Organics Management to Reduce Methane and Combat Climate Change Workgroup (2023)

Meeting #13 January 5, 2024



Policy Feedback



Input: Part II: Funding for Sustainable Food Management

- Alli K. Grant programs concerns about ID of source of funding and implementation timeline and amount of funding. Need more details to be able to comment on future versions.
- Rose. G. Like changes in this section. Same questions as Alli. Need to know source and amount of funding. Why do some have it and some do not.
- Paul J. Offer appreciation for change in section 201. sub 4 that allows department to issue grants on non competitive basis. Nice to see that reflected,. Important piece for local governments to be non competitive. Thank you for change.
- Michael W. Providing direct support of seeking federal grants would be helpful, as would providing a pool of money for matching funds from other grant sources. Support could be through government staff working on grant seeking or allowing organizations to seek funding to pay for employees/consultants to seek grants.
- Holly Y. Under second 2 on page 2 we applaud the WA Legislature for utilizing the latest EPA Report. 'From Field to Bin: The Environmental Impacts of Food Waste Management Practices'. This language however, is outdated and refers to these management practices as a "Hierarchy" rather than a slide scale that was determined after considering a solutions circularity and a number of different environmental impacts. We urge the legislature to remove the word "hierarchy" for uniformity purposes to ensure that those operating in this sector understand that these solutions are offered in terms of most preferred to least preferred and are dependent on the feedstock at hand.

- Holly Y. Trouble following page on page 18 section 303 lines 15-17. Exempts comingling of food waste what is the point of that change?
 - Jacob. Page 20 co-mingling piece. Language on page 18 is about process for local gov't to be exempt.
- Paul J. Changes on page 16. Item 5 expands areas that qualify for exemptions but not sure the other exemptions expand? Changes might confuse the issue more. Having a hard time following.
- Rose. G. Appreciate exemption under 301 (page 10). No specifics on exemption criteria on how flexible it will be. More clarification would be helpful.
- Alli. K. Section 301 bi simplify following in 1a allow department may "by waivers" reduce.... In section iie remove the language that the dept can exempt certain individuals. Ecology does should not manage individual exemptions across the state. 3a iii remove exemption and add a time limit between those populations remove or make it time bound across the state. Section 303 business diversion. 1aii capacity to accept clarification around defining the word "capacity". Change language to have year round capacity to process and accept deliveries. 2aiii language change in chat. End of 303 recommend keeping original language around businesses around MF. Makes date obsolete for MF residents.
- Neil E. Do not recommend changes to 305. AD facilities in CA that accept green materials in CA that create materials. Would look further at the the EPA regulations, so those materials should not be leaving site and going to compost facilities is the responsibility of land owner that they not send materials that have been treated.
- Jay B. Thank you for changes in 304. On bin colors, Cedar Grove uses a brown container customers are accustomed to that suggest brown or green for commercial customers.
- Rodd P. 1.a suggest frequency waiver details so prospective requesters know what will be asked (ie, local composter approval, etc)
- Rodd P. More flexible and timely approach is to allow local Health Depts to issue waivers on frequency, area boundaries, etc.
- Rose G. Thank you for allowing flexible options for businesses in Sec 301
- Dan C. Please clarify in section 301 that if the bill is proposing that municipalities already offering every other week collection through the year would be required to offer collection every week.
- Kate K. Section 304, 6B this allowance is too open-ended. Should be time-limited, like "Until 2030" or something like that. Dumpsters stay in service for a very long time, are not difficult to paint (whereas it may be somewhat difficult to get color-specific lids), and in fact are often repainted numerous times before they are retired from service. Painting dumpsters does have a cost and goes against waste industry branding interests, but it is totally doable. It seems reasonable to give some allowance of existing containers to stay the colors they are, but at some point (perhaps the next time they are painted after 2024), existing containers should be required to be painted to align with the color-coding requirements.
- Rodd P. RE: Multi-family mandate the implementation date doesn't change the fact that many if not most such accounts in many jurisdictions simply do not have space to add multiple new compost containers without sacrificing parking, landscaping, etc which may be required by law to be maintained. Local jurisdictions and service providers should guide this goal.
- Brent L. Thank you for the changes on Page 20, lines 19-22
- Kate K. Also in section 3, I'm confused if multifamily requirements are aligned with commercial or residential. Outreach to multifamily residents is much more similar to single family than to commercial, and services between all residents should be aligned.

