversification presents a strong argument for including TDP manufacturers and installers who use crumb rubber, and other types of end-users using TDA in civil engineering projects, such as landfill operators or local public works agencies. Including them would provide a direct incentive for their use of California rubber, and may induce them to find new ways to use crumb rubber and/or TDA in value-added products. However, some market segments are very well established and may already be encouraged by other programs or plicies, and this should be considered as well. For example, RAC use by Caltrans is currently mandated, although Caltrans is allowed to use crumb from any U.S. producer. One option is for TDP Manufacturer/end-user incentives to be narrowly targeted to promote expansion of new market segments, such as rubber-plastic molded products. .

The focus on market expansion and diversification also supports consideration of incentives for TDP consumers. However, there are a large number of consumers and products, each with vastly different economics, and implementing such a program could be challenging. California's current TDP, RAC and TDA grant programs provide such an incentive for local agencies, and another option is to consider private retail rebate programs. While these have pros and cons, decision makers should consider how these programs can most efficiently mesh and/or overlap in considering any new policies.

Providing incentive payments to haulers is problematic because they have little ability to influence markets as processors do, and because their large number would complicate administration.

Additional related issues to consider regarding who should be eligible include:

- **Whether to limit eligibility to firms located in California**. Other states' incentive programs and Canadian EPR programs have moved toward only including firms located in their jurisdiction, although sales to customers in other areas usually qualifies. An exception is the California plastics program which uniquely requires in-state processors and manufacturers to submit matching documentation, focusing all resources on in-state infrastructure exclusively.

- **Whether to exclude certain market segments or industry activities**. Most tire incentive programs and tire EPR programs are very flexible in the range of allowed end uses, although most have some guidelines and one, in Ontario, does restrict TDF. Some have suggested a California program should not incentivize export (whether waste tires with uncertain end uses or processed TDF used overseas in confirmed end uses). CalRecycle has focused on crumb and civil engineering, two end uses that compete with disposal, ADC and TDF as well as reuse. (CalRecycle is currently statutorily prohibited from promoting TDF.) Most programs have not included tire reuse because this is a well established, high value market already.

- **Whether to include installers in addition to TDP manufacturers**. Few U.S. incentive programs make a clear distinction here, as they define crumb rubber producers as end-users and do not involve firms purchasing crumb to make or install new products. However, the Ontario EPR program provides incentive payments to manufacturers of molded, extruded or calendared TDPs, but not to installers of sports fields or playground surfacing, for example. This is one way to focus on end-user incentives. The Ontario Tire Stewardship (OTS) manufacturer incentive is also tiered, paying C$40 per metric ton for all use of Ontario crumb, and an additional C$120 per metric ton for increased use over and above a manufacturer's running three year average use. The BC program is similar, but also provides as lower incentive to manufacturers of fabricated products (cut and stamped from tire).

- **How to address TDP marketing/brand owners who contract out production to custom manufacturers.** Some California firms have developed branded TDPs that they market, while relying on custom manufacturers to produce their products. In the case of firms marketing playground surfacing or artificial turf, such marketing firms rely on crumb producers and sometimes independent installers to deliver product to customers. There are no identified precedents on how best to answer the question of whether the brand owners/marketers, custom manufacturers and/or installers should be eligible to receive incentive payments, but it must be clarified in any new program's design.

If implemented, what should the incentive amount be?

Incentive payment amounts vary wildly. U.S. programs pay between $22.50 and $150 per ton (i.e., between 1.1 and 7.5 cents per pound), while Canadian programs have tiered incentives that can range much higher. In British Columbia, for example, crumb producers are currently reimbursed up to C$370 per metric ton (C16.8 cents per pound) for fine crumb rubber, in addition to C$168 per metric ton (C7.6 cents per pound) for fiber and steel shipped, while Ontario pays up to C$270 per metric ton (C12.3 cents per pound) for fine crumb rubber shipped. One quantitative basis for evaluating payment amounts is the typical transaction price for the material being incentivized. Crumb rubber in California reportedly currently (as Spring 2012) sells for between 12.5 and 14.5 cents per pound, which is down some 3 cents lower than a few years ago but still

higher than in some eastern regions. In effect, some Canadian programs are currently providing an incentive equal to or higher than the value of the material incentivized.

Some proponents suggest that incentive payments should be high enough to make a clear difference, while not so high as to trigger a "free-for-all" of new companies engaging in incentivized activities, which runs the risk of causing many negative impacts. While this is a subjective, qualitative exercise to a degree, crumb rubber incentive rates on the level of Canadian incentives (i.e., well over C$200 per metric ton) applied to California would appear to have high potential for serious detrimental impacts. In contrast, rates at the low end of other state programs (i.e., $25 to $50 per ton, or 1.7 to 3.4 cents per pound) would perhaps have less potential for significant negative impacts, while offering an incentive that is some 13 to 26 percent of the current prevailing price. By contrast, the maximum California plastics incentive rate 7.5 cents per pound is about 32 percent of the 2011 average weighted value of recycled plastic. However, pricing can vary significantly for different specifications of both recycled tires and plastic, and therefore any given payment rate will benefit different firms to different degrees. Many incentive programs have different payment rates for different products. Most importantly, if decision makers move towards implementing incentives, SAIC recommends that specific proposals defining all key incentive elements be provided for analysis and comment by industry stakeholders.

Other options to consider in setting incentive rates include establishing tiered rate structures that match pricing and priorities of different market segments, and ensuring that funding is adequate to provide consistent payments without interruption, regardless of the rate that is established.

As discussed below, under an EPR program, the PRO would likely have wide latitude to employ a range of mechanisms for implementing their mandate, including devising a direct payment system and/or direct contracting with individual firms. The above discussion about incentives would apply for a PRO administered incentive payment program.

What might state program costs be under incentives or EPR?

Program costs have two components, administration and incentive payments. Administration costs are not estimated in this report, but CalRecycle administrative needs are discussed below. Total incentive payments are a function of: who is eligible, the payment rate and the volume of approved payment claims. Initial volumes in the first year can be estimated based on current uses, while future volumes are much more difficult to predict and plan for.

SAIC developed two cost estimates to illustrate the range of potential costs and to provide a tool for evaluating different incentive proposals (see Section 5 for more detailed analyses). Based on an assumed payment rate of $25 per ton (1.7 cents per pound), which is on the relatively low end of the range, and based on 2010 waste tire flows in California, total incentive payments for a program incentivizing crumb and civil engineering applications would have been $3.9 million. At an incentive rate double this amount, i.e., $50 per ton (3.4 cents per pound), payments to crumb and civil engineering would be $7.8 million. (See Table 10 in Section 5. Note that if ADC and TDF were included, then total payments would have been $8.3 million). The point of the incentive program is to increase tire flows to targeted market segments, so total incentive payment amounts can be expected to grow as flows shift to these uses. Predicting actual shifts and the amount of approved incentive payment claims can be very challenging. To illustrate, SAIC developed a hypothetical growth scenario in which crumb rubber doubles and civil

engineering doubles compared to its relatively high levels in 2008 (along with other market flow assumptions). Based on these assumptions, and compared to the "status quo" cost estimates in Table 10, total payments to crumb and civil engineering segments alone would increase from $3.9 million to $8.7 million (see Table 11 in Section 5). If the payment rate for these targeted segments were increased to $50 per ton (3.4 cents per pound), payments to crumb and civil engineering would total $17.4 million. While hypothetical, these examples show the potential for total incentive program costs to vary widely and increase rapidly, if the policies have the desired impact of driving flows to incentivized market segments. One way to deal with this is to cap the annual amount available, as is done in the California Plastics program and many others. However, this can lead to chronic uncertainty over incentive revenues, which can erode the ability of firms to make business decisions based on the revenue. A lesson from past experience is that programs should strive to match revenue and expenses so that there is as much certainty as possible over program rules and payments.

State program costs under an EPR program would be expected to be very low compared to current programs, as by definition tire industry manufacturers would be responsible for funding and administering the program, with state costs limited to administration of the EPR policy, and possibly select other market development related roles (in addition to current permitting and enforcement roles). Total tire management system costs, as discussed in previous sections, could increase or decrease, depending on the specifics of the EPR law and implementation decisions made by the PRO.

Would incentives or EPR policies impact current programs?

An incentive program targeting processors and manufacturers/end-users of crumb and TDA would have a similar role to CalRecycle's current TBAP and loan programs. Assuming payments were not made to consumers such as local governments, it would have a different focus than most CalRecycle tire grant programs, although it would presumably share the same goal of expanding demand and diversion. It could function as a complement to grants though, not necessarily replace them. While grants to TDP consumers are controversial, some stakeholders are concerned that an incentive program could mean they would be eliminated. RAC and civil engineering technical assistance programs would still facilitate use of these materials, even with a new incentive program.

Depending on implementing legislation and the PRO's strategies, a tire EPR program could overlap substantially with many of CalRecycle's current programs. For illustration, OTS, perhaps the most far reaching tire EPR program currently existing, undertakes many of the same market development and research activities currently operated by CalRecycle. Other EPR programs, however, do not include such aggressive market development activities, and state decision makers could choose to retain such roles for CalRecycle.

Would there be new state roles under an incentive or EPR policy?

Ongoing CalRecycle administration under an incentive program would involve claim reviews, compliance monitoring and enforcement. Depending on program rules, it may be necessary or desirable to invest in strengthening Waste Tire Manifest System (WTMS) practices so that the system can be used as a basis for verifying claims. Staffing needs are difficult to predict, but the California plastics program and other state tire programs apparently are implemented with relatively few staff, on the order of one to three. The E-waste program, on the other hand, is

more complex and involves 25 CalRecycle staff in the payment system, along with additional staff at Department of Toxic Substances Control (DTSC) and the Board of Equalization (BOE). Given California's size and challenges already experienced in policing the tire grants program to ensure out-of-state tires are not involved, a large-scale incentive program could potentially be very challenging to administer and police. Again, key factors would include the number and type of firms involved and the amount of the incentive payment, which could induce a large number of firms to participate if it were relatively significant..

Administering a tire EPR program would involve developing regulations, reviewing and approving PRO plans and ongoing monitoring and enforcement or coordination, depending on the specifics of enabling legislation. A tire EPR program may be more complex than the new paint and carpet programs, given the larger number of players and the diversity of markets. Some EPR programs include an explicit role for the State to participate on a PRO board or otherwise to be involved in reviewing or coordinating PRO activities.

Are new legislation or regulations required, and what conditions and controls are needed to implement incentives or EPR?

Current statute (§ 42872(a)) authorizes CalRecycle to include in its tire program "The awarding of grants, subsidies and loans to businesses or other enterprises, and public entities, involved in activities and applications that result in reduced landfill disposal of used whole tires and reduced illegal disposal or stockpiling of used tires."

Although statute does not specifically define subsidy, according to the CalRecycle Legal Office the legal definition of subsidy includes a cash payment made by the government to promote a public interest.[2] The incentive payments discussed in this report are designed to promote the public interest as expressed by the legislature's intent set out in PRC § 42870. In the event an incentive program is approved, the CalRecycle Legal Office recommends that regulations be developed for the program, because it would involve a range of financial impacts and involve nuanced rules, as well as legal considerations such as California's Proposition 26, which addresses issues related to government imposed fees.

CalRecycle would need to establish a number of conditions and controls to ensure that incentive funds are used appropriately and to guard against fraud and other concerns. Examples, similar to the E-waste and plastics programs, include: requiring source documentation and other reports from funding recipients that specifically identify the number of tires recycled; preparing annual reports summarizing how funds were spent and total program statistics; preparing budget reports to ensure fund solvency as payment obligations change; and establishing compliance monitoring and enforcement mechanisms to guard against fraud.

Implementing an EPR policy for tires would clearly require new legislation and the development of regulations interpreting the legislation and identifying legal issues to establish clear rules to guide participants. The implementing legislation would need to address a number of key issues, and would serve as the marching orders for the stewards or a new PRO that would implement the program. Key elements include: defining enforceable goals and responsible parties; potentially identifying allowable implementation elements, such as the type of funding and/or types of

[2] Black's Law Dictionary, 8th ed., Bryan A. Garner, Editor in Chief, 2004.

market end uses that are preferred or not allowed; and requirements for submitting plans and documenting results over time. Additionally, while a PRO would likely be responsible for funding and implementing programs, broad language intended to provide the state with a variety of assurances may be needed, along the lines of the conditions and controls discussed above for incentives. Finally, tire industry representatives have indicated their concern about federal anti-trust legislation, which could potentially restrict their ability to collaborate and, specifically, to set a standardized tire recycling fee. Such issues would need to be addressed. The California paint EPR law, for example, includes a provision designed to address this concern at the state level, specifically stating that compliance with the act does not violate anti-trust law.

1. Background

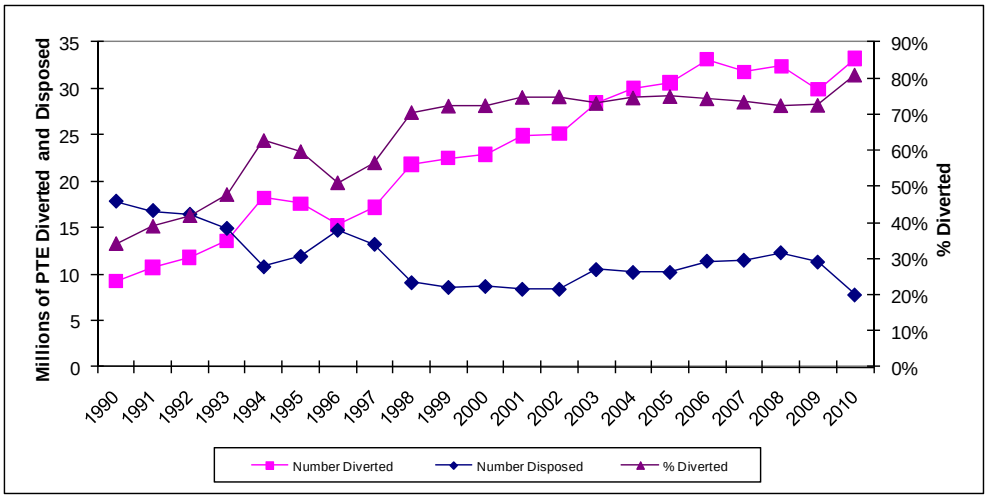
This report analyzes tire incentive and extended producer responsibility policies that could potentially be implemented in California, and contrasts them with existing approaches.

Current Waste Tire Management Programs

CalRecycle's waste tire management program has evolved over two decades, and involves a range of market development and enforcement activities aimed at achieving a 90 percent diversion rate by 2015 and ensuring all waste tires are properly managed. Through the 2015/16 fiscal year, the average annual budget is $37.2 million per year, with 42 percent of this amount allocated to research and market development to increase diversion.[3] The program is funded by a $1.75-per-tire fee on new tire sales, of which $1.00 is allocated to CalRecycle and $0.75 to the California Air Resources Board. The current tire fee is set to be reduced to $0.75 per tire in 2015, but statute does not specify how proceeds will be divided between the two agencies.

The program has successfully established an effective statewide tire collection, processing and management infrastructure. All significant noncompliant waste tire stockpiles have been abated, and accumulation of new stockpiles is no longer a major concern. As shown in Figure 1, after rising steadily throughout the 1990s, the California tire diversion rate[4] was stagnant at approximately 72-75 percent over the past decade, until an explosion of baled waste tires and processed TDF exports to Asia resulted in an abrupt jump in diversion to over 80 percent in 2010.

Figure 1
Waste Tire Diversion and Disposal Trends



[3]Program details are in the Five Year Plan for the Waste Tire Management and Recycling Program, available on CalRecycle's Web Site. Appendix B in this report presents select budget tables from the most recent plan.

[4] CalRecycle tire diversion rate and goal are based on the number of whole tires used to make products or that flow to non-landfill locations; they are not adjusted for residuals such as fiber and steel. Detailed market update information is available in the Annual California Waste Tire Market Reports, posted on CalRecycle's Web Site.

To increase diversion, CalRecycle employs a variety of tools aimed at diversifying and expanding markets, including:

- Funding such as grants to local agencies purchasing tire-derived products (TDPs) and loans to processors and TDP manufacturers to help them grow;
- Research on new products and applications;
- Technical Assistance to help demonstrate and establish new tire-derived products and to assist businesses in overcoming market development barriers;
- Outreach to raise awareness and acceptance of tire-derived product benefits;
- Education on how to sustainably produce and use new tire-derived products; and
- Policy adjustments to address the need for changes in certain practices or programs as circumstances change and experience is gained.

CalRecycle does not rely on any one market development mechanism, but rather seeks to employ all of these tools in an optimal way to catalyze investment and address key barriers to market expansion. CalRecycle has achieved some significant successes with this inherently long-term approach. For example, CalRecycle applied the above tools in the 1990s and into the 2000s to help establish rubberized asphalt concrete (RAC) and tire-derived fuel (TDF) as strong, viable markets. (CalRecycle is now statutorily prohibited from promoting TDF.) CalRecycle is currently focusing these tools on expanding civil engineering, in addition to seeking further growth in RAC and other crumb rubber markets.

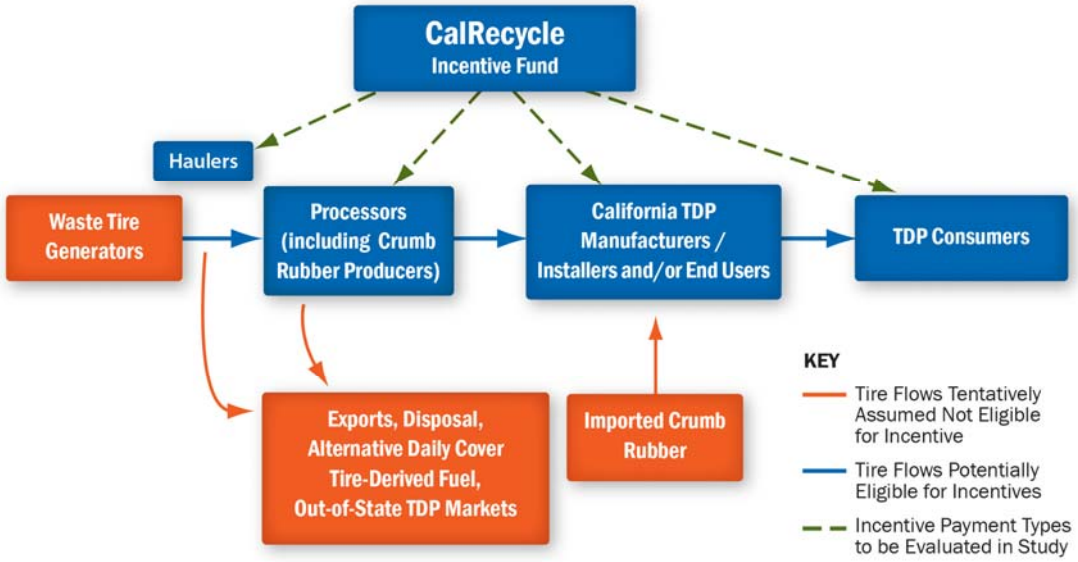
Some stakeholders feel the state has effectively achieved success, since all waste tires are managed and new, illegal stockpiles are no longer accumulating. On the other hand, some are concerned about stagnant diversion rates, heavy reliance on in-state TDF markets and, increasingly, waste tire export markets. Concerns over waste tire exports include disruptions to pricing that may be unsustainable and could jeopardize the viability of established processors, and lack of information on how tires are used and environmental health and safety practices in some importing nations. Without TDF, ADC and all exports, the estimated 2010 California tire diversion rate would drop from 81 percent to 39 percent. Some have also complained of increasing competition from out-of-state crumb rubber and tire-derived product (TDP) vendors with incentive programs who sell product in California at very low prices. Combined with California's relatively high production costs, and export-induced declines in waste tire collection revenues, some industry stakeholders say these competitive pressures make it increasingly difficult to remain profitable and grow.

Definition of Incentive and EPR Policies

To address these concerns, some California decision makers and stakeholders have expressed interest in the potential application of incentive policies as part of California's waste tire management system. For the purposes of this report, "incentive policy" means direct monetary incentive payments made to selected entities for specified types of activities involving recycling. Figure 2 illustrates how a tire incentive program could work, with payments made from the state tire fund to support select types of firms involved in recycling tires, based on the amount of recycled material handled, subject to specific conditions and controls intended to ensure that only targeted materials and activities benefit, while others do not. Theoretically, payments could be

made to entities throughout the recycling chain, although the nine U.S. states that have implemented such similar programs all made payments to either the processor and/or end-users, sometimes in addition to grants provided to tire-derived product consumers. Terminology varies somewhat across states and programs, with most states defining "end-user" to include TDF users as well crumb rubber producers, while not including TDP manufacturers. This report focuses mainly, but not exclusively, on the potential for processors defines crumb rubber producers as processors, and focuses on TDP manufacturers/installers as end-users who could potentially receive incentive payments, possibly in addition to the others mentioned above. These terms are defined in Appendix A, Glossary. While haulers and TDP consumers could theoretically receive incentive payments, this report focuses mainly on processors and end-users as the likely recipients, for reasons that are described in Section 5.

Figure 2
Incentive Payment Flow Chart



Proponents cite the California Plastic Market Development Payment Program as a successful example of an incentive program (Chapter 907, Statutes of 2006). Another current California program can also shed light on incentive policy implementation issues: The California Electronic Waste Recycling Program (Chapter 526, Statutes of 2004). These programs are described at the beginning of the next section, along with a number of tire incentive and EPR programs. The Used Oil Payment Program (Chapter 353, Statutes of 2009) also includes an incentive payment element; however, this program is less pertinent because it only funds local agencies.

Extended producer responsibility (EPR) policies assign industry (typically brand owners) with responsibility, under the oversight of an appropriate governmental agency, for funding and operating end-of-life management programs for targeted products, and with achieving specified diversion or other goals. In these programs, a Producer Responsibility Organization (PRO) is typically formed to implement programs on behalf of most or all brand owners, and typically these programs involve payments to entities in the recycling chain in a manner similar to government incentive programs. CalRecycle is currently implementing legislated EPR policies

covering carpets and paint, and several states have adopted EPR for Electronic Waste. EPR has been implemented extensively outside of the U.S. for a variety of products. Although there are no tire EPR programs in the U.S., several are in place Canada and Europe, and these are also described in Section 2. CalRecycle's *Overall Framework for an Extended Producer Responsibility System in California* also identifies the need for oversight by an appropriate government agency, for example, to review and approve industry stewardship plans, ensure a level playing field and generally to adopt and enforce rules in a way that ensures effectiveness and equity among all industry players.

Report Purpose and Organization

With this backdrop, CalRecycle tasked SAIC Energy, Environment & Infrastructure, LLC (SAIC) to provide an objective base of information on tire incentive and EPR policies as California decision makers and stakeholders consider future directions for California's Waste Tire Management Program. The report provides a high-level summary of experience with tire incentive and EPR policies, the main arguments for and against their use, and implementation issues. While the focus is on incentive policies, EPR was included because of CalRecycle's commitment to explore EPR adoption for various products, and because established tire EPR programs include monetary payments and therefore can help shed light on incentive policies.

After this introduction, Section 2 summarizes experience with a range of incentive and EPR policies implemented in U.S. States, Canada and Europe. Drawing on this base of experience, Sections 3 through 5 then evaluate and contrast incentive and EPR policies in terms of their effectiveness in increasing diversion, impacts on consumers and industry, and implementation issues, respectively. Finally, Section 6 presents some high-level conclusions on the challenges involved in considering whether and how to implement incentives or EPR.

Additional background information is presented in the appendices. Appendix A defines key terms and acronyms. Appendix B presents budget tables from the current Five Year Tire Plan. Appendix C provides estimates of waste tire flows to different market segments from 2008 through 2010. Appendix D presents tire recycling market size and current penetration estimates. Appendix E provides additional details on the incentive and EPR programs summarized in Section 2. And, Appendix F presents results of a survey of tire dealer disposal fees.

2. Experience with Incentives and EPR

To support the evaluation of incentive and EPR policies presented in the remainder of this report, this section describes experience with selected similar policies in California, other U.S. States, Canada and Europe.

California Plastics and E-Waste Recycling Incentive Programs

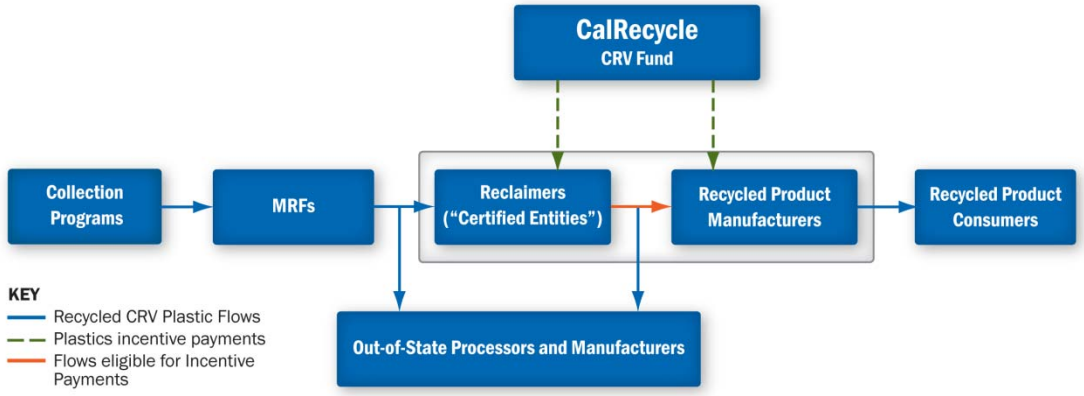
Plastics Market Development Payment Program

Proponents cite the California Plastic Market Development Payment Program as a successful example of an incentive program. The program was originally adopted in 2006 through AB 3056 (Chapter 907, Statutes of 2006) with funding of $5 million per year, and was reauthorized in 2011 through AB 1149 with funding of $10 million per year and a sunset date of January 1, 2017. Through payments to plastics reclaimers and recycled product manufacturers of up to $150 per ton, the program aims to develop California markets for recycled empty plastic beverage containers. It is funded through unredeemed deposits under the state's Beverage Container Redemption Program.

An important context for the program is that after years of growing exports to Asia in the late 1990s and into the 2000s, the export rate from California exceeded 90 percent and domestic plastic reclaimers were seeking additional supply. The program addresses this issue, with the goals of developing California markets for recycled empty plastic beverage containers and ensuring that reclaimers process plastic to a high enough standard to be usable by California manufacturers.

Figure 3 illustrates the flow of funds in the program. Two types of entities are eligible for payments: 1) Plastics reclaimers (termed "certified entities") that wash, pelletize, produce flake or other form usable for a product manufacturer from empty plastic beverage containers collected in the state for recycling; and 2) Approved manufacturers using the material from the certified entity to manufacture a plastic product. Both recipient types must be located in California.

Figure 3
California Plastics Incentive Program Flow Chart



Payments are made to reclaimers and end users as a pair; that is, to be eligible, the certified entity must submit documentation showing they shipped material to an approved manufacturer. And, manufacturers must submit matching documentation that they received the materials with the intent to manufacture product. Both the processor and the manufacturer must be located in California. This matching documentation element means that a processor is only eligible for incentive payments for material that is shipped to an in-state manufacturer who also applies for the incentive payment. No other identified program requires that the firm a processor ships material to must also apply for the incentive payment. This element facilitates review of claims since once the processor's claim is verified the manufacturer's matching claim can simply be checked against it. It also helps ensure only California materials are covered since the manufacturer's material supplies are already scrutinized independent of its claim submission.

Payment amounts have generally been set at the maximum allowable rate per statute of $150 per ton (or 7.5 cents per pound) for both processors and manufacturers; however, the actual rate paid is based on the amount of funding available and size of claims received. In 2011 the program paid $150 per ton for the first two quarters, and $67 per ton for the last two quarters due to reduced funds. The maximum payment rate of 7.5 cents per pound is about 32 percent of the 2011 average weighted value of recycled plastic of 23.5 cents per pound.[5] Plastic prices vary considerably, with the price for baled PET delivered to California ports ranging from 26 cents to 36 cents per pound between November 2011 and February 2012, as an example.[6] Annual average payments and total volume covered in the program is summarized in Table 1 below.

