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Invisible Enemies: Reducing Air Toxics in the Portland Airshed

City Club of Portland (Portland, Or.)

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City Club members will vote on this report on Friday, May 3, 2013. Until the membership votes, City Club of Portland does not have an official position on this report. The outcome of the vote will be reported in the City Club of Portland Bulletin dated May 9, 2013, and online at www.pdxcityclub.org.

Executive Summary

Portland still has a serious air pollution problem.

Portland's metro area endures toxic air pollutants at concentrations that negatively affect the public's overall health and increase the rate of disease. At least 52 air toxics are present in Oregon, and between six and ten are at unhealthy concentrations in Portland (see Table 1 on page 11).

Smog is under control. Air Toxics are not.

Air pollution control has developed along two pathways: one for *criteria pollutants* (or *smog*) and one for *air toxics*. Smog pollutants have steadily declined under orchestrated mandates by the Environmental Protection Agency and Oregon Department of Environmental Quality. However, air toxics have not been sufficiently controlled or reduced for the Portland metropolitan area.

City Club members, and the public, may be unaware of Air Toxics.

Air Quality Index reporting, Air Pollution Advisories, and other existing alert systems do not measure or report levels of air toxics. In fact, only three monitoring stations in the state are capable of detecting air toxics, only one is in the metro area, and the results are poorly publicized. As a result, many well-informed citizens receive an incomplete and reassuring impression that we have conquered "air pollution."

Air Toxics cause health problems.

The scientific community now understands how tiny exposures, over time, affect health. Roughly quantified, 180 more cases of cancer occur in the Portland metro area due to each of the six air toxics listed in Table 1.

Air Toxics' sources may surprise you.

A comprehensive process conducted by an expert advisory committee of the Oregon Department of Environmental Quality (DEQ) yielded a listing of source in priority order.[i] Based on the research performed over

the last 18 months, your City Club committee refined that list to the following priority order:

1. Residential wood combustion
2. Cars and light trucks
3. Heavy duty diesel vehicles (freight trucks and dump trucks)
4. Non-road internal combustion engines (construction equipment and generators)
5. Industrial metals facilities

While your City Club committee recognizes that tackling emissions coming from a company yard, a construction site, or an industrial process may take priority for a specific neighborhood, this list prioritizes action that will benefit everyone in the Portland metro area.

Change will require coordination.

The five priority areas encompass home, leisure, and work life, and different parts of the Portland airshed have different concentrations of each. Anti-pollution initiatives will require coordination between government agencies to change the behavior of thousands of small businesses and individuals.

Industrial emissions are regulated, but standards vary.

The industrial and commercial emissions permitting processes are subjected to ongoing public debate, policy proposals, news coverage, and regulatory enforcement. However, no federal, state or metro-area ambient standards exist for air toxics. As a result, it is difficult to know the concentration of toxics in our airshed.

Behavior and policy change will require effective public education.

News coverage and public education has been haphazard. Many in the region know about specific pollution sources, such as forest fires, heavy metals, or coal train cars. The concentration of one or two pollutants leads to broad generalizations about the quality of our air. For Portlanders to understand the 15 different air toxics that are negatively affecting our health, coordinated information systems are required.

Read your committee's Conclusions here.

Read your committee's Recommendations here.

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[i] Oregon Department of Environmental Quality Air Quality Division: 2010. "Oregon Air Toxics Benchmarks." http://www.deq.state.or.us/aq/toxics/benchmark.htm.

Introduction

The City Club of Portland's Friday Forum description for January 25, 2013 touted "our region's clean air," without fanfare or further justification. Likewise, if you had asked most members of this study committee one year

ago if Portland has an air pollution problem, you might have heard any of the following comments:

- "No. On a sunny day, we can see Mt. Hood. Remember the eighties?"
- "I don't think so - doesn't all the rain wash our air?"
- "Compared to where I grew up, Portland's air is very clean!"

Many people only pay attention to air quality on the one or two summer days each year when the media broadcasts an Air Pollution Advisory to advise children and those with lung problems not to exert themselves outside. Portland enjoys a national reputation for its mass transit mall, for the downtown parking "lid" of twenty years ago, for its bike commuters, and for its focus on sustainability. How can "the greenest city in America" [i] have an air pollution problem?

Criteria pollutants and Air Toxics are the two major categories of air pollution.

A crucial realization for your City Club committee was the division of "air pollution" into "criteria pollutants" (five components of smog plus lead) and "air toxics." Most of the best-known public information about "air pollution," is solely about criteria pollutants. This includes Air Pollution Advisories[ii] and the daily air pollution forecasts from www.airnow.gov. Portland has enjoyed dramatic success in reducing criteria pollutants, but toxic air pollutants remain a problem.

Regulation of Air Toxics is not as effective as regulation of criteria pollutants.

After Congress passed the Clean Air Act in 1970, elected policymakers, activists, and state enforcement agencies focused on reducing the six smog pollutants. However, two driving forces make criteria pollutant regulation more effective than air toxics regulation. First, federal, state, and local regulatory mechanisms have been less coordinated in tackling singular, diffuse sources of air toxics, such as woodstoves and personal vehicles. Second, for air toxics emitted by industry, regulatory negotiations from 1970-1990 heavily revised the Clean Air Act so that few ambient standards remain. Instead, current regulation addresses each industry category and each pollutant one at a time with an "achievable technology" standard.

Portland's air only looks clean

Portland's air toxics pollution problem is an invisible one, and as a result, receives much less attention today than it did in the past. However, it is still unsafe. The remainder of the report will detail the reasons that your City Club committee has come to this conclusion.

Notes and definitions

Several notes and definitions will be important to the reader's understanding of this report.

This report will use the term "criteria pollutants" interchangeably with "smog."

The six original smog, or "criteria" pollutants, as seen in the bottom section of Table 1, are:

1. Carbon monoxide,
2. Lead,[1]
3. Nitrogen oxides (including nitrogen dioxide, nitrous acid and nitric acid)
4. Ground-level ozone,
5. Sulfur oxides (including sulfur dioxide), and
6. Particulate matter.

Particulate matter is then further divided into two categories: (i) respirable particulate matter, which is larger than 2.5 micrometers and smaller than 10 micrometers in diameter and is identified as PM10, and (ii) "fine" particulate matter, which is smaller than 2.5 micrometers in diameter and is identified as PM2.5. PM2.5 does include one air toxic: diesel particulate.

"Portland," or "Portland's air," is defined as the airshed that covers three counties and parts of two others.

An airshed is an area that shares similar air quality due to geographic and meteorological conditions. The correct technical term is the Portland Area Airshed, but unless otherwise specified, this report uses "Portland" for simplicity. "Portland's air" is thus comprised of all of Multnomah, Clackamas and Washington counties and a portion of Yamhill County in Oregon, along with Clark County, Washington. This "area airshed" roughly aligns with the Metropolitan Statistical Area used by the U.S. Census Bureau and other federal statistics.[2] For detailed maps, consult the Study Area[iii] for the Portland Air Toxics Solutions Advisory Committee (PATSAC).

Carbon dioxide, methane, and other "greenhouse gases," are outside the scope of this study.

The study charge for this report explicitly directed your City Club committee to exclude greenhouse gas science and policy to keep the topic of "air quality" manageable.

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[1] The criteria pollutant lead is not part of smog. It is included here for simplicity's sake.

[2] The MSA includes *all* of Yamhill and Columbia counties, as well as Skamania in Washington

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[i] KATU News. March 16, 2010. "Portland renamed greenest city in America." Citing *American Cities Business Journals*, who analyze 43 metro areas on several factors. It ranked the Portland-Vancouver-Beaverton area No. 1.

[ii] Oregon Department of Environmental Quality. 2013. "Air Quality Air Pollution Advisories." Accessed February 18, 2013 at http://www.deq.state.or.us/aq/advisories/index.htm

[iii] Oregon Department of Environmental Quality. 2013. "Interactive Maps of Portland Air Toxics 2017 Modeling Study." Accessed February 18, 2013 at http://www.deq.state.or.us/aq/toxics/patsmaps.htm

Table 1: Smog & Air Toxics

Below is a simplified list of the two types of pollutants the study considered, and their major sources. It also includes a *simplified* level of health concern for each toxic's current monitored or modeled level in the Portland airshed. The red, yellow, and green levels of concern mirror highest, mid-range, and lowest risks to public health, or first, second, and third order of abatement priority.

This report discusses the air toxics listed in Table 1, and focuses on the most important sources in the section on Air Toxics Findings. This report presents finding on criteria pollutants (smog) later in this document. They appear together in this table to provide a complete list of air pollutants in one place, as a handy reference.

Regulatory Framework

U. S. Environmental Protection Agency (EPA) and federal law

Federal regulation takes two approaches, and Air Toxics are less regulated.

The federal regulatory approach includes hundreds of written federal pollution regulations. The overall approach is bifurcated into two methods:

> **Absolute standards, no matter the source** are established for the six criteria pollutants. Local governments that do not attain them face major federal revenue consequences. Appendix A lists these standards in concentrations per cubic volume of air.
>
> **Relative standards are applied to sources on an industry-by-industry basis.** The "Maximum Achievable Control Technology" limits air toxics released by, for example, diesel engines on interstate highways, sea-going freighters, industrial smokestacks, and manufacturing processes.

Clean Air Act background and mechanisms [i]

The 1970 Clean Air Act propagated a steady flow of public debate followed by new, usually stricter, standards. First, it transferred air pollution control from the Department of Health, Education, and Welfare (HEW) to the new Environmental Protection Agency (EPA). The Clean Air Act and its amendments (CAA) have required ever more stringent emissions standards for vehicles, industry, and machinery. The CAA devised a regulatory structure that establishes air quality standards, identifies states and localities that do not meet those standards, and creates State Implementation Plans (SIP)[1] [ii] to achieve better results. The CAA created the National Ambient Air Quality Standards (NAAQS), which apply to the six criteria pollutants.

EPA designates geographic areas[iii] that exceed NAAQS or SAAQS as "non-attainment areas" for the specific pollutant. Federal law requires that state, local, and tribal governments work together to devise and implement control strategies to achieve attainment. Once a non-attainment area meets federal and state standards, it becomes a "maintenance area."[2] [iv]

Congress enacted the Clean Air Act to address criteria pollutants at a time when the impact of those pollutants was both visible and palpable, and it has been highly successful in reducing those criteria pollutants nationwide. In addition, the mechanisms incorporated in the CAA have promoted systematic tightening of standards as EPA and

other

Table 1: Pollutants in the Portland Air, Simplified

Air Toxic	Top Sources	Level of Concern
15 PAH (Poly-Aromatic Hydrocarbons)	1. Residential wood combustion 2. On-road gasoline engines (<10%)	1st
Acrolein	1. Forest fires and structural fires 2. Construction & tobacco 3. Residential wood combustion	R
1,3 butadiene	1. Residential wood combustion 2. On-road gasoline engines 3. Non-road 4-stroke engines	R
Benzene	1. On-road engines 2. Residential wood combustion 3. Non-road 4-stroke engines	R
Acetaldehyde	1. Residential wood combustion 2. On-road gasoline engines 3. Non-road diesel engines	R
Diesel Particulate	1. Non-road diesel engines 2. On-road diesel engines	R
Manganese	1. Surface coatings 2. Metal manufacturing	Y
Arsenic	1. On-road gasoline engines 2. Major natural volcanic background	Y
1,4 Dichlorobenzene, (aka paradichlorobenzene)	1. **Consumer products** such as insecticides that control moths, disinfectants for mold, mildew, trashcans and bathrooms	
Naphthalene	1. **Consumer products** (esp. tobacco, mothballs) 2. Residential wood combustion 3. Asphalt and surface coatings	G
Cadmium	1. Residential heating (natural gas) 2. Forest fires and burns 3. Metal manufacturing	G – NW(Y)
Formaldehyde	1. Residential wood combustion 2. On-road gasoline engines 3. Non-road diesel engines	G
Ethylbenzene	1. Painting/solvents 2. On-road gasoline engines 3. Non-road 2/4-stroke engines	G
Nickel	1. Metal manufacturing 2. Industrial fuel <10%	G
Chromium VI (Hexavalent)	1. 65% on-road mobile 2. metal manufacturing	G
Perchloroethylene *(Not of concern)*	Dry cleaner fluid, still monitored	G

Criteria (Smog) Pollutants	Top Sources	Level of Concern
$PM_{2.5}$ (Ultrafine = <2.5 micrometers)	**Incomplete combustion** of any fuel, also [Sunlight+NOx or SOx+H2O]	Y
Carbon Monoxide (CO)	**Incomplete combustion** of gasoline and diesel fuel in cars and trucks and some equipment	G
Ground-Level Ozone (O3)	Heat + NOx or SOx from **incomplete combustion** of any fuel	G
Sulfur Oxides (SOx)	Electric power plants, burning coal & heavy oil	G
Nitrogen Oxides (NOx)	1. Cars, trucks, buses 2. Electric power plants	G
Lead	Formerly in gasoline	G
Respirable Particulate Matter PM_{10} (Fine = <10 micrometers)	**Incomplete combustion** of any fuel, also [Sunlight+NOx or SOx+H2O]	G

scientists in the private sector conducted new research on harm.

From 1970 to 1990, EPA attempted to set standards for each individual toxic air pollutant, based on the risk it posed to health. However, that process proved litigious and slow, resulting in actual regulation of only seven air toxics during that twenty-year period: asbestos, benzene, beryllium, inorganic arsenic, mercury, radionuclides, and vinyl chloride.[3]

In 1990, Congress enacted significant amendments to the CAA, which identified 189 Hazardous Air Pollutants (HAPS), defined as those pollutants "known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects." Congress directed EPA to develop and implement reductions, using a technology-based approach to reduce emissions from "major sources," along with a risk-based approach to address remaining sources. Of this group, EPA selected 32 as "Mobile Source Air Toxics" (MSAT). EPA refined the list further, and identified six toxics as "priority MSATs": benzene, formaldehyde, acetaldehyde, diesel exhaust (particulate matter/diesel exhaust organic gases), acrolein, and 1,3-butadiene.

The technology-based approach utilizes "maximum achievable control technology" (MACT) standards to regulate emission of "major sources" within identified stationary categories. EPA bases MACT standards on emission

levels already achieved by the best-performing industrial equipment. EPA does not ordinarily control a particular industry's method of compliance, as long as the method is successful in reaching the applicable standard. Because of this revised and adaptable system of regulation, EPA has been successful in drastically reducing toxic air pollutants from stationary industry sources. In addition to utilizing emission goals from best-performing industries, EPA utilizes the National Air Toxics Assessment (NATA) in its national assessment of air toxics territories it may investigate further.

EPA continues to assess risks associated with mobile source air toxic (MSAT) pollutants. It has created the Integrated Risk Information System (IRIS), a database of human health responses to various pollutants.

DEQ created the Portland Air Toxics 2017 Modeling Study for the Portland Air Toxics Solutions Advisory Committee (PATSAC), which shows that these vehicle-related toxics are more highly concentrated in densely populated neighborhoods, near busy roads and highways and in areas with business and industrial activity. For example, in the last year EPA moved to tighten diesel particulate standards following new discoveries from the World Health Organization and others.

Oregon Department of Environmental Quality (DEQ)

DEQ makes recommendations about, and enforces, air pollution laws and emission permits in the whole state of Oregon, with the exception of the Lane Regional Air Protection Authority, which does parallel work inside Lane County. DEQ enters into formal partnership agreements with EPA to take action on specific pollution items (see Table 1) and implements various programs to improve citizen health.

The governor appoints a five-member panel of knowledgeable volunteers to the Oregon Environmental Quality Commission (EQC). The EQC serves as DEQ's policy and rulemaking board and provides direction and oversight of public hearings. It also appoints DEQ's director. DEQ has approximately 700 staff members with primarily scientific and technical backgrounds.

Ordinarily, DEQ does not draft or advocate specific pollution laws. Instead, it publishes reports, internet fact sheets, and documents, provides representatives to testify at public hearings, and staffs problem-solving civic committees in order to bring empirical facts about air pollution into public or legislative awareness.

In addition to continuous fact-finding and monitoring activities, DEQ occasionally visits suspected pollution sites and responds with enforcement notices, orders, or assessments (i.e. fines). Over the years, DEQ has developed a number of compliance programs designed to encourage the public and organizations to reduce individual, non-industrial pollution through positive incentives.

Federal regulations have lowered allowable pollution concentrations over the decades since 1970 Clean Air Act. These regulations have driven the adoption of Oregon's rules concerning air quality. In some cases, DEQ established State Ambient Air Quality Standards (SAAQS) that are more stringent than the federal standards.[v] For example, 2009 DEQ regulations that require homebuyers to remove uncertified wood-burning devices upon the sale of a home cover a broader range of wood burners than federal certifications[vi].

