Oregon Department of Environmental Quality

Background Material: Feedback from Interested Parties on Proposed Standards and Methods for Evaluating the Life Cycle Impacts of Covered Products

Plastic Pollution and Recycling Modernization Act (SB 582, 2021)
Rulemaking Advisory Committee Meeting 5, Rulemaking 2

Feb. 1, 2024

The table below summarizes and paraphrases feedback that DEQ received on proposed standards and methods for evaluating the life cycle impacts of covered products. DEQ received input from a topic-specific Rulemaking Advisory Panel (RAP) and from other interested parties. Much of the feedback was submitted to DEQ in response to two separate Requests For Information that DEQ published in the spring and fall of 2023. Changes made to the DEQ rule concept based on feedback received are indicated in bold in the "DEQ Rule Concept" column. Feedback on each of the 10 current rule concepts is presented initially in the table, followed by feedback which may inform future rule concepts or directly inform the draft rule language.

Rule concept number	Item(s)	DEQ rule concept or plan for draft rules	Feedback from the Rulemaking Advisory Panel	Feedback from other interested parties
Clarifying Rules				
1	Defining one percent Calendar for disclosure Requirements for subsequent disclosures	• Define one percent by Stock Keeping Unit (SKU). • Producer should assess the top one percent of SKUs by **Oregon sales volumes**. • **Batch assessments can be performed covering multiple SKUs that represent products of multiple sizes that fulfill the same function (i.e., for a product line or family)**.	Ordering a producer's SKUs by Oregon sales revenues to select the top one percent places emphasis on the primary packaging, even though secondary and tertiary packaging account for considerable volumes of overall packaging. This is fine if secondary and tertiary packaging are required for inclusion in the assessments; it may even be appropriate	*Ameripen:* Conducting the assessments at a format or category scale rather than SKUs could generate broader lifecycle data in aggregate, as many producers use the same or very similar packaging. If using SKUs, Ameripen supports the batch assessment concept. Producer assessments should be conducted in coordination with the PRO to ensure consistency. Disagrees with using sales revenues to order SKUs; recommends using sales volumes or weight. Give producers the option to use national data. *Astro-Nought:* Require all SKUs associated with a particular batch LCA to be reported. Cross-reference SKUs with UPCs to allow consumers access to the LCA information via the barcodes on products.

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		• **Assessments will cover any secondary or tertiary packaging associated with the SKU, as well as the primary packaging, but not the product itself.** • First disclosure deadline of Dec. 31, 2026. • Producers who weren't in the top 25 when interim market share rankings were published in September 2025 but then were included when updated data were published in August 2026 get an extra six months. • If still a large producer two years later, the subsequent disclosure must not duplicate SKUs from the prior disclosure (rank SKUs again and take the next one percent). • Can repeat assessment of a SKU after 10 years (or earlier if all SKUs have been assessed).	because producers will have more control over primary packaging.	*EEQ (PRO in Quebec):* A single large producer could sell up to 25,000 SKUs into a province or state, so one percent could amount to 250 SKUs. *GPI:* It is unclear how the assessment results will be used by the department. The results for the top 25 producers may not be representative of all packaging discarded by the residential sector. *P&G (Proctor & Gamble):* Supports SKUs as the appropriate scale for disclosures and recommends the one percent be defined using Oregon sales volumes (rather than revenues). Give producers the option to use national data. *PCPC (Personal Care Products Council:* Some producers will not want to disclose their top one percent of SKUs by sales revenues, so DEQ should instead require disclosures for the top one percent of products by volume. Regarding inclusion of secondary and tertiary packaging in an assessment, it can be particularly hard for a producer to keep track of packaging used for palletization and to track tertiary packaging in e-commerce.
2	Mandated eco-modulation bonuses	**There must be bonuses for** **1. Simple life-cycle impact disclosure; and** **2. Actions that substantially reduce life cycle impacts measured through the standards and methods established in rule.**	• Life cycle impacts (ORS 459A.844(4)(d)) evaluated according to standards and methods established in rule can account for the other statutory factors required to be taken under consideration in developing an eco-modulation approach, i.e., post-consumer recycled	*[Feedback to inform the question of whether or not DEQ should mandate particular LCA-based eco-modulation bonuses in rule, effectively emphasizing ORS 459A.844 (4)(d) above (a)-(c) and (e).]* *ADEME (French regulatory agency):* (general advice on ecomodulation) In order to craft an effective ecomodulation formula, you need to know your market and gather a lot of background data. Identify your priority and then the attribute that will achieve the priority.

