stop funding the program for the remainder of the year. In these cases, collectors and recyclers, including local governments, are left to either cover the costs of the program, charge their customers an end-of-life fee, or terminate collection services and leave consumers without an opportunity to properly discard their unwanted devices.

California could implement a robust EPR program by addressing these weaknesses with strong legislation that mandates key components including a sustainable funding mechanism, enforceable performance and convenience standards, anti-trust provisions, penalties for noncompliance, specific management standards for processing covered devices and residuals, and program transparency.

The following sources offer detailed information about existing EPR programs around the nation and world.

The Electronics Recycling Coordination Clearinghouse[24] maintains the most up-to-date information on state programs including product scope by state, covered entities by state, landfill bans, collection data, manufacturer registration, and many other topics.

An evaluation of Canadian EPR programs, including e-waste recycling programs, was presented at the Conference on Canadian Stewardship in September 2017.[25] One of the key findings presented was that competition between stewardship organizations is critical for effective EPR programs. Additionally, a lack of harmonization between provincial and national efforts can be a barrier to increasing efficiencies in EPR systems.

The Product Stewardship Institute (a national, membership-based nonprofit organization) published a study in July 2014 analyzing the 25 state electronics programs: "Electronics EPR: A Case Study of State Programs in the United States."[26] The study discusses components that are integral to successful e-waste recycling programs, including a broad scope of covered products and covered entities, sustainable funding, ambitious performance and convenience requirements, consistent enforcement, clear recycling and processing standards, and strong public education and outreach.

Perhaps the most comprehensive report concerning the management of e-waste in the United States is "The Electronics Recycling Landscape,"[27] which was published in May 2016 for the Closed Loop Foundation. The report identifies the makeup and quantity of the electronics waste stream, analyzes current management systems, identifies successes and challenges of existing programs, and provides solutions to support the development of a resilient used electronics management system. The report groups recommendations into three categories:

- Collection system enhancements to improve effective collection and consolidation of electronic waste;

[24] http://www.ecycleclearinghouse.org/
[25] https://resource-recycling.com/recycling/2017/10/03/assessing-extended-product-stewardship/
[26] http://c.ymcdn.com/sites/www.productstewardship.us/resource/resmgr/Electronics_Reports_Factsheets/2014.07.17_PSI_Case_Study_US.pdf
[27] Primary authors: The Sustainability Consortium, Arizona State University and the National Center for Electronic Recycling. https://www.sustainabilityconsortium.org/downloads/tsc-electronics-recycling-landscape-report/

- Technological innovation to address sorting and disassembly issues while encouraging new business models for reuse and refurbishment; and
- Collaborative initiatives to develop better tools and processes across the electronics supply chain.

Other States	Europe	Canada	CA Waste Characterization Study
Currently 25 states with electronics recycling laws. Categories of covered devices and the number of states covering each category: Monitors (25) Laptops (24) TVs (22) Desktop computers (22) Tablets (20) Printers (14) Keyboards and mice (9) Portable DVD (6) Fax/Scanners (3) E-readers (15) Media players (3) DVD/VCRs (4) Servers (4) Set top boxes (4) Game systems (4) Digital frames (1) 3-D printers (6)	WEEE Directive. Electrical and Electronic Equipment (EEE) is defined as equipment which is dependent on electric currents or electromagnetic fields to work properly. General rule of thumb, if it has a battery or needs a power supply, it is EEE and there are structures in place to reuse/recycle this equipment when it reaches end of life. 6 Categories: • Temperature exchange equipment • Screens, monitors and equipment containing screens having a surface greater than 100 cm2 • Lamps, fluorescents, high intensity discharge, sodium lamps, LED • Large equipment, such as washing machines, dryers, dish washers, stoves, musical equipment, slot machines, large printing machines, photovoltaic panels, etc. • Small equipment, such as vacuum cleaners, sewing machines, microwaves, irons, toasters, electric knives, shavers, hair care, toys, sports equipment, smoke detectors etc. • Small IT and telecommunication equipment such as mobile phones, GPS, calculators, printers, computers, etc.	Covered products vary by Province. All Provincial programs started with phase 1, which includes televisions, computer monitors), CPUs, keyboards, cables, mice, speakers, printers, laptops, notebook computers, and tablets. Phase 2 includes stereos, VCRs, cameras, telephones and other personal electronics, and the batteries used in these products. Provinces have expanded their programs at different rates. In BC, phase 5 was implemented in 2015 and now almost every item with a battery or plug is covered including motorized kitchen countertop appliances, microwaves, weight measurement devices, garment care appliances, desk and table-top fans, personal care appliances, and exercise machines electrical tools, sewing machines, arts, crafts and hobby devices. All other provinces have expanded to phase 2 with most considering phase 3 and 4 expansion in the next few years. Only Alberta has never expanded past phase 1, although adjustments are expected soon.	Brown Goods – larger, non-portable electronic goods with circuitry. Examples: microwaves, stereos, VCRs, DVD players, large radios, and audio/visual equipment. Computer-Related Electronics – electronics with large circuitry that is computer-related, not including monitors. Examples: processors, keyboards, printers, fax machines, mice, disk drives, and modems. Other Small Consumer Electronics – portable non-computer-related electronics with large circuitry. Examples: personal digital assistants (PDAs), cell phones (including those with a screen larger than 4 inches), phone systems, phone answering machines, portable electronic book readers (like Kindles and Nooks) computer games and other electronic toys, portable CD players, camcorders, digital cameras, cell phone chargers and other electronic device chargers, and other electronic devices Video Display Devices (CRT) – items with video displays larger than 4 inches that contain a CRT. Examples: some televisions, computer monitors, and other items containing a CRT. The shape of the item is usually more boxy than flat. Video Display Devices (Other) – items with video displays larger than 4 inches that are not CRTs, nor are they included in the Other Small Consumer Electronics category. Examples: some televisions, computer monitors, portable DVD players, tablet computers (like the iPad and Kindle Fire), and laptop computers. The shape of the item is usually more flat than boxy, and the device is primarily intended to display moving video, perform computing functions, or view web content