- Travis D. Related to 305 I am not sure how common this would be, but how will people be able to identify whether or not their materials have Clopyralid and Aminopyralid?
- Holly Y. In the tracked changes version on page 23, lines 13-16 there is language stating that "Nothing in this section requires a business to dispose of non-food organic materials that are not commingled with food waste by using the services of an organic materials management facility that does not accept food waste." Can we clarify what the meaning of this language is? It is slightly confusing and it is unclear what this is aimed at.
- Rod W. Continued concerns over 2030 curbside expansion date regarding feasibility, availability of infrastructure and facility capacity, etc. Current wording requiring
 collection 52 weeks per year. In the case of missed pick-ups for unsafe weather etc. service is usually resumed the next week. That would not be possible with a 52 weeks
 per year requirement and would force companies to operate in unsafe conditions. There needs to be geographic distinctions and allowances at the local level.
- Rod W. The waiver process in Sec 301(e) appears unclear. It says DOE may exempt individuals that manage organics through other means than curbside collection, but does
 not address the process. Do individual citizens or businesses write in to DOE for an exemption? What proof is required? Similar questions on enforcement for the business
 organics management requirements in Sec 303
- Kate K. Agree with Neil Edgar that the limitations of materials treated with Clopyralid not be limited to compost facilities, but be applied to all organic management facilities.
- Alli K. Sec 301 (a) Suggestion: Add clarity to the process. Recommend adding language: Jurisdiction may request a waiver from the department for food waste collection 52 weeks annually, based on seasonal needs, or food waste constituent (such as dried).
- Rose G. I hope to comment on Ecology's comment on 301(1)(e)'s exemption moving exemption to local jurisdictions will be challenging for businesses with multiple locations who use the same alternative disposal facilities. Different exemption standards or multiple exemption requirements are challenging.
- Dan C. please clarify if in section 301 that the bill is proposing that municipalities already offering every other week collection through the year would be required to offer collection every week.
- Ron J. Section 301 (1), as I understand it, will require our city to provide weekly residential curbside organics service, unless we are granted a waiver from the department. I assume this is to mean the Department of Ecology, but it's unclear. Moreover, the City of Olympia implemented a progressive and forward thinking alternating every-otherweek (EOW) residential curbside program in 1998. All three waste streams alternate every other week. Garbage is picked up one week (tues-fri), recycling the next, and then one-half of the city each Monday for organics. This system reduced the need for running a dual collection system. It reduced the number of trucks on the road from 9 to 5. And we have absorbed growth ever since. We do not get odor complaints. When the city added food scraps to residential curbside in 2008, we worked with the County health department to get approval for EOW organics. Because residential curbside is mostly yard waste, about 90% according to at least one Thurston County study, it makes sense to leave it at EOW even with adding more food. The county at the time, wanted commercial organics, when it was specific to food waste, to be collected weekly at a minimum, which we agreed to and continue that practice. Moving to a weekly organics collection system will require additional trucks, additional drivers, and greater impacts neighborhoods and more fossil fuels burned. It will have cost implications to the utility and its rate payers. A single automated side load truck cost around \$400,000. And it's a roughly 2-year process to get one spec'd, sourced and delivered. Olympia, and other cities, should not have to apply for an exemption for a system that is working and is not broken Please modify the bill language to allow for residential curbside organics collection (mixed yard and food waste).

