Statement of fiscal and economic impact

ORS 183.335 (2)(b)(E)

Fiscal and economic impacts

DEQ proposes to reduce industrial air toxics emissions and their associated cancer and noncancer risk through an air toxics permitting program. The proposed rules would have fiscal and economic impacts on businesses, state and federal agencies, units of local governments and the public. Fiscal impacts can be positive or negative to those affected. As examples, reducing health costs to the public would be a positive impact, and increasing costs of regulatory compliance for businesses would be a negative impact.

Owners of existing industrial facilities as well as proposed new industrial operations will incur costs to analyze whether emissions from their operations are below Risk Action Levels that would be set under these rules. In some instances, the proposed rules may require owners or operators to take actions to reduce air toxics emissions if a facility's emissions of air toxics result in health risks above Risk Action Levels.

The owner or operator of a facility may complete an initial screening analysis to determine whether additional analysis is warranted. Facilities that require more in-depth analysis will need to complete air dispersion modeling. If potential risk levels exceed Risk Action Levels, then more complex air modeling and a health risk assessment will be required.

Following these analyses, if health risks are predicted to be above Risk Action Levels, the facility will be required to reduce risks over time through available control methods, which may include the installation and use of emissions controls, but which could also include pollution prevention steps. These actions are likely to result in costs to the regulated community. However, in some instances of pollution prevention, regulated entities may see a decrease in costs.

People who are exposed to air toxics at sufficient concentrations and durations have an increased chance of getting cancer or experiencing other serious health effects. These health effects can include damage to the immune system, as well as neurological, reproductive (e.g., reduced fertility), developmental, respiratory and other health problems. In addition to exposure from breathing air toxics, some air toxics, such as mercury, can deposit onto soils or surface waters, where they are taken up by plants and ingested by animals and are eventually magnified up through the food chain. These rules may result in reduced air toxic emissions and less exposure to air toxics by people who live and work in proximity to facilities that emit air toxics.

Less exposure to air toxics will result in fewer premature deaths and illnesses allowing Oregonians to experience longer lives, better quality of life, lower medical expenses, fewer work and school absences, and better worker productivity.

Methodology for this analysis

The following analysis describes the fiscal impacts to business, government and the public. For regulated businesses, the analysis focuses on the fiscal impacts associated with performing risk assessments at different levels, potential emission reduction methods, and range of costs for the emission reduction methods. For government, the analysis describes potential impacts on government owned facilities and fiscal impacts to the agencies administering the new regulations. For the public, the analysis describes potential benefits to the service and consulting sector and using example pollutants and associated illnesses, potential general fiscal benefits from decreasing health risks. All estimates in this analysis are bounded by important caveats and limitations. Any use or consideration of fiscal impact estimates in this analysis should be accompanied by relevant caveats and limitations to avoid inaccurate assumptions or conclusions.

In November 2016 DEQ sent a request to all permitted facilities that may be subject to Cleaner Air Oregon rules to report on their air toxics emissions. At the time of this draft analysis, DEQ is still receiving and processing these data. DEQ does not have complete emissions or risk information for facilities that could be impacted by Cleaner Air Oregon. Even after DEQ has completed its analysis of the industrial air toxics emission inventory, each affected facility will need to go through the proposed risk screening and assessment process to gain accurate knowledge about risk posed and regulatory requirements. Some businesses will “screen out” at more simple assessment levels and will have little to no fiscal impacts, while others will be required to implement more complex and costly steps to assess potential health risks from air emissions. Historically, some businesses have sought to avoid being subject to regulations ahead of effective dates by voluntarily making changes to reduce their emissions. Each owner or operator will have to make individual decisions about whether to voluntarily reduce risk so that they screen out at the simplest assessment level.

Because of the high level of uncertainty about who will be affected and how, this fiscal analysis addresses potential ranges of impact for business, government and the public. DEQ considered but did not choose two other approaches to analyzing Cleaner Air Oregon fiscal impacts described below.

As an alternative to the general approach considering various ranges of impact, DEQ considered estimating potential risk, outcomes and fiscal impacts for the approximately 2,563 facilities that could be regulated by Cleaner Air Oregon rules. (The Lane Regional Air Protection Agency has approximately an additional 200 existing facilities that will be evaluated in their area of jurisdiction, but those are not specifically included in this fiscal impact statement.) DEQ decided against this approach due to the high likelihood of inaccurate estimates of risk and resulting programmatic requirements. This approach would also have required additional research and modeling work, for which resources are not currently available. At the time of this fiscal analysis, DEQ only has initial emission inventory information for a portion of potentially affected sources. This information must be checked for quality, and in many cases, is anticipated to be further refined and revised. Without a facility proceeding through the full steps of risk screening and assessment, it is not possible to predict with accuracy how much any particular business would have to spend to comply with risk reduction requirements, or how much benefit from reduction of associated air toxics risk could occur for people living nearby.

DEQ also considered analyzing Cleaner Air Oregon fiscal impacts by creating models or scenarios assuming various levels of emissions, risk analysis, required emission control, and potential impact on populations living nearby. While this approach would have the advantage of providing an opportunity to estimate both cost and benefit impacts based on the same scenarios, it was ultimately rejected because of the high potential to inaccurately represent actual conditions.

Implementation of Cleaner Air Oregon and Associated Costs

DEQ and OHA are currently proposing to implement the regulations using a tiered approach that would address a limited number of the highest risk facilities first, and then proceed to the remaining facilities after that. DEQ has proposed to address up to 80 facilities within the first 5 years out of approximately 2,563 known permitted facilities potentially subject to the program. There may be an unknown number of additional facilities that are currently not required to get permits under the existing air quality permitting program but may be subject to Cleaner Air Oregon rules. This tiered implementation would delay fiscal impacts for many potentially affected facilities and communities statewide, providing longer lead times and periods for analysis and compliance planning. DEQ believes this delayed implementation will allow facilities to better plan for compliance, and to achieve compliance at less cost.

Risk Assessment Costs

Whenever air toxics are emitted from a facility, these rules propose a stepwise progression to ensure that the release of these contaminants does not result in adverse impacts to public health or the environment. Four screening methods or levels are provided in the rules to calculate the predicted offsite ambient air concentrations of toxics. Initial screening levels incorporate conservative assumptions to represent worst-case conditions. Each succeeding level requires more detailed and site-specific information, with less conservative assumptions. To the extent that site-specific conditions provide better dispersion than the worst-case conditions, the site-specific later screening steps will predict a lower risk. At any screening level, the resulting risk from various air toxics are added together and compared to the Risk Action Levels (RALs). A facility can begin the risk analysis at any level and progress through the subsequent levels if needed.

As explained in the preceding Methodology section, DEQ does not know what level of assessment will be required for each and every permitted facility, so it is not possible to estimate the fiscal impact on individual facilities or even groups of facilities. For example, a facility will need to decide if they want to do a full health risk assessment (Level 4) to most accurately assess risk, which can be a time consuming and costly exercise, or, if they want to reduce their risk by incorporating pollution prevention or adding a pollution control device. Until these types of decisions are made by all facilities whose risk is above RALs at Level 1, DEQ cannot accurately estimate how many facilities will screen out of Cleaner Air Oregon at each level of assessment. To describe fiscal impacts to industry, DEQ is including the cost estimates for each level of assessment that facilities may incur, what the DEQ fees would be to review each level of assessment, and ranges of cost estimates for different types of pollution control equipment that may be required. Incorporating pollution prevention is extremely process-specific. DEQ cannot estimate those costs accurately, but has included an example below to illustrate the potential range of impacts.

Level 1 involves use of a DEQ-developed lookup table to determine whether a facility's emissions may be above Risk Action Levels. The lookup table consists of dispersion factors, which users choose based on the height of the emissions stack and the distance from that stack to the nearest exposure location outside the facility. The lookup table itself was developed using dispersion modeling (EPA's AERMOD model) but does not require the user to set up or run a dispersion model.

At the simplest level, when facility stack heights and distance to the nearest exposure location is unknown, a facility may use the most conservative or health protective factor which assumes little dispersion and close exposure locations. Use of the most conservative dispersion factor would involve a simple calculation using only emission rates. The cost of the Level 1 analysis would be minimal since all Oregon facilities with air permits at the time of this proposed rulemaking should already have the information necessary to perform lookup table emission rate calculations. DEQ required these facilities to submit emissions inventory data for all air toxics in 2017. That emissions inventory request itself is not included in this fiscal impact analysis, because DEQ's authority to request it was independent of this rulemaking. However, new facilities coming into the program after rule adoption would be required to perform emission inventories, so cost estimates are included in this analysis.

If a facility has stack and exposure location information, it can perform a slightly more complex calculation to determine whether its emissions would be above Risk Action Levels. This calculation would yield a more refined risk estimate. The cost of using the lookup table with stack and exposure location information would be minimal for less complicated facilities since gathering the needed data and using the table would not pose a significant cost. Facilities that have Title V permits have already provided stack height data to DEQ, and so would only need to determine exposure locations.

For a new facility, the cost associated with producing an emissions inventory would depend on the size and complexity of the facility and the number of air toxics emitted. The costs could range from approximately $1,200 to $20,000. Facilities regulated under General and Basic Air Contaminant Discharge permits would only be required to report production data, so they would not incur any additional costs since these facilities are already required to report this information to DEQ annually. DEQ is using the emissions inventories to rank facilities that potentially pose the highest risk and to screen out facilities that pose de minimis risk. DEQ would perform the Level 1 analyses for General and Basic Air Contaminant Discharge permittees using the most conservative dispersion factor, but new sources or unpermitted sources would be required to perform the analysis themselves.

