ANALYSIS OF SUSTAINABILITY IMPACTS OF
Alameda County Supply Chain Expenditures

Technical Report

Alameda County
SUSTAINABILITY
Local Action, Global Impact.

Prepared by Good Company
April 2019

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Table of Contents

Acknowledgements

Introduction

Alameda County, California is a national leader in local government sustainability. The County's sustainability efforts include over four megawatts of solar energy installations, a smart grid system, nearly a dozen U.S. Green Building Council LEED certified buildings, including several certified at the Platinum and Gold level, and nationally recognized programs in sustainable fleets, energy and water efficiency, waste reduction, and sustainable purchasing.

Building on this previous work, the County contracted with Good Company to perform a Supply Chain Spend Analysis (Spend Analysis) that quantifies the environmental impacts associated with the County's fiscal year 2014/2015 financial expenditures. County purchases considered in the Spend Analysis include procurement of all material goods, food, utility services, and professional services used in the course of County operations. It also includes expenditures on community-based services which are procured by the County to perform the critical functions providing the social safety net for its community.

To perform the Spend Analysis, Good Company utilized a new environmental lifecycle assessment model released by U.S. Environmental Protection Agency in 2017 to identify high-impact purchase types and departments, as well as vendors who did business with the County in the study period, fiscal year 2015. The EPA's model includes a variety of impact metrics, six of which are utilized for the Alameda County Spend Analysis: greenhouse gases, particulate matter, ozone, acid rain, human toxicity, and water use.

The intent of this analysis is to identify and prioritize opportunities to implement strategic initiatives within its operations and procurement to improve the environmental performance of the County's supply chain in order to meet its Strategic Vision[1] to ensure the health and wellbeing of its citizens.

Methodology

This section of the report describes the data, tools, and analytical approach used to conduct Alameda County's Spend Analysis.

To calculate impacts in a spend analysis, two pieces of information are needed: financial data and impact factors. The following formula provides a high-level example of how these two pieces of information are used to calculate impacts in this analysis. The following sections provide details on the source of these factors and how they are used in this analysis.

$$Finacial\ Data\ (\$)\ \times Impact\ Factor\ \left(\frac{Impact}{\$}\right) = Impacts$$

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[1] For details visit https://vision2026.acgov.org

Financial Data

Alameda County staff provided Fiscal Year 2014/2015 financial records as well as other operational and analytical data to support the analysis. This specific fiscal year was selected to align with a complementary study of the climate impact of government operations completed by the County. The financial data includes over 100,000 payment records to vendors by voucher and credit cards. Each payment record includes information on the County-specific purchasing codes, merchandise amount, department, purchasing order (PO) type, and vendor name.

The County also provided a crosswalk that assigns U.S. Bureau of Economic Analysis (BEA)[2] industry classification codes to Alameda County-specific purchasing codes. This crosswalk was reviewed and revised multiple times by the consultant team and County staff to ensure the most accurate BEA category is assigned to calculate impacts, as described in the next section.

Impact Factors

U.S. Environmental Protection Agency's *United States Environmentally-Extended Input-Output* (USEEIO) data model[3] is the source of the impact factors used in this analysis. The model was accessed using openLCA (v1.6.3).[4] USEEIO and openLCA are free, publicly available resource, as are all the resources and tools used in this analysis.

The USEEIO model melds U.S. 2013 economic and environmental data on greenhouse gases, criteria air pollutants, resource use, nutrients and toxics impacts to build a lifecycle model for 385 U.S. goods and services (defined by BEA industry classification). The model provides impact factors per dollar for 20 environmental, human health, and resource use metrics.

"Lifecycle" in the case of the USEEIO includes all upstream fossil fuel energy use and process emissions (e.g. methane waste disposal) required to bring a specific type of product or service up to the point of retail purchase. The USEEIO model does NOT include emissions from the operation or the disposal of the product or service being purchased. For example, the USEEIO model can be used to estimate the impacts associated with production and transport for cost of a new building heating system up to the point of purchase. But it does NOT include impacts associated with the use (e.g. natural gas combustion) or disposal (e.g. landfill disposal or recycling of the materials) of the system. Appendix E provides additional details on the analytical approach related to use of USEEIO, as well as information on the adjustments made to the model, and sensitivities that have the potential affect the results.

> **Supply Chain Expenditures**
>
> Payments made by the County to a network of suppliers that produce goods and services purchased by Alameda County for operational needs to and provide community services. Production may take place locally or in other locations for final consumption in Alameda.

> **Lifecycle Assessment**
>
> Total environmental impact of a product from extraction of raw materials through production and transport up to the point of County purchase. Impacts from use and disposal of products are not considered in this analysis but are included in the County's Operational Greenhouse Gas Inventory.

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[2] For details on BEA codes visit https://www.bea.gov/sites/default/files/2018-04/2017-industry-code-guide.pdf
[3] USEEIO downloaded 5/2018 at https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRMRL&dirEntryId=336332
[4] openLCA downloaded 6/2018 at http://www.openlca.org

Impact Metrics

The USEEIO model includes 20 distinct impact assessment metrics. Six impact metrics were selected by Alameda County staff, based on programmatic need and consultation with County stakeholders. See Table 1 for a summary of the selected metrics. These metrics are used in the Results Overview and High-Impact Purchasing Categories sections of this report to compare and contrast different types of County purchases; identify high-impact purchase types; and identify and prioritize opportunities to reduce supply chain impact through strategic initiatives within its operations and procurement. The report findings includes consideration of all six impact metrics, some metrics are excluded in the presentation of results within this report due to space limitations and similarity of results, (e.g. impacts of smog and acid rain strongly correlate to greenhouse gas emissions).

Table 1: Summary of USEEIO Impact Metrics Used in Analysis.

Impact	Description
Global Climate Change	Greenhouse gas emissions measured in kilograms of carbon dioxide equivalent (kg CO_2e). Studies have found that man-made GHGs are the cause of climate change and the resulting changes to our physical environment; effects on human health; and future changes to resource availability.
Human Respiratory	Airborne particulate matter emissions with a diameter of 2.5 micrometers or smaller measured in kilograms of particulate matter equivalent (kg $PM_{2.5}e$). Studies have found a close link between $PM_{2.5}$ exposure to premature deaths from heart and lung disease.
Human Toxicity	Human toxicity is measured with the comparative toxic unit for human toxicity impacts (CTUh). This measure expresses the number of disease cases in the total human population per unit of mass of the chemical emitted. The measure takes into account toxicity exposure through ingestion and inhalation.
Water Use	Ground and surface water consumed measured in cubic meters (m^3). Depleting fresh water sources in the arid western United States due to oversubscription and drought exacerbated by climate change impacts human and ecosystem health and resource availability.
Smog	Ground level ozone measured in kilograms of ozone equivalent (kg O_3e). Ozone is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC). Breathing ozone can trigger a variety of respiratory health problems for children, the elderly, and those with lung diseases like asthma.
Acid Rain	Acid rain is measured in kilograms of sulfur dioxide equivalent (kg SO_2e). Acid rain is formed when sulfur dioxides and oxides of nitrogen are emitted to the atmosphere and react with water to form acids. These acids return to earth as rain and acidify surface water sources.

Purchasing Categories

For the purpose of this Spend Analysis, each of the County's 192 purchasing codes is assigned a purchasing category and sub-categories to summarize the County's 100,000 individual purchases into similar groups. The purchasing categories are used in the Spend Analysis to sub-total County impact results by common types of purchases.

The categories and sub-categories listed in Table 2 were selected working with County staff based on consistency with the County's previous Spend Analysis, review of current best practices for Spend Analysis, consultation with Sustainable Purchasing Leadership Council

publications, and other considerations based on County-specific context. For additional information on purchasing categories typically used supply chain analysis see the West Coast Climate and Materials Management Forum's, *Supply Chain GHG Inventory Trends Analysis.*[5] Similar to the impact metrics described above, the purchasing categories are used in the *Results Overview* and *High-Impact Purchasing Categories* sections of this report to compare and contrast the relative impact of different types of County purchases.

Table 2: Summary of Purchasing Categories and Descriptions Used in Analysis.

Category	Description
Construction & Maintenance	All new design, construction, renovation and maintenance on buildings, other facilities, infrastructure and grounds. **Sub-categories** are New Construction and Maintenance.
Food	Grocery and meal preparation services for County correctional institutions, and other County operational needs.
Office Supplies & Equipment	Furniture, computers and other IT equipment, printing supplies and services, and other general office-related supplies. **Sub-categories** are Furniture, IT Equipment, and Supplies & Printing.
Other Goods	Uniforms, highway signs, lab equipment and supplies, medical and dental equipment and supplies, County water supply contracts, water treatment chemicals, and other miscellaneous items. **Sub-categories** are Administrative (including water-related purchases) and Health Care.
Professional Services	Computer programming and IT professionals, educational services, attorneys, accountants, environmental consultants, etc. This category includes community-based organizations providing services to the community on behalf of, or subsidized by, the County, such as medical, dental, counseling, and child care services. **Sub-categories** are Community-directed Services and Business Services.
Purchased Fuels & Energy	Upstream emissions for the production of fuels used directly in owned County equipment (such as gasoline, diesel, and natural gas) and fuels combusted to generate electricity purchased by the County. These are not the tailpipe emissions, rather they are the energy and process emissions that occur upstream of the fuels combustion. **Sub-categories** are Electricity, Transportation Fuels, and Natural Gas.
Transportation – Equipment & Services	Vehicles, equipment and associated maintenance services, and business travel services including taxis and lodging services. **Sub-categories** are Vehicles and Equipment and Business Travel.

[5] Downloaded 11/2018 from
https://westcoastclimateforum.com/sites/westcoastclimateforum/files/related_documents/TA%20Final.pdf

Results Overview

This section of the report details the results of the Spend Analysis. The section begins with an overview of the County's 2015 spend (in dollars $) and continues with a description of Countywide impacts and details of impacts by Purchasing Category, Department and Vendor.

County Expenditures

Figure 1 presents Alameda County's Fiscal Year 2014-2015 financial expenditures grouped by Purchasing Categories. As can be seen, Professional Services and Construction and Maintenance combined make up about 90% of the County's 2015 expenditures. Professional Services is dominated by the County's purchase of community direct services – such as mental and physical health, social services, etc. These services are a critical part of the County's role as the social safety net provider in the community.

Figure 2 presents 2015 expenditures by County Department. As can be seen, about 80% of County expenditures are made by 5 departments – Behavioral Health Care Services, General Services Agency, Social Services Agency, Health Care Administration, and the Sheriff's Department.
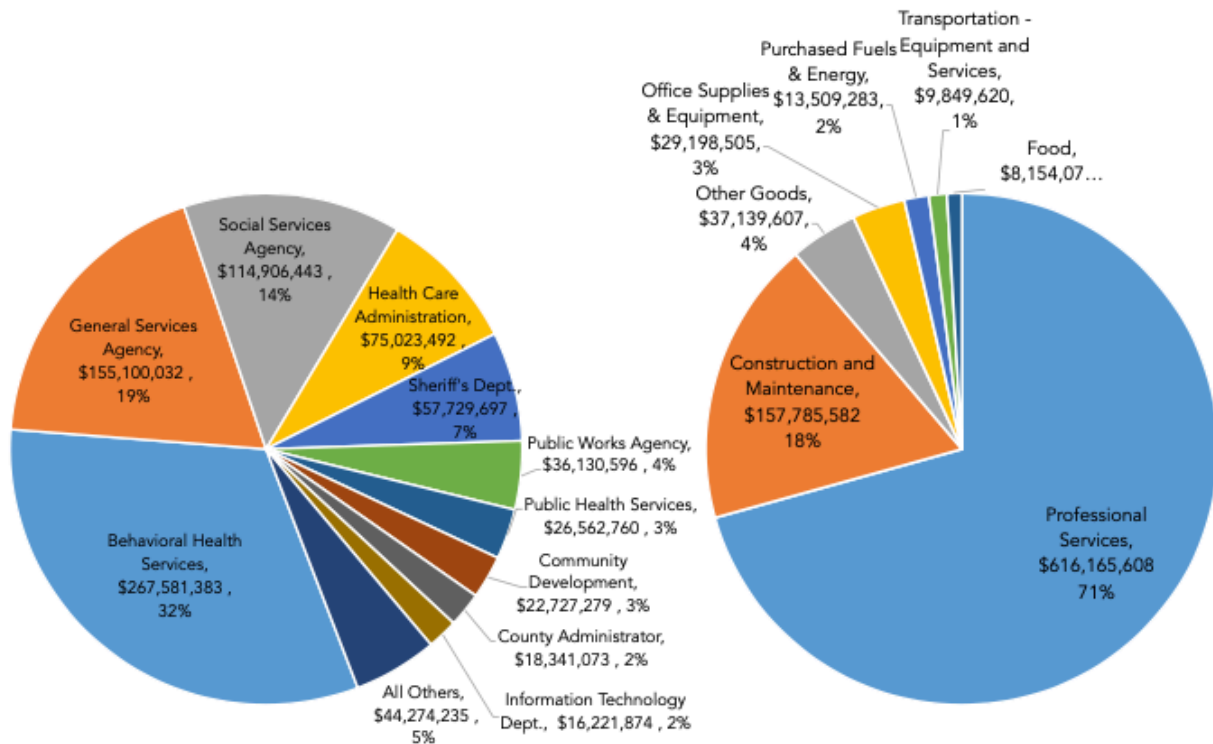
Figure 1: 2015 spend by category.

Figure 2: 2015 spend by department.

Countywide Impacts

The following subsections provide the total impacts for three metrics – greenhouse gases, particulate matter[6], and water use – and provide a common equivalency to provide a sense of scale comparison.

GREENHOUSE GAS EMISSIONS (GHG)

Supply chain GHGs for the County's FY 2014/15 expenditures total 175,000 MT CO$_2$e.

This quantity is the equivalent of any one of the following:

> 30,000 homes energy use for 1 year
> 38,000 passenger vehicles driven for 1 year
> 200,000 acres of average U.S. forest sequestering carbon for 1 year

PARTICULATE MATTER (PM)

Supply chain PM for the County's FY 2014/15 expenditures total 138,000 kg PM$_{2.5}$.

This quantity is the equivalent of the following:

> 683 million miles driven by heavy duty, diesel powered 2008 model year vehicles

WATER USE

Supply chain water use for the County's FY14/15 expenditures total 2.9 billion gallons.

This quantity is the equivalent of the following:

> 25,000 families annual water use

For scale, Alameda County's 2015 greenhouse gas emissions inventory for government operations estimates emission from its owned buildings, vehicles, employee commutes and waste generation to totaled about 49,400 MT CO$_2$e. While the County has less direct control over emissions occurring in the supply chain than it does its own operations, the scale of opportunity to create positive change is significant.

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[6] Providing an equivalency for PM is difficult because negative health effects require certain PM concentrations for a period of exposure. A specific quantity of PM does not necessarily mean people are exposed. The same is true for some of the other metrics used in this analysis (e.g., smog and human toxicity).

Impacts by Purchasing Category

Figure 3 compares three impact metrics (GHGs, PM, and water use) by purchasing category. Table 3 provides additional details for the graphics shown in Figure 3 and provides impact values for all impact metrics for each Purchasing Category and Sub-Category.

> **Two Categories make up 80% of the air quality impacts and 60% of water use:**
>
> **Professional Services** is dominated by Community-Directed Services, which are County funded community services such as medical, dental, child care subsidies, and community food and housing support. These services are critical to the community's wellbeing, and these findings identify an opportunity to improve business efficiency for these providers.
> **Facility Construction & Maintenance** is dominated by new construction for facilities and infrastructure, including the production and transport of materials and onsite emissions from fuel combustion in construction vehicles and equipment.

These figures show that Professional Services and Construction are similarly dominant sources of greenhouse gas impacts in Alameda County's supply chain, Construction is the leading source of particulate matter impacts, and Professional Services leads the sources of impacts for water use.

Impacts by Department

> **Five departments represent 75% of impacts:**
>
> General Services Agency (GENSA)
> Social Services Agency (SOCSA)
> Behavioral Health Care Services (BHSVC)
> Sherriff's Department (SHERF)
> Public Works (PBWKS)

Alameda County has 26 departments and agencies providing a wide range of services to assist vulnerable residents, enforce the law, ensure justice, protect public health, and improve our quality of life. Figure 4 compares three impact metrics (GHGs, PM, and water use) for the top 5 Departments to identify opportunities to prioritize efforts to improve the environmental performance of the County's supply chain. General Services Agency represents the majority of impact, across the metrics, followed by Social Services Agency or Behavioral Health Care Services (depending on the metric). See Appendix A for additional details.