Federal law has not set ambient limits for air toxics, so DEQ does not have a federal "hammer." This is one reason air toxics remain an issue. In contrast, there are specific "not to exceed" standards for criteria pollutants that specify exact standards, which state and local governments must meet or face negative consequences. In parts of Lane and Klamath counties, which EPA considers "non-attainment" areas, DEQ is *required* to prioritize actions to bring those airsheds into compliance.

DEQ cannot show it applies sufficient resources to improve Portland's air quality.

Your City Club committee tried to determine how much of DEQ's budget is dedicated to air toxic work in Portland. DEQ has a published budget. However, notwithstanding considerable effort, we were unable to calculate the amount of expenditures on the Portland airshed, beyond industrial permit activities.

California and Washington have state air pollution governing structures, as well as several sub-agencies at the county or regional level. This allows agencies to adjust approaches based on regional differences.

DEQ's Air Toxics Scientific Advisory Committee (ATSAC)

One response to the 1990 Clean Air Act amendments by EPA has been regular National Air Toxics Assessments (NATA). EPA intends these national reviews of data to help identify areas with potential problems, based on EPA computer models. Air toxic processes at EPA have never developed *ambient* federal standards, only industrial *point-of-emission* standards. Instead, publication of assessments highlights priorities in the air, source-by-source, and state-by-state. This explains why, with over 180 substances on the list of hazardous pollutants, this report now focuses on 15. DEQ has investigated its own data in light of NATA and in light of the actual industries in Oregon.

Your committee heard from four guest witnesses who served on DEQ's Air Toxics Scientific Advisory Committee (ATSAC). In the pollution control profession, toxicologists set targets and regulators implement programs to reach those targets. The programs involve different processes with different stakeholders. ATSAC was essentially a toxicology committee. The ATSAC committee spent a few hours per week for years, with DEQ staff support, developing the list of the most worrisome air toxics presented in Table 1, ranking them, and setting the Health Based Benchmarks.

They critically reviewed 140 different compounds considered air toxics by EPA that might be present in Oregon, and winnowed them down to 52 items, using emissions inventories and other information. As a collaboration of different agencies and experts, ATSAC did not attempt to define standards from scratch; they relied on prior work by others. They reviewed information from EPA's IRIS system and the International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO). They also reviewed toxicology research from large states like California and Massachusetts. ATSAC examined cancerous and non-cancerous toxicants studies, and sought updated information from study authors.

The ATSAC's purpose was to set up Health-Based Benchmarks (HBB) based on the best available evidence. Your City Club committee heard few, if any, specific objections to one HBB or another. Instead, some of those interviewed expressed general feelings that the goals were unattainable or impractical – for example, that a one-in-one-million level of risk tolerance for cancer cases was too idealistic.

ATSAC examined interactions between multiple pollutants in the human body and concluded that the one-in-one-million standard for one pollutant would approximate a ten-in-one-million real-world cancer risk, since nobody is exposed to just one pollutant. This means that the combined effect of all air toxics is about ten additional cases of cancer per one million people at any given time.

In 2006, ATSAC voted as a group to set the HBBs and reached a consensus on an ambient goal for each toxic. ATSAC then sent recommendations to the EQC, which adopted them as aspirational goals for the state.

DEQ became one of the only state regulatory agencies in the nation at that time that had adopted even a

suggested standard for ambient concentrations of the air toxics that Congress had directed EPA to reduce in 1990. In the absence of federal ambient air toxic standards, the rest of the nation had thus far relied on Maximum Achievable Control Technology (MACT) for large polluters and on a hodgepodge of industry-specific, negotiated regulations for smaller polluters emitting certain chemicals.

Non-DEQ Regulators

Two other agencies that affect air quality bear mention: Oregon Department of Transportation (ODOT) and Metropolitan Regional Government (Metro). Because so much air pollution comes from incomplete combustion in car and truck engines, both ODOT and Metro have been required for many years, under federal transportation planning laws, to consider pollution emissions that might accompany any planned improvements to streets, highways, bridges, freeways, or other changes to traffic flow.

Metropolitan Regional Government (Metro)

Metro employs analysts with similar skills to DEQ staff and planners, and the two agencies work together closely on air pollution caused by mobile sources in the Portland metropolitan area.

Metro's efforts in transportation and land use planning have reduced vehicle miles traveled (VMT), resulting in fewer emissions of all types, per capita. Metro has also directed staff to create models that include air toxics emissions. It has developed its own modeling through its research department. It plans to evaluate the impact on air toxics of proposed transportation projects, such as the East Metro Connections Plan and the Southwest Corridor Plan.[ix]

Metro has the legal authority to take a more active role with respect to air quality.[4] [x] Under Metro's Charter, the Regional Framework Plan was to include "livability protection" for "existing neighborhoods taking into consideration *air pollution*, water pollution, noise, and crime" [emphasis added][xi]. This authorizes Metro to address air quality issues, and to research and monitor air quality. Were it not already specifically authorized by Metro's Charter, the second Chapter, Section 7 of the Charter gives Metro the authority to assume additional functions "of metropolitan concern" by ordinance.

Oregon Department of Transportation (ODOT)

Vehicle-generated air pollution has been recognized as a threat to human health and nature since the middle of the twentieth century. In 1955, the federal government passed the Air Pollution Control Act, the first legislation to address air quality as a problem of national concern. The 1970 Clean Air Act and its amendments (CAA) have required ever more stringent emissions standards for new vehicles, so over time pollution from the automobile has fallen dramatically.

The Portland metropolitan area, like most other urbanized areas in the country, has experienced relentless pressure from population growth and the ownership of more cars per capita to build roads and parking places. Between 1978 and 1998, the population of the Willamette Valley grew by over half a million. Total vehicle miles traveled (VMT) increased by over 100% and VMT *per capita* increased by over 50% from 1975 to 1995.

Research shows that most of the potential for reducing the drive-alone rate in the Willamette Valley is among commuters who commute to destinations within the Portland metropolitan area. In 1998, commuters generated 28% of all trips and 35% of vehicle mile traveled in the Willamette Valley. The growing number of VMT creates

ongoing pressure to devise strategies to control air pollution that are more effective. Even though the pollutants in engine exhaust have decreased in each successive generation of vehicles, exhaust-related pollution exceeds allowable concentration limits regularly. For example, an "exceedance" in ozone levels occurred up to 3 days per year in Portland over the past five years. In the 30 days prior to publication of this report, fine particulate matter ($PM^{2.5}$) entered the "moderate" or "yellow" health zone two times on the Air Quality Index history page: http://www.deq.state.or.us/aqi/aqi30Day.aspx.

ODOT's mission includes implementing the CAA.

Oregon Department of Transportation has a division whose purpose is to ensure that transportation developments conform to the Clean Air Act's mandate to meet national ambient air quality standards.

Metro's Urban Planning addresses air pollution, beyond DEQ and ODOT

State Improvement Plan (SIP) is an organizing term. Street and highway improvements and traffic plans must be consistent with the Air Quality SIP that each state submits to EPA. SIP plans have three major transportation components: a Mobile Source Emission Budget, Control Measures (CMs), and Transportation Control Measures (TCMs).

To achieve and maintain attainment status, the Mobile Source Emission Budget sets a ceiling on total emissions of the criteria pollutants from road sources. The most current land use planning assumptions, transportation data and models, and air quality models must be the basis. For example, when the City of Portland was often out of attainment for ozone and carbon monoxide from 1972 to 1996, the Downtown Plan included a "parking lid" in the city zoning and business license code in an attempt to reduce vehicle exhaust from commuters coming into downtown. Portland has a long record of accomplishment of investing federal dollars that other cities might use for freeways to encourage mass transit and active transportation.

Control Measures and Transportation Control Measures are other programs and projects that result in emission reductions. CMs include wood-burning restrictions, limits on road sanding in particle nonattainment areas, and vehicle inspection and maintenance programs in carbon monoxide or ozone areas, such as the Portland metropolitan area. TCMs include rideshare, mass transit, and bicycle and pedestrian facilities. They provide the public with an alternative to highway facilities.

Highway funds and air quality regulation are integrated. The CAA limits federal funding and approval to transportation plans, programs, and projects that conform to the air quality goals established by the SIP.[6][xiv] This means that a complex analysis is necessary to prove that road plans and individual transportation projects contribute to the attainment of National Ambient Air Quality Standards and help meet emission reduction targets.[xv]

Metro oversees Portland conformity in transportation planning. Metropolitan Planning Organizations must publish conformity determinations at least every four years, in consultation with each other and the federal government. After consultation, Metro, ODOT, affected local jurisdictions and the United States Department of Transportation must make conformity determinations and develop regional transportation plans and transportation improvement programs.[xvi] "Hot spot" analysis (essentially, an analysis done at the spot most likely to have the highest level of pollution) must demonstrate that the project does not cause or contribute to a violation of the National Ambient Air Quality Standards (NAAQS).[7] [xvii]

Unlike the criteria pollutants in NAAQS, Mobile Source Air Toxics (MSATs) are not subject to specific

quantitative standards. Nevertheless, the regulatory structure established to address the criteria pollutants is highly relevant for MSATs, because criteria pollutants and air toxics usually exist together. To the extent MSATs are directly regulated, it is in the context of the National Environmental Protection Act (NEPA), which requires an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) for federally funded projects. Both the EA and EIS must include an alternatives analysis that considers several design proposals for each project. The alternatives analysis must include data concerning MSATs.

Summary of Oregon Sustainable Transportation Initiative

Oregon House Bill 2001 (2009) and Senate Bill 1059 (2010) resulted in the creation of the Oregon Sustainable Transportation Initiative, which is intended to produce a Statewide Transportation Strategy (STS) to reduce greenhouse gases by 25% by 2035 through land use and transportation policy. While your committee's study charge does not include consideration of greenhouse gases, reducing greenhouse gas emissions will almost certainly reduce many air toxics as a side effect. Advocacy efforts on air toxics regulations will be easier to coordinate with this new Statewide Transportation Strategy.[xviii]

Successful government action against Air Toxics

Your City Club committee uncovered several examples of local government agencies implementing stricter standards for vehicles under their control, in an effort to initiate changes that benefit the public:

- Washington has a program to retrofit or replace its school buses and public fleet vehicles with exhaust filters. The program has been quite successful, replacing or retrofitting many thousands of vehicles, but it enjoys uncertain support.

- Oregon has adopted a new requirement that all diesel school buses meet EPA 2007 'tier" standards, with either retrofits or new buses by 2017. Portland Public Schools, which outsources its bus services to First Student, Inc., has replaced diesel with propane-fueled buses as a response, while Beaverton School District has retrofitted or replaced its buses. Oregon's Deputy Superintendent of Schools issued a memo in 2002 that required Oregon school bus drivers to avoid idling and queuing to reduce emissions, and educated school districts in the health and monetary costs of excess diesel exhaust and idling.[xxiii]

- Funded by a grant from EPA, Metro has acted in the past two years to retrofit on-road garbage trucks with diesel particulate reduction technology. Metro also requires that operators of Metro's two solid waste transfer stations reduce diesel particulate emissions from rolling stock equipment. The transfer stations meet EPA Tier 4 emissions standards for the non-road diesel used in their operations. They also implement an anti-idling policy for visitors to the facilities.

Multiple agencies will regulate Air Toxics.

If federal law adopts firm benchmarks for air toxics overnight, as exist for the six criteria pollutants, no one agency would oversee efforts to reach the goals. Potential opportunities to reduce some toxic emissions from the top four sources include:

- Specific federal EPA directives on air pollution
- State law covering real estate transactions
- State and federal law covering vehicle mileage standards and transportation planning

- State land use board decisions
- Local codes addressing construction and neighborhoods (building permits, business permits, landscape machinery, noise and nuisance abatement codes)
- Mass transit governance
- International marine law (Port of Portland shipping and loading regulation)
- Local zoning laws

In addition, Occupational Health & Safety Administration (OSHA) and state building codes designed to improve worker health and indoor air quality have significantly reduced pollution for everyone, since most indoor air reaches the outdoors eventually.

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[1] *State implementation plan (SIP)* means, as defined in section 302(q) of the Clean Air Act (CAA), "the portion (or portions) of the implementation plan, or most recent revision thereof, which has been approved under section 110 of the CAA, or promulgated under section 110(c) of the CAA, or promulgated or approved pursuant to regulations promulgated under section 301(d) of the CAA and which implements the relevant requirements of the CAA."

[2] *Maintenance area* means "any geographic region of the United States that EPA previously designated as a nonattainment area for one or more pollutants pursuant to the Clean Air Act Amendments of 1990, and subsequently designated as an attainment area subject to the requirement to develop a maintenance plan under section 175A of the Clean Air Act, as amended."

[3] Benzene and arsenic remain on the narrowed list of 15 air toxics of concern listed by DEQ.

[4] Metro's Charter, Chapter II, gives it "jurisdiction over matters of metropolitan concern. Matters of metropolitan concern include the powers granted to and duties imposed on Metro by current and future state law and those matters the Council by ordinance determines to be of metropolitan concern."

[5] "The purpose of this division is to implement section 176(c) of the [CAA], as amended [42 U.S.C. 7401 et seq.], and the related requirements of 23 USC 109(j), with respect to the conformity of transportation plans, programs, and projects which are developed, funded, or approved by the United States Department of Transportation (DOT), and by Metropolitan Planning Organizations (MPOs) or other recipients of funds under Title 23 U.S.C. or the Federal Transit Laws (49 U.S.C. Chapter 53)."

[6] "*Conformity* means a Clean Air Act (42 U.S.C. 7506(c)) requirement that ensures that Federal funding and approval are given to transportation plans, programs and projects that are consistent with the air quality goals established by a State Implementation Plan (SIP). *Conformity* …means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS. The transportation conformity rule (40 CFR part 93, Endnote 20) sets forth policy, criteria, and procedures for demonstrating and assuring conformity of transportation activities."

[7] "*Hot-spot analysis* is an estimation of likely future localized CO, PM_{10}, and/or $PM_{2.5}$ pollutant concentrations on a scale smaller than the entire nonattainment or maintenance area, including, for example, congested roadway intersections and highways or transit terminals, and uses an air quality dispersion model.

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[i] U.S. Environmental Protection Agency. *The Plain English Guide to the Clean Air Act: Understanding the Clean Air Act*. (Washington, DC: http://www.epa.gov/airquality/peg_caa/) Last updated November 8, 2011

[ii] 23 CFR 150.104.

[iii] United States Environmental Protection Agency, "Air Pollution Monitoring," Accessed February 18, 2013 at http://www.epa.gov/oaqps001/montring.html

[iv] 23 CFR 150.104.

[v] OAR 340-202-0050 through 0130.

[vi] Oregon DEQ. 2009. Relationship to Federal Requirements: Heat Smart Program for Residential Woodstoves and Other Solid Fuel Burning Devices. Rule caption statement published 04/22/2009.

[vii] Air Toxics Scientific Advisory Committee. 2012. History synopsis accessed March 16, 2013 at http://www.deq.state.or.us/aq/toxics/benchmark.htm

[viii] Environmental Protection Agency. 2011. 2005 National-Scale Air Toxics Assessment. Washington, DC: Sections include Cancer Maps 1 & 2 by Tract, Respiratory Maps 1 & 2 by Tract, Technical Methods Document, Fact Sheet, and Summary of Results, along with video modules. Accessed April 22, 2013 at http://www.epa.gov/nata2005/

[ix] July 19, 2012 study committee interview with Rex Burkholder, Metro Council.

[x] Metro Charter, Chapter II

[xi] Metro Charter, Chapter II, Section 5(4)(a).

[xii] Oregon Department of Transportation, Planning Analysis Unit. May 1998. Commuting in the Willamette Valley. (P. 3) Salem, OR: Accessed April 23, 2013 at http://www.oregon.gov/ODOT/TD/TP/CM_HERS/WVcommute.pdf

[xiii] Oregon Administrative Rules Chapter 340 says about Division 252

[xiv] U.S. National Archives and Records Administration. *Code of Federal Regulations.* Title 23, Part 450. Definitions. Accessed February 23, 2013 at http://www.ecfr.gov/cgi-bin/ECFR

[xv] Oregon Department of Transportation. September 26, 2008. Air Quality Manual. Oregon Department of Transportation. Accessed February 23, 2013 at ftp://ftp.odot.state.or.us/techserv/geo-environmental/environmental/Proc...

