

# SUSTAINABLE SUPPLY CHAIN ANALYSIS

## Executive Summary Report

Prepared by Trucost

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## EXECUTIVE SUMMARY

### Introduction

The City of Portland (the City) has a history of striving to be more sustainable in its operations and planning. Starting with the publication of the City's Sustainable City Principles in 1994, the City of Portland has established a variety of policies to guide its work on sustainability, including: The City's Sustainable Procurement Policy, Green Building Policy, and Climate Action Plan<sup>1</sup>.

The City of Portland's Sustainable Procurement Program (SPP) is responsible for implementing key aspects of these policies related to City purchases and seeks to harness the City's purchase power to demand cleaner, greener, fairer products and services. As part of this goal, the SPP would like to better understand the environmental, social and economic (ESE) impacts of its supply chain using best practice approaches, which include Economic Input-Output Life Cycle Assessment (IO-LCA) and associated ESE Impact Analyses.

The City of Portland commissioned Trucost, a world leader in natural capital valuation, to assist in calculating the ESE impacts of its supply chain, by conducting a sustainable supply chain analysis for the purchases made by the City in fiscal year 2014-2015. By understanding how the City's purchases depend on natural capital and where there are "hot spots" within its supply chain, the City can identify specific opportunities to reduce supply chain impacts, eliminate risk, focus green procurement activities, and use the results of this analysis as the foundation for updating sustainable procurement program goals and implementation strategies for impact reduction across the City's expenditures.

#### NATURAL CAPITAL

The finite stock of natural assets (air, water, and land) from which goods and services flow to benefit society and the economy. It is made up of ecosystems (providing renewable resources and services), and non-renewable deposits of fossil fuels and minerals.

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<sup>1</sup> To view these and related City policies, go to the Portland Policy Documents Website: <http://www.portlandonline.com/auditor/index.cfm?c=26818>

This report is the Executive Summary of the project and findings. There is also a detailed technical report that complements the Executive Summary that provides additional information.

## Analysis Scope & Approach

Trucost analyzed the environmental performance of the City of Portland's supply chain, through an impact spend analysis, for the entire fiscal year (FY14-15). Trucost quantified emissions and resource use using a combination of Trucost's environmental economic input-output (EEIO) life cycle based model, data provided by the City, as well as data disclosed by companies that Trucost maintains in the Trucost Environmental Register, a global database on company environmental performance. Trucost's EEIO model quantifies impacts from "cradle-to-gate"<sup>2</sup>. For purchased products (e.g. office supplies, building materials, equipment, uniforms, fuel, etc.) this encapsulates the impacts of everything from the raw material supply (extraction, handling, and processing of raw materials) through the manufacturing of the final product. For purchased services (e.g. financial, legal, healthcare, education, etc.) this means all of the other goods and services a company needs in order to perform its service. In the case of sectors like utilities and fuel, cradle-to-gate would include purchased services and products from petroleum refineries and petroleum/natural gas extraction companies, as well as, services like support activities for transportation and legal services. Cradle-to-gate for the construction sector would also include impacts from purchases with petroleum refineries (for fuel), cement and concrete manufacturers, commercial and industrial machinery and equipment use, and construction management related services.

Trucost obtained the City's purchase ledger for FY14-15, which is from July 1 2014 through June 30 2015, cleaned the list of transactions by reviewing the data for completeness and identifying any data gaps or inconsistencies among the different datasets. Trucost excluded all credits/negative spend lines and spend lines with "0" value. Spend associated with purely financial transactions not associated with a good or service such as debt, interest, fees, tax payments, loans and grants were also removed.

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<sup>2</sup> While this supply chain analysis assessed multiple environmental impact areas, when referring to greenhouse (GHG) emissions, "cradle to gate" falls within what is known as Scope 3 GHG emissions - indirect emissions that are produced as a result of the City's purchase of goods and services. These emissions are additional to the City's inventory of Scope 1 and Scope 2 GHG emissions.

Trucost mapped each supplier<sup>3</sup> and line item to its primary sector of operations and calculated the environmental impacts of the City's purchases based on this mapping. While the Trucost model is based on the NAICS<sup>4</sup> classification scheme, Trucost was also able to include NIGP<sup>5</sup> Commodity and Service Codes, which the City primarily uses for sector classification.