The General Services Agency's impacts are the result of expenditures for the construction, procurement and maintenance of County facilities and fleets, as well as electricity, natural gas, and vehicle fuels used to operate them. These expenditures are made on behalf of all County departments to fulfill the business and operational needs of the County.

The Social Services Agency's impacts are the result of expenditures related to community directed social services. Behavioral Health Care Service's impacts are the result of expenditures related to community directed medical services. These expenditures are to fulfill the critical social safety net services the County provides within its community.

Impacts by Vendor

Alameda County worked with over 2,200 vendors in Fiscal Year 2014-2015. Table 5 shows the Top 20 Vendors, which generate about 50% of Countywide supply chain impacts. These top vendors are dominated by construction firms and community service providers (medical, child care, and other human services). Utilities also appear near the top for some impact categories.

Ten vendors represent 40% of impacts

Clark Design Build
Hensel Phelps Construction
Alameda Health System
Aramark Correctional Services
Child Care Links
Telecare Corporation
Vanir Construction
Corizon Health, Inc.
Arntz Builders Inc.

It is important to note that this analysis is based on national average data for impact factors (impact metric/$ spent) and does not account for sustainability actions already undertaken by County vendors. Vendors identified as high impact simply indicate opportunities to affect positive change due to a significant contract size, or because they operate in a particularly impactful industry. County contracts are competitively bid on a regular basis, so vendors listed may no longer be a County vendor. This information is simply meant to help County staff to identify and prioritize its efforts.

Figure 3: Percent of greenhouse gas, particulate matter, and water use impacts by purchasing categories (%).
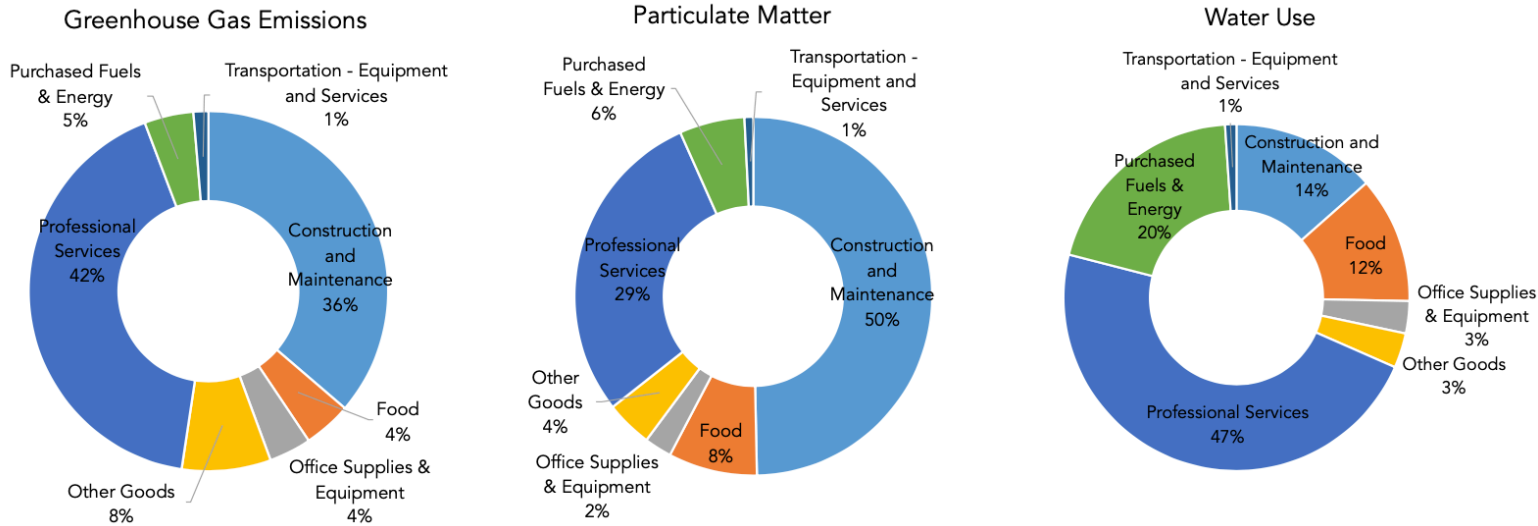
Table 3: Details for purchasing sub-categories for impacts. Red equal greater impact and Green means less impact.

Results Groupings - Subgroupings	Global Climate Change		Human Respiratory		Water Use		Human Toxicity		Smog Formation		Acid Rain	
	kg CO2e	%	kg PM2.5e	%	m3	%	CTUh	%	kg O3e	%	kg SO2e	%
Construction and Maintenance - New Construction	56,423,864	32%	59,990	43%	1,276,871	12%	0.0923	33%	4,211,656	38%	151,206	24%
Construction and Maintenance - Maintenance	7,281,576	4%	8,835	6%	191,325	2%	0.0106	4%	370,565	3%	16,098	3%
Food	7,584,417	4%	11,140	8%	1,282,039	12%	0.0096	3%	322,528	3%	48,517	8%
Office Supplies & Equipment - Furniture	915,218	1%	611	0%	53,678	0%	0.0031	1%	72,918	1%	2,754	0%
Office Supplies & Equipment - IT Equipment	2,592,088	1%	1,125	1%	121,574	1%	0.0037	1%	149,663	1%	7,648	1%
Office Supplies & Equipment - Supplies & Printing	3,161,462	2%	1,694	1%	150,792	1%	0.0067	2%	203,783	2%	10,837	2%
Other Goods - Administrative (water purchased included)	13,485,823	8%	5,513	4%	317,517	3%	0.0157	6%	511,044	5%	38,455	6%
Other Goods - Health Care	592,098	0%	329	0%	35,697	0%	0.0010	0%	34,190	0%	1,880	0%
Professional Services - Business Services	7,198,562	4%	3,098	2%	335,849	3%	0.0113	4%	446,501	4%	21,957	4%
Professional Services - Community-Directed Services	66,318,775	38%	36,941	27%	4,814,414	44%	0.0985	35%	3,508,808	31%	221,238	36%
Purchased Fuels Energy - Electricity	3,166,390	2%	7,187	5%	2,044,372	19%	0.0087	3%	762,000	7%	80,859	13%
Purchased Fuels Energy - Natural Gas	2,122,023	1%	371	0%	80,555	1%	0.0041	1%	93,025	1%	4,767	1%
Purchased Fuels Energy - Transport Fuels	2,479,293	1%	615	0%	42,036	0%	0.0139	5%	319,786	3%	8,157	1%
Transportation - Business Travel	11,119	0%	5	0%	350	0%	0.0000	0%	1,282	0%	39	0%
Transportation - Vehicles and Equipment	2,342,548	1%	1,094	1%	114,707	1%	0.0034	1%	148,867	1%	6,648	1%
Grand Total	175,675,256	100%	138,548	100%	10,861,777	100%	0.2827	100%	11,156,615	100%	621,060	100%

Large impact
Moderate impact
Low impact

Figure 4: Percentage of greenhouse gases, particulate matter, and water use impacts by Department (%).

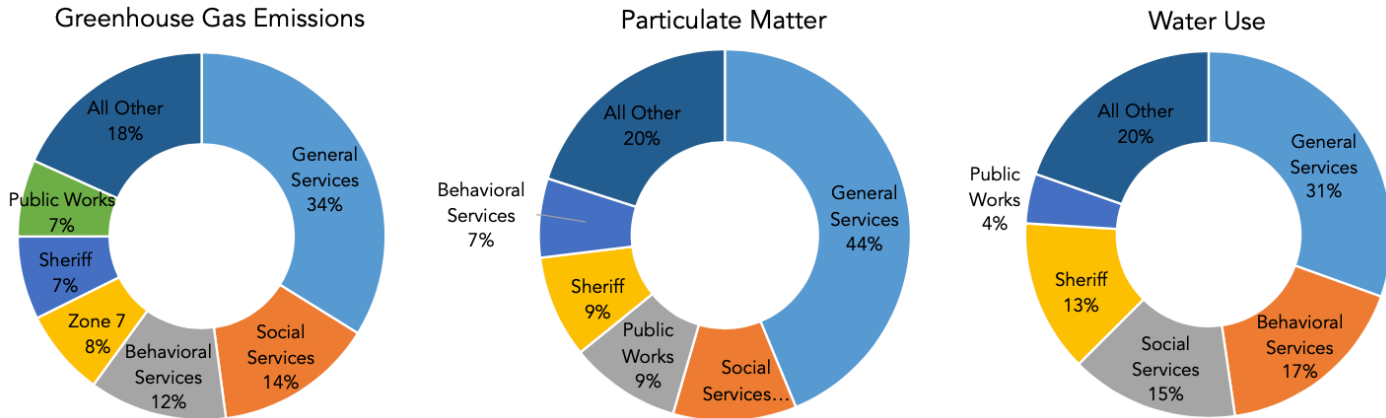
Table 4: Top 20 County departments. Red equal greater impact and Green means less impact.

Department	Global Climate		Dept.	Human Respiratory		Dept.	Water Use		Dept.	Human		Dept.	Smog Formation		Dept.	Acid Rain	
	kg CO2e	%		kg PM2.5e	%		m3	%		CTUh	%		kg O3e	%		kg SO2e	%
GENSA	59,474,380	33.9%	GENSA	60,625	43.8%	GENSA	3,311,887	30.5%	GENSA	0.109	38.7%	GENSA	4,876,405	43.7%	GENSA	228,347	36.8%
SOCSA	24,652,748	14.0%	SOCSA	14,886	10.7%	BHSVC	1,869,162	17.2%	SOCSA	0.037	13.2%	SOCSA	1,276,905	11.4%	SOCSA	100,398	16.2%
BHSVC	21,298,907	12.1%	PBWKS	13,374	9.7%	SOCSA	1,610,577	14.8%	BHSVC	0.032	11.5%	BHSVC	1,122,558	10.1%	BHSVC	59,318	9.6%
ZONE7	13,421,828	7.6%	SHERF	12,343	8.9%	SHERF	1,461,250	13.5%	PBWKS	0.019	6.7%	PBWKS	837,757	7.5%	SHERF	58,101	9.4%
SHERF	12,859,569	7.3%	BHSVC	9,527	6.9%	PBWKS	476,645	4.4%	SHERF	0.019	6.7%	SHERF	642,761	5.8%	ZONE7	37,227	6.0%
PBWKS	11,902,439	6.8%	ZONE7	6,431	4.6%	HCSVC	463,114	4.3%	ZONE7	0.016	5.6%	ZONE7	565,356	5.1%	PBWKS	36,138	5.8%
HCSVC	8,703,767	5.0%	CMDEV	5,896	4.3%	CMDEV	335,875	3.1%	HCSVC	0.013	4.6%	HCSVC	524,549	4.7%	HCSVC	24,071	3.9%
CMDEV	5,855,197	3.3%	HCSVC	4,406	3.2%	PROBT	300,975	2.8%	CMDEV	0.009	3.1%	CMDEV	327,303	2.9%	CMDEV	22,874	3.7%
PHSVC	3,310,042	1.9%	PROBT	2,583	1.9%	ZONE7	265,054	2.4%	PHSVC	0.006	1.9%	PHSVC	203,711	1.8%	PROBT	12,684	2.0%
PROBT	2,789,807	1.6%	PHSVC	1,870	1.3%	PHSVC	216,017	2.0%	ACOFD	0.004	1.6%	ACOFD	155,471	1.4%	PHSVC	10,068	1.6%
ACOFD	2,461,402	1.4%	EHSVC	1,621	1.2%	ACOFD	129,849	1.2%	PROBT	0.004	1.4%	PROBT	134,909	1.2%	ACOFD	7,243	1.2%
CAOFF	2,240,643	1.3%	ACOFD	1,390	1.0%	CAOFF	119,156	1.1%	CAOFF	0.003	1.2%	CAOFF	127,394	1.1%	CAOFF	6,495	1.0%
ITDPT	1,922,025	1.1%	CAOFF	1,138	0.8%	ITDPT	93,052	0.9%	ITDPT	0.003	1.0%	ITDPT	110,736	1.0%	ITDPT	5,779	0.9%
EHSVC	1,588,832	0.9%	ITDPT	863	0.6%	ALCTY	68,213	0.6%	EHSVC	0.002	0.7%	EHSVC	55,255	0.5%	EHSVC	2,590	0.4%
ALCTY	770,512	0.4%	ALCTY	340	0.2%	COLIB	27,068	0.2%	ALCTY	0.001	0.4%	ALCTY	40,557	0.4%	ALCTY	2,128	0.3%
COLIB	602,612	0.3%	COLIB	294	0.2%	EHSVC	22,209	0.2%	COLIB	0.001	0.4%	COLIB	40,113	0.4%	COLIB	1,835	0.3%
DAOFF	400,307	0.2%	DAOFF	211	0.2%	HRSVC	20,988	0.2%	DAOFF	0.001	0.3%	AUDTR	27,724	0.2%	DAOFF	1,247	0.2%
HRSVC	321,649	0.2%	HRSVC	211	0.2%	DAOFF	19,220	0.2%	AUDTR	0.001	0.2%	DAOFF	25,334	0.2%	AUDTR	1,099	0.2%
AUDTR	315,420	0.2%	AUDTR	142	0.1%	AUDTR	12,251	0.1%	HRSVC	0.000	0.2%	HRSVC	17,767	0.2%	HRSVC	1,070	0.2%
ROVTR	225,614	0.1%	ROVTR	108	0.1%	ROVTR	11,552	0.1%	ROVTR	0.000	0.1%	ROVTR	11,604	0.1%	ROVTR	644	0.1%
TTAXC	133,512	0.1%	TTAXC	64	0.0%	TTAXC	6,612	0.1%	TTAXC	0.000	0.1%	TTAXC	7,477	0.1%	TTAXC	404	0.1%
CSSVC	105,902	0.1%	CSSVC	53	0.0%	PDOFF	5,254	0.0%	CSSVC	0.000	0.1%	CSSVC	6,808	0.1%	CSSVC	331	0.1%
PDOFF	100,191	0.1%	PDOFF	50	0.0%	CSSVC	4,996	0.0%	PDOFF	0.000	0.1%	PDOFF	5,701	0.1%	PDOFF	315	0.1%
ASESR	84,661	0.0%	BOARD	47	0.0%	ASESR	4,169	0.0%	ASESR	0.000	0.1%	ASESR	4,936	0.0%	ASESR	259	0.0%
BOARD	67,535	0.0%	ASESR	40	0.0%	CONSL	3,372	0.0%	CONSL	0.000	0.0%	CONSL	3,773	0.0%	CONSL	206	0.0%
CONSL	65,755	0.0%	CONSL	33	0.0%	BOARD	3,263	0.0%	BOARD	0.000	0.0%	BOARD	3,751	0.0%	BOARD	190	0.0%
Top 5 Total	131,707,432	75%		110,756	80%		8,729,520	80%		0.217	77%		8,756,386	78%		483,390	78%
Grand Total	175,675,256	100%		138,548	100%		10,861,777	100%		0.283	100%		11,156,615	100%		621,060	100%

Department Legend

Code	Department
ACOFD	Alameda County Fire Department
ASESR	Assessor's Office
AUDTR	Auditor Controller Agency
BHSVC	Behavioral Health Services
BOARD	Board of Supervisors
CAOFF	County Administrator
CMDEV	Community Development Agency
COLIB	County Libraries
CONSL	County Counsel
CSSVC	Child Support Services
DAOFF	District Attorney's Office
EHSVC	Environmental Health Services
GENSA	General Services Agency
HCSVC	Health Care Administration
HRSVC	Human Resource Services
ITDPT	Information Technology Dept.
LAWLB	Law Library
PBWKS	Public Works Agency
PDOFF	Public Defender's Office
PHSVC	Public Health Services
PROBT	Probation Department
ROVTR	Registrar of Voters
SHERF	Sheriff's Department
SOCSA	Social Services Agency
TTAXC	Treasurer - Tax Collector
ZONE7	Zone 7 Water Agency

goodcompany.com MAKING SUSTAINABILITY WORK

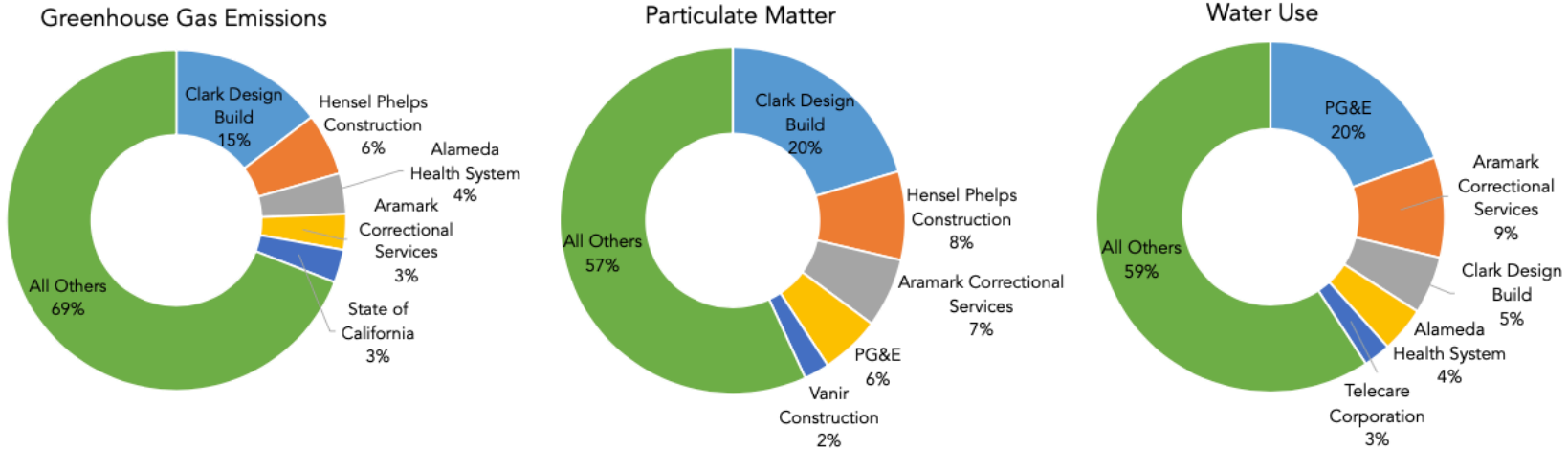Figure 5: Percentage greenhouse gases, particulate matter, and water use impacts by Top 5 Vendors (%).