If Risk Action Levels are exceeded at Level 1, the next step is to perform air dispersion modeling to determine the concentration of an air toxic at exposure locations downwind of the emission point. The most rudimentary form of dispersion modeling is called screening modeling. **Level 2** uses a screening model (in most cases, EPA's AERSCREEN model). Users enter data for the building dimensions and stack height, temperature and flowrate. AERSCREEN uses worst-case meteorology and conservatively assumes that exposure locations are directly downwind from the stack. AERSCREEN only allows a single stack to be modeled at one time. If modeled risk complies with Risk Action Levels, no further analysis is required.

If a **Level 3** assessment is required, more complex, refined modeling (usually using EPA's AERMOD model) would be done. This level of assessment is more accurate as it requires more detailed site-specific information about meteorology, topography, and exposure locations, and encompasses less conservative assumptions. AERMOD model work would often be performed by specialized contractors rather than by facility staff.

The last, most complex and accurate level of assessment is a **Level 4** Comprehensive Health Risk Assessment. A Comprehensive Health Risk Assessment would be a refinement of the assumptions in Level 3, and would look at how emissions of air toxics from a specific project would affect public health. It involves several steps, including hazard identification, exposure analysis, toxic response, and risk characterization. DEQ has developed a Health Risk Assessment Protocol that will describe the criteria that must be met to submit a complete Comprehensive Health Risk Assessment. As with all levels of assessment, the cost of a Comprehensive Health Risk Assessment depends on the complexity of the facility and the air toxics emitted. DEQ contacted various Oregon environmental/engineering consultants, who provided information regarding the costs of their services to the regulated industries. These cost estimates for the different levels of assessment are included in the Table 1 below:

Table 1

Emissions Analysis and Risk Assessment Costs

Task	Simple	Complex
Emissions inventory	$0*-$5,000	$60,000
Level 1 Assessment Lookup Table Calculation Using Stack Heights and Exposure Location Distance	$100	$600
Level 2 Assessment -Screening modeling	$5,000	$35,000
Level 3 Assessment -Refined modeling	$5,000	$100,000
Level 4 Assessment -Health Risk Assessment	$5,000	$500,000

*DEQ is doing the emissions inventory for all the approximately 2,200 sources that have Basic and General Permits.

Statement of Cost of Compliance

Large businesses - businesses with more than 50 employees

DEQ anticipates the proposed rules, when fully implemented, could have fiscal and economic impacts on approximately 1,360 large businesses holding air quality permits and an unknown number of businesses that are not currently required to have air permits. If the cancer or noncancer risk from a facility exceeds the Risk Action Levels, the facility would be required to take action to reduce air toxics emissions or show that the best available control technology for air toxics (TBACT) is already installed. The proposed rules would allow facilities flexibility in choosing a method to reduce emissions through the application of pollution prevention or pollution control equipment.

In EPA's and DEQ's hierarchy of pollution management strategies (acceptable ways to reduce pollution), pollution prevention, also known as source reduction, is preferred over the addition of pollution controls and treatment whenever feasible (see Pollution Prevention Act of 1990, https://www.epa.gov/p2/pollution-prevention-act-1990). [1]

Positive: The proposed rules are intended to establish a focused and consistent approach for regulating air toxics emissions. Providing regulatory certainty could have positive fiscal and economic impacts for Oregon businesses by making it easier for them to plan future investments. It is also possible that state air toxics regulation could reduce the likelihood of lawsuits from members of the public seeking damages from exposure to pollutants or means to achieve industrial emission reductions. Positive fiscal and economic impacts can also be realized by preventing pollution, as discussed below.

Pollution Prevention Costs and Savings

An approach to compliance under the proposed rules is the elimination or reduction of air toxics from the processes of emission sources through pollution prevention measures. Pollution prevention often involves the replacement or reduction of a hazardous substance in products and processes by less hazardous or non-hazardous substances, but

[1] Pollution prevention is generally preferred because it results in less pollution to control, treat, or dispose of. Pollution controls can generate wastes or contaminated equipment that require end-of-life management. Reducing pollution at the source means less hazards posed to the public and the environment. In addition, pollution controls can fail and toxic substances can be used in unintended ways. Reducing the use of those toxic substances at the source avoids those potential risks.

also can include the implementation of technology or process modifications, such as work practice standards or efficiency measures, that achieve equivalent functionality and performance. Pollution prevention has been implemented successfully for cleaning operations (e.g., metal parts), coating and painting (e.g., marine anti-fouling, wood preservation), lubricants and process fluids (e.g., loss lubrication, mold release agents), and dry cleaning of clothes.

In evaluating the costs of pollution prevention, DEQ considers not only the cost of replacing one solvent for another, but also capital costs, energy differences, labor costs, waste disposal and quality control considerations. In many instances, DEQ has found that pollution prevention can decrease costs for a facility owner, rather than increase them. Short-term investments in pollution prevention measures can result in savings that can pay for the initial investments over time.

For example, an Oregon-based company replaced use of a highly regulated chlorinated solvent to remove lubricant from parts with a heated, centrifugal spin dryer. This process change resulted in the following: elimination of solvent purchases, reuse of the lubricant, reduction of solvent air emissions by nearly 80,000 pounds, elimination of solvent-lubricant waste mixture, and lower labor, permitting and waste disposal costs. The benefits for this investment were realized in less than one year. In addition, there were benefits that were tangible, but more difficult to measure, such as lower regulatory burden and worker exposure to hazardous substances. Another Oregon company worked with a university researcher to develop a soy-based resin for plywood products as an alternative to urea formaldehyde. This new material is cost-competitive with urea formaldehyde plywood, more water resistant, and complies with strict California air emissions standards. Developing a product line containing a low hazard resin with strong performance qualities provided the company with unique market advantages.

Smaller businesses have also achieved short-term economic benefits from pollution prevention investments. For example, a small Oregon parts re-manufacturer replaced a highly volatile and toxic resin with a water-based alternative. This substitution required only a small process modification (introducing heat to accelerate curing time), but reduced volatile organic compound emissions by 92%. The alternative resin was more expensive per gallon, but because so much less was lost to the air, the total amount of the product used per year was significantly less. The reduced product purchases associated with this change produced a three-month payback in the initial investment, as well as avoiding potential regulation from the air emissions.

Negative: Cleaner Air Oregon regulations include many provisions to allow flexibility and mitigate potential negative fiscal impacts. Facilities above Risk Action Levels may request conditional risk levels, have additional time to comply, and may wait for effective control technologies to develop if none are available at the time of permitting. If TBACT is required and a facility can prove that it does not have the financial resources or capacity to comply, the proposed regulations could allow for DEQ to consider assigning a conditional risk level and a postponement of risk reductions. In addition, the proposed tiered implementation plan will delay potential impacts to many facilities. Because a facility's decisions on how to respond to Cleaner Air Oregon regulations will be influenced by many factors, DEQ lacks information to predict specific negative fiscal impacts. However, if a facility must prepare simple to complex risk assessment or modeling to demonstrate compliance, or reduce emissions by installing and operating pollution control equipment, there would be negative fiscal impacts.

The different types of pollution control equipment are described below. Table 2, **Pollution Control Equipment for Air Toxics Emissions,** includes a summary of the types of pollution control devices, the pollutants controlled, examples of facilities where the pollution control device is used and the estimated associated costs. The costs in the table are from EPA's Air Pollution Control Technology Fact Sheets, which are based on the EPA Air Pollution Control Cost Manual, and correspondence with facility representatives.

Pollution Control Equipment Costs

If a regulated facility has conducted air dispersion modeling where results exceed the Risk Action Levels, the facility determines that pollution prevention measures would not work to reduce emissions, and the emissions are not already controlled by TBACT, a facility owner or operator could be required to purchase and install control equipment to reduce air toxics emissions. The cost to a regulated facility to install control equipment would vary depending on the type of pollutant, the amount of reductions needed, and the size and existing layout of the emission source. The cost would also depend on whether or not the emission source is new or existing (already has some type of air pollution control in place), and whether the facility owner or operator already employs environmental compliance staff to address state and federal air pollution regulations. Finally, the cost could also be impacted by whether or not the facility owner or operator needs to hire an environmental consultant to complete the work necessary to demonstrate compliance with the regulation. Ranges of costs of different types of pollution control equipment are included in Table 2 below.

Air toxics control devices are designed to capture several broad categories of emissions: particulate matter, volatile organic compounds, and other gaseous mixtures, including mists. Emissions can be reduced by a number of different air pollution control devices; some of which can control multiple types of air toxics. The following paragraphs explain the different types of air pollution control devices available for these broad categories of emissions, how they reduce emissions, control efficiencies, and typical applications.

Particulate Matter: Examples of air toxics that are emitted as particulate matter include metals such as arsenic, cadmium, chromium, lead, and nickel. Fabric filters (baghouses) and wet scrubbers are the most commonly applied control equipment for management of particulate matter air toxics from process emission sources. Particulate matter air toxics can also be controlled with electrostatic precipitators, permanent total enclosures and High Efficiency Particulate Air (HEPA) filters.

Fabric Filters: Fabric filters, also commonly referred to as baghouses, are used in many industrial applications. They operate in a manner similar to a household vacuum cleaner. Dust-laden gases pass through fabric bags where the dry particulates are captured on the fabric surface. After enough dust has built up on the filters, as indicated by a buildup in pressure across the fabric, dust is periodically removed by blowing air back through the fabric, pulsing the fabric with a blast of air, or shaking the fabric. Dust from the fabric then falls to a collection hopper where it is removed. As dust builds up on the fabric, the dust layer itself can act as a filter aid, improving the removal efficiency of the device.