Trucost analyzed 163,827 lines of spend, covering 8,219 suppliers and \$385 million. Spend was provided from 10 data sources for 26 city bureaus/offices. This spend data includes distributed purchase orders (DPO) made by a bureau which can be a purchase made from a contract or a purchase under \$5,000 for which no contract is required, standalone purchase orders (PO) with no contract, procurement card purchases (PCARD), and direct payments.

Environmental impacts were calculated for seven categories including:

- Greenhouse gas (GHG) emissions (GHGs considered by the 2007 Intergovernmental Panel on Climate Change 5th Assessment Report) in metric tons GHG equivalent
- Electricity use in mega-joules and kilowatt-hours
- Use of nonrenewable fossil energy resources (including petroleum, coal, and natural gas) in mega-joules
- Water consumption measured by volume
- Criteria pollutants<sup>6</sup> (O<sub>3</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, CO, NO<sub>x</sub>, SO<sub>2</sub>, Pb) measured by mass of concentration
- Toxic releases (as defined by the U.S. EPA Toxics Release Inventory (TRI), 2014 TRI Chemical List) measured by mass of concentration<sup>7</sup>

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<sup>3</sup> Throughout this report the term "supplier" is used as an all-encompassing term that can refer to a vendor providing any type of product or service (e.g. construction services, goods & services, professional services) to the City through any procurement method (e.g. formal contracts, retail purchases, etc.).

<sup>4</sup> The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

<sup>5</sup> The National Institute of Governmental Purchasing code is a coding taxonomy used primarily to classify products and services procured by state and local governments in North America maintained by the National Institute of Governmental Purchasing: The Institute for Public Procurement.

<sup>6</sup> Criteria pollutants are six common air pollutants which the Clean Air Act requires the EPA to set National Ambient Air Quality Standards (NAAQS) for based on human health and/or environmentally criteria.

<sup>7</sup> The six criteria pollutants are air pollutants which are ubiquitous in the United States and are known to be harmful to public health and the environment. Toxic releases are any of the 595 individually-listed chemicals in the TRI and can be air, land, or water pollutants.

- Landfill-bound waste generation measured by mass

In addition to quantifying the magnitude of each of these environmental impact areas, Trucost applied natural capital valuation as a weighting methodology to assess the City's supply chain across multiple environmental impact areas<sup>8</sup>. Using a weighted, common metric across multiple impact areas allows the City to better understand the relative importance of some environmental impact areas compared to others. Natural capital valuations take the quantified physical environmental impacts and converts them into monetary values using environmental valuation techniques. These monetary values are estimates of the cost to society of the damage caused by pollution and natural resource extraction. For example, the natural capital cost of carbon is calculated using the social cost of carbon which estimates the economic damages associated with an increase in CO<sub>2</sub> emissions. This is meant to be a comprehensive estimate of climate change damages stemming from things such as changes in agricultural productivity, human health risks, property damages, and changes in energy costs. Valuing natural capital in monetary terms also enables the City of Portland to communicate what these impacts mean in terms of financial risks alongside traditional financial metrics. For example, these valuations provide a good proxy for potential exposure to policy measures that seek to apply the polluter pays principle (PPP)<sup>9</sup>.

## Results

This section presents the key findings of the ESE impacts associated with the City of Portland's spend for the 2014-2015 fiscal year.

- **City of Portland's quantified supply chain environmental impacts** - During FY14-15, the City of Portland's purchases were responsible for the emission of 270,000 metric tons of carbon dioxide equivalents (tCO<sub>2</sub>e), with a GHG intensity of 701 tCO<sub>2</sub>e per million dollars spent. The GHG emissions of the City's purchases are over four times the City's Scope 1 and 2 GHG emissions<sup>10</sup> (63,000 metric tons) for the same period. Impacts from the other six ESE categories

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<sup>8</sup> Electricity use and nonrenewable fossil fuel use were not directly included in the natural capital valuation because these are mid-point metrics, which have resulting emissions and environmental impacts, which were evaluated using natural capital valuation.

<sup>9</sup> The polluter pays principle (PPP) states that whoever is responsible for damage to the environment should bear the costs associated with it. The immediate goal of the PPP is that of internalizing the environmental externalities of economic activities.