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		Bonus #2 must be larger in magnitude than bonus #1. Bonus #2 shall also be granted in a tiered structure (e.g. a 10 percent reduction in normalized/weighted score results in a smaller bonus than a 20 percent reduction, which results in a smaller bonus than a 30 percent reduction, etc.). Bonus #2 will be granted only for actions taken directly by a producer and cannot be earned passively. Bonus #1 can be claimed (in any given year) for **100 SKUs only**, to avoid overly benefitting large producers with in-house LCA expertise. Define criteria for what constitutes a "substantial impact reduction" for the purposes of Bonus 2 (see next row below). The two mandated bonuses do not preclude the PRO from proposing other bonuses and maluses in its program plan.	content, product-to-package ratio, choice of material, and recycling rate. Important considerations include rules for allocation of recycling benefits and what the unit of reporting is, i.e., functional unit (which would account for product-to-package ratio) or declared unit (which would not). • Need to be specific about what SKUs can and cannot be batched together in a batch assessment. • Reconsider the limit on how many SKUs can be awarded Bonus #1, as it could hold back the amount of disclosure achieved.	*CAA (Circular Action Alliance, prospective PRO):* PROs should have complete flexibility in terms of determining the approach to eco-modulation. *CCNA (Carton Council):* LCAs should be weighted more heavily than the other four statutory factors. *CMI (Can Manufacturers' Institute):* weight LCAs more lightly than product-to-package ratio and recycling rate. *EEQ:* EEQ awards 10 percent bonuses for "case studies" that involve demonstrating benefits using a rapid LCA tool operated by EEQ. The rapid tool looks at climate impacts only. *GPI (Glass Packaging Institute):* Generally opposes the use of LCA to inform eco-modulation due to its failure to encompass emergent impacts of plastic and potential to overburden implementation. Opposes bonuses for voluntary disclosures of life cycle impacts if the assessments are built off of incomplete data or are missing information on emergent impacts. Considers that post-consumer recycled content and recycling rate need to be considered as part of ecomodulation and outside of LCA since the purpose of the policy is to ensure recycling of printed paper and packaging. Ecomodulation criteria should furthermore not be solely on life-cycle impacts due to the continuing flaws in in the data available to truly understand many toxics/chemical impacts of plastics, paper and metals recycling on the environment. *P&G (Procter & Gamble):* Recommends that DEQ focus on only a few critical factors in initial eco-modulation for ease of implementation. Other criteria identified in the statute (i.e. choice of material, inclusion of PCR, product to package ratio, and recyclability of the packaging material) are the prime determinants of the LCA footprint for packaging [anyways]. • The LCA footprint is heavily influenced by available recycling infrastructure—so don't use LCAs to determine fees prior to infrastructure improvements. • It is also important to ensure that packaging continues to meet its functions for human safety and health: incentivizing the minimization of packaging too much could have negative consequences. • Limiting bonus #1 to only 10 SKUs renders it unattractive to a large producer—the cost of doing the assessments will exceed the value of the bonus received.

