

2012

DRAFT for Comments and
Discussion:

Border Waste Tire Integrated
Management Methodology
for the Development of a Model Integrated
Waste Tire Management Plan Framework for
the California-Baja California Border Region

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Version: 2/14/2012



*Technical Assistance for the Creation of a Methodology for the Development of a
Model Integrated Waste Tire Management Plan Framework for the State of Baja
California, Mexico.*

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1 INTRODUCTION

This report introduces a series of theoretical concepts, and the method of policy analysis, pertinent to establishing a framework for the development of a model integrated waste tire management plan for the California-Baja California Border Region.

The intent of this methodological report is to assist policy makers in expanding their understanding of the work that both California and Baja California, in the context of ongoing bi-national and regional efforts, are conducting to address the environmental and health issues that improper waste tire disposal poses to humans and ecosystems. Ultimately, a framework that supports identifying essential program components, areas for complementarity and cooperation, as well program coordination opportunities in regional waste management can help advance programmatic goals on both sides of the border.

This report first identifies, from a comparative perspective, a set of key policy design parameters from best practices in integrated waste tire management. Sample case studies used in this report to demonstrate the usefulness of the approach, include programs from North America and Europe. Ultimately, the approach aims to provide a series of basic guidelines for problem solving and policy design to improve program performance in waste tire management in general.

The method of policy analysis introduced here is based on more than four decades of experience developing a methodology to improve policy design and implementation at the University of California, Berkeley.¹ In essence, policy analysis is an interdisciplinary approach to problem solving in the public sector. It provides a structured approach to go about resolving a policy challenge, as well as to support the necessary iterative process of fine-tuning

¹ See for instance: Bardach, Eugene. *A Practical Guide for Policy Analysis. The Eightfold Path to More Effective Problem Solving*. CQ Press. Third Edition. (2009)

environmental management programs as we adapt to contextual realities during the implementation phase.

Environmental integrated management planning conveys the notion of combination and harmonization of modular aspects within a sectoral programmatic approach to best address the contents and functions in ecosystem management and its governance (i.e., international treaties, national laws, local regulations, etc.). This report introduces the notion of key policy design parameters as fundamental building blocks of an integrated waste tire management plan. The concept of key policy design parameters supports the process of identifying model features (or modules) in program design, features which are essential for the well functioning and performance of a plan (i.e., minimize the impact of waste tire dumping on human health and the environment and/or maximize the productive end use of waste tires). Conceptually, the policy maker can compartmentalize these design features into individual elements that can stand by themselves and developed incrementally if the overall program goals or full-fledge implementation are not feasible given contextual limitations at a particular point in time. Therefore, the framework provides some dynamic perspective on program development and implementation. Identification of these key policy design parameters is informed by lessons learned from implementation experiences from existing smart practices in waste tire management programs, as well as deep understanding of which elements, regardless of who governs them, can be harmonized and integrated into more expansive in scope towards a more regional approach in the future.

This report does not analyze the state of affairs of the environmental and economic impact of the flow of waste tires in the region nor does it present a comprehensive inventory of scrap tire pile sites or flows. Previous work conducted under contract for the California Integrated Waste Management Board by the Institute for Regional Studies of the Californias at San Diego State University on The Flow of Used Waste Tires in the California-Mexico Border Region in 2009, and by the United States Environment Protection Agency (US EPA) Border 2012: U.S. – Mexico Border Scrap Tire Report of 2007, already present an excellent diagnostic of the problems surrounding scrap tire flow in border region.

This report uses some of these past studies as reference, as part of the literature review conducted under this project, and where possible, updates information based on recent programmatic and/or policy developments and progress in addressing this issue. Primarily, it presents a theoretical framework to support progress achieved by the State of Baja California's effort to develop an integrated waste tire management plan, in particular to provide tools to advance its effectiveness. Through better understanding of the institutional developments and state of program implementation in Baja California on both sides of the border, the hope is to foster opportunities for further regional dialogue and cooperation among US, Californian, Mexican and Baja Californian government agencies and other stakeholders.

California has successfully addressed the challenge of diverting or safely managing 70-80% of the more than 41 million waste tires that are generated each year in the State. CalRecycle's Tire Program manages these tires through permitted waste tire facilities, registered waste tire haulers, and monitored waste tire manifest system. In addition, this program encourages the recycling of tires and provides market development support through grant and loan programs, and research and technical assistance.

The flow of California's used tires into Mexico through various legal and illegal means has long been of concern, as reflected in various bills and programs addressing border issues. Some of these tires end up being illegally disposed of along the 167 mile California/Mexico border region of the State of Baja California, Mexico. The improper disposal of tires in this region poses a serious risk of tire fires, creates breeding grounds for disease-carrying vectors, and results in air, water, and land pollution on both sides of the border. These serious, shared risks to health, safety and the environment gave rise to CalRecycle adding into its Five-Year Plan a contract to provide technical assistance to the State of Baja California to further the development and effectiveness of its own integrated waste tire management plan.¹

While CalRecycle lacks statutory authority to spend state resources in Mexico, the agency aims to foster a continued dialogue between California and the State of Baja California to improve

the understanding of the policy challenges that addressing the environmental and health issues that the flow of tires poses to this part of the U.S. – Mexico border. This exercise of technical assistance hopes to serve as an instrument to support information exchange between these neighboring states, as well as to identify areas of coordination and cooperation that could enhance regional waste tire management in general.

These activities occur under a long standing spirit of good neighbor cooperation, as demonstrated by letters of intent at all levels of government, as well as the cooperation of the businesses, trade associations, governmental and non-governmental groups interested in developing proper disposal, clean-up programs and the productive use of waste tires through market development support, as part of the life cycle of tires in the region.

To develop a model border used and waste tire management plan framework for Baja California, Mexico (Model Framework) that adequately addresses these risks, builds upon the existing institutional efforts and programs already operating in Baja California, and that incorporates the flexibility and adaptability necessary to respond to changing political, economic, social and environmental contexts in the border region, we are suggesting a modular policy design framework focusing on key policy design parameters.

Modularity of policy design allows for incremental movement towards overall policy program goals in discrete blocks adaptable to changing political, economic, social and environmental contexts. Breaking large policy programs into compartmentalized, self-contained components that can be functionally implemented independently of each other to achieve incremental progress towards the larger program creates an added layer of flexibility and adaptability to the varying contexts. Each component should have the capacity to stand by itself, but build synergistically with the other components when they are all implemented. This demands a dissection of international best practices for waste tire management into these key policy design blocks by asking “what can be implemented independently, but still contribute to the cohesive overall change desired?” With regards to working towards more regional approaches,

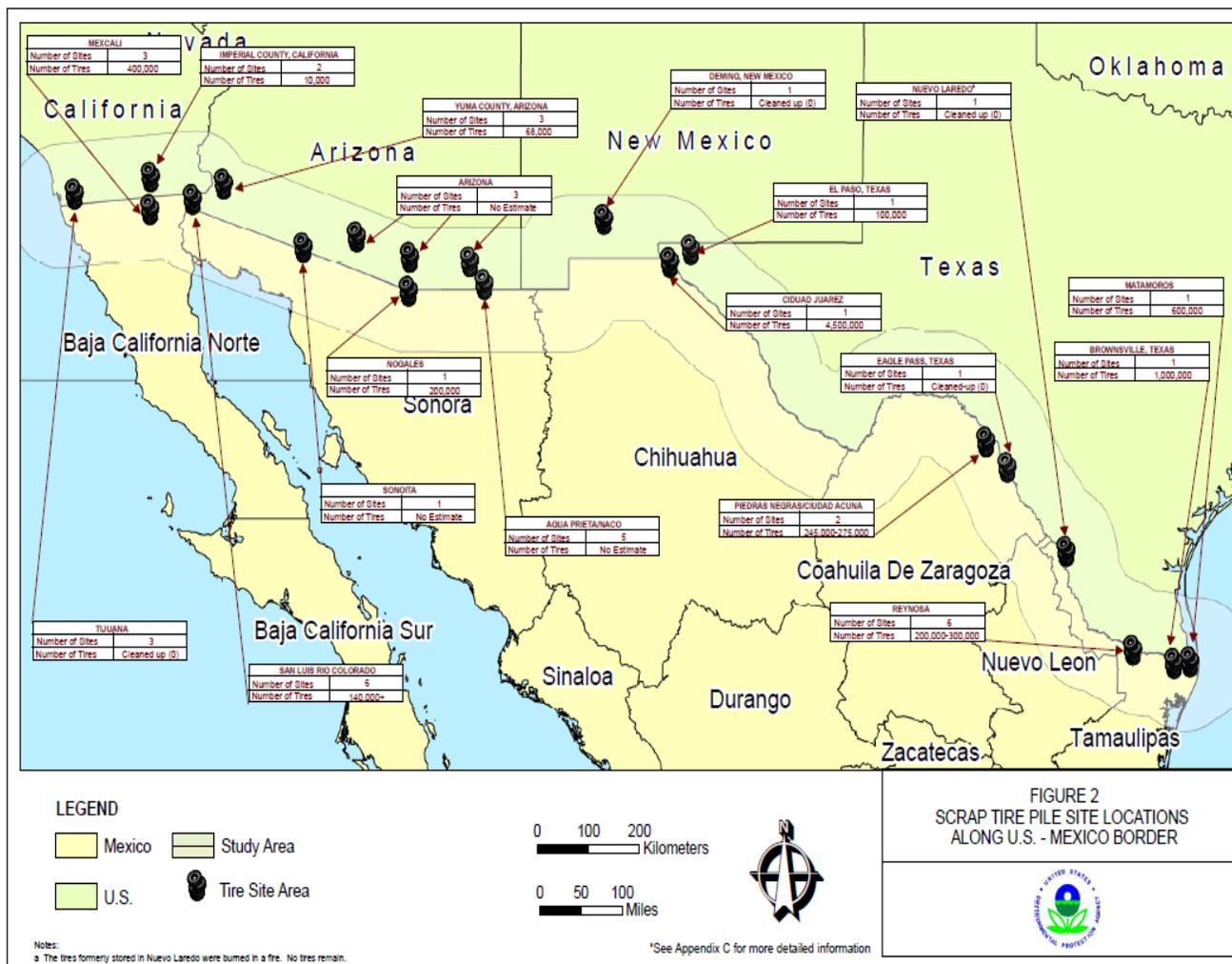
further review of coordinated and harmonized practices and features of independent programs should also be consider such as tracking, information collection, exchange and management systems, as well as enforcement practices.

