

About the Supply Chain Greenhouse Gas Emission Factors v1.4.0 NAICS-6 Datasets

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Summary

This document describes the Supply Chain Greenhouse Gas Emission Factors v1.4.0 NAICS-6 U.S. commodity datasets. Just like for the previous version, v1.3.0 (W. Ingwersen 2024), the datasets comprise greenhouse gas (GHG) emission factors (Factors) for 1,016 U.S. commodities as defined by the 2017 version of the North American Industry Classification System (NAICS). However, two core updates were made: (1) the Factors are built with U.S. GHG emission data for 2023, and (2) IPCC AR6 global warming potentials are used instead of AR5.

Factors are given for all NAICS-defined commodities at the 6-digit level except for electricity, government, and households. Each record consists of three factor types as in the previous releases: Supply Chain Emissions without Margins (SEF), Margins of Supply Chain Emissions (MEF), and Supply Chain Emissions with Margins (SEF+MEF). One set of Factors provides kg carbon dioxide equivalents (CO₂e) per 2024 U.S. dollar (USD) for all GHGs combined using 100-yr global warming potentials to calculate the equivalents. In this dataset there is one SEF, MEF and SEF+MEF per commodity. The other dataset of Factors provides kg of each unique GHG emitted per 2024 dollar per commodity without the CO₂e calculation. The dollar in the denominator of all factors uses purchaser prices.

Background

The Supply Chain GHG Emission Factors estimate the GHG emissions indirectly and directly associated with a U.S. commodity per dollar value over specific life cycle phases (W. Ingwersen and Li 2020a). Sets of these Factors were originally published for years 2010-2016 and subsequently revised twice (W. Ingwersen and Li 2020b; W. W. Ingwersen and Li 2022a, 2022b). The v1.2 dataset, which was based on the 2019 GHG data, was released in 2023 (W. Ingwersen 2023). The v1.3.0 dataset, which was based on the 2022 GHG data, was released in 2024 (W. Ingwersen 2024).

The Factors are created using a combination of two models - a sector attribution model for GHGs (SAM-GHG, formerly referred to as the National GHG Industry Attribution Model), and the U.S. Environmentally-Extended Input-Output (USEEIO) model. The SAM-GHG produces totals of the direct emissions by detailed industries and is used as an input into a selected USEEIO model. The USEEIO model produces the direct and then indirect emission intensities following data year adjustments and calculations. The final factors are adjusted to reflect purchaser prices, which are useful with expenditure data.

The first set of Factors described here are in CO₂e. These Factors are intended for reporting GHGs embodied in purchases or what is referred to in the GHG Protocol standards as Scope 3, category 1 “Purchased goods and services” and category 2 “Capital goods” (WRI and WBCSD 2013; USEPA 2024). Some may choose to use them for other Scope 3 categories as well. The second set of Factors, provided by gas, are complimentary data that enable greater flexibility and resolution in accounting and reporting GHGs. Providing factors by gas allows users to track and report GHGs in expenditure data per gas. Leaving the gases in kg of mass allows users to choose global warming potentials of their choice in performing CO₂e calculations.

The Factors are primarily intended for use in Scope 3 GHG accounting and reporting. The basic use of the Factors is to match a Factor category with an item that has been purchased and is classified by the matching NAICS-6 codes, and multiply the respective Factor by the dollar amount spent. Such a calculation will result in direct and indirect GHG emissions associated with the given USD amount of a good or service.

Methods

The Factors are derived using the methodology described in the 2020 report (W. Ingwersen and Li 2020a), except where noted here.

The Factors are constructed using a more recent SAM-GHG model by NAICS-6 Industry (Young et al. 2025) that was applied to GHG emissions for year 2023 given by the most recent U.S. Greenhouse Gas Inventory (U.S. EPA 2025). This dataset includes emissions totals for carbon dioxide, methane, nitrous oxide, carbon tetrafluoride, HFC-125, HFC-134a, HFC-143a, HFC-227ea, HFC-236fa, HFC-32, sulfur hexafluoride, HFC-23, hexafluoroethane, nitrogen trifluoride, perfluorocyclobutane, and perfluoropropane. All of these GHGs are used in Factor construction.

Standard names for the GHGs are taken from the Federal LCA Commons Elementary Flow List (FEDEFL) v1.3.2 (W. Ingwersen et al. 2021).

The USEEIO model created, USEEIOv2.6.0-phoebe-23, is a commodity-based model, with a total requirements matrix prepared using the same modeling assumptions used for USEEIO v2.0 (W. Ingwersen et al. 2022). The economic components of the USEEIO model use the 2017 benchmark detailed Make and Use tables, which became available as part of the 2023 comprehensive industry account updates (BEA 2023).

USEEIOv2.6.0-phoebe-23 has additional resolution in the Waste and Remediation sector that was not available in the model underlying the v1.3.0 factors. This is the same Waste and Remediation sub-industry detail that was provided for USEEIO v2.0, but the data have been updated to be compatible with the updated Make and Use tables.

For the Factors in CO₂e, the 100-yr global warming potentials (GWPs) from the IPCC 6th Assessment report (AR6) are used to convert GHGs into CO₂e. The dataset of the GWPs used was part of a release of IPCC GWPs from the 4th through the 6th report (Young, Cashman, and Ingwersen 2023). These GWPs are in the form of characterization factors that have already been aligned with the FEDEFL.

These Factors are derived from the raw N matrix of the underlying USEEIO model. The N matrix contains indirect plus direct CO₂e per commodity in kgCO₂e per USD. The other set of Factors that are presented in kg per GHG are drawn from the M matrix. The M matrix contains indirect plus direct GHGs by gas per commodity in kg GHG per USD. The M and N matrices are further described in the USEEIO v2.0 documentation (W. Ingwersen et al. 2022).