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				Tillamook: The factors discussed in ORS 459A.844 (4)(a)-(c) should be weighed equally with factor (d), or perhaps with greater value when evaluating the environmental impacts of covered products. Factor (e) should be weighed to a lesser extent as producers do not have the ability to control consumer behavior nor do they have the ability to control the system for collection of covered product materials. Points made in support of this opinion: • Packaging can impact shelf life and the integrity of products sold. While a traditional LCA might explain how different materials impact the environment, they do not give weight to how their durability or use delivers other environmental benefits. • Producers that choose packaging materials and forms to maximize/preserve shelf life should not be penalized for this choice if the material is not "recyclable" or otherwise is considered trash. In fact, if producers choose materials that are scientifically proven to maximize shelf life and reduce waste, such choices should be incentivized, and this factor should be weighed heavily relative to LCA assessment results. Maximizing shelf life for food items means less greenhouse gas emissions resulting from food waste. • In the case of perishable foods, material choices are often limited and heavily regulated at the federal level. When certain foods are limited in material choice for packaging and those materials are currently not recyclable or packaging needs to be opaque and include a moisture resistant coating to meet food safety standards, such criteria should not be penalty factors as is seen in some eco-modulation structures. *Wasco Co:* the five statutory factors should be weighed equally in an ecomodulation formula.
2	Defining "substantial impact reduction"	• A substantial reduction in impacts is defined as **more than 50 percent impact reduction across 13 impact categories** (the 16 categories from Product Environmental Footprint Category Rule (PEFCR), minus the 3 toxicity impacts, and plus the emergent	• To be effective, impact categories must be prioritized. Don't shy away from this. • The thresholds for substantial reduction need to be high enough to not be within the range of error.	*Ameripen:* Exclude human health and ecotoxicity impact categories from the priority list due to error exceeding the bonus thresholds. Exclude the plastics ecosystem impact category because it is emergent and not yet widely-accepted. The concept unduly disincentivizes material-switching to plastic. *CMI:* Supports the inclusion of the plastics impacts on ecosystems impact category among priority impact categories. *GPI:* A 50 percent threshold is very aggressive for glass and may be impossible to achieve. Achievement may depend upon the development of more clean energy infrastructure [rather than

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		impact category of plastics impacts on ecosystems). • In order to roll up midpoint results for each impact category into a single overall score, **normalization factors and weighting factors representing relative harm to ecosystems and developed for the PEFCR will be applied.** • DEQ will in consultation with the Rulemaking Advisory Committee ascribe a weighting to the plastics impact on ecosystems impact category (not included in PEFCR), and proportionally reduce the weightings of the other impact categories.	• Error ranges for the human health and ecotoxicity impact categories exceed the thresholds proposed for applying the bonus; therefore, these impact categories should be removed from the list of priority categories. • Consider including water use and land use among priority impact categories, as they are important impacts of paper production. • The 75/25 percent rule from RFI #2, in a case of material-switching to plastic, would practically apply as a pass/fail (i.e., no bonus for material-switching to plastic), and unjustly prioritizes the plastic impacts category above the other categories. • Normalizing and weighting impact categories to result in one score could be the best solution in terms of simplicity. Due to constraints, it would be appropriate to use normalization and weighting factors developed under another project. • Consider following PEFCR guidance 7.4.1 to select priority impact categories (normalization and weighting approach).	producer action]. Ideally for small producers there would be a way to achieve the substantial impact reduction bonus without a comparative LCA, which could be prohibitively costly to apply. *GreenCircle:* Oregon DEQ may want to consider lowering the proposed thresholds to encourage more producer action. *Multiple producers:* The bonus for substantial impact reduction may not be fair in that it would only reward behavior going forward and not past producer actions. Producers that would stand to gain the most are those that have taken the least action to date. *P&G:* Use endpoint scores rather than midpoints, or normalize and weight impact categories to get to a single score. This is appropriate because not all the referenced impact categories are equally relevant. Eutrophication, for example, is a very localized issue. The proposed approach to plastics impact on ecosystem [which wouldn't attribute a bonus for material switching to plastic] is not based on clear scientific grounds. *PCPR:* The 50 percent threshold is too high.