[xvi] U.S. National Archives and Records Administration. *Code of Federal Regulations.* Title 40, Part 93. Determining Conformity of Federal Actions to State or Federal Implementation Plans. 2008. Accessed February 23, 2013 at http://www.ecfr.gov/cgi-bin/ECFR?page=browse

[xvii] 40 CFR 93.101.

[xviii] Oregon Department of Transportation. May 2012. DRAFT Oregon Statewide Transportation Strategy, Executive Summary pp. 3-4.

[xix] Boyer, Mike and Lyons, Kim. 2005. *Washington State Clean School Bus Program: Report to 2005 Legislature.* Olympia, WA: Washington State Department of Ecology and WSU Energy Extension Office. Accessed April 22, 2013 at http://www.ecy.wa.gov/quality/plaintalk/examples/12-08%20Draft%20Program...

[xx] Oregon Legislative Assembly ,75th. May 1, 2009. House Bill 2795, An Act Relating to diesel engines. http://www.leg.state.or.us/09reg/measpdf/hb2700.dir/hb2795.en.pdf (House Bill 2795 was passed).

[xxi] Portland Public School News. June 24, 2009. *New law won't affect clean-running PPS bus fleet.* Accessed at http://www.pps.k12.or.us/news/743.htm

[xxii] Holman, James. June 27, 2008. "Beaverton school bus retrofit will reduce diesel emissions." *The Oregonian*, accessed at http://www.oregonlive.com/environment/index.ssf/2008/06/beaverton_school...

[xxiii] Heiligmann, Nancy. (October 11, 2002.) "Memo # 066-2002-03: Reducing Diesel Exhaust," State of Oregon: Deputy Superintendent of Public Instruction.

[xxiv] Metro. 2012. Personal communication "Regional Clean Fleet Project" from Molly Chidsey of Metro, Dec. 7, 2012 and http://www.oregonmetro.gov/index.cfm/go/by.web/id=38468

Air Toxics Findings

Portland has 15 priority Air Toxics. Eight exceed Health-Based Benchmarks[i].

As shown in Table 1, of the 189 Hazardous Air Pollutants (air toxics) published by the Environmental Protection Agency (EPA) in 1990, the Oregon Department of Environmental Quality (DEQ) has identified 52 that are likely to be in Oregon and specified 15 that are expected to be found in the ambient Portland air in 2017. To introduce each component, we have coded them with colored stoplights to indicate level of danger. "Green" means that, on DEQ's Portland Air Toxics Solutions Advisory Committee (PATSAC) modeling maps,[ii] concentrations everywhere are below two to five times Health-Based Benchmarks (HBB), and for most of the urban area, they are at or below the mark. Eight of the pollutants routinely reach concentrations ranging from five to ten times HBB. These pollutants were coded yellow and red in Table 1, with red indicating that the majority of Portland's metropolitan area exceeded ten times the benchmark. *More detail about ambient and desired levels for each pollutant is available in Appendix A in an expanded version of Table 1.*

Focusing on Air Toxics changes regulatory priorities.

A comprehensive process conducted by an expert advisory committee of the Oregon Department of Environmental Quality (DEQ) yielded the following ten categories of sources[i], listed in priority order:

1. Residential wood burning
2. Road vehicle emissions (gas and diesel)
3. Construction equipment (diesel and gas)

4. Other non-road engines (diesel and gas)
5. Lawn and garden equipment (diesel and gas)
6. Solvent use (solvent coating and consumer products)
7. Industrial facilities
8. Airports
9. Rail
10. Open residential burning

DEQ bases this prioritization on total estimated risk from air toxics, the practicability of emission reductions, and the directive in Oregon air toxics regulations to address both region-wide and localized risk. Based on the research performed over the last 18 months, City Club's committee refined the list above to the following priority order:

1. Residential wood combustion
2. Cars and light trucks
3. Heavy duty vehicles (freight trucks and dump trucks)
4. Non-road internal combustion engines (construction equipment, generators)
5. Industrial metals facilities

Industry is not the primary source of Air Toxics.

The term "air pollution" calls to mind factory smokestacks and choking smells. However, one of the first things your City Club committee learned was that those formerly prominent sources are now the fifth priority and comprise roughly 10% of the air toxics in the emissions inventories and models.[iii] Individual neighborhoods, within about one quarter-mile[1] of certain sources, might face a different order of risks. Those who live near a particular industry, freight terminal, or freeways breathe a different "mix" when they are home than the priority list implies. However, your committee was charged to make recommendations that will help the area airshed as a whole, and so we accepted this ordering as the best available, a product of many years of monitoring, modeling, and health outcome calculations by environmental professionals and regulatory stakeholders.

Several possible explanations exist for industry's reduced influence on air toxics. First, DEQ has had forty years with legal authority and steady industrial permit funding to reduce

About Air Toxics

What is an air toxic? An air toxic is an air pollutant in a minute concentration that can cause a deleterious health effect.

What are specific air toxics? Acrolein, benzene, diesel particulate, naphthalene, and nickel to name a few. Air toxics may not be as familiar to the public as classic air pollutants of the 1970's & 1980's such as "acid rain" or "smog" or lead.

What are the health effects of air toxics? Air toxics are known to cause lung irritation and disease, birth defects and miscarriages, cancers, and skin disease. Most of what is known uses models to combine epidemiology (human population) studies with animal medical research experiments.

What is the source of air toxics? Air toxics are mostly produced by humans: during man-made fires, operation of mobile and stationary combustion engines, use of chemical agents in coatings and agriculture, and in industrial processes.

How can we sense air toxics? Air toxics are sensed by sophisticated chemical analysis using instruments. Toxic air pollution is transparent, odorless, and colorless.

Are air toxics major players in global warming, greenhouse gas emission, smog production, ozone layer destruction, and carbon footprinting? *No.*

How is the public protected against air toxic exposure? Examples include licensing of industrial firms to allow specific amounts of air toxics, national standards for emissions of new automobile and diesel engines, wood stove emission standards, vehicle testing, national standards for gasoline refining, limits on non-road diesel operation, product labeling, zoning and highway planning.

industrial discharges. In contrast, DEQ's authority in the four leading priorities is unclear, as are standards set at the federal level. Second, funding for non-industrial work by DEQ is dependent on legislative decisions, and subject to General Fund wrangling. Finally, the polluters are much more diffuse. Like Pogo, "We have met the enemy and he is us." [v] Individuals are now the most important polluters.

Residential wood combustion is the top contributor of three priority Air Toxics.

Wood combustion is not, by volume, contributing as much pollution to the air as personal cars and trucks. However, modeling indicates that 15 PAH is the pollutant *most* over the health benchmark, and is highly carcinogenic. In addition, wood burning in our airshed produces 434 tons of Butadiene, Naphthalene, Benzene, Formaldehyde, Acrolein, and even a trace amount of Cadmium. The PATSAC White Paper estimates that wood burning in this airshed produces nearly half of a pound (.43 lbs.) of airborne toxics for each of the 2 million people in the metro area.

In the PATSAC Study Area, an estimated 2% of households, or 14,000 homes, heat solely with woodstoves, [vi] an unknown number of which use uncertified devices. PATSAC estimates that 40% of residents who own any wood-burning fireplaces, stoves, or inserts own an uncertified wood-burning device. It may be reasonable to assume, then, that about 5,600 (40% of 14,000) woodstoves and fireplace inserts are uncertified and need replacement. Replacement of these stoves would provide a health and economic benefit to the whole population, but the individual expense can be daunting. Purchase and installation costs between $2,500 and $3,000 per unit.

Internal combustion engines contribute six of eight problem Air Toxics.

The largest source of air toxics is gasoline and diesel internal combustion engines, which produce six of the priority air toxics.[2] Vehicle exhaust is the source of 40-50% of air toxics in Oregon[vii] and three of the five priority categories on DEQ's action list implicate combustion engines. The contributing engines include personal vehicles, heavy highway trucks, and non-road diesel-powered equipment.

The difference between modeling and monitoring

Monitoring measures the actual presence and concentration in the air of a given component to the ten-thousandth of a microgram (10^{-10}). Monitors can detect levels of a harmless and abundant gas like Nitrogen or a minute toxic like Arsenic.

Modeling mathematically infers what a pollutant's ambient concentration is likely to be. This is based on past monitoring, known quantities of toxic emissions, and air patterns.

Air Toxics are rarely *monitored* for ambient levels.

Air toxics, occurring in ultra-low concentrations, are hard to monitor in the air, and monitors are scarce nationwide.[viii] There are just three air toxic monitors run by DEQ for the entire state, and one air toxic monitor alone in the Portland metropolitan area. As a result, most reports on air toxics base results on modeling.

Your committee assessed the accuracy and reliability of the computer modeling and found the following:

- For most air toxics, what we know about the airshed overall is based on last year's data from a single monitoring station near Jefferson High School, and what we know at a neighborhood level is based on models.
- For three air toxics in the Portland airshed, what we know is built on modeling based on monitoring performed in 2005 when a special grant from EPA provided five additional monitors for one year of air toxic data collection. These toxics are the highly carcinogenic 15 PAH, Acrolein, and diesel particulates.
- Computer modeling begins with available empirical data, and takes many logical influences into its equations. While the air monitoring data collected and analyzed under the federal grant in 2005 provided a detailed empirical foundation, as the years pass, opponents of reduction measures lose confidence in the models.
- Influences that are included in models include weather and topography; freeway and traffic patterns; housing development density; building construction year to indicate air exchange pace; and population data such as locations of K-12 schools or percentage of smokers.
- However, the National Air Toxics Assessment study by EPA should be viewed as a rough filtering method that alerts the public and regulators to areas where more data should be collected and analyzed.

DEQ has developed its own models, which incorporate local empirical detail, such as emissions inventories from DEQ industrial permits. Those models are the sources of the projections they made for 2017 in the Portland Air Toxics Solutions Advisory Committee study maps and for the data in Table 1.

No clear limits exist for Air Toxics.

When an area under state, local, or tribal jurisdiction exceeds EPA's ambient concentration limit for any of the six criteria pollutants, the Air Quality Maintenance Area is "out of attainment." This is a violation of federal law, with legal and economic implications. Federal highway and sewer funds may be withheld, U.S. attorneys may file lawsuits against states or local agencies to force them to create an action plan, and news headlines may emphasize local non-compliance. Political constituencies grow concerned about business promotion, health, and pride in the locality's public image. EPA must approve a plan to reduce the pollution concentration, and plans often develop rapidly.

By contrast, even when good monitoring data is available for air toxics, without a "not to exceed" legal limit for ambient concentrations, the results may generate little concern, because there is no way to know if a line has been crossed.

488 tons of toxic emissions is an imposing number.

The U.S. Environmental Protection Agency maintains a Toxic Release Inventory (TRI) as a publicly available EPA database that contains information on toxic chemical releases and waste management activities reported annually by certain industries as well as federal facilities. In Multnomah County, 770,416 pounds of toxic air pollutants were "disposed of off-site" into the air from known sources between 2008 and 2010. During the same period, Clackamas County released 160,358 pounds and Washington County released 46,365 pounds.[ix] [x] This totals to 977,139 pounds, or more than 488 tons. For comparison, Sacramento, with a similar population, stood at 1,340,491 pounds, about 1/3 more toxic releases.

The USA Today Report

One reason for the recent citizen activism around toxic air pollutants in Portland is the National Air Toxics Assessment (NATA), undertaken by the Environmental Protection Agency and published in 2005 and in subsequent years.

USA Today commissioned its own national model that elaborated conditions with more local data than the (NATA) had attempted. A 2009 USA Today article based on that data placed Chapman Elementary[xi] in the top 3% of schools facing extra risk from air toxics. This flew in the face of a general perception of "clean air" in Portland and sparked community activism. Neighbors near Chapman made three discoveries and shared them with your City Club committee:

1. Air toxics are not subject to simple concentration limits like criteria pollutants are. This means there is no way to call foul even when empirical air quality data is available. The standards are based on the performance of control technology inside companies, which only experts are able to judge.

2. Solid information on actual levels of chemicals and their immediate health risks is difficult to find at the local jurisdiction level. Each business reports on its own toxic releases to state regulators. This means highly technical information is exchanged out of the public eye without a translating entity such as the Air Quality Index.

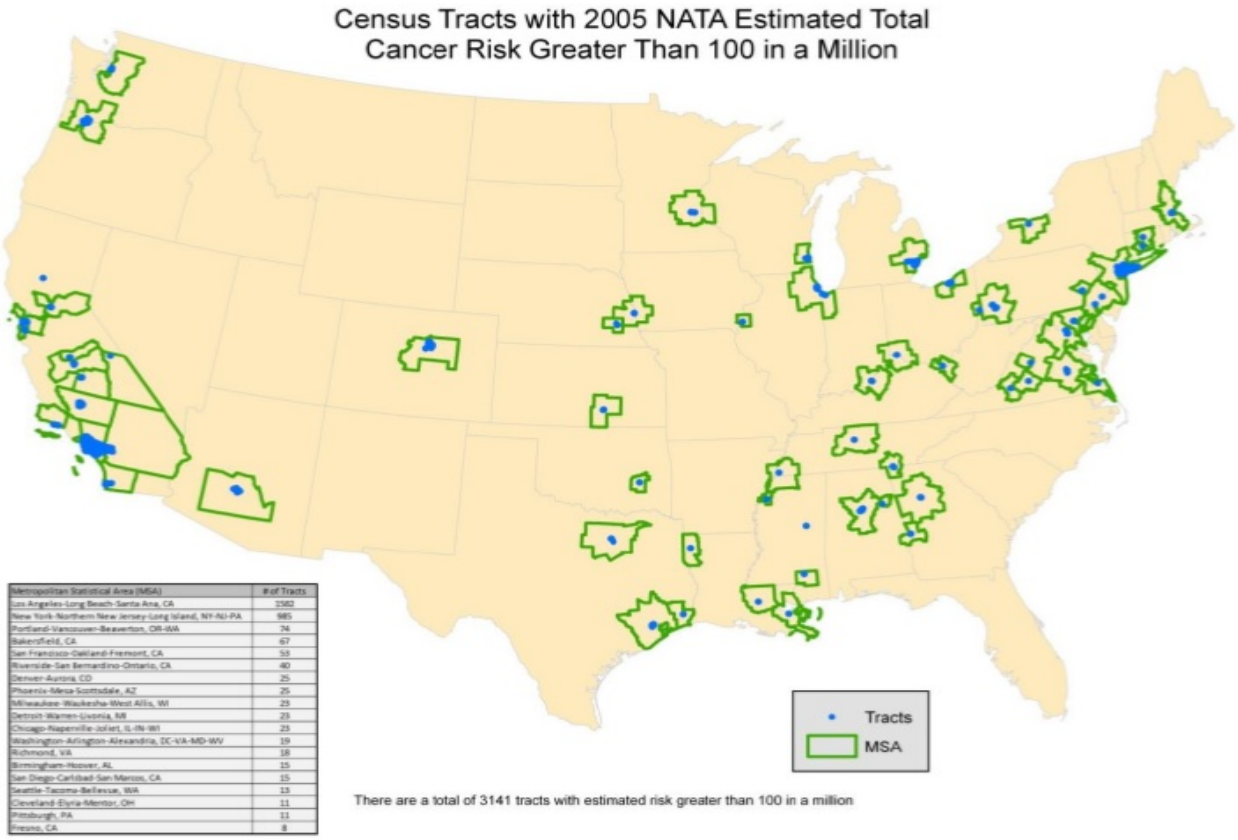
3. DEQ issues industrial emission permits in a five-year, highly formalized process that occurs in scripted stages with rules determining allowable evidence and submission deadlines. Many citizen groups have found it hard to provide input that has an impact.

The community organizing around Chapman school, and publicity by Neighbors for Clean Air led to the negotiation of a groundbreaking Good Neighbor Agreement as a supplement to ESCO's Air Emissions permit from DEQ. The existence of the Good Neighbor Agreement has some industry representatives and regulators concerned about the precedent that open-ended negotiations, unbounded by pollution laws, could become for Oregon. The Good Neighbor Agreement is essentially a voluntary agreement to reduce emissions by 20% even though the normal DEQ/EPA permit would not require that level. ESCO estimates they will spend $5 million dollars to comply, and agreed to additional monitoring devices at the elementary school.

Keeping Portland's situation in perspective

USA Today ranked the Portland metropolitan area third behind New York City and Los Angeles[xii] for having the largest number of census tracts at high risk for excess cancers due to toxic air pollution. Your committee has determined that this status is accurate and yet it exaggerates the severity of the problem.