Appendix II - A

Concepts for Enhancing Existing Fee and Payment Model

(NOTE: This document was presented at the October 11, 2017, stakeholder workshop. Since that time, the "seven program enhancements" have been updated to nine and are presented as independent recommendations in the Final Project Summary and Recommendations document; separate from the "Enhancing Existing Fee and Payment" Model.)

This section describes options for enhancing the current California Covered Electronic Waste (CEW)[28] recovery and recycling program to address challenges facing e-waste management now and into the future. By definition, the CEW recycling program currently addresses only certain video display devices. Increasingly complex technologies are being discarded, often with less intrinsic material value, which are more difficult to dismantle and contain components requiring special handling. Meanwhile, global economics are disrupting commodity markets.

Several program enhancements are discussed in this section: 1) add new devices to the definition of a covered electronic device (CED); 2) increase public education and outreach; 3) strengthen and increase manufacturer responsibilities; 4) provide incentives for repair and reuse of electronic devices; 5) establish new market development programs; 6) initiate new research activities; and 7) streamline the submittal of claim documentation.

Legislation would be needed to accomplish any of the seven program enhancements listed above and described in detail below. Legislation should include a stable funding mechanism sufficient to ensure that collectors and recyclers are fully reimbursed for appropriate collection and management activities. In addition, the legislation should include clear definitions of new CEDs, specific management standards for processing new CEDs, clear education and outreach goals, accountability and penalties for new manufacturer requirements, implementation provisions for repair and reuse incentives, and authority for grants and loans. A new structure for both fees charged at retail sale and recovery/recycling payment rates would need to be specified. Currently, CED determination requires the Department of Toxic Substances Control (DTSC) to find that covered devices exhibit hazardous characteristics when disposed. Depending on the scope of products targeted for inclusion, changes may be needed regarding how CED determinations are made. This would require coordination with DTSC to determine if Health and Safety Code (25141.10.1) also needs revision.

Pursuant to new enabling legislation, extensive regulatory revisions would be needed to include new products and establish processes for cancellation, residual management, recordkeeping, claims, etc. A rulemaking process for new statutory requirements would

[28] http://www.calrecycle.ca.gov/Electronics/CEW/Default.htm

also be required.

There are several advantages, disadvantages and implementation challenges to this approach.

Advantages of Enhancing the Existing Fee and Payment Model

- Build on an existing successful program with no disruption to existing collection and recycling infrastructure; many collectors and recyclers currently accept non-CEWs as a part of doing business.
- Cost-free and convenient collection opportunities would be available for consumers.
- New CEDs and their residuals would be handled in a manner consistent with current CEW environmental oversight.
- Existing CEW public education and outreach materials can be easily expanded to include new devices; expanded education and outreach requirements would improve consumer understanding of e-waste management options and might influence purchasing behavior.
- CalRecycle internal claim review procedures would remain relatively intact; adding devices would require some new review procedures; tools and databases would require revisions.
- Increased involvement of manufacturers might help influence design for the environment.
- New incentives would help promote repair and reuse activities.
- Streamlined claim documentation submittal would save significant review time and greatly improve efficiency.

Disadvantages of Enhancing the Existing Fee and Payment Model

- Requires legislation and new/revised regulations.
- Requires identification of manufacturers and retailers subject to the CED fee collection system;
- Additional personnel may be needed for CalRecycle and the California Department of Tax and Fee Administration (DTFA, formerly Board of Equalization); may involve expansion of DTFA audits.
- Increased complexity for consumer fee and recycler and collector payment. Due to the potentially wide range of technologies, it would be difficult to obtain data on “average net cost to recycle” CEDs to determine appropriate payment rates.
- Depending on the universe of covered devices, it could be difficult to determine and enforce appropriate downstream management standards.
- Fees on today’s possibly less hazardous devices cover costs to manage yesterday’s more toxic devices.

Challenges and Issues to Address

- Potential challenge for DTFA to identify distribution chains and collect fees from new retail locations.
- Obtaining data on sales and costs to recover and recycle.
- Determining what constitutes cancellation for new CEDs in California.

- Researching and determining appropriate materials management standards and end use destinations for new CEDs and derived residuals claimed in the program.
- Determining appropriate documentation requirements; verification of CA-generated material.
- Coordinating with manufacturers to establish increased requirements that are both meaningful and achievable.

Roles and Responsibilities

- Manufacturers/Producers – Provide information to retailers to identify covered electronic products and have additional responsibility under the enhanced program.
- Retailers – Collect fee at point of sale. Provide consumer information about where to recycle CEDs. May act as a collector in the system.
- Collectors/Recyclers – Register with CalRecycle; follow all applicable statutes and regulations regarding handling of hazardous wastes including proper downstream handling and end-use destination; submit source documentation and payment claims per regulation.
- CalRecycle – Provides oversight and enforcement of program, establishes acceptable material management standards, establishes and communicates documentation requirements for new CEDs, develops (or contracts for) public education and outreach program.
- DTSC – Oversees and enforces the management of hazardous waste.
- Department of Tax and Fee Administration – collects the recycling fees
- Local Government entities – Continue to accept electronic waste at existing HHW collection facilities/events. May act as collector via contract with recycler.
- Consumers – Pay fee when purchasing a covered device. Responsibly handle electronic discards by delivering to authorized collector or recycler.