Baghouses maximize the filtration area by configuring the fabric filter media into a series of long small-diameter fabric tubes referred to as “bags.” The bags are tightly packed into one or more filter compartments with one compartment normally off-line for cleaning. Most baghouses contain as many as ten or more compartments with several hundred bags per compartment.

Baghouses are used to control air pollutants from asphalt plants, cement kilns, coal-fired power plants, steel mills, foundries, cement manufacturing, and other industrial processes and can collect 99 to 99.9% of the entering particulates, even fine particulate matter.

Electrostatic precipitators (ESPs): ESPs are relatively large, low velocity dust collection devices that remove particles in much the same way that static electricity in clothing picks up small pieces of lint. Transformers are used to develop extremely high voltage drops between charging electrodes and collecting plates. The electrical field produced in the gas stream as it passes through the high voltage discharge introduces a charge on the particles, which is then attracted to the collecting plates. Periodically the collected dust is removed from the collecting plates by a hammer device striking the top of the plates (rapping) dislodging the particulate, which falls to a bottom hopper for removal.

Electrostatic precipitators are often configured as a series of collecting plates to improve overall collection efficiency. Efficiencies between 99 and 99.9% can be achieved, and ESPs are used in many of the same applications as baghouses, including power plants, wood-fired boilers, steel and paper mills, smelters, cement plants, and petroleum refineries. In some applications, water is used to remove the collected particulates. ESPs using this cleaning mechanism are referred to as “wet ESPs” and are often used to remove fumes such as sulfuric acid mist.

Permanent Total Enclosure: Permanent total enclosures are not control devices, per se, but an adjunct method that increases the capture efficiency for some other control device. Permanent total enclosures are permanently installed structures that completely surround a source of emissions. They consist of walls, roof, windows, doors, and exhaust and make-up air fans. The pollutants are captured by means of a ventilation system, which draws contaminated air from the enclosure and replaces it with clean supply air. The waste gas is vented to a control device, such as an incinerator or carbon adsorber, for abatement. The abatement device is not part of the permanent total enclosure. In order to qualify as a permanent total enclosure, an enclosure must meet EPA Method 204 Criteria for and Verification of a Permanent or Temporary Total Enclosure. If the criteria are met, the capture efficiency is assumed to be 100%. Permanent total enclosures are used by manufacturers who paint, spray, coat or apply solvent based materials to their products such as printers, can coaters, and surface coaters (spray coating of motor vehicles, mobile equipment or metal and/or plastic parts).

HEPA Filter: High Efficiency Particulate Air (HEPA) filters are often installed as the final component in a PM collection system, downstream from other PM collection devices such as electrostatic precipitators or baghouses. HEPA filters can have a 99.97% efficiency for the removal of 0.3 µm diameter or larger particulate matter. Common industrial applications of HEPA filters are hospitals, low-level nuclear waste operations, and mixed waste incinerators. In addition, the filters are used in a number of commercial applications and manufacturing processes such as clean rooms, laboratories, food processing and the manufacturing of pharmaceuticals and microelectronics. The filters can be utilized in any application where dust is generated and can be collected and ducted to a central location. HEPA filters are typically utilized for applications involving chemical, biological and radioactive PM.

Wet Scrubbers: Scrubbing is a physical process whereby particulates, vapors, and gases are controlled by either passing a gas stream through a liquid solution or spraying a liquid into a gas stream. Water is the most commonly used absorbent liquid. As the gas stream contacts the liquid, the liquid absorbs the pollutants, in much the same way that rain droplets wash away strong odors on hot summer days. Wet scrubbers are commonly used to recover products or to purify gas streams that have high concentrations of water-soluble compounds and are designed to get as much mixing between the gas and liquid as possible.

Wet scrubbers can be highly effective in removing particles, with removal efficiencies of up to 99%; however, their efficiency for very small particles can be much lower. Wet scrubbers produce a wastewater stream that will likely require treatment before reuse or discharge. When possible, collected particulate matter is separated from the water, and the water is reused, but this is often difficult; disposal of a wet sludge by-product is often required.

Scrubbers are used for wood-fired boilers, lime kilns, potato fryers, coal-burning power plants, and asphalt/concrete plants, and can be very useful at facilities that emit particulates along with sulfur oxides, hydrogen sulfide, and other gases with high water solubility. In these cases, they can be used to collect multiple types of pollutants. Wet scrubbers are often used for corrosive acidic or basic gas streams.

Volatile Organic Compounds (VOCs): Examples of air toxics that are volatile organic compounds include acetone, benzene, chloroform, formaldehyde, isopropyl alcohol, and vinyl chloride. Volatile organic compounds are controlled with various types of control equipment: thermal oxidizers, regenerative thermal oxidizers, catalytic oxidizers or reactors, carbon adsorbers, wet scrubbing (described above), and biofilters.

Thermal oxidizers or incineration: Incineration involves the high efficiency combustion of certain solid, liquid, or gaseous wastes. The reactions may be self-sustaining based on the combustibility of the waste, or may require the addition of auxiliary fuels, such as natural gas or propane. Their fuel consumption is high, so thermal units are best suited for smaller process application with moderate-to-high VOC loadings. They may be batch operations or continuous as with flares used to burn off methane from landfills. When not burning solids, they are also called thermal oxidizers, and these devices can operate at efficiencies that range from 98 to 99.99% and above. Thermal oxidizers are used to destroy odorous or toxic

VOCs from almost all VOC sources, including reactor vents, distillation vents, solvent operations, and operations performed in ovens, dryers and kilns. Combustion of fuel for thermal oxidizers or incineration also generates air pollutants, including greenhouse gases and air toxics.

Regenerative thermal oxidizers: Regenerative thermal oxidizers (RTOs) use a high-density media such as a ceramic-packed bed still hot from a previous cycle to preheat an incoming VOC-laden waste gas stream. The preheated, partially oxidized gases then enter a combustion chamber where they are heated by auxiliary fuel (natural gas) combustion to a final oxidation temperature typically between 1,400º-1,500ºF and maintained at this temperature to achieve maximum VOC destruction, however, temperatures of up to 2,000ºF may be achieved, if required, for very high control efficiencies of certain toxic VOC. The purified, hot gases exit this chamber and are directed to one or more different ceramic packed beds cooled by an earlier cycle. Heat from the purified gases is absorbed by these beds before the gases are exhausted to the atmosphere. The reheated packed bed then begins a new cycle by heating a new incoming waste gas stream. High flow, low concentration waste streams which are consistent over long time periods can be treated economically with RTO systems. Typical regenerative thermal oxidizer efficiencies range from 95 to 99%. RTOs can be used to control VOC emissions from metalworking and coating operations, automotive manufacturing, and forest and wood products manufacturing.

Catalytic oxidizer or reactor: Catalytic oxidizers operate very similarly to thermal/recuperative incinerators, with the primary difference that the gas, after passing through the flame area, passes through a catalyst bed. The catalyst has the effect of increasing the oxidation reaction rate, enabling conversion at lower reaction temperatures than in thermal incinerator units. Catalysts, therefore, also allow for smaller incinerator size. Catalysts typically used for VOC incinerators include platinum and palladium. In a catalytic incinerator, the gas stream is introduced into a mixing chamber where it is also heated. The waste gas usually passes through a recuperative heat exchanger where it is preheated by post combustion gas. The heated gas then passes through the catalyst bed. Oxygen and VOC migrate to the catalyst surface by gas diffusion and are adsorbed onto active sites on the surface of the catalyst where oxidation then occurs. The oxidation reaction products are then desorbed from the active site by the gas and transferred by diffusion back into the gas stream. Catalytic oxidation is most suited to systems with lower exhaust volumes, when there is little variation in the type and concentration of VOC, and where catalyst poisons or other fouling contaminants such as silicone, sulfur, heavy hydrocarbons, and particulates are not present. Catalytic oxidizers can achieve 95% destruction efficiency but higher destruction efficiencies (98-99%) are achievable at larger catalyst volumes and/or higher temperatures. Catalytic oxidizers can be used to reduce emissions from solvent evaporation processes associated with surface coating and printing operations and also plywood veneer dryers, gasoline bulk loading stations, and resin manufacturing.

Carbon adsorption: Incineration is not always cost-effective, particularly in situations involving chlorinated solvents where incineration would produce hazardous secondary materials, or in instances where recovery of the solvent allows for recycling and reuse. In these situations, chemical adsorbers are very effective. A well designed adsorber system can achieve 95% - 98% control efficiency. The pollutant is adsorbed on the surface (mostly the internal surface) of a granule, bead, or crystal of adsorbent material. It is not absorbed by a chemical reaction. This is an important difference. The adsorbed material is held physically, rather loosely, and can be released (desorbed) rather easily by either heat or vacuum. Chemical adsorbers can also provide the additional benefits of solvent recovery, which can offset the system capital and operating costs.

Biofilters: Biofilters are used to destroy VOCs and odors by microbial oxidation of these problem compounds. They are most effective on water-soluble materials. The polluted air is passed through a wetted bed, which supports a biomass of bacteria that absorb and metabolize pollutants. Efficiencies over 98% are possible with this application. Biofiltration can be used in the wood products industry to control press vent and dryer emissions (particularly methanol and formaldehyde).

Mists: Examples of air toxics that are gaseous mixtures included chemicals suspended in mists include chemicals such as chromic acid, hydrogen chloride, hydrogen fluoride, and sulfuric acid. Wet scrubbers are often used for corrosive acidic or basic gas streams (see discussion above).