Table 5: Top 20 vendors by global climate change and other impact categories.

Vendor	Global Climate Change		Human Respiratory		Water Use		Human Toxicity		Smog Formation		Acid Rain	
	kg CO2e	%	kg PM2.5e	%	m3	%	CTUh	%	kg O3e	%	kg SO2e	%
CLARK DESIGN BUILD OF CALIFORNIA INC	25,818,117	14.7%	27,639	19.9%	578,247	5.3%	0.042	14.9%	1,930,865	17.3%	69,324	11.2%
HENSEL PHELPS CONSTRUCTION CO INC	10,408,643	5.9%	11,143	8.0%	233,122	2.1%	0.017	6.0%	778,433	7.0%	27,948	4.5%
ALAMEDA HEALTH SYSTEM	6,787,562	3.9%	3,926	2.8%	467,916	4.3%	0.010	3.6%	387,274	3.5%	18,738	3.0%
ARAMARK CORRECTIONAL SERVICES, INC	5,956,018	3.4%	8,748	6.3%	1,006,781	9.3%	0.008	2.7%	253,280	2.3%	38,100	6.1%
STATE OF CALIFORNIA	5,512,760	3.1%	1,511	1.1%	55,168	0.5%	0.005	1.8%	154,593	1.4%	12,353	2.0%
PG&E	5,288,412	3.0%	7,558	5.5%	2,124,927	19.6%	0.013	4.6%	855,025	7.7%	85,626	13.8%
CHILD CARE LINKS	3,189,518	1.8%	1,917	1.4%	221,456	2.0%	0.005	1.6%	154,103	1.4%	14,140	2.3%
TELECARE CORPORATION	3,070,287	1.7%	1,346	1.0%	273,310	2.5%	0.005	1.7%	161,277	1.4%	8,481	1.4%
VANIR CONSTRUCTION MANAGEMENT INC	2,994,246	1.7%	3,205	2.3%	67,062	0.6%	0.005	1.7%	223,931	2.0%	8,040	1.3%
CORIZON HEALTH INC	2,559,461	1.5%	1,122	0.8%	227,838	2.1%	0.004	1.4%	134,444	1.2%	7,070	1.1%
ARNTZ BUILDERS INC	2,369,782	1.3%	2,537	1.8%	53,076	0.5%	0.004	1.4%	177,229	1.6%	6,363	1.0%
SOUTHERN COUNTIES OIL CO	2,215,936	1.3%	549	0.4%	37,571	0.3%	0.012	4.4%	285,817	2.6%	7,291	1.2%
ALAMEDA ALLIANCE JOINT POWERS AUTHORITY	1,861,041	1.1%	1,264	0.9%	101,403	0.9%	0.003	1.0%	112,299	1.0%	5,126	0.8%
ALTEN CONSTRUCTION INC	1,817,035	1.0%	1,945	1.4%	40,696	0.4%	0.003	1.1%	135,891	1.2%	4,879	0.8%
COMMUNITY CHILD CARE COORD COUNCIL ALACO	1,516,530	0.9%	910	0.7%	105,153	1.0%	0.002	0.8%	73,260	0.7%	6,711	1.1%
SENECA FAMILY OF AGENCIES	1,501,075	0.9%	659	0.5%	133,463	1.2%	0.002	0.8%	78,885	0.7%	4,146	0.7%
CHILDREN'S HOSPITAL & RESEARCH CENTER	1,488,890	0.8%	725	0.5%	122,249	1.1%	0.002	0.8%	79,817	0.7%	4,234	0.7%
JMB CONSTRUCTION INC	1,464,011	0.8%	1,567	1.1%	32,789	0.3%	0.002	0.8%	109,489	1.0%	3,931	0.6%
KEMIRA WATER SOLUTIONS, INC	1,324,508	0.8%	759	0.5%	39,787	0.4%	0.002	0.6%	68,164	0.6%	5,549	0.9%
CLEAN HARBORS ENVIRONMENTAL SVCS, INC	1,310,237	0.7%	1,475	1.1%	8,810	0.1%	0.002	0.6%	38,868	0.3%	1,788	0.3%
Top 10 Total	88,454,069	50%	80,505	58%	5,930,824	55%	0.15	52%	6,192,945	56%	339,839	55%
Grand Total	175,675,256	100%	138,548	100%	10,861,777	100%	0.283	100%	11,156,615	100%	621,060	100%

Large impact
Moderate impact
Low impact

Analysis of High-Impact Purchasing Categories

Based on the findings presented in the *Results* section, high-impact purchasing categories were selected by County staff for more detailed analysis. This deeper analysis uses the details contained within the USEEIO model to highlight supply chain activities that occur within the supply chain of the goods and services procured by the County that drive the bulk of the impacts, and to identify those impacts that are generated locally (e.g., PM emissions from local vendor fleet operations). The intent of this detailed analysis is to provide information and recommendations on available opportunities to work with specific types of service vendors to reduce impacts and improve the health and wellbeing of the community.

Table 6 summarizes the Purchasing Categories; Alameda County Purchasing Codes selected for further analysis; and related Vendor Service Types available in the USEEIO model that approximate the types good or service provided by County vendors, either through direct contract or via funding related to the County's role as a social safety net provider (e.g. childcare subsidies for families receiving SNAP benefits).

Table 6: High-impact purchasing categories and codes selected for further analysis.

Purchasing Category	Purchasing Codes	USEEIO Vendor Service Types
Professional Services	Community Services (CMSVC)	Child care and family services
		Food and housing services
	Medical Providers (MED3)	Hospitals
		Physician offices*
Facility Construction & Maintenance	Construction Services (CONS2)	Commercial construction
		Commercial maintenance
		Street and bridge construction
Food	Food Services (FOOD2)	Food and drinking places
		Package meat production

Also used as a proxy for Dentists and Counselors

The following sections of the report provide analysis of each of purchasing categories identified here as high impact. Analysis continues into the activities that generate these impacts within the supply chain by selecting vendor service types available in the USEEIO model that are most similar to the services received by the County. The intent of providing these details is to inform opportunities for impact reductions. The opportunities are presented in two groups: (1) Local and (2) Local + Global.

- **Local Reduction Opportunities:** These opportunities focus on actions that will reduce local sources of impacts, particularly those that have a direct impact on human health, such as particulate matter. Local impacts are produced either by equipment that is directly owned by County-contracted vendors (such as fleet vehicles or building equipment fueled by natural gas) or equipment that is operated locally and occur due to vendor activities (such as freight and waste hauling services).

- **Local + Global Reduction Opportunities:** These opportunities include Local Opportunities, but also include opportunities to reduce impacts further up the supply chain at the point of production. For example, impacts from meat production don't happen locally, but are large and can be reduced through changes in vendor purchasing activities.

Professional Services

Professional Services, as a County purchasing category, represents between 30% and 50% of Countywide impacts, depending on the impact metric. This report categorizes these services into two types:

- **Community-directed Services:** These are County-funded community services such as social services, medical clinics, homelessness services, childcare subsidies, and community food and housing support. These services fulfill the County's critical role as the social safety net provider for its community.
- **Business Services:** These services support the business operations of County departments.

Within Professional Services, Community-directed Services represent 90% of impact and Business Services represents the remainder. Three County departments direct about 80% of the spending for Community-directed Services: Social Services Agency, Behavioral Health Care Services, and Health Care Services Agency. Figure 6 shows the relationships between the Category; Departments directing the services; and the top three vendors for each. As a category, Community-directed Services includes over 775 distinct vendors.

The **Top 10 Community-directed Services vendors, across all Departments** are:

- Alameda Health System
- Telecare Corporation
- Corizon Health, Inc
- Seneca Family of Agencies
- Children's Hospital & Research Center
- Alameda Alliance Joint Powers
- Community Child Care Council
- Child Care Links
- La Clinica De La Raza, Inc.
- Westcoast Children's Clinic, and Lincoln.

Figure 6: Relationship between purchasing category; departments; and top three vendors.
Note that Department percentages indicate % of total spend for all Departments; and Top three Vendors indicate % of total for all Vendors within the related Department.
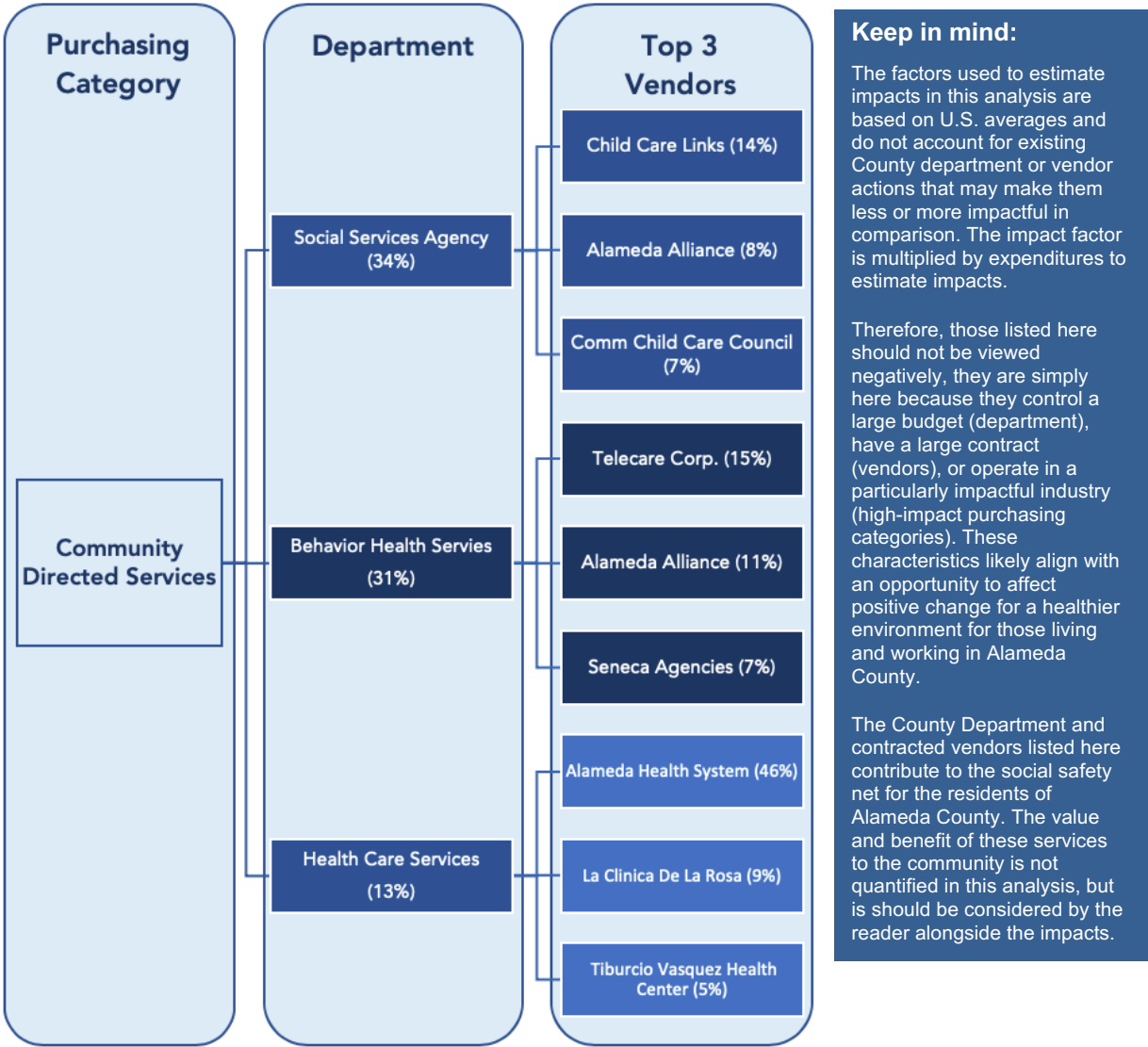

Purchasing Category	Department	Top 3 Vendors
Community Directed Services	Social Services Agency (34%)	Child Care Links (14%)
		Alameda Alliance (8%)
		Comm Child Care Council (7%)
	Behavior Health Servies (31%)	Telecare Corp. (15%)
		Alameda Alliance (11%)
		Seneca Agencies (7%)
	Health Care Services (13%)	Alameda Health System (46%)
		La Clinica De La Rosa (9%)
		Tiburcio Vasquez Health Center (5%)

Keep in mind:

The factors used to estimate impacts in this analysis are based on U.S. averages and do not account for existing County department or vendor actions that may make them less or more impactful in comparison. The impact factor is multiplied by expenditures to estimate impacts.

Therefore, those listed here should not be viewed negatively, they are simply here because they control a large budget (department), have a large contract (vendors), or operate in a particularly impactful industry (high-impact purchasing categories). These characteristics likely align with an opportunity to affect positive change for a healthier environment for those living and working in Alameda County.

The County Department and contracted vendors listed here contribute to the social safety net for the residents of Alameda County. The value and benefit of these services to the community is not quantified in this analysis, but is should be considered by the reader alongside the impacts.

Figure 7 compares the range of greenhouse gas impact factors (kg CO_2e / $) for a variety of different types of Community-directed Services included in EPA's USEEIO model. Those with larger greenhouse gas impacts consume more energy and material goods (including food) compared to those with lower impacts. Similar graphics (to Figure 7) are available for the other impact metrics. While not presented here, they inform the recommendations section of the report.