The raw values from the underlying USEEIO model M or N matrices are adjusted to be in purchaser prices in 2024 USD using the model Φ and ρ matrices as described in the USEEIO v2.0 documentation (W. Ingwersen et al. 2022). Commodities for which all factors have 0 values are dropped. Factors for USEEIO sectors representing

government (G*), special sectors used for input-output table balances (S*), and those for the electricity sector (221100) are dropped. Government sectors were not needed for the designated use case, and electricity factors were dropped because estimation of GHG emissions from electricity is part of Scope 2 in the GHG Protocol; these factors are intended, as specified above, for limited applications in Scope 3 accounting. The remaining factors are mapped from USEEIO code to NAICS 2017 6-digit codes (U.S. Census Bureau 2021). Where more than one USEEIO code maps to a single NAICS 2017 sector, a monetary output-weighted approach is used to average the factors using the commodity output for the target year of 2023 as the weighting factor. This mainly applies to the construction sector commodities.

Model validation checks were performed for the USEEIO model underlying these Factors, following the same economic and environmental flows validation procedures used to validate the USEEIO v2.0 model (W. Ingwersen et al. 2022).

A comparison of the Factors to the previous version v1.3.0 (W. Ingwersen 2023) was performed. The dollar years in the denominator of v1.4.0 and v1.3.0 are different – v1.4.0 Factors use 2024 USD, v1.3.0 factors use 2022 USD. However, this difference was left as is for this comparison, since the objective was to show the difference between published versions without further adjustment.

Results

The dataset provides sets of factors including Supply Chain Emissions Factors (SEFs), Margin Emission Factors (MEFs), and Supply Chain Emission Factors + Margin Emission Factors (SEF+MEF) for 1016 commodities defined by unique 2017 6-digit NAICS codes. These represent 392 unique sets (SEF, MEF, SEF+MEF) of factors, one unique set for each relevant USEEIO model code, as these sets of Factors are the same for each NAICS code corresponding to the same USEEIO code.

Table 1 shows the distributions of the SEFs, MEFs, and combined Factors. Among non-zero factors, the range of factor values is 0.026 - 7.417 kg CO2e/\$, with a median value of 0.1585 and a mean of 0.2748 indicating that most combined factors are < 0.2748 kg CO2e/\$. 75% of SEFs are less than 0.298 kg CO2e per USD. MEFs are non-zero for 45% of commodities. MEFs are in all cases less than the corresponding SEFs, and therefore the SEFs+MEFs are most influenced by the corresponding SEF.

Table 1: Distributions of Factor values by Factor Types.

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Supply Chain Emission Factors without Margins	0.024	0.098	0.1410	0.2581	0.2605	7.417
Margins of Supply Chain Emission Factors	0.000	0.000	0.0000	0.0167	0.0310	0.121
Supply Chain Emission Factors with Margins	0.026	0.100	0.1585	0.2748	0.2980	7.417

Table 2 lists the 20 highest Factors.

Table 2: Top 20 Supply Chain Emission Factors with Margins. Unit is kg CO2e per USD 2024

2017 NAICS Code	2017 NAICS Title	Supply Chain Emission Factors without Margins	Margins of Supply Chain Emission Factors	Supply Chain Emission Factors with Margins	Reference USEEIO Code
562212	Solid Waste Landfill	7.417	0.000	7.417	562212

2017 NAICS Code	2017 NAICS Title	Supply Chain Emission Factors without Margins	Margins of Supply Chain Emission Factors	Supply Chain Emission Factors with Margins	Reference USEEIO Code
562213	Solid Waste Combustors and Incinerators	5.005	0.000	5.005	562213
327310	Cement Manufacturing	2.673	0.065	2.739	327310
112111	Beef Cattle Ranching and Farming	2.240	0.039	2.280	1121A0
112112	Cattle Feedlots	2.240	0.039	2.280	1121A0
112130	Dual-Purpose Cattle Ranching and Farming	2.240	0.039	2.280	1121A0
112120	Dairy Cattle and Milk Production	1.900	0.051	1.951	112120
486110	Pipeline Transportation of Crude Oil	1.547	0.000	1.547	486000
486210	Pipeline Transportation of Natural Gas	1.547	0.000	1.547	486000
486910	Pipeline Transportation of Refined Petroleum Products	1.547	0.000	1.547	486000
486990	All Other Pipeline Transportation	1.547	0.000	1.547	486000
111130	Dry Pea and Bean Farming	1.408	0.078	1.486	1111B0
111140	Wheat Farming	1.408	0.078	1.486	1111B0
111150	Corn Farming	1.408	0.078	1.486	1111B0
111160	Rice Farming	1.408	0.078	1.486	1111B0
111191	Oilseed and Grain Combination Farming	1.408	0.078	1.486	1111B0
111199	All Other Grain Farming	1.408	0.078	1.486	1111B0
325311	Nitrogenous Fertilizer Manufacturing	1.319	0.036	1.356	325310
325312	Phosphatic Fertilizer Manufacturing	1.319	0.036	1.356	325310
325314	Fertilizer (Mixing Only) Manufacturing	1.319	0.036	1.356	325310

The largest combined factor is for Solid Waste Landfill; the next largest factors are for Solid Waste Combustors and Incinerators sectors, and Cement Manufacturing sectors. Some of these commodities share the same USEEIO Factor, as indicated by the Reference USEEIO Code.

The underlying USEEIO model passed model validation checks, including the check that the total GHGs per industry can be recalculated from the model using total US production in the demand vector, using Equation 28 in Ingwersen et al. (2022).