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			• Consider options for normalization – using global vs internal factors, applying a non-linear normalization to toxicity impacts in order to include them in consideration for the bonus, etc.	
Standards and Methods				
3	General approach to rules`	Develop a general product category rule (PCR) equivalent that can encompass all covered products under the RMA. Lean on existing PCRs and normative standards for deriving PCR content, with a particular emphasis on ISO 21930 for the underlying structure of the PCR, and on PEFCR, ISO 14040, ISO 14044, and ISO 14025 as sources for content.	• Development of a Product Category Rule is well-suited to DEQ's purpose. • For an analyst/producer conducting an assessment, it will be most user-friendly if the entire PCR is laid out in rule. • Drawing upon ISO 21930 for the rule structure is appropriate. DEQ could consider rather leaning more heavily on the European Commission's PEF methodology, but problems could result due to the PEF's being developed for the European rather than the US context.	*[Recommendations on normative standards to adopt or draw content from]* *Ameripen:* Concerned that ISO 21930 hasn't gone through rigorous public scientific vetting for evaluating packaging. Recommends drawing primarily from the European Commission's PEF methodology. *CAA:* Recommends ISO 14040/14044. *Dow:* ISO 14040/14044/14067 standards for LCAs and PCFs accordingly, PlasticsEurope eco-profile program and methodology, Together for Sustainability (TfS) PCF guidelines, PEFCR guidance. *GPI:* Supports the use of ISO 21930 for the structural backbone pending stakeholder review in public comment. *P&G:* Concerned that ISO 21930 hasn't gone through rigorous public scientific vetting for evaluating packaging. Recommends drawing primarily from the European Commission's PEF methodology. Also recommended referencing the EN standards and RecyClass industry guidelines in rules.
3	Unit of assessment	**Functional units to be set by the analyst in alignment with a list of product categories covered under the RMA and put into rule.**	• Need to use functional units to enable the before-after scenario analysis underpinning the substantial impact reduction bonus. • There is some limited potential for producers to "game" the bonus using the	*Astro-Nought:* use functional units in order for the assessment results to have more relevance for consumers. *Dow:* recommends use of functional units. *EPS Industry Alliance:* concerned about original recommendation to use declared units, as use of a weight-based rather than volume-based unit for protective packaging could yield results favoring more environmentally-impactful materials.

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			flexibility to set the functional unit.	*P&G:* recommends use of fixed mass units of a material type (e.g., 1 ton) per package placed on the market (declared units).
4	Impact assessment methodology	DEQ proposes: • **Mandatory inclusion of all 16 impact categories from the latest PEFCR environmental footprint methodology and assessment of impacts following the normalization and weighting scheme within the PEFCR methodology,** • **Mandatory reporting of hazardous waste release and hazardous substances embedded in products as required under ISO 21930, Sections 7.2.14, 8.4.1, and 8.4.2.** • Optional inclusion of emergent impact categories and methodologies including, but not limited to: ○ MariLCA plastic ecosystem impacts (required for inclusion if seeking the substantial impact reduction bonus) ○ S-LCA (social LCA) indicators ○ LCIA based on Planetary Boundaries, and ○ Damage cost factors through natural capital accounting.	• Recommend requiring some but not all of the indicator reporting from ISO 21930, as some of this data may not mean much in isolation.	*[Recommendations on where to draw impact assessment methodologies from and which impact categories to include]* *Ameripen:* Recommends using the 16 impact categories in PEF. Ok to include the emergent impact categories as they generate info relevant to product design and end of life disposition, but they should be optional out of concern for cost and time needed to conduct the assessments. *CAA*: Use the10-15 impact categories in commonly-used LCIA frameworks. Use methodologies from EPA TRACI, and IPCC for GWP. *CMI:* "Emergent impacts" of plastic should be captured inside or outside of life cycle analysis and impact eco-modulation *Dow:* DEQ could apply the impact categories from TRACI, EF 3.0, RECIPE midpoint H, or the PEFCR guidance. *GPI:* supports the general approach to impact categories being derived from ISO 21930. Microplastics, marine debris and other criteria should also be included. Would like to know more about how the LCA results mandated in ORS 459A.944 will be used in order to provide feedback regarding the optional emergent impact categories. *MariLCA:* Recommends mandating inclusion of "impacts of plastics on ecosystems" among impact categories, and that would allow the encompassed impact sub-categories to evolve over time (and allow for physical impacts on marine biota to be included in LCAs conducted at the start date in 2025). *P&G:* Recommends using the 16 impact categories in PEF – comprehensive, developed in a consensus-based process, and developed for use on products and their packaging. As for the proposed emergent impact categories, LCIA based on Planetary Boundaries is relevant and may help to define relevant indicators better than the selected prescribed human toxicity and ecotoxicity impacts and indicators. The other