Figure 7: Comparison of GHG impacts (kg CO_2e / $) for various types of services.
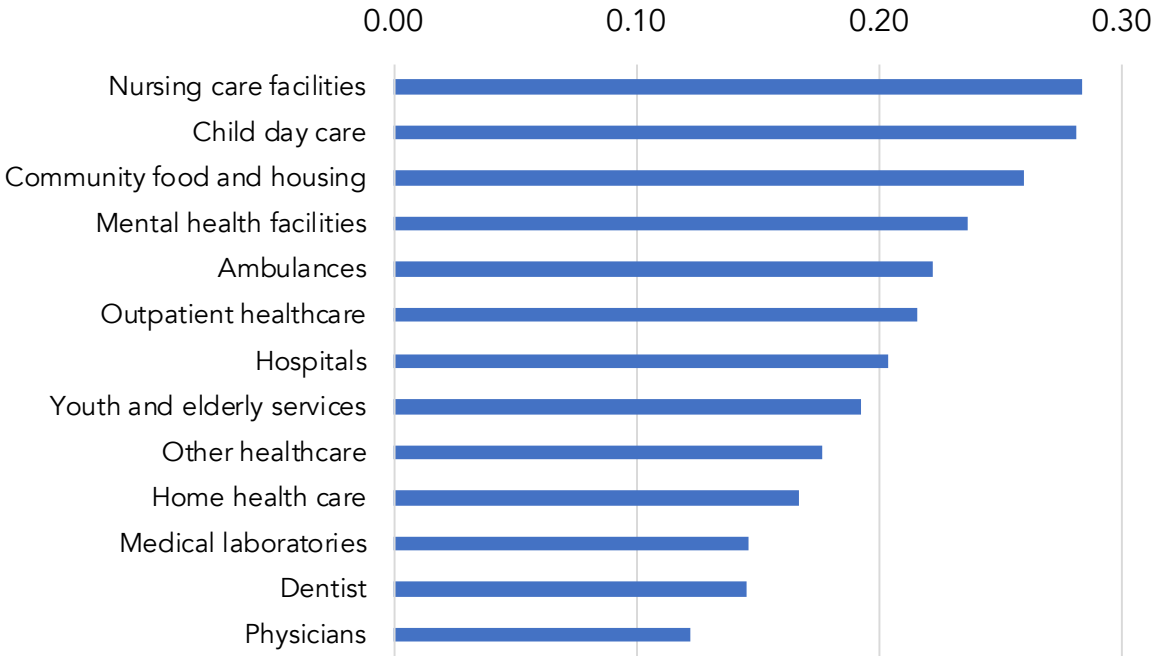
Based on types of services provided by the top Community-directed Services vendors, four high-impact service types are detailed in the following sections in order to highlight opportunities to reduce impacts in Alameda County's supply chain. They include:

- Child care
- Food and housing services
- Hospitals
- Physician/dentist offices

CHILD CARE SERVICES

Alameda County provides childcare subsidies as part of its critical role as a social safety net provider. *Figure* 8 compares the percentage of total impact for supply chain activities that occur within Child Care Services that result in the largest impacts. Many of these impacts are controlled or influenced by vendor operational practices.

- **Climate Change**: Building electricity use represents the largest source of impact; followed by the purchase of dairy and meat products; and fuel combustion by vendor-owned facilities and equipment.
- **Human Respiratory**: Production of dairy and meat products is the largest source of impact (generated at the point of production, not at the point of consumption); followed by electricity use and waste management.
- **Water**: Production of foods represents the largest source of water use; followed by electricity purchases; and onsite facility use of water.
- **Human Toxicity**: Upstream fuel production as well as fuel combustion by vendor-owned facilities and equipment are the largest sources; followed by fuel production and use by commercial and heavy-duty truck freight; and production of plywood and other lumber products.

Figure 8: Percentage of total life-cycle impact, by supply chain activities for four impact metrics (%).
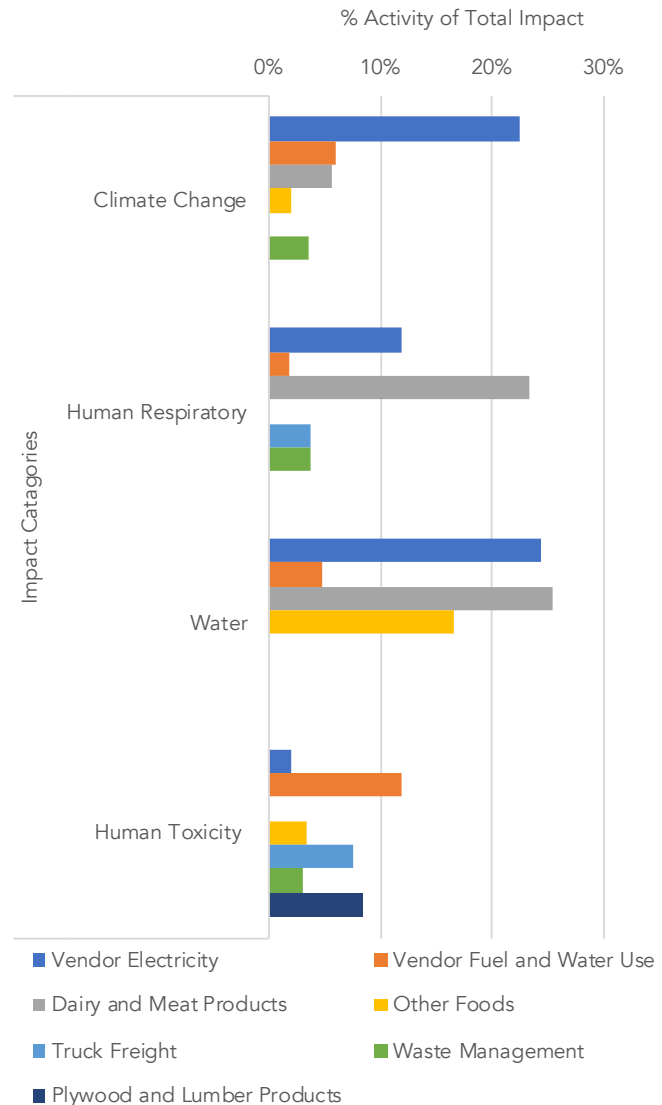
Opportunities to reduce local impacts:
Purchase energy efficient equipment and vehicles and implement conservation practices.
Reduce solid waste (especially the wasting of edible food).

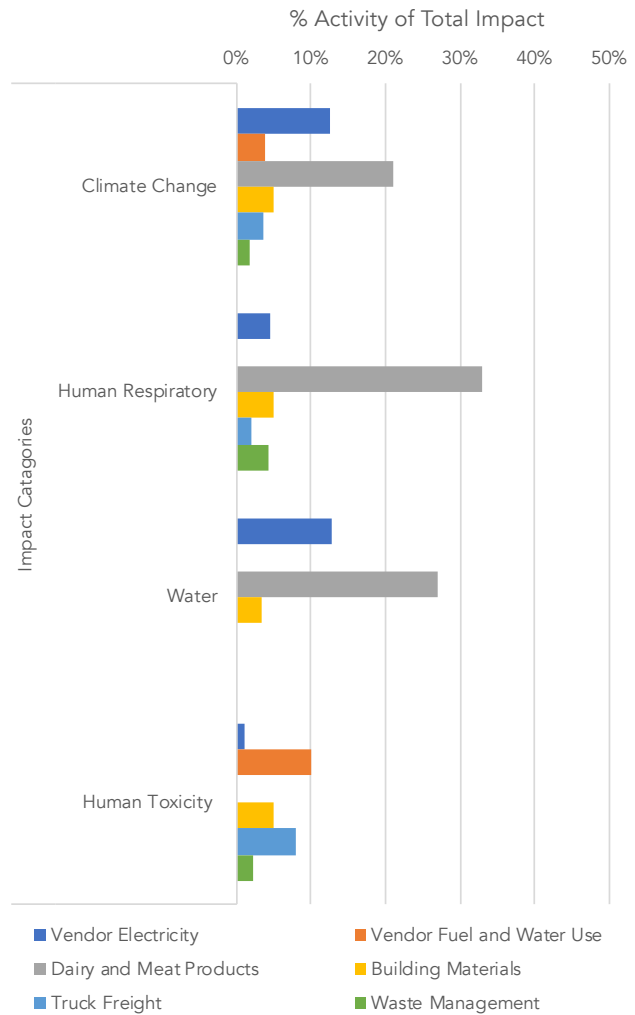**Opportunities to reduce local + global impacts:**
Ensure facilities are supplied with renewable electricity from local power provider.
Electrify vendor-owned vehicles and building systems.
Substitute lower impact, nutritional equivalents for dairy and meat products.

COMMUNITY FOOD AND HOUSING

Alameda County provides community-directed services to assist those most in need with food and housing security. *Figure* 9 compares the specific percentage of total impact for supply chain activities within Community Food and Housing Services that result in the largest impacts. Many of these impacts are controlled or influenced by vendor operational practices.

- **Climate Change**: The purchase of dairy and meat products represent the largest source of impact; followed by building electricity use; production of building materials; and fuel combustion by vendor-owned facilities and equipment.
- **Human Respiratory**: Production of dairy and meat products is the dominate source of this impact (generated at the point of production, not at the point of consumption).
- **Water**: Production of dairy and meat products are the largest source of water use; followed by electricity purchases.
- **Human Toxicity**: Upstream fuel production and fuel combustion by vendor-owned facilities and equipment are the largest sources; followed by fuel production and use by commercial and heavy-duty truck freight; and production of plywood and other lumber products.

Figure 9: Percentage of total life-cycle impact, by supply chain activities for four impact metrics (%).

Opportunities to reduce local impacts:
        Reduce solid waste (especially the wasting of edible food).
        Purchase energy efficient equipment and vehicles and implement conservation practices.

Opportunities to reduce local + global impacts:
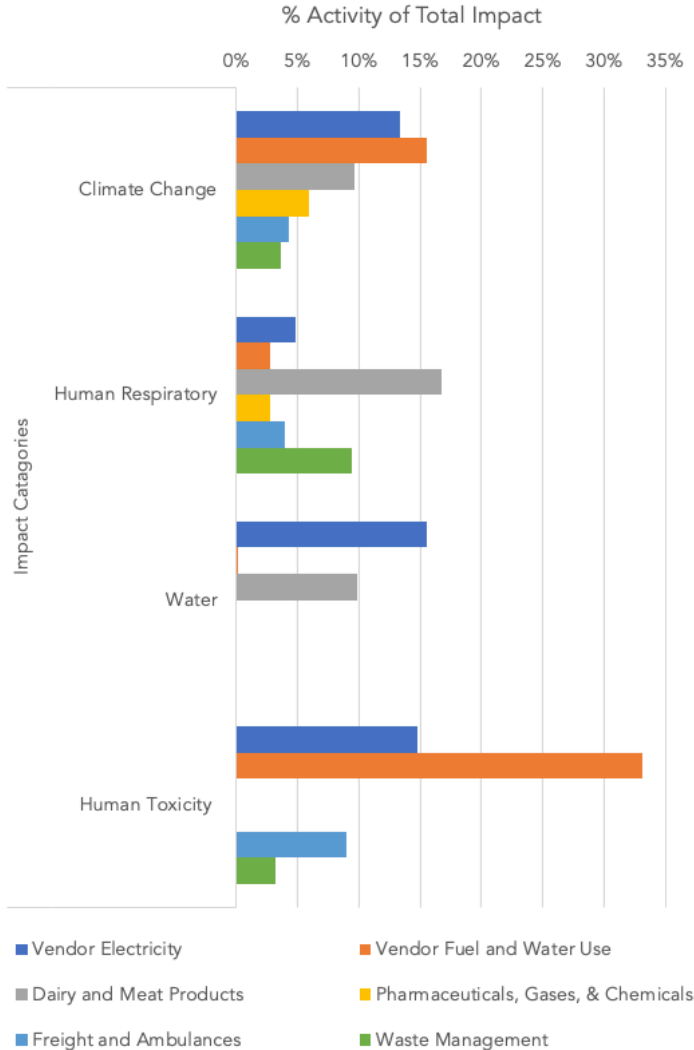   Substitute lower impact, nutritional equivalents for dairy and meat products.
        Specify low carbon cement using Environmental Product Declarations.
        Ensure facilities are supplied with renewable electricity from local power provider.

HOSPITALS

As part of its role as the community social safety net, Alameda County provides subsidies to hospital that provide services to those in need. Figure 10 compares supply chain activities within Hospitals that result in the largest relative impacts. Many of these impacts are controlled or influenced by vendor operational practices.

- **Climate Change**: Use of natural gas and vehicles fuels is the largest source of Hospital emissions; followed by building electricity use; and production of dairy and meat products.
- **Human Respiratory**: Production of dairy and meat products is the largest source of this impact (generated at the point of production, not at the point of consumption); followed by waste management.
- **Water**: Production of dairy and meat products are the largest source of water use; followed by building electricity use.
- **Human Toxicity**: Upstream fuel production and fuel combustion by vendor-owned facilities and equipment are the largest sources of impact; followed by building electricity use; contracted freight and ambulance services.

Figure 10: Percentage of total life-cycle impact, by supply chain activities for four impact metrics (%).

Opportunities to reduce direct impacts:
    Purchase energy efficient equipment and vehicles and implement conservation practices.
    Reduce solid waste (especially the wasting of edible food).
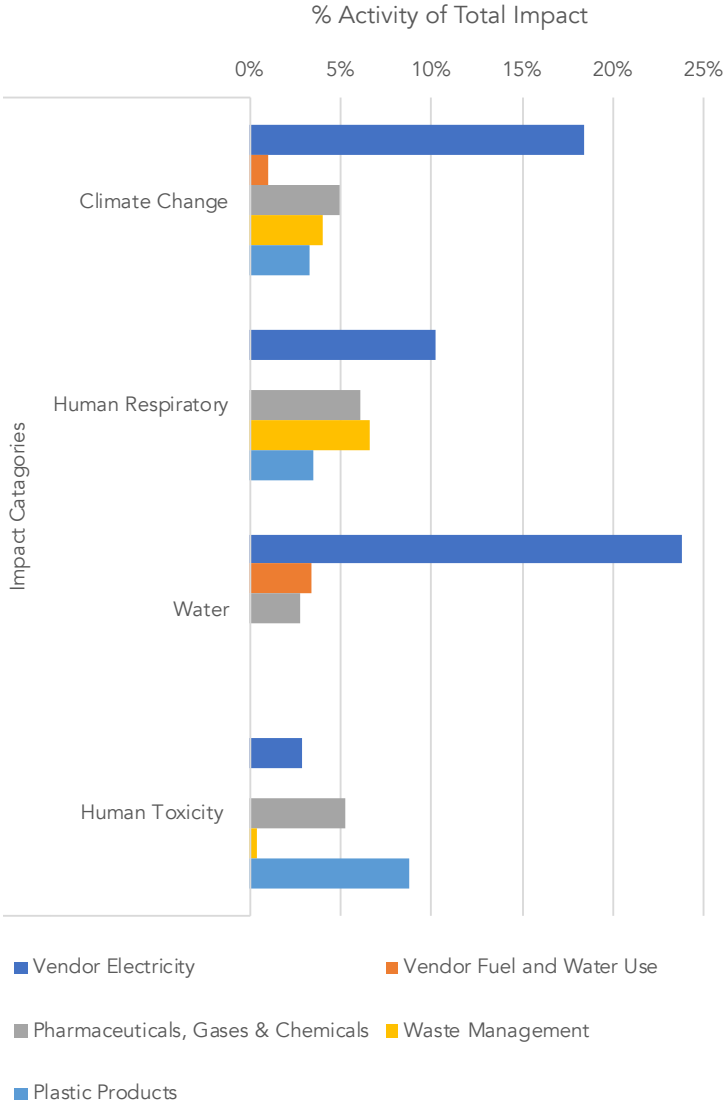
Opportunities to reduce direct + upstream impacts:
    Ensure facilities are supplied with renewable electricity from local power provider.
    Electrify vendor-owned vehicles and building systems.
    Substitute lower impact, nutritional equivalents for dairy and meat products.

PHYSICIAN OFFICES

Alameda County contracts with community-based organizations that provide medical and dental services as part of its role as the social safety net provider. Figure 11 compares supply chain activities within Physician Offices that result in the largest relative impacts. Many of these impacts are controlled or influenced by vendor operational practices.

- **Climate Change**: Electricity use is the dominant source of impact; followed by production of pharmaceuticals, gases and other chemicals used during service; and waste management.
- **Human Respiratory**: Electricity use is the largest source of impact; followed by waste management; and production of pharmaceuticals, gases and other chemicals used during service.
- **Water**: Electricity use is the dominate source of water use due to the high volume of water used to produce electricity.
- **Human Toxicity**: Production of plastic products is the largest source of impact; followed by production of pharmaceuticals, gases and other chemicals used during service.

Figure 11: Percentage of total life-cycle impact, by supply chain activities for four impact metrics (%).

Opportunities to reduce local impacts:
Purchase energy efficient equipment and implement conservation practices.
Reduce solid waste (especially usable pharmaceuticals and plastic products).