Detailed Description of Key Components

1. **Add New Products to the Definition of a Covered Electronic Waste**

   Consideration of new products

   - Staff conducted an informal, qualitative review of electronic products that could potentially be added to the definition of a covered product – (See separate section for detailed description.) Products were evaluated based on criteria including current management, toxicity levels, ease of processing, prevalence of product in the waste stream, trends, and material recovery value. Although staff recommends that a process be implemented to evaluate potential new CED, CalRecycle is not making a proposal for specific products or product categories to be added as a CED at this time.
   - Covered entities – Households, schools, businesses, government entities, nonprofit organizations.
   - Includes all CED sold for use in California including internet sales.
   - Includes all CED used by a person in California prior to its discard.

- Includes new, historic and orphan products (without an identifiable producer).

Implementation steps for CalRecycle once new products are identified

- Work with stakeholders to determine consumer fee
    - New categories of CED – Should fee on new covered devices be based on size, weight, unit, hazardous material in the device, difficulty of recycling, whether or not device can be repaired/reused, or another factor?
    - Consumer fee should closely reflect actual costs to collect and recycle CED.
    - Need data on current sales, projections, anticipated product lifespan, anticipated rate of entry into waste or repair stream, costs to collect and handle.
    - Modulated fees should be considered – provide cost relief for certain environmentally desirable design features (e.g. recycled content, upgradeability); or conversely, to add cost if environmentally undesirable features are present (e.g. amount of toxic materials).
- Work with stakeholders to determine recovery and recycling payments
    - New category of CEW – Should recovery and recycling payment rates be based on size, weight, unit, hazardous material in the device, difficulty of recycling or another factor?
    - Repair and reuse – how can the payment rates properly reimburse collectors and recyclers while incentivizing repair/reuse?
    - Base payments on net cost data collected and stakeholder input.
    - Differentiated payment rates may be established for new categories of CEWs.
    - Seek authority to adjust the payment rate for recyclers and collectors annually.
- Work with DTSC and other stakeholders as appropriate to establish materials management standards for new CEWs
    - What constitutes cancellation?
    - Determine minimum management standards for processing new CEWs to minimize negative environmental impacts from collecting and recycling activities; is compliance with DTSC- administered regulations sufficient?
    - Determine required or allowable cancellation methods and records.
    - Recyclers must cancel devices in California.
    - CEW should be managed for the highest and best use according to California's solid waste hierarchy.
    - Encourage domestic processing – see financial incentives section.
- Determine appropriate processing documentation for new CEW.
    - Identify documentation needed to determine if CEWs are generated from a California source. How to ensure material is eligible, properly weighed, dismantled and that residuals are properly handled?
    - Determine any new mechanisms to claim payments.

2. **Increase Public Education and Outreach**
    a. Require point of purchase information be provided to consumers (see manufacturer responsibility section for details).
    b. Re-establish funding for statewide public education program/materials per statute 42476 (c).
    c. Work with the Office of Education and the Environment to explore whether concepts of e-waste management could be included in the environmental education curricula.

3. **Strengthen and Increase Manufacturer Responsibility**
    a. Strengthen and clarify existing manufacturer reporting requirements to provide more enforcement authority and receive more consistent reports. Manufacturer responsibility and reporting requirements would be extended to new CEDs.
    b. Require manufacturers to label hazardous components (e.g. identify if battery or lamp is present and its location).
    c. Produce public outreach materials for retailers to distribute to consumers at point of purchase. Materials must inform consumer that the device is hazardous and illegal to dispose of in the trash, provide information on where and how device can be collected (website, app or phone number), and information on reparability of device.
    d. Mandatory take-back of certain products that are not conducive to collection at local events/facilities. Would be identified in coordination with manufacturers, collectors and local government HHW program managers.
    e. Manufactures should work towards enhancing durability of their products, promoting repair and reducing waste. Could work with a trade organization to develop durability and recyclability standards. (Like American Plastics Recyclers developed Design for Recyclability guidelines). In addition, have a base level guarantee on their products performance and life expectancy, similar to France's policy requiring manufacturers to have a 2-year warranty on products.

4. **Provide Incentives for Repair and Reuse**
    a. CalRecycle to facilitate partnerships with repair and reuse organizations such as Fixit Clinics[29], iFixit[30] and The Repair Association[31]
    b. Support "right to repair" legislation in California and at the federal level as appropriate.
    c. Update cancellation requirement to allow for reuse and repair.

5. **Establish New Market Development Programs including Grants and Loans**

[29] http://fixitclinic.blogspot.com/
[30] https://ifixit.org/
[31] https://repair.org/

a. Develop new grant programs to support the e-waste collection and management system. Possible grants could include:
    i. Research into new recycling/processing methods.
    ii. Infrastructure grants to encourage domestic processing of non-hazardous e-waste.
    iii. Funding for nonprofit repair and reuse organizations.
b. Research feasibility of low-interest loan, or loan guarantee program for recycling/processing.
c. Reinvigorate the Electronic Product Environmental Assessment Tool (EPEAT) state purchasing guidelines and provide information to state purchasing agents.
d. Promote EPEAT guidelines to local governments. Consider limiting CalRecycle grant and payment program funding to entities that follow EPEAT guidelines.
e. Investigate feasibility of adding a "bonus" payment to cover additional transportation costs in very rural areas.