Mist Eliminators: Chevron-blade and mesh-pad mist eliminators are the types of mist eliminators most frequently used to control emissions of chromic acid mist from decorative and hard chromium plating and chromic acid anodizing operations. The most important mechanism by which mist eliminators remove chromic acid droplets from gas streams is the inertial impaction of droplets onto a stationary set of blades or a mesh pad. Mist eliminators typically are operated as dry units that are periodically washed down with water to clean the impaction media.

Chemical Fume Suppressants: Chemical fume suppressants are added to decorative chromium plating and chromic acid anodizing baths to reduce chromic acid mist. Although chemical agents alone are effective control techniques, many plants use them in conjunction with an add-on control device. Chemical fume suppressants are surface-active compounds that are added directly to chromium plating and chromic acid anodizing baths to reduce or control misting. Fume suppressants are classified as temporary or as permanent. Temporary fume suppressants are depleted mainly by the decomposition of the fume suppressant and drag out of the plating solution, and permanent fume suppressant are depleted mainly by drag out of the plating solution. Fume suppressants include wetting agents that reduce misting by lowering the surface tension of the plating or anodizing bath, foam blankets that entrap chromic acid mist at the surface of the plating solution, or combinations of both a wetting agent and foam blanket. Polypropylene balls, which float on the surface of the plating baths, also are used as a fume suppressant in chromium plating tanks. The control efficiencies for chemical fume suppressants are 78 percent for hard chromium electroplating controlled and 99.5 percent for decorative chromium plating.

Table 2

Pollution Control Equipment for Air Toxics Emissions*

Control Device Type	Types of Pollutants it can reduce	Examples of facilities where this is used	Initial costs		Annual Operating Costs	
			low	high	low	high
Fabric filter (baghouse)	PM, hazardous air pollutant (HAP) PM	Asphalt batch plants, concrete batch kilns, steel mills, foundries, fertilizer plants, and other industrial processes. Colored art glass manufacturers.	$360,000 - $18,500,000		$180,000 - $6,200,000	
Electrostatic precipitator (ESP)	PM, HAP PM	Power plants, steel and paper mills, smelters, cement plants, oil refineries	$320,000 - $7,100,000		$100,000 - $7,600,000	

Control Device Type	Types of Pollutants it can reduce	Examples of facilities where this is used	Initial costs		Annual Operating Costs	
			low	high	low	high
Enclosure	Fugitive PM or volatile organic compounds (VOCs)	Any process or operation where total emissions capture is required, i.e., printing, coating, laminating	$14,000 - $420,000		$400 - $10,000	
HEPA filter	Chrome emissions	chrome plating	$13,000 - $240,000		Application specific	
Wet scrubber (packed towers, spray chambers, Venturi scrubbers)	Gases, vapors, sulfur oxides, corrosive acidic or basic gas streams, solid particles, liquid droplets	Asphalt and concrete batch plants; coal-burning power plants; facilities that emit sulfur oxides, hydrogen sulfide, hydrogen chloride, ammonia, and other gases that can be absorbed into water and neutralized with the appropriate reagent.	$25,000 - $170,000		$19,000 - $830,000	
Thermal oxidizer	VOCs, gases, fumes, hazardous organics, odors, PM	Landfills, crematories, inks from graphic arts production and printing, can and coil plants, hazardous waste disposal. semiconductor manufacturing	$17,000 - $6,200,000		$3,500 - $5,200,000	
Regenerative thermal oxidizer	VOCs	Paint booths, printing, paper mills, municipal waste treatment facilities	$940,000 - $7,700,000		$110,000 - $550,000	
Catalytic reactor	VOCs, gases	Landfills, oil refineries, printing or paint shops	$21,000 - $6,200,000		$3,900 - $1,700,000	
Carbon adsorber	Vapor-phase VOCs, hazardous air pollutants (HAPs)	Soil remediation facilities, oil refineries, steel mills, printers, wastewater treatment plants	$360,000 - $2,500,000		Not available	

Control Device Type	Types of Pollutants it can reduce	Examples of facilities where this is used	Initial costs		Annual Operating Costs	
			low	high	low	high
Biofilter	VOCs, odors, hydrogen sulfide (H_2S), mercaptans (organic sulfides)	Wastewater treatment plants, wood products facilities, industrial processes	$360,0000 - high end not available		Not available	
Fume suppressants	Chromic acid mist, chromium, cadmium and other plating metals	Chromic acid anodizing and chrome plating operations	Up to $122,000		Not available	

*Costs are from examples in the EPA Air Pollution Control Cost Manual, Report No. 452/B-02-001, EPA Air Pollution Control Technology Fact Sheets, and information provided by permitted facilities

Other costs that may be incurred by facility owners or operators subject to Cleaner Air Oregon include fees, compliance costs and community engagement costs.

Fees

DEQ and OHA are in the process of identifying the proposed staffing resources necessary to implement the Cleaner Air Oregon draft rules. The agencies anticipate those resources to cost the agencies approximately $2,500,000 - $3,000,000 annually, and are working to produce a more refined range, along with relevant assumptions. The agencies are planning to propose several fee scenarios representing different combinations of "base" and "activity" fees. These fees will supplement existing agency generals funds dedicated to Cleaner Air Oregon and DEQ's overall air toxics reduction work. Table 3, below will summarize proposed Cleaner Air Oregon permitting fees.

Table 3
Proposed Cleaner Air Oregon Permitting Fees (placeholder)

Direct Impacts: Some percentage of the approximately 1,360 large businesses with current air permits could be affected by Cleaner Air Oregon base or activity fees. It is not possible to estimate how many will pay these fees because inclusion in Cleaner Air Oregon will depend on numerous factors influencing whether a facility's emissions are above or below Risk Action Levels. In addition there may be an unknown number of additional facilities that are currently not required to get permits under the existing air quality permitting program but may be subject to Cleaner Air Oregon rules and would have to pay fees.

Indirect Impacts: Cleaner Air Oregon fees could affect businesses indirectly if other businesses change the price of goods and services to offset any increased or decreased costs from paying permit fees.

Compliance Costs

Regular reporting: All currently permitted sources report to DEQ annually so their reporting requirements for Cleaner Air Oregon will be in addition to existing reporting requirements. Some facilities that aren't required to have air permits under current regulations require may be required to have them under Cleaner Air Oregon, and in that case the requirement to report annually would be new. Some facilities already report emissions of Hazardous Air Pollutants (187 pollutants out of approximately 600 air toxics) annually. Under the proposed regulations, all facilities that emit air toxics must report emissions to DEQ a minimum of every three years. Facilities that have permit requirements to limit air toxics emissions must report compliance annually or semi-annually. The initial emissions inventory created the greatest workload for facilities, so updating this inventory should involve minimal costs. DEQ anticipates that the additional reporting requirements for Cleaner Air Oregon cost facilities approximately $120 to $1,200 per year.

Source testing: Source testing is currently not required as a part of Cleaner Air Oregon, but some facilities may choose to do source testing to more accurately estimate emissions. Source testing may be required to determine compliance with Cleaner Air Oregon permit conditions but DEQ anticipates that will be the case for very few sources. Cost for source testing for air toxics depends on the air toxic to be tested. Source testing for some air toxics, such as hexavalent chromium, is relatively complex and therefore expensive. Source test costs range from $7,500 for a single air toxic that is easy to test to $35,000 for multiple air toxics that are more difficult to test. Businesses already required to perform periodic compliance source testing could save money if the air toxics and criteria pollutant tests could be aligned.

Community Engagement

If the risk from a facility is greater than any Risk Action Level, a Community Engagement Plan is required. Under a Community Engagement Plan, the owner or operator of the facility will be required to notify the community within the area of impact, hold two public meetings to describe the risks and solicit input on ways to reduce the risks, provide translation services if necessary, report back to DEQ the results of the public meetings, and hold ongoing annual meetings to keep the community updated on ongoing activities to reduce risk, if necessary. Costs for holding a public meeting range from $1,400 to $6,400.

If a new facility seeks a permit to construct and their risk is estimated to be over 5 in 1 million but less than 10 in 1 million, the owner or operator of the facility is required to notify the community within 7 days of permit application submittal and hold one public meeting if requested by ten or more individuals. Costs for holding a public meeting range from $1,400 to $6,400.

Impact on small businesses (those with 50 or fewer employees) ORS 183.336

The proposed rules would require that the facility owner or operator of a small business demonstrate that the risk posed by the facility's air emissions would not exceed the proposed Risk Action Levels. This compliance demonstration can be accomplished using any of the levels of risk assessment, 1 through 4.

In addition to the fiscal and economic impact described under the section above “Large businesses - businesses with more than 50 employees,” the proposed rules could have the following impacts on small business:

a) Estimated number of small businesses and types of businesses and industries with small businesses subject to proposed rule.

The proposed rules could affect approximately 1,090 small businesses, such as asphalt plants, autobody shops, chromium electroplaters, dry cleaners, ethylene oxide sterilizers, grain elevators, gas stations, lumber mills, metal fabricators, metal foundries, and surface coaters. If any of these businesses had Cleaner Air Oregon permit conditions, they would have additional compliance requirements over existing permit requirements. In addition there may be an unknown number of additional facilities that are currently not required to get permits under the existing air quality permitting program but may be subject to Cleaner Air Oregon rules and would have to pay fees.

Many of the small businesses subject to the Cleaner Air Oregon rules would only be required to submit triennial reports of air toxics emissions. Some small businesses may be required to reduce air toxics emissions through either permit limits, pollution prevention or pollution control equipment if cancer risk, chronic noncancer risk or acute noncancer risk is above Risk Action Levels.

b) Projected reporting, recordkeeping and other administrative activities, including costs of professional services, required for small businesses to comply with the proposed rule.