2 POLICY CONTEXT AND BACKGROUND

California used and waste tires flow into Mexico through various legal and illegal means as part of the cross-border tire trade, contributing to the approximately 1.5 million waste tires in Baja-California needing disposal each year. For 2008, 637,500 of these tires arrived in Baja through legal imports, still below the official import quota (by 15%) set by the Federal Government of Mexico. The number of tires arriving illegally is unknown, but has been estimated as between 10% and 150% of the official flow.ⁱⁱ While customs agents dispute the higher of these two numbers, citing a lack of any sufficient large seizures of illegal tires at the border to warrant them, the numbers of tires potentially moving across the border in much smaller quantities could be quite large. With new tire sales in Baja averaging around 500,000/year, and an additional 80,000 tires being imported on associated used and scrap cars, there is a roughly 700,000 tire gap in official numbers that has been hard to track. Regardless of source, many of these tires end up being illegally disposed of along the 167 mile California/Mexico border region. While over 30% are diverted to CEMEX cement kilns as a source of fuel and another 30% used in formal and informal civil engineering projects, the remainder are either landfilled, or dumped illegally, many along the U.S. Mexico border. Additionally, while five of six large waste tire piles in Baja-California have been cleaned up through the Border 2012 collaboration, there remain numerous smaller piles that represent significant additional environmental and health burdens.

The improper disposal of tires in this region poses a serious risk to public health, safety, and the environment, on both sides of the border. These scrap tires pose an environmental and health risk for several reasons. If disposed of in informal waste piles or improperly managed dump sites, they can be breeding grounds for vectors carrying a range of diseases, including Malaria, dengue fever, encephalitis, West Nile virus, and Yellow Fever (EPA 2010). These tires can also leach chemicals into soil and water tables, and generate sufficient gases at high enough

concentrations of tires to create an air pollutant risk and fire hazard. As these tires, and the environmental risks associated with them, can traverse the political boundary between California and Baja-California, this becomes a regional problem. The map below show EPA’s research on tire piles inventory and location.



SOURCE: EPA (2007)

3 INSTITUTIONAL BUILDING BLOCKS: TOWARDS INTEGRATED WASTE TIRE MANAGEMENT PROGRAMS IN BAJA CALIFORNIA

This section will first introduce the institutional and legal framework that gives basis to the development of an integrated waste management plan in the State of Baja California. Secondly, it will present some programmatic activities developed at the municipal level within the state. Then, it will describe the key elements and aims of ongoing negotiation towards a multi-stakeholder agreement to advance the development of key aspects of the State's waste tire management plan. Finally, it will present a progress report in the development of some essential components towards an integrated plan.

3.1 JURISDICTIONAL CONTEXT

3.1.1 FEDERAL GOVERNMENT

The Federal Agency of Environment and Natural Resources in Mexico is the Secretariat of the Environment and Natural Resources (SEMARNAT). The SEMARNAT coordinates and evaluates policies and guidelines for environmental protection and sustainable usage of natural resources at the national level. The SEMARNAT has explicit jurisdiction over all *hazardous* materials.

The Secretariat of the Economy also has a role in waste management. It is the federal agency responsible for authorizing and distributing the yearly used tire importation quotas. These quotas are negotiated yearly by the Secretariat, federal and state government authorities, and tire dealer associations.

3.1.2 STATE GOVERNMENT

The Baja California Secretariat of Environmental Protection (SPABC) is the agency responsible for applying state-level policy for environmental protection, including waste management policies and provisions. The SPABC has legal jurisdiction over non-hazardous waste, and over special management waste. No institutional framework exists within the Baja California Secretariat (SPBC) policies specifically regarding waste tire management. No auditing or

enforcement programs are currently directed to the management of waste tires. State Governments and Municipal Administrations generally share responsibility in handling urban solid waste and special management waste.

3.1.3 MUNICIPAL GOVERNMENT

Municipalities may *assist* the state and federal governments in efforts to promote large scale environmental protection. Since 1983, Municipalities can raise revenue through property taxes, user fees, and other local services. However, most municipal funds are obtained from the state and federal governments instead of from their own collection efforts.

A municipality in Mexico is roughly equivalent to the counties of the United States. Mexican states are divided into municipalities. Each municipality is administratively autonomous. Citizens elect a "municipal president" *presidente municipal*, who heads an *ayuntamiento* or municipal council, responsible for providing all the public services for their constituents.

Baja California is divided into only five municipalities, Ensenada, Mexicali, Tecate, Tijuana, and Playas de Rosarito. The municipalities in Baja California cover large areas incorporating several separated cities or towns that do not necessarily conform to one single urban area. Each municipality is responsible for public services such as water and sewage, street lighting, public safety, traffic, cleaning services and maintenance.

3.1.4 INTERNATIONAL COOPERATION MECHANISMS

Given that the state of Baja California shares a border with the United States, it is possible to use international entities as a resource to help implement Baja California's Waste Tire Management Program along the border region. At the federal level there has been high level of cooperation and funding to address border environmental problems derived from La Paz Agreement.ⁱⁱⁱ This event led to the legal basis for the creation of U.S.-Mexico Environmental Program which is collaboration between the United States and Mexico "to improve the environment and to protect the health of the nearly 12 million people living along the border."^{iv} The Integrated Border Environmental Plan for the US-Mexico Border Area (1992-1994), the creation of the Border Environmental Commission (BECC) and the North American

Development Bank both in 1994, and the series of border plans (i.e., Border XXI, Border 2012 Program and its new phase currently in draft format Border 2020) demonstrate the good neighbor intentions of a bi-national effort that seeks to clean the air, provide clean drinking water, and reduce hazardous waste along the U.S.-Mexico border. Because Baja California shares a border with the United States, some of these institutions can function as bi-national mechanisms to facilitate Baja California's Waste Tire Management efforts along the U.S.-Mexico border area specifically.

Several supplementary actions have been taken in the last decade, derived from the memorandum to address the waste tire issue signed by the US EPA and Mexico's Ministry of the Environment and Natural Resources (SEMARNAT) in 2004 which focused on major illegal and dangerous sites, the followed by the US-Mexico Border Scrap Tire Integrated Management Initiative Border 2012 (aka *Tire Initiative*), and the 2008 10 Border States Letter of Understanding in support of this initiative underscore the level of importance of the issue to the region. In 2006 a US-Mexico Border Tire Group was created. In Border 2012, the waste tire issue was obviously a priority.

Progress has been achieved. As reported by SEMARNAT at the 2011 US- Mexico Border Scrap Tire Meeting in San Diego, California under the La Paz Agreement and the Border 2012 program both the INNOR and El Centinela scrap tire sites in Baja California, which combined contained over 1,250,000 tires were cleaned up. Tires were shredded and used as fuel in various cement kilns in México. To date, over 6.8 million tires overall have been recovered in the border region. SEMARNAT also is working to prevent the creation of more scrap tire yards by working closely with local governments to meet local needs, develop better management practices, promote the cleanup of small yards, promote greater cooperation and coordination between local, state, and federal authorities, and promote greater participation from private industry. SEMARNAT is working on joint US-Mexico efforts to establish policies for scrap tire management in the border region, which address better cross-border coordination among state and local governments, integrated regulatory and management frameworks, and capacity-building efforts. SEMARNAT

hopes to have in place a national management plan in place soon which can be shared and coordinated with local and state authorities and other stakeholders.^v

However, new management and collaborative approaches are needed. As BECC has proposed a model where public-private partnerships to advance waste tire management strategies with in border plans forward. The BECC model would allow for the participation of all private and local stakeholders as well as local, state, and federal government agencies. The end result would be a sustainable plan that can alleviate the scrap tire problem in the border region. However, BECC also points to the need for further studies on the development of scrap tire processing technologies and their adaptation to local needs, better outreach to citizen groups, defining a regulatory framework for the integrated management plan, and developing a market for scrap tire materials.^{vi}

The Border 2020 Program (in development) outlines as part of its materials management and clean site goals the intention to further develop scrap tire pile prevention and enhance recycling capacity, as well as to support the institutional capacity to clean up contaminated sites.^{vii} However, because the most pressing and dangerous cases of legacy tire pile sites have been mostly resolved; shifting priorities seem to indicate that there is a new emphasis in this area focusing now on hazardous waste management, in particular electronic waste (i.e., e-waste).

At the regional level a non-binding collaboration agreement stating the intent of cooperating on the issue of waste tire management was signed between California's Environmental Protection Agency and the Secretariat of Environmental Protection of the State of Baja California on March 25, 2010 outlining areas of possible cooperation. Finally, with this report, CalRecycle is contributing with technical support to the effort of exploring pertinent frameworks for policy design and program development to effectively address this regional waste management issue.

3.2 LEGAL CONTEXT

3.2.1 THE POLITICAL CONSTITUTION OF THE UNITED MEXICAN STATES

The Federal Constitution of 1917 addresses waste management in Article 115.^{viii} This article only recognizes municipalities as public service providers. According to Article 115 “municipalities are responsible for the cleaning, collection, transfer, treatment, and final disposal of waste.”^{ix} The Article does not refer specifically to the reach of its associated environmental and health protection functions or objectives.^x This Constitutional provision translates an obligation for the municipal governments to provide municipal waste collection and disposal for their citizens, but not for commercial and industrial activities.^{xi} Additionally, this provision does not explicitly limit the capacity of municipal regulation over urban waste generators.^{xii}

3.2.2 FEDERAL LAW

The federal law that governs waste management in Mexico is the General Law for the Prevention and Integrated Waste Management of 2003 (*Ley General para la Prevención y Gestión Integral de los Residuos (LGPIGR)*).^{xiii} The LGPIGR makes the federal government responsible for hazardous waste.^{xiv} The LGPIGR also emphasizes the need for federal authorities to collaborate with municipal governments and other government agencies to create the necessary infrastructure for the integrated management of waste.^{xv} The LGPIGR instructs state and municipal governments to develop programs for the prevention and integrated management of waste streams, and for the remediation of contaminated sites.^{xvi} Under the LGPIGR, state and municipal governments are tasked with drafting and implementing programs for the prevention and integrated management of solid urban waste and for waste that requires special handling.^{xvii}

The LGPIGR gives municipal governments jurisdiction over *solid urban waste*, and for the collection, treatment, transport, and final disposal of such waste. The federal law instructs municipalities to coordinate with the state government and with interested social sectors to develop Municipal Programs for the Prevention and Integrated Management of Solid Urban

Waste, which must comply with the provisions contained in the state program for the prevention and integrated management of the corresponding waste stream.^{xviii}

The LGPGIR imposes a legal duty for municipalities to: (1) issue the necessary regulations and other legal and administrative provisions to comply with the LGPIR;^{xix} (2) control solid urban waste;^{xx} (3) provide on their own, or through service providers, integrated management for solid urban waste, in compliance with the LGPIR, and other state legislation;^{xxi} (4) grant permits for integrated management of solid urban waste;^{xxii} (5) establish and keep an up-to-date registry for large generators of solid urban waste;^{xxiii} (6) verify compliance with this law, along with other laws and ordinances that address solid urban waste;^{xxiv} (7) impose sanctions and all applicable security measures to enforce the LGPIR;^{xxv} (8) collaborate in efforts to control hazardous waste generated by micro-generators, and impose the appropriate sanctions in accordance with this law;^{xxvi} (9) prevent pollution and promote the remediation of areas that contain hazardous materials, and hazardous waste;^{xxvii} (10) collect payment of integrated solid waste management services and programs;^{xxviii} (11) use the revenue generated to strengthen and further promote similar waste management programs;^{xxix} (12) and enforce all other applicable laws and regulations on integrated waste management.^{xxx}

The federal LGPIR does not specify whether or not waste tires are to be considered a solid urban waste or a special management waste. It is clear that if waste tires can be classified as solid urban waste, then they fall under the jurisdiction of municipal governments. If however, waste tires are classified as a special management waste, then they *may* be regulated by the municipal government, but under the supervision of the state government entities because special management waste falls under the state government's jurisdiction.