In the ranking of Metropolitan Statistical Areas (MSAs), the Portland airshed is indeed third. As shown in Figure 1, 74 census tracts in our region are estimated to have a cancer risk greater than ten times the national average of ten in one million.[xiii] A census tract is a geographic and population-based neighborhood with typically 4,000 to 8,000 citizens. The top-ranked Los Angeles MSA (1582 tracts), and second-ranked New York MSA (985 tracts) put more than ten times as many people at risk.[3] Portland is far more comparable to Bakersfield, CA (67) and San Francisco (53) and nearly every American city has many similarly situated census tracts.



Metropolitan Statistical Area (MSA)	# of Tracts
Los Angeles-Long Beach-Santa Ana, CA	1582
New York-Northern New Jersey-Long Island, NY-NJ-PA	985
Portland-Vancouver-Beaverton, OR-WA	74
Bakersfield, CA	67
San Francisco-Oakland-Fremont, CA	53
Riverside-San Bernardino-Ontario, CA	40
Denver-Aurora, CO	25
Phoenix-Mesa-Scottsdale, AZ	25
Milwaukee-Waukesha-West Allis, WI	23
Detroit-Warren-Livonia, MI	23
Chicago-Naperville-Joliet, IL-IN-WI	23
Washington-Arlington-Alexandria, DC-VA-MD-WV	19
Richmond, VA	18
Birmingham-Hoover, AL	15
San Diego-Carlsbad-San Marcos, CA	15
Seattle-Tacoma-Bellevue, WA	13
Cleveland-Elyria-Mentor, OH	11
Pittsburgh, PA	11
Fresno, CA	8

Figure 1: Census Tracts Facing Ten Times More Cancer Risk than the American Average

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[1] While each air pollutant's "range" for staying suspended in the air varies, with heavier chemicals and particles falling to the ground within 500 or 1000 feet, DEQ Air Quality Analyses reported a change at approximately one-quarter mile/1500 feet, in studies of point sources, roads, or construction sites.

[2] 1,3 butadiene, benzene, ethyl benzene, diesel particulate, arsenic and chromium 6.

[3]Each census tract typically holds between 4,000-8,000 residents.

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[i] Oregon Department of Environmental Quality. 2011. DEQ Fact Sheet: EPA's National Air Toxics Assessment Oregon Results.

[ii] Oregon Department of Environmental Quality, "Interactive Maps of Portland Air Toxics 2017 Modeling Study," Accessed February 18, 2013 at http://www.deq.state.or.us/aq/toxics/patsmaps.htm

[iii] Wind, Cory-Ann, and Oregon Department of Environmental Quality. 2011 May 13. "Air Toxics Monitoring at Harriet Tubman Leadership Academy in Portland." (DEQ Fact Sheet 09-AQ-016)

[v] Kelly, Walt. Earth Day 1971. Pogo comic strip.

[vi] Portland Air Toxics Solutions Advisory Committee (PATSAC). 2007. White Paper on Residential Heating. 2007

[vii] Oregon DEQ. May 10, 2013. *Fact Sheet: Air Quality in Portland-Portland Air Toxics Solutions Report*

and Recommendations. Salem, OR: Accessed at http://www.deq.state.or.us/aq/factsheets/12aq035patsReport.pdf

[viii] Profita, Cassandra. November 28, 2012. "Testing for Air Toxics In Portland." Oregon Public Broadcasting-Ecotrope. http://www.opb.org/news/blog/ecotrope/testing-for-air-toxics-in-portland/

[ix] U.S. Environmental Protection Agency. 2011. Toxics Release Inventory (TRI) Program Homepage. Accessed March 1, 2013 at http://www.epa.gov/tri/ (Can compare counties on "TRI Explorer" link.)

[x] U.S. Environmental Protection Agency. February 24, 2013. Release Chemical Report | TRI Explorer | US EPA. Accessed February 24, 2013 at http://iaspub.epa.gov/triexplorer/tri_release.chemical

[xi] Environmental Protection Agency. 2011. 2005 National-Scale Air Toxics Assessment. Washington, DC: Sections include[MCE1] Cancer Map 1 by Tract, Cancer Map 2 by Tract, Respiratory Maps 1 & 2 by Tract, Technical Methods Document, Fact Sheet, and Summary of Results, along with video modules. Accessed April 22, 2013 at http://www.epa.gov/nata2005/

[xii] Ibid.

[xiii] Environmental Protection Agency. February 17, 2011. *"Summary of Results for the 2005 National-Scale Assessment."* Washington, DC: Accessed April 22, 2013 at http://www.epa.gov/ttn/atw/nata2005/05pdf/sum_results.pdf.

Air Toxics and Health

Negative health effects are indisputable, but hard to quantify.

Cases of cardiovascular disease, cancer, asthma, high blood pressure, skin disease, kidney and liver disease, birth defects, and neurological damage in brain functions and learning are diagnosed at increased rates in Oregon's urban populations.[i] However, each one of these health problems can be attributed to factors beyond air pollution.

For two pollutants, fine (diesel) Particulate Matter and 1,3 Butadiene, there is very recent research correlating exposures with fatal heart attacks and reduced life expectancy, while controlling for other patient characteristics, but this kind of immediate consequence from air toxics is the exception in the literature.

The 2005 NATA estimates that Multnomah County has more than 100 cancer cases per million people due to air toxics.[ii]NATA also estimates that the national average for cancer from air toxics is 10 cases per million people. Multnomah County residents,then, face a risk ten times higher than the overall national average.

Oregon is among the top five states in the nation in the percentage of adults or children who carry an asthma diagnosis (about 10%; with more in sub-groups), and the western urban counties' percentages exceed statewide averages. However, tobacco smoking, second-hand smoke exposure, and obesity are each more influential as a predictor for asthma than air pollution, and these risk factors vary by urban county as well. Native and cultivated

pollen counts, pet ownership, and indoor-carpeting prevalence, which vary or coincide with western Oregon geography, also play a role.

It is beyond the scope of this report to estimate precisely how many Portland metropolitan citizens experience a particular disease that they would not experience if the air were cleaner. To distinguish the effects of long-term exposure to air toxics from the effects of risk factors attached to individual health behaviors, a complete epidemiological study for each air toxic and each disease is required. Your committee can say that, overall, air toxics *aggravate* health problems in susceptible populations, and make them harder to control.

Long-term health impacts are coming into focus.

Individual toxics have slowly become a cause for concern for policy makers as the results of 5-, 10-, and 20-year longitudinal studies made the case for action. DEQ launched the Air Toxics Scientific Advisory Committee (ATSAC) in 2004 to identify the health hazards present in Oregon air. It identified the toxics in Oregon air and set recommended ambient air levels based on scientific literature.

Air toxics have subtle effects, which occur over decades of exposure. Children are especially susceptible, as are those with chronic conditions like asthma and heart disease. Recent technological advances allow for greater understanding of the effect that air toxics have on interactions with multiple health-related variables. Computers have facilitated long-term, statistical studies of large samples because they can handle the many variables in a single inferential statistics equation to find significant correlations. Table 2 briefly states the problems associated with individual toxics in Portland air.

Table 2: Health Effects from Specific Air Toxics [Source of more information in brackets.]

Air Toxic	Health Effect
15 PAH (poly-aromatic hydrocarbons)	probable human carcinogen, skin disorders, respiratory disorders [http://www.epa.gov/ttnatw01/hlthef/polycycl.html]
Acrolein	respiratory congestion, eye, nose and throat irritation
1,3-butadiene	probable human carcinogen and may be associated with heart disease
Benzene	known carcinogen, which may also cause blood disorders, anemia and genetic damage
Acetaldehyde	probable carcinogen
Diesel Particulate	increased lung cancer, breathing and heart problems
Manganese	CNS, respiratory effects, manganism syndrome [http://www.epa.gov/ttnatw01/hlthef/manganes.html]
Arsenic	human carcinogen, G-I effects, skin disorders, kidney damage [http://www.epa.gov/ttnatw01/hlthef/arsenic.html]

1,4Dichlorobenzene, (aka paradichlorobenzene)	possible human carcinogen, CNS, liver and skin effects [http://www.epa.gov/ttnatw01/hlthef/dich-ben.html]
Naphthalene	possible human carcinogen, cataracts, respiratory effects [http://www.epa.gov/ttnatw01/hlthef/naphthal.html]
Cadmium	probable human carcinogen, kidney disease [http://www.epa.gov/ttnatw01/hlthef/cadmium.html]
Formaldehyde	nasopharyngeal cancers and possibly leukemia, probable human carcinogen, IgE allergy response [http://www.epa.gov/teach/chem_summ/Formaldehyde_summary.pdf]
Ethylbenzene	respiratory effects, neurological effects [http://www.epa.gov/ttnatw01/hlthef/ethylben.html]
Nickel	human carcinogen, Nickel dermatitis (rash), respiratory effects [http://www.epa.gov/ttnatw01/hlthef/nickel.html]
Chromium VI (Hexavalent)	human carcinogen, respiratory effects [http://www.epa.gov/ttnatw01/hlthef/chromium.html]

Health outcomes are indeterminate for any one individual.

While this section has tried to describe expected health effects, the state of the science is not such that one can say "W" amount of exposure air toxic "X" caused my friend or relative "Y" to get "Z" disease. Air toxics in combination may compound the adverse impacts that each might have individually. Since people do not stay in one location, they may experience widely different background levels of air toxics, making it difficult to assess the significance of a particular level of an air toxic at a particular location. Some people may suffer from a single, relatively brief exposure to one air toxic. Some people may experience the most toxicity indoors, or away from home. Yet most analysts use ambient outdoor data and residential locations.

In sum, there are statistically significant *correlations* between air pollution levels and diseases counted in the population, even though it is difficult to establish connections in individual cases.

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[i] Multnomah County Health Department. (also Oregon Public Health Institute and Upstream Public Health) November 2012. *West Hayden Island Health Analysis.* Portland, OR: Contact Elizabeth Clapp or Moriah McGrath.

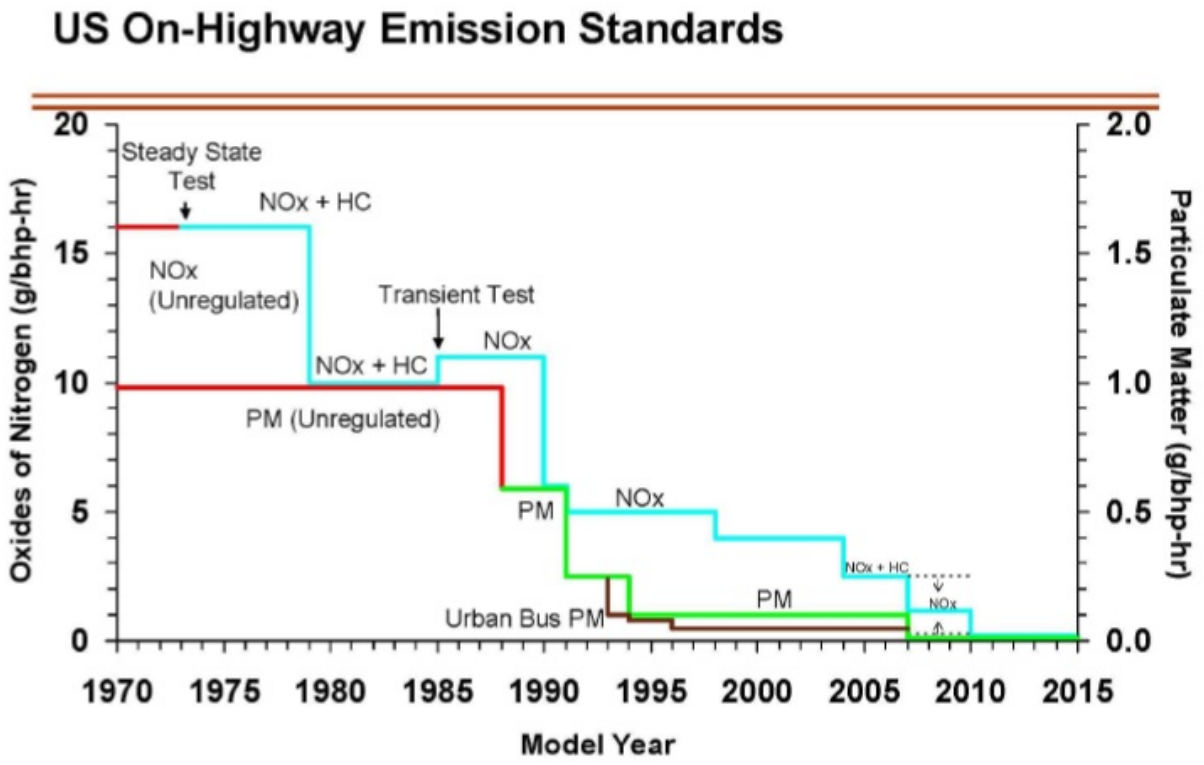
[ii] Oregon DEQ. February 2011. Fact Sheet: EPA's National Air Toxics Assessment Oregon results. Accessed April 22, 2013 at http://www.deq.state.or.us/aq/factsheets/11aq009.pdf

Criteria Air Pollutant Findings

Criteria pollutant concentrations have been dropping for 40 years.

Criteria pollutants are the main components of the smog that plagued many American cities during the 1960s and 1970s, and are largely within established health limits in the Portland airshed. The coughing, burning eyes, rashes, and the visibility and safety issues of large American cities in the 1970s are long gone for Portland. As shown in Figure 2, heavy truck diesel emissions have steadily declined for forty years. Your City Club committee saw other charts of criteria pollutants over time with similar, dramatic reductions.

Figure 2: Oregon Trucking Association Graphic (2012) Showing Nitrogen Oxides & Particulate Matter



City Club's previous reports on air quality – 1955 and 1983

The City Club investigated air quality in 1955 and 1983, and those full reports enabled your 2012-13 committee to see what has changed and what has not. In 1955,[i] the State Air Pollution Authority was a new statewide approach seen as a model alternative to local government regulation of pollution problems. The state authority had a dual approach that DEQ still uses: respond to complaints and try to abate specific problems; and simultaneously

conduct a continuous research program to understand how problems develop and how to prevent them. In 1955, City Club committee praised the state authority for its cooperative approach to persuading commercial polluters, even though it had legal authority to enforce its decisions with other methods. The 1955 report also describes many meteorological facts that often cause Portland to concentrate air pollutants rather than disperse them. Most of the polluting activities detailed in 1955 ceased long ago. For example, commercial garbage burning no longer occurs where Portland Meadows is today.

By 1983, the scientific community understood reduction methods for criteria pollutant concentrations; however, an understanding of air toxics was just emerging. Reducing the emission levels of some of the six criteria pollutants was still an urgent goal. The 1983 study focused on three primary sources of air pollution: motor vehicles, industry, and vegetative burning (back-yard burning and woodstoves) [ii].

As early as 1983, actions taken by industry (including motor vehicle manufacturers) were causing pollution from motor vehicles and industry to decline. The 1970s energy crisis led to increased electricity and heating fuel costs, and pollution from residential wood burning had been sharply increasing. *Fifty percent of residents engaged in backyard waste burning and wood heating* --particulate matter finer than 2.0 microns was the most seriously out of compliance.

The 1983 report identified essentially the same regulatory structure that the current study has found, except that at that time there was a Portland Air Quality Advisory Committee under DEQ. The report lays out simplified federal air quality regulation and legislative history. It includes a summary of the workings of industrial air pollution control and automobile emission control, vehicle inspection, parking restrictions, traffic control, flex time, bicycle and pedestrian programs, transit programs and other strategies, most of which are still in use.

Criteria pollutants have declined steadily since then, with what your committee perceives as an effective, iterative regulatory partnership between Oregon's DEQ and the federal EPA. In the Portland area today, it is rare for smog to exceed allowable limits.

Most information about air pollution is about criteria pollutants.

The Air Quality Index (AQI) is a national reporting mechanism established by EPA that requires cities with a population of more than 350,000 to report on certain criteria pollutants in a wide variety of news, business, and weather publications. Uniform colors convey the quality of the air (green is good, yellow is moderate, orange is unhealthy for sensitive groups, red is unhealthy for all groups, purple is very unhealthy and maroon is hazardous). It is available daily in the newspaper and hourly at http://www.deq.state.or.us/aqi/index.aspx). The AQI shows the vast majority of days well nestled in the "green" zone. Only the very curious would scrutinize an Air Quality Index graphic more closely and notice that it only measures a handful of criteria pollutants: typically some combination of carbon monoxide, ozone, and the two sizes of particulate matter. (www.airnow.gov)

The American Lung Association, another source of information about ozone and particulate pollution, generally gives Multnomah County an "A" or "B" grade.[iii] http://www.stateoftheair.org/2012/states/oregon/

City Club members, and the public, may be largely unaware of air toxics because air toxics are rarely measured or reported. Few outside regulatory, industry, or activist circles discuss ambient levels of air toxics in the way the public discussed smog-related air pollution in the 1960s and 1970s. Air toxics concentrations are many times lower than smog ingredients, and usually require extended exposures to affect health.