Small businesses that must meet Cleaner Air Oregon permit requirements would have increased recordkeeping and reporting requirements. Administrative activities, including costs of professional services, required for small businesses to comply with the proposed rule may increase from $100 to $500,000 if the small business is required to perform computer modeling or a health risk assessment if cancer risk, chronic noncancer risk or acute noncancer risk is above Risk Action Levels.

c) Projected equipment, supplies, labor and increased administration required for small businesses to comply with the proposed rule.

Depending on the size and nature of a small businesses' operation, pollution control costs could be much less than or in some cases the same as the cost ranges for different types of control equipment found in Table 2, above. Summarizing from Table 2, if a small businesses' cancer risk, chronic noncancer risk or acute noncancer risk were above Risk Action Levels, the proposed rules could result in additional costs ranging from approximately $13,000 to $18,500,000 for initial equipment including purchase and labor, and ranging from approximately $400 to $7,600,000 in annual operating costs.

Direct Fee Impacts: Some percentage of the approximately 1,090 small businesses potentially affected by Cleaner Air Oregon regulations could be required to pay an annual base or activity fees. It is not possible to estimate how many will pay the activity fees because inclusion in Cleaner Air Oregon will depend on numerous factors influencing whether a facility's emissions are above or below Risk Action Levels.

Indirect Fee Impacts: Cleaner Air Oregon fees could affect small businesses indirectly if other businesses change the price of goods and services to offset any increased or decreased costs from paying permit fees.

d) Describe how DEQ involved small businesses in developing this proposed rule.

DEQ notified small businesses during rule development by email, announcements on the DEQ website, advisory committee meetings, and through Twitter and Facebook. Small business representatives were on the rules advisory committee during rule development. At the onset of the public comment period, DEQ notified small businesses by mail (postcards), email, and notices in the Secretary of State Bulletin.

Impacts on state agencies and local government

The majority of state agencies and local governments should be minimally or not directly impacted by the proposed rules because the rules predominantly regulate process emission sources, many of which are related to manufacturing. State agencies and local governments holding permits may be required to reduce air toxic emissions if the predicted risk exceeds Risk Action Levels, the cost of which is discussed above. State agencies own 21 permitted facilities, federal agencies and tribes own 6 permitted facilities, and local governments own 52 permitted facilities.[2] Cleaner Air Oregon base and activity fees would affect these permit holders directly. Changes to fees could affect these agencies indirectly if businesses change the price of goods and services to offset any increased or decreased costs from paying a permit fee.

In instances where new or existing facility emissions cause potential risk above the applicable Risk Action Levels, local governments may be asked to consult with the DEQ Director and the Oregon Health Authority (OHA) to consider and weigh local factors prior to a DEQ decision whether to issue a permit. Local government may also be consulted in land use issues potentially affected by facilities emitting air toxics.

DEQ and OHA will see an increase in workload as a result of the proposed rules. Implementation of a new permitting program will require additional resources. DEQ has completed a workload analysis to estimate the cost of different levels of risk assessment and the number of additional resources needed. DEQ will permit facilities subject to Cleaner Air Oregon with the aid of OHA staff in areas of health risk assessment and risk communication. DEQ and OHA workloads would initially increase as staff becomes familiar with the proposed rules and a new program and could level off after the first tier of implementation.

Having the Cleaner Air Oregon air toxics program in place may also reduce DEQ and OHA's workload in some instances, by reducing the need for the agencies to respond on a facility by facility basis to public concerns about air toxics emissions that are not currently covered by a regulatory structure.

[2] DEQ counts approximately 34 other non-private permittees that are categorized as nonprofit, other, or unknown.

DEQ anticipates needing the following resources to begin implementation of Cleaner Air Oregon:

- Section manager
- Project manager
- Permit writers (4)
- Modeler
- Toxicologist
- Support staff
- Communications staff

The fees to fund these positions are included in Table 3, above.

Impacts on the Public

As a whole, the proposed Cleaner Air Oregon rules are intended to assess and decrease risk above Risk Action Levels for people living nearby industrial facilities. The Risk Action Level analysis would be based many factors, including the best available science regarding toxicity of regulated air toxics, as proposed in the Risk Based Concentrations. Cleaner Air Oregon air toxics reductions that decrease cancer risk, chronic noncancer risk or acute noncancer risk could create positive economic benefits and improvements in public health and welfare statewide. The rules could also have negative economic effects on the public. In analyzing potential positive and negative effects on the public of proposed Cleaner Air Oregon rules, DEQ has consulted with OHA and relied upon information provided by them.

Positive Impacts on the Public

Depending on exposure, air toxics can increase risk of cardiovascular and respiratory illness, lung disease, cancers, birth defects, premature births, developmental disorders, central nervous system damage, intellectual disability, and premature death. These health problems have negative economic impacts. In general, EPA detailed cost benefit analysis of air pollution regulation over the last 20 years has shown that the benefits can greatly outweigh the costs of compliance. DEQ and OHA lack available information to estimate specific health and welfare benefits from implementing Cleaner Air Oregon, but below provide general information about health effects that could be caused by the more common higher risk air toxics emissions and the range of associated health costs. The proposed Cleaner Air Oregon rules have the potential to meaningfully impact public health in the state by reducing air toxics emissions. The air toxics that would be regulated by Cleaner Air Oregon rules are known to increase risk of a wide range of health outcomes.

Based on preliminary analysis of a subset of emissions inventory data using proposed screening tools and Risk Action Levels, DEQ and OHA have determined that a number of air toxics are most likely emitted at concentrations whose risk exceeds the proposed Risk Action Levels. Information from EPA's National Air Toxics Assessment supports this initial analysis. The impact of air toxics on health depends on peoples' exposure. DEQ and OHA do not currently have enough information about how many people are exposed to specific concentrations of industrial air toxics emissions or about the relative actual contribution of air toxics to disease to know how reducing emissions will translate to improved public health in quantitative terms. As Cleaner Air Oregon regulations are implemented, the emissions inventory and the permitting process will improve DEQ and OHA's understanding of Oregonians air toxics exposures.

In this analysis it is not possible to predict the total reduced medical costs that would result from the proposed rules. However, it is possible to describe the range of health outcomes associated with air toxics currently emitted in Oregon and to describe the economic burden of medical treatment for a subset of those health effects. This section also provides national analyses that estimate the fraction of certain diseases that are due to environmental exposures.

Health effects caused by air toxics commonly emitted by industrial facilities in Oregon

DEQ and OHA summarized the health effects associated with 15 of the air toxics to be regulated under Cleaner Air Oregon: lead, formaldehyde, arsenic, cobalt, manganese, acrolein, polycyclic aromatic hydrocarbons (PAHs), chlorine, hexavalent chromium, cadmium, benzene, dioxins, naphthalene, trichloroethylene, and hydrogen fluoride. This information is summarized in Table 3 below.

The agencies selected this set of 15 chemicals as examples of air toxics that are likely to be emitted above the proposed Risk Action Levels based on the preliminary analysis of a subset of emissions inventory data using proposed screening tools and Risk Action Levels, but further analysis will be required to determine whether that is the case. This summary illustrates the range of health effects that may be caused by this small subset of 15 air toxics. Many more of the air toxics to be regulated under Cleaner Air Oregon are associated with these and other health effects.

Table 4

Examples of health effects associated with a subset of 15 air toxics

Type of Toxicity	Air toxics associated with these health outcomes
Respiratory Effects Includes asthma and asthma symptoms (difficulty breathing, shortness of breath, coughing, wheezing, chest pain), reduced lung function, respiratory irritation, and other respiratory conditions	formaldehyde*, cobalt*, hexavalent chromium*, cadmium*, chlorine*, acrolein*, hydrogen fluoride*, naphthalene*, PAHs, manganese, arsenic
Cancer includes lung, respiratory, leukemia, lymphoma, liver, kidney and gastrointestinal cancers	arsenic*, hexavalent chromium*, cadmium*, formaldehyde*, PAHs*, benzene*, trichloroethylene*, lead*, dioxins*, naphthalene*
Heart Disease includes hypertension, arrhythmia, heart attack	arsenic, PAHs, lead, acrolein, hydrogen fluoride
Kidney Function includes reduced kidney function, kidney stones	cadmium*, lead, trichloroethylene, hydrogen fluoride
Liver Disease includes reduced liver function, fatty liver disease	dioxin*, trichloroethylene, hydrogen fluoride
Neurological Effects includes effects on motor function, balance, vision, hearing, cognition, memory, anxiety, focus or behavior following exposure as an adult or during brain development	lead*, arsenic*, manganese*, cadmium, PAHs, benzene, trichloroethylene, formaldehyde, cobalt
Fetal Development includes low birth weight, pre-term birth, miscarriage, and birth defects following exposure to mothers during pregnancy	arsenic*, PAHs*, trichloroethylene*, formaldehyde, cadmium, benzene, trichloroethylene, lead, dioxins
Impaired Fertility includes damage to male or female reproductive organs, reduced sperm counts, altered sex hormones, and infertility	manganese, PAHs, hexavalent chromium, dioxins, trichloroethylene
Blood Regulation includes impaired bone marrow function, anemia	benzene*, lead, naphthalene, cobalt
Immune Function includes allergic responses, reduced immune function	trichloroethylene*, benzene*, dioxins, PAHs

Gastrointestinal Effects includes nausea, vomiting and abdominal pain	naphthalene*

*For these chemicals, the associated health effect serves as the basis for Risk Action Levels proposed in Cleaner Air Oregon. Inclusion of all other chemicals is based on studies referenced in EPA, ATSDR, or OEHHA documents. The magnitude of and certainty around these associations varies.[3]

Information needed to Quantify Economic Impact of Health Improvements

Oregon currently lacks the data necessary to quantify total potential health cost savings from Cleaner Air Oregon because of the lack of information about how many people are exposed to specific concentrations of industrial air toxics emissions and the relative actual contribution of air toxics to disease. Just as a lack of information about individual facility risk assessment and emission reduction outcomes prevents DEQ from quantifying specific fiscal impacts to businesses, a lack of health information also prevents DEQ from quantifying specific positive fiscal impacts from potential Cleaner Air Oregon emission reductions. The many different categories of information required to quantify the economic impact of regulations on public health are identified in Table 5 below. The health impact of reducing emissions depends on the specific chemicals that are being reduced, the health risks those chemicals influence (1), the relationship between exposure and health (2), and the extent to which emissions are reduced (3 and 4). Defining the economic impact of improved health further requires knowledge of the portion of cases that are related to air toxics exposures (5), prevalence of health outcomes in the state (6), and the cost of medical treatment for each case (7).