Comparison to Previous Factors

We compared the SEFs with the previous release based on common NAICS codes. 1005 SEFs shared common NAICS codes between v1.3.0 and v1.4.0. The waste sectors were not disaggregated in v1.3.0 and therefore these sectors are removed from the comparison set to focus on changes for the equivalent Factors. The Factors were not adjusted to use a common USD year or common GWPs for the comparison.

Table 3 shows a statistical summary of the relative change both for the factors in CO2e and for the factors by gas for the SEFs+MEFs. Data are shown as fractional change.

The average change in the CO2e SEFs was -7%. The majority of SEFs for carbon dioxide have decreased between 6% and 14%, with a median value of change being -10%. Methane SEFs have changed on average by -2%. The majority of nitrous oxide SEFs have decreased between 11% and 19%.

Table 3: Summary Statistics of Relative Change from v1.3.0 to v1.4.0 by GHG for Supply Chain Emission Factors without Margins.

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
CO2e	-0.32	-0.13	-0.09	-0.07	-0.05	0.75
Carbon dioxide	-0.36	-0.14	-0.10	-0.08	-0.06	0.68
Methane	-0.36	-0.11	-0.04	-0.02	0.03	0.72
Nitrous oxide	-0.34	-0.19	-0.16	-0.12	-0.11	0.74

Of the 1005 Supply Chain Emission Factors with Margins, 100 increased by more than 5%, and 747 decreased by more than 5%.

Table 4 and Table 5 show the commodities with the greatest increase and decrease in their SEF+MEF.

Table 4: Commodities with Greatest Relative Increase from v1.3.0 to v1.4.0 .

2017 NAICS Code	2017 NAICS Title	Percent Change		
		v1.3.0	v1.4.0	(%)
111130	Dry Pea and Bean Farming	0.85	1.49	75
111140	Wheat Farming	0.85	1.49	75
111150	Corn Farming	0.85	1.49	75
111160	Rice Farming	0.85	1.49	75
111191	Oilseed and Grain Combination Farming	0.85	1.49	75
111199	All Other Grain Farming	0.85	1.49	75

2017 NAICS Code	2017 NAICS Title	v1.3.0	v1.4.0	Percent Change (%)
211120	Crude Petroleum Extraction	0.41	0.64	57
211130	Natural Gas Extraction	0.41	0.64	57
111110	Soybean Farming	0.53	0.82	54
111120	Oilseed (except Soybean) Farming	0.53	0.82	54
324110	Petroleum Refineries	0.27	0.41	53
441110	New Car Dealers	0.07	0.10	42
441120	Used Car Dealers	0.07	0.10	42
441210	Recreational Vehicle Dealers	0.07	0.10	42
441222	Boat Dealers	0.07	0.10	42
441228	Motorcycle, ATV, and All Other Motor Vehicle Dealers	0.07	0.10	42
441310	Automotive Parts and Accessories Stores	0.07	0.10	42
441320	Tire Dealers	0.07	0.10	42
111910	Tobacco Farming	0.74	1.05	42
111920	Cotton Farming	0.74	1.05	42

Table 5: Commodities with Greatest Relative Decrease from v1.3.0 to v1.4.0 .

2017 NAICS Code	2017 NAICS Title	v1.3.0	v1.4.0	Percent Change (%)
525110	Pension Funds	0.218	0.148	-32
525120	Health and Welfare Funds	0.218	0.148	-32
525190	Other Insurance Funds	0.218	0.148	-32
525910	Open-End Investment Funds	0.218	0.148	-32
525920	Trusts, Estates, and Agency Accounts	0.218	0.148	-32
525990	Other Financial Vehicles	0.218	0.148	-32
327310	Cement Manufacturing	3.924	2.739	-30
483111	Deep Sea Freight Transportation	0.816	0.583	-29
483112	Deep Sea Passenger Transportation	0.816	0.583	-29
483113	Coastal and Great Lakes Freight Transportation	0.816	0.583	-29
483114	Coastal and Great Lakes Passenger Transportation	0.816	0.583	-29
483211	Inland Water Freight Transportation	0.816	0.583	-29

2017 NAICS Code	2017 NAICS Title	Percent Change (%)		
		v1.3.0	v1.4.0	
483212	Inland Water Passenger Transportation	0.816	0.583	-29
327320	Ready-Mix Concrete Manufacturing	0.606	0.439	-28
327410	Lime Manufacturing	1.623	1.185	-27
327420	Gypsum Product Manufacturing	1.623	1.185	-27
333914	Measuring, Dispensing, and Other Pumping Equipment Manufacturing	0.223	0.166	-26
111211	Potato Farming	0.631	0.471	-25
111219	Other Vegetable (except Potato) and Melon Farming	0.631	0.471	-25
327331	Concrete Block and Brick Manufacturing	0.328	0.247	-25

Data on change by commodity and GHG for each SEF type are provided in the `RelativeChangefromv1.3.0tov1.4.0inSEFsbyGHG.csv` and `RelativeChangefromv1.3.0tov1.4.0inSEFsbyGHG.csv` supporting documents.

SEF Change Compared to Price Change

The prices of commodities change due to inflation or deflation. The commodity-specific price change data that are used to compute the SEFs can affect the SEF value as the SEF is measured per dollar commodity in a given year. As the price increases (inflation), given the same CO2e emissions, the SEF values will decrease. To evaluate the influence of the commodity-specific price changes on the SEFs from v1.3.0 to v1.4.0 on the dataset of SEFs with margins in CO2e as a whole, a Pearson correlation coefficient (“r” value) was calculated between the relative price changes per commodity from 2022 to 2024 and the relative SEF changes. The Pearson correlation coefficient was -0.9. The negative correlation is expected due to the inverse relationship between SEF increases and price increases. This result indicates a strong correlation between the price change and the SEF change between the 2022 to 2024 based factors. The other changes can be explained by direct and indirect emission changes and the changes in the global warming potentials of GHGs from AR5 to AR6. The commodity-specific relative changes in SEFs and price can be found in the Supporting Information.