The rarity of DEQ's Air Pollution Advisories for Portland, and the steadiness of the "green/safe" reports, left most

on your committee and, we suspect, most of the public with the impression that there is not an air pollution problem in Portland. **If this report can alert all Portland-area citizens to the other unhealthy air pollutants beyond smog, it would accomplish a meaningful breakthrough in the civic conversation.**

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[i] Portland City Club. 1955. Report on Air Pollution in Portland. Portland, OR: City Club Bulletin, pp. 381-396.

[ii] City Club of Portland. *Report on Air Pollution Control Policies in the Portland Airshed*. 1983. City Club of Portland Bulletin pp. 7-76.

[iii] American Lung Association. 2012. State of the Air 2012 - Methodology. Accessed April 22, 2013 at http://www.stateoftheair.org/2012/key-findings/methodology.html

Permit Regulation of Commercial Sources

The permitting process for industrial and commercial emitters

The process at DEQ for industry to obtain a pollution permit is conceptually similar to the process for a homeowner to obtain a building permit. When an Oregon homeowner applies for a building permit, the zoning and construction codes, not political winds, are supposed to determine whether the builder's plans will be approved. If the permit is not approved, well-documented procedures exist for the permit applicant to get an impartial hearing, to change his plans, or to obtain exceptions or "waivers" to the applicable codes, if the plans meet other criteria.

Similarly, if a commercial permit application complies with all EPA regulations, DEQ grants approval. The permits contain verifiable promises by the applicant not to emit certain hazardous chemicals and to disclose the presence of possibly hazardous chemicals/precursors in advance, in case an accident occurs. The applicant also promises not to exceed certain amounts per year of other chemicals and not to operate on certain days or at certain times, such as during atmospheric events. It is then DEQ's job to monitor compliance with the standing permit for the next few years and manage the cycle of renewals for each.

In both the building permit case and the air pollution case, the applicant need not understand or know about *all* of the applicable rules before applying for the permit, but the applicant does need to understand enough to submit a technically proficient plan, usually authored by a professional, in order for the permit-granting officials to process and respond to the request.

Like a building permit, once DEQ grants the permit, it rarely acts to halt activity, as long as the applicant meets permit conditions. Most DEQ regulations are based in federal EPA regulations and the CAA, and so rule changes occur over decades – not weeks, months, or in response to a few years of agitating. This frustrates citizens bothered by about a particular pollution source.

Industry emission levels will likely continue downward.

Every industrial factory or business process that generates known air pollution emissions in amounts over certain thresholds must apply for a permit from DEQ. Such "Title V Operating Permits" are now active for about 120 sources in Oregon. Title V governs the emission of very large-scale processes only — emissions of more than 100

tons of criteria pollutants per year, or more than 10 tons of selected hazardous substances. A few thousand permits called Air Contaminant Discharge Permits (ACDPs) are required for 92 other business or agricultural activities that generate smaller amounts.

Industrial permits support 72% of DEQ's entire budget, and DEQ must use the money to support permit-related research and enforcement. The state updates permit requirements for industry and commercial processes every five years based on this permit-supported research. These requirements tend to incorporate new protection for the air.

Changes to the Clean Air Act in 1990 known as Title V also "placed a greater responsibility on business for monitoring, reporting, and certifying compliance with the conditions of the permit."[i] The 1990 Congress intended that these revisions would increase the public's influence on the process. All new permits, renewals, and significant permit modifications must have a public notice period. Citizens can now comment on the permit and request a public hearing. There is a process by which citizens can appeal directly to the federal EPA. Neighboring states and EPA also have more opportunity to comment on permit content.[ii]

While trying to increase public involvement, Congress intended that the 1990 changes would simplify compliance for business. In exchange, more of the professional and technical burdens of pollution measurement, and the expense of third-party certification were placed on businesses.

Who pays for the regulatory system?

Businesses "write the checks" for permits to emit pollution, and for the equipment or processes to clean it up. As stated above, permit fees cover 72% of the DEQ budget, according to your committee's analysis. A solid argument exists that their processes pollute a common good, and so the public should exact a price for that use. It is also true that a for-profit company must either pass on costs to customers or go out of business. However, since many air toxics now stem from individual activities, your committee agrees with business witnesses that the public should pay for more of the regulatory activity. Costs associated with Medicaid, Social Security Disability, Medicare and private health decline when pollution is reduced.

Your committee met with several industry trade groups, including Associated Oregon Industries, Oregon Trucking Association, Western States Petroleum Association, Northwest Underground Contractors Association, Oregon Transformation, and Oregon Hearth, Patio & Barbeque Association. Based on these meetings, your committee came away with four concepts.

I. Owners of businesses and equipment that emit pollutants have paid most of the costs of pollution control, but the cost savings are distributed widely to all.

The beneficiaries of pollution control include all citizens, health care organizations, government health insurers like Medicaid, Social Security Disability, and Medicare, and all employers who suffer when their employees are absent, ill, or die suddenly.

For example, EPA recently estimated that for every dollar spent to tighten diesel emission standards for truck engines, twenty dollars in health care and mortality costs are saved.[iii] The costs are borne by truck owners of all types, while everyone benefits. Some businesses find this unbalanced.

II. Industry tends to be philosophically opposed to regulation, as a matter of

principle: freedom from government intrusion in business markets.

Some industry leaders view pollution controls as an example of government being "anti-business" and weakening their competitive position. For-profit organizations told your committee that they spent a lot of staff time and money trying to anticipate proposed future regulations and block them.

For example, the Oregon Trucking Association (OTA), which represents many different trucking sectors, such as dump trucks, logging trucks, road trucks and short-haul trucks, has a full time lobbyist in the legislature. The OTA believes that federal regulatory efforts and fleet turnover are sufficient to address diesel emissions from trucks. It tends to view DEQ's new air toxic Health-Based Benchmarks as too ambitious and the health need as unproven. OTA is wary of additional regulation because, in its view, trucking companies have to comply with too many regulations already. OTA would like the state to require an economic impact statement before adopting additional regulations. [iv]

Associated Oregon Industries (AOI) has about 1,600 members, ranging from one-person businesses to large businesses throughout Oregon. Located in Salem, across from the capitol, it has three full-time lobbyists and hires additional contract lobbyists during the legislative session. In an interview with your committee, AOI's Vice President, John Ledger, explained that AOI typically advocates for certainty above all in regulations, and for a clear permitting process. AOI is worried that if a business obtains all required permits and then, subsequently, is required to do more because of neighborhood activism, it will make the business environment too unpredictable, with the unfortunate consequence that businesses may not locate in Oregon. AOI supports adequate funding for DEQ to carry out its mission.[v]

III. Business is frequently on record protesting pollution control costs, but precise dollar impacts are elusive.

Businesses rarely publish facts and analysis to support their arguments that government is cutting excessively into profits by imposing pollution control costs.[vi] Your City Club committee found a lack of precise data about pollution control costs. Academics have done cost-effectiveness and cost-benefit analyses, but only with special permission and in a small sample of locations and industries.

Two major forces seem to be keeping actual cost data private. First, many, companies view their response to pollution controls as a proprietary strategy in a competitive environment. Second, each facility and each pollutant is unique.

It is impossible to generalize costs as a percentage of revenues or operations. Companies make changes to reduce pollution output at the same time as they incorporate other technological improvements. This makes it difficult, if not impossible, to attach a price tag for the anti-pollution costs alone.

For example, while cautious toward new air toxics regulation, the OTA representatives seemed less concerned about the costs of heightened levels of diesel controls on the horizon. Federal requirements will end up built in to new engines as they come off the manufacturing lines, and engine replacements are a predictable cost built in to the transportation business. The OTA estimates a new truck engine might cost between 5% to 15% more to comply with diesel regulations by EPA.

In the best case, pollution control burdens become invisible or are a net gain because they save money or time equal to the cost impact. This has apparently happened with diesel freight trucks. The federal manufacturing controls on engine emissions have also increased fuel efficiency, so the changes have paid for themselves in the

end. Trucking witnesses pointed out that it is hard to estimate the net cost because many of the engineering improvements also improve fuel mileage. Each engine design improvement brings non-pollution-related improvements, for which they are willing to pay as a cost of doing business. In addition, companies do not upgrade all of their trucks at once. Fleets are improved overall, as the oldest trucks are replaced and retrofitted first. For example, among the 280,000 trucks licensed to operate in Oregon, only 18% were built before 2002, by which point EPA's NO_x and Particulate allowable emissions had already been cut by at least 80%[vii]. The next federal "Tier" will be phased in during 2013, with limits set at roughly $1/100^{th}$ of the 1993 Tier.)

One economist recommended that your committee view pollution as wasted raw material—inputs that were lost without adding value to the outputs, rather than as a regrettable but unavoidable side effect of product creation. He was speaking of one small business that was able to sell the material recovered from recapturing its toxic emissions, making it possible to buy fewer raw materials per sold item. This pollution abatement paid for itself in a couple of years with these new income streams.

The 1983 City Club study discusses the possible economic impacts of air pollution regulation. The 1983 committee concluded that the cost of pollution reduction did not negatively affect the Portland area.

Your 2012-13 committee concluded that while the costs of compliance with pollution controls are real, businesses have tended to incorporate them into routine price increases that the buyers of goods or services accept. The next iteration of a product is often superior in other design features, as well as pollution controls, which usually masks the expense associated with the controls.

IV. A small number of focused advocates hired by private interests can be very effective in influencing state lawmaking.

When federal restrictions are vague or require state and local interpretation, business advocacy is vigilant and effective. Your committee heard about cases where proposed regulations are blocked or made meaningless because of intricate detours in the legislative process created by interest groups such as trade organizations or business representatives. Paid lobbyists can pay attention early to possible negatives, while citizen activism tends to be strongest only when there is a stark problem that raises public concern to a level that interrupts everyday work and family routines. Here are three instances:

- DEQ has statutory authority from the legislature to regulate new trucks. In 2011, DEQ recommended a statutory change, similar to one already adopted in California, that would have required trucks to install aerodynamic controls (e.g. "skirts" and lower-rolling resistance tires), but the OTA balked at the cost of retrofitting during the recession. DEQ analyzed the cost/benefit ratio of the proposal and found it would take two to three years to pay back the costs. OTA responded that trucking businesses would not be able to secure financing. Opponents attached unrelated measures to the bill to amend Oregon's law, and the bill ultimately failed.[viii]

- The trucking bill also would have restricted overnight idling, by requiring truckers to go to a facility where electricity was available or to use an auxiliary power unit to generate heat or air conditioning. The OTA offered an amendment instead that the House Energy and Environment Committee ultimately supported. The amendment precluded local governments from adopting regulations on idling that are more stringent.[ix]

- The Portland Air Toxics Solutions Advisory Committee (PATSAC) invited letters of comment on a draft of its report. In response, AOI and the Oregon Metals Industrial Council (OMIC) first noted that their representatives were outnumbered on the committee by representatives of environmental interests by

approximately eight to one. They stated a series of challenges to the report's assumptions and conclusions. The most significant was that the report focused unduly on industrial sources, which ranked seventh in previous PATSAC materials as a contributor to air toxic emissions. Other challenges included the contention that the "multiple and extensive layers of existing federal and state toxic emission reduction regulations" are already adequate.[x] AOI and OMIC both opposed "additional layers of regulations that are not based on documented problems."[xi] Given the low ranking of industrial point sources, they argued that additional regulations would serve only to raise prices and would result in lost sales in a highly competitive world market, without significant environmental benefit.

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[i] Oregon DEQ. 2012. Air Quality / Title V Operating Permit Program / About. Accessed at http://www.deq.state.or.us/aq/permit/tv/about.htm

[ii] Ibid.

[iii] Graham, John D. 2007. "The Evolving Regulatory Role of the U.S. Office of Management and Budget." *Review of Environmental Economics and Policy*. Vol.1, No. 2, pp. 171-191. (Reprint published by Oxford Univesity Press/Association of Environmental and Resource Economists.)

[iv] Interview with Debra Dunn, Oregon Trucking Association, May 30, 2012

[v] Interview with John Ledger and Tom Wood, Associated Oregon Industries, May 9, 2012

[vi] Oregon Public Broadcasting –Think Out Loud. 2013, January 8. "What Effect Will California's Cap and Trade Law Have?" Reported by Dave Blanchard and accessed 3-16-2013 at http://www.opb.org/thinkoutloud/shows/will-californias-cap-and-trade-law...

[vii] Charts provided by Debra Dunn and Oregon Trucking Association. 2012.

[viii] Interview with Andy Ginsburg, DEQ Administrator, July 18, 2012.

[ix] Ibid.

[x] November 3, 2011 Letter from John Ledger, Vice President, Associated Oregon Industries and Mark Nelson, Executive Director, Oregon Metals Industrial Council to Andy Ginsburg, Air Quality Division Administrator, Oregon Department of Environmental Quality

[xi] November 3, 2011 Letter from John Ledger, Vice President, Associated Oregon Industries and Mark Nelson, Executive Director, Oregon Metals Industrial Council to Andy Ginsburg, Air Quality Division Administrator, Oregon Department of Environmental Quality

Advocates Against Air Toxics

Anti-pollution advocates and neighborhood activists have been essential since the 1960s to the protection of public health and the natural environment. It is certain the Clean Air Act and Clean Water Act would not have passed without the ground swell of public witnessing that surrounded events like the first Earth Day, with 20

million demonstrators across the nation.[i] With competing concerns in today's public policy debates, clean air advocates remain essential.

A particular air toxic can be of low priority for the whole airshed and yet of high priority in immediate neighborhoods.

People living and working within a quarter mile (many pollutants drop off after 1500 feet or less) of an industrial source or a heavily traveled road that emits air toxics might easily face a different ordering of priorities than the five priorities your City Club committee forwards in this report. Your committee, in an effort to make policy recommendations, tried to conceive of the city's airshed as a whole, as does DEQ in its benchmarking and modeling efforts about air toxics. For any one pollutant of concern, activists can examine data and find different priorities at the neighborhood level. There has been a shortage of neighborhood-level monitoring and reporting, and the statewide approach necessitated by the structure of DEQ has frustrated neighborhood activists for some time.

Many advocates work on Air Toxics in Portland, and collaboration can increase their effectiveness.

Environmental organizations already working on air pollution concerns include the Audubon Society of Oregon, Columbia Riverkeeper, Friends of the Columbia Gorge, Greenpeace, Northwest Environmental Defense Center located at Lewis & Clark, Physicians for Social Responsibility, Power Past Coal, Sierra Club, and Willamette Riverkeeper. Local community organizations include Neighbors for Clean Air and the Northwest District Association Air Quality Committee. Recent activism has had demonstrable results, including the following:

> The film "What's in Our Air" by Sharon Genasci, which documented the efforts of northwest Portland neighbors to sample the air in their local airshed shared with industrial neighbors.[ii]
>
> The "Good Neighbor Agreement" with ESCO Corporation (a steel casting foundry), ensures a voluntary 20% reduction in pollution released, and is incorporated into ESCO's DEQ permit.
>
> The Sierra Club, the Citizen's Utility Board and other environmental groups have played a key role in a recent series of heated public hearings with Portland General Electric that resulted in PGE's closure of the Boardman, Oregon coal-burning electric power plant.
>
> The Friends of the Columbia Gorge, Power Past Coal, and the Sierra Club are now very active in opposing the several proposed Northwest coal export terminals, arguing that diesel pollutants from locomotives and tugboats themselves, and potential coal dust dispersion containing toxic elements, are among the environmental and public health injuries.
>
> Several hundred individuals opposing the Morrow Pacific Coal Export Project turned up at the DEQ Air Quality Hearing in Portland on December 6, 2012.[iii]
>
> At the December 12, 2012 Scoping Hearing on the Gateway Pacific Terminal EIS in Vancouver, co-sponsored by the U.S. Army Corps of Engineers and the Washington State Department of Ecology, many of the several hundred attendees opposed to the project who testified cited their concerns about air toxics associated with the proposed coal terminal.[iv]

The people most affected by government decisions remain the most powerful voice, whether for cleaner air,

cleaner water, or other common goods. Advocacy is most effective when groups of activists engage around common interests.

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[i] Roach, John. April 6, 2010. *National Geographic Society Daily News* –"Earth Day Facts: When It Is, How It Began, What to Do." Accessed at http://news.nationalgeographic.com/news/2009/04/090421-earth-day-facts/.