6. Initiate New Research Activities

a. Use the Local Conservation Corps Grant for e-waste management to undertake front line, labor- intensive research as appropriate to meet program needs and in keeping with contract provisions.
b. Partner with national and international organizations on more in-depth research regarding issues such as toxicity, material recovery feasibility, recycling technologies, reparability.
c. Investigate value of a "green seal" type of labeling system that would indicate the ease of disassembly, recycled content and hazardous material contained in the device.

7. Streamline Claim Documentation and Submittal Processes

a. Investigate the feasibility of electronic claim documentation submittal.

Appendix II - B

Concepts for Electronic Waste Product Stewardship Model

(NOTE: This document was presented at the October 11, 2017, stakeholder workshop.)

This section describes a product stewardship approach to collecting and managing electronic waste in California. A comprehensive electronic waste management system based on a Product Stewardship model would have as its foundation CalRecycle's definition of product stewardship and the essential components of an effective stewardship program[32]. Because this would be a new approach in California for the management of e- waste, and because e-waste product stewardship programs in other states do not have all the components that CalRecycle believes are needed to be successful, this document provides a detailed description of these key components.

Product Stewardship is a strategy to place a shared responsibility for end-of-life product management on the producers, users and all entities involved in the product chain, rather than on local government or the general public, to reduce the cradle-to-cradle impacts of a product and its packaging. If the responsibility is placed primarily on producers/manufacturers, then this would be known as Extended Producer Responsibility or "EPR", which has its own defined essential components. This allows the costs of treatment and disposal to be incorporated into the total cost of a product. It sends a market signal to reflect the true environmental impacts of a product, to which producers and consumers respond.

Product Stewardship programs are typically industry-run. Government agencies provide oversight and enforcement but producers are responsible for collecting and managing funds and implementing the program. The programs are not prescriptive and allow flexibility for industry to determine the most cost-effective solutions within parameters established by law or regulations promulgated by government. The most common model requires electronic manufacturers to submit a stewardship plan, either as part of a stewardship organization or as an individual manufacturer detailing their program. Another approach allows manufacturers to opt out by remitting to the Department a fee that is calculated to pay the net average cost of collecting, processing, and recycling hazardous electronic waste.

Sustainable funding is critical to the success of a product stewardship program. Funding must be sufficient to cover the costs of establishing and maintaining a comprehensive collection and management system.
Legislation can either require costs to be internalized similar to other costs of doing businesses or authorize a point-of-purchase consumer fee.

Legislation would be needed to establish a comprehensive product stewardship model

[32] http://www.calrecycle.ca.gov/epr/

for electronic waste. It would have to include a sustainable funding mechanism, enforceable goals (or authorization for CalRecycle to establish goals by a specific date), anti-trust provisions, penalties for non-compliance, specific management standards for processing covered devices and residuals, and a number of other provisions that are described below in detail.

There are several advantages, disadvantages and implementation challenges to such a program.

Advantages of Product Stewardship Approach

- Manufacturers and producers (MFR/PR), rather than local governments and taxpayers, take responsibility for the management of their products.
- Those that profit from the sale of products, or that use products, cover the end-of-life management costs rather than the general public. Disclosing the true life cycle cost of a product might influence purchasing behavior.
- Cost-free and convenient collection opportunities would be available for consumers.
- State and local government oversight costs are minimized.
- A Stewardship Organization (SO) or individual Manufacturer/ Producer has the flexibility to design and implement a collection and recycling system that works best for their industry within rules regarding management standards and accountability.
- Discarded electronic devices and their residuals would be processed in an environmentally secure manner with appropriate oversight.
- SOs and MFR/PRs are held accountable for financial and performance practices through independent audits.

Disadvantages of a Product Stewardship Approach

- Requires new legislation and regulations.
- Today's MFR/PRs may have to assume responsibility for legacy devices (possibly with more toxic materials) made by other manufacturers that are no longer in business.
- Depending on how the program is designed, small recyclers and collectors could be at a competitive disadvantage.
- Depending on how the program is designed, local governments may lose control over which recycler they work with.
- Reuse and repair may be treated as a disadvantage towards the sale of new products.
- Without competition, a SO may be incentivized to keep costs as low as possible, potentially resulting in discarded products not being managed to their highest and best use.

Challenges and Issues to Address

- Potential impacts on existing businesses that were established under the E-Waste Recycling Program (SB 20); need to analyze jobs created or lost; avoided disposal costs; infrastructure impacts, etc.
- Transition impacts – Oversight required to ensure that all e-waste continues to be handled in a compliant manner during the transitional period and that collectors/recyclers are appropriately reimbursed for activities during the transition.
- Determining appropriate documentation requirements; verification of CA-generated e-waste.
- Identifying and including a new universe of MFR/PRs.
- Researching and determining appropriate materials management standards and end use destinations for variety of newly covered e-waste and derived residuals.
- Articulate clear, measurable and enforceable goals

Detailed Description of Key Components

Definitions

- Manufacturer/Producer (MFR/PR) is either 1) the person who manufactures the covered product and who sells, offers for sale, or distributes the product in the state; 2) imports the product into the state for sale or distribution; or 3) sells the product in the state.
- Stewardship Organization (SO) is an entity formed by a group of producers to act as an agent on behalf of the producers to administer a product stewardship program.