Usage Notes

Users of these Factors for estimating GHGs associated with purchased goods or services should follow the following steps. This assumes the goods and services are valued in USD, and not mass or physical quantities.

1. Associate each good or service with the closest NAICS code using NAICS code descriptions.
2. OPTIONAL but RECOMMENDED. Adjust the dollar year of the selected Factors to match the dollar year of the spend data. For instance, to adjust any SEF from the given 2024 year to 2025, use the following equation:

$$SEF_{c\$2025} = SEF_{c\$2024} * \frac{CPI_{c,2024}}{CPI_{c,2025}}$$

where the *CPI* is an annual commodity-specific price index for commodity *c* derived from BEA underlying

detailed industry gross output data. This calculation is equivalent to the ρ matrix adjustment described in the USEEIO v2 documentation used for USEEIO v2.0 (W. Ingwersen et al. 2022), where the CPI data used are the industry-specific chain-type prices published by the BEA as part of the industry account underlying detail data (“Industry Underlying Estimates” 2022), which are then transformed into commodity-form using a market shares approach. The supply-chain-factors code can be executed to generate all the Factors in a user-provided dollar year to perform this change using the factor adjustment functionality built into useeior (Li, Mo et al. 2022).

3. Multiply dollars spent for a good or service by its matched Factor to get kg of a GHG or CO₂e the total direct + indirect GHG emissions for a given good or service, depending on the unit of the given Factor. If users wish to convert GHGs into CO₂e using IPCC global warming potentials, they can access a set GWPs from various IPCC reports and for 20 and 100-year time horizons that match with the GHG names used in this dataset in the IPCC GWPs for FEDEFL v1 dataset (Young, Cashman, and Ingwersen 2023).

Do not add the results of the calculation of SEF and/or MEF to the result of the SEF+MEF, since this will be duplicative.

For more guidance on using the Factors see the webinar on Using the Supply Chain GHG Emission Factors (W. Ingwersen and Li 2022).

Code Availability

The source code for producing the Factors can be found in the cornerstone-data/supply-chain-factors repository (<https://github.com/cornerstone-data/supply-chain-factors/tree/v1.4.0>). The published factors can be found on Zenodo (<https://doi.org/10.5281/zenodo.17202747>) (W. Ingwersen and Young 2025). A model specification file for the USEEIOv2.6.0-phoebe-23 model is present under model-specs. The *CalculateEmissionFactors.Rmd* R markdown notebook along with supporting R scripts are used to generate the Factor datasets. This notebook draws on useeior (<https://github.com/cornerstone-data/useeior>) to build and calculate the USEEIO model. The 2023 GHG direct emission totals by sector dataset, prepared using FLOWSA (<https://github.com/USEPA/flowsa>), is automatically retrieved upon building the model for the first time and stored locally for the user. The matching global warming potential factors for the IPCC GWP were prepared using the LCIA Formatter (<https://github.com/FLCAC-Admin/LCIAformatter>), and are likewise retrieved and stored locally upon first build of the model. The supply-chain-factors repository provides additional guidance on use of the source code.

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Supporting Information

Table S 1 provides relative changes in SEFs compared to the changes in price from v1.3.0 to v1.4.0 and price per USEEIO commodity from 2022 to 2024.

Table S 1: Comparison of relative change in SEF and price from SEF version v1.3.0 to v1.4.0 and from 2022 to 2024 .

USEEIO Code	Name	SEF Change	Price Change
1111A0	Fresh soybeans, canola, flaxseeds, and other oilseeds	0.54	-0.25
1111B0	Fresh wheat, corn, rice, and other grains	0.75	-0.34
111200	Fresh vegetables, melons, and potatoes	-0.25	-0.02
111300	Fresh fruits and tree nuts	-0.03	0.02
111400	Greenhouse crops, mushrooms, nurseries, and flowers	0.32	-0.22
111900	Tobacco, cotton, sugarcane, peanuts, sugar beets, herbs and spices, and other crops	0.42	-0.26
112120	Dairies	0.13	-0.11
1121A0	Cattle ranches and feedlots	-0.21	0.18
112300	Poultry farms	0.04	-0.06
112A00	Animal farms and aquaculture ponds (except cattle and poultry)	-0.19	0.15
113000	Timber and raw forest products	0.02	-0.07
114000	Wild-caught fish and game	0.16	-0.06
115000	Agriculture and forestry support	-0.17	0.08
211000	Unrefined oil and gas	0.57	-0.37
212100	Coal	0.03	0.02
212230	Copper, nickel, lead, and zinc	0.02	0.01
2122A0	Iron, gold, silver, and other metal ores	-0.10	0.05
212310	Dimensional stone	-0.24	0.17
2123A0	Sand, gravel, clay, phosphate, other nonmetallic minerals	-0.10	0.06
213111	Well drilling	-0.12	-0.09
21311A	Other support activities for mining	0.01	-0.02
221200	Natural gas	0.00	-0.06
221300	Drinking water and wastewater treatment	-0.17	0.07
230301	Nonresidential building repair and maintenance	-0.09	0.05
230301	Nonresidential building repair and maintenance	-0.12	0.05
230301	Nonresidential building repair and maintenance	-0.11	0.05