[ii] Genasci, Sharon. 1999. Video: *What's in Our Air?* Portland, OR: Rainbow Video & Film Productions. http://rainbowvideoandfilm.net/whatsinourair.html

[iii] Learn, Scott. December 6, 2012. *The Oregonian.* "Coal export meeting in Portland draws a crowd of about 800." http://www.oregonlive.com/environment/index.ssf/2012/12/coal_export_meeting_in_portlan.html

[iv] Associated Press. December 13, 2012. *The Oregonian.* "Final hearing in Seattle on proposed coal export terminal." http://www.oregonlive.com/environment/index.ssf/2012/12/final_hearing_in_seattle_on_pr.html

Regulatory Policy Options

Based on what your City Club committee has learned, the following governmental solutions illustrate ways to address Portland's air toxics problem.

Woodstove and wood burning regulations could be enforced now.

DEQ has set standards for new woodstoves that will greatly reduce their contribution to air pollution, but there were no citations issued for illegal woodstove operation in 2011[i] and homeowners are only required to replace outmoded woodstoves when they sell their homes. Incomplete combustion, as for every other toxic, is both wasteful and polluting. [1]

In interviews with your committee, representatives of the woodstove industry stated that they have been very active in working with DEQ to reduce emissions from new woodstoves. The woodstove industry is the only one your committee saw that is actively encouraging DEQ to be more aggressive in enforcing its regulations.

New woodstoves do not have the heavy impact of outmoded woodstoves on the airshed. Woodstoves currently on the market meet current air quality regulations and emit a maximum of 4.5 grams per hour of particulates or less.[iii] The problem is the many hundreds of existing installed woodstoves fail to meet current standards and emit 60 to 90 grams per hour – 15 to 20 times the legal limit. Consequently, existing woodstoves that fall far short of meeting current standards for new woodstoves are the region's most significant air pollution problem.

Even when replaced, older woodstoves may remain in the airshed. There is currently a brisk market in sale of second-hand woodstoves, and many of them are not certified. On a typical day last spring, a search on CraigsList.org for "woodstoves" resulted in twenty listings for woodstoves or woodstove inserts. Eleven woodstoves, a majority of those for sale, were illegal to sell in Oregon. It is reasonable to expect that in fall and winter, the primary season for buying woodstoves, the number of illegal stoves on the market will be even greater.[iv]

Homeowners are not saving money by using non-compliant woodstoves (or fireplaces) to heat their homes. According to DEQ, replacement of a non-compliant woodstove will pay for itself in a few winters, because new stoves burn 60% less wood to produce the same amount of heat.[v] In addition, federal and state tax credits of $1500 and $300 are available to help pay for the replacement stove. However, if those who buy compliant woodstoves for all these good reasons sell their old stoves, the program has no positive effect.

This issue will be resolved only through informed decision making by individual homeowners and property owners. The problem will persist until the public becomes better aware of illegal woodstoves. [vi] The following strategies would address this problem:

o Create a statewide positive public awareness campaign, which would involve printed support material and public service announcements on radio, television, and social media. DEQ has begun this process with its "Heat Smart" program.

o Provide financial support from government or non-profits to assist lower-income households in making the change to compliant woodstoves — many of the homes with wood heat may be rentals, or owned by low-income homeowners.[vii]

> For example, in Lane County, the regional air protection agency (LRAPA) pursued and received a $415,000 grant from the U.S. Department of Energy that allowed them to replace 217 uncertified woodstoves at an average subsidy of $1,843. LRAPA was able to apply for this grant with a minimum of delay and local approval procedures. Your committee understands that the statewide Oregon DEQ labors under more constraints when seeking permission from the legislature to pursue these kinds of federal anti-pollution funds, which can lead to missed opportunities.

o Change to "move-in" requirements on owners of rental property that phase in the installation of a certified woodstove. The first couple of years would require merely notifying new tenants, with a three or four year future moratorium on renting property with uncertified woodstoves. As toxic as they are to outdoor air, non-compliant woodstoves also place tenants at risk, just like lead paint, mold, and non-working smoke detectors — all of which have current renter notification and repair requirements.

o Stop illegal sales of old woodstoves. DEQ must dedicate staff to work aggressively to prevent sales of illegal stoves through any channel. Hiring a compliance officer with full-time responsibility for preventing sales of illegal woodstoves is the next step.

o Check into the possibility of asking Craigslist.com to make advertising of non-compliant woodstoves a special-treatment listing, pointing out that they are not legal in Oregon. Your committee understands something similar has been developed to reduce Craigslist sales of stolen vehicles.

o When DEQ begins following up on leads and issuing citations for blatant and obvious violations, the news will spread by word of mouth, as it does for radar speed traps. One witness believed that sales would dry up once those involved in the trade of illegal woodstoves realize that the state is serious and there will be consequences.[viii]

o The legislature should fund DEQ at a level that will permit education and enforcement. This need not be a long-term commitment. By replacing and destroying non-compliant woodstoves and preventing the installation out-of-area non-compliant ones, DEQ can reduce the length of the commitment.

DEQ monitoring stations could be increased to correspond to Portland's size and likely concentrations.

As required by the Clean Air Act and it amendments (CAA), DEQ continually monitors certain criteria pollutants, [ix] at 45 sites in Oregon. Each monitor may only monitor one or two pollutants. The CAA requires the installation of a certain number of monitors, which are located based on population and the likelihood of particular criteria pollutants. The sampling stations are approximately the size of a trailer and house instruments in a climate-controlled environment.

DEQ uses two stations to gather criteria pollution Air Quality Index data for Portland. The SE Lafayette station measures particulates (PM2.5 and PM10), ozone, carbon monoxide, sulfur dioxide and nitrogen dioxide. The Sauvie Island station measures particulates (PM2.5 and PM10), along with ozone on a seasonal basis from May through September. This shorter list of items is typical of DEQ monitors.

Figure 3: The SE Lafayette Criteria Pollution Monitoring Station

Figure 4: The Sauvie Island Criteria Pollution Monitoring Station

Source: Oregon DEQ[x]

Each pollutant requires a different method of sampling and analysis. For example, ozone sampling occurs continuously, using ozone-specific equipment, which is dependent upon electric power, shelter from weather, and an internet connection. For some other pollutants, samples are collected manually once per hour during certain days per week. About two dozen DEQ staff members analyze the collected data at a lab in Portland.

In contrast to the 45 monitoring station for criteria pollutants, there are only three DEQ monitors for air toxics in all of Oregon. EPA provides the funding for two of them. Only one is located in the Portland airshed. The limited number of monitors is attributable, at least in part, to the fact that the CAA does not require air toxics monitoring, so EPA supports them only as needed. Only the Medford toxics monitor uses state money.

Figure 5: The Air Toxics Monitoring Station in North Portland.

Source: Jeffrey M. Smith, Air Quality Monitoring Manager, Laboratory & Environmental Assessment Division, DEQ

Continuity of monitoring is more important than the total number of monitors or of sites. While DEQ views the modeling efforts they have used as relatively reliable, more data gathered from more locations across the region would be helpful to achieve greater accuracy by providing current evidence. Sampling is designed to detect any changes larger than five percent over three years. Sampling in just one year, or intermittently, can fail to distinguish between one-time events and normal events. Sun, weather and other factors that affect air toxics may create unusual data in a particular year, but the anomalies are usually smoothed out over three or five years.

The existing monitoring station in North Portland costs $155,000 per year just to operate. This number does not include the expense, primarily in staff time, of analyzing the data collected, which is between one and 1.5 full time employees. [xi]

Progress will rest on collected facts about toxics that go beyond DEQ models. Everything Table 1 shows about which air toxics are a problem, and how much of a problem, is based on a set of data from a 2005 EPA special study, and on subsequent computer modeling. Without better data, DEQ has no defense when a critic says, "Prove to me there is a problem before imposing a solution." The DEQ general fund, non-permit-related air quality budget for the biennium was $52 million for 222 staff, so this recommendation affects perhaps 2.5% of air quality staff and .6% of the budget, per monitor[xii]. There is room to maneuver within existing resources. Lane County, with a much smaller budget and geography, has more monitors for both criteria pollutants and air toxics.

Many witnesses that came before your City Club committee agreed that there is a monitor shortage, including:

> Candee Hatch, private consultant in pollution control technologies
> John Ledger, president of Associated Oregon Industries
> Bob Amundson, private environmental regulation consultant
> Andy Ginsburg and Sarah Armitage of DEQ
> Ben Duncan, Multnomah County Public Health and Organizing People / Activating Leaders (OPAL) Environmental Justice Oregon activist.

In commenting on the PATSAC Report, AOI and OMIC agreed "there is no good substitute for actual monitoring data, and that [DEQ] should continue to seek the resources to conduct this activity."[xiii] AOI objected that using data resulting from modeling, as opposed to monitoring, "substitutes the theoretical for the actual."[xiv]

West Coast state laws for heavy-duty highway trucks are not uniform.

Many of the long haul highway trucks passing through our area originate or terminate their trips in California, which subjects them to stiffer emission standards than those imposed by EPA,[xv] thereby benefiting Oregonians inadvertently. However, Oregon's looser standards permit the use of older, dirtier trucks to haul loads into and around our state. The California standards could inadvertently harm Oregonians in those instances.

DEQ has current authority from EPA to regulate older legacy trucks. A proposal by DEQ to require highway trucks to use California standards of aerodynamic streamlining and to limit truck idling was rejected by the Oregon House in 2011.[xvi]

California has regulated heavy-duty tractor-trailers[xvii] since 2010, requiring them to be fitted with aerodynamic faring and low rolling-resistance tires. The California EPA Air Resources Board requires that legacy highway

trucks, buses and school buses be fitted with particulate filters and scheduled for early replacement, starting in 2012.[xviii]

Washington Department of Ecology (DOE) has experimented with reducing truck idling by the use of auxiliary power units and electrified highway truck parking.[xix] The DOE is trying to fund the installation of add-on technologies, such as aerodynamic faring and singlewide tires for highway trucks.

Decisions about heavy truck standards have had negative consequences for Oregonians.

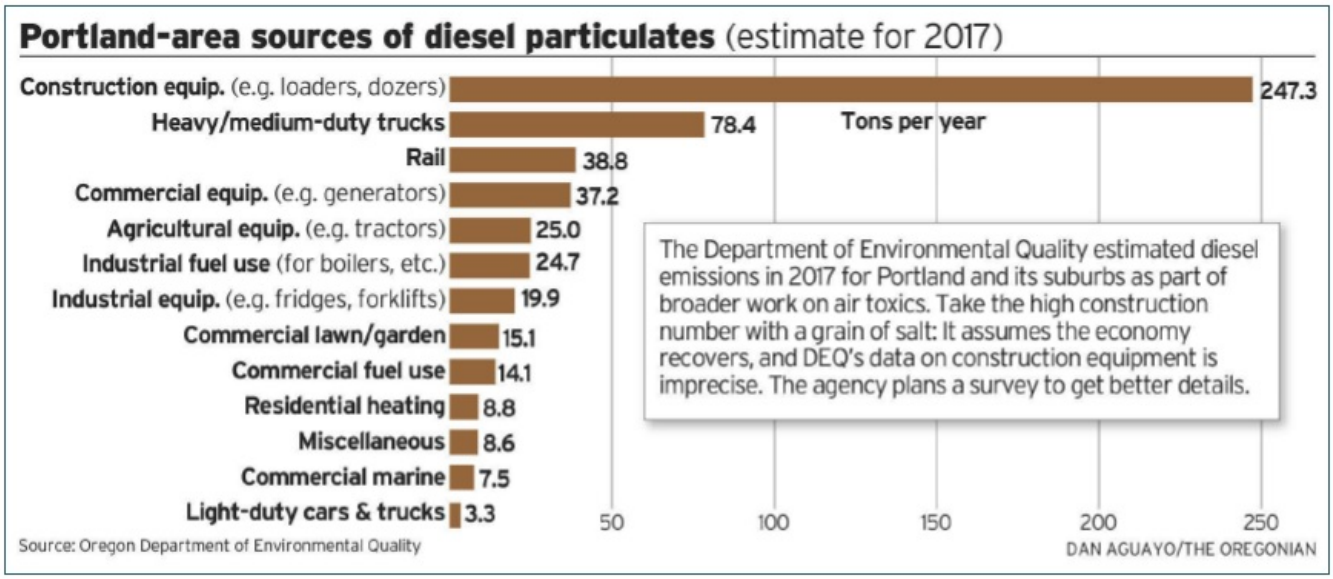
Your committee heard from both the trucking industry representatives and the DEQ diesel expert that even as federal emission standards for diesel trucks have become tougher, there is an "all trucks roll downhill" phenomenon. The older a truck engine gets, the more likely it will end up in Portland. When a truck no longer meets stricter California and Washington highway standards, its owner might move it to Oregon. Once the truck becomes unreliable for long freeway hauls, its owner might sell it to a regional Willamette Valley short-hauler or an in-town hauler of landscape supplies or garbage. Trucks that could break down at any minute are exclusively used in large freight and industrial yards. Since they are not licensed for roads, they may never leave the owner's property.

This is why, although trucks on highway corridors disperse particulate matter emissions throughout the state, almost all older diesel engines eventually end up in Portland.[xx] Since such trucks do not meet any of the federal emissions adopted in the previous 15 years, they pollute the local air far more than modern trucks.

Oregon could adopt heavy truck diesel standards similar to California and Washington.

Your committee could not find a compelling argument against setting common emission standards for freight trucks on the West Coast. Because Washington and California both have stricter emission standards, older, less clean-burning trucks are being taken out of service there, and used here in Oregon. In general, particulate matter emissions from heavy duty highway vehicles is already overseen by federal engine emission standards that are tightened every 2 to 5 years, but the implementation is very gradual due to the slow process of vehicle replacement, especially since the recession of 2008.

Figure 6: August 22, 2012 *The Oregonian,* context on non-road diesel discussion and heavy trucks.



Non-road diesel engines are lightly regulated and contribute to the Air Toxics inventory.

DEQ estimates the contribution to particulate matter emissions in the PMA by non-road diesels to be 343 tons per year or 41% of the total.[xxi] Non-road diesel engines include mining and construction equipment, marine, stationary power and railroad engines. Non-road diesel engines are subject to EPA standards, which use an age-tier system and separate categories by engine power.[xxii]

EPA standards for non-road engines are slightly more complicated than those for heavy-duty highway vehicles are, and are generally lower. As with highway diesels, the only air toxic controlled is particulate matter. The application of these tiered standards should reduce emissions from this category of vehicles, as the fleet grows younger by replacement. However, the recession has seriously slowed the expected turnover rate of the fleet.

Regional authorities in Chicago, California and New York City have imposed stricter operational restrictions than EPA restrictions for non-road diesels, in order to reduce public exposure to this significant pollutant. [xxiii]As a result, contractors in these regions are required to use newer equipment and to retrofit older equipment. They must comply with restrictions addressing the fuels they use and establishing maximum operating hour limitations for stationary engines. California requires equipment labeling, registration and reporting of non-road vehicles and imposes fleet average NOx targets.

Oregon does not allow DEQ to regulate these engines. In 2011, Portland proposed standards for city contract bidders similar to those of other regional authorities, but withdrew the proposal after a presentation at a public meeting attended by stakeholders. Local intrastate construction firms in Oregon object to stiffer local emission standards, maintaining that they would be placed at a disadvantage with respect to large, better-capitalized firms, which currently operate in California and own their heavy equipment rather than rent it.[xxiv]

State legislation authorizing the Oregon Department of Environmental Quality (DEQ) to regulate the operation of non-road engines would allow DEQ to develop and impose rules to reduce these significant and harmful emissions. Metro, the Tri-counties, Oregon Department of Transportation, the Port of Portland, and the City of Portland could mitigate the effects in the short term by imposing strict local standards for particulate matter emissions from non-road diesel engines.

[1] Fireplaces are rarely used more than a few hours per week for visual effects, as they are not effective heating. Unless there is an "inversion air pollution advisory," when Portlanders are asked to refrain from burning unless they heat with wood, fireplaces are not regulated, as their contribution to air pollution is relatively small.

[i] Patricia Neptune and William Savery looked at the public list of DEQ citations and found none. See email from pm-neptune to Committee, subject: Wood Burning Stove Citations, April 20, 2012. Reference email from saveryw to Committee, subj: RE: Wood Burning Stove Citations, April 20, 2012.

[iii] Memo from Fred Kirkpatrick, Classic Heat Source Inc., April 23, 2012.

[iv] Interview with Fred Kirkpatrick, Classic Heat Source, April 23, 2012.