The federal law does specify that solid urban waste that is generated from a source that produces more than ten tons per year must be considered a special management waste. Such large sources do fall directly under the state's jurisdiction for regulation. Therefore all large generators of waste *tires* should be classified as generators of special management waste. Doing so obligates all large generators(including large generators of waste tires) to follow the

special management waste laws, which are managed by the state government. It may be feasible to construe the federal LGPIR so broadly so as to classify municipalities themselves as a “a major generator of waste.” As such, each municipality would be required to classify the totality of its waste (which would surely exceed the 10 ton minimum and include scrap tires) to be classified as a special management waste and to be incorporated into the integrated waste management plans which fall under the state government’s jurisdiction. Doing so would permit a uniform approach to waste tire management across the state of Baja California. This would be an ideal approach if conditions in each municipality so closely resemble one another that a waste tire management plan that is crafted by the state and applied to each municipality would sufficiently address local conditions. This broad interpretation, required for the application of a state-regulated uniform approach to waste tire management, however would not be desirable if each municipality differs significantly, and requires specially crafted local regulations to achieve local waste tire management.

3.2.3 STATE LAW

Baja California has a state law in place that addresses waste management, the Law for the Prevention and Integrated Waste Management of 2007 (*Ley De Prevencion Y Gestion Integral de Residuos Para El Estado De Baja California, LPGBC*).^{xxxii} This state law promotes the recycling of reusable waste, and provides certain state-wide measures to regulate *special management waste*.^{xxxii}

The LPGBC requires the municipal governments, to act under the state government’s supervision to create and authorize the operation of transfer centers for tire recycling and waste tire disposal.^{xxxiii} The LPGBC also requires all persons who engage in waste tire commerce or in retreading waste tires to dispose of such waste tires only in authorized transfer stations or in authorized recycling centers.

The LPBC specifies certain regulations that the municipal authorities must oversee. The LPGBC makes municipal governments solely responsible for *solid urban waste*. The LPGBC specifies that municipal government must promote the establishment of programs to advance

integrated waste management, and to *minimize* the waste produced by large municipal generators of waste.^{xxxiv} Additionally, the LPGBC makes municipal authorities responsible for coordinating with the state secretary to develop alternative markets for recycled solid urban waste.^{xxxv} Municipal governments are also required to determine the different operational costs and to establish a system for collecting fees and to charge for waste management services.^{xxxvi} Municipal authorities must also organize and implement administrative schemes to collect payment for the treatment, transport, and final disposal of solid urban waste.^{xxxvii} Additionally, municipal authorities must register, and authorize activities related to the operation of solid waste sites.^{xxxviii} Municipal governments are also given the authority to inspect, enforce, and sanction persons who violate the waste management laws of the LGPBC.^{xxxix}

The LGPBC also establishes special regulations for generators of solid urban waste.^{xi} These regulations apply to micro generators of waste tires, because upon becoming a large generator of waste (approximately 10 tons per year per generator), then the facility is classified as a generator of special management waste, which is regulated by the state government. Article 10 of the LGPBC specifies that generators of solid urban waste and of special management waste are liable for the *entire* life cycle of the waste they generate.^{xii} This regulation applies to both micro generators of waste (solid urban waste) and to large generators of waste (special management waste). Therefore, generators of solid urban waste are liable for the management, collection, acquisition, transport, recycling, treatment, and final disposal of such waste, or until such waste reaches the pre-approved final disposal or final treatment facility.^{xlii}

Additionally, all generators of solid urban waste, or special management waste must participate in programs to prevent and reduce the generation of solid waste.^{xliii} Such generators must also pay for the requisite cleaning service to treat solid urban waste, or for the management of such waste.^{xliv} Generators must also pay for taxes and charges that ensue from the violation of the state law, and other applicable ordinances.^{xlv}

The LGPBC also outlines specific regulations for large generators of *special management waste*.^{xlvi} All large generators of special management waste are required to obtain *state*

authorization by properly registering their facility.^{xlvii} Additionally such large generators are required to maintain an annual record of the volume and type of waste generated, and on how the waste was managed.^{xlviii} This annual record must be preserved for two years so that it may be supplied to the state Secretary, when he/she requests it.^{xlix} Large generators are also responsible for the storage, transport, recycling, treatment, and final disposal of the waste that is generated in large volumes, including special management waste.^l Large generators must alternatively deliver such waste to authorized waste treatment facilities.^{li} They must comply with safety regulations and identify, label and classify the waste.^{lii} Furthermore, large generators of special management waste must notify authorities in case of emergency, an accident, or the loss of a waste that the generator has generated.^{liii} Additionally, large generators must place proper security measures to prevent environmental impacts, and ecological emergencies.^{liv}

3.3 INSTITUTIONAL FOUNDATIONS TOWARDS AN INTEGRATED WASTE MANAGEMENT PLAN

The federal LGPIGR provides a guide to formulate Baja California's Waste Tire Management Plan.^{lv} The federal LGPIGR indicates that the state and municipal governments, should draft and implement *local* programs for the prevention and integrated management of solid urban waste and for waste that requires special handling (this should apply to micro generators of waste tires), by use of the Basic Diagnosis for Integrated Waste Management.^{lvi} These programs should seek to manage waste streams, assess the infrastructure available to satisfy the demand for services, specify local objectives and goals to prevent waste generation, improve the management of solid urban waste, and include strategies and timelines for the accomplishment of these goals.^{lvii} These programs should also propose ways to finance these programs, create the mechanisms to promote collaboration between various municipal programs, and outline the technical assistance that the Ministry can supply in the pursuit of such programs.^{lviii}

The LGPBC established a set of general prohibitions that can be applied to Baja California's Waste Tire Management Plan.^{lix} Under the LGPBC, it is prohibited to discharge solid urban

waste, or special management waste in unauthorized locations.^{lx} It is also prohibited to extract solid urban waste, or special management waste from final disposal sites, or to reclassify such waste, or to scavenge for work inside and outside of final waste disposal sites.^{lxi} Additionally, persons are prohibited from creating unauthorized waste disposal facilities.^{lxii} It is also prohibited to dispose of solid urban waste into a water body, or into any other unauthorized site.^{lxiii} It is prohibited to contaminate the ground.^{lxiv} Furthermore, it is illegal to burn any type of waste in the open air.^{lxv} Lastly, the LGPBC makes it illegal to deposit, infiltrate, or manage waste that might potentially accumulate in the ground and become hazardous to the natural environment.^{lxvi}

Additionally, there is already a strong foundation in place for sanctioning potential violators of Baja California's Waste Tire Management Plan.^{lxvii} The state of Baja California has codified these sanctions in the LGPBC.^{lxviii} These sanctions may be administered by the municipal or state authorities.^{lxix} The LGPBC specifies that waste generators, possessors, or service providers who deliver waste to unauthorized entities will share liability for doing so.^{lxx} Also, when there are various responsible parties and it is impossible to determine the extent of each person's participation in distributing waste, all participating parties will assume an equal share in the total liability.^{lxxi}

The LGPBC provides for both administrative and criminal sanctions for potential violators of waste management laws.^{lxxii} These sanctions could also apply to violators of Baja California's Waste Tire Management Plan. Administrative sanctions in the LGPBC include formal warnings^{lxxiii}; fines equivalent to 200 and up to 20,000 days of minimum wage payment in the state of Baja California^{lxxiv}. Criminal sanctions include imprisonment for up to 36 hours when the person opposes or obstructs enforcement of the LGPBC.^{lxxv} Furthermore, the LGPBC prohibits the creation of unauthorized waste disposal facilities, the mixing of solid urban waste/special management waste into water bodies, and the mixing of such waste with other hazardous substances.^{lxxvi}

The LGPBC also calls for a closure of a facility (either temporarily or permanently) when the offender has not complied with the terms and conditions, or corrective measures imposed by this law; in the case of repeated offenses that result in negative effects to the environment; or when the offender violates the law in three or more occasions.^{lxxvii} The LGPBC also codifies liability for damages.^{lxxviii} Specifically, all generators of solid urban waste and special management waste, and all operators of such waste facilities, will be held liable for civil and penal offenses *and* for the harm they cause to the natural environment.^{lxxix}

3.4 PROGRAMMATIC ACTIVITIES AT THE MUNICIPAL LEVEL

The Municipal government entities in Baja California have initiated local community cleaning programs to safely dispose of waste. These programs exist, in one form or another in each of the five municipalities of Baja California (Ensenada, Mexicali, Tecate, Tijuana, Playas de Rosarito). The existing programs are not continuous waste management programs targeting waste tires. Instead these are periodic cleaning events that take place occasionally and are administered at the community level.

