BEES PRODUCT COMPARISONS

NIST BEES LCA SOFTWARE

PRODUCT COMPARISONS – ALL IMPACT CATEGORIES

AVERAGE CEDAR BOARDS VS. AVERAGE VINYL SIDING

Category	Unit	Average Cedar Boards	Average Vinyl Siding
Ozone Depletion	kg CFC_{-11} eq	5.99E-08	2.51E-08
Primary Energy Demand - Non-Renewable	MJ	1.28E+01	1.29E+01
Primary Energy Demand - Renewable	MJ	1.01E-01	2.74E-01
Global Warming	kg CO_2 eq	5.12E-01	4.99E-01
Smog	kg O_3 eq	4.07E-02	2.37E-02
Acidification	kg SO_2 eq	4.47E-03	4.29E-03
Eutrophication	kg N eq	2.49E-03	3.20E-04
Carcinogenics	CTU_h	8.28E-09	1.16E-08
Non-carcinogenics	CTU_h	6.01E-08	5.89E-08
Respiratory Effects	kg $PM_{2.5}$ eq	2.62E-04	2.73E-04
Ecotoxicity	CTU_e	1.45E+00	1.62E+00

Category	Average Cedar Boards	Average Vinyl Siding
Ozone Depletion	100%	42%
PED - Non-Renewable	100%	101%
PED - Renewable	100%	271%
Global Warming	100%	97%
Smog	100%	58%
Acidification	100%	96%
Eutrophication	100%	13%
Carcinogenics	100%	140%
Non-carcinogenics	100%	98%
Respiratory Effects	100%	104%
Ecotoxicity	100%	112%

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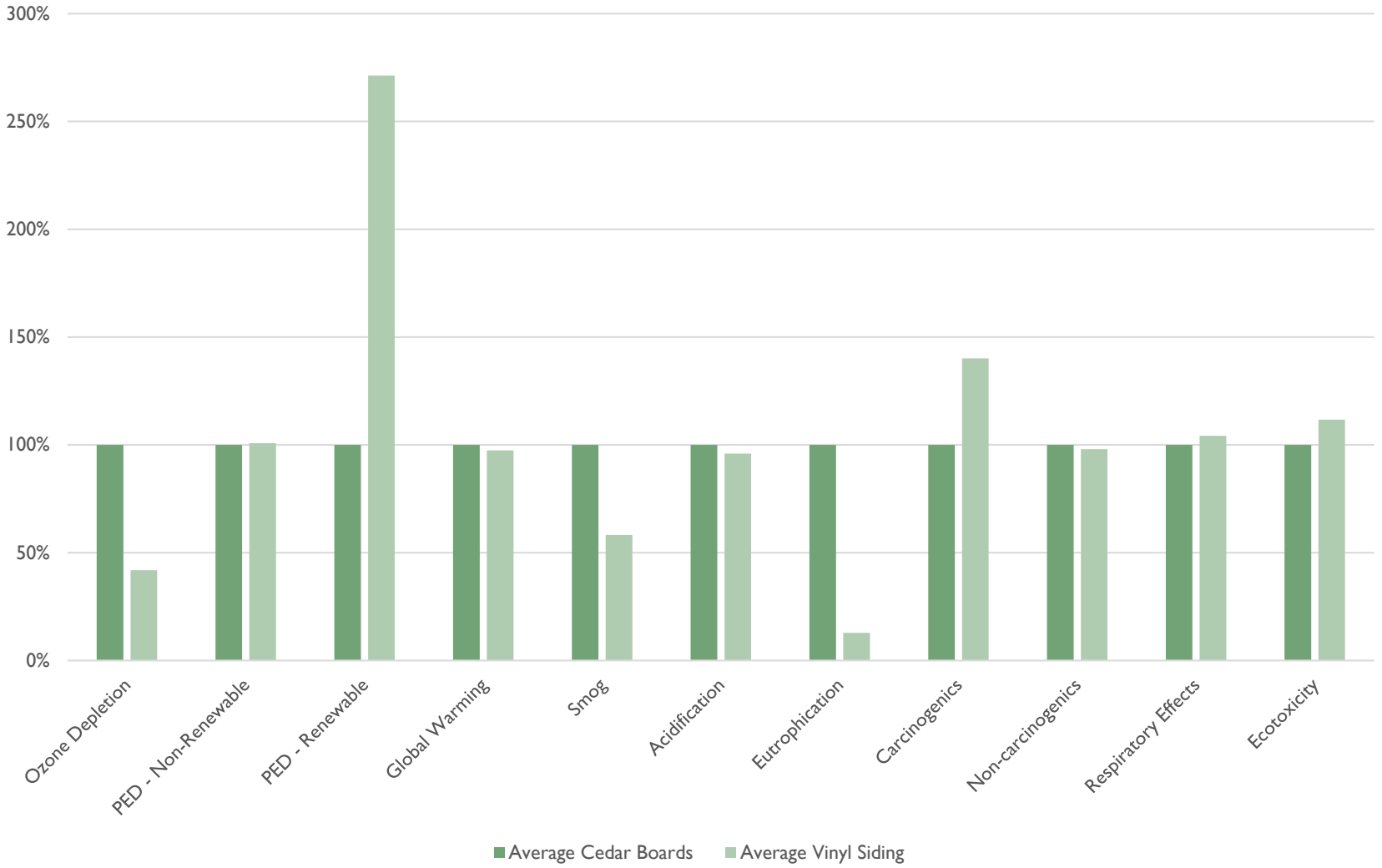
AVERAGE CEDAR BOARDS VS. AVERAGE VINYL SIDING