Opportunities to reduce local + global impacts:
Ensure facilities are supplied with renewable electricity from local power provider.
Electrify vendor-owned building systems.
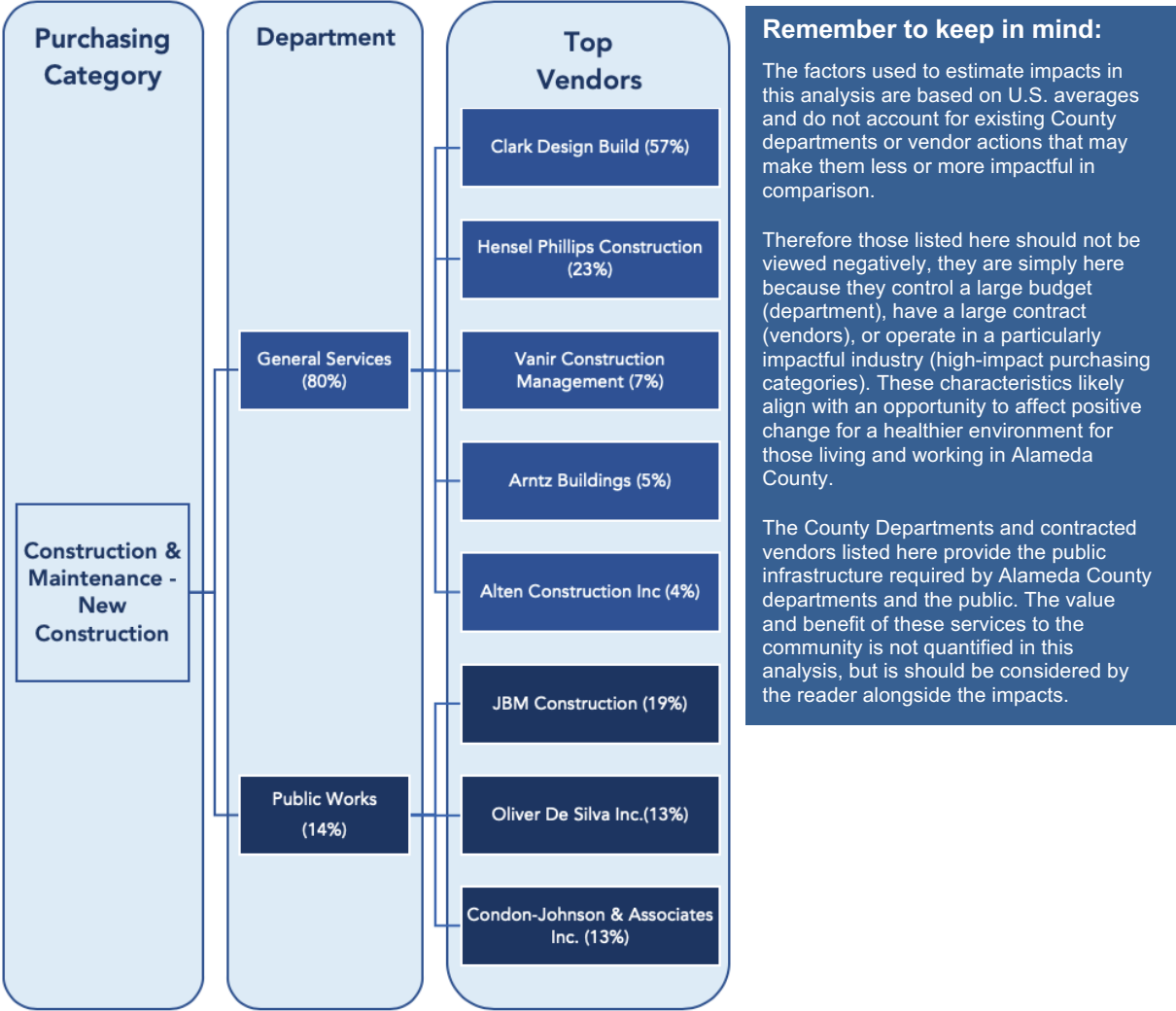
Construction and Maintenance

Construction and Maintenance, as a County purchasing category, represents between 15% and 40% of Countywide impacts, depending on the metric. Within Construction and Maintenance, new construction represents about 90% of the category impact while maintenance represents the remainder. There are two County departments that direct most of the spend for new construction:

- **General Services Agency:** provides design and construction management services on behalf of all County departments to meet the business needs of the organization.
- **Public Works Agency:** provides design and construction management services for public roads and infrastructure in the unincorporated areas of the County.

As a category, New Construction includes over 95 distinct vendors.

Figure 12: Relationship between new construction, departments, and top vendors.
Note that Department percentages indicate % of total spend for all Departments; and Top Vendors indicate % of total spend for all Vendors within the related Department.

Purchasing Category

Construction & Maintenance - New Construction

Department

General Services (80%)

Public Works (14%)

Top Vendors

Clark Design Build (57%)

Hensel Phillips Construction (23%)

Vanir Construction Management (7%)

Arntz Buildings (5%)

Alten Construction Inc (4%)

JBM Construction (19%)

Oliver De Silva Inc.(13%)

Condon-Johnson & Associates Inc. (13%)

Remember to keep in mind:

The factors used to estimate impacts in this analysis are based on U.S. averages and do not account for existing County departments or vendor actions that may make them less or more impactful in comparison.

Therefore those listed here should not be viewed negatively, they are simply here because they control a large budget (department), have a large contract (vendors), or operate in a particularly impactful industry (high-impact purchasing categories). These characteristics likely align with an opportunity to affect positive change for a healthier environment for those living and working in Alameda County.

The County Departments and contracted vendors listed here provide the public infrastructure required by Alameda County departments and the public. The value and benefit of these services to the community is not quantified in this analysis, but is should be considered by the reader alongside the impacts.

The **Top 10 New Construction vendors, across all Departments** are:

- Clark Design Build
- Hensel Phelps Construction
- Vanir Construction Management
- Arntz Builders
- Alten Builders
- JMB Construction
- Oliver De Silva, Inc.
- Condon-Johnson & Associates
- Conco West Inc.
- Jeff Luchetti Construction

Figure 13 compares the range of greenhouse gas impacts (kg CO2e / $) for a variety of different types of Construction in EPA's USEEIO model. Based on the analysis, roads construction has almost three times the greenhouse gas impact compared to utilities infrastructure projects, due to the high carbon intensity of materials used, as well as onsite construction emissions. Similar graphics (to Figure 13) are available for the other impact metrics. While not presented here, they inform the report recommendations.

Figure 13: Comparison of GHG impacts (kg CO2e / $) for types of construction projects.
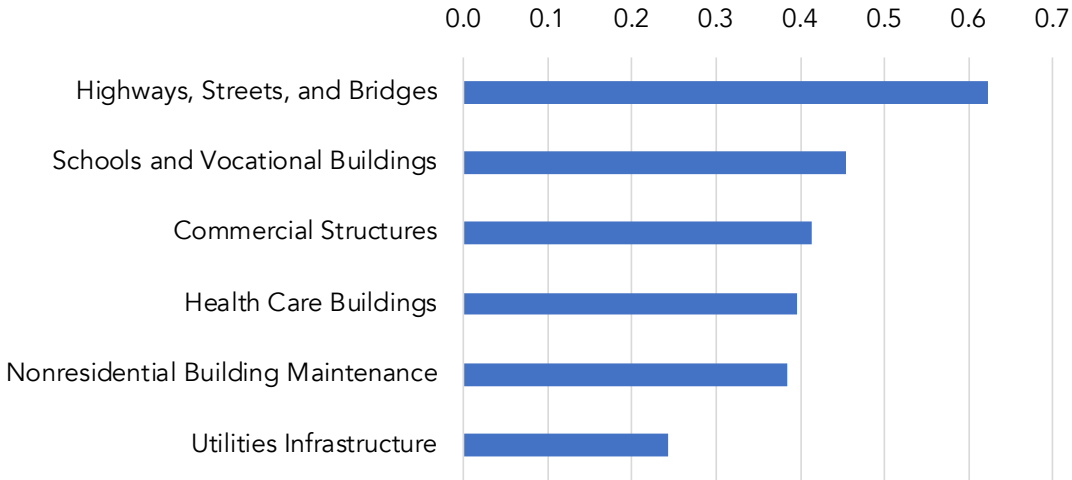
Based on types of services provided by the top Construction and Maintenance vendors, three high-impact service types are detailed in the following sections to highlight opportunities to reduce impacts in Alameda County's supply chain. They include:

- Commercial Construction
- Commercial Maintenance
- Street and Bridge Construction

COMMERCIAL CONSTRUCTION

Alameda County constructs new buildings to meet the business and operational needs of its departments. Figure 14 compares supply chain activities within Commercial Construction that result in the largest relative impacts. Many of these impacts are controlled or influenced by vendor operational practices.

- **Climate Change**: Construction site and support vehicle and equipment fuel use is the dominate source of impact, followed by the production of concrete and metal products.
- **Human Respiratory**: Construction site and support vehicle and equipment fuel use is the dominate source, with impacts primarily occurring locally.
- **Water**: Production of metal and concrete construction products are the largest source of water use.
- **Human Toxicity**: Upstream vehicle fuel production and fuel combustion in construction equipment and in commercial and heavy-duty truck freight used to transport materials are the dominate sources of this impact.

The following sections outline opportunities to reduce impacts from Commercial Construction service providers.

Figure 14: Percentage of total life-cycle impact, by supply chain activities for four impact metrics (%).
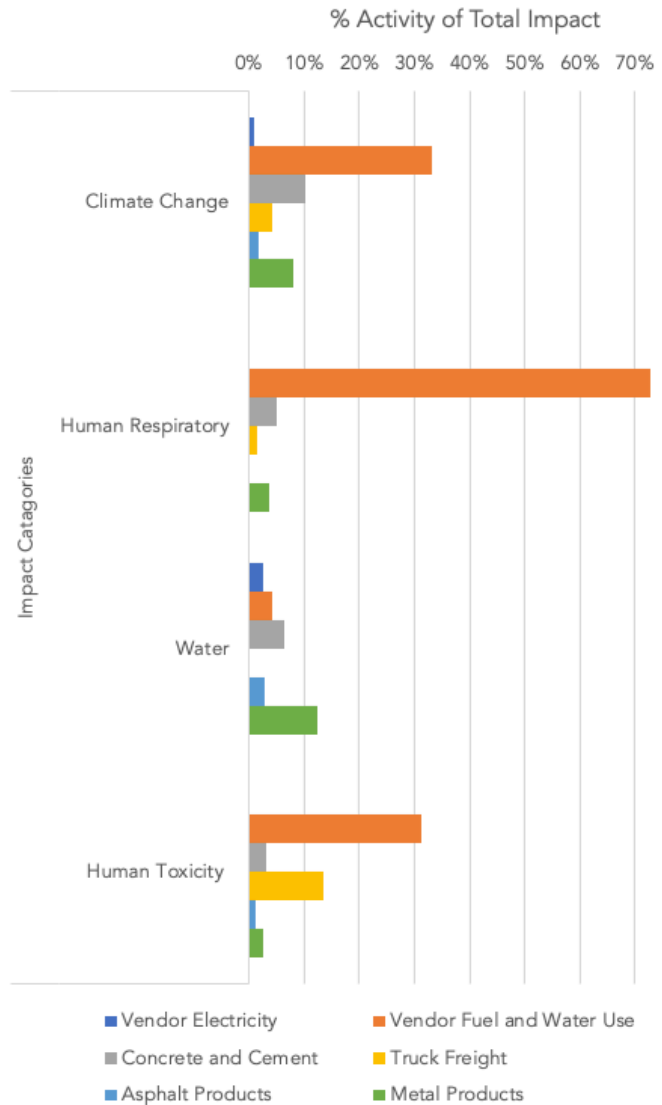
Opportunities to reduce local impacts:
Purchase energy efficient equipment and vehicles and implement conservation practices.
Confirm equipment is a recent model year or has after-market diesel particulate emissions controls.
Electrify any and all equipment as soon as commercially viable.

Opportunities to reduce local + global impacts:
Specify low-impact concrete and cement using Environmental Product Declarations.
Specify low-carbon fuels using certified scores under California's Low Carbon Fuel Standard.
Incentivize the use of building materials produced with renewable electricity or other low-carbon innovations.

COMMERCIAL MAINTENANCE

Alameda County contracts for the provision of goods and services to maintain over 100 facilities and a wide range of public infrastructure in the unincorporated areas of the County. Figure 15 compares supply chain activities within Commercial Maintenance that result in large relative impacts. Many of these impacts are controlled or influenced by vendor operational practices.

- **Climate Change**: Construction site and support vehicle and equipment fuel use is the dominate source of this impact, followed by the production of concrete.
- **Human Respiratory**: Construction site and support vehicle and equipment fuel use is the dominate source, with impacts primarily occurring locally.
- **Water**: Production of asphalt and metal construction products are the largest sources of water use.
- **Human Toxicity**: Upstream vehicle fuel production and combustion in construction equipment and in commercial and heavy-duty truck freight used to transport materials are the dominate sources of this impact.

Figure 15: Percentage of total life-cycle impact, by supply chain activities for four impact metrics (%).
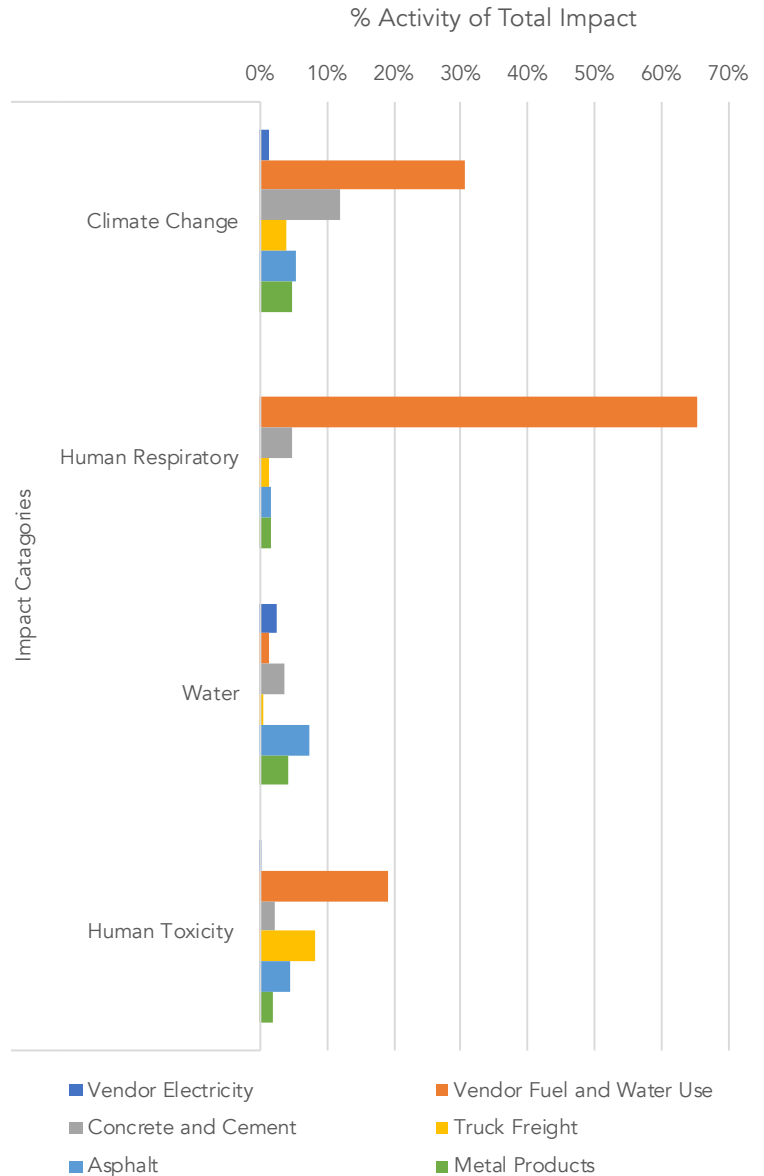
Opportunities to reduce local impacts:
Purchase energy efficient equipment and vehicles and implement conservation practices.
Confirm equipment is a recent model year or has after-market diesel particulate emissions controls.
Electrify any and all equipment as soon as commercially viable.