Table 1
History of Plastic Market Development Program

Calendar Year	Total Tons	Total Payments
2007	16,013.80	$4,804,140.00
2008	17,152.50	$4,999,970.30
2009	19,064.20	$3,806,508.56
2010	27,871.60	$8,361,480.00
2011	34,745.50	$8,077,518.76

The program is part of, and is funded through, the California Beverage Container Redemption Value Program (CRV), and actual payments to eligible entities are further discounted to account for the fact that only a certain portion of recycled plastic is CRV plastic. CalRecycle accounts for this by applying the average portion of qualifying[7] material by each resin type to payment applications. This rate, called a "market development payment (MDP)" rate ranges from 34 percent for HDPE to 93 percent for PET plastic bottles for 2012.

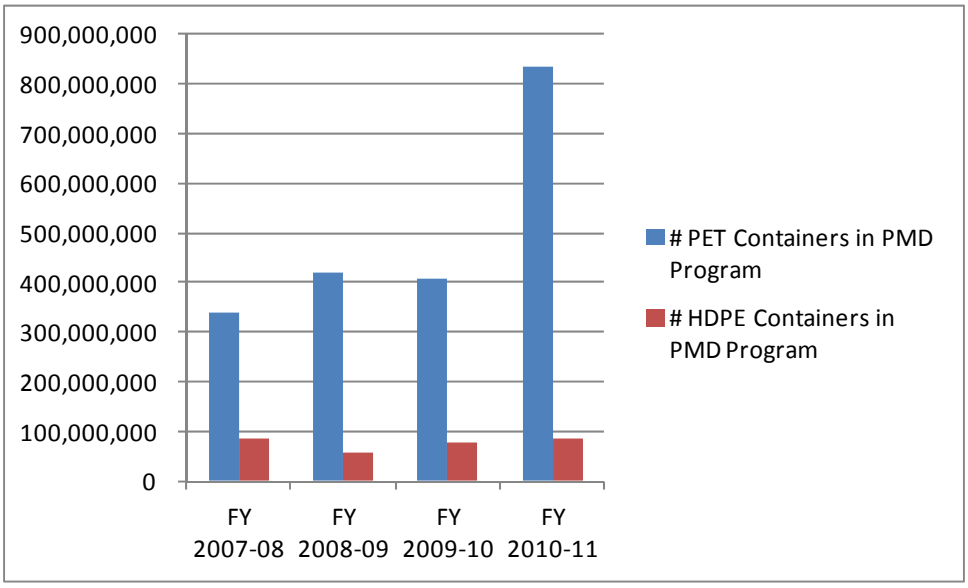
The program makes use of the processor certification and material tracking systems already established under the CRV program. To receive payments both processors and manufacturers each must submit a claim form to CalRecycle each calendar quarter in which the payment is

5 Correspondence with Resource Recycling Magazine.
6 Moore Recycling & Associates, Web Site.
7 Non-qualifying material includes food or drink packaging containers not included in the CRV program.

being claimed. The program is administered by two staff people, each working about half-time on the program, plus time for Accounting staff to verify payee data information and upload payment information, and for the Controller to issue checks each quarter. The fact that the program is part of the well-established CRV program helps to minimize administrative costs. For example, a system is already in place for certifying processors and for tracking CRV materials. Also, there are relatively few eligible entities, with six certified processors and 24 approved manufacturers, although the manufacturers do not always submit claims. CalRecycle tries to audit at least a third of the participants annually.

The program has apparently been successful in catalyzing increased use of collected plastics by in-state processors, and inducing some product manufacturers to shift from virgin to recycled feedstock. The number of manufacturers has increased since the program began when there were typically 15 to 20 manufacturers. There were also just four or five certified entities when the program began, compared to today's six. Figure 4 shows the trend for in-state use of HDPE and PET, including upticks in California use in recent years. Use of PET by California processors and manufacturers, for example, more than doubled to over 800 million containers in FY2010-11, equivalent to over 34,000 tons of material, or about 15 percent of the number of containers recycled. It should be noted that other market dynamics may also be at play. For example, according to Resource Recycling Magazine, overall exports of plastics from the U.S. decreased by 10 percent in 2011. SAIC did not conduct a detailed examination of plastics recycling markets. Despite the upticks, it is still the case that the vast majority of recovered plastics is exported.

Figure 4
Number of Containers Covered in PMD Program Annually



CalRecycle staff indicates that the volume of HDPE in the program in 2008-09 declined because no PMD payments were made in the fourth quarter of that year. Similarly during FY 2009-10 there was a reduced payment in the third quarter, and there was no payment in the fourth quarter of 2010, which likely impacted FY 2010-11 data.

Reportedly, the plastics incentives have been included in business plans of at least two plastic recycling firms, and may have contributed to the planned launch of a new bottle-to-bottle recycling facility in California. Several stakeholders consulted say the plastic market development program has served the state well. One advantage cited is that it does not "pick winners and losers," but rather provides everyone with the same opportunity and benefit, allowing them to choose how best to use funds to improve their business position. Another advantage is that the program makes the domestic reclaimers more competitive with out-of-state or out-of-country reclaimers sourcing recycled plastics. And, the tight tracking system and requirement that processors and manufacturers apply for payments jointly helps prevent fraud and boost partnerships.

One drawback cited is inconsistent payment rates caused by occasional fund shortfalls. With the funding now doubling, this may be alleviated. A related concern is late payments caused by cash flow challenges affecting the entire CRV program, exacerbated by late claim submittals. In the future CalRecycle may enforce a cutoff date for claim submission. To receive payment, processors must rely on manufacturers to submit paperwork to the state, and they are sometimes reluctant to do so as the recycled plastic may represent only a small fraction of their total flows.

One difference between plastics and that of tires is that there has been less scrutiny over whether different market segments should be favored or not within the plastics industry. Plastics are not used as fuel in California, and Staff report no concerns over the types of recycled products covered. Also, over 90 percent of California recycled plastics have been exported for many years, while this trend is only now affecting tire recycling.

California Electronic Waste Recycling Program

The California Electronic Waste Recycling Act (Chapter 526, Statutes of 2004) was established to create a collection and processing infrastructure that would provide "free and convenient" opportunities to the public to recycle covered electronic waste. The E-waste program was established at a time when the California collection and processing for electronics was in its early development stages, particularly for residentially generated electronics. Waste tires, in contrast have a very well-developed collection and processing infrastructure. The program is funded through a retail fee on covered devices, and among other program elements, provides per-pound payments to approved collectors and recyclers who dismantle covered electronic waste for recycling. In the future, however, the rate structure may be re-visited to account for different types of e-waste (particularly the growing portion of non-CRT E-waste). In contrast to California's retail fee and state administered program, many other states have adopted EPR policies for E-waste that assign responsibility to manufacturers to set up and administer programs. It should be noted that e-waste, containing hazardous materials, requires significant regulatory oversight due to its nature.

Payment rates are based on the net cost of collecting and recycling covered devices, including a reasonable profit. Collectors and processors submit annual cost reports to CalRecycle, and CalRecycle is able to adjust the payment rates every other year based on this information. CalRecycle can also adjust the retail fees funding the program once per year, and uses these two adjustments to ensure the program provides funding according to statute and remains solvent. Currently the standard recovery payment is $0.16 per pound, and the standard recycling payment is $0.23 per pound. Collectors and recyclers are paid based on claim submittals including source documentation on all devices handled upon which payments are requested. (There is also a

provision that allows California-generated CEW without source documentation to qualify, subject to strict conditions.) Participants must maintain certain records, such as signed transfer sheets for transferred CEWs, source logs, processing logs showing the definitive cancellation of CEW, and bills of lading for residuals. CalRecycle pays approved recyclers, and approved recyclers are required to pass through the portion of the payment reserved for collectors.

Some E-waste components have a positive monetary value, such as wire, while others like cathode ray tubes (CRTs) typically have a cost to dispose or recycle. The program does not cover reuse of covered electronic devices because they have a relatively high market value, similar to used tires. Approximately 25 CalRecycle staff administer the program, with the bulk of these resources applied to review of monthly payment claims. Additional staff at the Board of Equalization collect retail fees, and hazardous waste regulatory and compliance staff at the Department of Toxic Substances Control has oversight of the physical management of E-waste. CalRecycle staff review annual net cost reports (with support from the Department of Finance) and conduct site visits, among other activities, to monitor compliance and guard against fraud.

As summarized in Table 2, the E-waste program has achieved its goal of establishing a collection and recycling infrastructure, spawning a rapid increase in the number of E-waste collectors and recyclers in its first couple years. As of April 2011 there were 580 approved collectors and 55 approved recyclers. Both must be located in state. However, recyclers send derived commodities to out-of-state and out-of-country destinations, and must document that the CRT markets used are approved by prevailing authorities. Although technically only certain types of display devices are covered, in practice the program is generally credited with helping to spawn collection of a broad range of E-waste materials. CalRecycle staff believes the program has helped to deplete most electronics that were believed to have been stockpiled prior to the program's launch.

Table 2
Summary of Historic Outcomes of California E-Waste Program

Year	Number of Processor Claims	Processor Payments. ($Millions)	Total Pounds (Millions)
2005	225	31	65
2006	298	61	128
2007	351	89	185
2008	411	96	218
2009	315	73	186
2010	254	75	190
2011	298[8]	77	197

The program has confronted some concerns and challenges. Some feel it has been slow to adjust payment rates, for example, as CRT disposal costs have increased. As the electronics industry moves away from CRT-based display devices and towards various flat screen technologies, the

[8] Data as of 3/26/12. Not yet finalized.

nature of covered E-waste is changing. This shift has not yet played out, and the implications for program fees and payment rates are unclear. Markets for some E-waste components are poor, such as for mixed plastics which are commonly exported to Asia. The program is currently grappling with a lack of approved disposal or recycling options for CRT glass. California E-waste payments do not apply to recycled product manufacturing and the program does not include an explicit market development element, as it is mainly focused on ensuring collection and proper management of discarded covered devices.

Because participants are so diverse (including non-profits, landfills and local agencies in addition to different types of private firms handling varying E-waste materials), it is difficult to identify a single payment rate that supports all program participants equally. The initial processor payment rate of 28 cents per pound were viewed by some as very attractive, and spawned rapid growth in the industry and aggressive competition for E-waste supplies. This led to processors paying collectors more than the required amount, and in some cases to generators receiving payment for E-waste. Processors often pay collectors prior to CalRecycle review of their claims, sometimes resulting in situations where a processor is reimbursed well after it has already paid the collector. This dynamic provides necessary feedback to the industry, extending the compliance mechanism by harnessing the self interests of recyclers to better monitor their collection infrastructure.

Tire Recycling Incentive Policies in Other U.S. States

Figure 5 identifies nine current and past U.S. state tire incentive programs, and five current Canadian EPR programs (which generally include incentives or other payments to private firms as part of their structure). Five states currently operate tire incentive policies (Colorado, Louisiana, Oklahoma, Utah and Virginia), and four additional states previously operated tire incentive policies, but these programs were allowed to sunset and are no longer in operation (Idaho, Oregon, Texas and Wisconsin).

Figure 5
Select North American Tire Incentive and EPR Programs

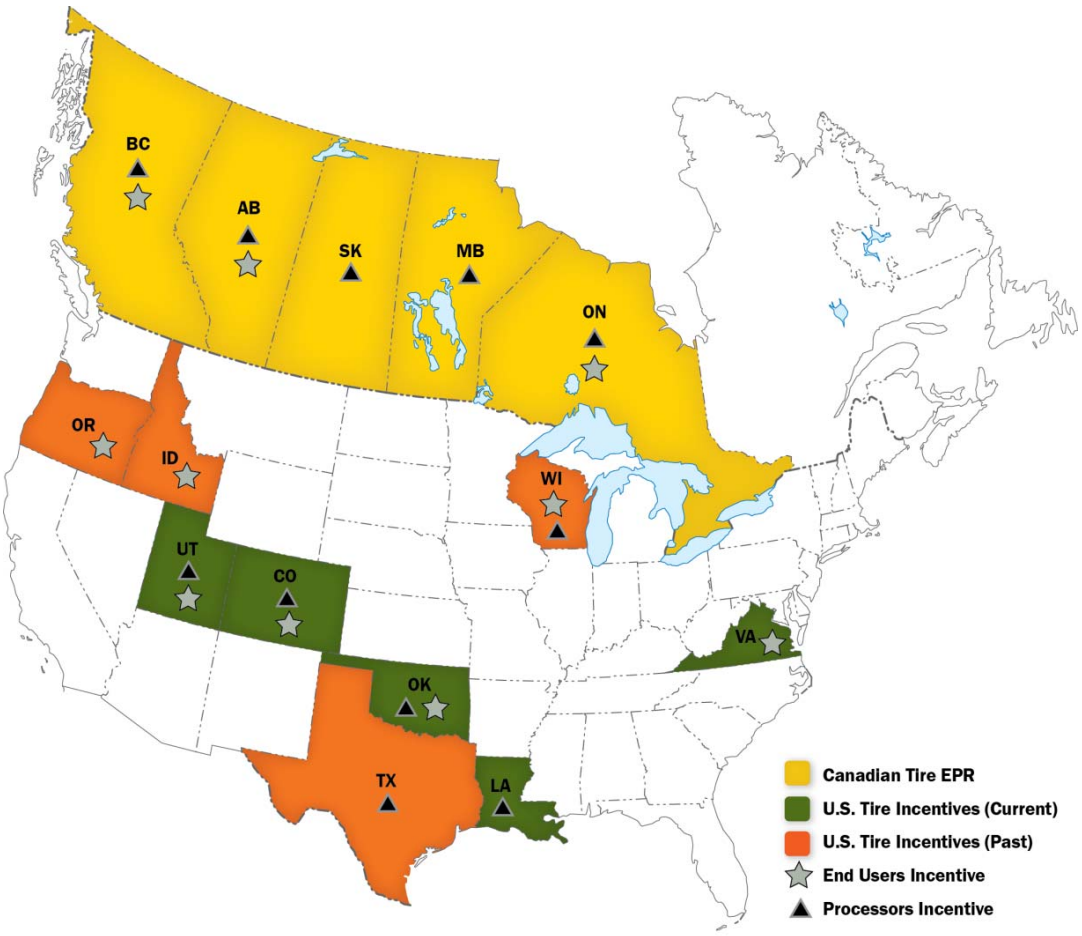


Table 3 on the following two pages presents select details on each of the U.S. state tire incentive programs highlighted in Figure 3. No two of the programs listed in Table 3 are exactly alike, and each one has important nuances that complicate making broad generalizations. Key differences involve the types of eligible firms and market segments, incentive payment amounts, whether out-of-state firms are eligible, terminology and the subtleties of each program's rules. Also, the programs were often implemented in very different contexts, in terms of the time period, their specific goals, their existing infrastructure and markets at the outset. With that caveat, following is a comparative summary of the programs covering several key points relevant to this evaluation. Additional details on each state program are provided in Appendix E. Also, a 2002 CalRecycle report provides additional perspectives on some of these state programs.[9] The Canadian EPR programs shown in Figure 3 are described later in this Section.

[9] "An Analysis of Subsidies and Other Options to Expand the Productive End Use of Scrap Tires in California." November 2002. Produced under contract by: Robert W. Wassmer, California State University, Sacramento.

The nine state incentive programs were all started between 1988 and 1998. Especially in their early years, markets for waste tires were virtually non-existent and processing infrastructure was often inadequate. In contrast to California's current well developed infrastructure and lack of stockpiles, the U.S. tire incentive programs were driven by the need to clean up illegal tire stockpiles and eliminate accumulation of new ones by building the infrastructure and markets needed to handle annually generated waste tires. In contrast to California's focus on crumb rubber and prohibition on promoting TDF, all the state incentive programs covered TDF users, while only some such as Utah and Oklahoma specifically promote crumb rubber. Some such as Virginia are very flexible, allowing broadly defined civil engineering applications such as alternative daily cover to be eligible, whether at in- or out-of-state landfills. Others are more restrictive, such as Oklahoma where civil engineering is not eligible for the end-user[10] incentive.

Four state incentive programs were allowed to sunset as planned in the original legislation. Each program had some success in developing in-state markets and infrastructure, including helping to establish TDF as a viable end-use which in most cases has continued to this day, though sometimes with some contraction. In some cases, the infrastructure and market gains made during the incentive programs collapsed after the program sunset. Idaho's scrap tire collection and processing infrastructure all but disintegrated after the incentive program stopped, however one market (the Potlatch facility) ceased accepting TDF due to EPA pressures, and more recently local cement kilns stopped or slowed their consumption of TDF due to the economic downturn, leaving many Idaho scrap tires going to Oregon and Utah markets. Oregon's tire diversion rate has fallen from 98 percent during the incentive program to about 33 percent. However, Texas and Wisconsin have well-established tire management infrastructure with growing crumb rubber capacity that developed well after their incentive programs sunset. Markets in Texas in particular appear strong, with eight TDF users, an established rubberized asphalt market, three existing crumb producers and one large new crumb producer planning to start up in 2012.

[10] Most states define "end-user" to include TDF users, crumb rubber producers and/or civil engineering project owners such as landfills or road contractors.

Table 3
Summary of Select North American Incentive Programs

State Name and Population [11]	When Started/ Ended	Main Goals	Incentive Eligibility and Amount	Funding Source[12] and Incentive Costs	Observations
Colorado 5,116,796	1998/ Ongoing	Remediate tire piles; Recycle annually generated tires; Enhance processor, end-user viability	Processors and end-users must be in Colorado. As of 2010, up to $65 per ton for processors and end-users. End-user rates technically are 2x processor rates, but both are capped at $65/ton	$1.50/tire fee $1.2 million total cost (CY 2009) $0.24 per capita	Initial $20/ton rate increased gradually. Initially didn't require sale of processed material, leading to stockpiles; law amended to better define eligibility. Program shifted to different department with more enforcement authority to enforce storage limits. Many illegal tire stockpiles. Strong processing infrastructure but only crumb producer now closed; 1 TDF user and few other end-users. Many tires still monofilled.
Louisiana 4,574,836	1992/ Ongoing	Remediate tire piles; Manage tires in approved end-uses	In-state processors only paid $150 per ton of processed material when sold to approved end-use. The end-use may be out-of-state.	$2/tire fee $10,169,017 total cost$2.22 per capita	Large demand for processed TDF by two pulp and paper mills, with a third one temporarily closed). Some civil engineering; rubberized asphalt use beginning; Well established processing infrastructure but no crumb producers. State is a net importer of tires.
Oklahoma 3,791,508	1989/ Ongoing	Remediate and prevent additional tire piles (90 sites remain); Beneficially reuse scrap tires	In-state processors get $54/ton plus $53/ton for transportation (to be eligible, must collect from all counties, and not charge disposal fee); TDF and crumb producers receive an additional $29/ton end-use payment; Civil	$2.50 /tire fee $5.6 million total cost (FY 2011) $1.41 per capita	Strong markets including cement kilns and 2 crumb producers. 3.4 million PTE covered in incentive program in 2011. Several incentive revisions over the years, including requiring proof of sales for processors, and increasing fee to avoid payment disruptions.

[11] 2011 Population per U.S. Census, provided as an indicator of size of state tire program, as availability of data and formulas for estimating quantity of tires collected varies significantly among states.

[12] Some states have various fees for tires of different sizes. Fees for passenger tires are shown here.

State Name and Population [11]	When Started/ Ended	Main Goals	Incentive Eligibility and Amount	Funding Source[12] and Incentive Costs	Observations
			engineering not eligible end-use.		
Utah 2,817,222	1990/ Ongoing	Promote tire recycling and reduce disposal; Develop tire recycling industry	In-state crumb producers get $65/ton with documented sale (buyer may be out-of-state); In-state TDF end-users get $50 per ton; $20 per ton to in-state end-users for ADC, civil engineering, monofill and landfill.	$1/tire fee $2,560,732 total cost (FY 2011) $0.91per capita	In 2011 25,000 tons went to crumb production and 17,000 tons to TDF. None to other uses or disposal. Changes: Now only in-state facilities are eligible; now require proof of sale for processed tires. Tiered payment system aims to steer tires to higher value uses. Incentive for monofilling, but no disposal in FY 2011.
Virginia 8,096,604	1994/ Ongoing	Remediate scrap tire piles; Avoid tire disposal	End-users located either in-state or out-of-state receive $22.50 per ton for annually generated tires, and $100 per ton for tires from stockpiles. All end-uses except disposal covered	$0.50/tire fee $2.6 million total cost (FY 2011) $0.32 per capita	Currently over half of annual generation goes to landfill civil engineering, including ADC. Historically no crumb, but a new producer is now opening in VA. Recent testing of rubberized asphalt may signal new market growth. Strong TDF demand but out of state only.
Idaho 1,584,985	1991/ 1996	Promote tire recycling and reuse; Avoid tire landfill	$20/ton for processing and end use (unconfirmed that in and out of state facilities eligible) $1.00 per tire for retreading passenger and light truck tires	$1/tire fee Costs NA	Sunset in 1996. Successful in handling stockpiled tires, but not for annually generated tires. During program 5 processors and 3 TDF markets operated; now only 1 small processor and 1 TDF user
Oregon 3,871,859	1988/ 1992	Clean up and prevent new stockpiles; Promote markets	End-users in and out of state received $20/ton	$1/tire fee Costs NA	Sunset in 1992. Helped establish first TDF users in nation in WA, OR and ID. Some have stopped use but several continue to use TDF. In 1994, 98% of tires were diverted, now 2/3 are disposed.
Texas 25,674,681	1992/ 1997	Eliminate tire stockpiles; Develop tire end	In-state processors received $80-85 per ton. No requirement to sell material.	$2/tire fee Costs NA	Sunset in 1997. Not requiring sales prior to incentive payments led to 60 million PTE in shred stockpiles; Program helped spawn TDF markets with 8 current users. Strong

State Name and Population [11]	When Started/ Ended	Main Goals	Incentive Eligibility and Amount	Funding Source[12] and Incentive Costs	Observations
		uses/markets			infrastructure developed after incentive program with 3 current and 1 large, planned crumb producer, and an established rubberized asphalt market
Wisconsin 5,711,767	1988/ 1997	Eliminate stockpiles; Develop markets; Avoid disposal	In-state end-users initially received $20/ton with no processing payment; later shifted to $20/ton for processors and $40/ton for end-users (both must be in-state)	$2/tire fee on first-time vehicle registration Costs NA	Sunset in 1997. Program helped develop processing infrastructure and 3 continuing TDF users. Stockpiles eliminated. One new crumb producer started last year. One processor sought permission to landfill due to lack of markets, but this is statutorily prohibited.

Of the five active programs Colorado, Oklahoma and Utah make payments to both processors and end-users. These states provide incentives for TDF and crumb rubber producers, both of which the states define as end-users. In this report, crumb rubbers are considered processors, and there is a focus on whether TDP manufacturers/installers should be eligible for incentive payments. None of the current programs make incentive payments to TDP manufacturers. However, when Wisconsin's program was active, it provided a $40-per-ton incentive for end users of crumb rubber. Most states also define civil engineering projects as eligible end-uses, although Oklahoma does not. In Virginia, half of the state's annually generated tires flow to civil engineering, which is defined broadly to include, for example, landfill ADC. Programs in Utah and Colorado offer incentives for monofilling tires, although no tires were disposed in Utah in 2011. Three programs have tiered rate structures. For example, in Oklahoma all eligible processors and end-users operating collection vehicles can qualify to receive $53 per ton for transportation costs. Processors receive an additional $54 per ton to shred tires, and crumb producers receive an additional $29 per ton. TDF users also receive an additional $29 per ton end-use payment. In Utah TDF end-users receive $50 per ton, while crumb rubber producers (considered an end user by the state) receive $65 per ton. And in Colorado, technically end-users are eligible for payments twice the rate of processors, but both processors and end-users are capped at $65 per ton, often resulting in a flat rate to both. The remaining two active programs are quite different from one another, with Louisiana providing the highest incentive amount of any program, $150 per ton of processed, sold material, only to processors, while Virginia pays the lowest incentive amount, $22.50 per ton, only to end-users (In addition to $100/ton for stockpile tires.)

The diversity of these state tire incentive programs complicates identifying best practices for California. Moreover, with the exception of Texas, the programs were all implemented in states much smaller than California, in a period when scrap tire markets and processing technologies were far less developed than they are now. Despite these challenges, following are some of the key lessons learned by experience in U.S. states:

Recycling market development by definition, seeks to catalyze changes in industry practices (i.e., growth of recycling infrastructure and demand). In U.S. states with incentives, increased competition has lead to expanded infrastructure, but also winners and losers as competition increased to take advantage potential payments on a limited tire supply. And, competitors outside of incentive states, such as California crumb rubber producers, complain that incentives provide an unfair market advantage.

Incentive payments have helped to build new tire collection and processing infrastructure, and to expand demand for scrap tires. However, the infrastructure and markets established are vulnerable and may not be sustainable if the incentive program is eliminated. While much of the TDF demand incentives helped to build in the four states that allowed their incentive programs to sunset has been endured, some has not, and processing infrastructure in states like Oregon and Idaho has reportedly contracted since their incentive programs sunset.

Unfortunately, there does not appear to be any clear lesson regarding who should be eligible for payments or how much the payment amount should be. Some programs report that even when payments are only made to one entity, in practice the processors and end-users may agree on pricing that in essence allows them to share the incentive. In the presence of a flat processing/end user incentive, some argue that high-volume, low-value products have tended to dominate the marketplace, such as Virginia's dependence on broadly defined civil engineering end-uses. This can preclude the emergence of diversified markets for tire derived materials. Even with a tiered

payment system, crumb rubber markets may develop only slowly, and may require additional resources/programs such as research and/or technical assistance to build markets like rubberized asphalt.

Programs must clearly require processors (including crumb producers) to document the sale of processed tires to approved end users prior to receiving incentive payments. The most notorious failure in this regard is Texas, where some 60 million shredded PTE in stockpiles accumulated and are still being cleaned up. In Colorado, apparent loop holes allowed a similar trend to begin, but the state has since adjusted program rules to alleviate the situation.

It is beneficial for incentive programs to allow sales to out-of-state buyers to "count." All of the states that require processors to sell product before receiving payment allow sales to out-of-state end-users as eligible. This helps ensure outlets for tire derived material in the absence of adequate in-state markets. However, most states (with the exception of Virginia and the now sunset Oregon program) have concluded that incentive payments should only be made to in-state firms. This facilitates administration and encourages in-state business development and infrastructure. A counter argument is that it may discourage development of regional markets, and may lead to dominance by one or a small number of large firms.

Incentive programs must be structured to provide as much certainty to private firms as possible over payment amounts, payment timing and the stability of program rules. This allows firms to count on revenue, and may induce them to make investments or undertake recycling practices that they may not if there is uncertainty over the program's future. This can be done by ensuring funding is adequate to cover increases in incentive demand, and by establishing clear time periods when potential changes to established program rules will next be considered. For example, the California E-waste program has identified specific time frames (once every two years) for when adjustments to the payment rate will be considered..

Factors beyond the control of the state agency often impact markets in a manner that complicates establishing clear cause-and-effect of incentive programs. For example, proximity to operating pulp and paper mills or cement kilns (which can consume large quantities of TDF), economic downturns, and advancement in technologies can all impact the marketplace regardless of the existence of incentives.

California EPR Policies

According to CalRecycle's web site, Extended Producer Responsibility (EPR), also known as Product Stewardship, is a strategy to place a shared responsibility for end-of-life product management on the producers and all entities involved in the product chain, instead of taxpayers at large; while encouraging product design changes that minimize a negative impact on human health and the environment at every stage of the product's lifecycle. This allows the costs of treatment and disposal to be incorporated into the total cost of a product. It places primary responsibility on the producer, or brand owner, who makes design and marketing decisions. It also creates a setting for markets to emerge that truly reflect the environmental impacts of a product, and to which producers and consumers respond.