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AVERAGE CEDAR BOARDS VS. AVERAGE VINYL SIDING

Compared to average cedar boards, average vinyl siding has lower impacts in certain TRACI 2.1 environmental impact categories, and higher impacts in other categories. Vinyl siding has lower impacts in the ozone depletion, smog, global warming, acidification, eutrophication, and non-carcinogenics impacts categories. Cedar boards have lower impacts in the renewable energy demand, non-renewable energy demand, carcinogenics, respiratory effects, and ecotoxicity categories. The impact category with the most favorable performance for vinyl siding is the eutrophication category, where impacts are 13% of those for cedar boards.

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AVERAGE CEDAR BOARDS VS. AVERAGE INSULATED VINYL SIDING

Category	Unit	Average Cedar Boards	Average Insulated Vinyl Siding
Ozone Depletion	kg CFC_{-11} eq	5.99E-08	2.72E-08
Primary Energy Demand - Non-Renewable	MJ	1.28E+01	1.69E+01
Primary Energy Demand - Renewable	MJ	1.01E-01	2.79E-01
Global Warming	kg CO_2 eq	5.12E-01	6.40E-01
Smog	kg O_3 eq	4.07E-02	3.27E-02
Acidification	kg SO_2 eq	4.47E-03	5.36E-03
Eutrophication	kg N eq	2.49E-03	3.44E-04
Carcinogenics	CTU_h	8.28E-09	1.24E-08
Non-carcinogenics	CTU_h	6.01E-08	6.97E-08
Respiratory Effects	kg $PM_{2.5}$ eq	2.62E-04	3.29E-04
Ecotoxicity	CTU_e	1.45E+00	1.86E+00

Category	Average Cedar Boards	Average Insulated Vinyl Siding
Ozone Depletion	100%	45%
Primary Energy Demand - Non-Renewable	100%	132%
Primary Energy Demand - Renewable	100%	276%
Global Warming	100%	125%
Smog	100%	80%
Acidification	100%	120%
Eutrophication	100%	14%
Carcinogenics	100%	150%
Non-carcinogenics	100%	116%
Respiratory Effects	100%	126%
Ecotoxicity	100%	128%