[v] Oregon DEQ. 2013. Air Quality Woodstove Program – Woodburning 101. Accessed at http://www.deq.state.or.us/aq/burning/woodstoves/101.htm

[vi] Interview with Ben Duncan, Multnomah County Health Department, May 15, 2012

[vii] Interview with Fred Kirkpatrick, Classic Heat Source, April 23, 2012.

[viii] Ibid.

[ix]including ozone, CO, SO_2, NO_2, PM2.5, PM^{10} and lead

[x] Oregon DEQ. 2013. Air Quality Monitoring Station – Portland Sauvie Island. Photos available at http://www.deq.state.or.us/lab/aqm/stations/sis14152.htm

[xi] Interview with Sarah Armitage, DEQ, April 11, 2012.

[xii] Oregon DEQ. October 12, 2011. Fact Sheet: DEQ 2011-13 Budget. Contact M. Aerne. Accessed at http://www.deq.state.or.us/msd/budget/DEQ11-13BudgetFactsheet.pdf

[xiii] *Ibid.*

[xiv] September 15, 2011 Letter from John Ledger, Vice President, Associated Oregon Industries to Any Ginsburg, Air Quality Division Administrator, Oregon Department of Environmental Quality

[xv] United States Environmental Protection Agency. 2013. "Heavy-Duty Highway Compression-Ignition Engines and Urban Buses--Exhaust Emission Standards," Accessed February 19, 2013 at http://www.epa.gov/otaq/standards/heavy-duty/hdci-exhaust.htm

[xvi] Interview with Andy Ginsburg, DEQ Administrator, July 18, 2012.

[xvii] California Environmental Protection Air Resources Board, "Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Regulation," Accessed February 19, 2013 at http://www.arb.ca.gov/cc/hdghg/hdghg.htm

[xviii] California Environmental Protection Air Resources Board. 2013."Truck and Bus Regulation Compliance Requirements Summary." Accessed February 19, 2013 at http://www.arb.ca.gov/msprog/onrdiesel/documents/FSReg Sum.pdf

[xix] Washington Department of Ecology. 2013."Focus on Reducing Engine Idling at Truck Stops," Accessed on February 19, 2013 at [fortress.wa.gov/ecy/publications/summarypages/0502025.html]

[xx] Interview with Kevin Downing, DEQ diesel specialist, June 20, 2012.

[xxi] Downing, Kevin. July 19, 2012. Oregon Department of Environmental Quality, Personal Communication, "2008 Portland Area Diesel PM Inventory."

[xxii] United States Environmental Protection Agency. Accessed on February 19, 2013 at http://www.epa.gov/otaq/standards/nonroad/nonroadci.htm

[xxiii] California Environmental Protection Agency Air Resources Board. January 14, 2011. "Off-Road Diesel Vehicle Regulation Compliance Requirements Summary."

[xxiv] Kalkhoven, John of NUCA. June 14, 2012. City Club Air Quality Study Committee Meeting Minutes.

Conclusions

1. The quality of the air we breathe is unacceptable: toxics are present here in concentrations that measurably and predictably affect human health and lead to cardiovascular and autoimmune diseases, as well as cancer.
2. Smog regulation that began in the 1970s is insufficient; another realm of air pollution regulation is air toxics, embodied in the 1990 revisions to the Clean Air Act.
3. EPA regulates smog and lead differently than air toxics: it regulates smog through prescribed standards and air toxics through the Maximum Achievable Control Technology program for each industry sector.
4. Many public agencies work on air quality, but their work lacks focus and coordination when it comes to air toxics.
5. Diesel equipment owners shift lower-performing units to Oregon because of our less stringent standards, compared to California and Washington.
6. A favorable business environment can coexist with further air toxic reductions. The history of criteria pollutant control has coincided with vast growth of wealth and productivity.
7. Individual choices to burn wood and drive automobiles produce the greatest amount of air toxics, and cleaner choices are available.
8. Air toxics cannot be effectively reduced by targeting industrial sources alone. DEQ's emphasis on the collection of business permit fees, and the reduction of businesses' pollution with those fees, results in a focus on commercial-industrial sources that is out of line with the need to reduce widely diffused sources of air toxics produced by the general public.
9. It is reasonable to act on publicly developed priorities and initiatives, as data obtained through monitoring will likely mirror models. However, a shortage of air toxic monitoring stations and analysis in the Portland airshed prevents DEQ and the public from having hard evidence when debating new laws, and from knowing the true progress of control measures since 2005.

Recommendations

1. DEQ should acquire more metro-area monitoring stations, and analyze and publish the resulting data, to

provide harder evidence of current levels of air toxics.
2. DEQ should more fully enforce existing wood stove certification laws.
3. All relevant government agencies within Oregon and Southwest Washington should strategically pool public education resources to achieve agreed-upon awareness goals for air toxics.
4. DEQ should begin to track and publish its general fund budget outlays according to geography and community served, as well as pollutant targeted.
5. The Environmental Quality Commission and the governor should exempt DEQ from Oregon legislative involvement for the purpose of federal supplemental funding applications to assist local jurisdictions.
6. State and local governments should explore public financing or loan options for woodstove replacements, diesel engine retrofits, and other solutions within their jurisdiction.
7. The Environmental Quality Commission should adopt the California emissions standard for heavy-duty diesel on-road trucks.
8. The legislature should authorize DEQ to regulate the operation of non-road diesel engines, and DEQ should develop and impose rules to reduce non-road diesel particulate emissions.
9. All government agencies within the airshed should adopt California's construction contract requirements for off-road diesel equipment.
10. DEQ should determine the level of funding required to implement fully its Portland metropolitan area goals and plans for air toxics, and should request those funds from the legislature, which should provide them. It is appropriate for a higher portion of DEQ's budget to come from the public now, as air toxics primarily spring from citizen behavior.

Signatures

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Bibliography

DEQ Materials

Associated Oregon Industries and John Ledger. *Comment Letter to Andy Ginsburg*: "Draft PATSAC Report and Recommendations." (Portland, OR: DEQ Air Quality Division, 5 pages.) September 15, 2011.

Associated Oregon Industries and Oregon Metals Industry Council. *Comment Letter to Andy Ginsburg*: "Portland Air Toxics Solutions Advisory Committee Report & Recommendations." (Portland, OR: DEQ Air Quality Division, 3 pages.) November 3, 2011.

Barnack, Anthony, and Oregon Department of Environmental Quality. *"2011 Oregon Annual Ambient Air Monitoring Network Plan."* July 2011. (Department of Environmental Quality Report: Submitted to EPA Region 10.)

Davis, George. "*Understanding ESCO's Title V permit structure*." (DEQ letterhead power point handout of July 5, 2011) P. 11

Ginsburg, Andy. *Personal communication: letter regarding budget questions, to supplement committee appearance*. (Portland, OR: DEQ) May 2, 2012

Oregon Department of Environmental Quality and Sarah Armitage. *Fact Sheet: Air Quality in Portland*. Air

Quality Division. Last updated May 10, 2012.

Oregon Department of Environmental Quality and Gregg Lande. *News Release: DEQ Will Use Latest EPA Air Toxics Assessment to Further Reduce Air Toxics in Oregon.* (Portland, OR: DEQ – Air Quality Division) For release March 11, 2011.

Oregon Department of Environmental Quality and M. Aerne. *Fact Sheet: DEQ 2011-2013 Budget*. (Portland, OR: DEQ - contact Dick Pedersen & Greg Aldrich) Last updated October 12, 2011.

Oregon Department of Environmental Quality and Marcia Danab. *Fact Sheet: Air Quality in Northwest Portland (Questions and answers about air quality near Chapman School).* (Portland, OR: DEQ Report No. 11-NWR-002) Updated December 7, 2011.

Oregon Department of Environmental Quality and Marcia Danab. *Fact Sheet: New Ozone Standard in 201, Preparing Oregon for a more protective standard.* (Portland, OR: DEQ - contact Sue Langdon) Updated September 8, 2011.

Oregon Department of Environmental Quality and Nancy Swofford. *Request for Comments: Proposed Modification of Title V Operating Permit for Finley Buttes Landfill Company.* (Portland, OR: DEQ - contact Doug Welch) Notice Issued February 6, 2012.

Oregon Department of Environmental Quality and Nancy Swofford. *Request for Comments: Proposed Renewal of Simple Air Contaminant Discharge Permit for Les Schwab Warehouse Center, Inc.* (Portland, OR: DEQ - contact Tom Hack) Notice Issued February 7, 2012.

Oregon Department of Environmental Quality and P.A.H. *Request for Comments: Proposed Renewal of Air Quallity Permit for Portland Int'l Airport* (Portland, OR: DEQ - contact Kathy Amidon) Notice Issued March 2, 2012.

Oregon Department of Environmental Quality and S. Clark. *Fact Sheet: DEQ Snapshot. (*DEQ Report No. 11-OD-001) Last updated March 21, 2011.

Oregon Department of Environmental Quality and Sarah Armitage. *Air Toxics Pollutant Summaries.* (Portland, OR: DEQ Report No. 05-AQ-003) Updated June 2, 2011

Oregon Department of Environmental Quality and Sarah Armitage. *Fact Sheet: Oregon's Geographic Approach to Reducing Air Toxics.* (Portland, OR: DEQ Report No. 08-AQ-001) Updated April 5, 2010.

Oregon Department of Environmental Quality and U.S. EPA Region 10. *Performance Partnership Agreement July 1, 2012 to June 30, 2014.* (Portland, OR: DEQ - contact Dick Pedersen, Director) Draft.

Oregon Department of Environmental Quality. *2011 Oregon Air Quality Data Summaries*. (Portland, OR: DEQ Report No. 11-AQ-021 - contact Anthony Barnack) June 2012.

Oregon Department of Environmental Quality. *Air Toxics Advisory Committee: Membership.* (Portland, OR: DEQ www.oregon.gov/deq, Attachment 1, Page 25 to Final Report.) June 2002.

Oregon Department of Environmental Quality. *Interactive Maps of Portland Air Toxics 2017 Modeling Study.* Last viewed October 7, 2012 http://www.deq.state.or.us/aq/toxics/patsmaps.htm

Oregon Department of Environmental Quality. *Internal Management Directive AQ.00.014: Policy and Implementation Guidance for the Oregon Air Toxics Program*. (Portland, OR: DEQ - contact Gregg Lande) Effective June 16, 2008.

Oregon Department of Environmental Quality. *PATS 2017 Pollutant Modeling Summary*" (Graphical presentation of 15 pollutants' modeling results on 15 slides, to the Portland Air Toxics Solutions Advisory Committee in Oregon on January 25, 2011).

Oregon Department of Environmental Quality. *Portland Air Quality and Toxics Questions and Answers,* last viewed "Why is ESCO allowed to continue to emit…?" on October 7, 2012, http://www.deq.state.or.us/aq/northwest/nwToxicQandA.htm .

Oregon Department of Environmental Quality. *Portland Air Toxics Solutions Committee Report & Recommendations.* (Portland, OR: DEQ – contact Sarah Armitage, Report No. 11-AQ-048 at www.oregon.gov/deq) April, 2012.

Portland Air Toxics Solutions Committee. *Meeting Minutes August 2009 to October 2011*. (Portland, OR: DEQ www.oregon.gov/deq. Specifically, meetings 1st through 7th, 9th, and 14th.) Retrieved July 8, 2012.

State of Oregon Administrative Rules. *Division 216: Air Contaminant Discharge Permits.* OAR 340-216-0020, published in Salem, Oregon.

Journalistic Readings

Alfred, Roger and Andrea Durbin. "Oregon's environment: It's time to reinvest in our natural resource agencies." *The Oregonian* (Guest Opinion), Saturday, February 04, 2012.

Amundson, Bob. "Letter to the editor: Diesel emissions remain a crucial part of air quality, toxics issues." *The Oregonian,* Friday, June 01, 2012.

Classen, Allan. "ESCO admits air pollution leak." *Northwest Examiner,* August 2010, Vol. 24, #12.

Classen, Allan. "Neighborhood schools under cloud of industrial air pollution." *Northwest Examiner,* April 2009, Vol. 23, #8.

Donohoe, Martin. Guest Opinion: "Campaigning for clean air: Pollution places a heavy burden on our health." *The Oregonian,* August 01, 2011.

Editorial Opinion. "Deadly Particles." *The New York Times*, online June 19, 2012 and June 20, 2012 p.A28.

Editorial Opinion."Cleaner Fuels, Cleaner Cars. *The New York Times*, April 4, 2012.

Editorial. "United States' economy - Over-regulated America: The home of laissez-faire is being suffocated by excessive and badly written regulation." *The Economist,* February 18, 2012.

Eric Mortenson, Eric. "With high-tech wood pellets and efficient burners, brothers push forest biomass as energy good for Oregon." *The Oregonian,* Thursday, May 10 & 11, 2012.

"EPA Tightens Soot Rules." *The Washington Post*. December 14, 2012.

"Global Warming: the New Black." *The Economist*. January 19, 2013.

Har, Janie. "Did Oregon's Department of Environmental Quality take a disproportionate hit in the 2011-13 budget? Half-True." *The Oregonian*, February 7, 2012.

Jerving, Sara. "ALEC's Vision of Pre-Empting EPA Coal Ash Regs Passes the House." *Center for Media and Democracy* at http://www.prwatch.org , April 23, 2012.

Koberstein, Paul. "DEQ admits downplaying ESCO threat: Nearby residents may get 95 percent of air toxics from foundry." *Northwest Examiner*, March 2010, Vol. 24, #7.

Koberstein, Paul. "Despite denials, DEQ knew of deadly chromium 6 emissions from ESCO." *Northwest Examiner*, November 2009, Vol. 24, #3.

Koberstein, Paul. "ESCO exceeding annual emission cap: Company documents show four straight years over permit limit." *Northwest Examiner*, October 2009, Vol. 24, #2.

Koberstein, Paul. "Examining ESCO's 'no harm' claims: Environmental reporter finds gaps, discrepancies in public record." *Northwest Examiner*, September 2009, Vol. 24, #1.

Koberstein, Paul. "High cancer-rate data traced to DEQ math error." *Northwest Examiner*, July 2010, Vol. 24, #11.

Koberstein, Paul. "Neighbors not satisfied with ESCO's offer to fund monitoring," *Northwest Examiner*, January 2010, Vol. 24, #5.

Koberstein, Paul. "State air-pollution regulators taken to task by Northwest residents at two public hearings." *Northwest Examiner*, June 2010, Vol. 24, #10.

Learn, Scott and Nakamura, Beth. "Northwest Portland neighbors push and work with Esco to reduce pollution." *The Oregonian,* March 17, 2012.

Learn, Scott. "Northwest coal export projects could have 'significant' public health impacts, the EPA says." *The Oregonian,* Friday, April 13, 2012.

Learn, Scott. "Environmental penalties for Umatilla Chemical Depot total nearly $800,000 since 1999." *The Oregonian*, Tuesday, January 31, 2012.

Learn, Scott. "Oregon Gov. John Kitzhaber calls for sweeping review of planned coal exports from Northwest ports." *The Oregonian*, April 25, 2012.

Learn, Scott. "Portland Harbor property owners make biggest pitch yet for lower-cost Superfund cleanup." *The Oregonian,* Friday, March 30, 2012.

Learn, Scott. "Multnomah County, Activist say Oregon Low Balls Diesel Pollution Risk." August 22, 2012.

McNeil Jr., Donald G. "W.H.O. Declares Diesel Fumes Cause Lung Cancer." *The New York Times*, June 12, 2012

Peveto, Mary. Letter to the editor: "ESCO not harmless." *Northwest Examiner*, December 2009, Vol. 24, #4.

Sallinger, Bob. "West Hayden Island: City's Commitment to Equity and the Environment Tested." *Audobon Society of Portland Warbler*, Nov/Dec 2012: Vol. 76, No. 11&12.

Siemers, Erik. "Coal export company promises $400M in economic impact." *Oregon Business Journal*, Thursday, May 10, 2012.

Williams, Christina, Editor. "Debate continues over coal at Northwest ports." *Sustainable Business Oregon,* published online April 18 & 19, 2012

Williams, Christina. "Business groups focus on saving DEQ budget." *Sustainable Business Oregon*, Tuesday, January 24, 2012.//

General Readings

City Club of Portland, Charlton, D., and Ellison, E. *et al. Report on Air Pollution in Portland.* May 12, 1955. City Club of Portland Bulletin pp. 381-396.

City Club of Portland. *Moving Forward: A Better Way to Govern Regional Transportation*. City Club of Portland: Bulletin, Vol. 96, No. 32, March 5, 2010.

City Club of Portland. *Report on Air Pollution Control Policies in the Portland Airshed.* 1983. City Club of Portland Bulletin pp. 7-76.