- Ron J. Section (301(1)(c) will also require mandatory collection for all residential and non-residential customer generating more than 0.25 cubic yards of organic materials weekly, effective April 1, 2030. I'm trying to understand how that will be enforced, and what the real intent is. Is it to make all residential customers required to use organics, or only those generating 0.25 cubic yards, which is technically 50.49 gallons. There are just shy of 202 gallons in one cubic yard. A 95-gallon cart is 0.47 cubic yards, so again, technically, a typical residential customer is not generating 0.25 cubic yards weekly. In fact, those that do generate around 95 gallons EOW, are doing so because of yard waste. Food waste is a very small portion of that volume. In fact, back in 2007/08 when the city was preparing to add food scraps to curbside yard waste collection, we performed some cursory studies which indicated the amount of food waste by volume in a household was not that large roughly a basketball or two size of material. For that reason, and input from our customers, we opted to provide a 35-gallon cart for those who didn't have much or any yard waste, but wanted to compost their food scraps. Today, about 15% of customers, around 850, subscribe to the smaller 35-gallon cart. It is unclear how backyard composting fits into this bill, and if it means a customer does not need to use curbside organics services?
- Section 301 (1) (c)(d)(e) will require organics service be mandatory for all residential customers on April 1, 2030. The language used in the bills in non-elective and all persons may only use, which we interpret as mandatory. It's unclear if this means all persons/customers, or only those who generate greater than 0.25 yards/week. There seem to be a contradiction in how this section begins versus how it ends. The timing of this requirement will be challenging to meet. The proposed legislation will require the purchase of collection trucks, roll-carts, hiring additional staff, both FTE(s), and temporary labor to deploy the additional carts. And a thorough financial study to determine customer rates. Olympia has considered bundling our curbside organics service as part of our recently adopted solid waste plan. So again, we agree conceptually that there is a huge benefit to getting the service in front of all customers. We already offer it as a subscription-based elective service for a fee. A change such as this has cost implications for the city and its rate payers. As written, the legislation, would, in effect, remove some of the city's control over how it delivers solid waste services.
- Section 303, Business Diversion. We are happy to see the change in 303(2)(a)(iii) from 4 cubic yards of MSW to 96 gallons of organic material waste. But with two caveats –

 to change to an amount consistent within the proposed legislation. The bill shifts from referencing 0.25 cubic yards to 96 gallons. Keep in mind that cart manufacturers vary in how they fabricate and market their carts. Some cart manufacturers build a 95-gallon cart, others build a 96-gallon cart. For example, Olympia originally used Cascade Container which made carts in even numbered sizes (32, 64, 96). But also Rehrig which uses odd numbers (35, 65, 95). Olympia only purchases Rehrig carts and has for quite some time. This change was made to standardize our inventory. The city recommends using consistent language throughout the bill when referencing material volume, and suggest using gallons throughout or swapping the cubic yards to commercial and using gallons for residential, which is consistent with industry terminology use. We also suggest striking the reference which keeps the door open for 4 cubic yards of MSW. There is no known relationship that we are aware of, that suggest a business generating 4 cubic yards has any specific portion that is organic compostable waste. The bill should stay true to organic waste generation.
- Section 303(7)(a). Please remove, "Beginning January 1, 2030, "business" includes a multifamily residential entity."

- Ron J. Residential single family, commercial businesses, which include all those mentioned in 303(7)(a), and multi-family are all very distinct customer classes when it comes to how we provide solid services and delivery education and outreach. While a typical multi-family property does get garbage service with commercial collection, it's not universal to recycling and compost service. A multi-family property does have a business component, but the occupants are residential households and produce residential type waste. Moreover, not all multi-family properties get serviced by commercial garbage/recycle/organics collection. Some receive single-family type service when it makes sense operationally. Multi-family needs to be its own category, separate from single-family and business. Mixed-use properties also need to be a unique category. They each have unique challenges. We're also concerned the language might inadvertently conflict with sections of RCW 32.21 and cities authority over recycling and organic waste materials generate at multi-family and mixed-use properties.
- Section 304 Bin Colors. The City agrees with the vast majority of this section. For the 1998 cart-based system implementation, Olympia and its community members selected gray for garbage, dark green for recycling and continued with bright green for yard waste (now mixed organics). In 2010, On the heels of Ecology's beyond the curb report, Olympia set out to change the color of its residential recycling carts to blue. Many options were evaluated and Olympia chose a "run to failure" model which would have the city purchasing only blue carts for recycle and corrugated cardboard. This was the least costly and most logical approach and did not result in landfilling of thousands or perfectly good green carts. As carts fail (break), they are saved and recycled through Denton Plastics, and only blue carts are purchased. Olympia originally expected the vast majority of green carts would be phased out in 10 years. Surprisingly, there are still quite a number of green recycle carts remaining. Eventually they will be phase out. We think bin colors, or lids as some haulers choose, is an important element in customer communication. We are concerned about the color choices for garbage. In 2004, Olympia converted to front-load commercial service from rear-load. We chose to purchase all 1, 1.5, 2, 2.5, 3, and 4 yard dumpsters with a galvanized coating for longevity. These contains are now 20 years old, their rough life expectancy, and a the vast majority are still in service and not showing signs of degradation. They are lasting much longer than expected. A typical painted container may only last 10 years. If galvanized containers can be considered "gray" I think we are okay with the bill language. If not, we ask that galvanized, which is more of a sliver, be added for garbage.