USEEIO Code	Name	SEF Change	Price Change
230302	Residential building repair and maintenance	-0.05	0.03
230302	Residential building repair and maintenance	-0.09	0.03
233210	Health care buildings	-0.09	0.08
233210	Health care buildings	-0.11	0.08
233230	Manufacturing buildings	-0.12	0.06
233230	Manufacturing buildings	-0.09	0.06
233240	Utilities buildings and infrastructure	-0.09	0.02
233240	Utilities buildings and infrastructure	-0.06	0.02
233262	Schools and vocational buildings	-0.11	0.08
233262	Schools and vocational buildings	-0.09	0.08
2332A0	Commercial structures, including farm structures	-0.11	0.07
2332A0	Commercial structures, including farm structures	-0.09	0.07
2332C0	Highways, streets, and bridges	-0.09	0.04
2332C0	Highways, streets, and bridges	-0.09	0.04
2332D0	Other nonresidential structures	-0.09	0.07
2332D0	Other nonresidential structures	-0.13	0.07
233411	Single-family homes	-0.09	0.06
233411	Single-family homes	-0.09	0.06
233411	Single-family homes	-0.08	0.06
233412	Multifamily homes	-0.08	0.07
233412	Multifamily homes	-0.12	0.07
233412	Multifamily homes	-0.09	0.07
2334A0	Other residential structures	-0.08	0.05
2334A0	Other residential structures	-0.09	0.05
311111	Dog and cat food	-0.20	0.13
311119	Other animal food	0.14	-0.13
311210	Flours and malts	0.02	-0.06
311221	Corn products	-0.06	-0.02
311224	Vegetable oils and by-products	0.16	-0.10
311225	Refined vegetable, olive, and seed oils	0.16	-0.11

USEEIO Code	Name	SEF Change	Price Change
311230	Breakfast cereals	-0.16	0.16
311300	Sugar, candy, and chocolate	-0.25	0.20
311410	Frozen food	-0.22	0.14
311420	Fruit and vegetable preservation	-0.14	0.10
311513	Cheese	0.04	-0.04
311514	Dry, condensed, and evaporated dairy	0.03	-0.05
31151A	Fluid milk and butter	-0.05	0.03
311520	Ice cream and frozen desserts	-0.09	0.06
311615	Packaged poultry	0.23	-0.16
31161A	Packaged meat (except poultry)	-0.16	0.12
311700	Seafood	0.01	0.01
311810	Bread and other baked goods	-0.18	0.11
3118A0	Cookies, crackers, pastas, and tortillas	-0.16	0.10
311910	Snack foods	-0.20	0.14
311920	Coffee and tea	-0.24	0.17
311930	Flavored drink concentrates	-0.12	0.06
311940	Seasonings and dressings	-0.14	0.08
311990	All other foods	-0.07	0.00
312110	Soft drinks, bottled water, and ice	-0.20	0.14
312120	Breweries and beer	-0.07	0.01
312130	Wineries and wine	-0.12	0.07
312140	Distilleries and spirits	0.03	-0.06
312200	Tobacco products	-0.22	0.09
313100	Fiber, yarn, and thread	0.00	-0.06
313200	Fabric	-0.06	0.00
313300	Finished and coated fabric	-0.02	0.00
314110	Carpets and rugs	-0.09	0.03
314120	Curtains and linens	-0.05	0.03
314900	Other textiles	-0.09	0.04
315000	Clothing	-0.13	0.08

USEEIO Code	Name	SEF Change	Price Change
316000	Leather	-0.11	0.06
321100	Lumber and treated lumber	0.16	-0.15
321200	Plywood and veneer	0.21	-0.19
321910	Wooden windows, door, and flooring	-0.01	-0.02
3219A0	Veneer, plywood, and engineered wood	0.08	-0.07
322110	Wood pulp	-0.06	-0.02
322120	Paper	0.01	0.04
322130	Cardboard	-0.06	-0.03
322210	Cardboard containers	-0.03	-0.02
322220	Paper bags and coated paper	-0.11	0.05
322230	Stationery	-0.12	0.06
322291	Sanitary paper (tissues, napkins, diapers, etc.)	-0.02	0.04
322299	All other converted paper products	-0.09	0.04
323110	Books, newspapers, magazines, and other print media	-0.11	0.08
323120	Printing support	-0.06	0.06
324110	Gasoline, fuels, and by-products of petroleum refining	0.53	-0.27
324121	Asphalt pavement	-0.17	0.07
324122	Asphalt shingles	-0.10	0.06
324190	Other petroleum and coal products	0.39	-0.25
325110	Petrochemicals	0.36	-0.32
325120	Compressed Gases	-0.15	0.04
325130	Synthetic dyes and pigments	0.00	-0.02
325180	Other basic inorganic chemicals	-0.02	-0.05
325190	Other basic organic chemicals	0.10	-0.15
325211	Plastics	0.06	-0.15
3252A0	Synthetic rubber and artificial and synthetic fibers	-0.05	-0.06
325310	Fertilizers	0.19	-0.27
325320	Pesticides	0.14	-0.16
325411	Medicinal and botanical ingredients	-0.08	0.04
325412	Pharmaceutical products (pills, powders, solutions, etc.)	-0.06	0.03