Scope

- Includes all MFR/PRs that sell electronic devices for use in CA.
- Covered products will be determined and established in statute or as part of a rulemaking process. CalRecycle could choose to adopt an existing product scheme used in other states and countries, or evaluate products using specified criteria.
- Covered entities: Households, schools, businesses, government entities, nonprofit organizations.
- Includes new, historic, and orphan products (without an identifiable producer).
- Includes all sales into CA or for use in CA, including internet sales.
- Requires statewide coverage, both urban and rural.

Roles and Responsibilities

- Manufacturers/Producers – Design, finance, and operate the program, either as individuals or as part of a Stewardship Organization (SO). Register with CalRecycle to sell covered products in CA. SO or individual MFR/PR submits

plans describing how the goals of the program will be accomplished and subsequent reports as defined by CalRecycle. Individual manufacturer or SO ensures that all entities associated with program implementation (collectors, recyclers, local governments) are reimbursed for eligible activities, and provides outreach and education.

- Retailers – If a point of purchase fee is established in legislation, retailers collect the fee on sales of new covered products and remit it to the SO. May accept electronic devices from consumers as a collector and receive reimbursement from the SO. Assist with public outreach and education by providing point of purchase consumer information.
- Collectors, Recyclers/Processors – Multiple approaches can be taken: 1) collectors and recyclers contract with the SO to accept and appropriately handle covered electronic waste and receive reimbursement from SO; 2) SO selects smaller group of recyclers through a competitively bid process to appropriately handle e-waste on their behalf and receive reimbursement from the SO; or 3) the state (CalRecycle) approves recyclers to participate in the program who then contract directly with the SO to provide processing services. Other models are also possible, but any model must include the following elements:
    - Collectors and recyclers receive reimbursement from SO for appropriate and compliant collection and processing activities.
    - Collectors and recyclers must follow all applicable statutes and regulations for managing hazardous materials.
    - Recyclers must be certified by third party organization (R2 or e-Stewards) or equivalent operating standards.
    - Submit annual reports to SO and CalRecycle.
- CalRecycle – Provides oversight and enforcement of program; reviews and approves plans, budgets and reports from the SO to determine if program goals are being met. Ensures that independent third party audits are conducted for both financial and non-financial performance aspects of program implementation. Assesses fines and penalties if the stewardship organization is found to be out of compliance.
- DTSC – Oversees and enforces the management of hazardous waste.
- Local government entities – Continue to accept electronic waste at existing HHW collection facilities/events. May act as collector via contract with producers or SO and receive reimbursement for compliant collection activities from SO. Assist with public education and outreach.
- Consumers – Pay fee when purchasing a covered device if a visible fee is established in legislation. Responsibly handle electronic discards by delivering to authorized collector or recycler.

Financing – Legislation authorizes a financing mechanism that is sufficient to fully cover the costs of the SO's e-waste collection and recycling program, including state administrative costs and education/outreach efforts.

- Requires program costs to be internalized similar to other costs of doing businesses (see Image 2, page 15) or establishes a visible point-of-purchase

consumer fee (See Image 3, page 16).

- Costs must be apportioned in an equitable manner determined by market share or a combination of market share (based on manufacturer share of current or recent sales) and return share (based on brands returned in the system plus a share of orphan products. Specific financing scheme is established in legislation. Several models are used in other states and countries; CalRecycle would analyze these approaches to determine the most effective model for California.
- Collectors, recyclers and local governments must be fairly compensated for appropriate collection and processing activities conducted under the program; including labor, transportation and processing costs.
- No end-of-life fee can be charged to consumers for discarding covered products.
- "Modulated fees" can be incorporated to provide cost relief for certain environmentally desirable design features (e.g. recycled content, upgradeability, longevity); or conversely, to add cost if environmentally undesirable features are present (e.g. amount of toxic materials).
- Authorizes an account at CalRecycle to accept fees/penalties dedicated to program-related enforcement and oversight activities.

Goals and Measurement

- Clear, measurable and enforceable goals are established in legislation or by CalRecycle if so delegated by legislation.
- Must include both performance goals (amount of material reused or recycled) and convenience goal (adequate recycling opportunities for public).
    - Performance goal concepts – Various approaches have been used. Examples include: 1) industry- wide weight-based collection and recycling goal (potentially pounds per capita); 2) recycling target allocated on a proportional "market share" for each registered MFR/PR based on sales of covered products; 3) proportional "return share" with recycling targets apportioned to MFR/PR for products of their own brands returned through the system over a certain number of years; 4) combination of market share and return share. One challenge with market share is light-weighting of devices. One approach that has been used elsewhere is establishing recycling target by unit rather than by weight or by weight of the specific material of concern (e.g. battery or lamp) rather than the whole device. Some countries have established a per pound penalty for not reaching the recycling target and allow, "trading or selling" of any excess pounds collected. To ensure rural coverage and encourage reuse, some states/countries provide "extra credit" for collection in very rural/remote communities or for donations to schools or nonprofits.
    - Convenience goal – Collection opportunities must be provided year round and available to residents in rural areas. Examples of collection goals include a minimum of one collection opportunity per 10,000 residents and one per county; 90% of population must reside within 15 miles of collection opportunity. Either of these approaches should be coupled with a

rural/remote goal; either access to at least one annual collection; or a collection opportunity within 25 miles of miles of retailer selling similar device assumes that if consumer travels to retailer to purchase, they can travel same distance to recycle).