Opportunities to reduce local + global impacts:
Specify low impact concrete and cement using Environmental Product Declarations.
Specify fuels types using certified scores under California's Low Carbon Fuel Standard.

ROAD CONSTRUCTION

Alameda County builds and maintains roadways in the unincorporated areas of the County. Figure 16 compares supply chain activities within Road Construction that result in large relative impacts. Many of these impacts are controlled or influenced by vendor operational practices.

- **Climate Change**: Construction site and support vehicle and equipment fuel use is the dominate source of this impact, followed by the production of concrete and asphalt products.
- **Human Respiratory**: Construction site and support vehicle and equipment fuel use is the dominate source, with impacts primarily occurring locally.
- **Water**: Production of dimensional stone products (e.g. gravel) is the largest source of water use; followed by water used for electricity production.
- **Human Toxicity**: Upstream vehicle fuel production and combustion in construction equipment and in commercial and heavy-duty truck freight used to transport materials are the dominate sources of this impact.

The following sections outline opportunities to reduce impacts from Road Construction service providers.

Figure 16: Percentage of total life-cycle impact, by supply chain activities for four impact metrics (%).
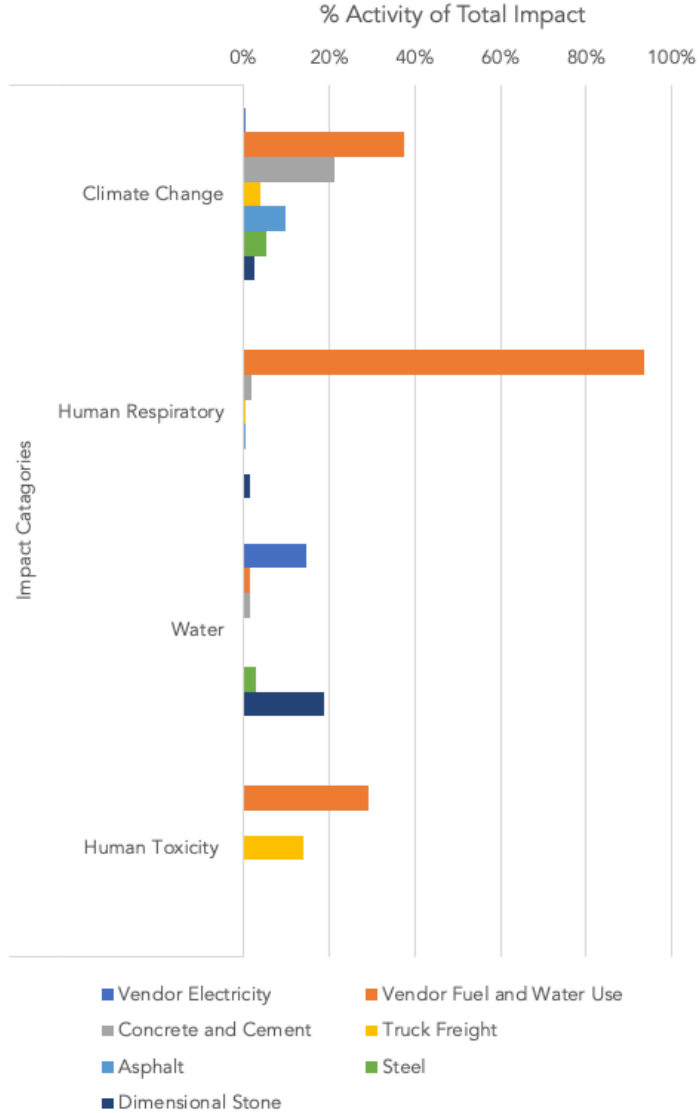
Opportunities to reduce local impacts:
Purchase energy efficient equipment and vehicles and implement conservation.
Confirm equipment is a recent model year or has after-market diesel particulate emissions controls.
Electrify any and all equipment as soon as commercially viable.

Opportunities to reduce local + global impacts:
Specify low-carbon concrete and cement using Environmental Product Declarations.
Specify low-carbon asphalt materials and warm mix processing.
Specify fuels using certified scores under California's Low Carbon Fuel Standard.
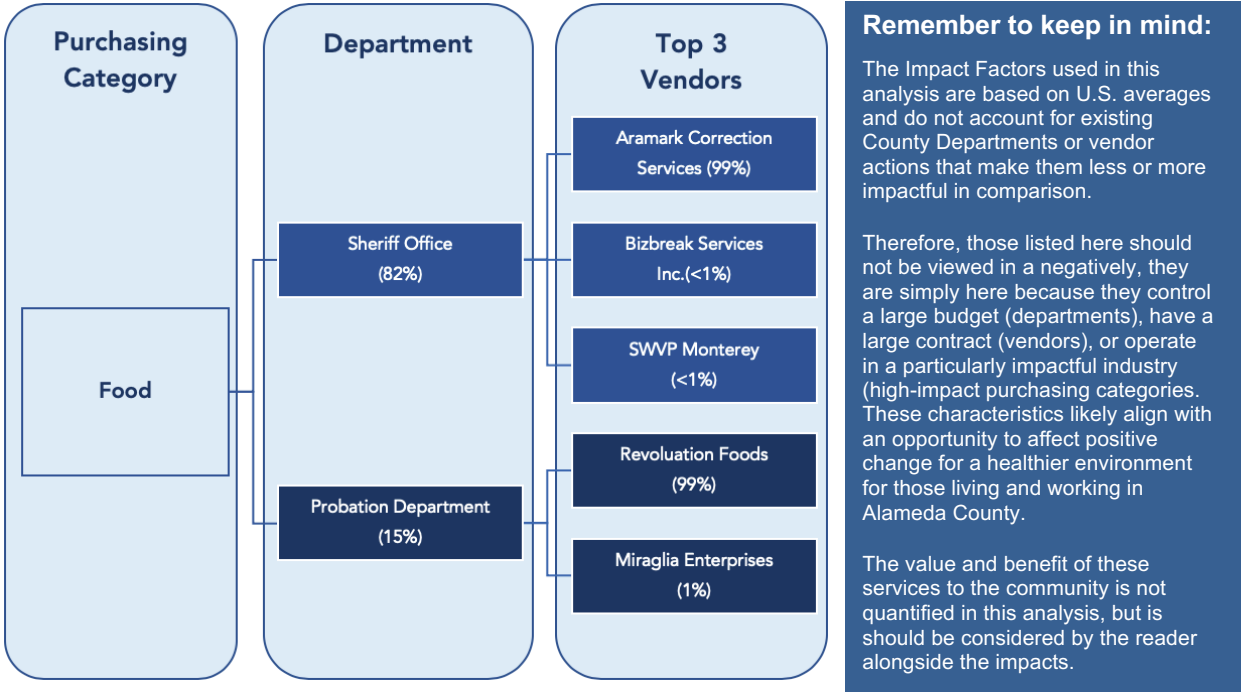
Food

Food, as a County purchasing category, represents between 3% and 12% of Countywide impacts, depending on the impact metric.

Within Food, there are two County departments that direct over 95% of food and food service-related purchases, primarily related to the care and custody of individuals housed in the County's juvenile and adult correctional facilities. Figure 17 shows the relationships between the Category, Departments with high-impacts, and the top vendors for each. As a category, Food Services includes 31 distinct vendors.

Figure 17: Relationship between food purchasing; departments; and top vendors.
Note that Purchasing Code percentages indicate % of total spend for all Codes; and Top Vendors indicate % of total for all Vendors within the related Department.


Remember to keep in mind:

The Impact Factors used in this analysis are based on U.S. averages and do not account for existing County Departments or vendor actions that make them less or more impactful in comparison.

Therefore, those listed here should not be viewed in a negatively, they are simply here because they control a large budget (departments), have a large contract (vendors), or operate in a particularly impactful industry (high-impact purchasing categories. These characteristics likely align with an opportunity to affect positive change for a healthier environment for those living and working in Alameda County.

The value and benefit of these services to the community is not quantified in this analysis, but is should be considered by the reader alongside the impacts.

The **Top 10 Food vendors, across all Departments** are:

- Aramark Correctional Services, Inc.
- Revolution Foods, Inc.
- E&N Ghattas, Inc.
- Suleiman Hijazi
- Mariaglia Enterprises Inc.
- Macke Water System, Inc.
- Blue Heron Catering
- DS Services of America Inc.
- Omar Hijazi
- Gayle Tilton

Figure 18 compares the range of greenhouse gas impact factors (kg CO_2e / $) for a variety of different food types included in EPA's USEEIO model as well as impacts for dollars spent at a full-service restaurant. Based on the analysis, meat and dairy products have a greater greenhouse gas impact compared to plant-based foods, because additional material inputs (i.e. animal feed) are required raising livestock as compared to grains, fruits and vegetables. In

addition, methane emissions from livestock digestion, particularly for cattle, and manure management are also significant sources of greenhouse gas emissions.

Figure 18: Comparison of GHG impacts (kg CO_2e / $) for food products and services.
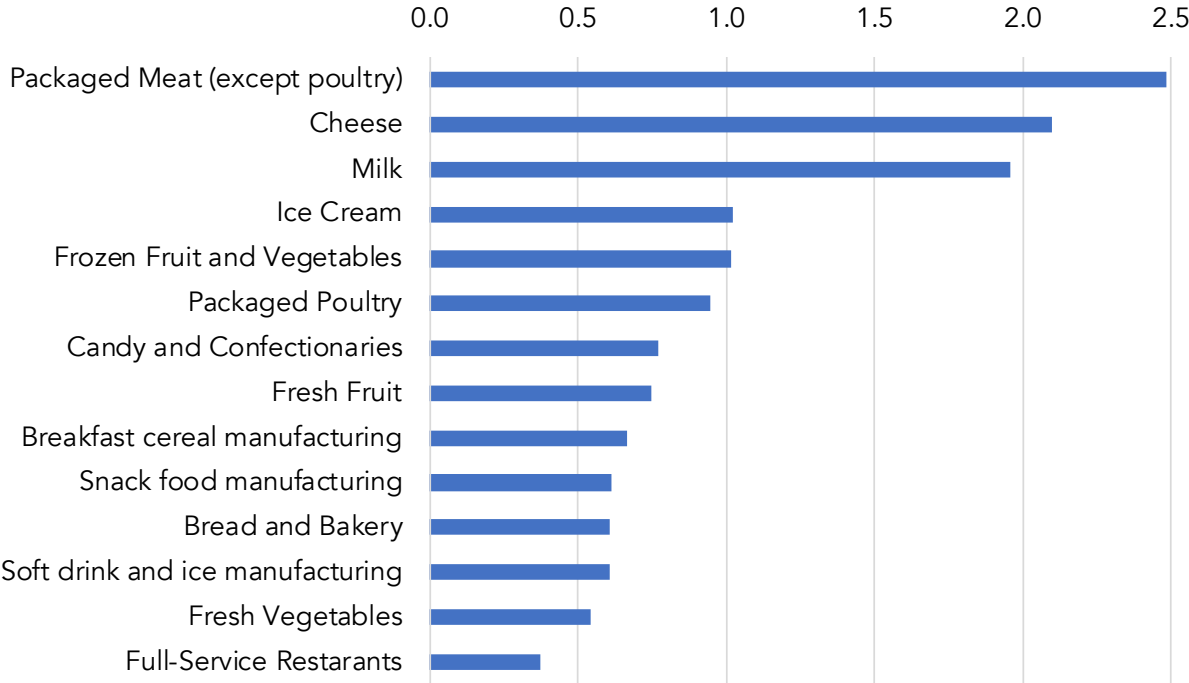
Note that while County procurement for this category is primarily for food services, Figure 18 is primarily focused around food types. This is because the majority of impacts related to the provision of food services occur during the production and transport of food products. One of the greatest opportunities to significantly reduce food-related impacts is substitution of high impact food types with low impact food types. A second and arguably more powerful action related to food is to avoid the wasting of all edible food and specifically the wasting of high-impact food types (i.e. meat and dairy). Based on types of services provided by the top vendors, two high-impact service types within Alameda County's food and food service purchasing are detailed in the following sections in order to highlight opportunities to reduce Alameda County's supply chain impacts.

They include:

- All other food and drinking places
- Packaged meat products

All other food and drinking places are the closest BEA Industrial Sector included in USEEIO to correctional food services provided by vendors within the County's correctional institutions. Packaged meat products are included to identify opportunities to reduce impacts related to beef production to inform County purchasing specifications.

FOOD AND DRINKING PLACES

Alameda County contracts for food services, primarily related to the care and custody of individuals housed in the County's juvenile and adult correctional facilities. Figure 19 compares supply chain activities within the operation of food and drinking places that result in large relative impacts. Many of these impacts are controlled or influenced by vendor operational practices.

- **Climate Change**: Production of meat and dairy products is the largest source of impacts; followed by electricity use during food preparation.
- **Human Respiratory**: On-farm diesel emissions from equipment used in the production of oilseed and grain products are the dominate sources of impacts.
- **Water**: On-farm water use for grain production (used directly and as animal feed) is the largest source of impact; followed by water used in electricity production; and on-farm use during production of meat and dairy products.
- **Human Toxicity**: Upstream vehicle fuel production and combustion in commercial and heavy-duty truck freight is the dominant source of impact; followed by production of oilseed products.

Figure 19: Percentage of total life-cycle impact, by supply chain activities for four impact metrics (%).
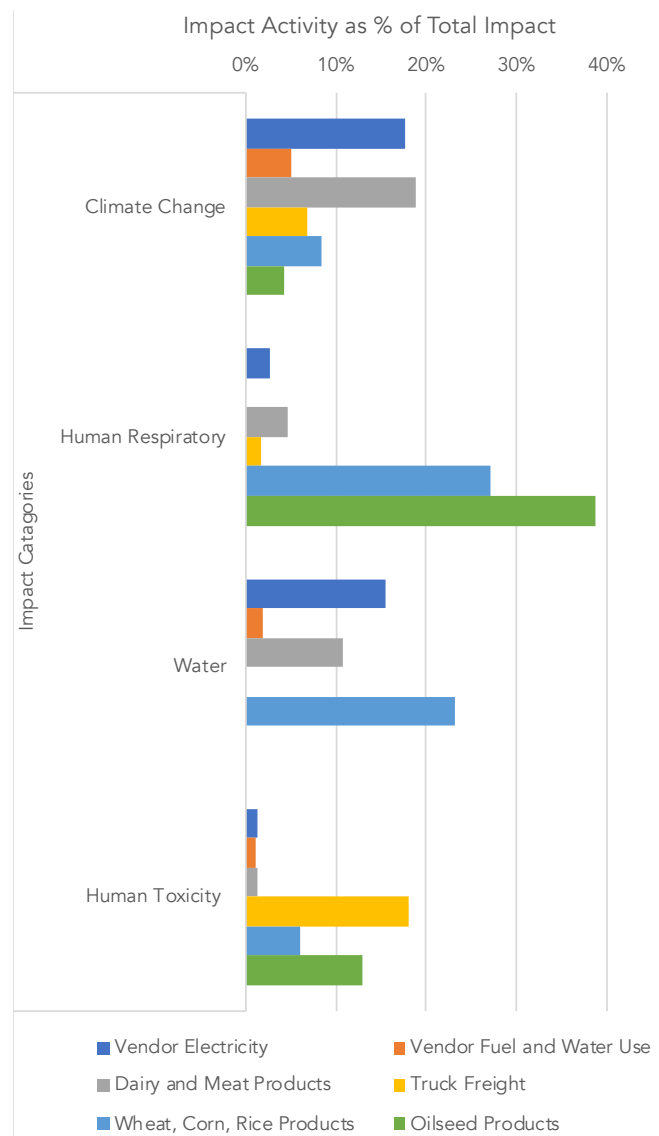
Opportunities to reduce local impacts:
Purchase energy efficient equipment and vehicles and practice conservation.
Reduce solid waste (especially the wasting of edible food).

Opportunities to reduce local + global impacts:
Ensure facilities are supplied with renewable electricity from local power provider.
Substitute lower impact, nutritional equivalents for dairy and meat products.
Explore opportunities to specify the sourcing of meat products from facilities that operate using best practices that reduce impacts associated with manure management.

PACKAGED MEAT PRODUCTS

Animal-based proteins, particularly beef, have the highest impact per dollar across multiple impact metrics. Figure 20 compares supply chain activities within packaged meat production that result in large relative impacts. Many of these impacts are controlled or influenced by vendor operational practices.