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		• Generation of midpoints for impact assessment and environmental indicators.		emerging areas are not sufficiently advanced for practical implementation at the current time. *PCPR:* Recommends alignment with the SPICE tool. *Wasco Co:* Emergent impacts, such as microplastics and marine debris, should be included. They could be captured by factoring in a percentage to each products impact as being microplastic/ marine debris as we can't fully guarantee that the item won't end up being either.
5	Plastic leakage inventory data requirement	Require the application of Plastic Footprint Network methodologies (derived from Plastics Leak Project) to measure/ estimate the flow of plastics into or out of a covered product system. This will allow quantification of all plastic leakage across the life cycle of a covered project and support the use of the MariLCA impact methodology. **No primary or secondary reporting requirement is proposed. Though, consistent with the data quality requirements of ISO 14044:2006 Section 4.2.3.6, primary data is preferred for its representativeness.**	• The point is to draw attention to the issue, which this will do. • [regarding the idea of additionally requiring the reporting of primary data on plastics leakage] At present practically no one is collecting primary data on plastic leakage, so could be too burdensome to require it. However, collection of primary data may be part of a pathway to mitigation of a leakage problem.	*Ameripen:* Not confident that the plastics leak project provides a reliable method for tracking material flows. Concerned about undue burdens on producers who lack holistic line-of-sight into the entire supply chain, including end-of-life disposition. Requirement on PROs to track materials through to disposition also seems adequate to address this concern. *P&G:* The plastics leakage project is likely adequate to track leakage but not impact from leakage. As leakage is a shared issue and not only owned by producers, this (putting the onus on producers to track leakage) needs discussion. *PCPR:* the ability to track plastic leakage is not adequately robust, localized data are needed—for example, on recycling and landfilling rates. Onus should be on the PROs or DEQ rather than the producers. Also--recyclable plastics, if properly disposed of, do not impact ecosystems. Methodology should reflect this.
6	Updated data requirement for addressing methane leakage	Require the use of data that reflects the latest understanding of methane leakage (i.e., the most recent inventory data, especially for polymers).	• A lot of work is being done to understand the problem of methane leakage, which if adequately accounted for is known to increase GWP outcomes by 20-30 percent.	*Ameripen:* Methane is adequately accounted for in LCI datasets for oil and gas, as well as waste management, so no action needed. Requiring primary data reporting would impose an undue burden on producers. *P&G:* Methane leakage upstream is likely less relevant than what is released in different end of life options.

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		No primary or secondary reporting requirement is proposed. Though, consistent with the data quality requirements of ISO 14044:2006 Section 4.2.3.6, primary data is preferred for its representativeness.	• Oil and gas life cycle inventories have been updated to account for leakage, but life cycle inventories for polymers, broadly-speaking, have not yet been updated. This gap should be filled by the RMA's start date, however. A requirement to use the latest data should keep producers from underreporting GWP.	*PCPR:* Requests additional information for understanding why DEQ is proposing a rule focused on this issue. Regarding the concept of a primary data reporting requirement, notes the lack of specific methodologies for tracking methane leakage. *Rocky Mountain Institute (RMI):* Set a primary data threshold for methane leakage emissions, mold injection stage emissions and share of resins used for production and/or require request of data further up the supply chain.
7	Evaluation of reusable products	• **Define "reusable product" a product that is a) designed for reuse, b) durable, c) supported with adequate commercial or publicly-owned infrastructure to enable the highest and best reuse, and d) actually reused.** • **Assessments of reusable products must incorporate the following key parameters:** ○ **Use-phase variables for customer transportation for return (mode/distance) and the washing and sterilization process** ○ **Return Rate – factor to account for breakage, losses, or yield across each reuse cycle** ○ **Expected number of reuse cycles** • **Producers can use projections for key**	• The rule needs to both protect against rewarding spurious claims of reuse but also give breathing space/grace period to reuse startups that are just getting off the ground. • The definition of "reusable product" should target reusables for which producers are developing systems to enable the reuse, rather than products that consumers themselves reuse or might reuse. • Consider using the term "reused product" rather than "reusable product."	*Ameripen:* Recommends following the PEF approach and modeling for the number of reuse cycles for which the product was designed. Suggests that the definition of "reusable product" could be improved. "Adequate infrastructure" is too vague a term. Consider replacing with this definitional language from ISO 14021: "Facilities or products exist that allow the purchaser to reuse or refill the product or package." The definition of "reusable product" needs to include those covered products intended to be refilled by the consumer in the home. *CMI:* reusable containers do not always have a lower environmental impact, particularly when the recycling rates of traditional containers reach the high rates that would be achieved in a recycling refund program. Reusable containers only start to deliver benefits once a long list of conditions are met. Driving distance between container pick up, delivery to the washing station and delivery to the filler need to be accounted for in the LCA. *Dow:* The variability in the number of uses can lead to incorrect estimations of the impact of re-use. The burden of re-use is carried by the consumer and collection systems which are not widely designed for re-use models. *GPI:* encourages Oregon to establish rules that reward refillable and reusable containers that are free of toxic materials and additives (gives examples of global EPR schemes that do this in