EPR has been implemented extensively outside of the U.S. for a variety of products, including 23 states that have an EPR law covering E-waste. In EPR programs an industry consortium, in this report termed a Producer Responsibility Organization (PRO) is typically formed to implement programs on behalf of most or all brand owners, and often these programs involve payments to

entities throughout the recycling chain. Typically the PRO issues an RFP to service providers and /or otherwise contracts for services with the entity(ies).

CalRecycle has explored EPR programs for a variety of products and is currently implementing legislated policies covering carpet (AB 2398, Chapter 681, Statutes of 2010) and paint (AB 1342, Chapter 420, Statutes of 2010). Experience in California to date is limited, as CalRecycle just approved in January 2012 the stewardship plan submitted by the Carpet America Recovery Effort (CARE), the PRO established by the carpet industry to implement the law. Paint manufacturers have until April 2, 2012 to submit their stewardship plan outlining how they will comply with the new law.

In July 2004, CalRecycle (then the California Integrated Waste Management Board) sponsored a Tire Stewardship Forum, facilitated by the Product Stewardship Institute (PSI). This lead to a 2005 Tire Stewardship Action Plan published by PSI. While PSI maintains a web page on tire stewardship, no further activity to explore tires EPR was identified. The California Product Stewardship Council has not identified tires as a top priority at this time.

Canadian Tire EPR Policies

As shown in Figure 3 above, five Canadian provinces have implemented tires EPR laws: Alberta, British Columbia, Manitoba, Ontario and Saskatchewan. While these Canadian policies use the term product stewardship rather than EPR, they embody to varying degrees the basic principles of EPR in that they assign a significant degree of responsibility for funding, planning and/or implementing tire programs, and achieving goals, to industry, and PROs have been formed in each province to administer these programs. The Canadian EPR programs involve, to varying degrees, government oversight and in some cases stakeholder involvement on governing boards. In some instances retailers are considered to be stakeholders, and producers are involved more peripherally. In the case of Ontario, the programs are precluded from sending tires to TDF unless no other alternative exists. Ontario is the only Canadian province that receives payments from producers of tires directly. The other provinces fund their programs through advance disposal fees much like U.S. programs, though administered by the PROs. The following discussion focuses on the Ontario and British Columbia EPR programs as examples. More in-depth discussion of Canadian EPR programs is provided in Appendix E.

Ontario's tire EPR program is administered by Ontario Tire Stewardship (OTS), which has a goal of establishing markets and infrastructure to recycle all of the province's tires into high-value crumb rubber products. The program is funded through tire fees stewards remit to OTS based on the quantity of each tire type they sell in the province, ranging range from C$5.84 for passenger tires to C$250.20 for giant OTR tires. The program recovered 96 percent of passenger tires and essentially all truck tires in 2010. OTS reports that 31 percent went to crumb rubber, 8 percent to mulch, 36 percent to shreds (with end-use applications that are unclear from the OTS web site data), 12 percent to reuse, 1 percent to retread, and approximately 3.5 percent was processing bypass that was ultimately disposed. Nearly 7 percent of the total weight collected and processed/reused consisted of byproduct that was recycled.

OTS (like British Columbia, discussed below) has established incentive payment rates for crumb rubber producers and TDP producers designed to make them more economically competitive and to facilitate industry growth. Total incentive payments in Ontario were $53,420,247 in 2010, or

approximately $4.03 per capita. Processing and manufacturing incentives were $1.03 per capita. Total program expenditures were C$64,561,018.59 which equates to $4.87 per capita.

Examples of rates for Ontario are shown in Table 4 below. As an example, a crumb rubber producer selling 20 minus mesh product would receive $270 per metric ton, while the highest U.S. payment rate, in Oklahoma, is $150 per ton. OTS also makes payments to tire collectors such as tire dealers to cover their costs in collecting, storing and arranging for hauling ($88 per ton for on-the-road tires), and to haulers to cover their costs, including transportation. The program distinguishes between on-the-road and off-the-road tire types, with payment rates varying considerably.

Table 4
Examples of OTS Incentive Payment Rates

Type of Firm	Product Produced and Sold	Input Materials	Incentive Payment Rate[13]
Processor	Crumb Rubber, 95% minus 20 mesh, free of steel	Tire Shreds from On-the-Road Tires	C$140/MT
		Whole On-the-Road Tires	C$270/MT
	Crumb Rubber, 80% minus 8 mesh, free of steel	Tire Shreds from On-the-Road Tires	C$115/MT
		Whole On-the-Road Tires	$230/MT
	Coarse Ground Rubber, Minus ¼" sieve, free of steel	Tire Shreds from On-the-Road Tires	$65/MT
		Whole On-the-Road Tires	$155/MT
	Fabricated products such as blasting mats, etc. Must utilize at least 75% of tire by weight	Whole On-the-Road Tires	$65/MT
	Primary shred used as TDF or feedstock for crumb rubber production	Whole On-the-Road Tires	$55/MT
TDP Manufacturers	Molded, extruded or calendared TDPs (excludes installers)	Ontario Produced Crumb Rubber	Base rate of $40/MT on all production + $120/MT for annual increase over 3 year average use

[13] Canadian EPR program costs are presented in Canadian dollars, denoted C$, and weights for Canadian programs are in metric tons (MT).

British Columbia's EPR program is implemented by Tire Stewardship British Columbia (TSBC), and in 2007 replaced a government-run payment program that had been in place since 1991. Of tires collected and diverted in 2010, 71 percent was processed into crumb rubber, and 29 percent used as TDF (these rates do not include residual waste). The diversion rate is 82 percent. . The program is funded through retail tire fees from C$5.00 for passenger tires to C$35 for logger-skidder tires. OTR tires are excluded from British Columbia's program. Examples of TSBC's incentive payment rates for processing and TDP manufacture are presented in Table 5. Rates are for processed materials that have been sold/recycled.

Table 5
Examples of Tire Stewardship BC Incentive Payment Rates

Type of Firm	Product Produced and Sold	Rate
Processor	Crumb rubber or powder form up to 5/16" and free of steel and fiber	C$370/MT for crumb rubber C$168/MT fiber and steel
	Processes that change the shape of the tire but use the tire in essentially the same form, such as blasting mats and portable terrain mats.	C$140/MT
	Processed for high volume applications such as coarse shred used as road fill.	C$69/MT
	Whole tire used in its original form used to make a product.	C$0/MT (Transportation assistance available)
	Rubber granules with a particle size of >5/16" up to ¾" and free of steel for use as recycled rubber mulch, typically used as landscape material..	$266/MT
	Shred processed for TDF	C$127/MT
TDF End-Users	Passenger/light truck tires accepted for fuel at facilities with whole tire feed systems.	C$73/MT
TDP Manufacturers	Manufacture of recycled rubber products using BC derived rubber. Eligibility requirements include using a minimum of 1 million pounds annually.	Up to C$0.05/lb. ($110/MT)

Source: TSBC Summary of Programs and Policies, October 2011, available at: http://www.tirestewardshipbc.ca/pdf/TSBC_policies_as_at_Oct_01_2011.pdf.

The incentive payments for processors, manufacturers and end users listed in Tables 4 and 5 are intended to boost the competitiveness of these firms and expand diversion through crumb rubber recycling. As EPR programs, both TSBC and OTS also cover costs and provide a reasonable rate of return to generators and haulers, including transportation payments based on distance and load types. In effect, these PROs are the sole contracting entity for scrap tire management services in these provinces, in lieu of the private business relationships that would otherwise prevail.

In addition to the payment system, OTS also manages an aggressive market development program similar in scope to CalRecycle's. The program includes outreach activities, research and development grants, demonstration projects, a nascent rubberized asphalt initiative and grants to local agencies purchasing tire-derived products. OTS's overall program is summarized in Table 6 below. OTS may face changes in their funding structure as the Government of Ontario's Minister

of the Environment issued new direction to Waste Diversion Ontario (WDO) requiring a review of Stewardship programs in the province, including the Used Tires Program. The government seeks to change funding strategies to ensure producers pay the actual cost of waste disposal instead of a projected cost, which is currently the case. This would change the payment system from one based on per-unit of packaged material to a lump-sum system, which they believe would be a "more sound financial footing."

Table 6
Ontario Tire Stewardship Programs

Program	Purpose	2010 Expenditure
Incentive Payment Program	• Provide incentives to collectors, haulers, processors and manufacturers using Ontario scrap tires in the province. • Keep manufacturing in Ontario, developing jobs and ensure tires are recycled in high-value end-uses..	$53,420,247 Total Including: • $1,258,852 Manufacturing Incentive • $30,682,211 Transportation Incentive • $12,811,806 Processor Incentive • $8,667,378 Collection Allowance
R&D Program	• Provide grants to businesses to help them realize an emerging technology or process to utilize scrap tires in a viable business. • Work with industry to develop technologies and products using scrap tires in Ontario, such as RAC	$160,253
Education and Outreach	• Raise general awareness of program • Educate public on tire maintenance • Educate public on TDPs • Obtain feedback on OTS program • Promote the OTS program to businesses that might be interested in starting an operation in Ontario	$1,121,196
Program Administration and Audit/Review	• Ensuring all stewards are registered • Conduct audits/collect penalties and interest as necessary (in 2010 OTS audited 4 stewards, 164 collectors, 7 haulers, and 3 processors) • Educate program participants about program details, expectations, and changes as they arise	$5,089,167
Total Expenditures		$64,561,018

Source: 2010 OTS Annual Report, available at:
https://www.ontariots.ca/files/OTS%202010%20AR%20and%20signed%20AFS.pdf

These relatively high incentive payments and complementary programs have spawned rapid increase in processing capacity in Ontario crumb rubber production and TDP manufacturing infrastructure. However, both provinces continue to export large quantities of crumb.

Some firms say that the Ontario program has disrupted established tire supply, pricing and processing infrastructure both in Ontario and in neighboring states and provinces. This has caused some U.S. processors to move operations to Ontario or to shut down entirely, and caused some supply pressures for TDF users in the Midwest and northeast. British Columbia's processing infrastructure has been supported for many years prior to the 2007 launch of the EPR program, and is more stable than Ontario's relatively new program. Canadian crumb rubber producers and, especially in Ontario, TDP suppliers are able to exploit pricing advantages to win market share as far away as California.

European Tire EPR Policies

Overview

Information and informed perspectives on European tire programs is more challenging to obtain than for North American programs. However, following is a broad overview, including descriptions of programs in France and Spain as examples.

The Council of the European Union's Directive 1999/31/EC of April 1999 encouraged nations to espouse the "polluter pays" principal, and take measures to ensure that whole scrap tires could no longer be landfilled by July 2003, and no material from shredded tires would be landfilled as of July 2006. Since 1996, landfill of scrap tires has declined from 32 percent of used tires generated to 4 percent in 2009. In 2010 the major markets for EU-generated scrap tires were energy recovery (38 percent) and material recovery/recycling (40 percent). An estimated 10 percent of tires were exported for reuse, 8 percent were retread, and 4 percent were landfilled or had an unknown disposition.[14] Over the past 15 years the combined portion of scrap tires going to recycling and energy recovery increased from 31 percent to 78 percent. Landfill decreased from nearly 50 percent in 1996 to 4 percent in 2010. The portion of scrap tires being exported has remained relatively steady, while the portion of tires retread has declined from 12 percent to 8 percent. Of the 1,315,000 metric tons of scrap tires being recycled, 18 percent went to civil engineering applications and 82 percent to product manufacturing (such as flooring, sports fields, roofing materials, etc.). Of the 1,248,000 metric tons that were used for energy recovery, 92 percent went to cement kilns an 8 percent to co-generation facilities. The greatest number of scrap tires is generated in the largest EU nations: Germany, UK, France, Italy Spain and Poland, which each manage between 250 and 600,000 metric tons per year.

The European Tyre and Rubber Manufacturers Association (ETRMA) reports that the EU nations where a producer responsibility system has been operating for over 10 years have recovery rates of 100 percent and have eliminated all stockpiles[15]. ETRMA classifies the types of tire management programs in the EU as: 1) Producer responsibility, 2) Free market; and 3) Tax system. ETRMA reports that most manufacturers prefer the producer responsibility model in

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[14] European Tyre and Rubber Industry, Statistics, 2011 Edition, available at: http://www.etrma.org/uploads/Modules/Documentsmanager/20120126-etrma-statistics-2011.pdf.

[15] ETRMA, End of Life Tyres: A Valuable Resource with Growing Potential, 2011 Edition, available at: http://www.etrma.org/uploads/Modules/Documentsmanager/brochure-elt-2011-final.pdf.

which the law defines the legal framework and assigns the responsibility to the producers (tire manufacturers and importers) to organize the management of end-of-life tires and such programs are most suitable for reaching 100 percent diversion in a cost-effective manner. Countries with EPR programs in place include: Belgium, Estonia, Finland, France, Greece, Hungary, Italy, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden and Turkey.

ETRMA defines the tax system as a system in which a government agency is responsible for the recovery and recycling of tires at the end of their life. There is a tax levied on tire production, which is passed on to the customer. This is considered to be, in effect, an "intermediate" system in that the producers pay a tax to the State, which is responsible for managing the recovery of scrap tires, including paying collectors and processors with the revenues collected vie the tax. Denmark and the Slovak Republic have tax systems in place to manage scrap tires.

Under the free market system, according to ETRMA, legislation states objectives but not who will be responsible for ensuring the objectives are met. In this way all the operators in the recovery chain contract under free market conditions and act in compliance with legislation. Often there is voluntary cooperation among businesses to promote best practices and take advantage of economies of scale. Nations with free market scrap tire management programs in place include Austria, Bulgaria, Croatia, Germany, Ireland and Switzerland. The UK has a free market program in place but collectors and processors have to report to national authorities, therefore ETRMA suggests that this hybrid program could be considered a "managed free-market" system. U.S. crumb producers have stated that crumb rubber from Germany is being offered for sale throughout the U.S. at relatively low prices.

France

France is the third largest generator of scrap tires in the EU after Germany and the UK. Scrap tire recycling regulation in France is shaped by EU regulations. France has made the tire industry responsible for collection and disposal of scrap tires. In response, the seven major tire manufacturers in France have formed a company—Aliapur—to manage the program. The Environmental Code of France stipulates that:

- Based on tons of tires sold in the previous year, producers must collect (or have collected), then process (or have processed) the used tires stored by their distributors or present in local companies and groups;
- Producers are authorized to group together to satisfy their obligations collectively;
- Distributors of new tires must take back used tires free of charge within the limit of their annual sales; and
- Report required data (quantities of tires sold and managed at the end of useful life) to the government annually.

To fund the program an eco-fee (or value added tax, VAT) is charged on the sale of new tires. In France the VAT is currently €1.35 per passenger tire (when the program was first implemented in 2004 the fee was €2.20 per passenger tire). Per the Grenelle Law II (Law 2010-788, officially signed July 13, 2010), producers who do not satisfy these requirements are subject to a general tax on polluting activities. In addition Article 8-IV-3 states that the French Secretary of State is responsible for the environment and can apply an administrative fine to non-conforming

businesses, "the amount of which takes into account how seriously obligations have not been respected and any advantages obtained as a result."

In 2010 approximately 278,756 metric tons of scrap tires were collected in France. Approximately 41 percent of tires went to "material recycling," of which 3 percent went to civil engineering, and one percent went to recycling of carbon and iron. Another 43 percent went to energy recovery, and 16 percent to reuse and retreading. In 2009 and 2010, Aliapur was faced with an surge of scrap tires on which no eco-fee had been paid. Aliapur had to limit collections, which made them the subject of criticism from the public and the media. However, the organization was taking a stance against program fraud and was within the limits of the law in doing so. Aliapur demanded sanctions against businesses selling tires into the French market without financing their recovery through payment of the eco-tax.

Aliapur contracts with service providers for the collection and processing of scrap tires. These three-year contracts were renewed in January 2010. Of the €51.2 million annual expenditures of Aliapur, budget, approximately 49 percent pays for collection and transportation of tires, 34 percent pays for processing, 7 percent for TDF, and 2 percent for research and development and 9 percent for program administration. Total program costs are approximately €0.78 per capita or €181.49 per metric ton. For comparison's sake, this translates to $1.04 per capita or $219.04 per ton.

Spain

Signus is a non-profit organization formed by tire manufacturers to satisfy the requirements of Royal Decree 1619/2005 in Spain, which calls for producers to take responsibility for the management of scrap tires at the end of their useful life. There are currently 211 stewards (tire manufacturers and importers) that fund the operation of Signus based on the quantity and types of tires they sell into the Spanish marketplace. Brand owners pay a fee of €1.01 per passenger tire sold. The per-tire fee increases based on the size of the tire, up to €34.80 for agricultural IV and commercial IV tires. Signus contracts with private businesses to ensure adequate collection and processing of scrap tires throughout Spain. There are 8 shredding facilities, 13 crumb rubber producing facilities, and 13 facilities accepting scrap tires as fuel in Spain. Of the energy facilities, ten are cement kilns, one is an energy generation facility, and one is a pyrolysis facility.

In 2010 there were an estimated 182,217 metric tons of scrap tires sold into the marketplace by Signus members, and 192,070 tons of end-of-life tires (ELTs) were managed. The disposition of those tires was: 9 percent reuse/retread; 40 percent energy recovery and 51 percent material/recycling. Within the energy recovery category 94 percent went to cement kilns, 4 percent to electricity generation, and 2 percent to pyrolysis. Within the recycling/material recovery category 97 percent went to crumb rubber production (and steel recovery), 2 percent to civil engineering, and 1 percent to "other" recycling. Of the crumb rubber, 68 percent is used as turf fill, 15 percent in playgrounds, 8 percent in bitominous mix, 4 percent in rubber parts, and 3 percent in "other" uses.

In an effort to advance end markets Signus participate in research and development efforts. Current projects include supplying tires to a small pyrolysis plant, an embankment fill project, crash barriers at a race track, and building a breakwater at a reservoir in Caceres. Signus sees a growing need for standardization with respect to end of life tires for verification of the properties

of the materials obtained from them, and has led the industry to consider such standardization, as well as specifications for processed material.

One issue Signus is facing is fraud. Although membership of stakeholders has increased steadily over the history of the program (from 31 in 2006 to 211 in 2010), there are still importers and manufacturers that do not pay into the program but whose tires are recovered through the program, creating a "free rider" issue. The apparent growth of sales of tires over the internet contributes to this issue.

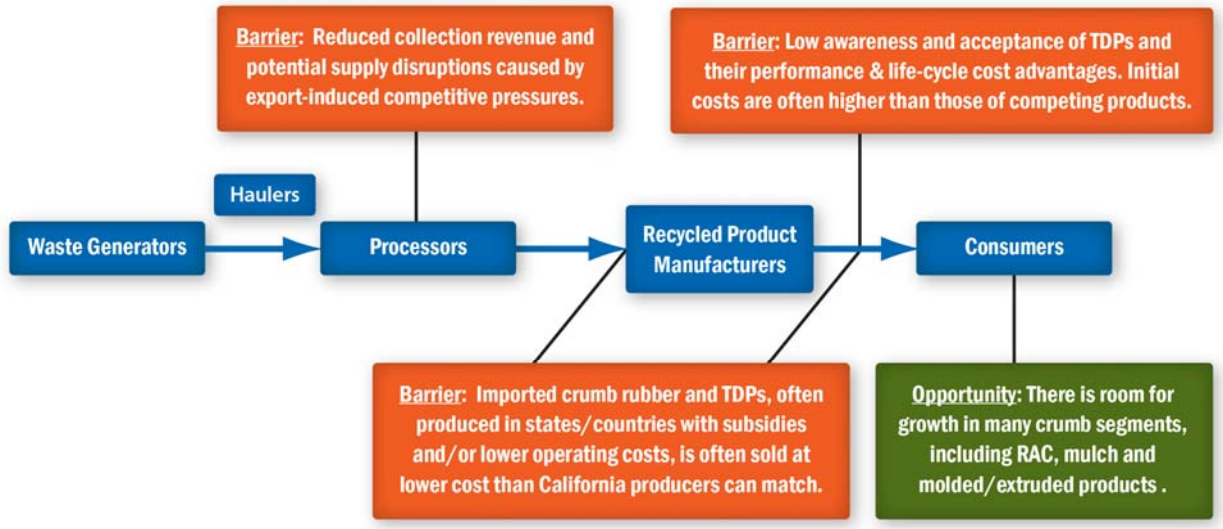
3. Effectiveness in Increasing Diversion

The tire recycling industry is very diverse, and each market segment involves distinct market development opportunities and barriers. This section briefly discusses these, and provides a high level evaluation of the potential effectiveness of incentives and EPR in expanding diversion rates.

California tire recyclers can expand in a different ways, for example, by: increasing volumes as overall market demand increases; winning market share from out-of-state suppliers; developing new recycled tire products; and/or increasing use of crumb rubber in established products (i.e., feedstock conversion). Appendix D presents estimates of the theoretical size of each waste tire market segment. Although they are rough and do not reflect practical challenges to growth, these estimates describe the available opportunities to expand recycled tire demand. In recent years CalRecycle has focused on expanding diversion by increasing demand for crumb rubber and civil engineering. The agency is statutorily prohibited from promoting TDF. ADC is viewed as less desirable than civil engineering applications utilizing TDA's inherent material properties. And, exports are viewed with concern over regulatory compliance, disruptions in pricing and competitiveness, and lack of information on end-uses and environmental health and safety standards in some importing nations.[16] Few other tire recycling opportunities exist currently.

SAIC estimated the theoretical size of the California crumb rubber market at 44 to 62 million PTE per year, with the highest potential by far in RAC at 25 to 35 million PTE per year. Figure 6 identifies some (but by no means all) key barriers to crumb rubber expansion.

Figure 6
Examples of Key Opportunities and Barriers to Expanding California Crumb Rubber Demand

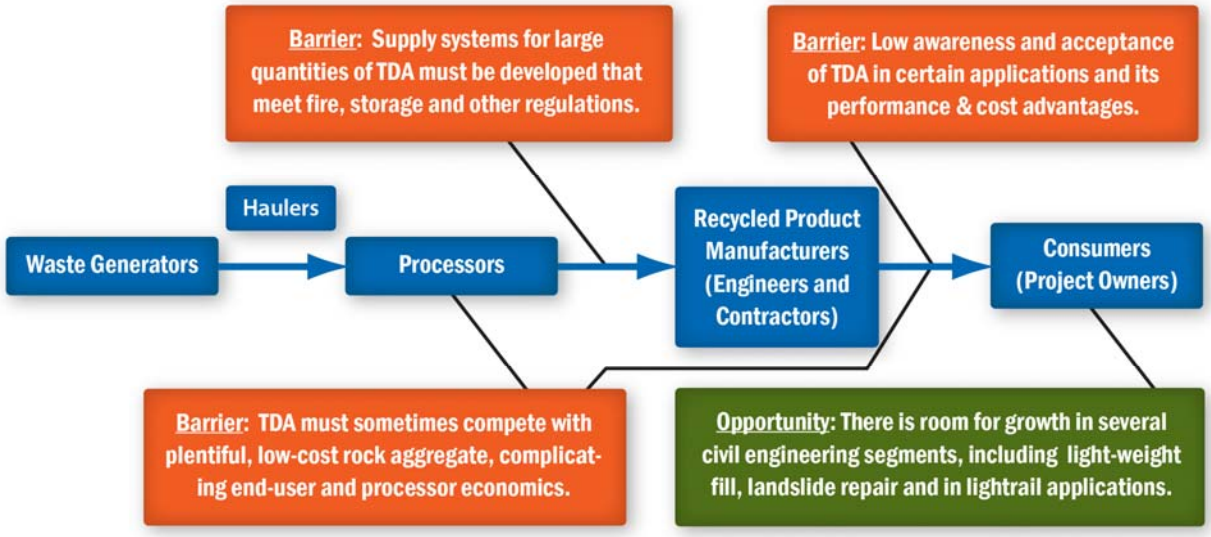


[16] CalRecycle publishes annual California Waste Tire Market Reports (available online) analyzing markets in detail. The 2011 market report will include an update on opportunities and barriers, and a special section on exports.

SAIC estimated the theoretical size of the civil engineering market at between 17 and 25 million PTE per year, with the highest potential in lightweight fill used in transportation related projects. CalRecycle has had success in overcoming barriers to TDF and RAC over several years, but has not yet achieved the same level of success with civil engineering applications. As shown in Figure 7, some barriers to civil engineering are similar to crumb rubber, such as the need to raise awareness among certain customer groups. But some are different, such as the unique barriers involved in making large quantities of supply available where and when it is needed.

Key points of this discussion pertinent to evaluating incentive polices are that market expansion barriers are unique to each market segment, and that the most critical barriers may appear at any point in the recycling chain. Opportunities and barriers also vary for different types of recycled materials, complicating comparisons of tire programs with programs targeting other materials.

Figure 7
Examples of Key Barriers and Opportunities to Expanding TDA Demand in California Civil Engineering Applications



Effectiveness of Incentive Policies in Increasing Diversion

While there have been some failures, experience shows incentive payments can be effective in expanding tire processing infrastructure and, to varying degrees, increasing demand for recycled tires. However, experience also shows some critical drawbacks and risks to be avoided. And, important implementation "details" can have a huge influence on both diversion effectiveness and industry impacts (especially the key questions of who should receive incentive payments and how large they should be). Following is a high level summary of incentive payment advantages and disadvantages related to expanding diversion. Industry impacts are then summarized in Section 4, and implementation issues are addressed in Section 5.

Advantages of Incentives

Proponents cite a number of advantages of incentives related to expanding diversion, including:

Effective in strengthening processing and end-use infrastructure. Incentive payments increase cash flow, making recipients generally more resilient and providing them with options to address growth barriers. They can use funds, for example, to help secure tires currently flowing to export or other markets, to reduce product prices to gain market share, or to invest in R&D, expand capacity, or marketing materials. As described briefly above and in more detail in Section 2, there are several examples of incentive programs helping to strengthen and/or build infrastructure. State programs initially were focused on building a brand new infrastructure in the 1980s and 90s, to remediate stockpiles and establish basic processing and end-uses for annually generated tires, mainly TDF and civil engineering. Some are evolving to focus on crumb, especially Utah. Incentive programs implemented under EPR in Ontario and British Columbia have strengthened or expanded crumb rubber capacity and increased demand for crumb by in-province manufacturers, although large quantities of crumb are still exported.

Helps Achieve High diversion. Incentive states generally have achieved high diversion, at least while the incentive programs were in place. Utah's tire diversion approaches 100 percent with 63 percent flowing to crumb rubber and 37 percent to TDF. Virginia's rate also approaches 100 percent, with 43 percent flowing to TDF and 55 percent to civil engineering). Ontario diverts over 95 percent of tires to recycling applications, with no reliance on TDF (which is not allowed under their program unless no other options exist).

Leveling the playing field with out-of-state firms. Some stakeholders emphasize incentives are needed to help California firms compete with out-of-state crumb rubber and TDP producers that may: benefit from incentive payments; have lower operating costs; and/or may not have suffered reduced collection revenues caused by low cost exports. They argue incentives can help California firms win market share inside and outside of California, thereby increasing demand for California crumb rubber.

Help established California firms compete with export markets. Incentive payments provide processors a source of revenue that can be used to compete to secure tires from export flows or other markets. Or, incentive payments can make up for reduced tip fee revenues caused by export-induced competition.

Assist companies in expanding or siting new facilities. Incentive revenue can be used to help motivate or justify expansion or citing of new facilities. This has been cited in connection with the California plastics program and the Ontario program, for example.