3.4.1 ENSENADA

The municipality of Ensenada manages waste tires by using said tires as an ingredient to manufacture cement at a large cement kiln, located in Ensenada.^{lxxx} The cement kiln utilizes waste tires (in their entirety) as a combustible agent. The waste tires help to raise the heat of the ingredients to reach the necessary level to manufacture cement. The method by which waste tires are transported to the local cement kiln is well coordinated. Local tire dealers must apply for a permit, before they can import tires into Mexico. Upon issuing a permit, the state government authority that oversees permitting requires that a certain percentage of the tires imported, be properly disposed of, in a pre-approved facility. The only pre-approved facilities in which used tires can be properly discarded include the local cement kiln, and the municipal tire distribution centers (*centros de acopio*). The state Secretariat for Environmental Protection (*Secretaría de Protección al Ambiente*) keeps an up to date record on the total amount of imported tires, by each tire dealer, and the amount of tires that were properly discarded in a

pre-approved facility, by each of these tire dealers. The regulatory structure that exists for the importation of tires, which is closely monitored by a state-mandated quota system provides a strong foundation for properly discarding waste tires. Initially, when waste tires were first used as a combustible for the manufacture of cement, the cement kiln in Ensenada would receive waste tires from all parts of the state. Now, the municipality of Ensenada uses waste tires that are found locally, in Ensenada. The existence of a large cement kiln in Ensenada, which can use waste tires as a raw material in the manufacture of a saleable good, relieves this municipality from the heavy burden that other municipalities experience from the plentiful waste tires that exist. Therefore, waste tires are not as big of a problem in Ensenada, as it is in other regions of the state. Furthermore, Ensenada has several local programs to reduce trash in the municipality, which, although do not target waste tires directly, do have a net positive effect in relieving the municipality from the hazards caused by copious amounts of waste tires.

In Ensenada, as in other municipalities, there is a general problem with the accumulation of solid waste. The Municipal Directorship for Public Services runs a program which takes place in a different neighborhood every other Sunday of the month. The program involves launching an informational campaign in the targeted neighborhood to inform citizens that large municipal dump trucks will come by to collect all large waste items (including large household appliances like refrigerators, stoves, couches, etc.). These large waste items often end up on neighborhood yards, lawns, parks, streets etc. This program also collects waste tires that are improperly disposed of and eventually accumulate as solid waste in local neighborhoods. The waste tires that are collected are taken to two pre-approved waste tire disposal centers—the local cement kiln, or to the municipal tire distribution centers. Another program that indirectly helps to relieve the waste tire problem is jointly coordinated by the Municipal Directorship of Ecology, Transit, and Public Services. The separate Directorships travel to distinct neighborhoods and set up information booths to answer citizen questions/complaints, and also to inform them about proper waste tire disposal facilities, and about the dates for the Clean program so that households can be prepared to discard all waste materials during such cleanup events (including waste tires).

3.4.2 MEXICALI

While there is not a permanent program to address waste tires in Mexicali, there is a new State disposal site down in the Mexicali Valley. This disposal is receiving waste tires from several events in various neighborhoods where local delegations ask that residents help to take waste tires to a temporary collection center, where later the tire companies or the municipal authorities transport the collected tires to final disposal site.^{lxxxii} According to authorities, between 2,000 to 8,000 have already been accumulated from several of the local dumps in the city, and transported to authorized final disposal sites which at this moment handle around 750,000 at the side. These cleanup events are not programmed on a periodic basis, instead these events take place sporadically, and they are either planned by volunteer organizations, tire dealers, or by local businesses. The local businesses often organize cleaning efforts, with their own funds, so as to reduce the accumulated waste in the city. These cleanup efforts also relieve the waste tire problem, because waste tires are taken to either final disposal sites or to local recycling facilities during these events. The reasons behind such privately funded cleanup efforts is that the local businesses, with the desire to attract customers, have a real vested interest in the appearance and cleanliness of the municipality. From the State Disposal certain quantity is going to the Ensenada cement kiln the rest are looking to be handle by recycles Companies which are also support by the State Economic Department in order to grow up and use the waste.

3.4.3 TECATE

The municipality of Tecate employs a three-prong approach to address the waste tire problem.^{lxxxiii} The first prong involves the Municipal Resources Department which manages a waste collection program in different neighborhoods. Through this program, which takes place approximately once a month, the Municipal Resources Department travels to distinct neighborhoods and transports waste tires to transfer centers for tire recycling and waste tire disposal. The second prong involves municipal support to local non-governmental organizations in their efforts to clean the municipality. These programs arrange periodic visits to distinct neighborhoods to collect waste including solid waste that accumulates in

unauthorized locations. The Municipal Ecology Department, under the Directorship for Urban Administration, collects waste tires that are found in the midst of the solid waste. The collected waste tires are then sent one of three locations: (1) the temporary waste tire landfill which is adjacent to the authorized location for solid waste disposal (in the neighborhood known as Guajardo); (2) the temporary waste tire storage facility (*Taller del Ayuntamiento*); or (3) a local authorized landfill where solid urban waste is generally disposed of. The third prong involves municipal coordination with the State Agency for Environmental Protection to dispose of tires in the Municipality of Mexicali. The Municipality of Tecate coordinates with the State Secretariat for Environmental Protection and solicit authorization to dispose of waste tires at temporary waste tire transfer stations in Mexicali. This state program allows the municipality of Tecate to dispose of 10,000 of its waste tires at no cost to the municipality. The waste tires are transported to the authorized location with the help of volunteer transporters who load the tires in Tecate and transport them to Mexicali. Tire dealers have also expressed an interest in collaborating in these efforts but have not done so.

Today there are approximately 70,000 or more tires in Tecate. The Municipality of Tecate has been allowed to dispose of 10,000 or more of these in Mexicali, at no cost to Tecate. Currently there is a lack of funding to adequately dispose of the remaining 60,000 waste tires. The cement kiln in Ensenada is a waste tire outlet which is now too costly for Tecate to use. Previously, Ensenada would accept waste tires from all parts the state to be used as a combustible material in the production of cement. Now, Ensenada charges 6 *pesos* for tires coming from outside Ensenada to be disposed of at the local cement kiln. The Municipality of Tecate lacks the monetary resources to send the remaining 60,000 tires to be disposed of in the Ensenada cement kiln.

One temporary method for alleviating the waste tire problem in Tecate is made possible through federal funding. The federal government provides yearly funding for a temporary employment program for the Municipality of Tecate. The amount of this fund varies on a yearly basis. The Municipality of Tecate uses these federal funds to employ citizens to provide cleaning services for the municipality. These citizens help to identify unauthorized locations for

waste tire disposal, and to properly dispose of the waste tires encountered during the cleaning process.

3.4.4 TIJUANA

According to the Municipal Environmental Protection, waste tires are governed by the exclusive jurisdiction of the state government entities.^{lxxxiii} This is so because according to the municipality of Tijuana's interpretation of the law, waste tires are categorized as a special management waste. Currently, Tijuana does not have a program in place that specifically targets waste tires. What the municipality of Tijuana has achieved, is to arrange meetings, mediated by the Municipal Directorship for Environmental Protection, to persuade the local tire dealers and business owners to establish best practices for disposing of waste tires. The reason why Tijuana is not closely involved with waste tire management at the municipal level is because there are 9 separate delegations (*delegaciones*). This means there are 9 large, urban, and widely dispersed zones within the municipality of Tijuana. The sheer size of Tijuana, and the dispersed delegations make it much more difficult for Tijuana to address waste tire management at the municipal level than it is for municipalities like Ensenada, which is also large, but whose urban zones are concentrated into 2-3 delegations. Because of the size of Tijuana, cleanup efforts that help to reduce waste tires are conducted by local organizations under the leadership of the distinct delegations. These cleanup efforts have the support of the Directorship for Ecology, and Social Development, but are lead by the Municipal Director for Public Services through the distinct delegations.

The municipality of Tijuana does recognize the harms caused by waste tires, and would like to have a greater ability to address the problem, but given that the Municipal Environmental Protection Directorship only has 300,000 *pesos* (approximately \$26,000 US dollars) to operate annually, and only two full-time employees, it is incapable of implementing a waste tire management program. Instead the Municipal Environmental Protection Directorship enforces regulations that are codified by state law, and covered by state funds. It functions as a source of direction, without being fully operative as an enforcement agency. Despite the lack of resources to enforce, the directorship does promote general environmental stewardship, and

supports the efforts of the Municipal Directorship for Public Services (*Dirección de Servicios Públicos*), which is in charge of providing cleaning services to the municipality. In doing so, the Directorship inadvertently alleviates the waste tire problem by taking said tires to pre-approved final disposal facilities or to recycling facilities.

3.4.5 PLAYAS DE ROSARITO

Playas de Rosarito has an incentive-based waste tire cleanup program.^{lxxxiv} The community participates in this program by taking waste tires to pre- approved facilities. Citizens are paid two *pesos* (20 cents) for each tire they deliver. This cleanup program is headed by the municipal Secretariat for Urban Administration. The program takes place periodically for a few months during the year. The collected tires are shredded and either stored at local landfills for future disposal or immediately disposed of at the local landfill. As in Tecate, some waste tires in Playas of Rosarito are permitted to be discarded at temporary waste tire transfer station in Mexicali. This outlet however is not sufficient to cope with the entire amount of waste tires located in Playas de Rosarito.

3.5 RECENT INSTITUTIONAL AND PROGRAMMATIC DEVELOPMENTS

In October of 2010, reforms to the law for the prevention and integrated management of waste for the state of Baja California (LPGIRBC) were published. They stipulated the obligations of stakeholders that work in vulcanization, retreading and sale of new and used tires by the year 2010. The Baja secretariat of environmental protection in coordination with secretariat of economy, SEMARNAT and chamber of commerce of the state determines the quantity of used tires to be allotted to 120 registered importers with the commitment that each importer will dispose in authorized “centers de acopio” an amount of tires equal to or greater than those imports. This management plan includes a manifest system for haulers of so-called “special wastes”, or wastes generated by individual generators in quantities above ten tones per year. In the current discussions for the integrated waste tire management plan, a manifest system is being suggested for waste tires specifically.

Additionally, the previously voluntary fee assessed on tire importers is now mandatory, and is included in the State's Revenue Law as a fee, being directed towards the operation of the Mexicali temporary storage facility, which is now in operation, as well as a portion going to the State's general fund. An additional temporary storage facility has been developed in Tijuana (not state run), and is registered and obliged to present proof of proper disposal of all waste tires delivered as part of the new State registry for waste tire storage facilities and regulatory requirement for the appropriate disposal of waste tires in authorized and state-run temporary storage facilities. These steps are expected to minimize the environmental and health impacts in State of Baja California and the border.

3.6 ONGOING MULTI-STAKEHOLDER NEGOTIATIONS

In late 2011, early 2012, Baja California has developed a draft integrated waste tire management plan, following up on the action point they set in their broader 2009-2013 Integrated Waste Management Plan.