<sup>10</sup> Scope 1 emissions are all GHG emissions associated with the City of Portland's direct operations such as fuel consumption for facilities and fleet. Scope 2 emissions are GHG emissions from the City's consumption of purchased electricity, heat or steam.

include: 67 million kWh of electricity use, 2.9 billion mega-joules of nonrenewable fossil fuel energy use, 590 metric tons of criteria pollutants, 20 metric tons of toxic releases, 5,400 metric tons of landfill-bound waste generation, and 5 million cubic meters of water consumption. Table ES1 below displays these results and associated equivalences.

TABLE ES1: QUANTIFIED ENVIRONMENTAL IMPACTS AND EQUIVALENCES FY14-15

Impact Category	COP Impacts	Equivalent to
GHG	270,000 metric tons	4.3 times the City's Scope 1 and 2 GHG emissions
Electricity use	67,000,000 kWh	Annual electricity use of 6,100 US homes <sup>11</sup>
Nonrenewable fossil fuel energy use	2,900,000,000 mega-joules	0.5% of Oregon's total fossil fuel energy consumption in 2014 <sup>12</sup>
Criteria pollutants	590 metric tons	Annual NOx emission of 52,000 cars <sup>13</sup>
Toxic releases	20 metric tons	5% of the total toxic releases reported by facilities in Multnomah County in 2014 <sup>14</sup>
Landfill-bound waste	5,400 metric tons	0.2% of Oregon's total municipal post-consumer waste 2014 <sup>15</sup>
Water consumption	5,000,000 cubic meters	7% of the water supplied to retail customers by Portland Water Bureau in FY14-15 <sup>16</sup>

- City of Portland's weighted supply chain environmental impact and natural capital costs:** As mentioned earlier, natural capital valuation techniques were applied to be able to analyze and compare the relative importance of multiple environmental impact areas using a weighted, common metric. The total natural capital costs from Portland's extended environmental impacts across its 2014-2015 expenditures analyzed (\$385 million) are estimated to be \$45 million or 12% of the total analyzed spend (Table ES2 and Figure ES1). Greenhouse gas emissions is the greatest contributing environmental issue, accounting for the majority (73%) of the City's

<sup>11</sup> Used 10,932 kWh as average annual electricity consumption in 2014 (<https://www.eia.gov/tools/faqs/faq.cfm>)

<sup>12</sup> Used 572.5 trillion Btu as total fossil fuel consumption for Oregon in 2014 (<http://www.eia.gov/state/?sid=OR>)

<sup>13</sup> Used 0.693 g of NOx per mile driven, assuming 12,000 miles driven a year (<https://www3.epa.gov/otaq/consumer/420f08024.pdf>)

<sup>14</sup> Used 879,915 lbs. of total releases for Multnomah County in 2014 (<https://www.epa.gov/trinationalanalysis/where-you-live-2014-tri-national-analysis>)

<sup>15</sup> Used 2,572,453 tons of municipal post-consumer waste disposed in Oregon in 2014 (<http://www.deq.state.or.us/lq/pubs/docs/sw/2014MRWGrateReport.pdf>)

<sup>16</sup> Used 19.2 billion gallons of annual consumption in 2014 (<https://www.portlandoregon.gov/water/article/554344>)