Table 5
Information Needed to Quantify Economic Impact of Health Improvements

Type of Information	Current availability of data
1. Health risks associated with each chemical	Some chemicals are well characterized while toxicity data is missing or incomplete for others. There is some information about toxicity for all chemicals with proposed Risk Based Concentrations (RBCs). The amount of information and level of certainty around the association with health effects varies.

[3] EPA Integrated Risk Information System. https://www.epa.gov/iris
ATSDR Toxic Substances Portal. https://www.atsdr.cdc.gov/toxprofiles/index.asp
California Office of Environmental Health Hazard Assessment. Air Toxics Hot Spots Program Technical Support Document for the Derivation of Noncancer Reference Exposure Levels. Dec, 2008. https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-technical-support-document-derivation

Type of Information	Current availability of data
2. Relationship between exposure and health	Even when health effects are identified, it can be difficult to quantify the amount of risk expected at a specific level of exposure; this relationship is well characterized for some chemicals and not available for others. There is little information on how multiple chemicals may interact to impact health. This makes it difficult to evaluate the cumulative health impact of reducing exposure to multiple air toxics.
3. Level of current exposure	Information from existing DEQ air permits and EPA's National Air Toxics Assessment provide some information on potential exposures, but these do not cover all sources of industrial air toxics. The emissions inventory will provide a clearer picture of current potential exposures from industrial sources once it is complete. As Cleaner Air Oregon is implemented and facilities go through the new permitting process, there will be a more accurate picture of emissions.
4. Predicted reduction in exposure	This will depend on many factors including which facilities are included in the first tier of implementation and which air toxics they emit. Without complete information on current emissions, facility risk assessment and required emission reductions, it is not possible to know reductions of emissions and exposures of each air toxic.
5. Percent of each health outcome that is attributable to air toxics	This is determined based on the known relationship between exposure and effect, the extent to which exposure to each chemical occurs, and the extent to which other factors are known to contribute to health risk. Previous analyses of the environmental contribution to disease have weighed these factors to identify the percent of each health outcome that is due to an environmental exposure. This is referred to as the "environmentally attributable fraction." Typically, this is presented as a range rather than a specific percentage to demonstrate the extent of uncertainty around each estimate. There is a limited set of health outcomes for which there are peer reviewed estimates of the environmentally attributable fraction. Where those estimates exist, they often focus on all pollution (beyond industrial air toxics) or on a single pollutant.
6. Prevalence of each health outcome in Oregon	OHA tracks incidence of several health outcomes that may be impacted by air toxics, including cancer, adverse birth outcomes, asthma, and heart disease. Baseline data is not as readily available for conditions related to brain development, neurological outcomes, infertility, allergy, and immunity.

Type of Information	Current availability of data
7. Economic burden of each case	Economic costs can be measured in different ways. Some estimates focus on direct medical costs of disease. Others account for indirect costs such as missed days of work and school. For some health outcomes, these metrics have been established by the Center for Disease Control (CDC) or in published literature, while for other health outcomes data on economic burden is less easily accessible. Social costs such as social isolation, time spent by unpaid caretakers, and emotional burden of premature death are important to consider but difficult to quantify.

Costs of Chronic Diseases in Oregon

Air toxics included in Cleaner Air Oregon are associated with increased risk of four of the top five leading causes of death in Oregon (heart disease, stroke, respiratory disease, and cancer). [4] DEQ and OHA don't know what portion of these may be attributable to industrial air toxics, but data clearly show that chronic diseases have a substantial social and economic impact in Oregon. OHA uses Center for Disease Control and Prevention data to estimate the cost of certain chronic diseases in Oregon. If even a small fraction of these chronic health outcomes is attributable to air toxics, reducing emissions could prevent substantial health costs. The total estimated costs of chronic diseases tracked in Oregon are summarized in Table 6.

Table 6

Total Estimated Cost of Chronic Diseases that are Tracked in Oregon

Health Outcome	Description	Average Annual Cost of Each Case	Estimated Annual Medical Costs in Oregon[A]	Examples of air toxics that may contribute to health risk
Asthma	estimates include adults and children	$2,740	$411 million	formaldehyde, cobalt, hexavalent chromium, cadmium, PAHs, manganese, arsenic

[4] OHA. 2016. Leading Causes of Death. http://public.health.oregon.gov/ProviderPartnerResources/PublicHealthAccreditation/Documents/indicators/leadingcausesofdeath.pdf)

Health Outcome	Description	Average Annual Cost of Each Case	Estimated Annual Medical Costs in Oregon[A]	Examples of air toxics that may contribute to health risk
Cancer	estimates are based on adult cancer treatment only	$11,410	$1.9 billion	arsenic, hexavalent chromium, cadmium, formaldehyde, PAHs, benzene, trichloroethylene, lead, dioxins, naphthalene
Cardiovascular disease	estimates are for adults only and include hypertension, stroke, coronary heart disease, congestive heart failure, and other heart disease	$2,220-$16,760 (disease-specific)	$3.6 billion[B]	arsenic, PAHs, lead, acrolein, hydrogen fluoride

[A] Calculated using the CDC Chronic Disease Cost Calculator[5] based on 2008 prevalence and cost statistics and 2010 census data. Estimates are limited to medical expenditures and do not include indirect costs such as missed days of work and school.

[B] This cost estimate integrates costs of all cardiovascular disease without double counting costs of treatments for comorbid cardiovascular conditions.

Oregon Health Authority also tracks cases of pre-term birth, low birth weight, miscarriage, and some birth defects. There are no existing estimates of the direct medical costs associated with these adverse birth outcomes in Oregon, but there is potential for substantial economic and social impact. The total incidence of selected adverse birth outcomes in Oregon are summarized in Table 7. While several air toxics are associated with increased risk for these adverse birth outcomes, the portion of cases attributable to exposure to air toxics is unknown.

[5] OHA, 2010. Estimated medical treatment costs of chronic diseases, Oregon 2010. http://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Documents/datatables/CDCC_2010.pdf

Table 7
Adverse Birth Outcomes in Oregon

Health outcome	Total number of pregnancies impacted by each health outcome in OR 2009-2013[A]	Potential Economic and Social Costs	Examples of air toxics that may contribute to health risk
Low birth weight[B]	14,239	Costs depend on degree of prematurity/weight but can include direct medical costs associated with neonatal ICU treatment, increased risk of neonatal infections, increased risk of developmental disabilities, predisposition to disease later in life, parental stress, and costs of parents' missed days of work.	arsenic, PAHs, formaldehyde, cadmium, benzene, trichloroethylene
Pre-term birth[C]	17,442	Costs depend on degree of prematurity/weight but can include direct medical costs associated with neonatal ICU treatment, increased risk of neonatal infections, increased risk of developmental disabilities, predisposition to disease later in life, parental stress, and costs of parents' missed days of work.	lead, formaldehyde
Miscarriage[D]	978	Costs include direct medical costs, genetic testing/placental virus testing to determine the cause, parents' missed days of work, and emotional trauma to parents.	PAHs, lead, formaldehyde, arsenic, dioxins, trichloroethylene
Birth anomalies[E]	2,831	Costs are highly variable depending on the type and severity of the anomaly, but may include neonatal surgery, follow-up surgeries and medical costs throughout childhood and into adulthood, long-term disability, parents' missed days of work, and stress to families	dioxins, arsenic, trichloroethylene, benzene

[A] There were 228,115 total live births in Oregon 2009-2013.
[B] <2500 grams birth weight. Source: Vital records
[C] <36 weeks' gestation at birth. Source: Vital records

[D] Fetal deaths at or after 20 weeks of gestation. Any spontaneous pregnancy losses earlier in gestation are not recorded. Source: Oregon Vital Records
http://www.oregon.gov/oha/PH/BIRTHDEATHCERTIFICATES/VITALSTATISTICS/Pages/index.aspx
[E] Birth anomaly numbers are limited to cases of 12 "core" birth anomalies that have been tracked historically in the Oregon Birth Anomalies Surveillance System (anencephalus, cleft lip alone, cleft palate, gastroschisis, hypoplastic left heart syndrome, hypospadias, limb deficiencies, spina bifida, tetralogy of fallot, transposition of the great arteries, and trisomy 21). Oregon has recently started tracking a broader set of birth anomalies but data are not yet available.
National Birth Defects Prevention Network, 2016 https://www.nbdpn.org/docs/bdra23587-sup-0001-suppinfo01_2016DEC16.pdf

Estimates of the portion of health effects caused by pollution

Several analyses have estimated the portion of a given disease that is attributable to environmental exposures. Because there is often uncertainty around the complex ways that genes, nutrition, social factors, behavior, and chemical exposures interact to influence health, the environmentally attributable fraction is often presented as a range rather than a specific number.