Enhanced viability and more flexible, targeted use of State funds by private firms. Recipients can apply the incentive proceeds in a very flexible way as circumstances dictate, for example, to help secure tire supplies, reduce prices, increase marketing, develop new products or other firm-specific market development activities. Incentive payments strengthen the general profitability, competitiveness and vitality of recipients by enhancing cash flow. Some argue this is more directly beneficial than assistance services provided through CalRecycle's TBAP program, low-interest loans or other state programs.

Disadvantages of Incentives

In contrast to the above advantages opponents cite the following disadvantages of incentive payment programs:

Unsustainable benefits and dependence on government programs. Some argue that incentive benefits may be tenuous and disappear if the policy goes away, and that some firms' existence will depend directly on the continuation of the program. This was apparently the case for processing infrastructure and for certain end-uses in the four tire incentive programs that sunset. However, it is difficult to tease out cause-and-effect with incentives, as some states, like Texas, (and California) have developed effective processing infrastructures and diverse end uses without incentives.

Potential to trigger over-expansion and production. Some stakeholders fear an incentive program could trigger a "free-for-all" in which many firms from inside and outside the state set up California operations specifically to benefit from the incentives. This could lead to severe overcapacity that exacerbates competition for tire supplies, reductions in tip fee revenues and competitive pressures, the very issues the incentives are intended to overcome. While this has not been a big issue in small states, it has occurred, especially in larger jurisdictions like Texas, and with attractive incentive rates like Ontario. California's large size could exacerbate this concern. Its population of 38 million is 80 percent as large as the 47 million people residing in the 14 other North American jurisdictions identified with tire incentive or EPR programs. However, having a significant barriers to entry relative to incentive payments (e.g., tiered structure so that relatively low-value material receives a lower incentive rate than highly processed crumb), ensuring material must be sold before it is eligible for an incentive payment, and not allowing mobile processors to be eligible to incentive payments (unless perhaps affiliated with a permanent in-state location) are methods used to mitigate this impact.

Implementation challenges. The main implementation challenge is minimizing fraud, including the potential for payment claims to be based in part on out-of-state tires, or for product not sold into an approved market (assuming that is a requirement). CalRecycle has stepped up efforts to audit TDP grants, but some are still concerned that out-of-state tires sometimes are used in grant-funded projects. Another implementation challenge is the potential for total claim amounts to abruptly increase due to increased market activity. This makes predicting funding needs difficult, and can potentially cause a funding shortfall that may require reducing payments. A lack of certainty over future payments is a significant concern of incentive recipients in some current programs, and can reduce the full potential of the policy.

State picks winners and losers. Incentive systems promoting some end uses over others (such as crumb or certain civil engineering applications over TDF, ADC or exports) will benefit some firms over others. (It must be noted that, by their nature, recycling market development programs seek to promote certain industry practices over others.)

Unintended consequences inevitably result. Incentive payment programs may negatively impact non-incentivized markets that would otherwise be viable on their own, such as TDF. Incentives can lead to competition for tires that could potentially exacerbate current pressures in this regard.

Inefficiencies can result. Incentives are not necessarily efficient in achieving their desired results. For example, they may: pay for existing and new activities that may occur without

incentives; benefit host states at the expense of firms in other areas; have unintended consequences that can reduce or even negate their intended benefits; and may promote high-volume, low-value end-uses at the expense of higher value ones. A $25-per-ton California incentive to processors and in-state end users covering crumb rubber and civil engineering applications in 2011 would have resulted in $3.85 million in incentive payments, based on the amount of tires used in those applications in that year (without, of course, the assistance of incentives).. Also, if TDF is excluded, an incentive policy could exacerbate tire supply concerns currently being experienced by some TDF users, even though TDF has the potential to use increasing amounts of tires independently of state support.

Effectiveness of EPR Policies in Increasing Diversion

EPR programs are not, per se, market development policies, but they can have beneficial impacts on recycling infrastructure and markets. Like incentive policies, however, there are also risks and potential drawbacks. Many tire EPR programs include an incentive payment element similar to that described above, and to this extent the same evaluation above applies, in addition to the following points. Depending on the EPR legislation and strategies employed by the PRO, implementing a tire EPR policy in California holds the potential for far-reaching impacts on costs, revenues and market opportunities throughout the supply chain.

Advantages of EPR

Advantages of EPR programs relative to increasing diversion include:

Expansion of processing infrastructure. Canadian and European EPR programs have been successful in ensuring a sufficient infrastructure for tire processing and establishing end uses. Because of British Columbia's and Ontario's reliance on incentives this outcome is described in more detail above.

Industry organizations can exploit business acumen and supply chain relationships. Industry organizations have options for providing collection, processing, and manufacturing that state agencies do not have. For example, since they are contracting with and providing funds to firms throughout the recycling supply chain, they can establish terms of service that incentivize or require certain recycling practices.

Industry can often act more nimbly and with fewer restrictions than government agencies. PROs are often able to make decisions, update bylaws, and negotiate contracts on a tighter timeframe, adjust fees, and often with fewer restrictions. For example, they can issue RFPs for services and negotiate with service providers to optimize costs and results, typically more quickly and with fewer restrictions than government entities can

EPR internalizes recycling costs into business costs, and may have more stable funding than government programs. In many instances EPR programs have been implemented to help develop or strengthen a collection and processing infrastructure that a municipal or state program might not have the ability to fund, or to fund fully. Many also believe that having consumers pay for the end-of-life management of a product upon purchase (whether an explicit cost or hidden) is more equitable and helps consumers understand that proper material management has a cost.

Minimizes government administration and staffing. Since EPR programs are administered by industry, state staffing and expenses are minimized. The state role mainly involves oversight and

ensuring accountability for the mandate, based on specifics in the enabling legislation. Some view this as a positive, while some may view it as a negative.

Disadvantages of EPR

Some potential drawbacks of EPR programs include:

Potential to negatively impact some market players. PROs administering EPR programs may choose to provide payment programs that are open to all qualifying firms, in effect an open market that is framed by the PRO's terms and conditions (as in British Columbia). Another option is for PROs to directly contract with firms to provide needed services. In either case, some established firms may see new opportunities and grow, while others may lose existing customers and see reduced opportunities.

Potential disruptions to market prices. As with incentive programs, EPR programs can disrupt market pricing relative to "free market" programs. This can have the result of triggering below-market pricing which disrupts competitiveness outside of the host jurisdiction, essentially "de-valuing" the material and products. For example, there have been reports of low cost crumb rubber from Germany being sold throughout the U.S., similar to reports in California of competition with incentivized crumb production from Canada and other U.S. states.

Reduced government control and transparency. Depending on the statutory mandate for an EPR program, there may well be less transparency in decision making and other factors compared to CalRecycle's focus on public process, and government and/or stakeholders may have less authority or input on strategic decisions.

Focus on lowest cost solutions. If a PRO is not precluded from doing so by enabling legislation, it could choose to pursue the lowest cost solutions, potentially having a detrimental impact on established industry. For example, a PRO could maximize exports in lieu of developing in-state markets for tire-derived material.

PROs cannot implement policy and enforce regulations. PROs generally exert control over the supply chain through contracting and program rules, but cannot directly influence government policies.

4. Potential Impacts on Consumers and Industry

This section examines how incentive or EPR policies could potentially impact consumers and different types of scrap tire management firms, both positively and negatively. Table 7 summarizes some of the key potential impacts involving regulated roles and responsibilities; costs, benefits and market opportunities; and overall competitiveness. (Note that some firms may engage in many of the roles identified in the Table.) Following the table, these three categories of impacts are broadly summarized.

Table 7
Examples of Potential Incentive and EPR Impacts to Consumers and Industry

Stakeholder Group	Current Situation	Potential Impacts Under Incentives	Potential Impacts Under EPR
Tire Consumers	Pay $1.75 state tire fee plus typical disposal fees of $1.00 - $2.50, with an average of $1.61 (See Appendix F for details.)	Possible state tire fee adjustment, depending on details of a new legislated incentive policy.	Possible reduction in state tire fee and elimination or replacement of current disposal fees with standard fee schedule.
Generators/Tire Dealers	Collect state tire fee and disposal fee. Retain $0.015 of state tire fee. Store tires and arrange for shipment for disposal. Keep revenue difference between disposal fee and actual disposal costs. May sell reusable tires.	No direct change likely. Possible adjustment in state tire fee could impact $0.015/tire retainage.	Likely reduction in disposal fee windfall revenue. Possible reduction in options for disposal services. Possible loss of used tire revenue.
Haulers	Charge generators/dealers disposal fee. Haul tires and may sell reusable tires. Pay tip fee to processor or end-use destination.	Theoretically could receive incentive payments, but don't in all non-EPR programs. May receive a share of incentives from processors if market circumstances dictate.	Possible increased competition and reduction in customer base and/or changes in pricing if contracted under PRO.

Stakeholder Group	Current Situation	Potential Impacts Under Incentives	Potential Impacts Under EPR
Processors	Receive tip fee and tires from haulers or collection accounts. Process tires and ship processed tire products. May receive revenue or pay tip fee for shipped products. State Programs: TBAP; RAC/TDA technical assistance; low-interest loans	Likely incentive recipient if servicing targeted markets. New cash flow can help to address export concerns and expand crumb and TDA, as demand allows. Need for new documentation in CalRecycle payment claims. Possible increase in competition, reduced tire collection revenue. Possible changes to current assistance programs.	Likely incentive payment recipient. Need to provide documentation in payment claims to industry organization. Possible increased competition and changes to customer base due to industry issued contracts. Possible enhanced cash flow for some firms to help compete with tire exports and imported crumb/TDPs.
TDP Manufacturers/ Installers and Other End-Users	Pay for crumb rubber and other processed tire feedstock. Receive revenue from product/ service sales State Programs: TBAP; RAC/TDA technical assistance; low-interest loans	Possible incentive recipient, with enhanced cash flow to improve competitiveness. Possible increase in competition for raw materials and product sales. For non-targeted markets, possible increased supply costs. Possible changes to current assistance programs.	Possible incentive recipient, with enhanced cash flow to improve competitiveness. Possible increase in competition for raw materials and product sales. TDF users: possible loss of supply if precluded in legislation. Possible changes to current assistance programs.
TDP Consumers	Purchase product made with recycled tires. State Programs: TDP/RAC grants to government agencies	Possible incentive recipient (though not in any existing programs). Possible changes to current assistance programs.	Possible incentive recipient (though not in any existing programs). Possible changes to current assistance programs.
Tire Manufacturing Industry	NA	NA	New responsibilities to design and administer new tire program, and achieve specified goals.
CalRecycle	Administer $37 million/year state tire program. Responsibility for all enforcement and diversion/ market development programs.	Likely shift of resources from certain market development programs to new incentive administration roles. Possible other adjustments TBD.	Likely large curtailment of some or all diversion/ market development programs. Shift to EPR enforcement and other changes TBD.

Changes in Roles and Responsibilities

Incentives

Incentive policies would probably not result in changes in roles and responsibilities, with the exception of CalRecycle, which would need to administer the program. Some current CalRecycle programs may be curtailed or eliminated due to overlaps with some current programs (discussed further in Section 5.) Incentive recipients would be required to maintain source documentation and submit it with payment claims to CalRecycle, as is done with current incentive programs.

EPR

In contrast to incentives, an EPR policy would by definition result in substantial changes in roles and responsibilities. A PRO would likely be formed to design, fund and administer the newly cast waste tire management system, and would be responsible for achieving specified goals. Individual tire manufacturing firms would likely have the option of implementing a separate program for their tires, but that has not occurred in existing EPR programs. CalRecycle's current market development and diversion programs may be substantially curtailed if not eliminated, with new roles established to administer the EPR program. (This is discussed further in Section 5.)

Changes in Costs, Revenues and Market Opportunities

Incentive

Firms eligible for incentive payments, most likely processors and/or TDP manufacturers, installers or other end-users, would directly receive an additional, new revenue source based on submitted claim forms reviewed and approved by CalRecycle staff. As described in the previous section, this increased cash flow can make them stronger, facilitate growth and help them compete with exports for tires, make up for reduced tip fee revenue associated with exports and/or help them compete with out-of-state suppliers. Depending on the incentive policy details and market trends, these firms could possibly also see increased competitive pressures or other unintended consequences resulting from the policy. These firms would incur new costs associated with the need to maintain documentation required to receive payments, and other administration costs. There is the potential for errors in documentation and record keeping that, even if well intentioned, could result in penalties, unanticipated expenses or loss of expected incentive revenue.

Under an incentive policy, tire consumers may see a shift in costs if the state fee needed to be adjusted to fund the program, however, this may not be necessary.

The other stakeholder groups listed in Table 7 above would not see a direct change in costs and revenues, though they may see changes in costs and revenues through indirect impacts. For example, tire dealers and haulers may see more favorable pricing if demand for tires by incentivized processors increases. And, TDP consumers may potentially see more favorable pricing if suppliers are able to, and choose to, pass on a share of incentive revenue to consumers in an effort to boost sales. Additional indirect impacts involving market opportunities and competitiveness, as discussed below, could also impact certain firms' bottom line.

CalRecycle will see increased costs needed to administer a new program, but these may well be offset by reductions in current programs. (See Section 5.)

EPR

Implementing a tire EPR policy in California holds the potential for far-reaching impacts on costs, revenues and market opportunities throughout the supply chain. The overall, system wide costs of scrap tire management could increase or decrease, depending on the specific mandate to industry, and the implementation approach an industry PRO adopts. Some stakeholders have said that the Ontario and other EPR programs have very high costs. Analysis of system wide costs in EPR programs was beyond the scope of this report.

Tire Consumers

The net cost impact to tire consumers could be positive or negative, depending on how an EPR system was implemented. Tire consumers could potentially see a reduction in the state tire fee, assuming major responsibility for market development and certain other activities was shifted from CalRecycle to an industry PRO. The informal disposal fees currently charged to tire consumers could potentially be eliminated, as in Ontario's EPR program in which tire manufacturers provide funding directly to OTS, with costs incorporated into tire pricing. Or, the highly variable current disposal fees could be replaced with a standardized fee schedule based on tire size, administered by an industry PRO as in British Columbia. Canadian EPR tire fees vary from C$4.00to C$5.84 per passenger tire, with higher rates for larger tires in many cases. While this is much higher than California's $1.75 per tire fee (for passenger tires), the Canadian fee is essentially a system wide fee that OTS uses to fund the entire scrap tire management system, including payments to collectors and haulers, in addition to the incentive payments to processors and TDP manufacturers. California tire consumers pay informal disposal fees for passenger tires typically ranging from $1.00 to $2.50, with an average of $1.61, plus the $1.75 state tire fee (based on a survey of 146 tire dealers). Based on responses from 41 tire dealers, the actual disposal fee they pay to tire haulers and processors for passenger tire disposal is $1.08. (See Appendix F for details.)

Generators/Dealers

The net cost impact to tire dealers could also be positive or negative, although some would likely see a net reduction in windfall revenue (the difference between consumer disposal fee revenues and actual costs), assuming the PRO administering an EPR program adopts a standardized fee and compensation schedule.

Haulers and Processors

Again depending on the details of enabling legislation and how the PRO chooses to administer a new EPR policy, individual haulers and processors may be "winners" or "losers." If the PRO establishes centralized contracts, there may well be far fewer haulers and processors in business under an EPR program. However, those remaining may be larger, more efficient and potentially highly profitable. If the enabling legislation precludes certain end-uses such as TDF or export, firms currently engaged in these activities may see volumes greatly reduced; while firms involved in targeted market segments may see business and revenues grow. Moreover, if the PRO provides incentives to help targeted segments, such firms could see substantial revenue increases. If the PRO implements an incentive payment system, then the analysis above would also apply.

TDP Manufacturers/Installers and End-Users

Similar to haulers and processors, impacts on TDP manufacturers, installers and other tire end-users will vary depending on the specific legislation enabling EPR and choices made by the PRO administering the policy. Certain TDP manufacturers may well receive direct incentive payments, as they do in Ontario's EPR program which provides incentive payments to manufacturers of molded, extruded or calendared recycled tire products. Installers may or may not be treated differently from manufacturers with fixed production facilities, as they are excluded from incentive payments in Ontario's program. TDF users and other tire end-users may be precluded from receiving incentives in California, given the current statute prohibiting CalRecycle assistance to them. This could result in further challenges to such non-targeted end-users in securing adequate tire supplies. Firms focused on prioritized markets may receive additional support from the PRO, such as technical assistance, research & development or marketing support, as is done in Ontario. If the PRO implements an incentive payment system, then the analysis above would also apply.

TDP Consumers

TDP consumers could potentially see reduced pricing if the PRO makes grants available, or otherwise directly supports their purchases, or if TDP producers choose to use incentive revenue to reduce prices as a sales expansion strategy. TDP consumers may also benefit from a maturing supply infrastructure with increased competition, which could result in both higher quality and better pricing.

Tire Manufacturers

Under EPR, tire manufacturers would see significant new responsibilities and, accordingly, new costs. The costs may be covered through incorporating them into tire pricing (as in Ontario) or by charging tire consumers a visible retail fee (as in British Columbia). In Ontario, there is currently pressure on OTS to shift from a system of charging tire manufactures fees based on projected budgets and to a system that would reimburse the organization for actual costs. This is seen by some as a way to reduce costs.

CalRecycle

CalRecycle will incur costs for administering an EPR program, but also may see vastly reduced costs if the EPR policy in effect largely "replaces" its current diversion and market development role. However, it is possible that some market development roles could continue to be assigned to CalRecycle. It would also be important to ensure that CalRecycle maintained an appropriate level of staffing for enforcement activities and for addressing policy issues related to the EPR program.

Changes in Competitiveness

Depending on how a new incentive or EPR policy were to be structured and implemented, there would likely be "winners" and "losers" among consumers and firms currently involved in California's waste tire management industry. There is also the potential for a range of unintended market disruptions that can be difficult to predict, especially if the incentive amounts are high enough to induce many firms to shift to practices targeted by the incentive payments.

Incentives

Some proponents of incentives emphasize their potential to level the playing field, in terms of providing California crumb and TDP producers with an incentive payment that helps them to compete against out-of-state producers receiving incentive payments in their home locations. They also point to the need to adjust for California's relatively high operating costs. The increased cash flow incentives provide can help processors compete for tire supplies with exports and with imported crumb or TDPs.

Experience shows there is also the potential for incentives to reduce the competitiveness of some firms. For example, if the incentive is very high, it may lead to over-expansion of infrastructure as in-state firms expand and out-of-state firms set up operations in California. While market expansion always brings a degree of disruption as firms vie for market share, experience in Ontario's tire incentive program (which is part of their EPR program) shows the result can be aggressive competition for tire supplies which impacts collection revenues and may use incentive revenues in low efficiency ways (i.e., to help firms overcome supply pressures that the policy itself created). California's E-waste program saw a similar trend in its early years. Rapidly growing production in market segments receiving incentive payments could also result in a glut of crumb rubber and/or select TDPs which exacerbates competition and results in reduced pricing, further pressuring firms. Ultimately, a prolonged period of competition could likely result in a shake-out in which some firms emerge as "winners" with a relatively large market share while others are diminished or shut entirely.

Firms involved in waste tire management activities that are not eligible for incentives may see increased competition for tire supplies. On the other hand, if some of these firms choose to refocus efforts in incentivized segments, competition could potentially be reduced.

EPR

EPR programs may include incentives, and the above discussion of competitiveness impacts for incentives therefore applies to EPR as well. In addition, if the PRO chooses to implement the EPR policy through centralized contracts, as most other tire EPR programs have done, competitive pressures will be immense for certain haulers and processors in the short term. However, in the longer term there may be reduced competition as some firms cease operating. In contrast to the current situation in which many firms compete one-by-one for collection accounts, these services may be taken over by the PRO which would likely issue far fewer, longer term contracts.

5. Implementation Considerations

This section discusses several important issues that decision makers should consider when designing and implementing incentive or EPR policies, including: goals; who should be eligible for incentives and what the amount should be; implementation costs; whether new legislation is required; and the conditions and controls CalRecycle would need to establish in administering a new policy, especially related to minimizing fraud.

What Should Be the Goals of a New Incentive or EPR Policy?

Again, the assumed goals for a new incentive payment or EPR policy, in the context of this report, would be to increase waste tire diversion, strengthen California infrastructure and markets, and address concerns over exports. Following are some additional considerations related to policy goals.

Several stakeholders interviewed for this report focused immediately on what the state would be seeking to achieve in adopting a new incentive or EPR policy. California has already achieved the goal that many states had for their tire incentive programs, namely, eliminating illegal tire stockpiles and establishing an infrastructure and end-uses sufficient to manage annually generated waste tires. Incentive proponents in California have emphasized the need for policies to better promote recycling, especially through crumb rubber market segments. More specific goals include: leveling the playing field so California producers can compete with subsidized crumb and TDP imports, and helping processors compete with burgeoning exporters for tire supplies and replace reduced tip fee revenues. Although controversial among processors, CalRecycle has also focused on expansion of civil engineering markets in recent years, and incentives could help address reluctance to use TDA related to cost differentials or other barriers.

Although EPR policies typically involve payments made by PROs to private firms, EPR is distinct and more complex than incentives, and advocates often cite a broader range of objectives. For example, according to the Framework for an Extended EPR System in California, available on CalRecycle's website, lists broad EPR goals related to: addressing all products and materials in the waste stream; including measurable performance goals related to source reduction and recycling, product design and lifecycle environmental impacts; maximizing convenience to consumers and reducing the burden on tax payers while internalizing waste management and recycling costs into business and product costs. Regardless of the broad policies California decision makers may choose to enact, individual stakeholders highlighted a number of goals or principles related to how any new policy should be implemented. These include:

Diversion vs. Recycling. Some emphasize the need for economically sustainable, market-based recycling representing the "highest and best use" for waste tires. According to this argument, focusing on an overall diversion goal that does not distinguish among non-landfill uses can result in dominance by high-volume, low-value market segments. While opinions vary, some would exclude certain end-uses from "counting" as diversion, such as export, ADC, TDF, or use of TDA that does not rise to the level of "civil engineering application." As noted previously, if all exports, TDF and ADC were excluded, California's 81 percent tire diversion rate in 2010 would have been only 39 percent.

Industry Fairness and Equity. Also referred to as the need for a level playing field, many industry stakeholders emphasize this point above all others. However, achieving this goal presents a dilemma because recycling market development programs, by their nature, are designed promote certain activities and market segments over others. One can argue that incentives do provide a level playing field in that all firms are equally allowed to engage in incentive activities, but in practice firms already in a field have a leg up and those focused on other, non-incentivized market segments may be detrimentally impacted.

Efficiency. Some stakeholders emphasize the need to use state resources wisely and efficiently to achieve desired outcomes. In practice, market development is influenced by a range of philosophical and political opinions that can yield passionate arguments about what is "efficient." However, clear inefficiencies can also be easy to objectively identify, if difficult to remove. For example, several potential inefficiencies associated with incentive payments are discussed in Section 4 above. Many current tire programs have also been critiqued by some as inefficient, including certain grants and the TBAP program.

If Implemented, Who Should be Eligible to Receive Incentive Payments?

While strict adherence to a "level playing field" principle would dictate that all competing industry players receive the same incentive amount, in practice we assume the State is seeking to expand diversion and achieve other related goals. Therefore, if an incentive policy is enacted, it will be necessary to determine who is eligible to receive payments.

SAIC was asked to consider the pros and cons of providing tire incentive payments to haulers, processors, TDP manufacturers/installers and/or TDP consumers. We conclude that California decision makers should focus on providing incentive payments to processors and/or TDP manufacturers/installers and other end-users involved in targeted industry segments (such as contractors managing civil engineering projects or cement kilns using TDF, if these market segments were covered in the policy). If incentives are implemented, processors should be eligible because of their key position in the market place, in effect, directing whole tires to specific market segments. TDP manufacturers and other end-users should be eligible because they provide the crucial market demand for processed tires. Making them eligible will provide a direct incentive for using California-generated crumb and other feedstock types, and will assist them to increase sales, develop new products or take other measures to expand demand. The California Plastics Market Development Program is unique in that it requires processors ("certified entities") and manufacturers, in effect, to request payments in tandem, based on matching documentation that CRV material processed by a certified California process was shipped to an approved California manufacturer for use in manufacturing new products.

Decision makers should also consider whether and how to continue to provide an incentive to certain TDP consumers such as local agencies, whether through the current CalRecycle grant programs or similar programs such as retailer rebates that have been discussed within CalRecycle. Given the large number of TDP consumers and hugely variable pricing terms, a system of across-the-board per-pound or per-unit incentive payments to TDP consumers does not seem viable to administer.

Providing incentive payments to haulers is not recommended because of their large number, challenges in ensuring that tires flow to covered market segments and monitoring compliance,

and because haulers are not in a position to influence market flows, as processors and TDP manufacturers are.

Of all the incentive and EPR programs discussed in Section 2, only the EPR programs provide direct monetary payments to firms other than processors and end-users. The EPR programs make payments to generators and haulers, but these are to cover operating costs, not to incentivize recycling. The California E-waste program includes payments to collectors, but these are required to be passed down by recyclers, not directly paid by CalRecycle, and again the purpose is to cover their average operating costs. In practice, incentive payment recipients sometimes share the revenue with other firms downstream or upstream in the supply chain, depending on market circumstances. For example, if supplies are tight, processors may make more favorable pricing terms with collectors. And, if their goal is increasing sales to certain markets, they may offer more favorable pricing to customers. Both situations have been seen in past incentive program experience.

In addition to the fundamental question of which types of firms should be eligible for incentives, following are some related issues that decision makers should consider:

Whether to limit eligibility to firms located in California. Of the five active U.S. state tire incentive programs, only Virginia allows out of state end-users to qualify. Oregon's now sunset program also had this policy. However, several other jurisdictions, including Utah and Ontario have changed, or are in the process of changing, to allow only in-state firms to qualify. All tire programs now require documentation that crumb rubber or other processed tires was sold, but allow the sales to be to purchasers out of state.

Whether to require processors and end-users to submit coordinated documentation. As described above, this is a unique feature of the California Plastics Market Development Program. It has the advantage of focusing state resources only on in-state infrastructure and helping California firms to win in-state market share, while facilitating administration. On the other hand, it would limit the ability of California crumb producers to compete for market share, while receiving incentive payments, in out-of-state markets.

Whether to exclude certain market segments or industry activities. Most tire incentive programs and tire EPR programs are very flexible in the range of allowed end uses, although most have some guidelines and some, like Ontario, do restrict TDF. This issue is tied to fairness and also the specific goals the program is intended to achieve. Some recycling advocates have suggested that ADC, exports and informal beneficial use applications such as used of tire bales in projects that, strictly speaking are not civil engineering projects, not be eligible, and there is some debate about whether TDF should qualify. TDF is an established market in which some users are currently constrained from using more tires only by lack of supply, and which could expand significantly when the construction market improves. Reuse of tires has generally not been included in incentive programs, although the Idaho program when operating did include a payment for retreads, and a South Carolina program (not analyzed in this report) reportedly provides an incentive for tire reuse. Finally, another question is whether buffings from retreading should "count" towards eligibility programs. CalRecycle has generally not allowed this in grant programs.

Whether to include installers in addition to TDP manufacturers. Few U.S. incentive programs make a clear distinction here, as they define crumb rubber producers as end-users and

do not involve firms purchasing crumb to make or install new products. However, the Ontario EPR program provides incentive payments to manufacturers of molded, extruded or calendared TDPs, but not to installers of sports fields or playground surfacing, for example. Some installers are also brand owners and active TDP marketers in a position to use incentive payments to boost sales, supporting including them. On the other hand, many installers are contractors that are hired to conduct installations, and incentivizing such firms may not result in the desired outcomes.

How to address TDP marketing/brand owners who contract out production to custom manufacturers. Some California firms have developed branded TDPs that they market, while relying on custom manufacturers to produce their products. In the case of firms marketing playground surfacing or artificial turf, such marketing firms rely on crumb producers and sometimes independent installers to deliver product to customers. There are no identified precedents on how best to answer the question of whether the brand owners/marketers, custom manufacturers and/or installers should be eligible to receive incentive payments, but it must be clarified in any new program's design.