Based on general principles of environmental and economic sustainability provided by the legal and institutional context described above (and in section 3), which makes citizens responsible to protect and conserve the environment, Baja California is negotiating among key stakeholder a more integrated approach for the management and disposal of waste tires. The draft *Coordination Agreement for the Development of Activities Related to the Integrated Sustainable Management and Final Disposal of Waste Tires in the State of Baja California* is expected to be signed by the following parties this year:

- The Mexican Federal Government
- Executive Power of the State of Baja California – Governor
- Secretariat of Government of the State
- Secretariat of Environmental Protection of the State
- State Legislature - President of the Environmental Commission
- Municipal governments:
 - Mexicali

- Tecate
- Tijuana
- Playas de Rosarito
- Ensenada
- Chambers of Commerce, Services and Tourism:
 - Mexicali
 - Tijuana
- Tire importers (representation pending)
- New Tire Businesses and Distributers

The plan points to the need to develop instruments to enable intergovernmental and interagency collaboration to restore and preserve environmental quality in the state. In particular it states that “it is important to foresee long term solutions regarding the problem of improper accumulation of waste tires through the implementation of concrete actions that can contribute to the solution of the problem of this type of waste in piles along the border region that invade the natural environment and represent a grave waste management problem”.

Key objectives of the agreement beyond clean up and restoration of the environment is to avoid:

- Tire burning that affects air quality, soil and water contamination.^{lxxxv}
- Health hazards
- New piles and improper disposal of waste tires

The signatory parties will agree to the following objectives of the program:

- Develop an information system about the waste tires generated in the State of Baja California
- Coordinate the activities and jurisdictional competences of the municipal, state and federal authorities in the area of prevention and integrated management of waste
- Involve all generator of this waste, from the consumer to importers, retail and bulk commerce of new and used tires, recyclers, junk yards, etc.
- Locate and identify tire dump sites that need to be restored (i.e., clean up actions) with the participation of importers and municipal and state authorities.

- Conduct permanent waste tire clean up operations and restoration of contaminated sites. In these cases disposal of tires will be free.
- Achieve proper management of the disposal of waste tires that guarantees the disposition, co-processing or reutilization according to standing norms of the State of Baja California.

The Federal Government will commit to the management of the imports quotas in response to the needs of the State only when the commitments stipulated in the agreement are met.

The State through the Secretariat of Environmental Protection commits to:

- Register and control the importation and final disposal of used tires in waste tire storage facilities (*Centros de Acopio*, in Spanish).
- Establish and/or authorize the operation of temporary waste tire disposal and recycling facilities in the metropolitan areas of the State's municipalities.
- Authorize in municipalities transference centers of waste tires that would allow temporary storage of this waste.
- Maintain rights fees, for the disposal of waste tires, that would allow to operate effectively the State storage facilities and to promote clean up action whenever necessary.

The environmental commission of the State Legislature commits to:

- Promote a culture of environmental responsibility of the public servants.
- Diminish the environmental impact generated of the administrative activities of its agencies and entities
- Promote and propose legislative and budgetary incentives to maintain and strengthen the co-responsibility of all stakeholders related to the business of tires in the State

The municipalities commit to:

- Conduct inspection and vigilance to verify compliance with the law that affects commercial activities and services related to the business of managing tires, and if necessary impose the corresponding sanctions.
- Locate sites polluted with waste tires and propose clean up and restoration operations.

The Chambers commit to:

- Promote among their members involved in the business of tires the actions derived from the agreement.

The Used Tires Importers commit to:

- Observe, with regards to waste tires, the legal requirements of the (LPGIRBC), its statutory regulations:
 - Register at the Secretariat of Environment Protection as generators of special management solid waste.
 - Dispose of the waste tires and pneumatics generated because of their activities in temporary storage, recycling or final disposition facilities authorized by the Secretariat of Environmental Protection.
 - Use the manifest system that the Secretariat of Environmental Protection will issue, in order to conduct the monitoring of the generation and management practices of the pneumatics and tires vulcanized, re-vulcanized, used and commercialized.
 - Cover the fees for the rights and/or other contributions established in the environmental and tax laws
 - Obtain an annual certificate of non dues owed when the integrated management of the totality of the tires and pneumatics established in the import permits granted by the federal authority (i.e., Ministry of Economy).
- New Tire Distributer and Businesses commit to:
 - Not yet established.

This final description of the current undergoing efforts within Baja California to address waste tire management showcase the goal of developing an inclusive collaborative approach to

problem solving. If politically this approach is achieved, it will serve as a valuable and effective mechanism towards integrated management. The last building block in this process is having the agreement of the tire industry and commercial aspects of this business to agree to a more holistic approach of the value chain of this product. The following section will introduce the policy analysis methodology and other theoretical concepts for the design of a model integrated waste tire management plan. The role of the non-governmental organizations, in particular environmental and conservation groups, is also valuable and merits to be highlighted as their work is a constant reminder to government and industry of the necessity to address the environmental, health and other risks and dangers that the waste tire problem presents to citizens and ecosystems in the State of Baja California, its communities and the shared border with California. But also as a resource to assist in some aspect of the solution such as monitors, providing alternative solutions and in many cases physical support in clean up efforts in the region.

4 THEORETICAL FRAMEWORK FOR A MODEL INTEGRATED WASTE TIRE PLAN

4.1 THE METHOD OF POLICY ANALYSIS

Policy analysis is the interdisciplinary approach to problem solving in the public sector. It provides a structured method to go about resolving a policy challenge, as well as to support the necessary iterative process of fine-tuning governmental programs as we adapt to contextual realities during the implementation phase, adjust for unexpected effects of a policy, in other words as we learn by doing. Problem solving requires first to have a clear idea of the nature of the problem in order to devise policy alternatives and assess the potential outcomes of these recommendations. In short, it is a common sense set of steps to discipline our thinking and analysis during the iterative process of addressing policy issues.

Given the complexity of environmental policy issues, a method that helps organize our thought process and economize in the analysis may prove useful for the design of ambitious integrated programs or plans. Policy making occurs in a political context so awareness of all the external factors and social interests that influence the design and decision making in the policy formulation process is important. Policy analysis allows the analyst to present the most educated guesses on what solution(s) can be applied to a particular problem given current level knowledge. The political process will then determine actual implementation. Good policy analysis will increase the chance of action and finding common ground among stakeholder on how to go about solving a problem affecting society.

This section will outline the concepts and methodology introduced by this report in order to assist in developing a model integrated waste tire management plan for the California – Baja region. It will not fully develop a solution or a plan; it will only present conceptual and practical illustrations of utilizing these theoretical frameworks by combining the policy analysis methodology with smart practices from current programs in California, Ontario, Canada and the European Union.

4.2 PROBLEM DEFINITION AND EVOLUTION IN POLICY DESIGN AND OBJECTIVES

A clear understanding of the problem may take time to develop and could require substantial investment in research and the process of discriminating relevant information that can educate the path towards resolving an issue. However, a suggested approach in problem definition is to quantify the issue and defining its impact by conceptualizing it as rates of growth, size, speed, etc. This process helps emphasize the objective by pointing into solutions that would minimize or maximize the effects of the problem. From previous studies of the flow of used and waste tires in the California-Mexico border region it is clear that too many tires had been accumulated in some sites illegally such as the so-called legacy piles, and/or because of bad business execution. This was the case identified by the Border 2012 and that were targeted under its Goal 3 to “cleanup three of the largest sites” in the border. Two of these sites were located in Baja California: Centinela with 1.2 millions tires and INNOR with 415,000 tires two abandoned tire piles in Mexicali met such criteria. With financial and in-kind contributions in the amount of \$800,000 from the US EPA to Mexico, the clean-up of these two sites was completed in 2004 and 2005 respectively. A key element in the solution of this problem was the collaborative efforts to assist in a viable productive use of this resource between government, industry and other interested stakeholders. Ultimately, all the INNOR tires were transported to CEMEX's plant in Ensenada, whereas Centinela tires were transported to CEMEX plants located in Ensenada and Hermosillo where they were then co-processed as tire derived fuel (TDF).

However, problems evolve, and as we advance in the implementation of policy solutions programmatic focus may change as reflected above on the new priorities of the Border 2020 Program (i.e., more emphasis on e-waste management strategies). More recently, the State of Baja California has been developing and implementing different actions toward integrating a comprehensive plan to address the waste tire issue at the local level as described above in

section 3. However, the federal support derived from the Border 2012 program in targeting dangerous large waste tire sites, and the local government own success in developing mechanisms and infrastructure for collecting tires through clean up campaigns and ad hoc incentive programs has derive into a situation in which too many tires are now being accumulated in the official “temporary storage facilities”. This situation now calls for second generation, and third generation policy solutions, to the state and border regional problem. The need for processing capacity and proper market development channels for the productive use of the waste tire seem to be the current challenges of the Baja California context.