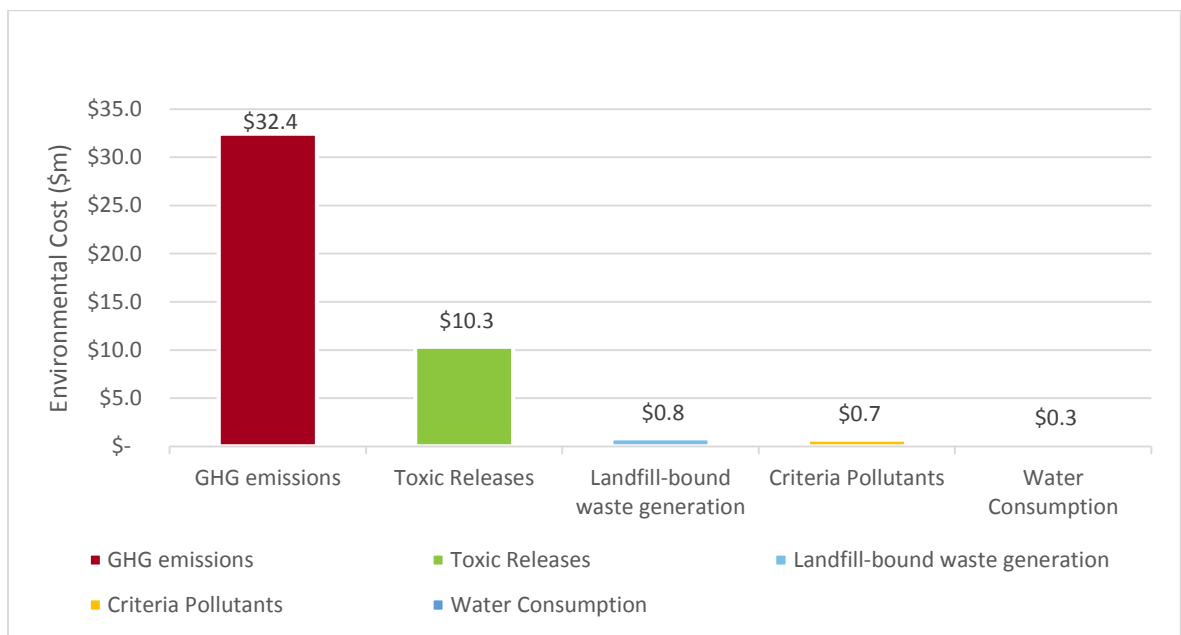
CITY OF PORTLAND: SUSTAINABLE SUPPLY CHAIN ANALYSIS

environmental impact costs amounting to \$32 million. Toxic releases account for another 23% or \$10 million of the environmental costs of the City’s annual spend, while water consumption, criteria pollutants and landfill-bound waste generation combined contribute the remaining 4% or \$2 million of environmental costs.

TABLE ES2: TOTAL SPEND AND ENVIRONMENTAL IMPACTS (AND PERCENT OF IMPACTS) FOR THE CITY OF PORTLAND FY 14-15

	Expenditure \$m	Total Environmental Cost \$m	GHG Emissions \$m	Toxic Releases \$m	Landfill-bound waste \$m	Criteria Pollutants \$m	Water Consumption \$m
FY14-15	\$385	\$44.6	\$32.4 (73%)	\$10.3 (23%)	\$0.8 (2%)	\$0.7 (2%)	\$0.3 (1%)

FIGURE ES1: COST OF THE CITY OF PORTLAND’S SUPPLY CHAIN IMPACTS BY IMPACT CATEGORY



**Product categories contributing the greatest natural capital impact:** The \$385 million in expenditures covered 192 NIGP categories (or 176 when similar categories were consolidated). Five categories account for over 57% of the total environmental costs (\$25.5 million). These top 5 NIGP categories are: ‘All Construction Services’, ‘All

Miscellaneous Services<sup>17</sup>, 'Automotive Vehicles and Related Transportation Equipment', 'All Fuel, Oil, Grease and Lubricants', and 'Automotive Equipment, Supplies, and Parts.' The top 20 categories account for 87% of the total environmental costs, while 99% of the total costs are contained in the top 77 of 176 consolidated NIGP categories.

## Recommendations

One of the main benefits of an impact spend analysis is that it provides a way to focus investments and resources on a small, targeted number of activities that will provide the greatest return. From the results of the analysis, Trucost recommends that the City of Portland focus its green procurement on the top impacts and NIGP categories to maximize its ability to improve its sustainable procurement program. The table below summarizes these impacts and recommendations.