Department of Environmental Quality, Northwest Region. "*Good Neighbor Agreement (DRAFT) entered effective November 22, 2011 by and between ESCO Corporation, the Northwest District Association, Neighbors for Clean Air, and the Northwest Environmental Defense Center.*" (Portland, Oregon: DEQ, direct inquiries to 503-229-5263) Revised November 28, 2011.

Garland, Rodney. *The burden of Asthma in Oregon: 2010.* Oregon Health Authority, Public Health Division: Health Promotion and Chronic Disease Prevention Section. Available electronically http://public.health.oregon.gov/DiseasesConditions/ChronicDisease/Asthma/Pages/burdenrpt.aspx

Graham, John D. 2007. "The Evolving Regulatory Role of the U.S. Office of Management and Budget." Review of Environmental Economics and Policy. Vol.1, No. 2, pp. 171-191. (Reprint published by Oxford Univesity Press/Association of Environmental and Resource Economists.)

Hardin, Garrett. "The Tragedy of the Commons." Originally published in *Science* Vol. 162, No. 3859: 1243-1248 on *December 13, 1968*. Copyright permission for single copies of single articles granted now from JSTOR http://www.jstor.org/journals/aaas.html

Hughes, Tom. *Press Release:* "Metro Council President Metro Council president 'deeply concerned' about House committee vote to end dedicated transit, air quality funding." (Portland, OR: Connect with Metro http://www.oregonmetro.gov/connect) February 7, 2012

Kirkpatrick, Fred. *Personal memo to Patricia Neptune, recommendations to DEQ and law cite, sent as a*

supplement to his committee interview. (Portland, OR: Classic Heat Source, Inc, fredk@ClassicHeat.com) April 23, 2012.

Metro. *Air Quality Conformity Determination: 2035Regional Transportation Plan & 2010-2013 Metropolitan Transportation Improvement Program*. (Portland, OR: Report from www.oregonmetro.gov/rtp) March 22, 2010.

Neighbors For Clean Air. *Blog*: Salem Update-DEQ Air Monitoring Grant (Portland, OR: www.whatsinourair.org/category/deq). May 9, 2011.

Neighbors For Clean Air. *Newsletter*: Family-Focused Candidate Forum on March 10, 2012. (Portland, OR: www.familyforwardoregon.org) March, 2012.

Oregon Department of Transportation. State of Oregon OREGON RAILROADS. Dated July 7, 2010.

Oregon Legislative Assembly, 76th 2012 Regular Session. *House Bill 4112: Requires Environmental Quality Commission to prepare certain revisions to Oregon's State Implementation Plan*. (Not passed, would have modeled motor vehicle pollution control systems on those of the State of Washington.)

Sierra Club. "Oregon Beyond Coal Campaign of the Sierra Club: Coal Exports in NorthWest. *Sierra Club Newsletter* accessed February 13, 2012 at http://www.sierraclub.org/coal/or/default.aspx.

Slavin, Courtney and Miguel Figliozzi. "*Air Quality and Multimodal Evaluation of an Adaptive Traffic Signal System: A Case Study on Powell Boulevard (Portland, Oregon)*" Portland State University-ITS Lab: Presentation in Santa Barbara, CA at the Western District ITE Conference, June 26, 2012.

Slavin, Courtney and Miguel Figliozzi. "*The Impact of Traffic, Bus Fleet Characteristics, and Atmospheric Conditions on Particulate Matter Exposure: A Case Study in Portland, Oregon*." Portland State University-ITS Lab: Presentation in Santa Barbara, CA at the Western District ITE Conference, June 25, 2012.

Tri-Met. *Tri-Met Service and Ridership Information*. (Portland, OR: Table of data for 1999-2011, 5 pgs.) Updated October 19, 2011.

U.S. Environmental Protection Agency. *The Plain English Guide to the Clean Air Act: Understanding the Clean Air Act*. (Washington, DC: http://www.epa.gov/airquality/peg_caa/) Last updated November 8, 2011.

Unknown Author - EPA. *"Summary of Results for the 2005 National-Scale Assessment."* (Summarizes NATA 2005 report, link in March 2012 Neighbors for Clean Air email flier.) Dated February 17, 2011.

US Environmental Protection Agency. Air Quality Index: A Guide to Air Quality and Your Health. (Research Triangle Park, NC: Office of Air Quality Planning and Standards, EPA-456/F-09-002) August, 2009.

Washington State Department of Ecology, Air Quality Program. *Focus on Health Risks of Air Toxics: National Air Toxics Assessment(NATA)*. March, 2011.

Wheeler, Nikki and Miguel Figliozzi. "Multicriteria Freeway Performance Measures for Trucking in Congested Corridors" *Journal of the Transportation Research Board, No. 2224*. 2011, pp. 82–93. (Washington,D.C: DOI 10.3141/2224-10)

Appendix A: Measured Pollution, Standards, & Status

Table 2: Expanded Version of Table 1

Criteria Pollutants	Top Sources	Metro-area Ambient Average	Allowable Level (EPA) micrograms/ cubic meter = µg/m³	How Much Above/Below Standard?	Status
Carbon Monoxide (CO)	**Incomplete combustion** of gasoline and diesel fuel in cars and trucks and some equipment	< 3.2 ppm (>1 monitor) (8-hour avg 2011)	<9 **ppm** as 8-hour avg (≥364 days)	About 1/3 X	G
Ground-Level Ozone (O3)	Heat + NOx or SOx from **incomplete combustion** of any fuel	<.068 ppm (>1 monitor) (3-year avg worst 8-hr)	<.075 **ppm** as 3-year avg worst 8-hour	About ¾ X	G
Sulfur Oxides (SOx)	Electric power plants, burning coal & heavy oil	9 ppb (Max 1-hour 2011)	<75 **ppb** as 3-year avg of worst 1-hour	About 1/7 X	G
Nitrogen Oxides (NOx)	Cars, trucks, buses Electric power plants	9 ppb (worst day 39ppb)	<53 **ppb** as 1-year mean	About 1/5 X	G
Lead (Lead compounds are a "16th" toxic in PATSAC study.)	Formerly in gasoline	.0044 µg/m³ (3-mo. avg 2011)	<.150 µg/m³ as 3-month avg	About 1/20 X	G
Respirable Particulate Matter PM_{10} (Fine = <10 micrometers)	**Incomplete combustion** of any fuel, also [Sunlight+NOx or SOx+H2O]	<56 µg/m³ (>1 monitor) (Max 24-hour 2011)	<150 µg/m³as 24-hour avg (≥364 days)	About 1/3 X	G
[ii]$PM_{2.5}$ (Ultrafine = <2.5 micrometers)	**Incomplete combustion** of any fuel, also [Sunlight+NOx or SOx+H2O]	<8.6 µg/m³ (>1 monitor) (annual mean 2011)	<15 µg/m³ as annual mean[iii] (<35 µg/m³ new one-hour std.)	Currently 1X	Y
Air Toxic	**Top Sources**	**Metro-area Ambient Average**	**Health-Based Goal "Ambient Benchmark Concentration"**	**How Much Above Goal?**	

			(ABC)		Status
15 PAH (poly-aromatic hydrocarbons)	1. Residential wood combustion (On-road gasoline engines <10%)	Not Available[iv] *(extremely minute to detect)*	.0009 µg/m³	>10X everywhere in modeling	1st

Acrolein	1. Forest fires and structural fires 2. Construction & tobacco 3. Residential wood combustion	Not Available[v] *(random fire occurrence)*	.0200 µg/m³	>10X	R
1,3 butadiene	1. Residential wood combustion 2. On-road gasoline engines 3. Non-road 2, 4-stroke engines	<.2000 µg/m³ (2011) (imprecise measuring ability?)	.0300 µg/m³	7X (>10X in major areas)	R
Benzene[vi]	1. On-road engines 2. Residential wood combustion 3. Non-road 2, 4-stroke engines	.8000 µg/m³ (2011)	.1300 µg/m³	7X (>10X in major areas)	R
Acetaldehyde	1. Residential wood combustion 2. On-road gasoline engines 3. Non-road diesel engines	1.2 µg/m³	.4500 µg/m³	3X (5-10X on much of map)	R
Diesel Particulate	1. Non-road diesel engines 2. On-road diesel engines	Not Available *(data collected needs to be fully analyzed[xxiii])*	.1300 µg/m³	5-10X (>10X in major areas)	R
Manganese	1. Surface coatings 2. Metal manufacturing	.0106 µg/m³	.0900 µg/m³	9X (worse in NW)	Y
Arsenic	1. On-road gasoline engines 2. Major natural volcanic background	.0009 µg/m³	.0002 µg/m³	3-5X (5-10X in spots)	Y
[vii]1,4Dichlorobenzene, (aka paradichlorobenzene)	1. **Consumer products** such as insecticides that control moths, disinfectants for mold, mildew, trashcans and bathrooms	<0.30 ppb	.09 ppb	3X (5-10X in urban west of 217)	G/Y

[viii]Naphthalene	1. **Consumer products** (esp. tobacco, mothballs) 2. Residential wood combustion 3. Asphalt and surface coatings	.0352 µg/m³	.0300 µg/m³	1X	G
Cadmium	1. Residential heating (natural gas) 2. Forest fires and burns 3. Metal manufacturing	.0012 µg/m³	.0006 µg/m³	½X to 2X (>5X industrial NW)	G – NW(Y)
Formaldehyde	1. Residential wood combustion 2. On-road gasoline engines 3. Non-road diesel engines	1.6 µg/m³	3.0 µg/m³ (EPA's = .009 µg/m³)	½X to 1X	G
Ethylbenzene	1. Painting/solvents 2. On-road gasoline engines 3. Non-road 2/4-stroke engines	40 µg/m³	2000 µg/m³	1/5X up to 5X in spots	G
Nickel	1. Metal manufacturing 2. Industrial fuel <10%	1.5 *nano*grams/m³	2.0 *nano*grams/m³	1X (2X in Industrial NW)	G
Chromium VI (Hexavalent)	1. (65%) on-road mobile 2. metal manufacturing	<.035 *nanograms*/m³	.08 *nanograms*/m³	<2X	G
Perchloroethylene *(Not of concern)*	Dry cleaner fluid, still monitored	<.3 µg/m³	35 µg/m³	1/100th X	

[i] Technology Transfer Network Air Toxics Web Site http://www.epa.gov/ttnatw01/

[ii] Fine particulate matter contains within it the air toxic "diesel particulates," which are coming under new scrutiny, in part from a new WHO study, and the federal and Oregon standard is likely to be lowered again soon, so this is the one Criteria Pollutant coded "Yellow" our analysis. It is simply not possible to immediately tell what kind of fine particulate a monitor picks up—did it come from a diesel engine or a wood stove or metal friction? DEQ has many years of "black carbon" monitoring data, but DEQ has not sufficiently analyzed it to provide the committee with summary for diesel particulates specifically. (Sarah Armitage and Anthony Barnack in emails/phone calls dated October 10-12, 2012.)

[iii] For comparison, California's stricter $PM_{2.5}$ standard is an annual average <12 $\mu g/m^3$ and a PM_{10} standard of <50 $\mu g/m^3$ as a 24-hour average.

[iv] There are 15 different chemicals in 15 PAH, and even collectively, the few ten-thousandths of a microgram per cubic meter likely in our air is below current possible detection abilities by DEQ's equipment. Without monitor data, the risk status remains high due to calculations and models about known sources. (Sarah Armitage and Anthony Barnack in emails/phone calls dated October 10, 2012.)

[v] Occurs randomly and intermittently, from house and forest fires combined with multi-state weather systems, so "we do not have enough information to characterize Acrolein yet" according to DEQ. "Stay tuned." (Sarah Armitage and Anthony Barnack in emails dated October 10-12, 2012.)

[vi] ***Benzene exposure in Portland will soon be dropping as a result of the "federal hammer."*** The source of exposure to benzene toxics is about 50% from mobile sources nationwide. The concentration in gasoline has been about 50% higher in the gasoline refined on the West Coast due to the North Shore oil source. In addition to auto exhaust another benzene source, transferring gasoline, has been controlled in Portland by state statue, although less populated areas statewide are not covered. California has already imposed tougher standards. However, EPA is limiting the benzene concentration nationwide over a four-year period starting after 2011. The technology to reduce benzene is already available. Under this law offsets by refiners can be acquired by buying credits from other refineries which are below limits, but this is restricted somewhat thanks to Senator Ron Wyden's objections to the initial bill.

www.epa.gov/oms/toxics.htm -www.processengr.com/ppt.../msat_regulation_options.pdf CITE problem ***

[vii] 1,4Dicholorbenzene has monitor data for 2011 (above), 2010 (<.30 ppb) and 2009 (.78 ppb) but it was obtained from DEQ directly instead of published in the *Oregon Air Quality Data Summaries.*

[viii] Naphthalene has monitor data for 2011 (above), 2010 (.0537 $\mu g/m^3$) and 2009 (.0444 $\mu g/m^3$) but it was obtained from DEQ directly instead of published in the *Oregon Air Quality Data Summaries*. Note that DEQ assumes for the sake of monitoring and modeling that "indoor" air pollutants, such as naphthalene in mothballs, will find its way outside eventually.

Appendix B: How You Can Help

City Club reports typically suggest places in our democratic and public institutions where policy and practice need to be changed for the common good. While the committee makes recommendations for the legislature, Metro, DEQ, and other public bodies to consider, we can make some improvement in air quality without waiting for new laws or advisory committee. Through conscientious choices in our everyday life about pollution sources: wood smoke, automobiles, light trucks, and two stroke engines used in yard work, we can reduce air toxics.

Portland has proved its ability to induce significant changes in individual behavior. Portland citizens have pioneered developments in personal computing and open-source software, sports apparel, and, more recently, "green" building practices. Portland is recognized as the nation's leading city for bicycling to work and for leisure and City Club will publish a report on this topic this year.

Before we describe individual behaviors that impact air quality, your committee first recommends that a book entitled *Switch* may be helpful to everyone looking for ways to influence individual behavior in an effort to reduce air pollution. *Switch*, written by Chip Heath and Dan Heath, specifically frames and describes successful methods for sparking individual behavior change in situations that seem intractable. The book illustrates crucial intervention points with many examples. One relevant example is the accepted concept of "designated drivers" to reduce drunk driving and traffic deaths. No new policies or public programs were required. A Harvard professor introduced the concept in America after he learned of its existence in Scandinavian countries. He initiated an effort to persuade popular American TV programs to introduce the concept in their sitcoms and dramas. The broadcasts worked, and alcohol-related traffic fatalities dropped from 23,626 in 1988 to 17,858 in 1992 – a reduction of 24% in just four years.

A few thousand people making similar lifestyle adjustments have the potential to have a large impact on toxics in the air shed. The more we learned, the more we became concerned that few members or witnesses arrived at our meetings on bikes or mass transit. Some of us had wood-burning fireplaces, unaware that they emitted toxic compounds, and some of us enjoyed yard work with 2-stroke engines regularly. We wish to bring to consciousness such incongruities, and to inspire individual action that need not wait for new rules or activists. Here a three ways to start:

1. Buy the most fuel-efficient car you can, and then drive it as little as possible! Use mass transit, carpool, walk or bike. Never idle for more than 10 seconds unless in moving traffic.
2. Upgrade your wood-burning stove to a certified fireplace insert or a certified new or rebuilt woodstove, and encourage your friends and family to do the same. Consider a gas or electric insert for your fireplace.
3. Replace household small gas motors, such as mowers, trimmers, saws, and edgers with electric or manual tools for lawn and garden work.

Useful Resources

Chip Heath and Dan Heath. 2010. Switch: How to Change Things When Change is Hard. NY: Random House Broadway Books

www.EnginesOff.com One minute of automotive engine idling releases the carbon monoxide of three packs of cigarettes, and most adults no longer smoke where children are present. A Denver study found that parents averaged about 4 hours of idling per school day next to an elementary school.

www.gettingaroundportland.org Metro's Travel Smart program which helps people reduce automobile trips.

Scott Learn. "Pollution problems and some solutions." March 18, 2012. *The Oregonian*, p.A17. "Rethink high-density developments by busy roads. Encourage transit and low emission vehicles. Subsidize homeowners and landlords who replace inefficient wood stoves.")

Editorial. May 28, 2012. "Portland's Dirty Secret" *The Oregonian*, p. A8. "Contrary to common belief, the biggest polluters… are us. We drive and burn wood in our fireplaces; we use lawnmowers and drive motor boats… we create air quality issues."

Colleen Oakley. January 6, 2013. "When the Weather Outside is Frightful" The Oregonian: Parade Magazine. "Natural wood smoke contains at least five known human carcinogens"