- Brandon H. Appreciate comments, still an issue for us labeling standards could provide challenges. Looking at new dates need to make sure there is sufficient lead time in the system to comply. Why are we changing the definition of producer in this particular act?
- Rose. G. Appreciate challenge of state and federal. Want to be collaborative suggest putting a voiding date if federal standard is similar to this. Put away section if federal standard is similar. Two goals standard across nation and not confusing consumers.
- Katie B. Aligned with Brandon and Rose hopeful for a federal solution. Thank you for change in pull be language. Language regarding education over enforcement are very helpful. Needs to be a lot of education before significant penalties. Ask that we remove signage language not sure how effective that would be. Other ways to educate consumers could be more effective.
- Dan C. Appreciate changes and response to feedback. Section 301 clarification. Would municipalities be required to offer weekly service?
 - Beginning 4/1/27 those jurisdictions that collect food waste that don't get a waiver would need to collect 52 weeks annually. All by 2030.
 - Heather T. Odor issue with materials sitting around. Idea is to allow Ecology ability to do waivers if necessary. Waiver gives flexibility.
- Chris C. Echo Katie, Brandon and Rose hoping for federal solution so we get clarity for everyone. State by state rules is very difficult for manufacturers to keep up with. Leg to stand on consistent definition of what a producer is. Already three or four bills this year with different definitions. Very difficult for regulated community to understand when these definitions differ by law.
- Andrea C. Exemption for eggs in not complying with date standard? What is reason for this?
- Brad L. 303 7. Understand change that businesses includes MF entities. Does this deregulate some MF collection?
 - Trying to align MF requirements with residential.
- Alli K. Section 403 confusion over who is primary agency/department department of Ag, not Ecology?
- Charlie B. Note that some grocers have raised questions about dairy. They like egg exemption. May ask to add dairy products.
- Rodd P. DOE Rule Authority the 2030 timeline allows potentially significant changes affecting multiple programs and thousands of residents just as the previous requirements take effect. This authority needs to be removed from the bill, or pushed out significantly.
- Rodd P. 3.01 The organics disposal ban is not workable under current legal precedent (Bonesteel v City of Seattle), and has neither education funds or mechanism, nor enforcement details. Again, local jurisdictions and their health departments and service providers should have the freedom and responsibility to work on this goal.
- Michael W. I am 100% behind Rose's comments, and that standardization at the federal level, or in collaboration with states on labeling. The Washington State Department of Ag and the USDA would be good entities to involve in developing this standard.
- Kent K. I would recommend that no changes be made to section 3aiii, and leave the exemption as is. I would be ok with adding qualifying residential population as a population threshold, but if 50% of the population is within an apple maggot quarantine area or other quarantine area, the total population number is not relevant.

- Rodd P. Enforcement a growing industry solicits loads of commercial solid waste from grocers, food processors, etc, from which they extract mainly liquid waste with energy or nutritive value. The residual tons bound for landfill are substantial (cans, glass, plastic, paper, etc), and effectively remain solid waste, which circumvents state law regarding hauling of solid waste. Loads should be source separated at the generator so state goals for resource recovery can be supported and expanded. Loads incoming at mixed waste and anaerobic processors should meet the same standards as at compost facilities recycling of collected material should be at 90%. Residual tonnage to the landfill should be <10%, again comparable to compost facility standards.
- Andrea C. I would propose: (4)(a) The requirements of this section do not apply to any types of food for which incompatible expiration labeling requirements are prescribed by federal law, including infant formula subject to the requirements of 21 C.F.R. Sec. 107.20, as that regulation existed as of January 1, 2024.
- Brandon H. 1. In Sec. 401(4), can we get an explanation of why eggs are exempt, and not something like milk? I think milk may be exempt in CA, but still checking. 2. How
 does the labeling requirements match up with federal labeling requirements. It is my understanding the feds are updating standards and consistency, especially given
 product comes from all over, is important. I heard your comments, and we need to work with you to ensure alignment with standards in other markets. 3. I'm still asking for
 feedback on the new dates, in terms of enough lead time for compliance with labeling. 4. Remove signage requirements