TABLE ES3: SUMMARY OF IMPACTS AND RECOMMENDATIONS

Focus Impact Area	Target NIGP Sectors	% of Supply Chain Impact Area Total	Key Bureaus	Focus of Next Steps
Supply Chain GHG Emissions (73% of total impacts)	All Construction Services	37% GHG	*Bureau of Environmental Services *Portland Water Bureau *Portland Bureau of Transportation	*Prioritize top construction services contractors for education & engagement on identifying, reducing, and reporting on GHG emissions.
	Utilities (Misc. Services)	7% GHG	*Portland Bureau of Transportation *Bureau of Environmental Services	*Transition to and specify low-carbon energy sources.
	Professional Services (Misc. Services)	3% GHG	*Bureau of Environmental Services *Portland Water Bureau *Portland Police Bureau	*Prioritize top professional services firms for education & engagement on identifying, reducing, and reporting on GHG emissions; *Factor in service provider GHG performance into solicitation criteria.
	Fuel, Oil, Lubricants	7% GHG	*Office of Management & Finance - Bureau of Internal Business Services *Bureau of Environmental Services	*Continue to transition to low-carbon fuels and electricity

<sup>17</sup> 'All Miscellaneous Services' includes Professional Services which makes up 59% of the spend in this category and Utilities which makes up another 26%.



CITY OF PORTLAND: SUSTAINABLE SUPPLY CHAIN ANALYSIS

	Target NIGP Sectors	% of Supply Chain Impact Area Total	Key Bureaus	Focus of Next Steps
	Automotive Vehicles & Related Transportation Equipment	6% GHG	*Office of Management & Finance - Bureau of Internal Business Services *Portland Bureau of Transportation *Portland Water Bureau	*Prioritize top suppliers for education & engagement on identifying, reducing, and reporting on GHG emissions. *Integrate product specifications with stricter environmental standards.
	All Road and Highway Building Materials (Asphaltic)	4% GHG	*Portland Bureau of Transportation	*Develop specifications targeted at reducing supply chain GHG emissions, such as increasing use of recycled/reclaimed asphalt, including such materials requirements for construction services contractors.

Focus Impact Area	Target NIGP Sectors	% of Supply Chain Impact Area Total	Key Bureaus	Focus of Next Steps
Supply Chain Toxic Releases (23% of total impacts)	Automotive Vehicles & Related Transportation Equipment	16% Toxic Releases	*Office of Management & Finance - Bureau of Internal Business Services *Portland Bureau of Transportation *Portland Water Bureau	Prioritize top suppliers for education & engagement on reducing toxics emissions from the supply chain AND Develop specifications targeted at reducing product components that drive supply chain toxic releases. Require Environmental and Health Product Declarations (EPDs and HPDs).
	Automotive Equipment, Supplies, and Parts	11% Toxic Releases	*Office of Management & Finance - Bureau of Internal Business Services *Portland Bureau of Transportation *Portland Fire & Rescue	
	Pipe, Tubing, Accessories	10% Toxic Releases	*Portland Water Bureau *Portland Parks & Recreation	
	Misc. Products (metal/plastic manufacturing)	8% Toxic Releases	*Portland Bureau of Transportation *Bureau of Environmental Services *Portland Water Bureau	
	Electrical Equipment <sup>18</sup>	6% Toxic Releases	*Portland Bureau of Transportation	

<sup>18</sup> This is primarily composed of light fixture purchases (78%)

**Focus on GHG emissions as top priority followed by toxic emissions** - The City of Portland should focus primarily on the reduction of GHG emissions as it accounts for 73% of the City's total environmental impact, and secondly toxic releases (23%). Combined these two impacts account for 96% of the City of Portland's weighted environmental impact.

GHG emissions are the largest impact contributor across all purchase categories. If the City could reduce its overall GHG emissions by 25%, it would reduce its weighted environmental impact by almost 20%, underlying the significance that GHG emissions has in Portland's supply chain. As outlined in Table ES3, the City can target GHG intensive purchases such as utilities, construction services, and fuel as a starting point to reduce emissions; these alone address over 50% of the total GHG emissions.

Toxic releases account for almost a quarter of the City's total impacts. Toxic releases can cause adverse human health and environmental effects. As outlined in Table ES3 the majority of the City's toxic release impacts are concentrated in sectors that are mainly involved in manufacturing, particularly of motor vehicle parts and equipment, metal fabrication, and electrical equipment. These sectors should be the focus for the City of Portland to make purchasing decisions that would reduce toxic releases, such as requiring environmental or health product declarations from suppliers, or including product specifications that limit toxic releases in the manufacturing process. In addition, the City can look to the Toxic Release Inventory (TRI) Program run by the US EPA to track TRI reporting of facilities that may be a part of the City's supply chain, including those involved in manufacturing, metal mining, electric power generation, and chemical manufacturing.