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		parameters during the first three years of the product's development (i.e., a grace period). Thereafter, actual data must be used.		various ways). At present it is unclear the extent to which reusables will be prioritized and valued under the new law. Comparing reuse and single-use scenarios can be problematic, especially if there isn't consistency in terms of the functional unit applied. Care should be taken to not disincentivize reuse and give some time for development of infrastructure. The reuse product that replaces a single-use product will likely have a new SKU. Regarding the "reusable product" definition, "highest-best" may be subjective. Predicting customer transport for return is a source of subjectivity. Consumers that prioritize reuse may transit less impactfully than regular consumers. *P&G:* There should not be differentiation between reusable and non-reusable packages. In the end, if packages are reusable, that will translate into lower EPR fees for the producer by production volumes (this is why we recommend a functional unit based on 1 ton of material). The definition of "reusable product" needs to include those covered products intended to be refilled by the consumer in the home. *PCPR:* Consider reuse being assessed either by reduction of footprint or reduction of quantity of material by percentage. *PR3:* Is setting standards for reuse systems that should be complete by 2025 and could be used for an attribute-based ecomodulation bonus (in the case that comparing reuse with single-use using our standards and methods isn't feasible or practical). PR3 standards will include: • Requirement to achieve 90 percent return rate within a 3-year grace period. • Required digital tracking of assets. Reporting requirements including average miles traveled. *Wasco Co:* Reuse should only be included if there can be proof that the product actually is being reused and whether or not the producer is promoting reuse of their product.
8	Scenario analysis requirements	Producers must perform sensitivity analysis for key data, parameters, or methodological choices (i.e. *impact hot spots*) in the life	• The variables for which sensitivity analysis is to be required need to be prescribed.	*CAA:* Recommends no sensitivity analysis requirements. *CCNA:* Compare products of similar utility in scenario analysis only if they're made of different materials *CMI:* Supports considering hypothetical or future scenarios (e.g., higher recycling rates).

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		cycle evaluation of their products. The sensitivity analysis should specifically include the range, min/max, and variance across all required LCIA categories and indictors. **Two variables for which sensitivity analysis is required:** **1. Electricity grid mix** **2. Recycling allocation methodology** Other impact hot spots are to be identified using PEFCR's procedures to identify the most relevant life cycle stages and processes, Sections 7.4.2 and 7.4.3.	• The analysis will generate a min/max and a range, but no mean.	*Dow:* Rules should also consider future/hypothetical scenarios. Products of similar utility produced by different producers should be compared with one another only if the LCA is critically reviewed by an external 3rd party. *GPI:* Hypotheticals have less value than real world existing options. *P&G:* Does not support the use of future scenario analysis as anticipating changes in the infrastructure used to produce packaging materials and treat them as waste will inherently introduce inaccuracies. Instead recommends regular updating of LCAs. Does not see value in comparison of data among different producers. Until LCA method and data requirements are clear, apple-to-apple comparison is unlikely and the comparison is not fair and should not be done. The reliance on common, generic datasets can increase the risk of "false" granularity that is an artifact rather than real. Methods should generally be set through discussion and consensus. Required variables should be established ahead of any testing to set a level playing field. *Wasco Co:* Mostly focus on current impacts but include future hypothetical scenarios as well. Initial submission should be a baseline for comparison of future impacts of the product. Products of similar utility should be compared with each other. *Yale University (Reid Leifset):* Over time you need to understand what's driving results and make adaptations on that basis. May need to put some things into your rules to enable this.
9	Recycling allocation methodology	• End-of-life allocation must follow the requirements of ISO 14044, section 4.3.4.3 and guidelines found in chapter 7.1.7.6 *Benefits and loads beyond the system boundary in optional supplementary module D* of ISO 21930:2017. This would allow different allocation approaches (e.g. cut off or avoided burden) but prohibit double-counting.	• Specify that the conclusions should hold true for either the "avoided burden" or "cut off" approach. • The PEF Circular Footprint Formula is perhaps the best-practice approach out there, but there is less familiarity with this method in the US and it is more complex to apply.	*CMI:* DEQ should determine how to account for the impact of a material like metal being able to be recycled many times *GPI:* Favors material-specific analysis. Cautions against adopting the PEFCR approach to recycling allocation due to the very different underlying materials management histories, geographies, (distance and mileage) and population densities between the EU and US. Recommends applying some type of distinction to chemical and other new recycling technologies for which environmental impacts are not yet well understood. *NRDC (Natural Resources Defense Council):* Ensure that hazardous waste generation and anything reportable to a toxics