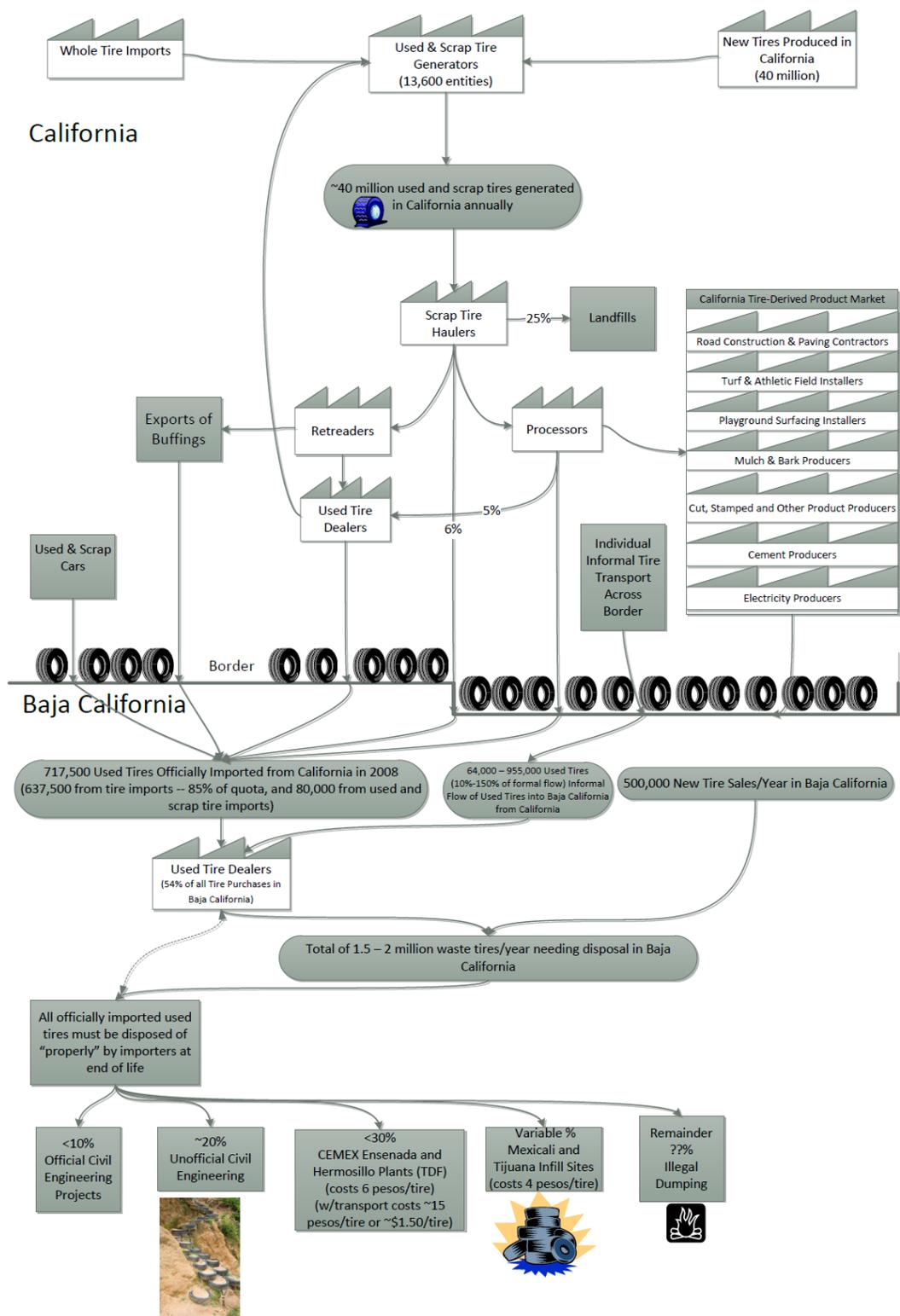
4.3 SMART PRACTICES IN MANAGING THE LIFE-CYCLE OF A TIRE

However, this problem is not unique to Baja California and this region. There are other jurisdictions, governments and international organizations working on similar issues, some with substantially more experience and/or technical and economic capacity. These experiences can serve as a resource to identify smart practices that could be extrapolated to the Baja California context if appropriate. Taking this into consideration, this report suggests that it is useful to consider first from holistic system perspective on the issue of waste tire management. In other words, that there is a life cycle to the tire and the more we can manage the value chain of the product we may have better control on where to maximize or minimize action in particular managerial decision nodes. See below in Figure 1 an example of the system modeling concept.

Just to illustrate this idea, in the life cycle of a tire as we follow the tire from production to end-of-life, we make decisions for instance after use to either store appropriately under industry and/or official norms (as in the case of Mexico’s NOM, official quality standards approved by the Ministry of Economy). Storage can also occur at officially authorized and certified facilities or in irregular sites. At this intervention or decision making point, our solution should tend to maximize the proper storage of the waste tire and minimize or eliminate lower standards, improper or illegal storage. Below you can also see system “exit” uses, or end of life processing supported by market development alternatives, which while productive in nature may have better or worst environmental impacts (e.g., energy use in cement production vs. rubberize

asphalt concrete on civil engineering projects). These considerations may also influence problem definition as we advance in the implementation of more advance integrated management programs.

Figure 1: Model of the Life-Cycle of Tires in the California – Baja California Border Region



4.4 KEY POLICY DESIGN PARAMETERS AND MODULARITY

The scope and development of an integrated management plan may depend on financial and technical capacity of the jurisdiction implementing the program. This report suggest that based on the existing catalogue of integrated waste tire management plans around the world and in the region, presenting different degrees in their evolution or maturity, policy analyst can identify key programmatic features that when reviewed from a comparative perspective (as applied in different context of implementation) may allow to classify them as essential elements or key modules that can be gradually expanded and/or adapted given changing conditions and differences in the context of implementation such as financial and technical considerations, as well as political and legal feasibility aspects for policy programs to be enacted and implemented.

4.5 ALTERNATIVES, POLICY OPTIONS AND INNOVATIVE SOLUTIONS

In policy analysis, as shown above there are alternative strategies to solve or mitigate a problem. The system model can allow present a comprehensive review of them. However, we should also consider “thinking out side the box” and innovating, and perhaps even improving policy design beyond the current state of the art in waste tire management plan design. While this report presents as an example only some smart practices from the international practice, it does not suggest limiting the process of conceptualizing policy solutions appropriate for Baja California and the California-Mexico border region on this matter using only those models. However, considering some of the proven key policy design parameters that determine the quality of a well performing plan, under the premise that some basic element of design are necessary to develop a well functioning waste tire management plan, it also suggest to consider innovation and adaptive management solutions to each particular context of implementation.

4.6 EVALUATION CRITERIA

Once we have analyzed the problem and conceptualized potential solutions, the policy analysis method calls for evaluating the recommended alternatives in order to project the outcomes of their implementation. These criteria also allow for the identification of the ideal design parameters given the particular social, environmental, political and economic contexts for which they are being analyzed. While some of the particular criteria may themselves change contingent upon the specificities of these contexts, several general criteria can be laid out that would be useful for all contexts.

4.6.1 FISCAL IMPACT AND SUSTAINABILITY

Evaluating funding mechanisms for waste tire management programs requires not only attention to the initial source of the funding, but to its medium and long-term sustainability. This would include analysis of issues such as regressiveness of financing options, market impacts, stability and dedicated nature of funding source, among other potential factors.

- **Costs:** Introducing or implementing policy programs to address the waste tires will have substantial costs associated with program administration, enforcement, and other prioritized program elements. In establishing a framework, these costs will need to be identified and addressed for any successful policy program.
- **Sources of Funding:** For the long-term success of policy programs, the funding sources must be identified and established. Sources could include but are not limited to taxes, local and state user and processor fees, tipping charges, and federal budget allocation, and potentially international partnerships and cooperation. In the United States, these have included fees assessed at the point of purchase of new tires (e.g. California, Arizona, New York, Illinois, Virginia), fees assessed at annual vehicle registration (e.g. New Mexico, Michigan), and by solid waste transporter registration fees (e.g. Texas), or “tipping fees” on a per-ton basis assessed on all waste managed at municipal waste landfills and resource recovery facilities in the state (e.g. Pennsylvania).

The type of funding can be determined by the overall program strategy, but in general, the funding source should have a mechanism that ensures the funds raised are directly used for the implementation of the waste tire management plan. Additionally, the point of collection of the funding source can impact sustainability of the funds. If tire fees are collected at point of disposal, for instance, there will likely be a tendency of consumers to avoid official disposal avenues, and thus avoid paying the fee.

Even with point of collection tailored to the context and program goals, however, without mandated collection there will likely be some avoidance of payments. In the United States, for instance, many states still allow consumers to keep their used tires when purchasing new ones to avoid the fee. This allows a good number of used tires to escape the formal used and waste tire regulatory systems in place, especially closer to the border where there are easy and lucrative transport and re-sale options. In general, it is more common to see mandates that tire retailers accept used tires than mandates that consumers leave their used tires with the retailers upon purchase of new tires (e.g. California, New York).

- **Political Survivability:** Tire fees can be quite subject to fluctuation and political pressures. Most states include so-called “sunset clauses” in their tire fees, although these are often extended. Tire fees in various U.S. states have fluctuated quite substantially since their inception, and there is significant pressure from the industry to reduce these fees across the board. Working to diversify the source of funding for waste-tire management and enforcement can be difficult, and while quite rare among integrated waste management programs, can alleviate some of this risk.

4.6.2 POLITICAL FEASIBILITY

This criterion can include issues such as feasibility of policy parameter options under current institutional contexts, legality under current regulatory frameworks, and political acceptability – both to electorate and to relevant administrations.

- **Political Acceptability:** Changing political alliances, economic circumstances, and social and environmental conditions can alter political will. For many international programs, the initial impetus for development of a program was not common recognition of the need to better manage waste tires, but rather large scale tire fires that triggered immediate political will. Analyzing these particular conditions, but also evaluating the general political acceptability of policy design components under these changing contexts is important for determining both initial feasibility and longer term sustainability of overall programs.
- **Legality:** Policy options need to be assessed as they relate both to management of used and waste tires within jurisdictions (both spatial and sectoral) as well as across jurisdictional boundaries. Overlapping institutional jurisdictions, management responsibilities, and fundraising options require clarification in order to establish standardized integrated waste plans.

4.6.3 FLEXIBILITY

While this is built-in to the notion of modular policy design, by nature, it is necessary to evaluate various policy design parameters for their potential flexibility or rigidity, in order to determine the degree to which they can be compartmentalized and incrementally developed. Additionally, program elements need to be able to sustain through changing political and economic conditions, and thus should be evaluated for their ability to operate under a variety of conditions.

4.6.4 EFFECTIVENESS

While perhaps a bit obvious, path-dependence upon commonly accepted program designs can often preclude direct analysis of the effectiveness of particular program components in attaining the overall goals defined by the jurisdiction. It is important to assess how each design parameter actually moves the overall program towards the short, medium and long term goals set out in the program design. Additionally, policy design elements can be evaluated for their likelihood to induce knock-on effects.

As different jurisdictions may have different auxiliary goals (e.g. not only diversion of waste tires from illegal sites, but promotion of the highest value-added markets for waste tires), outcomes should be evaluated with reference to these as well as the principle goals.

Additionally, although often implicit, goals such as efficiency and equity are also important to evaluations of the effectiveness of policy design components.