Stewardship Organization Plans, Budgets, and Annual Reports

- The SO or individual MFR/PR will conduct business in a transparent manner and is accountable to CalRecycle for implementation of their plan. Plans and reports will be approved by CalRecycle in a public meeting.
- The SO or individual MFR/PR submits a Stewardship Plan that describes the collection, processing and ultimate destination for covered products and demonstrates how the primary goals will be achieved. The Plan should also include strategies for managing and reducing the life cycle impacts of a covered product, for example: reduction in the use of hazardous substances; reuse, reparability and product longevity; the use of virgin material in the manufacture of a product; recycled content.
- Program performance must be demonstrated by the SO or individual MFR/PR via annual reports. Reports must contain sufficient data for CalRecycle to determine if the goals in the Stewardship Plan are being achieved and to enforce the requirements of the law including: pounds of e-waste collected; source of all devices collected and claimed; pounds transferred to another recycler; pounds recycled; and ultimate destinations (see also Environmental Responsibility section).
- The Stewardship program will include the establishment of an Advisory Committee comprised key stakeholders to provide input on the Stewardship Plan and ongoing feedback during program implementation.
- Budgets (submitted in stewardship plan for approval by CalRecycle) must be sufficiently detailed to describe how all program costs will be covered. Budget also must outline a contingency plan should anticipated revenue not cover program activities for the full year. Program must be offered on a continual basis and meet the convenience standard even after collection goals are realized.
- Budgets must provide transparency and verify that funds generated in California are spent on the California program.
- Independent, third party audits are required of the financial systems and the collection and processing systems including ultimate dispositions of e-waste and associated residuals.

Materials Management Standards – Program operations and materials management activities must be compliant with existing rules regarding hazardous and universal waste management for electronic devices (DTSC regulations[33]) and must conform to US EPA regulations.

- SO is responsible for ensuring that products are managed for highest and best use according to California's solid waste hierarchy (e.g., address source

[33] http://www.dtsc.ca.gov/HazardousWaste/ewaste/index.cfm

reduction, product design, reuse and materials recovery in addition to recycling).

- Encourages domestic processing and utilization of recycled materials.
- Retain existing E-waste program's requirement that recyclers must dismantle device before claiming it toward their recycling target.
- SO ensures that downstream processors adhere to best management practices that minimize negative environmental outcomes within the state and elsewhere.
- Recyclers must certified by a third party organization such as R2 or e-Stewards or equivalent.
- Annual reports submitted by SO detail end use destinations for all material claimed in the program.

Enforcement – Legislation authorizes CalRecycle to take enforcement action for non-compliant activities including sales bans and the levying of fines and penalties.

- Provides enforcement provisions in conjunction with existing provisions and enforcement for management of hazardous and universal waste by DTSC.
- Ensures that any penalties assessed on SO or individual MFR/PR are not paid for using program fee assessments but rather paid for by MFR/PR.
- Administrative costs for state for oversight and enforcement activities are covered by MFR/PR registration fees; or otherwise reimbursed by the SO's financing plan.

Education & Outreach

- SO or individual MFR/PR has lead role for consumer outreach and education. Efforts should be coordinated with retail outlets to ensure that point-of-purchase information is provided to consumers purchasing electronic devices. Point of purchase information should include statement that device may be hazardous and must be disposed appropriately. Also must provide information on how/where to dispose of device.

Reuse, Repair and Design for the Environment

- MFR/PRs will work towards enhancing durability of their products, promoting repair and reducing waste. Could work with a trade organization to develop durability and recyclability standards. (E.g. American Plastics Recyclers developed Design for Recyclability guidelines.) Products should be designed to facilitate repair, recycling and minimize negative environmental impacts; e.g. longevity, ease of disassembly, recycled content, and reduced hazardous materials in products. One legislative approach is to incorporate "modulated fees" to provide cost relief for certain environmentally desirable design features (e.g. recycled content, upgradeability); or conversely, to add fees if environmentally undesirable features are present (e.g., amount of toxic materials).

Appendix III

Consideration of Adding New Products as Covered Electronic Devices

(NOTE: This document was presented at the October 11, 2017, stakeholder workshop. The Product Selection Criteria Table is not included in this document as it is no longer relevant. It can be found on the Futures of E-Waste page, http://www.calrecycle.ca.gov/Electronics/Future/Default.htm

One of the key questions in looking at the future of the CEW program is considering whether new product categories should be added to the definition of a covered electronic device. The Electronic Waste Recycling Act of 2003 narrowly defines Covered Electronic Devices (CED) (Public Resources Code 42463(e)(1)) as follows: "Except as provided in paragraph (2), "covered electronic device" means a video display device containing a screen greater than four inches, measured diagonally, that is identified in the regulations adopted by the department pursuant to subdivision (b) of Section 25214.10.1 of the Health and Safety Code." The Program is now 14 years old and some of the electronic products of today were not even on the market when the law was written. Many stakeholders including local government officials and e-waste recyclers have stated that there is a strong need to expand the definition of CED to maintain the existing collection and recycling infrastructure, prevent illegal dumping and provide convenient opportunities for California residents.

Several approaches could be taken to select new devices to be covered in the program, as described below. Any approach has challenges including complex definitions and limited reliable data/information on products (e.g., toxicity), and any approach would require legislation to either define products or authorize a rulemaking process to do so. This draft paper presents two possible approaches for discussion at today's workshop:

1. Select an approach that is already used by other states or countries.
2. Undertake a process to define and select various product categories for a potential enhanced California program.