If Implemented, What Should the Incentive Amount be?

Detailed payment rates for select incentive and EPR programs were presented in Section 2. U.S. tire incentive programs have provided payments of $22.50 to $150 per ton, while Canadian EPR programs provide incentives of C$230 to C$370 per metric ton. The wide disparity in payment amounts means there are no clear precedents to guide California decision makers. However, following are several factors that should be considered, if an incentive policy is adopted:

High enough to make a difference. Some incentive program managers and stakeholders have suggested that there is no simple formula for calculating the ideal incentive payment amount, but that the amount should be high enough to make a noticeable difference and to promote the identified policy goals. In the limited interviews conducted for this report, no consensus and few specific suggestions for the "right" incentive amount were offered. Some proponents suggested that the incentive should be as high as Canadian incentives to level the playing field.

Not too high, to minimize negative industry disruptions. Some stakeholders cautioned strongly against establishing incentive payment rates that are so high as to trigger a "free for all," in which many new market entrants, some of which may be ill-equipped, launch new California-based ventures specifically designed to maximize incentive revenues. As described above, this can have a variety of serious, negative consequences on established industry, can result in inefficient use of state funds and may detract from achieving policy goals.

Tiered rates based on different market segments or to promote expansion. Some U.S. state programs and the two highlighted Canadian programs in Ontario and British Columbia have tiered programs vary processor payments with the type of specification produced. For example, in Utah crumb rubber producers receive $65 per ton while TDF end-users receive $50 per ton. Ontario's EPR program is unique in that it uses a tiered incentive structure for TDP manufacturers intended to drive expansion. It includes a base rate of C$40 per metric ton (C$0.018 per pound) for all use of Ontario produced crumb rubber, plus an additional payment of $120 per ton (C$0.058 per pound) for each ton over and above a producer's three year average annual production. While effective, some TDP manufacturers in Ontario complain that it punishes established producers who have been using Ontario crumb for years, as they are not eligible for the higher incentive amount, while newcomers to the Province are benefitting from

the tiered structure. In addition, manufacturers state that the rate structure tends to penalize companies, in a sense, when they are facing no or low growth anyway.

Dependable payment commitments vs. allowing payments to vary with funding. One lesson mentioned by several program managers is the need to provide private industry with consistent, reliable expectations regarding future program revenues. Funding should be clearly available to meet potential program needs, for example, and changes in program eligibility, payment amounts and other rules should be limited to certain time periods announced in advance, as is done with the California E-waste program. After having to reduce payments from the announced $150 per ton, the Legislature doubled funding for the California Plastics Market Development Program to attempt to alleviate such inconsistencies (AB 1149, Statutes of 2011).

Compare payment rates to market transactions for context. While setting incentive payment rates has been at least in part a qualitative or political exercise in many programs, one way to gain context is to compare incentive amounts with typical market pricing for the products being incentivized. For example, the California Plastics Market Development program was authorized to make payments of $150 per ton (7.5 cents per pound), which is about 1/3 of the average weighted price for recycled pellets and flake plastic as quoted by Resource Recycling Magazine.

To illustrate, Table 8 shows the equivalent per pound rates and per PTE rates of a hypothetical flat incentive payment structure of $25 per ton for various broadly defined tire feedstock types. These per ton and per pound rates can be compared to the typical market transaction price ranges shown in Table 9. Similar pricing comparisons could be made for TDPs, but the vast range of products and pricing in the market place complicates this, requiring decision makers to rely at least in part more on qualitative factors when considering incentives for manufacturers.

Table 8
Examples of Equivalent Incentive Values Based on Feedstock Sold and Whole Tires Processed

	Example Incentive Amount Based on Product Sold		Yield Rate Range[1]		Equivalent Incentive Amount Based on Whole Tires			
					$ per Ton Tires		$ per PTE[2]	
Product Type	$/Ton	$/Pound	Low	High	Low	High	Low	High
Whole Tires	$25.00	1.25	100%	100%	$25.00	$25.00	$0.25	$0.25
Processed TDF	$25.00	1.25	85%	100%	$21.25	$25.00	$0.21	$0.25
3/4 Inch Rubber Nuggets/Mulch	$25.00	1.25	75%	85%	$18.75	$21.25	$0.19	$0.21
Crumb Rubber	$25.00	1.25	60%	75%	$15.00	$18.75	$0.15	$0.19

[1] The yield rate is the percentage of product produced from a whole tire. It accounts for residual steel and fiber.
[2] Based on standardized Passenger Tire Equivalents, 20 pounds per tire by definition.

The example incentive amount of $25 per ton, as shown in Table 8, is relatively low, close to the $22.50 rate paid by Virginia to end-users, the lowest incentive rate identified in this study. It is

shown here only for illustration purposes. This rate is equivalent to 1.5 cents per pound, which would represent about 10 percent of the current price range for California crumb rubber. As noted in Table 9, some indicate that California crumb pricing has declined some 20 percent in recent years, about the same amount as an incentive of $50 per ton (3 cents per pound). These price reductions were triggered by the need to compete with out-of-state suppliers with lower cost structures, and to a degree because of increasing crumb rubber production capacity across North America, which appears to be outstripping demand. Table 9 also illustrates how the economics of scrap tire management are changing in California, with revenue declines for crumb rubber and whole tires sent to TDF users, exacerbating processor revenue declines tied to growing export volumes.

Table 9
Examples of Typical Current Pricing for Scrap Tires and TDM in California

Product	National Price Data[1]		California Pricing Notes		
	Specification	**Price Range** (Cents/Lb. Unless Otherwise Stated)	**Specification/ Application**	**Price Range** (Cents/Lb. Unless Otherwise Stated)	**Notes**
Crumb Rubber	10 Mesh	Average: 8.5 Range: 7-19	5-20 Mesh Price range for sales to RAC and Turf Markets	10 - 17	Price has declined at least 3-5 cents in recent years. Low end reflects sales competing directly with imported crumb from Canada, Other U.S. States & Germany
	20 Mesh	Average: 11.5 Range: 10-26			
	30 Mesh	Average: 11.5. Range: 10-26			
	40 Mesh	Average: 21.1 Range: 12.1 - 24	50 Mesh	30-50	Wide variability in fine mesh as supply/standards are still being established for these emerging markets
	80 Mesh	Average: 27.2 Range: 28.3 - 39	80 Mesh	50-85	
	100+ Mesh	Average: 65 Range: 30 - 80	Compounded Rubber-Plastic	Varies Widely	
Ground Rubber	3/8 Inch	Average: 10 Range: 7-20	3/4 Inch Rubber Nuggets (Mulch)	NA	Too few vendors to report.
Tire-Derived Aggregate	3 to 4 Inch	$16/Ton Range: $5-29/Ton	Landfill Applications	Low Tip Fee	Few projects; no data available.
	5 to 6 Inch	$28/Ton $19 - 39/Ton	Road Applications	$15-20/Ton	Market price not yet established.

Product	National Price Data[1]		California Pricing Notes		
	Specification	Price Range (Cents/Lb. Unless Otherwise Stated)	Specification/ Application	Price Range (Cents/Lb. Unless Otherwise Stated)	Notes
TDF	Whole Tires	$12.75 - $68/Ton Tip Fee	Whole Tires	$0 - $10 per Tire Tip Fee	Tip fees down sharply. Could become a positive price soon.
	2 Inch Nominal	$24/Ton Range: $7.60 - $31/Ton	2 Inch	NA	Only 1 user in CA. Price holding steady. Processed TDF sold to export may have a higher value than national price shown

[1] Scrap Tire & Rubber 2012 Users Director. Published by the Recycling Research Institute.

What Would State Program Costs be Under Incentives or EPR?

Incentives

This section addresses direct incentive payment costs only, not administrative costs. Incentive payment costs will depend directly on:

- The types of firms and activities eligible to receive payments (including definition of which market segments qualify);
- The payment rate for each qualified recipient and market segment;
- Current volumes of tires flowing to qualifying market segments;
- Future growth in qualifying market segments;
- The extent of fraudulent claims submitted and inadvertently approved; and
- Calrecycle administration costs.

Tables 10 and 11 below are intended as a tool to help decision makers consider the potential range of direct incentive payment costs. (Administration and fraud considerations, which also affect state costs, are discussed below.) Table 10 shows the total incentive payments that would have been made, based on 2010 market flows and a flat $25 per ton (1.7 cents per pound) incentive payment to both in-state processors and in-state manufacturers, installers and end-users, for all crumb, civil engineering, TDF and ADC uses. Based on these and other assumptions, total incentive costs for the broad program, based on 2010 flows, would have been $8.3 million. If only crumb and civil engineering were included, total incentive payments would have been $3.9 million. At an incentive rate of $50 per ton (3.4 cents per pound), payments to crumb and civil engineering would be $7.8 million.

Table 10
Example "Status Quo" Incentive Payment Costs
Based on 2010 Market Flows and $25/Ton Payment Rate[17]

Market Segment	Current Use		Incentive Payments to Processors at $25/ton	Assumed Percentage Sold to in-StateTDP Mnfctrs/ End-Users	Incentive Payments to TDP Manu-factures	Total Incentive Payments
	% of Total Generation	Amount (million PTE)				
Crumb Rubber Totals	**20.8%**	**8.6**	**$1,505,000**	**96%**	**$1,444,800**	**$2,949,800**
RAC	12.3%	5	$875,000	98%	$857,500	$1,732,500
Turf	3.3%	1.4	$245,000	90%	$220,500	$465,500
Pour-in-Place	0.4%	0.1	$17,500	98%	$17,150	$34,650
Mulch/Loose Fill Playground	2.7%	1.1	$220,000	90%	$198,000	$418,000
Molded/Extruded	1.8%	0.7	$122,500	100%	$122,500	$245,000
Other	0.4%	0.2	$35,000	100%	$35,000	$70,000
Civil Engineering Totals	**4.4%**	**1.8**	**$450,000**	**100%**	**$450,000**	**$900,000**
Landfill Applications	1.9%	1.8	$450,000	100%	$450,000	$900,000
Road Applications	0.1%	<0.1	Neg.	100%	Neg.	Neg.
Other Recycling	**0.1%**	**<0.1**	Neg.	**100%**	**Neg.**	**Neg.**
In-State TDF	**20.3%**	**8.4**	**$2,024,510**	**100%**	**$2,024,510**	**$4,049,020**
ADC	**1.9%**	**0.8**	**$200,000**	**100%**	**$200,000**	**$400,000**
Waste Tire Exports	**15.5%**	**6.4**	**NA**			
Reuse	**18.0%**	**7.3**	**NA**			
Disposal	**19.0%**	**7.8**	**NA**			
TOTALS	**100.0%**	**41.1**	**$4,179,510**		**$4,119,310**	**$8,298,820**

Since the point of the incentive program is to increase tire flows to targeted market segments, total incentive payment amounts can be expected to grow as flows shift to these uses. However, predicting actual shifts and the amount of approved incentive payment claims can be very challenging. For

[17] Additional assumptions include: Payments are based on amount of feedstock sold by processors and received by end-users. Reuse is assumed not eligible for incentives, but includes reusable tire sales and retreading. Costs do not include program administration. Costs are based on the yield rates shown in Table 8, and estimates for whole tire and processed tire TDF.

illustrative purposes only. Table 11 presents one hypothetical growth scenario . The table is based on most of the same assumptions as Table 10, but with increased assumptions for total tire generation and the portions flowing to crumb and civil engineering segments (with proportional reductions in other segments). Based on these assumptions, and compared to the "status quo" cost estimates in Table 10, total payments would increase from $8.3 million to $13.1 million. And, payments to crumb and civil engineering segments would increase from $3.9 million to $8.7 million. If the payment rate for these targeted segments were increased to $50 per ton (3.4 cents per pound), payments to crumb and civil engineering would total $17.4 million. While hypothetical, these examples shows the potential for total incentive program costs to vary widely and increase rapidly, if the policies have the desired impact of driving flows to incentivized market segments.

Table 11
Example Hypothetical Growth Scenario Incentive Payment Costs
$25/Ton Payment Rate[18]

Market Segment	Assumed Future Use		Incentive Payments to Processors at $25/ton	Assumed Percentage Sold to in-StateTDP Mnfctrs	Incentive Payments to TDP Manufacturers	Total Incentive Payments
	% of Total Generation	Amount (million PTE)				
Crumb Rubber Totals	**38.2%**	**17.2**	**$3,010,000**	**96%**	**$2,889,600**	**$5,899,600**
RAC	**22.2%**	**10**	$1,750,000	98%	$1,715,000	$3,465,000
Turf	**6.2%**	**2.8**	$490,000	90%	$441,000	$931,000
Pour-in-Place	**0.4%**	**0.2**	$35,000	98%	$34,300	$69,300
Mulch/Loose Fill Playground	**4.9%**	**2.2**	$440,000	90%	$396,000	$836,000
Molded/Extruded	**3.1%**	**1.4**	$245,000	100%	$245,000	$490,000
Other	**0.9%**	**0.4**	$70,000	100%	$70,000	$140,000
Civil Engineering Totals	**12.4%**	**5.6**	**$1,400,000**	**100%**	**$1,400,000**	**$2,800,000**
Landfill Applications	**9.3%**	4.2	$1,050,000	100%	$1,050,000	$2,100,000
Road Applications	**3.1%**	1.4	Neg.	100%	Neg.	Neg.
Other Recycling	**0.1%**	**<0.1**	Neg.	**100%**	**Neg.**	**Neg.**
In-State TDF	**18.7%**	**8.4**	**$2,024,510**	**100%**	**$2,024,510**	**$4,049,020**
ADC	**1.8%**	**0.8**	**$200,000**	**100%**	**$200,000**	**$400,000**

[18] The hypothetical growth scenario is based on: Total flow increases to 45 million PTE; 2010 crumb volumes double; Civil engineering volumes reach double their 2008 rates; other diversion holds steady except export which is reduced to 4.7 million PTE, and disposal reduced to 1 million PTE. The additional assumptions listed in footnote 15 on the previous page also apply.

Market Segment	Assumed Future Use		Incentive Payments	Assumed Percentage	Incentive Payments to	Total Incentive
Waste Tire Exports	10.4%	4.7	NA			
Reuse	16.2%	7.3	NA			
Disposal	2.2%	1	NA			
TOTALS	100.0%	45.0	$6,634,510		$6,514,110	$13,148,620

EPR

State program costs under an EPR program would be expected to be very low compared to current programs, as by definition tire industry manufacturers would be responsible for funding and administering the program, with state costs limited to administration and enforcement of the EPR policy, and possibly select other market development related roles (in addition to current facility permitting and enforcement roles). Total tire management system costs, as discussed in previous sections, could increase or decrease, depending on the specifics of the EPR law and implementation decisions made by the PRO.

Would Incentives or EPR Policies Overlap with Current Programs?

If an incentive or EPR policy is implemented, decision makers will need to consider whether and how to adjust current programs. For example, current programs may be reduced or eliminated if they provide the same or similar market development role as the new policies, or if funding is insufficient to implement both current and new policies. Following are some related considerations.

An incentive program targeting processors and manufacturers/end-users of crumb and TDA would have a similar role to CalRecycle's current TBAP and loan programs. These programs currently assist processors and TDP manufacturers, with the aim of helping to overcome barriers to market growth. The shift would provide firms with a direct source of revenue that they can use at their discretion, and several TBAP grantees have suggested this is preferable to the services provided by TBAP or loans, which must be repaid. On the other hand, some firms feel that loans are preferable because they require firms to show that they are credit worthy. Another consideration is that some firms, especially molded product producers, may currently use relatively small quantities of crumb rubber, and the resulting total annual incentive revenue, therefore, may be much lower than the value of TBAP services currently received. For example, for illustration, if a $50 per ton incentive rate were implemented, a manufacturer would need to use 1,000 tons (equivalent to 2 million pounds of crumb rubber or 167,000 PTE) to receive the lowest TBAP services grant available under current program rules, valued at $50,000. Under current TBAP program rules, TDP manufacturers need use only 5,000 PTE to qualify for a $50,000 service grant, and feedstock conversion firms exploring use of crumb rubber in established products can qualify by showing the potential for using 5,000 PTE. (These rules are being reconsidered by CalRecycle.)

Potential overlaps between incentive payments and CalRecycle TDP, RAC and TDA grant programs may depend on incentive policy details. Assuming payments were not made to TDP consumers such as local governments, incentive payments generally would have a different focus than CalRecycle tire grant programs, that is, they provide funding to purchasers of TDPs, not the firms producing TDPs. However, both would share the same goal of expanding demand.

Incentives could function as a complement to grants though, necessarily replacing them, if funding allows. Presumably, RAC blenders may be determined to be eligible for incentive payments as an end-user of crumb rubber or a TDP manufacturer (definitions of these terms vary somewhat across programs and will need to be clarified if a new incentive program is implemented). This would provide a direct incentive for use of California crumb in RAC projects, while some may argue it is a duplicative incentive to RAC grants provided to local agencies. Similarly, for civil engineering projects, presumably the engineer or contractor responsible for bidding a project would be considered the crumb end-user or TDP manufacturer, and therefore may qualify for incentive payments, while project sponsors such as building developers would presumably be identified as the TDP consumer. In situations where a local agency acts as both the contractor and the project owner, incentive payments and TDA grants would overlap directly.

While grants to TDP consumers are controversial, some stakeholders are concerned that an incentive program could mean they would be eliminated. Others argue that current grants are not efficient and may be building markets that are dependent upon ongoing government subsidies.

RAC and civil engineering technical assistance programs would still facilitate use of these materials, even with a new incentive program. If incentives prove effective in boosting use, decision makers may consider phasing these programs out as experience is gained.

If a tire EPR program were implemented in California, it could assume responsibility for the role played by many of CalRecycle's current programs. EPR programs typically involve system wide funding programs and sometimes aggressive market development programs. Decision makers could consider whether to continue such roles under the state program or to shift them to a new PRO under an EPR policy. For illustration, OTS, perhaps the most far reaching tire EPR program currently existing, undertakes the following activities that would overlap with current CalRecycle programs if implemented under a California EPR policy:

- Grants to local agencies purchasing select TDPs
- Research and development projects
- Demonstration projects for RAC
- Education and outreach to increase awareness and acceptance of TDPs
- Marketing assistance
- Market research and
- Illegal stockpile clean up and support for clean-up of illegally disposed tires

All permitting and enforcement activities continue to be the role of the Province's Environmental Ministry.

Would there be New State Roles under an Incentive or EPR Policy?

New CalRecycle roles under an incentive program would involve developing program rules and processes and forms. Ongoing administration would involve claim reviews, compliance monitoring and enforcement. Depending on program rules, it may be necessary or desirable to invest in strengthening WTMS practices so it can be used as a basis for verifying claims. Staffing

needs are difficult to predict without specific assumptions about the number of firms involved and the other program details described above. The plastics program is administered by two staff people, each working about half-time on the program, plus time for Accounting staff to verify payee data information and upload payment information, and for the Controller to issue checks each quarter. The program involves approximately 35 eligible firms currently, although not all of them regularly submit claims. The program benefits to a degree from the long-established administrative infrastructure for the broader CRV program. The E-waste program makes payments currently to up to 55 recyclers, but also involves over 500 collectors who receive payments through recyclers, and has 25 CalRecycle staff (in addition to other resources involved in other program aspects, such as the Department of Toxic Substances Control, which regulates facilities and hazardous materials management, and the Board of Equalization which collects retail fees. Other U.S. state programs have apparently not involved large numbers of staff. For example, Oklahoma's program, with a much smaller target audience than is likely in California, is administered by roughly the equivalent of one FTE. However, all of the programs are far smaller than California and none in the U.S. has involved TDP manufacturers except for Wisconsin, which is now defunct. The programs tend to rely on a small number of TDF users, civil engineering projects and crumb producers (which are typically defined as "end users" and not manufacturers).

Programs vary tremendously in the amount of effort allocated to combat fraud. Given California's size and challenges already experienced in policing the tire grants program to ensure out-of-state tires are not involved, a large scale incentive program could potentially be very challenging to administer and police. While projecting specific staff needs is challenging at this stage, unlike plastics, imported tires, crumb and TDPs are very prevalent in California and distinguishing them from California-generated tires and products has been a challenge for the TBAP and CalRecycle grants programs. An incentive program could greatly exacerbate these challenges if direct monetary payments are available. Again, key factors would include the number and type of firms involved, and the amount of the incentive payment, which could induce a large number of firms to participate if large.

Administering a tire EPR program would involve developing regulations, reviewing and approving PRO plans, and ongoing monitoring and enforcement or coordination, depending on the specifics of enabling legislation. A tire EPR program may be more complex than the new paint and carpet programs, given the larger number of players and the diversity of markets. .

Are New Legislation or Regulations Required, and What Conditions and Controls are Needed to Implement Incentives or EPR?

Incentives

Current statute (§ 42872(a)) authorizes CalRecycle to include in its tire program, "The awarding of grants, subsidies and loans to businesses or other enterprises, and public entities, involved in activities and applications that result in reduced landfill disposal of used whole tires and reduced illegal disposal or stockpiling of used tires." Although statute does not specifically define subsidy, according to the CalRecycle Legal Office the legal definition of subsidy includes a cash payment made by the government to promote a public interest.[19] The incentive payments

[19] Black's Law Dictionary, 8th ed., Bryan A. Garner, Editor in Chief, 2004.

discussed in this report are designed to promote the public interest as expressed by the legislature's intent set out in PRC § 42870. In the event an incentive program is approved, the CalRecycle Legal Office recommends that regulations be developed for the program, because it would involve a range of financial impacts and involve nuanced rules, as well as legal considerations such as California's Proposition 26, which addresses issues related to government imposed fees.

While some possible goals suggested for incentive programs, such as reducing exports or enhancing in-state infrastructure and employment, are not specifically included in current statute, CalRecycle could devise a program that aims to achieve these goals if the program is specifically tied to the tire diversion and market development goals that are included in statute. Such goals are also supported under AB 341 (Statutes of 2011), although there is no specific tie to waste tires. Further, the CalRecycle attorneys say the agency has broad authority in determining which activities are appropriate for tire subsidies, with some possible exceptions. For example, while CalRecycle could choose to target certain market segments such as crumb rubber, it could not currently target TDF, since that is specifically precluded by current statute. And, it is not clear whether current statute would authorize direct payments to individual members of the public, since they are not mentioned in the statute explicitly.

CalRecycle attorneys have also noted the increased potential for concerns if subsidies are provided to private businesses, as opposed to local agencies under the current grant programs. For example, a decrease in CalRecycle's management control could result in high profile project failures due to a variety of reasons, some of which are outside of the control of either CalRecycle and/or subsidy recipients, such as incompetence or fraud, economic downturns, the highly competitive nature of the industry, uncertainty of product availability, questions about the safety of some products, the potential for fraud through use of out-of-state tires or inaccurate tire use claims, or the use of Public Records Request process to obtain cost quotes of a competitor to gain an unfair business advantage.

Where there is a risk of loss of state funds, CalRecycle's fiduciary duty requires that it take actions and precautions to minimize the risk through the adoption of certain administrative conditions and controls. While statute doesn't identify the specific conditions and controls required to administer a tire subsidy program, CalRecycle attorneys suggest that the statutory standards for tire grants and loan programs be considered. Also, CalRecycle attorneys suggest considering statutory language covering other CalRecycle programs such as the Used Oil Payment Program (UOPP), although that program only applies to local agencies. Additional suggestions can be identified through lessons learned with the California plastics incentive program and the Electronic Waste Payment System, as well as the tire incentive programs analyzed in Section 2.

Considering these sources, following are some conditions and controls that CalRecycle should consider in administering a new tire incentive program:

- Preparation of a CalRecycle annual report summarizing program revisions, implementation activities, use of funds and results including the total number of tires diverted (as required under the UOPP statute, §48674);
- Submittal of payment claim forms either monthly or quarterly for use as a basis for payments. The forms would include clear source documentation ensuring only California

tires were used, and documenting the sale and/or receipt of materials (depending on the role of the payment recipient). An annual report may also be required of incentive recipients which includes the total number of used tires recycled and other information to aid in measuring the program's success (this is similar to the annual reports currently required of tire grantees under §42883);

- Payments should be made after activities are complete as, unlike the UOPP, there is no authorization in the Tire statutes for advance payment to the recipients of subsidies, or other types of funding.
- Regularly updated program updates should be prepared that clearly track program statistics and evaluate fund solvency, and the ability to meet incentive payment obligations in a timely manner, similar to activities currently undertaken in the E-waste and Plastics Market Development Programs.
- CalRecycle should adopt a clear system for informing program participants of the dates when program rules or payment rates may be adjusted, in order to provide clear expectations.
- A reliable means for ensuring that only California tires are allowed to receive payments would need to be devised. Challenges with current grant programs, even with stepped up CalRecycle efforts, indicate how difficult this may be, especially if the program provided attractive payment rates. While scrutiny of manifest data, invoices and bills of lading, for example, can document that a given firm received certain quantities of California tires or crumb rubber from California suppliers, ensuring that out-of-state tires did not flow to these firms or was not delivered in lieu of California tires is very challenging.
- To facilitate administering the program and reducing fraud, CalRecycle could invest resources in enhancing the current Waste Tire Manifest System. While some options may be costly or controversial, they include: increased quality control could help ensure that entries in the system are made using correct units; refined options for entering amounts of different types of tires would increase accuracy (compared to standard PTE units sometimes used that confuse different tire types); and expanded manifesting requirements and enforcement could help ensure that all required flows are documented, and potentially could cover additional products not now covered in the system.
- A compliance monitoring and auditing program, as well as new enforcement penalties, would need to be developed. The level of effort in current programs varies. Depending on how an incentive program is defined, it may involve as few as six to ten crumb rubber producers, or dozens or even hundreds of firms if a broad program included a range of processors, TDP manufacturers and installers and other end-users.
- CalRecycle should be prepared to engage in enforcement actions and, potentially, litigation, as has occurred with the CRV and E-waste programs.

EPR

Implementing an EPR policy for tires would clearly require new legislation and the development of regulations interpreting the legislation and identifying legal issues to establish clear rules to guide participants. The implementing legislation would need to address a number of key issues,

and would serve as the marching orders for the companies or a new PRO that would implement the program. Key elements include:

- Program goals, including specific enforceable goals that responsible parties will be held accountable for achieving;
- Definitions for responsible parties, including requirements for first importers, and a process for their registration;
- Identification of a government agency to provide oversight and accountability, along with specific authorities, roles and responsibilities;
- Vehicles for demonstrating compliance, such as submittal of a management plan, funding plan, annual reports and other record keeping and documentation;
- Enforcement mechanisms and penalties;
- Plan requirements, such as:
- Role in educating consumers about program/other tire issues (e.g., extend life of tires, tire-derived products)
- Recycling/diversion rate goal
- Frequency of collection goal
- Types of tires to be included
- No fee to generators
- Financing mechanism or
- Process for adjusting financing mechanism

Additionally, while a PRO would likely be responsible for funding and implementing programs, broad language intended to provide the state with a variety of assurances may be needed, along the lines of the conditions and controls discussed above for incentives.

Finally, tire industry representatives have indicated their concern about federal anti-trust legislation, which could potentially restrict their ability to collaborate and, specifically, to set a standardized tire recycling fee. Such issues would need to be addressed. The paint EPR law, for example, includes a provision designed to address this concern at the state level, specifically stating that compliance with the act does not violate anti-trust law:

> *(b) The following statutes are not violated by an action specified in subdivision (a): (1) the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code). (2) The Unfair Practices Act (Chapter 4 (commencing with Section 17000) of Part 2 of Division 7 of the Business and Professions Code).*

When Minnesota was considering implementing EPR framework legislation, the following language addressing anti-trust compliance was developed: [20]

> *A manufacturer that organizes collection or recycling under this section is authorized to engage in anticompetitive conduct to the extent necessary to plan and implement its chosen organized collection or recycling system and is immune from liability under state laws relating to antitrust, restraint of trade, unfair trade practices, and other regulation of trade or commerce.*
>
> *An organization of manufacturers, an individual manufacturer, and its officers, members, employees, and agents who cooperate with a political subdivision that organizes collection or recycling under this section are authorized to engage in anticompetitive conduct to the extent necessary to plan and implement the organized collection or recycling system, provided that the political subdivision actively supervises the participation of each entity. An organization, entity, or person covered by this paragraph is immune from liability under state law relating to antitrust, restraint of trade, unfair trade practices, and other regulation of trade or commerce.*

SAIC did not investigate whether such state legislation would adequately address concerns related to federal anti-trust law.