- **Climate Change**: On-farm methane emissions from cattle digestion and manure management are the dominate sources of impact.
- **Human Respiratory**: On-farm diesel emissions from farm equipment used in grain production and beef production are the largest sources of impact.
- **Water**: On-farm use during production of meat and grain production are the dominate sources of water use.
- **Human Toxicity**: Upstream vehicle fuel production and combustion in commercial and heavy-duty truck freight is the dominant source of impact.

The following sections outline opportunities to reduce impacts from Packaged Meat Production.

Figure 20: Percentage of Total Lifecycle Impact, by Supply Chain Activities for Four Impact Metrics (%).
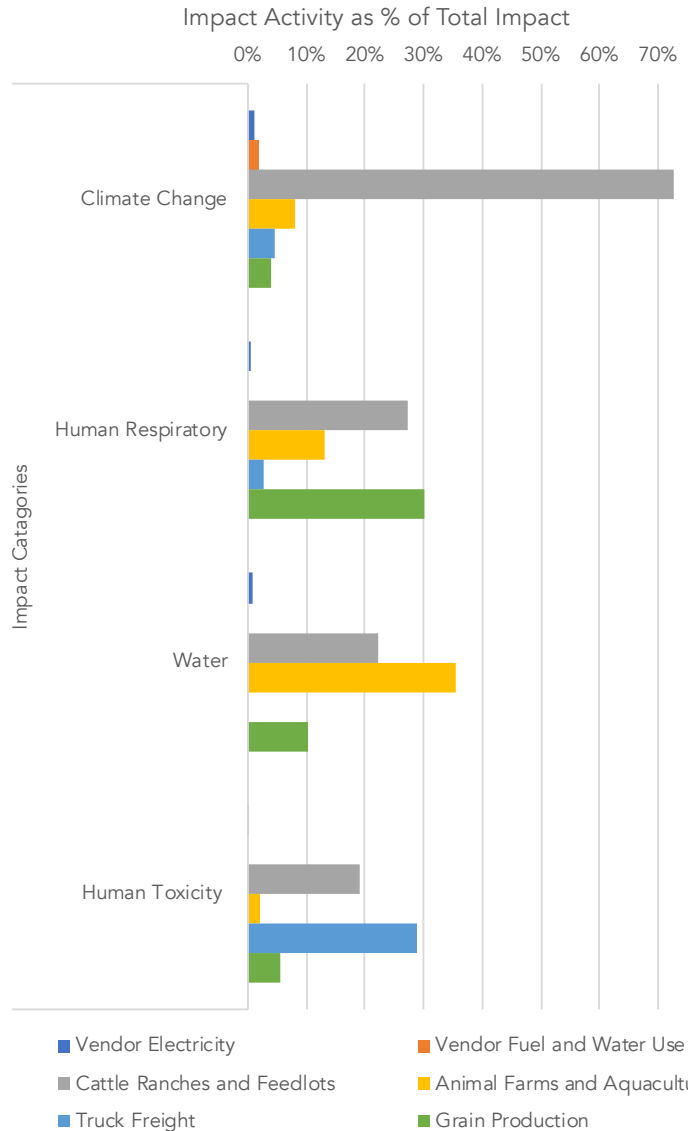
Opportunities to reduce local impacts:
Reduce solid waste (especially the wasting of edible meat products).

Opportunities to reduce local + global impacts:
Substitute lower impact, nutritional equivalents for dairy and meat products.
Explore opportunities to specify the sourcing of meat products from facilities that operate using best practices that reduce impacts associated with manure management.

Conclusions

Improving Community Health and Wellbeing

Production of goods and services purchased by Alameda County results in over three times the climate impact as compared to the County's greenhouse gas emissions inventory of government operations. The large scale of these supply chain impacts present an opportunity for bold action that can reduce the impacts related to delivering the critical government services it provides. The County has already made strides towards reducing supply chain impacts through its programming, such as certifying 10 new buildings as LEED Silver or higher, and consistently ranking within the Top 10 U.S. Green Fleets. Good Company conducted this analysis on behalf of the County to inform future programmatic efforts that will continue to place the County at the forefront of sustainability in order to benefit the health and wellbeing of its community.

Targeting Opportunities in County Purchasing

Across the impact metrics included in this report, two purchasing categories represent between 60-80% of the County's supply chain impacts:

- Professional services, including community-directed services that are a critical part of the social safety net
- Construction and maintenance of public facilities and infrastructure

These purchasing categories are the overwhelming areas of opportunity within County purchasing. Within professional services, the greatest impacts are the result of vendor use of electricity, fuel, freight services, and the production of meat and dairy products. While in construction, the greatest impacts are the result of vendor vehicle and equipment fuel use and the production of building materials. Local emissions from construction fuel use and the process (e.g. dust from demolition) are also a significant sources of local air pollution (e.g. particulate matter and smog).

Strategies to Reduce Impacts

The County and its vendors can partner to reduce impacts in these opportunity areas. This analysis of high-impact purchasing categories identifies discrete high-impact vendor activities that can reduce the County's supply chain impacts, including:

- Installation of energy efficient building equipment and energy conservation
- Purchase of renewable electricity
- Electrification of vehicles, both owned passenger vehicles and contracted freight
- Substitution of low-impact building materials (e.g. low-carbon cement substitutes)
- Reduce the wasting of edible food (especially meat and dairy)
- Substituting low-impact foods for high-impact foods (e.g. plant-based protein for beef)

By taking action in these areas, the County and its community of vendors will take strides towards meeting the Alameda County's vision for a prosperous and vibrant economy, safe and livable community, thriving and resilient population, and a healthy environment.

Appendix A – Top Purchasing Codes for High-Impact Depts

TOP 5 PURCHASING CODES FOR HIGH-IMPACT DEPARTMENTS

Table 7 shows the Top 5 purchasing codes for departments with greatest overall impacts. The colors on Table 7 show the relative impacts across all the Department tables. These tables are provided to aide in County employees outreach to specific departments.

Table 7: Top 5 purchasing codes for County departments with greatest overall impacts. *Notes: See legend below for information on color in graphics. Purchasing code specific percentages are calculated based on Countywide impact.

- Large impact
- Moderate impact
- Low impact

GENSA

Purchasing Code	Global Climate Change (kg CO2e)	%	Purchasing Code	Human Respiratory (kg PM2.5e)	%	Purchasing Code	Water Use (m3)	%	Purchasing Code	Human Toxicity (CTUh)	%	Purchasing Code	Smog Formation (kg O3e)	%	Purchasing Code	Acid Rain (kg SO2e)	%
CONS2	45,261,426	25.7%	CONS2	48,454	35.8%	ELECTRICITY	1,908,254	17.5%	CONS2	0.074	26.4%	CONS2	3,384,975	30.4%	CONS2	121,531	19.4%
ELECTRICITY	2,955,566	1.7%	ELECTRICITY	6,708	5.0%	CONS2	1,013,718	9.3%	FUEL1	0.012	4.4%	ELECTRICITY	711,265	6.4%	ELECTRICITY	75,475	12.0%
FUEL1	2,204,420	1.3%	BLDG1	1,282	0.9%	NATURAL GAS	80,117	0.7%	ELECTRICITY	0.008	2.9%	FUEL1	284,332	2.6%	FUEL1	7,253	1.2%
NATURAL GAS	2,110,461	1.2%	ENGN2	564	0.4%	ENGN2	54,335	0.5%	NATURAL GAS	0.004	1.5%	NATURAL GAS	92,518	0.8%	NATURAL GAS	4,741	0.8%
ENGN2	1,156,524	0.7%	FUEL1	547	0.4%	FUEL1	37,376	0.3%	BLDG1	0.002	0.7%	BLDG1	80,220	0.7%	ENGN2	3,454	0.6%
Top 5 Total	53,688,397			57,553			3,093,800			0.101			4,553,310			212,454	
Cty-Wide Total	176,214,693	30%		135,265	43%		10,895,415	28%		0.280	36%		11,125,043	41%		627,788	34%
Dept Total	59,764,177	90%		60,819	95%		3,342,573	93%		0.110	91%		4,892,591	93%		229,370	93%

SOCSA

Purchasing Code	Global Climate Change (kg CO2e)	%	Purchasing Code	Human Respiratory (kg PM2.5e)	%	Purchasing Code	Water Use (m3)	%	Purchasing Code	Human Toxicity (CTUh)	%	Purchasing Code	Smog Formation (kg O3e)	%	Purchasing Code	Acid Rain (kg SO2e)	%
CMSVC	18,604,091	10.6%	CMSVC	11,179	8.3%	CMSVC	1,291,726	11.9%	CMSVC	0.027	9.7%	CMSVC	898,868	8.1%	CMSVC	82,476	13.1%
SVCS1	3,762,857	2.1%	SVCS1	1,739	1.3%	SVCS1	197,874	1.8%	SVCS1	0.005	1.8%	SVCS1	213,961	1.9%	SVCS1	11,423	1.8%
PRNT2	582,291	0.3%	PRNT2	277	0.2%	PRNT2	29,554	0.3%	PRNT2	0.001	0.3%	PRNT2	32,317	0.3%	PRNT2	1,717	0.3%
PAPR1	294,225	0.2%	PAPR1	215	0.2%	PAPR1	17,098	0.2%	PAPR1	0.001	0.3%	TRANS	23,003	0.2%	PAPR1	1,417	0.2%
OFFC	220,970	0.1%	OFFC	123	0.1%	OFFC	11,983	0.1%	TRANS	0.001	0.2%	PAPR1	20,106	0.2%	OFFC	734	0.1%
Top 5 Total	23,464,435			13,533			1,548,234			0.034			1,188,255			97,765	
Cty-Wide Total	176,214,693	13%		135,265	10%		10,895,415	14%		0.280	12%		11,125,043	11%		627,788	16%
Dept Total	24,652,337	95%		14,070	96%		1,603,401	97%		0.037	94%		1,263,783	94%		101,455	96%

BHSVC

Purchasing Code	Global Climate Change (kg CO2e)	%	Purchasing Code	Human Respiratory (kg PM2.5e)	%	Purchasing Code	Water Use (m3)	%	Purchasing Code	Human Toxicity (CTUh)	%	Purchasing Code	Smog Formation (kg O3e)	%	Purchasing Code	Acid Rain (kg SO2e)	%
MED3	20,231,471	11.5%	MED3	8,870	6.6%	MED3	1,800,962	16.5%	MED3	0.031	11.0%	MED3	1,062,723	9.6%	MED3	55,887	8.9%
SVCS1	287,466	0.2%	SVCS1	133	0.1%	SVCS1	15,117	0.1%	SVCS1	0.000	0.1%	SVCS1	16,346	0.1%	SVCS1	873	0.1%
COMP4	114,564	0.1%	FOOD2	108	0.1%	FOOD2	12,375	0.1%	COMP4	0.000	0.1%	COMP4	5,368	0.0%	FOOD2	468	0.1%
TRAIN	99,497	0.1%	COMP4	48	0.0%	COMP4	5,873	0.1%	TRAIN	0.000	0.0%	TRAIN	4,625	0.0%	COMP4	322	0.1%
FOOD2	73,212	0.0%	FOOD1	44	0.0%	PHRM3	5,850	0.1%	PAPR1	0.000	0.0%	TONR1	4,017	0.0%	TRAIN	257	0.0%
Top 5 Total	20,806,210			9,203			1,840,178			0.0316			1,093,079			57,807	
Cty-Wide Total	176,214,693	12%		135,265	7%		10,895,415	17%		0.2800	11%		11,125,043	10%		627,788	9%
Dept Total	21,298,875	98%		9,465	97%		1,868,614	98%		0.0324	97%		1,121,556	97%		59,399	97%

SHERF

Purchasing Code	Global Climate Change (kg CO2e)	%	Purchasing Code	Human Respiratory (kg PM2.5e)	%	Purchasing Code	Water Use (m3)	%	Purchasing Code	Human Toxicity (CTUh)	%	Purchasing Code	Smog Formation (kg O3e)	%	Purchasing Code	Acid Rain (kg SO2e)	%
FOOD2	5,968,844	3.4%	FOOD2	8,767	6.5%	FOOD2	1,008,949	9.3%	FOOD2	0.008	2.7%	FOOD2	253,825	2.3%	FOOD2	38,182	6.1%
MED3	2,590,637	1.5%	MED3	1,136	0.8%	MED3	230,613	2.1%	MED3	0.004	1.4%	MED3	136,081	1.2%	MED3	7,156	1.1%
LAW	662,818	0.4%	LAW	391	0.3%	LAW	33,653	0.3%	LAW	0.001	0.3%	LAW	38,421	0.3%	LAW	2,170	0.3%
TRAIN	318,856	0.2%	TRAIN	134	0.1%	TRAIN	14,953	0.1%	FURN2	0.001	0.2%	TRAIN	14,821	0.1%	TRAIN	824	0.1%
JANI1	213,952	0.1%	FURN2	104	0.1%	CLOTH	13,844	0.1%	TRAIN	0.000	0.1%	FURN2	12,387	0.1%	SVCS1	535	0.1%
Top 5 Total	9,755,108			10,532			1,302,012			0			455,536			48,868	
Cty-Wide Total	176,214,693	6%		135,265	8%		10,895,415	12%		0	5%		11,125,043	4%		627,788	8%
Dept Total	12,759,294	76%		12,277	86%		1,459,006	89%		0.018	74%		633,975	72%		57,843	84%

PBWKS

Purchasing Code	Global Climate Change (kg CO2e)	%	Purchasing Code	Human Respiratory (kg PM2.5e)	%	Purchasing Code	Water Use (m3)	%	Purchasing Code	Human Toxicity (CTUh)	%	Purchasing Code	Smog Formation (kg O3e)	%	Purchasing Code	Acid Rain (kg SO2e)	%
CONS2	7,276,969	4.1%	CONS2	7,790	5.8%	CONS2	162,982	1.5%	CONS2	0.012	4.2%	CONS2	544,224	4.9%	CONS2	19,539	3.1%
SVCS1	587,463	0.3%	ROAD2	2,704	2.0%	ELECTRICITY	136,118	1.2%	VEHL3	0.001	0.3%	ELECTRICITY	50,735	0.5%	ELECTRICITY	5,384	0.9%
DISP1	521,347	0.3%	DISP1	587	0.4%	VEHL3	35,009	0.3%	ROAD1	0.001	0.3%	ROAD2	39,665	0.4%	SVCS1	1,783	0.3%
ROAD2	502,884	0.3%	ELECTRICITY	478	0.4%	SVCS1	30,892	0.3%	SVCS1	0.001	0.3%	SVCS1	33,404	0.3%	ROAD2	1,401	0.2%
ROAD1	493,331	0.3%	DISP2	282	0.2%	COUNS	24,815	0.2%	ROAD2	0.001	0.3%	ROAD1	30,669	0.3%	COUNS	1,204	0.2%
Top 5 Total	9,381,995			11,841			389,816			0.0151			698,697			29,312	
Cty-Wide Total	176,214,693	5%		135,265	9%		10,895,415	4%		0.2800	5%		11,125,043	6%		627,788	5%
Dept Total	12,176,344	77%		13,481	88%		491,443	79%		0.019	77%		851,819	82%		37,204	79%

Appendix B – Impacts by County Purchasing Codes

IMPACTS BY PURCHASING CODES

Table 8 shows the Top 20 County purchasing codes by impact. Based on the analysis, the Top 20 codes make up about 90% of the impacts and the Top five codes make up about 60% of the total impacts.

> The codes with the greatest impacts include:
>
> **Construction Services (CONS2)**: Facility construction / maintenance and A&E services.
> **Medical Providers (MED3)**: Offices of physicians and other related medical services.
> **Community Services (CMSVC)**: Community food, housing, and other relief services, including rehabilitation services.
> **Services (SVCS1)**: Community medical services including counseling and other professional consulting services.
> **Food Services (FOOD2)**: Food purchases for youth and adult correctional services.

While the following codes also show significant impacts, the decision was made by County staff not to focus on these codes in the high-impact categories because the county already has significant programming to address impacts related to fuel (electric vehicle purchases) and electricity purchases.

- Fuel Purchase (FUEL1) – County fuel and oil purchases.
- Electricity Purchase (ELECTRICITY) – County electricity purchases.

Likewise, County water contracts were found to result in significant impacts, but the County has limited ability to influence these purchases and therefore water is not considered in the high-impact categories.

- Water Purchase (WATER) – Drinking water purchases and related services for community consumption.