Information on approaches used in other states and countries was briefly discussed at the June 20, 2017 workshop[34], (see Attachment 2 "Potential Product Categories and Definitions). The Waste Electrical and Electronic Equipment (WEEE) Directive defines e-waste as equipment which is dependent on electric currents or electromagnetic fields to work properly. With a few exemptions, if a device has a battery or needs a power supply, it is included in the WEEE definition. In Canada, covered products vary by Province, but all include televisions, computer monitors, CPUs, keyboards, cables, mice, speakers, printers, laptops, notebook computers, and tablets. British Columbia has gone further by identifying an extensive list of covered products similar to the WEEE Directive. Twenty-four other U.S. states have e-waste recycling laws, and covered products vary widely among these. All states include monitors and all but three include televisions. Other

[34] http://www.calrecycle.ca.gov/Actions/PublicNoticeDetail.aspx?id=2094&aiid=1911

commonly covered devices include desktop computers (22 states), e-readers (15 states), printers (14 states), keyboards and peripherals (9 states) If CalRecycle were to adopt one of these existing schemes, legislation would be required but an extensive evaluation and rulemaking process (i.e., the second approach) should not be required.

The second approach is much more complicated. To implement this approach, legislation would be needed to authorize it and then a rulemaking would be needed. To illustrate how this approach might be implemented, the remainder of this document and the associated E-Waste Product Selection Criteria Table describe a qualitative evaluation exercise recently undertaken by CalRecycle staff. CalRecycle staff presents this description and table as a starting point for analyzing product categories and is not making a specific recommendation at this time. Staff used the criteria discussed at the June workshop (i.e., current management, toxicity, prevalence in the waste stream, trends and material recovery value) to evaluate product categories. As part of the overall assessment, staff also considered additional factors such as compatibility with current collection and recycling infrastructure, technological challenges, ease of processing, timeline (when would the products become waste), support of the circular economy/resource recovery etc.

In undertaking the qualitative evaluation of product categories, staff gathered readily available data and information. However, more extensive information that could inform this exercise is not readily available in the public domain. Staff used available information to evaluate product categories as falling into one of three general classifications regarding whether or not they should be considered for inclusion in an e-waste management system: high, medium or low. The final column in the E-Waste Product Selection Criteria Table contains a brief explanation of why CalRecycle staff has considered that a product category falls into a particular classification.

This approach has many caveats and limitations, and the evaluation presented here is illustrative only. If the State were to implement this approach, determining how to best do so would require significant discussion with stakeholders and decision makers. Some of the issues arising during the evaluation exercise include:

1. Lack of product specific data regarding composition, toxicity, current recycling methods, sales and use trends, etc. The table is based only on information readily available to staff.
2. What is considered the “product” for the purposes of evaluation and the management system? Should emphasis be placed on a whole product or the component of concern, for example printer versus toner cartridge?
3. Should the product be targeted only at end of life or also further upstream (e.g., to address design/planned obsolescence issues)? This could be notable for some products; e.g., the average lifespan of small household appliances has been cut in half over the last decade.
4. Some categories are adequately covered by existing market, e.g. white goods retail take-back. This raises the question of what the difference is between the current management structure and the gains that could be realized from adding devices to the program.
5. Is collection and recycling of the product category feasible? If the product is added

as a CEW, evidence of proper processing and residual flow becomes a relevant consideration. It would be necessary to define what constitutes sufficient processing.

Currently, CED determination requires Department of Toxic Substances Control (DTSC) to determine which covered devices exhibit hazardous characteristics when disposed. Depending on the scope of products targeted for inclusion in an expanded program, changes might be needed regarding how CED determinations are made. The authority to determine acceptable methods of disassembly and treatment also is within DTSC's purview, and DTSC decisions on this affect the economic feasibility of processing products. Expanding the scope of products in the program thus would require discussing many aspects of DTSC's role.

At the October 11, 2017 workshop, the attached E-Waste Product Selection Criteria Table will be used to initiate a dialogue with stakeholders. During the discussion, other approaches may be suggested and explored. Are some criteria more important than the others? For instance, how does consumer convenience compare to the amount of toxic materials used in a product? If there is high value in recovering materials from a device, does that mean that the product category should not be considered even if it can be handled in the same collection and recycling scheme?

Stakeholders are invited and encouraged to provide data that would fill in the gaps and assist in this evaluation. Stakeholders also are encouraged to submit written comments following discussion at the workshop. CalRecycle may present recommendations at a future Public Meeting.

Appendix IV

Encouraging Reuse, Repair and Product Longevity

(NOTE: This document was presented at the October 11, 2017, stakeholder workshop. Some statistics are out of date; e.g. 18 states have now introduced right-to-repair legislation.

The Electronic Waste Recycling Act of 2003, (SB 20) established a comprehensive system for the collection and management of electronic waste in California, accomplished primarily through a consumer fee and recovery/recycling payment system. The program has been very effective at building an extensive network for the collection of e-waste and ensuring proper handling and processing of covered electronic wastes (CEW).

In addition to the CEW program, SB 20 envisioned a system that would "… provide incentives to design electronic devices that are less toxic, more recyclable, and that use recycled materials." (PRC 42461(a)). The statute also encourages that "… products, components, and devices, to the greatest extent feasible, should be designed for extended life, repair and reuse." (PRC 42461(g)).