Input: Part V: Product Restrictions

- Alex T. Appreciate changes. Home composability section last part talks about standards instead of scientific evidence point to a specific standards. Reason to refer to a standard that is more specific. Will provide in writing.
- Kate K. Confused about enforcement section 502. First person to see or distribute. And the lack of enforcement language around people that sell the products with the stickers on them. Part 503 fibre based substrates exception for 98% fiber how would you know? Would start to apply to plastic lined containers e.g. coffee cups. Could cause plastic contamination issues. Concern about broader definition do not want plastic lined items in compost system.
 - Jacob other enforcement provisions in other parts of the bill. Section 505. For everyone other than plastic produce stickers producer is different. Section 503 could apply to all products.
- Janet T. Comment made to remedy "napkin problem" under law as written, napkins can't be called compostable. That was thought behind the 98% language. Maybe there is a different fix.
- Rose G. Section 502. Verifiable by a third party to qualify as a compostable produce sticker?
 - Jacob there is language to meet standards and have a third party certify. Require that products that are labeled as compostable meet standard and verified by third party.
- Neil E. Fiber based exclusion is an open door for microplastic introduction to compost facilities. Should not allow those materials in allows an open door is a significant error/issue.
- Kate K. Idea in chat to add language that prohibits inclusion of plastic? Kate suggest addition of language.
- Brent L. General Comment: Recommend adding a Greenhouse Gas Inventory for compost companies that require trucking from municipalities to organics management facilities in order to determine if the emissions associated with trucking is greater than not participating and if it is, then require the municipality to simply compost more locally to avoid unnecessary emissions.
- Rose G. Sec. 501's producer definition -- I want to echo Brandon Housekeeper's comment to conform the definition of producer with other laws or bills in contemplation (WRAP) to improve implementation feasibility.
- Chris C. Similar to date labelling, produce sticker requirements would be better regulated at the Federal level. Washington grown produce is distributed world wide, and similarly produce not grown here is imported from across the world.
- Kate K. I wonder if we should add language to the 98% fiber thing by explicitly prohibiting the inclusion of plastic.
- Janet T. What if we did 99% and no polymeric additives or coatings.
- Brandon H. Sec. 501(10) we don't support the change to the definition of producer. We need consistent definitions, and other established laws in WA, as well as other surrounding states use the current definition in the underlying language.

- Kate K. In existing compost reimbursement program there was a cap. Is there a change in the cap?
 - No 10K cap now a formula.
- Brent L. Concerns on section 6 that limits cities and counties to only purchase compost from municipal programs should be open to all that produce compost. Law should not prohibit that.
- Michael S. Would like to add digestate be added to part 6. It serves a purpose of diversion. Should be part of purchase reimbursement program.
- Travis D. Appreciate the procurement options in section 6.
- Alli K. Section 602 5. For clarity suggest by 12/31/2024 to spring of following year. And then also add annually thereafter. Enough time to pull together numbers and submit them. Remove a year long gap.
- Neil E. Regarding digestate traditionally a waste product after digester. Would need to meet standards for contamination. Materials from other sources than municipal may go against desire to create a circular economy. Want to incentive removing materials that are currently going to landfill.
- Chris T. Digestate is a bi-product but not a waste product itself. In those cases being able to chose another process that diverts from landfill that is not composting should be allowed. As long as it does not contain pathogens.
- Rodd P. PFAS in food scraps are already and irrevocably introducing unwanted chemicals into composting facilities. Efforts to reduce unnecessary use of paper towels and napkins are
 ongoing, but are we going to send thousands of tons of otherwise compostable fiber to the landfill? It would seem inadvertent, miniscule contaminants in paper products are a different
 matter from intentionally added ingredients.
- Brent L. We have a concern this Section 6 limits cities and counties to only purchasing compost from municipal solid waste programs and we feel it should be open to all who produce compost. If a municipality wants to purchase compost from us or another local compost producer that there is nothing in the law hindering their ability to do so. We would like to see the following change: NEW SECTION. Sec. 603602 Compost Procurement Reporting Amendment Subpart (6) Recommend to STRIKE the language "produce compost products that are derived from municipal solid waste compost programs...". Instead ADD, "produce compost products that are derived from local municipal compost programs and commercial compost companies..."
- Holly Y. I would like to second what Michael S says and request that digestate be included in the program as well. This should be specific to digestate that does not include biosolids and
 comes from a digester that does not incorporate human or animal wastewater. This type of digestate has been determined by the EPA to have greater beneficial value when used in land
 application than composting alone.
- Rod W. The goal of the policy is to improve environmental outcomes by diverting organic material from landfills. Most of that material will be collected through curbside systems, which the bill will expand by 2030. This will result in significant additional compost in the market. The policy will not be successful without developing sustainable markets for all of the additional compost produced from organic waste collected from curbside systems and processed at permitted composting facilities.
- Greg S. We agree with Neil's comments
- Alli K. Digestate standards are covered in WAC 173-350-250
- Yolanda P. Section 601(3) had language regarding "...using compost..." and our program would like to indicate that if the text in the parentheses is not being considered now, we'd like to propose adding the following language after compost, "as defined and met the standards in WAC 173-350" which is the solid waste handling standards. We have facilities that like to consider themselves as producing compost, but as Neil said, there is clear definition as to what compost is and the testing parameters it needs to meet to be considered compost.
- Ron J. Section 601. Thank you for removing the local government requirement to purchase compost. This would have create a logistical and cost burden to the city and its community members.