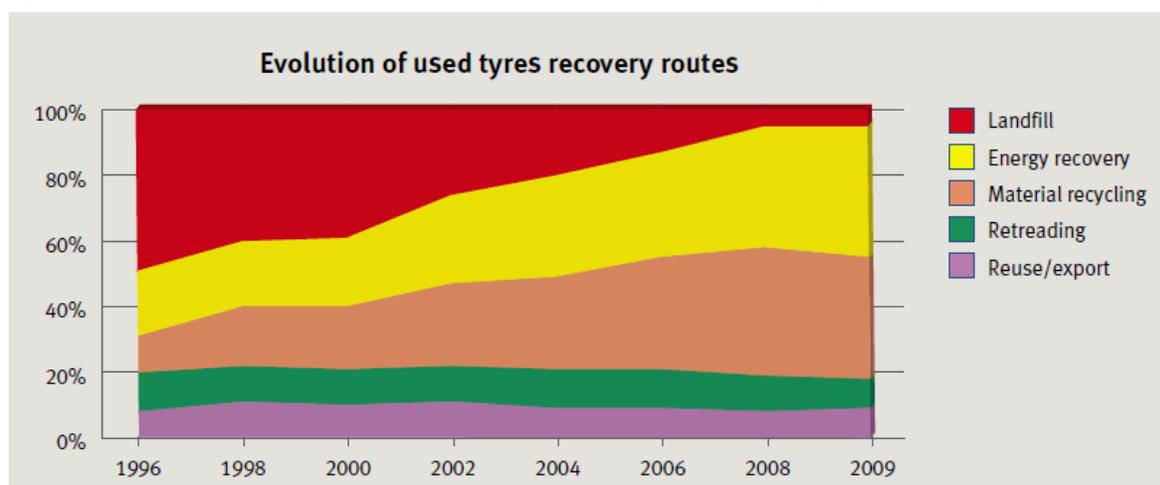
5 SMART POLICY DESIGN AND IMPLEMENTATION PRACTICES

A brief discussion of some of the background and current status of three different orientations towards waste tire management programs will be standardized in a manner to allow comparison and grouping of some of the similar design parameters of each system. Brief mention will also be made of several other programs to fill out a spectrum of approaches. California, Ontario and the European Union (as generalized from a majority of member states programs and EU regulations) present an interesting mix of program types, each with components that, when viewed for their potential independence from the broader programs, provide some potential building blocks to supply our framework.

5.1 EU PROGRAM

Two European Union Directives provide the key drivers for the creation of integrated waste tire management programs among member countries. The first was the passage of the EC Directive 1999/31 prohibiting the landfill of whole waste tires by 2003, and of shredded tires by 2006. While many states had some degree of waste tire management to this point, landfilling was still a substantial end point (32% in 1996) for many of the waste tires produced in Europe. By 2009 this amount had been reduced to 4%^{lxxxvi}.

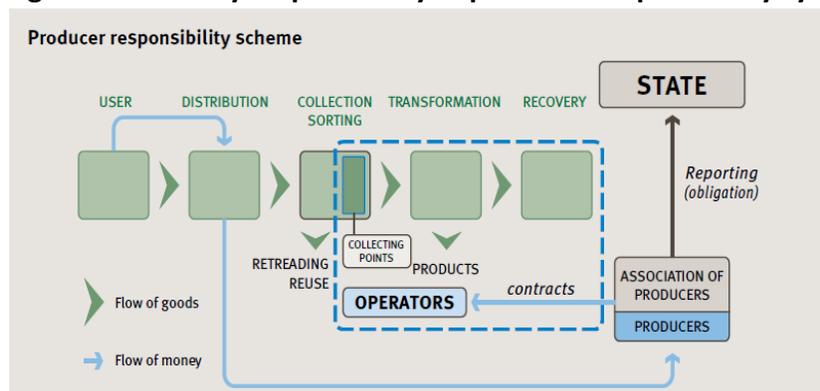
Figure 2: Productive Use of Waster and Used Tires in the European Union



Source: European Tyre & Rubber Manufacturers Association, 2010

The member states have a variety of program designs, but a majority of them have implemented programs that could roughly be considered “producer responsibility” systems. These systems assign the responsibility for the stewardship of a product and its appropriate end uses to the producers of the products themselves, but do little to design the key elements of plans. Thus you do not have the member states developing comprehensive integrated tire management plans or assessing tire fees at point of purchase to fund government programs, but rather a non-profit industry association representing the major “generators” of tires in the European Union designing and running the integrated management of waste tires themselves through fees they assess at the point of sale of new tires. The European Union passed the initial directive prohibiting whole tire and shredded tire disposal, the member states set regulations on reporting to consumers and member governments, and the industry association takes responsibility for developing an integrated management plan and managing the distribution and final processing of waste tires.

This type of program tends to encourage the distribution of waste tires to current markets rather than encouraging new markets, which is often a goal of many jurisdictions due to value added potential and employment creation concerns. In the case of Europe, the dominant end points for the increasing diversion of waste tires from landfills have been pretty equally split between tire-derived fuel uses and material recovery (e.g. tire-derived-asphalt applications)^{lxxxvii}.

Figure 3: Industry responsibility in producer responsibility systems

Countries: Belgium, Estonia, Finland, France, Greece, Hungary, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden and Turkey.

Source: ERTMA 2010

5.2 CALIFORNIA

California has quite extensive experience with waste tire management which provides some valuable history through which to evaluate various policy outcomes, and as a border neighbor with Baja California, will be briefly summarized here². California passed its first comprehensive waste tire management act in 1989 (AB1843), which included a tire fee assessed at the point of return of used tires, directives to promote markets for alternatives to landfilling tires, and requirements to develop regulations for storage of waste tires. Tire hauler registration requirements were first implemented in 1993 (SB 744), enforcement by police and highway patrol in 1996 (AB 2108), and a comprehensive manifest tracking system in 2000 (SB 876). The tire fee was revised from being assessed at the point of return of used tires to being assessed at the point of purchase of new tires in 1996 (AB 2108) due to the recognition that people were electing to illegally dump or stockpile used tires rather than paying the fee to deliver them to retailers.

² For a succinct review of principle waste tire legislation in California see: California Department of Resources Recycling and Recovery. Five-Year Plan for the Waste Tire Recycling Management Program. 1 July 2009. Web. 21 June 2011. <<http://www.calrecycle.ca.gov/Publications/Tires/2009011.pdf>>.

While California has not yet adopted a formal extended producer responsibility program for waste tires, CalRecycle the competent authority, has designed and implemented programs for other products and has demonstrated a long-term commitment to the concept. That said, many of the components of the California system are similar to those of the EU and Ontario, and the 5-year plans mandated by SB 876 include the components of a potentially cohesive extended producer responsibility plan.

Also similar to the Ontario system, California elected to restrict funding from the tire fee to promotion of higher value-added uses of waste tires, and formally forbids the use of these funds for the promotion of tire-derived fuel (AB 1756). While many of the market support programs to date have been targeted at supply side promotion of tire-derived-products such as crumb rubber production, California also passed legislation mandating a certain proportion of rubberized asphalt concrete in all highway construction and maintenance carried out by the California Department of Transportation (AB 338 2005).

Finally, of particular relevance to regional cooperation towards integrated waste tire management in the California, Baja California border region, both SB 772 (2005) and SB 167 (2009) mandate attention to border region-specific management issues and goals.

Through these programs, California has been able to divert 70-80% of waste tires generated annually in the state from landfills.

Figure 4: California Waste Tire End Uses

Table 1
Estimated End-Uses for California Generated Waste Tires, 2007–2009⁴

Category	Sub-Category	2007		2008		2009		Percent change 08-09
		Million PTE	Percent of Total	Million PTE	Percent of Total	Million PTE	Percent of Total	
Export	Waste Tires	0.7	1.5%	2.2	4.9%	3.3	8.0%	50.5%
	Used Tires (Exported)	1.6	3.7%	1.5	3.4%	1.8	4.3%	18.0%
	Subtotal	2.3	5.2%	3.7	8.2%	5.1	12.3%	37.2%
Reuse	Retread	4.4	10.2%	4.4	9.9%	4.4	10.6%	-0.3%
	Used Tires (Domestic)	1.8	4.1%	1.9	4.1%	2.0	4.9%	9.6%
	Subtotal	6.2	14.3%	6.3	14.0%	6.4	15.6%	2.6%
Ground Rubber	RAC & Other Paving	3.9	9.1%	4.3	9.7%	4.6	11.2%	7.3%
	Turf & Athletic Fields	2.5	5.8%	2.4	5.5%	1.3	3.2%	-45.0%
	Pour-in-Place Playground	0.3	0.6%	0.4	1.0%	0.3	0.7%	-33.1%
	Loose-Fill Play/Bark/Mulch	1.0	2.2%	1.1	2.6%	1.3	3.1%	12.2%
	Molded & Extruded	1.0	2.3%	1.2	2.6%	0.8	2.0%	-29.2%
	Other	0.6	1.3%	0.5	1.2%	0.1	0.3%	-76.4%
	Subtotal	9.2	21.3%	10.1	22.4%	8.5	20.6%	-15.3%
Civil Engineering	Landfill Applications	2.6	5.9%	2.1	4.6%	1.4	3.4%	-32.1%
	Non-Landfill Applications	1.0	2.3%	0.7	1.6%	0.4	0.9%	-51.6%
	Subtotal	3.5	8.2%	2.8	6.2%	1.8	4.2%	-37.2%
Alternative Daily Cover		2.8	6.5%	2.1	4.6%	1.2	2.9%	-41.5%
Other Recycling		0.1	0.2%	0.1	0.2%	0.1	0.2%	-9.7%
Tire-Derived Fuel	Cement	6.6	15.3%	6.7	14.9%	6.4	15.5%	-3.8%
	Co-Generation	1.1	2.5%	0.8	1.9%	0.6	1.4%	-30.5%
	Subtotal	7.7	17.8%	7.5	16.7%	7.0	16.9%	-6.8%
Landfill Disposal		11.5	26.5%	12.3	27.6%	11.3	27.3%	-8.5%
Total Generated		43.3	100.0%	44.8	100.0%	41.3	100.0%	-7.7%
Total Diverted from Landfill		31.8	73.5%	32.4	72.4%	30.0	72.7%	-7.4%
Imports		1.2	2.7%	0.5	1.1%	1.5	3.6%	188.4%

Source: California Tire Market Report: 2009

5.3 ONTARIO TIRE STEWARDSHIP PROGRAM

The Ontario Tire Stewardship Program represents another point on the spectrum of integrated waste tire management programs. Much like the European Union model, Ontario holds the generators of waste tires (producers and importers) as the primary responsible party in their reuse or recycling, following the principles of extended producer responsibility^{lxxxviii} or product “stewardship”. The big difference being that Ontario assigns responsibility through a fee charged to generators or “stewards” per tire they introduce into the Ontario market. Unlike

the most common programs in the European Union, Waste Diversion Ontario, the provincial government waste department, established the industry funding organization (Ontario Tire Stewardship) that collects the fees, designs the management plans, and implements the overall tire stewardship program, rather than being a purely private operation.

Additionally, Waste Diversion Ontario incorporated a key qualifier to the development of the integrated waste management plan: the highest value-added tire-derived products receive priority incentives, with landfilling and tire-derived fuel uses serving only as last resorts if there is no other way to process waste tire supply. Much as the European Commission directive prohibited disposal of whole and shredded tires from landfills across the EU as the driver for the development of producer responsibility programs, Ontario clearly established its own preferably outcomes before designing its program.