USEEIO Code	Name	SEF Change	Price Change
325413	Blood sugar, pregnancy, and other diagnostic test kits	-0.07	0.02
325414	Vaccines and other biological medical products	-0.05	0.06
325510	Paints and coatings	-0.11	0.03
325520	Adhesives	-0.11	0.03
325610	Soap and cleaning compounds	-0.16	0.07
325620	Toiletries	-0.10	0.06
325910	Ink and ink cartridges	-0.12	0.04
3259A0	Chemicals (except basic chemicals, agrichemicals, polymers, paints, pharmaceuticals,soaps, cleaning compounds)	-0.11	0.02
326110	Plastic bags, films, and sheets	-0.07	-0.02
326120	Plastic pipe, fittings, and sausage casings	-0.01	-0.07
326130	Laminated plastic plates and shapes	-0.15	0.07
326140	Polystyrene foam products	-0.06	-0.04
326150	Urethane and other foam products	-0.04	-0.04
326160	Plastic bottles	-0.09	-0.01
326190	Other plastic products	-0.11	0.02
326210	Rubber tires	-0.16	0.08
326220	Rubber and plastic belts and hoses	-0.09	0.02
326290	Other rubber products	-0.14	0.06
327100	Clay and ceramic products	-0.09	0.07
327200	Glass and glass products	-0.17	0.08
327310	Cement	-0.30	0.18
327320	Ready-mix concrete	-0.28	0.17
327330	Concrete pipe, bricks, and blocks	-0.25	0.16
327390	Other concrete products	-0.20	0.12
327400	Lime and gypsum products	-0.27	0.14
327910	Abrasive products	-0.12	0.07
327991	Cut stone and stone products	-0.11	0.07
327992	Ground or treated minerals and earth	-0.14	0.08
327993	Mineral wool	-0.14	0.11

USEEIO Code	Name	SEF Change	Price Change
327999	Other nonmetallic mineral products	-0.20	0.11
331110	Primary iron, steel, and ferroalloy products	0.28	-0.23
331200	Secondary steel products	0.09	-0.11
331313	Primary aluminum	-0.01	0.06
33131B	Secondary aluminum	0.10	-0.08
331410	Copper, gold and silver concentrates	0.08	0.04
331420	Secondary copper products	0.01	0.04
331490	Other secondary nonferrous metal products	0.02	0.05
331510	Cast iron and steel	-0.10	0.04
331520	Nonferrous metal casts	0.00	0.02
332114	Custom metal rolls	0.35	-0.24
332119	Lids, jars, bottle caps, other metal closures and crowns	-0.08	0.03
33211A	All other forging, stamping, and sintering	-0.05	0.02
332200	Cutlery and handtools	-0.14	0.08
332310	Metal structural products	-0.04	-0.01
332320	Metal windows, doors, and architectural products	-0.08	0.04
332410	Power boilers and heat exchangers	-0.21	0.15
332420	Heavy gauge metal tanks	-0.18	0.15
332430	Light gauge metal cans, boxes, and containers	0.02	-0.02
332500	Metal hinges, keys, lock, and other hardware	-0.06	0.01
332600	Springs and wires	-0.09	0.05
332710	Machine shops	-0.08	0.06
332720	Screws, nuts, and bolts	-0.17	0.12
332800	Metal coatings, engravings, and heat treatments	-0.10	0.11
332913	Metal plumbing drains, faucets, valves, and other fittings	-0.08	0.04
33291A	Valve and fittings (except for plumbing)	-0.19	0.13
332991	Ball and roller bearings	-0.09	0.06
332996	Fabricated pipe and pipe fittings	-0.11	0.04
332999	Misc. fabricated metal products	-0.06	0.03
33299A	Ammunition, arms, ordnance, and related accessories	-0.12	0.05

USEEIO Code	Name	SEF Change	Price Change
333111	Farm machinery and equipment	-0.13	0.06
333112	Lawn and garden equipment	-0.12	0.06
333120	Construction machinery	-0.18	0.12
333130	Mining and oil/gas field machinery	-0.22	0.12
333242	Semiconductor machinery	-0.11	0.10
33329A	Machinery for the paper, textile, food or other industries (except semiconductor machinery)	-0.10	0.08
333314	Optical instruments and lenses	-0.10	0.07
333316	Photography and photocopying equipment	-0.16	0.07
333318	Other commercial and service industry machinery	-0.09	0.05
333413	Air purification and ventilation equipment	-0.11	0.07
333414	Heating equipment other than warm air furnaces	-0.19	0.11
333415	Air conditioning, refrigeration, and warm air heating equipment	0.00	0.08
333511	Industrial molds	-0.13	0.10
333514	Special tools, dies, jigs, and fixtures	-0.11	0.08
333517	Metal cutting and forming machine tools	-0.10	0.06
33351B	Cutting and machine tool accessory, rolling mill, and other metalworking machines	-0.13	0.10
333611	Turbines and turbine generator sets	-0.13	0.08
333612	Speed changers, industrial high-speed drives, and gears	-0.15	0.10
333613	Mechanical power transmission equipment	-0.18	0.12
333618	Other engine equipment	-0.13	0.09
333912	Air and gas compressors	-0.18	0.14
333914	Pumps and pumping equipment	-0.26	0.12
333920	Material handling equipment	-0.14	0.09
333991	Power tools	-0.17	0.12
333993	Packaging machinery	-0.16	0.15
333994	Industrial process furnaces and ovens	-0.15	0.10
33399A	Welding and Soldering Equipment, Scales and Balances, and other general purpose machinery	-0.13	0.09
33399B	Hydraulic pumps, motors, cylinders and actuators	-0.14	0.10