[20] Found in Minn. Statute S 115A.3123, to address anti-trust concerns.

6. Conclusions

California decision makers are exploring possible changes to the state's waste tire management program. Reasons for this exploration include an impending reduction in the state tire fee from $1.75 to $1.00 per tire, industry concerns related to growing tire exports and low cost crumb rubber imports, and a range of stakeholder perspectives on how tire recycling and market development programs should evolve. This report provides a high-level overview of two distinct options: 1) Providing incentive payments to firms involved in recycling tires to help them thrive and grow; and 2) Adopting an Extended Producer Responsibility (EPR) mandate in which the tire industry would become responsible for funding and administering programs to achieve specified goals.

Both incentives and EPR offer a range of potential benefits, including increased diversion, strengthened in-state infrastructure and some relief against export-induced disruptions. However, both also have disadvantages and potential risks. For example, incentives can potentially result in over-expansion leading to further competitive pressures, and present implementation challenges like preventing fraud, projecting funding needs and the challenge of providing consistent expectations to industry about payment amounts. EPR could increase diversion, greatly reduce state costs and staffing needs, internalize end-of-life management costs into business costs, provide a level playing field for all regulated entities, and provide a stable funding source; depending on how it is structured, it might also reduce government control, stakeholder involvement and transparency. Both incentives and EPR would be likely to benefit some businesses, while having negative impacts on others.

Several U.S. states have adopted waste tire incentive programs, and waste tire EPR programs are in place in several Canadian Provinces and European countries. Each of these programs, however, is unique, and there are no clear guidelines for designing an incentive or EPR program in California. Some industry stakeholders question the need for new policies that could have a major impact on the industry, expressing that the state's infrastructure is well established and that recycling is growing steadily, if slowly. Others would welcome incentive revenue, while many have questions and need time to understand and evaluate these types of proposals.

Based on the information presented in this draft report, SAIC was asked for discussion purposes only to describe how a potential incentive program might be structured in California. The following thus is not a recommendation, but is offered to illustrate some lessons learned and key questions to consider.

Assuming that the goals of such a program would be to increase diversion through crumb rubber and civil engineering, address export concerns, and expand in-state infrastructure, then one approach to an incentive program might have the following components:

- Eligible Recipients:
    - California crumb rubber producers using California tires only with documented sales to approved end-users in or out of state; CA TDP Manufacturers purchasing qualifying California-produced crumb with documented product sales to customers in or out of state; and.

  - CA Civil engineering project owners purchasing qualifying California-produced TDA with documented use in approved project applications.

- Incentive Payment Amounts: $25 - $75/ton with tiered rates for different applications, with lower amounts for civil engineering and higher for fine crumb. For context, a $25-per-ton incentive (a relatively low rate compared to other programs) for civil engineering and crumb rubber applications, based on 2010 market flows, would result in total incentive payments of $3.9 annually, and , this amount could grow rapidly if the policy has the desired impact of increasing flows to these segments, or if the incentive rate were higher.
- The funding mechanism should be matched to projected total plausible incentive payment costs to ensure sufficient funding and to provide reasonable expectations to industry.
- Continuation of TDP, RAC and TDA grants, and/or use of another demand-driving mechanism, except that a grant recipient should not be able to also be an incentive recipient.

The above is only a starting point for discussion, and each of these elements requires scrutiny and consideration of many important details that would define precisely who receives incentive payments and for what purpose/activities.

The specific impacts of an incentive policy are impossible to predict, given the importance of the policy details, shifting market trends and the choices made by individual incentive recipients. For example, given the very strong demand for waste tires in export markets, balers still may match or beat any price enhancements offered by processors receiving incentive payments. Similarly, given relatively flat demand for crumb and the apparent over supply of crumb rubber in the North American market (much of which is incentivized), out-of-state suppliers may match or beat price reductions offered by California producers receiving incentives. With these caveats, however, following are some of the impacts that might be expected:

Increased Diversion. Some increase in diversion through crumb and civil engineering would be likely, as California firms win market share from out-of-state firms, and as manufacturers and civil engineering contractors/owners receive a direct incentive to consider crumb use and/or switch to California sources. In contrast, diversion through TDF, ADC and exports may potentially decline.

Strengthened or Expanded Infrastructure. This is very likely for incentive recipients, as the incentives would provide a boost to cash flow, allowing firms to use funds in a variety of ways. Depending on volumes, some manufacturers may not receive significant incentive payments initially, but they would have a strong incentive to expand use of California crumb. On the other hand, if incentives inadvertently trigger an oversupply of crumb or TDA, it could lead to further price reductions and competitive pressures.

Reduced Exports. This is very uncertain. Crumb and TDA producers may compete for tires from the export stream if their demand is sufficient. However, shifting flows from export to crumb or TDA will depend on sufficient demand, and the ability to successfully compete with exporters who may well respond with further pricing adjustments. Some crumb producers indicate that the main impact of exports to date is in declining tip fee revenues, not necessarily (yet) their ability to procure sufficient tire supplies.

An EPR approach tailored to California would require fewer program details than incentives, although several key issues would need to be defined. These include: definition of responsible parties; identification of measurable performance goals; definition of state oversight authority and clarification on what types of markets would be acceptable (i.e., would tire-derived fuel "count" toward diversion goals).

The majority of stakeholders interviewed for this report expressed a need to better understand why state decision makers are considering incentives or EPR policies, what the goals would be and how the policies would work. While some have clear positions, many do not, and express a need for more information. Some express that CalRecycle should not make significant changes based on current funding assumptions, since they may not be sustainable as the current tire fee is due to sunset in January 2015. Given this context, SAIC concludes that decision makers should proceed cautiously. Given the wide range of possible approaches, If CalRecycle pursues these options further, then it should consider developing a more detailed straw proposal with specifics such as exactly which types of firms, activities and market segments would be eligible for payments, how much the payments would be, and the impacts on current programs. This would allow both CalRecycle and industry stakeholders to better evaluate impacts and suggest refinements.

Appendix A
Glossary of Key Terms and Acronyms

Alternative Daily Cover (ADC) – The U.S. Resource Conservation and Recovery Act Subtitle D underwent a major revision in 1991 to ensure human health and the environment were protected. A major change was the requirement to cover disposed solid waste with six inches of earthen material at the end of each operating day, or at more frequent intervals if necessary. Materials other than, or in combination with, earthen materials, referred to as Alternative Daily Cover, may be used to achieve the same function, including shredded tires. Permission must be granted by the Enforcement Agency for the landfill with concurrence by the CalRecycle.

Asphalt-Rubber – A blend of asphalt cement, ground tire rubber, and additives in which the rubber component is at least 15 percent by weight and has reacted in the hot asphalt cement sufficiently to cause swelling of the rubber particles.

Buffings – High-quality scrap tire rubber, often elongated, that is a byproduct from the conditioning of tire carcasses to remove worn/used tread from a tire in preparation for re-treading. Buffings contain essentially no metal or fiber.

Chip Seal – A pavement surface treatment formed by evenly distributing a thin base of hot asphalt or asphalt-rubber onto an existing pavement and then embedding finely graded aggregate into it.

Civil Engineering (CE) – Use applications for shredded tires in public works construction applications where defined properties are needed, including use in roadways and transportation systems, landfill systems, as lightweight fill in retaining wall applications, or levee projects.

Cogeneration – The process of combusting a fuel and using the heat for both an industrial process and for generating electricity. Waste tires and/or other fuels may be the fuel that is combusted.

Tire Consumer – Individual consumers who purchase tires from tire dealers.

TDP Consumer – Individuals and companies that purchase finished products containing recycled tire rubber, including individual consumers purchasing TDPs from retailers, businesses purchasing TDPs for use in other manufacturing, construction or installation of products such as turf or playground surfacing; and facilities that purchase tire-derived aggregate for use in civil engineering projects.

Crumb Rubber – Rubber granules derived from a waste tire that are less than or equal to one-quarter inch or six millimeters in size. (30 Public Resources Code (PRC) §42801.7).

End User – User of processed tires, including TDP manufacturers making products from crumb rubber, installers of playground surfacing or artificial turf fields, TDF users producing cement or electricity, contractors and engineers leading civil engineering projects, landfills accepting tires as ADC or for disposal, exporters. There is some ambiguity in how this term is used across different programs, with many state incentive programs defining crumb rubber producers as end-users. In this report, crumb rubber producers are considered a type of processor.

Extended Producer Responsibility – Extended Producer Responsibility (EPR), also known as Product Stewardship, is a strategy to place a shared responsibility for end-of-life product management on the producers, and all entities involved in the product chain, instead of the general public; while encouraging product design changes that minimize a negative impact on human health and the environment at every stage of the product's lifecycle. Although EPR and "Product Stewardship" are often used interchangeably, increasingly EPR is used to describe a type of product stewardship program mandatory programs, while product stewardship is applied to voluntary programs. In this report, several Canadian Province tire programs that refer to themselves as "Stewardship" programs are referred to as EPR programs because they embody the basic elements of EPR, and to distinguish them clearly from incentive programs.

Incentive Policy – As used in this report, incentive policy means a program that provides standardized payments to companies engaged in specified activities, based on the volume of materials handled (e.g., a specified amount of money per ton of tires processed that are sold to an eligible end-use market).

Industry Funding Organization (IFO) – An organization comprised of industry representatives that jointly fund product recovery programs. The term "IFO" refers to an organization that only funds the program (or assists in funding the program), but does not have a role in managing the recovery program.

Installer – A firm that purchases crumb rubber or coarse ground rubber among other raw materials, and engages in the installation of applications such as playground surfacing, synthetic sports fields or other turf applications. Installers sometimes are owners of recycled tire product brands who engage in marketing and sales of such product applications. Other times installers are contractors who provide installation services on behalf of brand owners marketing products.

Passenger Tire Equivalent (PTE) – Historically, measurement of the quantities of waste tires were based on number of tires and not weight. Because waste tires come in a variety of sizes and weights (especially when passenger and light truck tires are compared to heavy commercial tires), it is useful to use a standard unit of measure to convert numbers of tires to weight and number of large tires to equivalent number of small tires, and vice versa. This factor is called the Passenger Tire Equivalent—the average scrap passenger tire historically has been commonly held to weigh 20.0 pounds. Furthermore, 14 CCR §17225.770 defines a "passenger tire equivalent" (PTE) as the total weight of altered waste tires, in pounds, divided by 20 pounds. 1 PTE = 1 Waste Tire.

Processor – A facility that accepts whole tires for processing, including culling of reusable tires, shredding, baling, chipping and/or production of crumb rubber or coarse ground rubber. In some programs crumb rubber producers are considered end-users instead of, or in addition to, being considered processors.

Producer Responsibility Organization (PRO) – An entity appointed by one or more producers to act as an agent on behalf of the producer(s) to administer a product stewardship program and comply with any legislated mandate. Other terms are sometimes used to describe an entity that works on behalf of the producer to implement its responsibilities, such as Third Party Organization (TPO) or Stewardship Organization (SO).

Rubberized Asphalt Concrete (RAC) – A pavement material that consists of crumb rubber mixed into regular asphalt concrete (a mixture of asphalt binder and mineral aggregate). Since 2007 the California Department of Transportation (Caltrans) has superseded using the term

Rubberized Asphalt Concrete with the term Rubber Hot Mix Asphalt, which is an equivalent term that Caltrans feels is more consistent with industry usage.

Rubber Hot Mix Asphalt (RHMA) – See the definition of Rubberized Asphalt Concrete.

Scrap Tire – A worn, damaged or defective tire that is not a repairable tire. (30 PRC §42805.6).

Stewardship Programs – Programs for managing products at the end of their useful life in which those involved in the generation and consumption of the product (producer and consumer, primarily) share responsibility. Although the terms "Extended producer responsibility" and "Product Stewardship" are often used interchangeably, Product Stewardship is increasingly used within the industry to describe programs that are voluntary in nature, such as the RBRC battery collection program.

Tire Business Assistance Program (TBAP) – A California program that provides services and resources for businesses who either process used tires or produce tire-derived products using California waste tires

Tire Derived Aggregate (TDA) – Pieces of scrap tires that have a basic geometrical shape and are generally between 12 mm and 305 mm in size and are intended for use in civil engineering applications.

Tire Derived Fuel (TDF) – The combustion of whole or shredded tires in an oxygenated environment to extract the energy value embodied in the tire for use in an industrial process or to generate electricity.

Tire Derived Material (TDM) – Processed material (crumb, shreds, aggregate, etc.) derived from scrap tires, typically used as a feedstock in further processing, or used as is in a civil engineering, turf infill, or other type of application.

Tire Derived Product(s) (TDP) – Material that meets both of the following requirements (30 PRC §42805.7):

1. Is derived from a process using whole tires as a feedstock. A process using whole tires includes, but is not limited to, shredding, crumbing, or chipping.
2. Has been sold and removed from the processing facility.
3. Used Tire – A tire that meets both of the following requirements:
4. The tire is no longer mounted on a vehicle but is still suitable for use as a vehicle tire.
5. The tire meets the applicable requirements of the Vehicle Code and of Title 13 of the California Code of Regulations.

Tire-Derived Product Manufacturer (TDP Manufacturer) – For the purposes of this report, this term refers to facilities that purchase processed or whole tires for the purpose of producing a product. Elsewhere, this term is sometimes defined narrowly to mean a firm that produces products from crumb rubber. However, in this report the term is used broadly to include firms that purchase processed tires for use as TDF (the product being electricity or heat), firms that use TDA in civil engineering applications (the product being the finished project, whether a road embankment or other). For the purposes of this report, TDP manufacturer is a type of end-user.

Waste Tire – A tire that is no longer mounted on a vehicle and is no longer suitable for use as a vehicle tire due to wear, damage, or deviation from the manufacturer's original specifications. A waste tire includes a repairable tire, scrap tire, and altered waste tire, but does not include a tire-derived product, crumb rubber, or a used tire. (30 PRC §42807)

Appendix B Waste Tire End-Use Trends

Table 1 presents detailed data on California waste tires flowed between 2008 and 2010. The largest destinations in 2010 were crumb rubber (8.6 million PTE), TDF (8.4 million PTE) and export (8.1 million PTE). Despite growing production capacity, crumb rubber declined somewhat in the past three years due to softening demand and reportedly increasing competition from out-of-state suppliers. A decline in reuse was likely a temporary result of tire generation trends and soft demand for retreads. Civil engineering and alternative daily cover (ADC) have the potential for abrupt increases and decreases, depending on project activity. Despite strong potential demand, the civil engineering market has yet to mature.

Table B-1
Estimated End-Uses for California Generated Waste Tires, 2008 – 2010[1]

Category	Sub-Category	2008		2009		2010		Percent change 09-10
		Million PTE	Percent of Total	Million PTE	Percent of Total	Million PTE	Percent of Total	
Export	Waste Tires	2.2	4.9%	3.3	8.0%	6.4	15.5%	93.3%
	Used Tires (Exported)	1.5	3.4%	1.8	4.3%	1.8	4.3%	-0.2%
	Subtotal	**3.7**	**8.2%**	**5.1**	**12.3%**	**8.1**	**19.8%**	**60.5%**
Reuse	Retread	4.4	9.9%	4.4	10.7%	3.6	8.8%	-18.1%
	Used Tires (Domestic)	1.9	4.1%	2.0	4.7%	2.0	4.9%	3.6%
	Subtotal	**6.3**	**14.0%**	**6.4**	**15.4%**	**5.5**	**13.7%**	**-11.4%**
Ground Rubber	RAC & Other Paving	4.3	9.7%	4.6	11.3%	5.0	12.3%	8.4%
	Turf & Athletic Fields	2.4	5.5%	1.3	3.3%	1.4	3.3%	2.3%
	Pour-in-Place Playground	0.4	1.0%	0.2	0.6%	0.1	0.4%	-40.8%
	Loose-Fill Play/ Bark/Mulch	1.1	2.6%	1.3	3.1%	1.1	2.7%	-14.3%
	Molded & Extruded	1.2	2.6%	0.8	2.0%	0.7	1.8%	-12.0%
	Other	0.5	1.2%	0.1	0.3%	0.2	0.4%	41.8%
	Subtotal	**10.1**	**22.4%**	**8.5**	**20.5%**	**8.6**	**20.8%**	**1.1%**
Civil Engineering	Landfill Applications	2.1	4.6%	1.4	3.4%	1.8	4.4%	28.3%
	Non-Landfill Applications	0.7	1.6%	0.4	0.9%	<0.1	0.1%	-90.1%
	Subtotal	**2.8**	**6.2%**	**1.8**	**4.2%**	**1.8**	**4.4%**	**4.4%**
Alternative Daily Cover		**2.1**	**4.6%**	**1.2**	**2.9%**	**0.8**	**1.9%**	**-34.2%**
Other Recycling		**0.1**	**0.2%**	**0.1**	**0.2%**	**<0.1**	**0.1%**	**-31.3%**
Tire-Derived Fuel		**7.5**	**16.7%**	**7.0**	**17.0%**	**8.4**	**20.3%**	**19.7%**
Landfill Disposal		**12.3**	**27.6%**	**11.3**	**27.4%**	**7.8**	**19.0%**	**-31.0%**
Total Generated		**44.8**	**100.0%**	**41.2**	**100.0%**	**41.1**	**100.0%**	**-0.1%**

Category	Sub-Category	2008		2009		2010		Percent change 09-10
		Million PTE	Percent of Total	Million PTE	Percent of Total	Million PTE	Percent of Total	
Total Diverted from Landfill		**32.4**	**72.4%**	**29.9**	**72.6%**	**33.2**	**81.0%**	**11.5%**
Imports		0.5	1.1%	1.5	3.6%	1.0	2.5%	-31.3%

[1] Data are from the 2010 California Waste Tire Market Report, available on the CalRecycle web site. PTE stands for passenger tire equivalents, which is defined by the State of California to equal 20 pounds

Appendix C Market Size and Current Penetration Estimates

Table C-1 presents theoretical market size and current penetration information for select market segments. This is, in effect, a description of opportunities to expand and diversify tire markets.

Table C-1
Estimated Market Size, 2008 Penetration, and Potential Penetration by 2015

Category	Estimated Theoretical Market Size (Million PTEs)		2008 Marketed (Million PTEs)	2008 Penetration (%)		2015 Market Potential (Million PTEs)	2015 Potential Penetration (%)	
	Low	High		Low	High		Low	High
Ground Rubber	**44.0**	**61.7**	**10.05**	**16**	**23**	**16.1**	**26**	**38**
Rubberized Asphalt Concrete (RAC)	*25*	*35*	*4.32*	*12*	*17*	*6.1*	*17*	*24*
Turf and Athletic Fields	*4.0*	*5.0*	*2.44*	*49*	*61*	*3.9*	*77*	*97*
Loose-fill Playground/Bark/Mulch	*4.5*	*7.5*	*1.15*	*15*	*26*	*2*	*27*	*44*
Pour-in-place Playground	*5.0*	*7.0*	*0.45*	*6*	*9*	*1.2*	*18*	*25*
Molded and Extruded	*4.0*	*5.0*	*1.15*	*23*	*29*	*2.0*	*39*	*49*
Other Ground Rubber	*1.5*	*2.2*	*0.54*	*25*	*36*	*0.9*	*42*	*62*
Alternative Daily Cover (ADC)	**35**	**40**	**2.06**	**5**	**6**	**2.1**	**5**	**6**
Civil Engineering	**17.1**	**24.7**	**2.79**	**11**	**16**	**5.0**	**20**	**29**
Transportation - lightweight fill[1]	*7.0*	*8.0*	*0.73*	*9*	*10*	*1.*	*24*	*27*
Transportation - retaining wall[1]	*3.0*	*4.5*	*0.00*	*0*	*0*	*1.0*	*22*	*33*
Transportation – light rail	*0.1*	*0.2*	*0.00*	*0*	*0*	*0.1*	*50*	*100*
Landfill use[1, 2]	*3.0*	*4.0*	*2.06*	*52*	*69*	*2.0*	*51*	*67*
Other uses – e.g., septic[3]*, residential retaining wall*	*4.0*	*8.0*	*0.00*	*0*	*0*	*0.0*	*0*	*0*
Tire Derived Fuels (TDF)	**15**	**20**	**7.50**	**38**	**50**	**7.7**	**38**	**51**
Exported Waste Tires	**7**	**10**	**2.19**	**22**	**31**	**3.7**	**37**	**52**
Exported Used Tires	**1.8**	**1.9**	**1.51**	**79**	**84**	**1.6**	**84**	**89**
Retreading	**4.8**	**5.2**	**4.42**	**85**	**92**	**4.5**	**87**	**94**
Domestic Used Tires	**2.2**	**2.4**	**1.85**	**77**	**84**	**2.0**	**85**	**93**

Category	Estimated Theoretical Market Size (Million PTEs)		2008 Marketed (Million PTEs)	2008 Penetration (%)		2015 Market Potential (Million PTEs)	2015 Potential Penetration (%)	
	Low	High		Low	High		Low	High
Other Uses (Incl. Agriculture)	1	2	0.08	4	8	0.1	5	10
Total	128	168	32.4	19	25	42.8	26	34

[1] Estimated market size derived from Kennec estimates.

[2] Landfill uses market size estimate is for landfill gas and leachate recirculation applications only. The 2008 estimate should not be used as a benchmark to evaluate future effort as it was necessarily based on reported use that in some cases could not be validated by CalRecycle and may not comprise CalRecycle defined civil engineering uses. Regardless of the uncertainty, R. W. Beck, Kennec, and CalRecycle agree that market penetration for landfill use is relatively low and that there is potential for more TDA to go to landfill gas applications. Landfill applications also include use of significant potential quantities of TDA in operational layers; however, this use is not listed separately because of significant regulatory and supply barriers. Despite the barriers, CalRecycle should be open to opportunities to expand such uses and this potential contributes to listing landfill TDA as a priority market segment.

[3] This application is listed because it has achieved wide acceptance in some other states; however, it is not currently included in the State Water Resources Control Board regulations.

Appendix D Current CalRecycle Programs and Funding Levels

Every two years CalRecycle updates its Five Year Plan for the Waste Tire Management Recycling Program. This is a blue print for the agency's waste tire management activities for the coming five years. Table D-1 presents a summary of funding for the entire waste tire management program from the most recent plan adopted in May 2011, with research and markets (the program areas focused on increasing diversion) accounting for about 42.2% of total funding over the five year planning horizon.

Table D-1
Total Tire Program Funding for Fiscal Years 2011/12-2015/16

Program Areas	FY 2011/12	FY 2012/13	FY 2013/14	FY 2014/15	FY 2015/16	Totals for All Fiscal Years
Enforcement	$8,360,000	$7,840,000	$7,840,000	$7,590,000	$7,590,000	**$39,220,000**
Hauler and Manifest Program	$450,000	$450,000	$450,000	$450,000	$450,000	**$2,250,000**
Cleanup*	$4,100,000	$3,600,000	$3,500,000	$3,500,000	$3,500,000	**$18,200,000**
Research	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	**$5,000,000**
Markets	$20,297,000	$13,090,000	$13,190,000	$13,440,000	$13,440,000	**$73,457,000**
Program Staffing and Administration	$5,557,000	$5,557,000	$5,557,000	$5,557,000	$5,557,000	**$27,785,000**
Administration	$2,277,000	$2,277,000	$2,277,000	$2,277,000	$2,277,000	**$11,385,000**
Mandatory Contracts	$1,700,000	$1,700,000	$1,700,000	$1,700,000	$1,700,000	**$8,500,000**
Totals	**$43,741,000**	**$35,514,000**	**$35,514,000**	**$35,514,000**	**$35,514,000**	**$185,797,000**

Table D-2 presents the research budget for the current five year planning period, showing a focus on civil engineering and RAC, in line with priorities established in the plan and supported by the 2010 program evaluation report.

Table D-2
Budget for Research Directed at Promoting and Developing Alternatives to the Landfill Disposal of Tires

Program Area	FY 2011/12	FY 2012/13	FY 2013/14	FY 2014/15	FY 2015/16
CE Applications for Waste Tires	$500,000	$500,000	$500,000	$500,000	$500,000
Research on Highway Construction Applications Using Waste Tires	$500,000	$0	$500,000	$0	$500,000
Research on Technologies Using Waste Tires	$0	$500,000	$0	$500,000	$0
Totals	**$1,000,000**	**$1,000,000**	**$1,000,000**	**$1,000,000**	**$1,000,000**

Table D-3 lists the program areas and budgets for the broader market development program over the planning horizon.

Table D-3
Budget for Market Development and New Technology Activities for Waste and Used Tires

Program Area	FY 2011/12	FY 2012/13	FY 2013/14	FY 2014/15	FY 2015/16
Outreach Campaigns*	$3,000,000	$0	$0	$400,000	$400,000
TDA Civil Engineering Technical Support	$750,000	$650,000	$750,000	$750,000	$750,000
TDA Grant Program	$1,500,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000
RAC and TDA Technology Centers	$100,000	$100,000	$100,000	$100,000	$100,000
RAC Technical Assistance Contract*	$1,325,000	$500,000	$500,000	$500,000	$500,000
Rubberized Pavement Grant Program	$5,445,000	$3,300,000	$3,300,000	$3,300,000	$3,000,000
Tire-Derived Products Grants and Pilot Retailer Rebate Program*	$3,400,000	$2,800,000	$2,800,000	$3,000,000	$3,000,000
Tire-Derived Product Business Assistance Program (TBAP)	$674,000	$1,626,000	$1,200,000	$800,000	$1,050,000
Tire Equipment Loan Program*	$4,000,000	$2,016,000	$2,400,000	$2,500,000	$2,500,000
Spanish Translation Services	$50,000	$0	$50,000	$0	$50,000
WRAP Activities	$23,000	$23,000	$15,000	$15,000	$15,000
Tire Events	$30,000	$75,000	$75,000	$75,000	$75,000
Totals	**$20,297,000**	**$13,090,000**	**$13,190,000**	**$13,440,000**	**$13,440,000**

Appendix E Detailed Information on Select Incentive and EPR Programs

This appendix provides detailed information on select incentive and EPR programs to complement and support the summaries presented in Section 2.

Overview

Currently in the U.S. there are five operational state tire incentive programs, and there are four state tire incentive programs that have ceased operations. Similarly, we have identified five Canadian EPR programs for scrap tires that involve significant industry roles and are considered EPR in this report. However, they are generally referred to as Product Stewardship policies in Canada, and the EPR elements vary considerably across provinces. These programs are described in more detail below.

State Tire Incentive Programs Still in Operation

Colorado

The state of Colorado's scrap tire program began in the late 1980's. The Colorado General Assembly passed legislation in 2010, HB 10-1018, creating the Processor and End User Program, C.R.S. 25-17-202.5. The purpose of the program is to assist new and existing waste tire recycling technologies to become economically feasible and to thereby encourage the use of waste tires and reduce the storage of waste tires in Colorado. Under the law, partial reimbursement (up to $65 per ton) is available for in-state scrap tire processors and end users. Payments are made on a monthly basis (applications must be submitted), and end users are paid at a rate twice that of processors. The actual rate paid is dependent upon the amount of money allocated to the fund (based on tire sales) and total obligations (e.g., other applicants). Eligible uses include tire-derived fuel, other recycling, manufacturing crumb rubber, and baling tires for use in civil engineering purposes. Non-eligible end uses include burning without energy recovery, reuse, retreading, and landfilling. End users and processors must be in-state in order to be eligible for reimbursement, but material does not have to remain in state in order for an in-state processor to receive their incentive payment. In 2009 (the last full year the program operated, due to budget sweeps), the program paid out $1.2 million in incentives, which is a cost of approximately $0.24 per capita.