Table 8: Top 20 purchasing codes by impact category.

Purchasing Code	Global Climate Change kg CO2e	%	Purchasing Code	Human Respiratory kg PM2.5e	%	Purchasing Code	Water Use m3	%	Purchasing Code	Human Toxicity CTUh	%	Purchasing Code	Smog Formation kg O3e	%	Purchasing Code	Acid Rain kg SO2e	%
CONS2	53,670,802	30.5%	CONS2	57,456	42.5%	MED3	2,191,548	20.1%	CONS2	0.088	31.3%	CONS2	4,013,889	36.1%	CONS2	144,111	23.0%
MED3	24,619,194	14.0%	CMSVC	13,543	10.0%	ELECTRICITY	2,044,372	18.8%	MED3	0.037	13.4%	MED3	1,293,202	11.6%	CMSVC	99,919	15.9%
CMSVC	22,538,875	12.8%	SVCS1	11,903	8.8%	CMSVC	1,564,927	14.4%	CMSVC	0.033	11.7%	CMSVC	1,088,980	9.8%	ELECTRICITY	80,859	12.9%
SVCS1	17,530,490	9.9%	MED3	10,794	8.0%	FOOD2	1,228,811	11.3%	SVCS1	0.026	9.4%	SVCS1	1,057,825	9.5%	MED3	68,008	10.8%
WATER	7,331,487	4.2%	FOOD2	10,678	7.9%	CONS2	1,202,063	11.0%	FUEL1	0.014	5.0%	ELECTRICITY	762,000	6.8%	SVCS1	48,285	7.7%
FOOD2	7,269,527	4.1%	ELECTRICITY	7,187	5.3%	SVCS1	955,185	8.8%	FOOD2	0.009	3.3%	FUEL1	319,786	2.9%	FOOD2	46,503	7.4%
ELECTRICITY	3,166,390	1.8%	ROAD2	2,704	2.0%	COUNS	93,651	0.9%	ELECTRICITY	0.009	3.1%	FOOD2	309,137	2.8%	WATER	16,429	2.6%
FUEL1	2,479,293	1.4%	DISP1	2,200	1.6%	VEHL3	80,555	0.7%	WATER	0.007	2.4%	WATER	205,594	1.8%	CHEM2	9,341	1.5%
CHEM2	2,229,769	1.3%	WATER	2,009	1.5%	NATURAL GAS	73,368	0.7%	NATURAL GAS	0.004	1.5%	CONS1	116,035	1.0%	FUEL1	8,157	1.3%
NATURAL GAS	2,122,023	1.2%	CONS1	1,661	1.2%	WATER	68,015	0.6%	CHEM2	0.003	1.1%	CHEM2	114,753	1.0%	NATURAL GAS	4,767	0.8%
DISP1	1,954,421	1.1%	BLDG1	1,394	1.0%	COMP1	66,980	0.6%	CONS1	0.003	0.9%	NATURAL GAS	93,025	0.8%	COUNS	4,544	0.7%
CONS1	1,551,534	0.9%	CHEM2	1,277	0.9%	CHEM2	55,520	0.5%	DISP1	0.002	0.9%	COMP1	89,005	0.8%	COMP1	4,403	0.7%
COUNS	1,477,692	0.8%	DISP2	673	0.5%	ENGN2	53,228	0.5%	COMP1	0.002	0.8%	TRANS	88,556	0.8%	CHEM1	4,279	0.7%
COMP1	1,469,538	0.8%	COUNS	645	0.5%	FOOD1	52,767	0.5%	BLDG1	0.002	0.8%	BLDG1	87,241	0.8%	CONS1	4,166	0.7%
ENGN2	1,181,745	0.7%	COMP1	636	0.5%	PRNT2	45,080	0.4%	PAPR1	0.002	0.7%	ENGN2	64,512	0.6%	PAPR1	3,735	0.6%
BLDG1	1,161,608	0.7%	FUEL1	615	0.5%	PAPR1	44,313	0.4%	TRANS	0.002	0.7%	COUNS	60,832	0.5%	ENGN2	3,529	0.6%
PRNT2	1,039,670	0.6%	CHEM1	585	0.4%	OFFC	42,036	0.4%	OFFC	0.002	0.6%	DISP1	57,978	0.5%	BLDG1	3,319	0.5%
CHEM1	1,021,447	0.6%	ENGN2	576	0.4%	FUEL1	38,581	0.4%	PRNT2	0.002	0.6%	PRNT2	57,702	0.5%	PRNT2	3,065	0.5%
WATER2	835,751	0.5%	PAPR1	566	0.4%	BLDG1	38,070	0.3%	ENGN2	0.002	0.6%	OFFC	56,244	0.5%	OFFC	2,713	0.4%
OFFC	817,142	0.5%	PRNT2	495	0.4%	COMP4	35,839	0.3%	COUNS	0.002	0.6%	PAPR1	53,012	0.5%	DISP1	2,667	0.4%
Top 20 Total	155,468,397	88%		127,595	94%		9,974,910	92%		0.25	89%		9,989,306	90%		562,800	90%
Grand Total	176,214,693	100%		135,265	100%		10,895,415	100%		0.28	100%		11,125,043	100%		627,788	100%

Appendix C – Impacts by Purchase Order Types

IMPACTS BY PURCHASE ORDER TYPE

Table 9 shows the Top Five Purchase Order (PO) Types by impact. The Top Five PO Types make up over 90% of the impacts. There are a relatively small number of codes consistently near the top. These include:

- Board Approved (BDAP) – Issued by Auditor-Controller upon Board approval for services >$25,000.
- Community-Based Organization Board Approved (CBO) – Issued by Alameda County buyer upon Board approval for Community-Based Organization services >$25,000.
- GSA Board Approved (PBAP) – GSA-managed procurement process upon Board approval for services >$25,000.
- GSA Contract (PCNT) – GSA-Buyer issued contract for goods, typically contracted for multiple years.
- GSA Contracted Utility Services (UTILITY) – Alameda County contracts and purchase of electricity, natural gas, and water.

Table 9: Top five purchase order types by impact category.

Purchasing Code	Global Climate Change kg CO2e	%	Purchasing Code	Human Respiratory kg PM2.5e	%	Purchasing Code	Water Use m3	%	Purchasing Code	Human Toxicity CTUh	%	Purchasing Code	Smog Formation kg O3e	%	Purchasing Code	Acid Rain kg SO2e	%
BDAP	85,858,705	48.7%	BDAP	81,010	59.9%	CBO	3,731,617	34.2%	BDAP	0.129	45.9%	BDAP	5,552,511	49.9%	BDAP	258,474	41.2%
CBO	49,632,148	28.2%	CBO	25,283	18.7%	BDAP	3,237,175	29.7%	CBO	0.072	25.9%	CBO	2,550,557	22.9%	CBO	172,719	27.5%
PBAP	11,729,849	6.7%	PBAP	7,811	5.8%	UTILITY	2,133,291	19.6%	PCNT	0.028	10.2%	UTILITY	878,462	7.9%	UTILITY	87,499	13.9%
PCNT	11,421,377	6.5%	UTILITY	7,787	5.8%	PBAP	741,087	6.8%	PBAP	0.017	6.1%	PCNT	838,510	7.5%	PCNT	38,472	6.1%
UTILITY	6,124,164	3.5%	PCNT	5,409	4.0%	PCNT	448,062	4.1%	UTILITY	0.014	4.9%	PBAP	601,260	5.4%	PBAP	34,913	5.6%
Top 5 Total	164,766,243	94%		127,300	94%		10,291,231	94%		0.26	93%		10,421,300	94%		592,077	94%
Grand Total	176,214,693	100%		135,265	100%		10,895,415	100%		0.28	100%		11,125,043	100%		627,788	100%

Large impact
Moderate impact
Low impact

Appendix D – Impacts for Purchase Card Transactions

PURCHASE CARD IMPACTS

Table 10 shows the impacts associated with purchase cards (p-cards). These impacts are included in the Countywide impacts. Based on the analysis, these purchases are very small relative to voucher purchases, about 1% of the total. The largest P-card impacts result from building construction and maintenance-related purchases.

Table 10: Purchase card impacts by purchasing category.

Purchasing Category	Global Climate		Human Respiratory		Water Use		Human Toxicity		Smog Formation		Acid Rain	
	kg CO2e	%	kg PM2.5e	%	m3	%	CTUh	%	kg O3e	%	kg SO2e	%
Construction and Maintenance	2,327,547	1%	2,490	2%	52,197	0%	0.0038	1%	174,009	2%	6,250	1%
Food	2,949	0%	3	0%	165	0%	0.0000	0%	168	0%	11	0%
Office Supplies & Equipment	4,398	0%	3	0%	182	0%	0.0000	0%	316	0%	13	0%
Other Goods	14,898	0%	12	0%	566	0%	0.0000	0%	996	0%	42	0%
Professional Services	10,973	0%	10	0%	324	0%	0.0000	0%	763	0%	30	0%
Purchased Fuels & Energy		0%		0%		0%		0%		0%		0%
Transportation - Equipment and Services	37,537	0%	14	0%	468	0%	0.0001	0%	1,861	0%	61	0%
Grand Total	176,214,693	1%	142,008	2%	12,813,523	0%	0.2883	1%	11,125,043	2%	627,788	1%

■ Large impact
■ Moderate impact
■ Low impact

Appendix E – Additional Details for Analytical Approach

Analytical Approach

Good Company used an analytical approach for assessing the supply chain impacts of Alameda County's spend that is similar to that documented in West Coast Climate and Material Management Forum's *Calculating Supply Chain Greenhouse Gas Emissions for Institutional Purchasing: A How-to Guide*.[7] The *How-to Guide* was created to guide local governments and other institutions through data collection, calculation and reporting of supply chain GHG emissions.

The primary difference between the *How-to Guide* and this analysis is use of U.S. Environmental Protection Agency's *United States Environmentally-Extended Input-Output* (USEEIO) data model as the source of impact factors instead of the Carnegie Mellon Green Design Institute's model called (and found at) www.eiolca.net. In addition, the *Guide* focuses exclusively on calculating GHG emissions, but the same approach may be used with any of the environmental impact factors included in the USEEIO model.

ANALYTICAL PROCESS STEPS

- **Step 1:** Reviewed Alameda County 2015 financial vendor and P-card master data sets (Excel) and made appropriate exclusions so as to avoid double counting with Alameda County's Operational GHG Inventory. See How-to Guide for more on exclusions.
- **Step 2**: Assigned U.S. Department of Commerce, Bureau of Economic Analysis (BEA) Industry Classifications (used in USEEIO) to Alameda County's purchasing codes to create a Master Data Set Crosswalk in Excel.
- **Step 3:** Capture Impact Factors from USEEIO
  - Using USEEIO (opened within openLCA)>
  - Select "Processes" in dropdown on left-hand side of openLCA window. Note: USEEIO lists processes by BEA code (economic sector).
    - Once a sector is chosen, select > "Create product system" [Create product system]
    - Select "Finish"
  - Click on the newly created "Product System". It will be named whatever you selected in the previous window. It is located in a separate tier of USEEIO dropdown on left-hand side of openLCA window.
  - Within Calculation Properties>
    - Impact Assessment Method > Impact Potential or Resource Use
    - Calculation Type > Analysis (selecting Analysis instead of "Quick Results" provides additional details on direct versus upstream impacts)

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[7] Available for download at https://westcoastclimateforum.com/cfpt/HowTo

- Select "Finish"
- **Step 4:** Impact Assessment for appropriate BEA data was exported into Excel files. The data used in the analysis is "unit of impact / 2013 $". 2013 is the data year used in the USEEIO model.
  - Values for Impact Metrics used in this analysis were added into the Master Data Set Crosswalk and used to calculate impacts for Countywide Voucher and P-card analyses.

SUPPLY CHAIN TIER ANALYSIS – DIRECT VS. UPSTREAM IMPACTS

The Impact Assessment window for a specific Product Systems is also used to assess details for high-impact categories within Alameda County's 2015 spend.

The following process steps were used:

- "Impact Analysis" tab. Provides details about root sources and relative contributions of Product System life-cycle impacts. This view provides quick lifecycle impact factors (unit of impact / $) but does not differentiate between direct and upstream impacts. For this analysis, the cut-off value was set to 0.1 (or 90% of impacts).
- "Process Results" tab. Provides Direct and Upstream relative contributions for impacts.
- "Contribution Tree" tab. Provides details about root sources and relative contributions of direct and upstream impacts. Contribution tree is based on the same data as Impact Analysis but is subtotaled differently. Subtotals here breakdown process contributions to flows and impact categories.

For additional details, see openLCA 1.7 Comprehensive User Manual.[8]

USEEIO MODEL ADJUSTMENTS

The impact factors as reported by USEEIO were adjusted in the following ways:

a) **Overall Adjustments:**
- Consumer Price Index (CPI) is used to adjust the USEEIO values (based on 2013 dollars) to align with Alameda County's 2015 spend data (2015 dollars).
- The USEEIO model is based on producer prices which are similar to wholesale prices. These values were used without adjustment for the fraction of retail purchases with the assumption that the majority of Alameda County's purchased goods are purchased at closer to wholesale prices than retail.

b) **Electricity Impact Coefficients Adjustments:**
- Electricity emissions included in this analysis are only the Scope 3, upstream emissions associated with electricity generation. Scope 2 electricity emissions associated with electricity used in County government operations are not included.
- For the initial Countywide analysis to identify high impact categories, USEEIO electricity factors are adjusted for the difference between impacts from the U.S. electricity grid (USEEIO uses U.S. average electricity impacts) and the California's regional electricity grid (CAMX). The values used to make the adjustment are taken from EPA's eGRID 2016 and are applied to the Scope 3, upstream emissions fraction (energy extraction, refinement, and transport) of fuels used during electricity generation.

[8] Downloaded 11/2018 from https://www.openlca.org/wp-content/uploads/2017/11/openLCA1.7_User_Manual_v1.1.pdf

- In the detailed analysis for the high-impact purchasing categories, USEEIO electricity factors were further adjusted using PG&E data to account for impacts from Alameda County's direct vendors.

c) Vehicle Fuels and Natural Gas
- USEEIO upstream factors for vehicle fuels and natural gas production were adjusted using values from California Air Resource Board's (ARB) Low-Carbon Fuel Standard documentation.[9]

SENSITIVITY DISCUSSION

The following describe areas of sensitivity in these types of analyses:

- **Assignment of BEA codes to organizational purchasing codes.** The BEA sectors in USEEIO have different impact intensities; therefore, assignment in the analysis crosswalk should be reviewed and discussed by multiple, knowledgeable parties and custom factors should be calculated when appropriate. For example, a custom factor was created for food as described in the High-impact Categories food section. During this analysis, County staff and the consultant each reviewed the cross walk three times during the course of the analysis to ensure the most accurate match possible between BEA sectors and County purchasing codes.
- **Electricity impact factors for a regional grid or local utility can be very different from the U.S. average**; therefore, adjustments should be made, particularly when considering how to reduce impacts from local County vendor (i.e. Tier 1 vendors). For those in the California regional grid, the impacts associated with electricity use are likely much lower than is reported by the USEEIO model which uses national average data.
- **USEEIO 2013 model year versus data year**. Impact factors should be adjusted to account for inflation using the Consumer Price Index. If this step is not taken, impacts will be overestimated.
- **Producer prices used in USEEIO model versus purchaser prices.** USEEIO prices do not include the markup for wholesale or retail goods. Markups have the effect of *lowering* the impact intensity of goods, as wholesale and retail operations are typically much less impact intensive compared to production of material goods. USEEIO does not currently include a purchaser price model and therefore the producer model is used and likely, slightly overestimating total impacts.

Figure 21 provides a screenshot of the USEEIO as viewed through openLCA. OpenLCA provides a wide range of features for LCA practitioners, but for the purpose of this analysis, it was simply used as an interface to access impact factors contained in the USEEIO dataset.[10] The impact factors were combined in a single Excel spreadsheet, along with the financial data and the analysis crosswalk to calculate impacts.

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[9] Available 11/2018 from https://www.arb.ca.gov/fuels/lcfs/fuelpathways/pathwaytable.htm

[10] For those interested, see the openLCA user guide downloaded 6/2018 at https://www.openlca.org/wp-content/uploads/2017/11/openLCA1.7_User_Manual_v1.1.pdf

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Figure 21: Screenshot of USEEIO as viewed in openLCA.