USEEIO Code	Name	SEF Change	Price Change
334111	Computers	-0.03	0.02
334112	Computer storage device readers	-0.01	-0.01
334118	Computer terminals and other computer peripheral equipment	-0.08	0.03
334210	Telephones	-0.11	0.08
334220	Wireless communications	-0.05	0.02
334290	Communications equipment	-0.14	0.08
334300	Audio and video equipment	-0.09	0.05
334413	Semiconductors	-0.01	0.01
334418	Printed circuit and electronic assembly	0.11	-0.09
33441A	Electronic capacitors, resistors, coils, transformers, connectors and other components (except semiconductors and printed circuit assemblies)	-0.12	0.10
334510	Electromedical appartuses	-0.14	0.08
334511	Navigation instruments	-0.10	0.08
334512	Automatic controls for HVAC and refrigeration equipment	-0.10	0.08
334513	Industrial process variable instruments	-0.16	0.13
334514	Fluid meters and counting devices	-0.13	0.11
334515	Signal testing instruments	-0.08	0.07
334516	Analytical laboratory instruments	-0.11	0.09
334517	Irradiation apparatuses	-0.09	0.04
33451A	Watches, clocks, and other measuring and controlling devices	-0.17	0.11
334610	External hard drives, CDs, other storage media	-0.14	0.09
335110	Light bulbs	-0.16	0.10
335120	Light fixtures	-0.10	0.06
335210	Small electrical appliances	-0.07	0.03
335220	Major home appliances	-0.07	0.03
335311	Specialty transformers	-0.15	0.09
335312	Motors and generators	-0.14	0.11
335313	Switchgear and switchboards	-0.20	0.16
335314	Relay and industrial controls	-0.15	0.12
335911	Storage batteries	-0.20	0.04

USEEIO Code	Name	SEF Change	Price Change
335912	Primary batteries	-0.11	0.05
335920	Communication and energy wire and cable	-0.05	0.02
335930	Wiring devices	-0.13	0.08
335991	Carbon and graphite products	-0.21	0.18
335999	Other miscellaneous electrical equipment and components	-0.03	0.02
336111	Automobiles	0.00	0.00
336112	Pickup trucks, vans, and SUVs	-0.08	0.05
336120	Heavy duty trucks	-0.08	0.06
336211	Vehicle bodies	-0.14	0.09
336212	Truck trailers	-0.04	0.00
336213	Motor homes	-0.06	0.03
336214	Travel trailer and campers	-0.03	0.02
336310	Vehicle engines and engine parts	-0.03	0.01
336320	Vehicle electrical and electronic equipment	-0.08	0.05
336350	Transmission and power train parts	-0.08	0.05
336360	Vehicle seating and interior trim (upholstery)	-0.07	0.02
336370	Vehicle metal stamping	-0.11	0.06
336390	Other vehicle parts	-0.07	0.03
3363A0	Motor vehicle steering, suspension components (except spring), and brake systems	-0.05	0.02
336411	Aircraft	-0.09	0.08
336412	Aircraft engines and parts	-0.11	0.07
336413	Other aircraft parts	-0.11	0.07
336414	Guided missiles and space vehicles	-0.07	0.06
33641A	Propulsion units and parts for space vehicles and guided missiles	-0.12	0.05
336500	Railroad rolling stock	-0.11	0.05
336611	Ships and ship repair	-0.07	0.06
336612	Boats	-0.12	0.08
336991	Motorcycle, bicycle, and parts	0.03	0.04
336992	Military armored vehicles and tanks	0.00	0.04

USEEIO Code	Name	SEF Change	Price Change
336999	Other transportation equipment	-0.05	0.02
337110	Wood kitchen cabinets and countertops	-0.09	0.05
337121	Home furniture - upholstered	-0.06	0.04
337122	Home furniture - wood, nonupholstered	-0.07	0.04
337127	Institutional furniture	-0.13	0.09
33712N	Home furniture - Cabinets and non-wood, nonupholstered	-0.02	0.02
337215	Shelving and lockers	-0.06	0.03
33721A	Office furniture and custom architectural woodwork and millwork	-0.12	0.09
337900	Mattresses, blinds and shades	-0.06	0.05
339112	Surgical and medical instruments	-0.13	0.05
339113	Surgical appliance and supplies	-0.12	0.06
339114	Dental equipment and supplies	-0.15	0.08
339115	Ophthalmic goods	-0.16	0.09
339116	Dental laboratories	-0.11	0.07
339910	Jewelry and silverware	-0.13	0.09
339920	Sporting and athletic goods	-0.10	0.06
339930	Dolls, toys, and games	-0.08	0.04
339940	Office supplies (not paper)	-0.11	0.06
339950	Signs	-0.18	0.12
339990	Gaskets, seals, musical instruments, fasteners, brooms, brushes, mop and other misc. goods	-0.13	0.07
423100	Motor vehicle and motor vehicle parts and supplies	-0.10	0.08
423400	Professional and commercial equipment and supplies	-0.07	0.08
423600	Household appliances and electrical and electronic goods	-0.12	0.15
423800	Machinery, equipment, and supplies	-0.12	0.09
423A00	Other durable goods merchant wholesalers	0.00	-0.01
424200	Drugs and druggists sundries	-0.06	0.07
424400	Grocery and related product wholesalers	-0.18	0.20
424700	Petroleum and petroleum products	-0.06	-0.04
424A00	Other nondurable goods merchant wholesalers	-0.12	0.09

USEEIO Code	Name	SEF Change	Price Change
425000	Wholesale electronic markets and agents and brokers	-0.10	0.08
441000	Vehicles and parts sales	0.42	-0.34
444000	Building material and garden equipment and supplies dealers	-0.01	-0.04
445000	Food and beverage stores	-0.15	0.12
446000	Health and personal care stores	-0.02	-0.01
447000	Gasoline stations	-0.08	0.05
448000	Clothing and clothing accessories stores	-0.06	0.04
452000	General merchandise stores	-0.11	0.08
454000	Nonstore retailers	-0.05	0.06
481000	Air transport	0.06	0.02
482000	Rail transport	-0.04	0.04
483000	Water transport (boats, ships, ferries)	-0.29	0.01
484000	Truck transport	0.29	-0.05
485000	Passenger ground transport	-0.13	0.01
486000	Pipeline transport	-0.04	0.05
48A000	Scenic and sightseeing transportation and support activities for transportation	0.06	-0.08
491000	Postal service	-0.15	0.19
492000	Couriers and messengers	0.04	0.10
493000	Warehousing	-0.09	0.13
4B0000	Other retail	-0.06	0.03
511110	Newspapers	-0.05	0.04
511120	Magazines and journals	0.00	0.01
511130	Books	-0.12	0.12
5111A0	Directory, mailing list, and other publishers	0.00	-0.01
511200	Software	-0.06	0.04
512100	Movies and film	-0.06	0.01
512200	Sound recording	-0.09	0.07
515100	Radio and television	0.08	-0.10
515200	Cable and subscription programming	0.09	-0.09
517110	Telecommunications	-0.09	0.07