These estimates of the environmentally attributable fraction are not specific to the set of air toxics included in Cleaner Air Oregon. Therefore, these numbers cannot be directly applied to estimate the contribution of air toxics to health risks in Oregon. Rather, they provide an indication of the potential magnitude of the contribution of pollution to disease. The most comprehensive assessment of the contribution of pollution to disease is a 2002 study drawing on 1997 data (dollar figures are 1997 dollars). The findings are summarized below.

- **Asthma.** Researchers estimate that 10-30% of asthma is attributable to outdoor air pollution (including both industrial and non-industrial sources). The yearly fraction of asthma cases that could be attributed to environmental factors cost the US between $0.7 and $2.3 billion. These cost estimates account for direct medical costs and lost productivity due to asthma-related premature deaths.[6]
- **Cancer.** Researchers estimate that between 2-10% of childhood cancer is attributable to environmental factors, accounting for nationwide costs ranging from $132-663 million a year. These cost estimates account for direct medical costs, costs associated with secondary cancers, lost productivity associated with treatments and premature death.[6]

[6] Landrigan PJ, Schechter CB, Lipton JM, Fahs MC, Schwartz J. Environmental pollutants and disease in American children: estimates of morbidity, mortality, and costs for lead poisoning, asthma, cancer, and developmental disabilities. Environ Health Perspect. 2002 Jul;110(7):721-8

- **Neurodevelopmental disorders.** Researchers estimate that 5-20% of neurodevelopmental disorders such as ADHD, autism, and mental retardation may be attributable to environmental factors (excluding lead which was considered separately), costing the US between $4.6-18.4 billion a year. Cost estimates in this study were based on direct costs of medical care, long-term care, and lost productivity.[6] Another study estimated that developmental delays caused by exposure to polycyclic aromatic hydrocarbons in New York City alone cost $13.7 million.[7]
- **Lead Poisoning.** Researchers estimated that the total cost of childhood lead poisoning in the US was 43.4 billion yearly.[8] All cases of lead poisoning are attributed to lead exposure, but the relative contribution of different sources of exposure to lead is not well established.

Living near industrial sites is associated with increased risk of illness

Several national studies, most published in the past five years, have found that living near industrial sites increases risk for several health conditions that are common in Oregon. The specific health impacts that are observed depend on the kinds of chemicals industries are using. Taken together, these studies suggest that reducing industrial exposure to air toxics could improve health.

- **Mortality.** A national study found that counties with higher rates of toxic air and water emissions also had increased rates of adjusted mortality.[9]
- **Cardiovascular disease.** A national study found that counties with higher emissions of carcinogens, metals, or hazardous air pollutants saw significantly higher rates of mortality from cardiovascular disease.[10]
- **Autism.** A national study found that children living close to industrial facilities releasing arsenic, lead or mercury into the air are significantly more likely to be diagnosed with autism spectrum disorder.[11]

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[7] Weiland K, Neidell M, Rauh V, Perera F. Cost of developmental delay from prenatal exposure to airborne polycyclic aromatic hydrocarbons. J Health Care Poor Underserved. 2011 Feb;22(1):320-9. doi: 10.1353/hpu.2011.0012.

[8] Landrigan et al 2002

9 (Hendryx and Fedorko 2011) Hendryx M, Fedorko E. The relationship between toxics release inventory discharges and mortality rates in rural and urban areas of the United States. J Rural Health. 2011 Winter;27(4):358-66. doi: 10.1111/j.1748-0361.2011.00367.x.

[10] (Hendryx et al 2014). Hendryx M, Luo J, Chen BC. Total and cardiovascular mortality rates in relation to discharges from Toxics Release Inventory sites in the United States. Environ Res. 2014 Aug;133:36-41. doi: 10.1016/j.envres.2014.05.010.

[11] (Dickerson et al 2015). Dickerson AS, Rahbar MH, Han I, Bakian AV, Bilder DA, Harrington RA, Pettygrove S, Durkin M, Kirby RS, Wingate MS, Tian LH, Zahorodny WM, Pearson DA, Moyé LA 3rd, Baio J. Autism spectrum disorder prevalence and proximity to industrial facilities releasing arsenic, lead or mercury. Sci Total Environ. 2015 Dec 1;536:245-51. doi: 10.1016/j.scitotenv.2015.07.024.

- **Asthma.** A nationwide evaluation of National Air Toxics Assessment data performed by CDC scientists found a correlation between modeled acrolein exposure and prevalence of asthma attacks in census tracts across the US. [12]
- **Cancer.** A national study found that living close to industrial facilities releasing chemicals known to cause cancer is associated with significantly higher rates of cancer hospitalizations. The authors estimated that in 2009, excess cancer risk associated with these industrial exposures cost an estimated $902.8 million in treatment costs.[13]

Improved air quality can improve public health

There are several examples of clear public health improvements observed in response to improvements in air quality:

- **In Southern California, air pollution control efforts were accompanied by meaningful improvements in children's respiratory health.** As air quality improved, the percent of children with decreased lung function was cut in half,[14] and children with asthma were 30% less likely to experience symptoms of bronchitis.[15]

- **The temporary closure of a steel mill in Utah Valley was linked to temporary improvements in birth outcomes and respiratory health.** One study found that rates of premature birth were significantly lower among women who were pregnant while the mill was closed than among women who were pregnant before or after the closure.[16] Another study found that children's hospital admissions for pneumonia, bronchitis and asthma were two to three times higher when the mill was opened than when it was closed.[17]

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[12] (DeCastro 2014). deCastro BR. Acrolein and asthma attack prevalence in a representative sample of the United States adult population 2000-2009. PLoS One. 2014 May 9;9(5):e96926. doi: 10.1371/journal.pone.0096926. eCollection 2014.
[13] (Hendryx and Luo 2013). Hendryx M, Luo J. Cancer hospitalizations in rural-urban areas in relation to carcinogenic discharges from Toxics Release Inventory facilities. Int J Environ Health Res. 2013;23(2):155-69. doi: 10.1080/09603123.2012.708919
[14] (Gauderman, et al., 2015) Gauderman WJ, Urman R, Avol E, Berhane K, McConnell R, Rappaport E, Chang R, Lurmann F, Gilliland F. Association of improved air quality with lung development in children. N Engl J Med. 2015 Mar 5;372(10):905-13. doi: 10.1056/NEJMoa1414123
[15] (Berhane, Chang, McConnell, & al, 2016). Berhane K, Chang CC, McConnell R, Gauderman WJ, Avol E, Rapapport E, Urman R, Lurmann F, Gilliland F. Association of Changes in Air Quality With Bronchitic Symptoms in Children in California, 1993-2012. JAMA. 2016 Apr 12;315(14):1491-501. doi: 10.1001/jama.2016.3444.
[16] (Parker et al 2008).Parker JD, Mendola P, Woodruff TJ. Preterm birth after the Utah Valley Steel Mill closure: a natural experiment. Epidemiology. 2008 Nov;19(6):820-3. doi: 10.1097/EDE.0b013e3181883d5d.
[17] (Pope, 1989) Pope CA 3rd.Respiratory disease associated with community air pollution and a steel mill, Utah Valley. Am J Public Health. 1989 May;79(5):623-8.

- **Federal regulations on leaded gasoline resulted in a dramatic decrease in blood lead levels in children across the country.[18]** The Center for Disease Control and Prevention has concluded that there is no safe level of lead exposure due to its impacts on brain development. Because lead exposure comes from many sources, scientists were not sure of the extent to which lead from paint and gasoline were responsible for high blood lead levels in children until they were able to observe the effect of these regulations.

Other considerations

In attempting to estimate the economic and health burden of air toxics emissions in Oregon, there are several additional points worth considering:

- A portion of the health costs of air toxics emissions are currently externalized. People who are not employed by a facility, but who live, go to school, or work near a facility emitting pollutants above proposed Risk Action Levels may bear the health burden of pollution exposure without experiencing the economic benefit a facility may have from exceeding Risk Action Levels.
- Many of the broader social costs of disease are particularly difficult to quantify. For example, indirect costs of asthma hospitalization include missed days of work and school; indirect costs of neurodevelopmental delays include lost lifetime earning potential, social isolation, and caregiver time; indirect costs of fetal heart malformation often include increased risk of secondary health effects.
- Risk-based air toxics permitting regulations could also significantly improve the health of workers, resulting in lower health care costs and more productive workers. Workplace exposure standards are typically not entirely health-based.

Negative Impacts on the Public

The proposed rules could have negative economic effects on the public if facilities providing jobs and contributing to local economies were to curtail production or close in response to regulatory requirements. Because employment plays a key role in the public health, proposed Cleaner Air Oregon regulations include many provisions to allow flexibility for regulated businesses which would decrease the chances of closures in

[18] EPA, History of Reducing Air Pollution from Transportation in the United States https://www.epa.gov/air-pollution-transportation/accomplishments-and-success-air-pollution-transportation

direct response to regulations. Facilities above Risk Action Levels may request conditional risk levels, have additional time to comply, and may wait for effective control technologies to develop if none are available at the time of permitting. Facilities demonstrating lack of financial ability to install the needed controls at the time required could postpone installation of controls to reduce risk. If facilities are above DEQ Director Consultation Risk Action Levels, there is a provision for consultation between the DEQ Director, the OHA and local governments to consider and weigh local factors, including employment, prior to a DEQ decision whether to issue a permit. In addition, the proposed tiered implementation plan will delay potential impacts to many facilities. However, business decisions are influenced by many factors, and DEQ therefore lacks information to predict specific potential impacts to employment.