**Focus on the top five NIGP categories**, as outlined in Table ES3. Within each of the GHG and toxic releases impact areas, the City should focus on the five NIGP categories that contribute the most to the impact area. The City should adopt initiatives across all bureaus but particularly focus on those that account for the greatest proportion of impacts in each of the top NIGP categories. For example, the top three bureaus (Bureau of Environmental Services, Portland Water Bureau, and Portland Bureau of Transportation) account for 90% of the impacts in the construction sector. Similarly, 99% of the GHG impacts from 'All Road and Highway Building Materials (Asphaltic)' can be traced to Portland Bureau of Transportation.

Through targeted engagement and ongoing collaboration, the City should encourage suppliers in each of the major NIGP categories to identify and implement ways to

decrease GHG emissions. The City should prioritize top suppliers for education and engagement on environmental risks and reporting and encourage them to disclose and manage on their own, and their suppliers' GHG emissions. The City can leverage its solicitations and require potential suppliers to provide environmental data so they can be benchmarked or the City can also explore alternative suppliers and incorporate environmental performance data into the supplier selection process. Product specifications integrating stricter environmental standards reducing upstream impacts could be integrated for product and supplier selection starting with adoption by top spending bureaus.

## Next Steps

Accounting for natural capital in business operations and supply chains is the first step towards managing risks and reducing environmental impacts. Based on the results of this analysis, Trucost recommends the following next steps for the City of Portland:

- **Socialize the results with others in the City** and get feedback on areas of impact and potential reductions.
- **Conduct a gap analysis** comparing current sustainability strategy to the findings of this analysis and update the strategy as needed.
- **Develop and implement tactics** for impact reduction by working with the top three bureaus (Bureau of Environmental Services, Portland Water Bureau, and Portland Bureau of Transportation) to develop a plan to address their top categories (see Table ES3).
- **Conduct regionalized water consumption analysis** since water scarcity risk is a regional issue depending on the availability and pricing of water in specific water basins.
- **Monitor progress and communicate with stakeholders** the goals and initiatives set out by the City of Portland to achieve environmental reduction goals.
- **Supplier engagement should be a key focus for the City of Portland** as the majority of the environmental impacts are concentrated to a relatively small number of suppliers; in fact, just 25 suppliers contribute almost 50% of the environmental impacts. Approaches for the City to conduct supplier engagement are discussed below.

Supplier engagement helps to refine the data by targeting the suppliers most material to the supply chain footprint, and working with them to incorporate company specific data into the results where possible. The City of Portland can begin by identifying these suppliers and communicating to them the importance and requirements of their engagement program to their supply chain. The City should also identify significant activities or processes where supplier data would be beneficial, such as obtaining GHG emissions from supplier operations or data on toxic releases. Managing the data is important and can be done so by creating an internal data collection system such as a spreadsheet, an online system, or through the use of a commercially available GHG management software package. The City can also work with an industry consortium to develop or use a data collection methodology and system to collect data for that industry group or work through an existing GHG (or other impacts) reporting/disclosure program.

Trucost recommends that the City develop a more formal strategy for supplier engagement that includes a specific timeline and tactics for engaging with suppliers, as well as goals (which could include goals for overall GHG and water disclosure, as well as emission reduction goals). Trucost also recommends that the City benchmark each of these suppliers against their peers, which would allow the City to identify best practice and provide incentives for improvement.

## Summary

The City of Portland commissioned Trucost to conduct a sustainable supply chain analysis that focused on seven environmental impact categories. Trucost both quantified the physical environmental impacts and converted the impacts into monetary terms using natural capital valuation. The results show that GHG emissions and toxic releases contribute the greatest amount to the City's total supply chain impacts. These impacts mainly stem from purchases in sectors such as construction, miscellaneous services (including utilities), and automotive vehicles and equipment.

This analysis focused only on environmental supply chain impacts and does not address other key procurement impacts such as product/service in-use impacts (energy, indoor air quality), end-of-life impacts, or social impacts of the supply chain (e.g. sweatshop labor, forced labor, unhealthy working conditions, etc.). The information in this report should be evaluated in conjunction with other life-cycle considerations.

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### Private reports

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