In 2010 the program was moved from the purview of the Department of Local Affairs to the Department of Public Health and Environment. When the program was under the Department of Local Affairs (DOLA) the Department had no real expertise in or authority over hazardous materials like tires. Therefore, some processors took advantage of the system and stockpiled processed tires that they had received incentive payments on. The state hopes that this will be less likely to occur now that the program is under the Department of Public Health and Environment. The state also has a recycling grant program which provides grants for public entities to purchase tire-derived products such as playgrounds and athletic fields.

Funding was diverted from the fund to the general fund several times. Also, the rate paid to participants can be quite variable depending upon the number of applicants and the amount of revenues available to the program- which, in Colorado, is tied to the seasonality of tire purchases

(higher during the colder months, lower in the summer). Therefore, the state encourages businesses not to "rely on" the incentive payments. Also, because funds have been diverted to the general fund, the state increased the frequency of grant rounds to ensure they did not retain too much in unencumbered funds. The last full year of the program was 2009 (because the funds were swept in 2010) during which 49,500 tons of tires were processed through the program, with incentive payments totaling $1.2 million.

Colorado's scrap tire collection and processing industry is well developed and mature. The majority of Colorado's scrap tire businesses have been in operation for more than 15 years. Ten scrap tire companies operate in the state currently. Other than the first years of Colorado's scrap tire management program when only one or two businesses were involved in the collection of tires, the number of companies that manage Colorado's annual scrap tire generation has been consistent at 8 to 10 companies. The services these companies provide have also stayed the same since their startup. These include: collect, haul, sort, cull, shred and bale.

Colorado' s tire recycling infrastructure is driven largely by the makeup of the Colorado scrap tire market, (i.e., TDF, TDA applications and monofills) and by the state's legislative and regulatory framework including the incentive program for processors and end-users.

According to discussions with both Colorado scrap tire program managers and tire processors, the incentive program helps sustain and support the state's existing tire recycling businesses but does little to create new markets or new tire recycling infrastructure growth in Colorado. An initiative promulgated in the 2010 legislation to establish a market development grant program bears this out. The new market development grant is intended to create new markets in the state by providing public entities with rebates for the purchase of tire-derived products such as playgrounds and artificial turf. According to regulators, there had been no end-use markets in the state to "help us with tires in inventories and stockpiles or entice new processing companies with higher value end use markets." In 2012 13 projects were awarded grants totaling $502, 674. These projects are expected to consume 87,734 scrap tires. Colorado still monofills some tires (less than 7 percent generated) and has significant numbers of tire stockpiles.

Approximately 4.8 million scrap tires were generated in Colorado in 2010. Of these, 93 percent were recycled. The top five end uses for scrap tire in Colorado include TDF, leachate/drainage fill material, crumb rubber, resale tires, and ADC.

Louisiana

Per regulations promulgated by Louisiana's Department of Environmental Quality in 1992 (and amended in 1994), which were authorized by the Louisiana Environmental Quality Act (Act 185, passed in 1989), Louisiana implemented a cradle-to-grave manifest system for waste tires. As part of the program collectors and processors of waste tires are permitted by the DEQ and must operate in accordance with the regulations. Also, a $2-per-passenger tire fee is collected upon the sale of new tires to fund the scrap tire program. The fee for medium truck tires is $5 and $10 for off-the-road (OTR) tires.

As part of the waste tire program DEQ subsidizes processors of scrap tires. Processors receive $1.50 per 20 pounds of eligible (e.g., derived from Louisiana scrap tires) processed tire material. Processors must be permitted by the DEQ and, as such, must be located within the state. End uses must be approved by the DEQ, but can be located outside of Louisiana. There are several processors that process tires into TDF, and one crumb rubber producer in Louisiana. In order to

be eligible for the incentive payment, the processor must provide documentation that the material has been sold to an approved end use. Processors invoice on a monthly basis. A DEQ official indicates that the primary end use for scrap tires in Louisiana is tire-derived fuel. In 2011 the state paid $10,169,017 to processors, who processed as total of 137,062,087 pounds (or 68,531 tons) of tire material. This is approximately $148.39 per ton of tire-derived material marketed or $2.22 per capita.

Louisiana generates about 5 million scrap tires annually and reportedly has markets for all the tires generated in the state and more making Louisiana a net importer of scrap tires and tire derived materials. Nearly 7 million scrap tires drawn from collectors in Louisiana as well as Texas, Arkansas and Mississippi are disbursed to energy recovery, civil engineering and crumb rubber markets in the state. These numbers are based largely on anecdotal information from processors, end users, neighboring state contacts and from previous Louisiana Department of Environmental Quality (DEQ) reports. DEQ has not updated the tire program statistics in several years, making it difficult to obtain exact data.

The top end-use markets in Louisiana are tire derived fuel and civil engineering. Two paper mills in the state together consume about 6 million tires-- more tires than are generated in the state. Another paper manufacturer has temporarily closed part of its paper making operation and is not currently consuming TDF but is expected to use TDF when it reopens. Civil engineering applications consume 1.5 -2 million tires per year. Civil engineering grade tire chips are used for leachate drainage and road base in landfill construction and for lightweight fill in marine bulkheads.

Rubberized asphalt is a new market in Louisiana. Louisiana processors have been working with the Louisiana Department of Transportation (LADOT) to develop a performance specification for rubber. The LA DOT has subsequently adopted 82/22 AR performance specification for Louisiana's roads that specifies 30 mesh crumb rubber. Processors report that savings achieved ($10 per ton of hot mix) with the use of crumb rubber in the new performance grade spec is helping drive rubberized asphalt use in the state.

There are three major scrap tire processors in Louisiana and numerous small collection and processing operations that handle tires in a variety of ways including sorting and culling for used tires and casings, tire derived fuel chips and civil engineering chips. One of the processing operations is also a monofill. The state allows shredded tires to be placed in monofills. Currently only one company processes tires to manufacture crumb rubber. One of the existing processors is now adding a crumb rubber division to its current shredding operations to produce crumb rubber for asphalt paving applications.

Processors would like to see some rule changes including a higher fee on tires, and better auditing/oversight of tire dealers/retailers. According to processors, not all the money from the tire fees is being deposited in the DEQ tire fund. Currently more tires are being processed than the fund has money for. Another problem processors said is that when the law was passed the $2.00 fee charged on tire sales was based on a 20 lb. tire. Today tire weight is closer to 24 lbs. per tire.

At one time the DEQ also had funds available to provide R&D and grants for scrap tire processing/manufacturing businesses, however there is only a small amount left in that fund, so this program has essentially stalled. State officials indicate that having payments at only one

level, the processor level, is adequate, as the processors only receive payment if their material goes to an approved (by DEQ) end use, so there are no stockpiles of processed tires. Also, the manifest system ensures that there are checks and balances so that fraud is minimized via review of the tires claimed vs. manifested and audits.

Louisiana processors credit the processing incentives with helping them compete with traditional materials in fuel and in civil engineering markets and increasing the use of tire derived fuel and tire derived aggregate. Processors also said that increased use of tire-derived materials in the state is helping educate end-users and the public to the benefits and value of recycled tire products. Their hope is that these benefits will allow tire-derived materials to eventually compete in the marketplace without incentives or subsidies. They point to the newly developing rubber asphalt market as an example.

Oklahoma

Oklahoma is one of a few states that has markets for its annual generation of tires – about 3.1 million – and can absorb cleanup tires from the state's remaining stockpiles as well. Six companies have operations that handle tires in the state. Of these three are crumb rubber processors, one is a dedicated TDF processor for cement kilns and the other two primarily collect, sort and cull for used tires and casings.

Oklahoma's incentive program is multi-layered and has gone through numerous revisions since its inception. Most of the revisions were to close loopholes in the system, such as requiring proof of an end-use and sale of processed tire material before receiving reimbursement. Over the years the program struggled with shortfalls in the tire fund resulting in pro-rata payments to processors and transporters. The state tire fund was also raided several times to make up for state budget shortfalls. DEQ addressed another loophole in the waste tire program in 2008 granting the Land Protection Division authority to conduct tire dealer inspections. The goal was to identify tire dealers and other retailers who sell tires and are not in compliance with the state's waste tire act.

On May 2, 2011 Oklahoma legislature passed a bill (HB1939) increasing the state's tire fee from $1 per passenger tire (a rate it had remained at since its inception in 1989) to $2.50. Tires with rims of more than 19.5" have a fee of $3.50. Motorcycle and motorized bicycle tires have a fee of $1.00 Agricultural tires have a fee of $0.05 per pound, with a minimum of $2.50 per tire. The state expects the increase in tire fees to result in an additional $6.6 million annually. State program managers and processors believe the increased fees will provide sufficient funds for the program and help sustain markets and eliminate shortfalls. To further assure the tire program remains funded, DEQ exhausts the funds every month and changed how it disburses payments. Any money remaining in the fund each month is allocated to cleanups.

The state's incentive program for processors and transporters of scrap tires includes the following incentives:

- $54 per ton for processed tire material, for processors.
- $53 per ton for processing facilities and TDF facilities to transport whole tires from dumps, collection sites, tire retailers, auto dismantlers, etc. to processors. (May not charge a collection fee, must collect from any facility at which there are at least 300 tires, and must use the tires to be compensated).

- Eligibility requirements include:

Processors must show that they are actively engaged and collecting tires in the state on a regular basis, and must collect tires from each county (this is to ensure the entire state, including the panhandle, is served). At least 2 percent annually of the tires collected have to be from dumps and/or landfills listed as high priority. And, they must provide data to the Department (sworn affidavit) of recycling fees collected, remitted by dealer, since tires were last collected. Processors are eligible to receive both of these incentives. In addition, crumb rubber processors are eligible for the following incentive: $29 per ton for those that make crumb rubber (if funding remains after paying out other incentives) This incentive is also available to end users of tire derived fuel.

There is also a baled tire program that reimburses local governments at a rate of $0.50 per tire for civil engineering projects using baled tires, however no such projects have been completed in the state. There is also reimbursement for bank stabilization projects, at a rate of $0.80 per tire for tires that are less than or equal to 17.5 inches in diameter, and $2.80 per tire for those that are over 17.5 inches in diameter. Bank stabilization and baled tire reimbursements cannot be combined with transportation reimbursements.

Compensation to waste tire facilities and TDF facilities is limited to those in Oklahoma. Processing facilities can also apply for up to $20 per ton in compensation for equipment. Approximately 3.4 million tires move through the incentive program annually.

Two cement companies currently burn TDF in Oklahoma and receive a $29/ton end user reimbursement for the fuel. A third cement kiln recently suspended its use of TDF due to a combination of economic conditions and the addition of other waste fuels. TDF remains the largest market in the state followed by the use of tire shreds in landfill applications including leachate collection and daily cover. Civil engineering applications do not qualify for the $29/ton end use benefit.

Three crumb rubber processors operate in the state. In-state markets for crumb rubber include playground rubber, infill rubber and rubber mat products. More than half the crumb rubber produced in the state is sold out-of-state. Crumb rubber producers are eligible to receive the per ton processor incentive, the per ton transportation incentive and the per ton end-use incentive. Oklahoma considers crumb rubber an end or finished product.

To increase markets for crumb rubber in the state, DEQ has launched an initiative to encourage the use of rubber modified asphalt. The department held a rubber modified asphalt forum last month to bring together rubber modified asphalt experts, state DOT engineers, paving contractors and crumb rubber producers to discuss the development of a specification for crumb rubber.

The initial intent of the Oklahoma waste tire incentive program was abatement of stockpiles in the state. All major tire accumulations have been cleaned up and less than 70 sites containing a total of 250,000 tires remain.

According to Oklahoma tire program managers, the incentive program has now evolved to a point "where it needs to move forward with something new." State program managers say the current program is beneficial in that it makes sure "we are servicing our tire recycling companies, tire dealers and communities with programs and events that help deter the creation of new stockpiles in the state." The incentive program, "spurs competition and more processing in the state,"

according to program managers. Incentive programs need to be an "ongoing process" and be able to "keep competition alive." One way managers say Oklahoma's program has done this is through its eligibility requirement that processors must collect tires from every county in the state. Processors are mixed on this requirement and say that while they recognize the purpose and agree it can create a competitive advantage, it also has economic and operational burdens for businesses.

On the downside, Oklahoma tire program managers expressed concern that the program is creating "too much dependency." They said a weakness of the program is not enough markets have been created. They also cited the need for a greater diversity of markets and said processors need to be "more creative and proactive in finding markets for their products."

Utah

The Utah Legislature passed the Utah Waste Tire Recycling Act in 1990 in response to increased stockpiles of waste tires and past experiences with stockpile fires. In Utah, large quantities of whole tires are banned from landfills. Up to four whole tires at one time are allowed. Tire shreds may be monofilled, however because of the high demand, there have not been many tire shreds monofilled in recent years. The Department of Environmental Quality (DEQ) manages the state's waste tire program. An estimated 2.6 million tires are generated in the state annually.

Funding for Utah's waste tire program comes from a $1.00-per-tire fee assessed on the purchase of each new tire, including those associated with a new vehicle purchase. Tire retailers and new vehicle dealerships collect the fee and transfer it to the Tax Commission. The fees are placed into the state's Waste Tire Recycling Fund and are used for the following:

1. Partial reimbursement of the costs of processing, recycling, or disposing of waste tires. Currently the reimbursement is set at $65 per ton for crumb rubber, $50 per ton for all other recycling (including TDF), and $20 for other beneficial uses (i.e., landfill daily cover, civil engineering purposes, light-weight aggregate fill). In addition, the reimbursement for monofilling shredded tires is $20 per ton.
2. Partial reimbursement of the transportation costs from the cleanup of waste tire piles.
3. Payment of administrative costs of local health departments, tire dealers, tax commission and DEQ. The tire dealers keep 2.5 percent for cost of administration and the Tax Commission keeps 2.5 percent for the cost of collecting the fees. Local health departments receive $5.00 per ton for each ton recycled for administration costs.

Utah is the only state with an active tiered incentive payment system. Utah processors say the intent is to create higher value markets for tire derived materials but overall industry reaction on the effectiveness of the tiered payments is mixed.

In FY 2011 43,426 tons of tires received reimbursement, a total of $2,560,732 (an average of $58.96 per ton or $0.91 per capita). The distribution of end markets was as follows:

- 25,962 tons used in crumb rubber (59.8 percent);
- 17,464 tons used in other recycling (40.2 percent) (most of this is TDF);
- No tires were monofilled or landfilled.

Processors must be in state to receive a rebate, however end uses for crumb rubber can be out of state (e.g., a crumb rubber manufacturer must show that the crumb has been purchased and shipped to a manufacturer, but that manufacturer can be in state). For TDF, the end user receives the rebate, but can defer it to the processor. To be eligible for the rebate, the facility using TDF must be in state. An end user cannot receive payment for material that a processor has received payment for.

A Utah DEQ representative indicated that if he could make a change to the program, he would allow out-of-state processors to be eligible for the incentive. In Utah all processors have been purchased by one large tire company (Liberty Tire) who now also has control of the tire hauling infrastructure. This has led to a lack of competition in the state. He also felt that having an incentive for monofilling allowed for a "safety net" – something processors could do with tires if markets were really low. The incentive was not high enough, however, to draw tires from higher uses. An industry representative interviewed said allowing tires to be monofilled is a safety net in itself and view the $20 per ton incentive as "encouraging" the practice. However, in 2011 no tires were landfilled or monofilled in the state.

Virginia

Beginning in 1989, Virginia's tire retailers were required to charge a fee of 50 cents per tire on all new tires sold and the funds were placed in the Waste Tire Trust Fund. The DEQ was directed to develop and implement a plan for the transportation and management of all waste tires generated in Virginia. In 2003 the state's General Assembly increased the fee to $1.00 per tire, beginning July 1, 2003 and running through June 30, 2011. The fee has gone back to $0.50 since July 2, 2011.

The Waste Tire End User Reimbursement Program was adopted in 1994 and subsidizes eligible end uses for waste tires. The current reimbursement rate is $22.50 per ton of tire material (equivalent to 22.5 cents per tire) or $100 per ton ($1.00 per tire) if generated from a certified tire pile. Eligibility for the end-use reimbursement requires that reused material be generated from within the state. Eligible end uses include:

- Civil engineering applications which utilize waste tire materials as a substitute for soil, sand or aggregate;
- Burning of waste tire materials for energy recovery (TDF);
- Pyrolysis of waste tires; and
- Manufacturing of products made from waste tire materials.

Since 1996, Virginia has used this unique reimbursement differential for tire pile cleanups (initially $50 per ton, then $75 per ton, and now $100 per ton). This system eliminates the need for competitive bidding, and allows any processor/end user "team" to "go to the field" and compete for cleanup work for piles ranging from 100 tires to 4,641,400 tires. Though the $100-per-ton incentive is still available, it was rarely utilized due to the complexities and variability of the remaining tire piles in the Commonwealth. Accordingly, DEQ shifted cleanup focus to contracted cleanups under the Clean Sweep projects. Such contracting is dependent on available funding. An increased interest by property owners and processors/end users has revitalized somewhat the $100 per ton incentive in certain parts of Virginia.

There are approximately 123 tire piles remaining in Virginia. Most of these piles are small, with only two large remaining piles. Most of the remaining piles are in areas that are difficult to access.

Virginia is the only program that is strictly an "end user" reimbursement. It has been successful in two ways: cleaning up the state's stockpiles (the original intent of the program) and in supporting and sustaining essentially two markets: TDF and TDA. There are no tire derived fuel users in the state currently. All of the TDF end users who benefit from Virginia's end-user reimbursement are out-of state. The majority of end use reimbursements in the state go to civil engineering applications: landfill drainage and landfill trench and cover material.

Although the end user is reimbursed, the program has had a considerable impact on developing the scrap tire processing infrastructure. There had been only one in-state processor prior to the inception of the program. Now there are 17 processors processing scrap tires from Virginia, 11 of which are in Virginia. However, a crumb rubber market has not developed in Virginia despite the fact that the incentive program has been in place for more than 18 years. Currently, the only crumb rubber end users receiving a Virginia end-user reimbursement are out of state. This may change with the recent opening of a full-scale crumb rubber processing operation in the state. Additionally, last year the Virginia Transportation Department placed rubberized asphalt pavements on highly traveled roads in three of the state's most populous regions to test the rubber modified asphalt and develop a spec for the state. The crumb rubber for the projects was produced out-of state.

Approximately 55 percent of the scrap tires generated in Virginia are used in civil engineering applications, 43 percent are used for TDF (out of state), and 2 percent in colored rubber mulch applications. Recent years have seen an increase in the portion going to the TDF market.

In FY 2011 the incentive program was still fully funded (e.g., the tire fee was at $1 per tire), and approximately $2.6 million was paid out in incentives and 97,000 tons of tires were recycled through the program. This is an average of about $26.80 per ton or $0.32 per capita. However, with reduced tire fees, the DEQ is not sure how they will change the program – if they will only be able to fund the first half of the year, or if they will reduce the incentive rate. There is also the possibility that some funds will be re-directed to the general fund. Therefore, DEQ cannot restructure the program until the state budget is passed. An estimated 7.5 million waste tires are generated in Virginia annually.

State Tire Incentive Programs No Longer In Operation

Idaho

Idaho's tire program was established by law in 1991. The law imposed a $1.00-per- tire fee on new tire sales, set requirements for scrap tire collection and disposal sites in the state and required that monies from the tire fee be remitted to the Waste Tire Grant Account for grants to counties or contracts with private entities to manage waste tires and cleanup illegal piles. A 1993 amendment to the law extended the sunset date for the tire fee to June 30, 1996, instituted a landfill ban on whole and shredded tires and revised the tire fee collection and disbursement procedures.

Idaho's program included the following market development incentives:

Retreading operations in the state could receive a $1.00 per tire for passenger and light truck tires retreaded in the state.

End users of tires and tire derived material could receive a $20/ton reimbursement for eligible uses such as energy recovery, shredding, soil erosion, collision barriers, crumb rubber for asphalt use, or as a raw material for other products, and hauling to out-of-state processing facilities.

During the life of the program two cement kilns and one pulp and paper mill burned tire derived fuel. One Idaho cement kiln burns tire derived fuel currently.

During the program five processors operated in the state. Today one small tire collection business operates in the state to collect, sort and cull tires for used tire sales. A Washington state scrap tire firm and an Oregon-based scrap tire firm provide the majority of tire collection services in Idaho today.

Idaho's scrap tire program was a five-year plan to address cleanup of illegal piles in the state and to create an infrastructure to manage and recycle the annual flow of tires. It was effective in cleaning up the state's tire piles but did not have the longevity to create an infrastructure that could maintain tire recycling in the state. Idaho DEQ does not track the quantity of scrap tires generated in the state, but they use the Scrap Tire Management Council's methodology of estimating one scrap tire per person annually, which would be about 1.4 million tires generated in Idaho annually.

Oregon

In 1987 Oregon established a scrap tire program through passage of HB 2202. The law was intended to clean up the illegal stockpiles and develop end-use markets for scrap tires. The legislation established a $1 fee on each new tire sold at retail (the retailer retained $0.15 per tire), and dedicated those funds to a Waste Tire Recycling Account. A direct market subsidy of $20 per ton was paid to end users, helping to ensure markets. When the tire fee ended in 1992, tire stockpiles were fast disappearing from the landscape. Over $2 million in reimbursement funds were distributed over the life of the Waste Tire Program. The Oregon DEQ also financed cleanup of 64 Oregon sites totaling 3.5 million waste tires at a cost of $3.7 million dollars.

By 1995 and 1996 Oregon was able to recycle 98 percent of its scrap tires. However, in 1997 a major end market for Oregon's scrap tires, a TDF facility (Potlatch) in Lewiston, Idaho, ceased accepting tires as fuel in response to EPA Region 10 concerns about emissions. With the development of new landfills in the state, landfill disposal soon became the predominant outlet for scrap tires, and by 2000 the recovery rate for scrap tires fell to 32 percent. In addition, scrap tires from neighboring states began to flow into Oregon landfills during this same time and by 2002 more than half of the tires landfilled in Oregon were from out of state. Additional issues faced by Oregon include:

1. Imported tires from Idaho and Washington displacing Oregon-generated tires in the marketplace, particularly west of the Cascades;
2. Competition with subsidized crumb rubber from Canada

In 1994 – 98 percent of the scrap tires generated in Oregon were being recycled. The most significant market was TDF. By 1999 only 33 percent of the state's scrap tires were being recovered. Approximately 2/3 of tires were being buried in landfills/monofills. HB 3909 was pitched in 2001, which would re-establish a point-of-sale recycling fee and aim to develop markets. The bill did not pass.

Currently Oregonians generate about four million waste tires per year and only about one third of them are recovered. The rest are shredded and disposed of in Oregon or out-of-state, or dumped illegally. Oregon law establishes a permitting system for waste tire carriers and storage sites, and also imposes a landfill ban on disposal of whole tires.

Tire derived fuel was the only major market developed in Oregon during the life of the tire incentive program. One cement kiln and two pulp and paper mills burned tires as supplemental fuel. Paper mills in the neighboring states of Washington and Idaho also provided a TDF market for Oregon-generated tires. Today, one pulp and paper mill and one cement kiln burn TDF in Oregon.

Oregon's end-user subsidy did help establish tire derived fuel markets during the life of Oregon's program and beyond. At the time there were little or no markets for tires and TDF was a new unproven fuel. Many industry stakeholders believe the end user subsidy helped pave the way for cement kilns and pulp and paper mills in the state to try the fuel. The subsidy worked in the sense that fuel markets in the Northwest continue to use TDF today – without a subsidy. In an indirect way, Oregon's program helped launch TDF as a viable supplemental fuel and the largest market for tires in the U.S. today.

Like Idaho, Oregon's program did not operate long enough to develop additional markets or a competitive infrastructure of companies in the state. The result is only about one third of the 4 million scrap tires generated in Oregon go to markets today and landfilling has become the dominant "end use" for Oregon tires.

Texas

In 1992 Texas began a Waste Tire Recycling Fund (WTRF), which was funded by a $2-per-tire fee in the purchase of new tires. Generators collecting the fee were provided with free collection of scrap tires. The WTRF also provided reimbursement to processors of scrap tires for the costs associated with producing shreds, crumbs, or chips. Initially the reimbursement was set at $0.85 per tire (approximately $85 per ton), which was reduced to $0.80 per tire ($80 per ton) in 1995.

The law did not require the tire-derived material to be sold in order for the processor to be eligible for reimbursement. The law was later adjusted (1995, SB 775) to include this provision, and to ensure that out-of-state processors and landfilling were not eligible for the incentive. However, the "marketed tons" provision was not enforced, due to political pressures. As a result, stockpiles of processed tires accumulated, which have been cleaned up in recent years. Today, the Texas Commission on Environmental Quality (TCEQ) reports there are five scrap tire sites with a total of just under eight million tires stored both shredded and whole. The state continues to pursue various legal instruments to get the piles cleaned up and applies any grant money that may become available.

SB 775 also established a grant program for scrap tire businesses, which enabled businesses to apply for a total of up to $2 million in grants to build waste tire facilities and up to $6 million to retrofit facilities to burn shredded or whole tires. This $6 million could also be used to reimburse facilities for using TDF, at a rate of $0.80 per tire. Transporters were also provided with a reimbursement of $0.40 per tire in 1995, or $40 per ton.

The major problem facing the waste tire recycling program was that the market for used tires and tire shreds has not kept up with the growing backlog of discarded tires. Three of the 26 sites

where tire shreds had been abandoned by 1997, when the number of processed stockpiled tires reached an estimated 70 million. In 1995 a fire broke out at a facility storing piles of shredded tires. It was reported that at that time the state was generating about 50,000 scrap tires daily (18.25 million annually), and that 70 percent of the tires processed were being recycled in 1997, including TDF. In 1997 10 facilities in Texas were permitted to accept scrap tires for fuel, and seven were actively doing so: five cement kilns, a paper mill and an aluminum smelter.

Additional challenges faced by the program included re-allocation of program funds, resulting in program revenue shortfalls, and fraud. Audits conducted in 1994, for example, indicated that four of the six audited processors were over-paid by a total of $21,109, and the other two were over paid by a total of over $95,000. SB 776 therefore required that all processors receiving payments be audited.

The Senate Natural Resources Committee suggested that the program continue, as it had been successful in eliminating approximately 700 scrap tire piles and had begun to develop end markets for scrap tires, but the committee suggested significant changes, including a payment to end users, not processors, to stimulate demand for processed tire material. The subcommittee also suggested that end users who transported tires out-of-state also receive payments in order to bolster regional markets, and that grants continue to be available to processors located in Texas.

The WTRF sunset in 1997, and despite attempts to reform the legislation and reintroduce the program, the state legislature has been unable to do so. There are still reportedly piles of processed tires throughout Texas. There is still no tire fee on the purchase of new tires in Texas. Texas still requires generators, transporters, processors, recyclers, energy recovery facilities, reclamation projects and storage sites to register with the state and to continue to report to the state. Tires are managed through a competitive system, however. Tire generators charge a "disposal fee" which they use to pay haulers to remove the scrap tires. Haulers deliver the scrap tires to authorized processing and end use or disposal sites.

When the incentive program was in place TDF became the primary market for scrap tires. TDF end users were eligible for an end user reimbursement of $80/ton. Seven companies (five cement kilns, a paper mill and a smelter) came on line under the Texas Waste Tire Program. Today, eight cement kilns burn TDF in Texas consuming 12.2 million tires (just over half of the 24 million scrap tires Texas generates annually). This demand is filled primarily from in-state supply.