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		• **Justifications must be provided to support quality factors applied in recycling allocation.**	• Require justifications for quality factors applied in recycling allocation—if the analyst is showing 1:1 input:output for plastics recycling (i.e., one ton in, one ton out of the same quality), that needs to be supported with a strong justification. • For chemical recycling, double-counting can occur by allowing free allocation in mass balance. Consider placing limits on how mass balance accounting is to be used to assign materials to outputs.	release inventory are among required data reporting, as these are considerations for various types of chemical recycling, including pyrolysis. *P&G:* Apply a single methodology across all materials. Recommends using the PEF method requirements for recycled content crediting: see step 4.4.8 in Annex 1 of this document. Do not treat chemical recycling differently from mechanical recycling; methods that do so are skewed and publicly criticized. *RMI Aluminum team:* Require dual allocation of emissions to product and to scrap.
10	Biogenic carbon	Require reporting of biogenic **CO2 flows**, but, due to the short-lived nature of covered products, mandate their exclusion from the calculation of global warming potentials for the purpose of claiming a substantial impact reduction bonus.	• Exclude biogenic CO2 flows from consideration for the substantial impact reduction bonus, but not biogenic CH4.	*CAA:* se a GHG protocol to account for biogenic carbon. *Dow:* Together For Sustainability (TfS)– use the Product Carbon Footprint Guideline for the Chemical Industry. *P&G:* This is an area where standards are still in development and not ready for use. *Wasco Co:* Hesitant to have biogenic carbon being accounted for. [Credit] would be such a small percentage compared to the overall carbon footprint of producing these products will have that it's almost unnecessary to include.
n/a	Require use of any other tools and standards besides core LCA?	The use of tools outside of life cycle assessment is not proposed at this time. As for tools that go beyond *core* LCA, DEQ proposes to mandate plastics leakage reporting and also mandate assessment of the impact of plastic on ecosystems for consideration	• DEQ could consider a general requirement to report on social impact that would be filled out in subsequent rulemakings. • Including assessment of "embedded toxics" would entail a lot of work to operationalize—i.e., would	*GAIA (Global Alliance for Incinerator Alternatives):* A social LCA requirement should be added. *Metro (Portland government bureau):* Could reporting against EPA's EJ mapping and chemicals of concern be included? *NRDC:* Recommends requiring an environmental justice screening and examining possible applicability of the CEQ tool for Justice40. *P&G:* Suggests incorporation of the EU Design for Recycling rules and material circularity as defined by EMF.