Manufacturers of electronic products are charged with certain responsibilities including consumer information, brand labeling, and annual reporting (PRC 42465.1). Manufacturers are required to report annually to the Department (PRC 42465.2) and provide information on CEW sales, the reduction of hazardous materials used in products, the increase of recycled content materials in products, and efforts to increase product design for recycling. However, since no measurable performance targets were included in the legislation, the Department's only enforcement tool is whether the required report is submitted. Consequently, the Act has had little to no impact on product design. Electronic waste management systems that have been implemented in other states and countries, based on an Extended Producer Responsibility or Product Stewardship approach, have also not had a significant impact on environmentally preferable product design. (E-Scrap Conference session 2016, "Assessing the EPR 'Experiment'[35]; Electronics EPR: A Case Study of State Programs in the United States"[36] 2014).

However, in response to consumer preference and environmental impacts, manufacturers have taken steps to design products that are lighter weight, use less material, and are more energy efficient. (EPSC Canada 2016 Design for the Environment Report)[37] Many manufacturers use the Electronic Product Environmental Assessment Tool (EPEAT) to promote the environmental aspects of their products to large purchasers. EPEAT standards were developed through extensive stakeholder

[35] https://resource-recycling.com/e-scrap/2017/04/13/assessing-epr-experiment/

[36] http://c.ymcdn.com/sites/www.productstewardship.us/resource/resmgr/Electronics_Reports_Factsheets/2014.07.17_PSI_Case_Study_US.pdf

[37] http://epsc.ca/2017-design-environment-report/

engagement and address multiple environmental attributes such as reduction/elimination of environmentally sensitive materials, design for end of life, product longevity, minimum content of postconsumer recycled plastic, energy conservation, and packaging.

After the passage of SB 20, many stakeholders were disappointed to learn that the Act did not specifically incentivize reuse since devices destined for reuse or repair, rather than for recycling, did not qualify for reimbursement. Even so, for the first several years of the Program's implementation, many stakeholders reported that functional devices or components such as laptops, tablets, or RAM retained sufficient economic value to encourage reuse or resale after needed repairs were made.

With rapidly changing technology and global markets however, that statement may no longer be valid. As mentioned above, some manufacturers are designing their products to use less precious metals and hazardous material. Moreover, the materials within the product that retain value or require special attention due to their hazardous nature are more difficult to access. For example, components such as batteries or memory may be inaccessible or infeasible to harvest or replace due to solder or proprietary fasteners. Consequently, instead of replacing or repairing a failed component, the entire device is discarded or shredded. When this happens, due to the hazardous nature of universal waste, environmental or regulatory issues can occur when certain components (e.g., batteries) are not identified and removed prior to a device being shredded.

The concept of repairing electronic devices with a goal of extending their usable life has gained increasing attention in the past few years. Various organizations (such as The Repair Association and iFix-It) have begun to address this issue and are pushing for reform. Legislation has been introduced in eleven[38] states to require manufacturers to provide access to information, diagnostic tools, and affordable replacement parts needed to repair products. Known as "right-to-repair" bills, none has yet passed for electronics. Other countries and trans-national governmental entities, particularly Canada and the European Union, are looking for ways to promote reuse through additional reporting and collection targets[39].

A significant new development in the right-to-repair issue is the May 30, 2017, Supreme Court decision[40] in the Impression Products vs. Lexmark International Printer company case. Lexmark International recently sued Impression Products, its competitor, for patent infringement, as the latter was refilling Lexmark's cartridges. Lexmark sought to control the use of its cartridges by preventing other companies from reusing and recycling them. The Court ruled that producers cannot control a product through patent law after the product is sold. This may spur further interest in the reuse issue because businesses or individuals who refurbish, repair or resell used products are now protected from patent infringement claims. The ruling also prevents manufacturers from forcing consumers to buy supplies only from the original source.

One concept used in other countries to stimulate environmentally preferable product design is the implementation of modulated/disruptor fees. A modulated approach adjusts

[38] Update: As of March 2018, eighteen states including California have introduced right-to-repair legislation

[39] http://ec.europa.eu/environment/waste/weee/pdf/16.%20Final%20report_approved.pdf

[40] https://resource-recycling.com/e-scrap/2017/06/01/supreme-court-decision-aids-repair-industry/

fees according to specific design features of a product. A reduced fee may be charged on products with more environmentally preferred attributes while an increased fee is placed on less desirable characteristics. For example, in Europe where modulated fees have been widely employed, fees are reduced when a product is easy to recycle or contains less hazardous materials. In France, the fee for portable computers or TVs containing brominated flame retardants increased by 20% while the fee for LED lighting as opposed to conventional lighting is reduced by 20% owing to the absence of mercury and the long life cycle. With this approach, certain materials and products designed with end-of-life management in mind have a clear price advantage.

Newly passed legislation in France requires manufacturers to tell consumers how long their products will last and how long spare parts for the product will be available. Manufacturers will also be required to repair or replace faulty products at no cost to the consumer within two years of being purchased.

Discussion

Following are some key topics concerning reuse, repair and encouraging product longevity. CalRecycle seeks stakeholder input on these through discussion at this workshop and in writing.

1. Reuse – Do products in working condition retain sufficient value to encourage reuse over cancellation or should more be done to incentivize reuse?
2. Repair – What are common reasons that products “fail to perform”? Can they be fixed by replacing one or more components if they were readily accessible?
3. How can we encourage design to make reuse, repair and recycling more efficient and cost effective?
4. Are there specific attributes of a product that would make it easier (or more difficult) to dismantle or recycle?
5. Would modulated fees be effective in encouraging more environmentally preferable product design?
6. From a policy perspective, should legislation be amended to incentivize reuse and repair? How?