These pre-qualifiers to the development of the program led to some program particularities somewhat different than other integrated waste tire management programs. The requirement that the highest value added uses for waste tires be promoted more heavily dictated quite accurate tracking of the flows of waste tires within the province of Ontario as well as beyond its borders, as Ontario Tire Stewards interpreted the Waste Diversion Act to require tracking of tires to end use, including if they are exported from the province as tire-derived-products. This tracking system represents one of the most complete “cradle-to-grave” tracking systems among international programs reviewed in the course of this project.

Overall the program has resulted in a 93% diversion rate of the approximately 12 million waste tires generated annually in Ontario at a cost of CA\$73 million in fees collected from stewards^{lxxxix}.

6 IDENTIFYING KEY POLICY DESIGN PARAMETERS:

6.1 REGULATORY CONTROLS:

Depending upon the short-term, medium-term and long-term end goals for waste tire management in a jurisdiction, regulations restricting unwanted outcomes for waste tires need to be passed. In the case of the European Union, this involved outright banning of disposal of whole tires and shredded tires in landfills. In California, whole tire landfilling is prohibited, but shredded tires may be landfilled and monofills are permitted. Ontario does not have formal restrictions on landfilling of waste tires (whole or shredded), but has an incentive structure built into its tire stewardship plan that prioritizes all other uses of waste tires.

6.2 ENFORCEMENT MECHANISMS:

There must be enforcement of this mandate. A system of enforcement is required to ensure that all transporters are actually keeping and turning in the necessary tracking data, as well as following through on their obligations in terms of deliveries to approved processing or disposal sites. This can be accomplished through existing transportation authorities. At weigh stations or other transportation points, these trip logs can be checked randomly to ensure compliance.

- California works with local “enforcement partners”, including local police and the state highway patrol – also provides training to those partners out of tire fee funding– AB2108 of 1996 allowed for traffic or peace officers to enforce waste tire hauler registration requirements^{xc}.
- EU varies by country, but likely uses pre-existing police infrastructure
- Ontario uses an audit system to reconcile the reporting made by collectors, haulers and processors in the manifest reports in three year cycles. Additionally,

the Waste Diversion Act of 2002 empowers provincial officers to act as enforcers of the requirements of the act, including the tracking and manifest system.

6.3 MONITORING:

There must be ability to track tires in order to enforce mandates on how waste tires are treated. This includes registration of all actors collecting, transporting and processing tires and a manifest system to record tire transactions between these actors.

Additionally, some capacity to enter the data in a form that is easily accessible for those officials looking to analyze it for policy design, implementation, or evaluation purposes would be necessary.

- The California manifest system tracks tires from used tire returns to retailers to hauler drop-off at disposal site, processor or export point. All haulers, processors and disposal sites are required to be registered with CalRecycle as well. While initially more comprehensive, after stakeholder complaints about the paperwork burden, the tracking system was simplified. It currently provides sufficient detail necessary to track diversion rates for waste and scrap tires ending up in California, but is more limited in tracking tire flows leaving California and those passing through California^{xci}.

The basic requirements of this system are a system of record keeping along all steps of the used tire generation/importation, sale, re-sale, disposal/export life-cycle. In California this is accomplished, in part, through the use of “comprehensive trip logs” kept by all official transporters of used tires in the state. At start up this would likely require some degree of training and perhaps a “soft start” in order to provide flexibility in adoption.

- In the European Union, while varied state to state, haulers are required to be registered with relevant departments in member states.

- Ontario uses a manifest system as well, but one that includes detailed processor tracking as well as reconciliation at each transaction stage (i.e. each actor fills out a manifest form). They require tire-derived product processors to provide proof of end-use tracking for their customers to ensure proper end use (e.g. preferably not disposal or TDF uses as prioritized by Ontario), and this includes end-uses of any waste tires exported from the province. Collectors, Haulers and Processors are all required to fill out components of the manifest and track by tire quantity and type all tires they deal with. All actors in the waste tire management plan are required to be registered.

6.4 RESPONSIBILITY AND STEWARDSHIP CLEARLY DEFINED

Responsibility for the proper disposal of waste tires must be clearly assigned and mandated in order to ensure that waste tire diversion mandates are met.

- California assigns informal physical and financial responsibility for management of waste tires to retailers (as the predominant initial congregation point for waste tires). This is paired with the broad programmatic guidelines and financial supports CalRecycle provides through its use of the state tire fee.
- Most E.U. member states assign responsibility to tire generators (producers and importers), require they devise manage plans, but leaves it up to them how to manage the specifics of waste tire diversion from landfills.
- Ontario assigns responsibility to tire generators (what they call “stewards”), but a collectively set up non-profit funded by the “stewards” designs and implements the actual management plans for waste tires in the province.

6.5 FUNDING MECHANISM:

Fees at the point of sale have often been the most successful and sustainable options for jurisdictions looking to raise money for waste tire programs. General

income taxes collected by States can be used, but often require consistent political will to maintain as a dedicated funding source. General waste fees have similarly been used, but also require consistent prioritization of waste tires as an issue within departmental budget planning. Regardless of the funding source, it must be economically feasible and preferably non-regressive.

- California this is funded by the tire fee on sale of new tires and is managed by CalRecycle, although responsibility for disposal is assigned first to retailers (at the point of collection for waste tires), and then handed down the chain of disposal to haulers and finally to end-use or disposal facilities
- The EU lets the tire generators decide how to raise money for their integrated waste tire management programs (extended producer responsibility). However, it should be remembered that enforcement to prevent illegal dumping and clean-ups of those illegal dump sites is a cost that is covered by the member states through normal taxes (e.g. police services).
- Ontario mandates the industry funding organization (non-profit set up to run the integrated management plan) collects fees from tire generators (per tire generated) and carefully doles out these fees to the collectors, haulers and processors based on market analysis of costs and benefits at various points in the value chain.

6.6 PRODUCTIVE USE OF WASTE TIRES & MARKET DEVELOPMENT:

There must be alternative, viable end-uses available to the disposal of waste tires (or they will just end up dumped illegally). Rubberized Aggregate Concrete (RAC) use in transportation infrastructure is a sizeable potential sink for scrap tires in most urban jurisdictions. In some cases, a point of aggregation may be necessary until capacity to process is reached – such as monofill sites. Tire derived fuel is currently a substantial consumer of waste tires in Baja California (consuming ~33% of scrap tires/year), but is

often evaluated against options that have higher value added use in jurisdictions developing integrated waste tire management plans. There are many decentralized uses of scrap tires in construction in Baja California that could be supported more officially, thus contributing to their growth and ensuring standards in construction are being met. Finally, pyrolysis, while still quite experimental, has been attracting increasing attention from the scientific community and may hold some potential in future developments

- California funds market development through grants for processors and new end-users of tire-derived products. California (and the U.S. Department of Transportation) also requires a certain % of all road maintenance/construction to use Rubberized Asphalt Concrete, thus creating some degree of stable demand for tire-derived products.
- EU puts responsibility for the development of these alternatives on the private sector, only providing the directive that the tires cannot be landfilled and the connected sanctions for doing so. One result of not specifying uses or providing market supports is many tires going towards lower value-added, but well-established uses such as tire-derived fuel (~50% across EU).
- Ontario requires the development of a comprehensive integrated management plan by the non-profit organization set up to manage waste tires, or by companies if their program is approved by Ontario. Additionally, they are implementing a hierarchical system of processing incentives to encourage processing into higher value-added products of the waste tires. To do this, they have conducted extensive market analyses to provide hierarchical tiered subsidies to higher value-added manufacturers of tire-derived rubber products.

7 OVERCOMING HURDLES FOR INTEGRATED WASTE-TIRE MANAGEMENT IN BAJA-CALIFORNIA, MEXICO

Based on the review of materials to better understand the policy context of waste tire management, this report identified a series challenges and remaining hurdles to advance this approach in Baja California and the California- Baja California region. The purpose of this report is not to offer policy alternatives or actual policy analysis but to present it as a useful method to address this issue and to support effective design and implementation of an integrated management plan. This section presents a summary of some of the most salient issues that data, studies and observers have already identified as necessary aspects to consider to better understand the problem, areas that need more development to overcome hurdles, as well as opportunities. Here are a few examples of this contextual realities and dynamics:

- The border acts as a congregation point for waste and used tires given the substantial markets for used tires on both sides of the U.S.-Mexico border. The region draws tires from other parts of the border states, and potentially from other states due to the strong market demand for used tires. The majority of the waste and used tires that congregate along the border stay along the border once they reach their end of life.
- Jurisdictional overlaps in authority for the management of waste and used tires present difficulty in determining final responsibility for the development and implementation of management plans.
- Financial constraints among the State of Baja-California and the local municipal departments limits funding for integrated waste-tire management programs above and beyond the operation of temporary storage stations (e.g. for enforcement of tire hauler regulations)
- While the State of Baja is quickly expanding its capacity for temporary storage for waste tires, and municipalities are developing their own resources as well, historically the lack of

existing disposal infrastructure contributed to the accelerated accumulation of tire piles which still need to be addressed.

- Undeveloped tire-derived product markets in Mexico and high fees for disposal at CEMEX or the Mexicali Land Fill result in many tires continuing to be disposed of informally
- Illegal importation of tires across the border from California to Baja-California (and potentially from other U.S. States through California to Baja-California) is currently and unknown additive, but potentially a substantial source of used and waste tires in Baja-California, and one hard to track.
- Difficulty in tracing all sources of waste tires ending up in Baja-California prevents ideal targeting of programs and limits potential funding raised from tire fees charged to formal importers.

8 CONCLUDING REMARKS

This report summarizes the evolution of the institutional and programmatic aspect in waste tire management in the State of Baja California to date. It presents a comparative perspective on smart or best practices in this area of environmental and resource management to help illustrate the usefulness of the policy analysis methodology. It also offers some complementary theoretical concepts such as system modeling, key policy design parameters and modularity in the evolution of plan development, to enhance the problem solving capacity in the region. The hope is that by offering a theoretical framework of analysis for modeling enhancements and innovative approaches within their own institutional, political and economic context among other considerations, Baja and California can improve the regional impact of their own programs. To date, for instance, the effectiveness of the California monitoring, tracking and enforcement systems minimizes the level of irregular flows of waste tires to Mexico. A regional system remains an aspirational goal, but a step forward would be more cooperation on enforcement know-how exchange and support from California to Mexican enforcement agencies, as well as coordination on harmonizing reporting, manifest collection and information management first with Baja California and eventually at a regional level.

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FINALIZED FOR FINAL DRAFT]

10 NOTES [TO BE FINALIZED]

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