Input: Part VII: Miscellaneous

- Alli K. ID of funding for section 702 workgroup and study.
- Katie B. Agree on where funding comes from. Questions about need for more work from business community to continue to participate in workgroup. A lot of effort already put into this.
- Brad L. Sec 701 Building code amendments: Building codes will need to be updated to require safe and accessible space by collection vehicles for all containers.
- Majken R. We would ask for language that, at minimum, requires AD or pre-processors to achieve a minimum of 90% recycling rate of all collected materials. This can be
 achieved by revising current solid waste handling regulations for AD to include permit requirements that require a facility to report/prove its recycling rate on a monthly
 basis.
- Rose G. In CA's situation, implementation dates have been a challenge. I hope there will be good consideration for these challenges in this proposal.
- Neil E. Rose is correct. The challenge with CA implementation dates is that they were not aggressive enough. The delay in collection program development has caused a delay in infrastructure investment.
- Michael W. I've brought up the BioMADE infrastructure funding opportunity a few times, and there is also the potential for Cap and Invest funding from the State. Is that going to be covered?
- Ron J. I want to preface our (city) comments with the fact we conceptually agree with what the bill is trying to achieve; which is maximizing greenhouse gas emission reductions by reducing methane causing organics being landfilled and improving food rescue and consumption (paraphrasing). My/our comments are really to reiterate the same ones I expressed during many of the stakeholder meetings held in 2023. These are centered around the impacts/potential impacts to the City's solid waste utility and collection system, and rate payers. My guess is that we are not the only city running municipal operations or through contract that share these concerns. Upon reading the latest draft, I see that some of the concerns were addressed, or attempted to be addressed.
- Ron J. Section 701. This is a good start but instead of authorized to amend, it really should require an amendment. Space for containers is one of the single biggest impediments to getting adequate compost and recycle diversion our of commercial and multi-family properties. The City references the state building code, WAC 51-50-009 in its design standards. Whether in RCW or WAC, the code needs to address at least four waste streams, garbage, recycle, organics, and corrugate cardboard.
- Ron J. Summary: Concerns about the non-elective residential curbside by April 1, 2030. Concerns about the reference using 0.25 cubic yards as it relates to gallons and a typical residential service. Concerns about retaining the reference to 4 cubic yards MSW as a fall back to the 96 gallons of organic waste by 2026 for businesses. Suggest changing the commercial volume to cubic yards and the residential volume to gallons. Use 95 gallons, not 96 if using that cart sizes. Concerns about Olympia's current and future inventory of galvanized dumpsters for garbage. These need to be acceptable as gray in color. Do not classify multi-family as business in this legislation. Address multi-family and mixed-use as separate categories. Thank you for removing the compost purchase requirement. Strengthen section 701 around building codes for solid waste. Again, we agree with the important role this legislation will have toward reduce climate emissions related to solid waste. The sections addressing food recovery, reducing wasted food, fruit stickers and so much more are all headed in the right direction. Part 3 as it relates to the requirement for organics collection could use some refinement.