The proposed rules could affect the public indirectly if businesses alter the price of goods and services in response to increased base or activity permit fees or the cost to comply with Cleaner Air Oregon rules. DEQ expects any such price increases to be small, but lacks available information to estimate potential increases accurately.

Citizens and local government representatives, such as city or county health or planning staff and elected officials may also be impacted by the need to participate in public meetings, including time to research and understand potential air toxics health concerns and risk assessment and permitting issues, and time spent preparing communications and attending meetings. DEQ is not able to quantify the time and fiscal impact on public process participants, but recognizes that time spent may impact local government budgets and for members of the public may require time away from work, childcare, travel or other expenses.

Impacts on the Environmental Services Sector

The direct cost of complying with regulations can result in increased employment. For example, an environmental regulation could mean more jobs for those engaged in pollution abatement. Further, it is possible that regulations may produce more labor-intensive production processes. Studies of national air quality regulations have shown positive effects on overall economic health. The Clean Air Act's public health safeguards encourage technology investments that can have positive economic effects on the public.

- More than forty years of experience with the Clean Air Act has shown that America can build its economy and create jobs while cutting pollution to protect the health of our citizens and our workforce.

- Between 1970 and 2011, aggregate emissions of common air pollutants dropped 68 percent, while the U.S. gross domestic product grew 212 percent.[19] Total private sector jobs increased by 88 percent during the same period.[20]
- Money spent on reducing pollution goes to companies that design, build, install, maintain and operate pollution-reducing processes and equipment. Direct and indirect labor needs for those controls included engineers, project managers, boilermakers, and other construction labor for pollution controls; workers in industries that provide construction materials such as steel, fabricated steel components, and concrete; workers that provide engineered equipment and specialty materials such as slurry pumps, fans, motors and catalysts; and workers in industries that manufacture and process reagents for operating pollution controls, especially limestone and ammonia.[21]
- Environmental costs are a small percentage of industry revenues. According to 2005 data from U.S. manufacturers, their total pollution abatement spending[22] represented less than one percent of the $4.74 trillion value of the goods they shipped.[23] The abatement costs include capital and operating costs for all pollution controls, not just those related to clean air. Air pollution control is responsible for less than half of these costs.
- Mainstream academic economic research contradicts broad claims that environmental regulations are bad for employment. Although in the short term new environmental regulations can have some positive and negative impacts on employment in different sectors, studies indicate that those impacts are limited and that the overall effect of environmental regulations on reported job shift events are extremely minor compared to other factors, such as overall economic growth, business cycles, and changes in technology.
- A peer-reviewed study by economists at Resources for the Future, a nonpartisan Washington, D.C. think tank, examined the impact of environmental compliance

[19] https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy#_edn6

[20] https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy#_edn7

[21] https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy#_edn14

[22] https://www.census.gov/prod/2008pubs/ma200-05.pdf (104 pp, 4.67 MB, 2008)
[23] https://www.census.gov/prod/2006pubs/am0531gs1.pdf (340 pp, 1.58 MB, 2006)

costs on employment in four regulated industries (pulp and paper, refining, iron and steel, and plastics). They concluded: "We find that increased environmental spending generally does not cause a significant change in employment." [24]

- Another peer-reviewed study published in the Journal of Public Economics found "no evidence that local air quality regulation substantially reduced employment" in the Los Angeles basin over a 13-year period of "sharply increased" regulation.[25] "In fact, [the regulations] probably increased labor demand slightly," the authors concluded.[26] The requirements being adopted for the Los Angeles area were more stringent than those in the rest of the country.
- A related study found that despite the additional cost of the Los Angeles area regulations, productivity in the area's oil refineries rose sharply between 1987 and 1992, while refinery productivity declined in other regions. "We conclude that [pollution] abatement cost measures may grossly overstate the economic cost of environmental regulation as abatement can increase productivity," the study concluded. [27]

Documents relied on for fiscal and economic impact

Air Contaminant Discharge Permits – Table 1, DEQ relied on OAR 340-216-0020
http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/_340_tables/340-216-0020_10-24.pdf

Air & Waste Management Association Fact Sheet: Air Pollution Emission Control Devices for Stationary Sources, April 2007
http://events.awma.org/files_original/ControlDevicesFactSheet07.pdf

EPA Air Pollution Control Cost Manual, Report No. 452/B-02-001, December 1995, Section 5, Chapter 1, SO_2 and Acid Gas Controls
http://www.epa.gov/ttn/catc/dir1/cost_toc.pdf

EPA Air Pollution Control Cost Manual, Report No. 452/B-02-001, January 2002, Section 6, Chapter 1, Baghouses and Filters

[24] https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy#_edn10

[25] http://econweb.ucsd.edu/~elib/berman_bui2001

[26] https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy#_edn11

[27] http://econweb.ucsd.edu/~elib/berman_bui2001_restat

http://www.epa.gov/ttn/catc/dir1/cost_toc.pdf

EPA Air Pollution Control Cost Manual, Report No. 452/B-02-001, September 1999, Section 6, Chapter 3, Electrostatic Precipitators
https://www3.epa.gov/ttn/ecas/docs/cs6ch3.pdf

EPA Health and Environmental Effects of Hazardous Air Pollutants,
https://www.epa.gov/haps/health-and-environmental-effects-hazardous-air-pollutants

EPA Technical Bulletin Choosing an Adsorption System for VOC: Carbon, Zeolite, or Polymers? May 1999
https://www3.epa.gov/ttncatc1/cica/files/fadsorb.pdf

EPA Pollution Control Technology Fact Sheet Spray-Chamber/Spray-Tower Wet Scrubber, EPA-452/F-03-016
https://www3.epa.gov/ttncatc1/cica/files/fsprytwr.pdf

EPA Air Pollution Control Technology Fact Sheet Catalytic Incinerator, EPA-452/F-03-018
https://www3.epa.gov/ttncatc1/cica/files/fcataly.pdf

EPA Air Pollution Control Technology Fact Sheet Regenerative Incinerator, EPA-452/F-03-021
https://www3.epa.gov/ttncatc1/cica/files/fregen.pdf

EPA Air Pollution Control Technology Fact Sheet Thermal Incinerator, EPA-452/F-03-022
https://www3.epa.gov/ttncatc1/cica/files/fthermal.pdf

EPA Air Pollution Control Technology Fact Sheet, Paper/Nonwoven Filter – High Efficiency Particle Air (HEPA) Filter, EPA-452/F-03-023
https://www3.epa.gov/ttncatc1/cica/files/ff-hepa.pdf

EPA Pollution Control Technology Fact Sheet Fabric Filter – Mechanical Shaker Cleaned Type, EPA-452/F-03-024
https://www3.epa.gov/ttncatc1/cica/files/ff-shaker.pdf

EPA Air Pollution Control Technology Fact Sheet Dry Electrostatic Precipitator (ESP) – Wire-Plate Type, EPA-452/F-03-028
https://www3.epa.gov/ttncatc1/cica/files/fdespwpl.pdf

EPA Air Pollution Control Technology Fact Sheet Permanent Total Enclosures (PTEs),

EPA-452/F-03-033
https://www3.epa.gov/ttncatc1/cica/files/fpte.pdf

EPA The Clean Air Act and the Economy
https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy#economy

Analytical Components of the Benefits and Costs of the Clean Air Act 1990-2020, the Second Prospective Study
https://www.epa.gov/clean-air-act-overview/analytical-components-benefits-and-costs-clean-air-act-1990-2020-second

Air Toxics Case Study – Health Benefits of Benzene Reduction in Houston, 1990-2020
https://www.epa.gov/sites/production/files/2015-07/documents/812caaa_benzene_houston_final_report_july_2009.pdf

EPA AP-42, Chapter 12.20 Electroplating 07/1996 -
https://www3.epa.gov/ttnchie1/ap42/ch12/final/c12s20.pdf

Advisory committee for fiscal and economic impact statement

DEQ appointed an advisory committee for the purpose of making recommendations on this fiscal and economic impact statement.

To comply with ORS 183.333, DEQ asked for the committee's recommendations on:

- Whether the proposed rules would have a fiscal impact,
- The extent of the impact, and
- Whether the proposed rules would have a significant impact on small businesses and comply with ORS 183.540.

If the committee indicates that the rule will have a significant adverse impact on small businesses, the agency shall seek the committee's recommendations on compliance with ORS 183.540 (Reduction of economic impact on small business).

If the statement of cost of compliance effect on small businesses required by ORS 183.335 (Notice) (2)(b)(E) shows that a rule has a significant adverse effect upon small business, to the extent consistent with the public health and safety purpose of the rule, the agency shall reduce the economic impact of the rule on small business by:

1. Establishing differing compliance or reporting requirements or time tables for small business;

2. Clarifying, consolidating or simplifying the compliance and reporting requirements under the rule for small business;
3. Utilizing objective criteria for standards;
4. Exempting small businesses from any or all requirements of the rule; or
5. Otherwise establishing less intrusive or less costly alternatives applicable to small business.

__________________________ Add comments from Advisory Committee

Housing cost

To comply with ORS 183.534, DEQ determined the proposed rules may have an effect on the development cost of a 6,000-square-foot parcel and construction of a 1,200-square-foot detached, single-family dwelling on that parcel.

The costs of additional permits, pollution control or process equipment, and compliance could be passed through by businesses providing products and services for such development and construction. The possible impact of these proposed changes appears to be minimal. DEQ cannot quantify the impact at this time because the available information does not indicate whether the costs would be passed on to consumers and any such estimate would be speculative.