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		for the substantial impact reduction bonus. Other emergent impact methodologies are optional for inclusion.	identifying specific chemicals of concern and levels of concern.	
n/a	Include rules specific to particular categories of products / materials?	• Single set of product category rules for all covered product categories • Could differentiate into separate PCRs in subsequent rulemakings. • Include a table of covered product categories in the rule.		*CMI:* Aluminum and steel should be treated as distinct categories, but more granularity unnecessary. *Dow:* Use standards specific to material classes. *GPI:* The function of the packaging materials should be judged in different categories. Primary food and beverage packaging requires different performance characteristics than tertiary shipping packaging for non-food contact goods. *P&G:* Core set of rules can be applied, product category rules or different criteria are not necessary unless the packaging needs to preserve food or ensure consumer safety during use. *Wasco Co:* A core/general set of rules could be defined across all covered products and be successful, but category specific rules could be a bit more thorough in addressing each type.
n/a	Mandate use of particular data sources or inventories and/or set requirements for data quality?	Follow ISO 21930 data requirements and matrix. 1. Mandate primary data from within your gate (foreground system). 2. Prefer primary data from outside the gate (background system), but allow secondary data. 3. For secondary data, provide a table of recommended datasets. Such as: • Ecoinvent (most common/most coverage, but not free) • GaBi • US Life Cycle Inventory		*CAA:* allow open-source industry-average inventory data and government/EPA data, or provide data to be used. *Dow:* Consider mandating the use of Ecoinvent, Carbon Minds, GaBI, and USLCI. Assessments should be based on primary data as much as possible. Evaluate data quality for technology, time, geography, completeness, and reliability (per TfS PCF guidelines). Data specific to manufacturing conversion processes (e.g. extrusion, lamination, coating, injection molding, and forming) needs to be made more available in order to capture process improvements.

Rule concept number	Item(s)	DEQ rule concept or plan for draft rules	Feedback from the Rulemaking Advisory Panel	Feedback from other interested parties
n/a	Life cycle stages covered / System boundary	Cradle to grave, excluding use phase.		*CMI:* Cradle-to-grave *Dow:* Cradle-to-gate (because operations outside of the manufacturing gate may be based on wide assumptions) *GPI:* Cradle-to-grave *P&G:* Include all relevant life cycle stages. The use phase does not appear to be relevant to the package assessment. *RMI:* Proposes the use of two cradle-to-gate boundaries, "benchmarking boundary" and "full boundary," for best comparison among aluminum and metal products. *TricorBraun:* Is there a possibility of allowing a producer to extend the system boundaries of their assessment to include impacts of wasted food? *Wasco Co:* Cradle-to-grave
n/a	Time frame for data used	12-month average, as current as possible. Consistent with requirements in **ORS 459A.884(4)**		*CAA:* Most recent *Dow:* Primary data as recent as practicable and not older than five years. Use most recent full year as a time boundary if representative of an average year of production. Data maximum validity of 5 years (TfS).
n/a	Third-Party Review and Verification	**External third party review is required if a significant impact reduction bonus is being claimed.** Reviewers would generally follow the requirements of Section 6 of ISO 14044 to ensure that: • The methods used to carry out the LCA are consistent with this International Standard, • The methods used to carry out the LCA are scientifically and technically valid, • The data used are appropriate and reasonable	• It would make sense to require third party review for the substantial impact reduction bonus assessments. You will need to indicate what standard the reviewer is reviewing to—if to the DEQ rules standard alone, the LCA community will need to develop new protocols for that. If some pieces can be reviewed to ISO 14044, existing review protocols can be applied.	*CAA:* DEQ review only *CCNA:* Require three reviewers minimum from experts versed in ISO-compliant LCAs *Dow:* 3rd party reviews should be considered if public claims will be made about the products impact assessment. *Green Circle:* Even if the PCR is well-defined there can still be different outcomes due to calculation methodology and assumptions. Therefore we recommend that 3rd party independent verification be required when there is a reduction impact calculation being made. *P&G:* third party should validate any methodology being proposed as part of rulemaking. A third-party verification of results might also be needed unless the methodology avoids too many degrees of freedom. *Wasco Co:* Require it *Yale University (Reid Leifset):* Add additional transparency requirements for responsibilities delegated to the PROs, including eco-modulation of fees.

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		in relation to the goal of the study, • The interpretations reflect the limitations identified and the goal of the study, and • The study report is transparent and consistent.		
n/a	Report format	Short-form EPD-like report per ISO 21930 section 9.		*Astro-Nought:* LCA results should be posted in an industry-standard, machine readable format. Such a standard might need to be created. The LCA should include a simpler "packaging facts" section which would name each packaging component and its material. Packaging facts could be checked against recycling rules to provide consumers specific instructions on what to do with each packaging component. *CAA:* Electronic reporting in a standard format. Only a summary level version of results should be available on public websites. *CCNA:* Publish summary of study results minus company-specific info *Dow:* Make available in any of the formats indicated. Inventories should be kept private. Choice of data should be confidential. No centralized repository. *Wasco Co:* Centralized repository and inventories made public.

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