USEEIO Code	Name	SEF Change	Price Change
517210	Wireless telecommunications	-0.05	0.03
517A00	Satellite, telecommunications resellers, and all other telecommunications	-0.08	0.06
518200	Data processing and hosting	-0.04	0.03
519130	Internet publishing and broadcasting	0.01	-0.04
5191A0	News syndicates, libraries, archives, Internet publishing and all other information services	-0.12	0.06
522A00	Nondepository credit intermediation and related activities	-0.10	0.08
523900	Investment advice, portfolio management, and other financial advising services	-0.09	0.08
523A00	Securities and commodities brokerage and exchanges	-0.12	0.10
524113	Direct life insurance carriers	0.04	-0.01
5241XX	Insurance carriers, except direct life	-0.15	0.13
524200	Insurance agencies and brokerages	-0.10	0.03
525000	Funds, trusts, and financial vehicles	-0.32	0.07
52A000	Monetary authorities and depository credit intermediation	-0.15	0.12
531HSO	Owner-occupied housing	-0.18	0.13
531HST	Tenant-occupied housing	-0.18	0.13
531ORE	Other real estate	-0.08	0.05
532100	Vehicle rental and leasing	-0.10	0.05
532400	Commercial equipment rental	-0.06	0.06
532A00	Consumer goods and general rental centers	-0.08	0.03
533000	Lessors of nonfinancial intangible assets	-0.06	0.07
541100	Legal services	-0.12	0.13
541200	Accounting, tax preparation, bookkeeping, and payroll	-0.09	0.10
541300	Architectural, engineering, and related services	-0.09	0.06
541400	Specialized design	-0.06	0.03
541511	Custom computer programming	-0.02	0.02
541512	Computer systems design	0.01	0.00
54151A	Other computer related services, including facilities management	-0.01	0.02
541610	Management consulting	-0.05	0.04
5416A0	Environmental and other technical consulting services	-0.07	0.05

USEEIO Code	Name	SEF Change	Price Change
541700	Scientific research and development	-0.07	0.04
541800	Advertising and public relations	-0.01	-0.02
541920	Photographers	-0.10	0.06
541940	Veterinarians	-0.15	0.15
5419A0	Marketing research and all other miscellaneous professional, scientific, and technical services	-0.12	0.11
550000	Company and enterprise management	-0.10	0.06
561100	Office administration	-0.09	0.06
561200	Facilities support	-0.14	0.10
561300	Employment services	-0.02	0.02
561400	Business support	-0.09	0.08
561500	Travel arrangement and reservation	-0.07	0.06
561600	Investigation and security	-0.18	0.17
561700	Buildings and dwellings services	-0.13	0.10
561900	Other support services	-0.13	0.09
611100	Elementary and secondary schools	-0.12	0.07
611A00	Colleges, universities, junior colleges, and professional schools	-0.09	0.06
611B00	Other educational services	-0.09	0.05
621100	Physicians	-0.05	0.02
621200	Dentists	-0.11	0.10
621300	Healthcare practitioners (except physicians and dentists)	-0.08	0.02
621400	Outpatient healthcare	-0.07	0.04
621500	Medical laboratories	-0.03	0.01
621600	Home healthcare	-0.12	0.08
621900	Ambulances	-0.08	0.02
622000	Hospitals	-0.10	0.08
623A00	Nursing and community care facilities	-0.12	0.09
623B00	Residential mental retardation, mental health, substance abuse and other facilities	-0.09	0.08
624100	Individual and family services	-0.10	0.10
624400	Child day care	-0.13	0.10

USEEIO Code	Name	SEF Change	Price Change
624A00	Community food, housing, and other relief services, including rehabilitation services	-0.10	0.08
711100	Performances	-0.14	0.10
711200	Sports	-0.18	0.12
711500	Independent artists, writers, and performers	-0.12	0.10
711A00	Promoters and agents	-0.17	0.11
712000	Museums, historical sites, zoos, and parks	-0.14	0.09
713100	Amusement parks and arcades	-0.13	0.08
713200	Gambling establishments (except casino hotels)	-0.17	0.07
713900	Golf courses, marinas, ski resorts, fitness and other rec centers and industries	-0.14	0.10
721000	Hotels and campgrounds	-0.10	0.06
722110	Full-service restaurants	-0.13	0.10
722211	Limited-service restaurants	-0.14	0.11
722A00	All other food and drinking places	-0.11	0.08
811100	Vehicle repair	-0.03	-0.01
811200	Electronic equipment repair and maintenance	-0.13	0.13
811300	Commercial machinery repair	-0.11	0.15
811400	Household goods repair	-0.12	0.12
812100	Salons and barber shops	-0.13	0.11
812200	Funerary services	-0.11	0.09
812300	Dry-cleaning and laundry	-0.15	0.12
812900	Pet care, photofinishing, parking and other sundry services	-0.17	0.14
813100	Religious organizations	-0.12	0.10
813A00	Grantmaking, giving, and social advocacy organizations	-0.10	0.10
813B00	Civic, social, professional, and similar organizations	-0.16	0.09