There were no crumb rubber processors or markets in the state during the active years of the waste tire program. The Texas Department of Transportation together with TCEQ and tire recycling industry stakeholders have since developed the use of rubber modified asphalt in the state. One large crumb rubber manufacturer has been operating in the state for nearly 10 years, two smaller crumb rubber producers have come on line and a large volume (10 million tires/yearr) crumb rubber manufacturer is building a facility and is expected to begin production in 2012. Other crumb rubber markets include landscape mulch and playground and athletic safety surfaces. Nineteen scrap tire companies including collectors, processors and crumb rubber producers comprise the tire recycling infrastructure in Texas.

Wisconsin

Like Idaho and Oregon, Wisconsin's Waste Tire Removal and Recovery Program, implemented in 1988, was initiated with a sunset provision in place and the program ended after six years. It

was initiated to address stockpile and tire pile cleanups and lack of markets in the state. The program was initiated largely in response to a significant scrap tire fire in St. Croix County. Wisconsin Department of Natural Resources (DNR) administered the program. The funding source was a $2-per-tire fee on new motor vehicles at the time the vehicle was initially registered in Wisconsin.

Between 1990 and 1997, the DNR cleaned up 12 million tires at 162 sites. Private parties cleaned up an additional 4 million tires at 408 sites. Almost all the tires were processed into fuel and used for generating energy or electricity at industries. In addition, the DNR provided grants to establish an infrastructure for collecting and processing tires and to establish end-use markets.

The state of Wisconsin employed an end-user reimbursement program from 1988 until the law sunset in 1997. A $20-per-ton reimbursement rate was provided to eligible businesses that were end users of scrap tire for energy recovery, construction, or manufacture of products made from recycled tires. Later in the program's history this reimbursement program was later expanded to provide an incentive of $20 per ton for tire processors and the amount provided to end users was increased to $40 per ton on scrap-tire-based raw materials if used in recycled-content products. End uses that were eligible for subsidy under Wisconsin law included energy recovery, pyrolysis, highway improvements, and the manufacture of new products. Not eligible for rebates were landfill disposal, reuse as a vehicle tire or for erosion control, or other uses of a split tire. Through the six years of the program, Wisconsin spent approximately $4.5 million on end-use rebates. The Legislature ended the program in 1992.

Wisconsin currently licenses haulers of scrap tires as well as operators of storage and processing facilities. Operators of such facilities must have an operations plan reviewed by DNR.

A waste tire management infrastructure did develop in the state despite the short duration of an active state program. Twelve companies currently operate scrap tire businesses in the state. Of the twelve only three are processors, the others are engaged in hauling, transfer and storage operations for tires. Most of the tires and/or processed tire material produced or handled by these companies are going to out-of-state markets. A representative of Wisconsin DNR indicates that markets for scrap tires, particularly TDF, seem to have declined in recent years, likely due to the economic downturn and the appropriation of TDF from other Liberty-owned facilities to the facility that had previously been supplied by the Auburndale facility . The primary processor in Wisconsin, Liberty Tire, has approached the state to receive permission to landfill tires, indicating that they have inadequate markets available to them, however this is prohibited statutorily.

Overall the Wisconsin incentive program was not successful in developing markets in the state. A new crumb rubber processing facility opened in the state last year and is actively pursuing markets for its materials. Interestingly, Auburndale's petition to the state for help is focusing new attention on tire processing and recycling capabilities in the state. State regulators, and solid waste and recycling program managers report a strong interest from tire recyclers seeking to locate in the state.

Canadian Tire EPR Programs

The following Canadian programs involve significant industry roles and are considered EPR in this report. However, they are generally referred to as Product Stewardship policies in Canada, and the EPR elements vary considerably across provinces.

Alberta

In Alberta the Designated Material Recycling and Management Regulation gives Alberta Recycling the responsibility for establishing and administering "industry operated recycling funds" for all materials designated by a material designation regulation. Three material designation regulations have been enacted: the Tire Designation Regulation and the Electronics Designation Regulation, both in 2004, and the Paint and Paint Container Designation Regulation in 2007. The DMRMR gives Alberta Recycling the responsibility for establishing and administering "industry operated recycling funds" for all materials designated by a material designation regulation.

The Tire Designation Regulation expires in 2014. This is to ensure proper review, with the opportunity to reinstate or amend the regulation. Alberta Recycling Management Authority is a not-for-profit association and a delegated administrative organization that reports to the Minister of Environment. There is a Tire Recycling Council, two members of which serve on the Board of Directors of Alberta Recycling.

To fund the tire program, an advance disposal surcharge (ADS) is charged on new (eligible) tires. The amount of the ADS depends upon the tire size and use. The ADS on passenger tires is C$4 per tire and C$9 for medium truck tires. The program expanded in 2011 to include OTR, specialty and industrial tires as well (the fee for OTR tires is C$40, $100 or C$200 depending upon the size of the tire).

Approximately 6 million tires are discarded, collected and recycled in the province annually. Under the program, Alberta Recycling provides incentives to transporters of scrap tires, depending upon their location (C$55,C$115 or C$180 depending upon the geographic area (defined as Zones A, B, or C) to collect and transport tires to a registered processor. Processors that shred tires into shreds 6" or less in size are eligible to receive $100 (CA) per metric ton for passenger and medium truck tires. TDF is an acceptable use of tire shreds. Those who shred OTR tires to the same specification are eligible to receive an incentive of C$150 per metric ton (MT). All registered processors must provide documentation relating to shred delivery, copies of proof of sale or delivery of the product, and a confirmation of acceptance signed by the receiving third party. Furthermore, processors are not eligible to receive payments greater than expenses.

Full-time manufacturers of crumb rubber who make at least 500 tons per year of crumb are eligible to receive C$425 per MT of crumb rubber "supplied to a third party for approved arms-length uses." For medium truck tires (MTT) this rate is C$503.33 per MT. This rate, however, is scheduled to be reduced over time to C$255 per metric ton by October 1, 2014.

Manufacturers of tire-derived products can receive an incentive for manufacturing products made from scrap tires or tire-derived material derived from Alberta scrap tires, however the incentive is meant to be a partial reimbursement of expenses. The maximum rate is currently C$110 per MT, and is scheduled to decline over time until it is completely eliminated in October 2014. (The decision to eliminate the manufacturing incentive was reportedly being re-evaluated.) Alberta makes a distinction regarding "fabricators" of tire products. Those entities are eligible to receive an incentive of up to C$2.50 per PTE all inclusive for collection of whole tires, processing whole tires and shipping expenses relative to fabricated products.

Alberta also provides an "end use incentive" to public entities that use tire derived materials or products, which is designed to rebate up to 100 percent of transportation costs associated with transporting tire materials or tire-derived products to a site.

Alberta also has a municipal grant program which helps communities purchase products made from recycled tires, thus stimulating demand for tire-derived products. Since the program's inception Alberta Recycling Management Authority has provided C$6 million in grants to municipalities and non-profits to purchase recycled tire products for 319 demonstration sites.

There is also a research and development project in progress to evaluate using tire-derived aggregate for as a drainage medium in landfills.

There are three processors serving Alberta (Liberty Tire Recycling Canada, Alberta Environmental Rubber Products (crumb processors), and Cutting Edge Tire Recycling (specializes in processing OTR tires, but accepts all tires). Producers of tire derived products include:

- Champagne Edition, manufacturer of rubber sidewalks, mats, pavers, traffic products and other molded products;
- E.C. Recycling Tire Mats, manufacturer of mats and other fabricated products;
- Everplay Installation, installers of pour-in-place playgrounds;
- G.E.M. Inc., manufacturer of roofing tiles, stucco and decking;
- Marathon Surfaces, Inc., installer of pour-in-place surfaces;
- Pro Tech Rubber Products, manufacturer of molded rubber products such as mats;
- Softline Solutions, ,manufacturer of pour-in-place surfaces, edging, and curb stops; and
- Tomko Sports Systems, manufacturer/installer of sports tracks.

Some of the installers of pour-in-place surfacing are not located in Alberta.

British Columbia

British Columbia's scrap tire program is an industry-led program which aims to place responsibility for end-of-life management of tires with consumers and producers of the tires. Thus, the program can be considered to be an EPR program. British Columbia has framework EPR legislation in place, and the Ministry of the Environment added scrap tires to the regulation in 2006. This regulation required industry to submit a stewardship plan to the Ministry by the summer of 2006. Tire Stewardship BC (TSBC), a non-profit organization comprised of industry, was formed to accept responsibility for the provincial scrap tire recycling program. TSBC submitted its Stewardship Plan to the Ministry on August 17 2006. The Plan was approved on September 19, 2006, and the new program was launched on January 1, 2007. The TSBC program replaced the government-run program that had been in place since 1991. According to the TSBC 2010 Annual Report [21] the program has been able to ensure that virtually all tires generated in BC

[21] Available at http://www.tirestewardshipbc.ca/pdf/TSBC-AnnualReport2010.pdf.

are recovered for recycling. To fund the program, an advance disposal fee (ADF) (also referred to as an Eco Fee in BC) is charged on the purchase of new tires. The fee is set by TSBC. The ADF is currently C$5 per passenger tire, C$9 per medium truck tire, C$15 per agricultural drive tire, and C$35 per logger/skidder tire. Off-the-road (OTR) tires are excluded from the program as markets are lacking for larger tire processing. Approximately 90 percent of the revenues from the fees is paid to the processors and haulers to collect, transport, and recycle the scrap tire. About 6 percent is used to administer the program, and the remainder is used for education and outreach and research and development.

In 2010 71 percent of the tires collected in BC (approximately 2.55 million tires, vs. 3.13 million sold for a diversion rate of 82 percent) were processed into crumb rubber, and the remaining 29 percent were used as tire-derived fuel. In 2010 9.3 million pounds of crumb were used in the manufacture of crumb-derived products in BC. TSBC has made agreements with the processors/manufactures in BC to provide them with incentives to process and/or manufacture using BC scrap tires or tire-derived material (described in more detail below). Western Rubber Products (located in Delta, BC and Chemainus, BC) manufactures crumb rubber, shreds, and colored mulch. Lehigh Cement Northwest uses tires for fuel. North West Rubber Mats limited also manufactures mats and specialty crumb.

The processor incentive rate is C$127 per metric ton for shreds for TDF,

There is an incentive of C$73 per metric ton for whole tire feed fuel systems, and other processing incentives include:

- **TDP1** – up to C$280 per tonne. Includes operations that reduce the scrap tire to a highly processed form, typically to a crumb rubber or powder form for use in producing new products such as blocks or mats (particle size up to approximately 5/16" and free of steel and fiber). The component values of the TDP1 rate are as follows: crumb rubber @ C$370 per metric ton (MT) / steel and fiber @ $C168 per MT.
- **TDP2** - $C140 per MT. Includes operations that process or change the shape of the scrap tire but utilize components of the scrap tire essentially in their original form: examples include blasting mats and portable terrain mats. Also includes end products made from scrap tire shred: particle size range >5/16" up to 3/4".
- **TDP3** - C$69 per MT, is characterized by high-volume applications such as coarse shred used as road-fill.
- **TDP4** - Nil incentive rate, where the product will be made from the whole tire in its original form. Transportation assistance will be available to ensure access to scrap tires as feedstock is available.
- **TDP5** – C$140 per MT for the shearing and disposal of BC generated scrap Rear Agricultural and Logger /Skidder tires that have received an Advance Disposal Fee.
- **TDP6** – at C$2.65 per Medium Truck Tire received for processing into either TDP1 or TDP2

- **TDP7** – at $266 per MT for colored rubber granules with a particle size range of >5/16 up to 3/4" and free of steel for use as recycled rubber mulch typically used as landscape cover.

Tire-derived products/material must be sold (with proof of sale provided) to be eligible for incentive payments.

Transportation incentives are also available, including (including ferry fares and down time, for loads meeting certain criteria.

BC also has a community grant program where public entities can receive up to C$20,000 in grants to purchase tire-derived products. In 2010 TSBC supported 17 communities building new recreation facilities or renovating existing ones with grants totaling over C$247,000 through the Community Grant Program. This was a significant increase in community participation over 2009.

BC is in the process of reviewing a manufacturers' incentive program.

Ontario

In Ontario an industry-funded organization, Ontario Tire Stewardship (OTS), implements and operates the province's scrap tire program. The program began in September 2009. When the program was implemented, the prior "tire fee" that Ontarians had to pay to dispose of tires was eliminated, in order to encourage proper management of tires (both on and off-road) at the end of their useful life. Instead, tires can be delivered to registered collectors at no charge. The program is funded by "stewards" (first importers and brand owners of tires) who remit a "tire stewardship fee" (TSF) to OTS for each tire they sell into Ontario. Besides stewards paying into the program, there is a role for collectors, haulers, processors and manufacturers in the system. Collectors must accept tires at no charge, report data to OTS, and ensure that tires are collected by OTS registered haulers. Collectors receive an incentive of C$0.88 per passenger tire, C$3.05 per medium truck tire, and either C$0.88 or C$3.05 per OTR tire, depending upon its size. Collectors can submit their claims on a quarterly basis. The haulers' role is to collect tires from registered collectors free of charge, and deliver them to a local registered processor or eligible end user. Haulers submit claims quarterly, and must have delivered the tires to a registered processor or end user in order to be eligible for the incentive payment. The current incentive rates, which are dependent upon the type of tire and location from which the tires were hauled, range from approximately C$1.01 to C$1.04 per passenger tire, or C$101.44 to C$104.24 per metric ton.

Processors must accept tires from all registered haulers at no charge, provided they have adequate capacity. They must also prove that the material has been sold and has an end use consistent with OTS goals (e.g., no disposal and no TDF) to be eligible for the processor incentive. The rate of the processor incentive is dependent upon the level of processing and the type of tire, as well as whether the material is a feedstock in manufacturing. The rates range from C$55 to C$337.50 per MT.

Lastly, recycled product manufacturers (RPMs) also are eligible for incentive payments. To be eligible, an RPM must have manufacturing operations in the province of Ontario, manufacture products using Ontario-derived scrap tires or scrap tire material, are molding, calendaring, or extruding products, and meet minimum vendor standards stipulated in the agreement with OTS. RPMs also file claims on a monthly basis. In 2009/10 OTS had a manufacturing incentive (MI) rate of C$160 per MT, but total payments were capped at C$2.1 million and total manufacturing

incentive (MI) going to one RPM were capped at C$630,000. In 2010/11 OTS changed the structure of the RPM incentive program such that a "base rate" of C$40 per MT was provided and an incremental rate of C$160 per MT was provided for each MT beyond the three-year average quantity of crumb rubber used. The three-year average was based on the amount used in 2006, 2007, and 2008. There was no per-business total incentive cap. There are currently 10 RPMs in Ontario. OTS also has a research and development (R&D)/technical assistance grant program to help RPMs address specific technical or operational barriers. In addition there is an education and outreach initiative to educate the public about proper tire maintenance and products made with scrap tires.

In 2010 total expenditures for the OTS program were C$64,561,068, which equates to approximately C$4.87 per capita. The processor and manufacturing incentives, combined, were C$14,070,568, or about C$1.04 per capita.

The OTS program is considered an EPR program, however it is less "free market" than most EPR programs, as governmental regulations do not allow for tires to be disposed or burned. Since its inception in 2009 OTS has resulted in the diversion of over 33 million tires, with a recovery rate of 96 percent. On February 9 2012, however, the Government of Ontario's Minister of the Environment issued new direction to Waste Diversion Ontario (WDO) requiring a review of Stewardship programs in the province, including the used tires program. The directive is to ensure that producers pay the actual cost of waste disposal instead of projected costs, which is currently the case in Ontario for multiple EPR programs. OTS announced that this new direction from the Minister may result in OTS having to review all aspects of the program, including how they invest in the Ontario tire recycling industry which, OTS fears may have a negative impact on the industry and slow or erode the growth of tire-derived businesses in Ontario.

Saskatchewan

Saskatchewan's Environmental Management Act authorizes the Lieutenant Governor in Council to make regulations with respect to the collection, treatment, disposal, recycling, recovery, reuse and reduction in use of "prescribed" products. Under the Environmental Management and Protection Act, Saskatchewan has passed separate regulations for individual product streams. Saskatchewan passed the Scrap Tire Management Regulations in 1988.

The SSTC is a non-profit, non-government, industry-sponsored organization managed by a volunteer Board of Directors selected by member associations. The SSTC was established in 1996. Since that time the corporation has managed the Scrap Tire Management Program and collects, transports and recycles scrap tires into useful products. In 1998, The Scrap Tire Management Regulations made it mandatory for all tire retailers to participate in the program or to contract an agency to provide this service on their behalf. The provincial government does not run or direct the SSTC or the tire recycling program. Its primary role in this area is regulation and enforcement. The tire recycling fee (TRF) is a fee the retailer collects from the consumer on the sale of each new tire in the province. The SSTC uses the funding to manage the program, pay for the collection, transportation and processing of scrap tires. SSTC pays the processors pre-determined rates per pound collected. Haulers also receive an incentive payment. The transportation incentive is not based on mileage, but differs depending on the size of the tires.

SSTC collects the recycling fee from retailers, then that money pays for the collection and processing – processors monthly, twice monthly for collectors. Incentive rates paid to collectors

and processors are privately negotiated and are not published. In 2010 Saskatchewan recycled 11,734 metric tons of tires, most of which was processed into crumb rubber. In 2010 SSTC paid out C$5,153,704 in processor and collector incentives, which is analogous to C$439.21 per MT or C$4.91 per capita.

The Saskatchewan program collects over 750,000 scrap tires annually. Two processors located in Saskatchewan serve the province, and have been serving the province since the program began. They are Shercom Industries and Assiniboia Rubber Recycling. Assiniboia Rubber Recycling manufactures rubber mulch, PermaLife Pour & PlayTM playground surfacing, and PermaLife SportsFillTM which is used in the installation of natural and artificial turf athletic fields. In addition, they manufacture an equestrian riding surface called PermaLife ArenaFillTM. Shercom Industries manufactures tire derived aggregate (TDA) and landscaping products such as pavers and other landscaping products as well as transportation products such as speed bumps and wheel chocks, parking curbs and industrial mats. Shercom is a vertically integrated company, providing collection, processing, and manufacturing services.

Saskatchewan also has a Black Gold Rush Program which focuses on conducting a one-time collection of scrap tires in the rural communities. SSTC provides an incentive payment for volunteer organizations who wish to help with the cleanup efforts.

In addition SSTC has a Community Grant program that provides up to $5,000 in matching funds to communities for purchasing tire-derived products.

There is no manufacturing incentive in Saskatchewan.

Manitoba

On April 1, 2008 Tire Stewardship Manitoba, a non-profit organization was formed to manage the tire program for the tire industry stewards in Manitoba. Tire Stewardship Manitoba's Tire Program Plan was developed with input from industry, environmental groups, municipalities, government and other stakeholders and approved by the Minister of Conservation. TSM's goal is to offer a sustainable, effective and efficient scrap tire management program, and one that is more comprehensive (accepting a broader array of types of tires) than the previous program, which was implemented in 1992.

A volunteer Board governs TSM and is comprised of several directors representing the following Member organizations:

- The Rubber Association of Canada
- Retail Council of Canada
- Western Canada Tire Dealers

Collectively, these organizations represent the international tire manufacturers, major suppliers, and tire retailers in Manitoba. A multi-stakeholder advisory committee also contributes to good governance of TSM program operations. The committee is composed of representatives of recyclers, municipalities, industry consumers and the provincial government. As of May 1, 2011, the TSM Advisory Committee member organizations were:

- Manitoba Motor Dealers Association

- Association of Manitoba Municipalities
- Keystone Agricultural Producers
- Manitoba Trucking Association
- Canada West Equipment Dealers Association
- Reliable Tire Recycling
- Winkler Rubber Products Corporation
- OTR Recycling
- Manitoba Conservation

TSM is accountable to its stakeholders and the public for the collection, recycling and environmentally sound disposal of all tires designated under the regulation.[22]

The program is funded via Eco-Fees charged on the purchase of new tires which are remitted directly from retailers to TSM. The Eco-Fee is C$4.50 for passenger tires, C$9.00 for medium truck tires with rim diameters from 15" to 24.5,"and OTR tire Eco-Fees are C$60 or C$135 per tire depending upon the size. Manitoba's program also includes farm vehicle tires, which have fees of C$4.50, C$9.00, or C$30.00 each depending upon the size of the tire.

The program has an established vertically integrated processor (Reliable Tire Recycling) with the capacity and ability to collect and process Manitoba's volume of scrap tires. A second processor (OTR Processing) collects and processes off-the-road (OTR) tires. The two processors located in Manitoba are eligible to receive incentive payments for processing and transporting scrap tires. Incentives for passenger tires are C$160 per MT plus $101 per MT for collection incentives, regardless of location. The processor, however, must collect from the entire province (it is estimated that 90 percent of the province's passenger tires are generated in Winnipeg). The processor incentive for OTR tires is over C$200 per MT, and the collection incentive is C$101 per MT. Collection incentives are paid directly to the processor, and they manage the collection of the tires.

TSM's key achievement for 2010 was recycling 12,972 MT of material from discarded tires and tubes into tire derived aggregate, crumb rubber, blast mats and molded products or a fuel supplement replacing fossil fuel. This is down from 2009, when 14,373 MT were recovered, but reflects a diversion rate of 106 percent. The disposition of Manitoba's scrap tires was the following in 2010:[23]

- Molded products, 330 MT (3 percent)
- Crumb rubber, 48 MT (0 percent)

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[22] Source: Tire Stewardship Manitoba's Program Plan, 2012 – 2016, which is available at: http://www.gov.mb.ca/conservation/pollutionprevention/waste/pdf/tsm_program_plan_2012-2016_april_27_2011_final.pdf

[23] Source: Manitoba Tire Stewardship 2010 Annual Report, available at: http://www.tirestewardshipmb.ca/wp-content/uploads/TSM-2010annualreport_final_WEB1.pdf.

- Blast mats, 745 MT (6 percent)
- Sidewalls, 1,627 MT (12 percent)
- Aggregate, 9,699 MT (75 percent)
- Exported fuel, 522 MT (4 percent)

TSM partnered with the Rubber Association of Canada to conduct a summer 2010 Be Tire Smart campaign, a community relations educational program to raise awareness on how proper tire maintenance positively impacts tire life, vehicle safety and the environment. The campaign focuses on educating Manitobans on the benefits of proper tire inflation and maintenance. Other education and outreach efforts included developing and distributing point-of-sale information for retailers, developing and distributing an Eco Calendar, and the 2012-2016 Tire Stewardship Plan Consultation.

A Community Grant Program is available to provide up to six C$5,000 matching grants for community projects using tire-derived products from Manitoba tires. In 2010 four such grants were awarded.

In addition TSM assists with research and development efforts on an as needed basis. They provided some R&D assistance to their OTR processor to help them develop a snow plow blade made from OTR tires, for example.

In 2010 TSM conducted 20 compliance audits of selected retailers for improving retailer remittance procedures. No material discrepancies were found. One retailer received a refund for an error resulting in an over-payment of eco fees. TSM also audits each of their processors annually.

In 2010 TSM paid out C$2,091,372 in processing incentives and C$1,378,804 in collection incentives, for a total of C$3,470,176 in incentive payments[24], which equates to C$267.51 per MT or C$0.10 per capita. Administrative costs were C$506,189 for 2010.

A representative of Tire Stewardship Manitoba indicates that the program aims to reimburse actual costs associated with basic processing (e.g., processing to a two-inch chip), but not "high-level" processing, as the philosophy of their program is that more sophisticated processing should be done when there is sufficient demand that can support purchase of the material at market prices. In addition, the representative points out that using ties for tire-derived fuel, although not the "highest and best use" in terms of market pricing, may be a good market from the program's perspective as the tire is consumed, and any potential liability issues are averted.

Also, because there are only about one million tires per year collected, the province believes having just two processors (one specializing in OTR tires, one in passenger tires) who both do the collection makes sense, as any more collectors/processors would result in reduced economies of scale and increased overall program costs. The program is run with three full-time staff.

[24] Source: http://www.tirestewardshipmb.ca/wp-content/uploads/TSM-2010annualreport_final_WEB1.pdf.

Appendix F Results of a Tire Dealer Survey

SAIC conducted a limited survey of tire dealers to document the range of disposal fees currently charged to individual tire consumers, and to gather information on the actual fees dealers pay to haulers picking up stored waste tires.

First, a simple phone survey was made, without identifying the purpose of the call, tire dealers were asked what they would charge a purchaser of new tires for disposal of their old tires. A total of 146 responses were obtained, grouped according to six state regions and four types of tire dealers. It should be noted that the Big Box Retailer category involved surveying multiple locations of companies that have established regional or national policies on disposal charges. As presented, the survey results for this category treat each location as a separate data point. The Franchise/Large Company category also included some franchise locations that may have standardized pricing, although there was more variability in this category, even among franchises of a given company in some cases.

The average reported disposal costs from each region and type of dealer are presented in Table F-1. These values include the state tire fee of $1.75. Table F-2 presents the standard deviations and Table F-3 lists the number of respondents. The statewide average according to these statistics is $3.36, including the State tire fee. Not including the State tire fee, the statewide average disposal charge is $1.61. However, this is not necessarily a statistically representative result.

A more limited survey of tire dealers was also conducted to gather information on the actual disposal fee these dealers pay to tire haulers or processors who pick up their waste tires. Based on 41 responses, the statewide average disposal charge for passenger tires was $1.08. The difference between the statewide average disposal fee charged to customers and the average actual fee paid to haulers was $0.53, but again this is not a statistically representative result.

Table F-1
Average Disposal Fees Charged by Tire Dealers to Individual Consumers of Passenger Tires (Includes $1.75 State Tire Fee)

Region	Auto Dealer	Big Box Retailer	Franchise/Large Company Named Store Tire Dealer	Independent Tire Dealer	Overall Average
Bay Area	$3.56	$2.88	$3.75	$4.25	$3.62
Central Valley	$3.79	$2.53	$3.52	$3.78	$3.41
LA County/Ventura/Santa Barbara	$3.35	$2.38	$2.75	$3.75	$3.09
Remote Northern Counties	$4.40	$2.90	$4.00	$4.75	$4.01
San Diego/Orange County	$3.28	$2.82	$3.40	$3.61	$3.31
Inland Empire/Dessert	$3.50	$2.15	$2.65	$2.70	$2.75
Total	$3.63	$2.61	$3.36	$3.77	$3.36

Table F-2
Standard Deviations of Average Disposal Fees Charged by Tire Dealers to Individual Consumers of Passenger Tires

Region	Auto Dealer	Big Box Retailer	Franchise/Large Company Named Store Tire Dealer	Independent Tire Dealer	Overall
Bay Area	1.68	0.25	1.43	0.41	1.15
Central Valley	1.78	0.80	1.10	0.18	1.16
LA County/Ventura/Santa Barbara	1.69	0.75	0.77	0.59	1.11
Remote Northern Counties	0.78	0.65	1.66	0.47	1.13
San Diego/Orange County	0.97	0.61	0.98	1.15	0.96
Inland Empire/Dessert	2.02	0.55	1.21	0.82	1.27
Total	1.46	0.66	1.16	0.87	1.16

Table F-3
Number of Survey Respondents to Simple Consumer Tire Disposal Fee Survey

Region	Auto Dealer	Big Box Retailer	Franchise/Large Company Named Store Tire Dealer	Independent Tire Dealer	Grand Total
Bay Area	4.00	4.00	5.00	4.00	17.00
Central Valley	8.00	9.00	10.00	10.00	37.00
LA County/Ventura/Santa Barbara	5.00	4.00	5.00	5.00	19.00
Remote Northern Counties	5.00	5.00	4.00	5.00	19.00
San Diego/Orange County	8.00	7.00	10.00	9.00	34.00
Inland Empire/Dessert	5.00	5.00	5.00	5.00	20.00
Total	35.00	34.00	39.00	38.00	146.00