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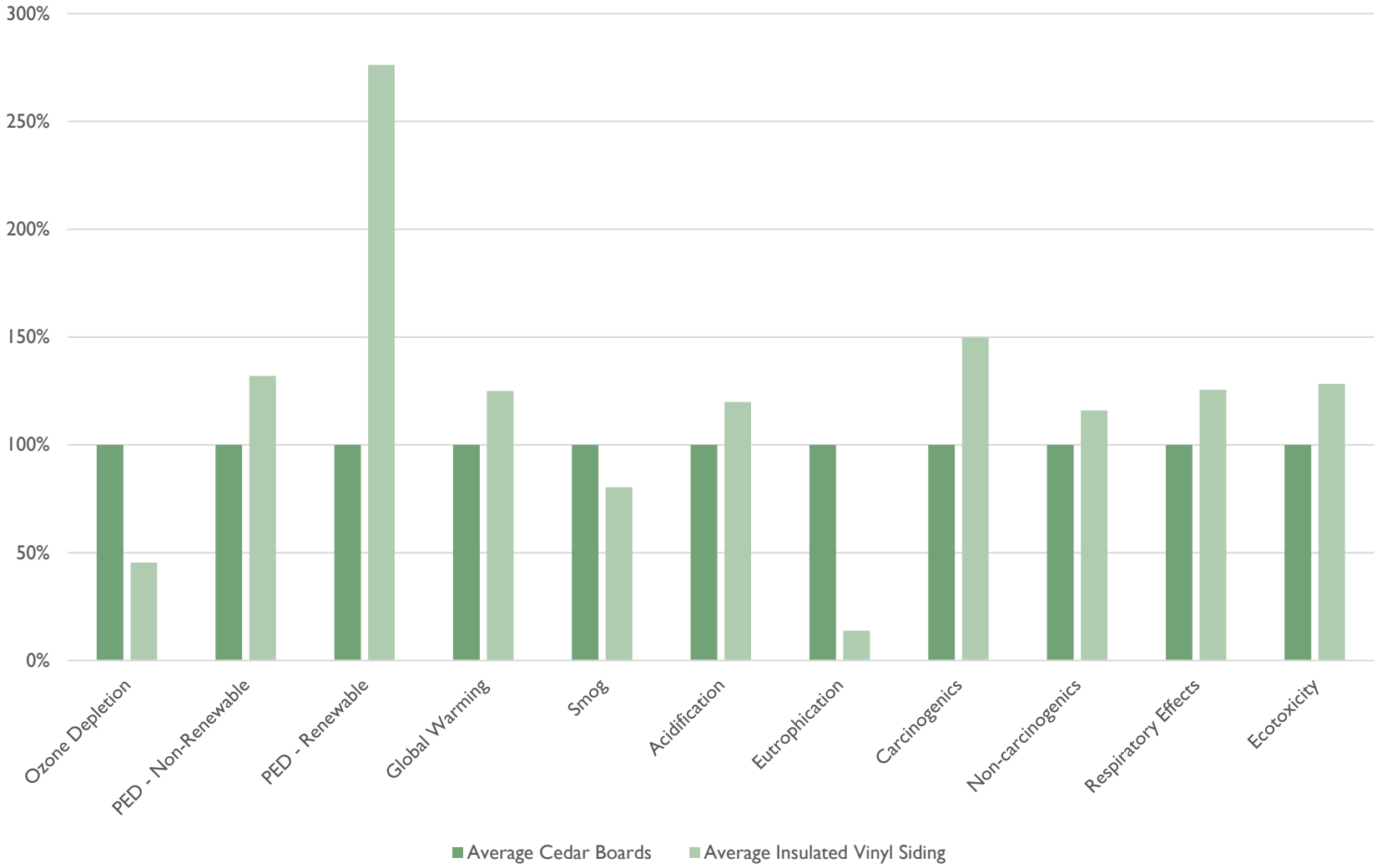
AVERAGE CEDAR BOARDS VS. AVERAGE INSULATED VINYL SIDING



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AVERAGE CEDAR BOARDS VS. AVERAGE INSULATED VINYL SIDING

Compared to average cedar boards, average insulated vinyl siding has lower impacts in certain TRACI 2.1 environmental impact categories, and higher impacts in other categories. Vinyl siding has lower impacts in the ozone depletion, smog, and eutrophication impacts categories. Cedar boards have lower impacts in the renewable energy demand, non-renewable energy demand, global warming, acidification, carcinogenics, non-carcinogenics, respiratory effects, and ecotoxicity categories. The impact category with the most favorable performance for vinyl siding is the eutrophication category, where impacts are 14% of those for cedar boards.

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AVERAGE FIBER CEMENT VS. AVERAGE VINYL SIDING

Category	Unit	Average Fiber Cement	Average Vinyl Siding
Ozone Depletion	kg CFC_{-11} eq	1.29E-07	2.51E-08
Primary Energy Demand - Non-Renewable	MJ	3.00E+01	1.29E+01
Primary Energy Demand - Renewable	MJ	4.81E-01	2.74E-01
Global Warming	kg CO_2 eq	2.36E+00	4.99E-01
Smog	kg O_3 eq	1.31E-01	2.37E-02
Acidification	kg SO_2 eq	1.28E-02	4.29E-03
Eutrophication	kg N eq	1.65E-03	3.20E-04
Carcinogenics	CTU_h	6.95E-08	1.16E-08
Non-carcinogenics	CTU_h	5.39E-06	5.89E-08
Respiratory Effects	kg $PM_{2.5}$ eq	1.50E-03	2.73E-04
Ecotoxicity	CTU_e	3.42E+00	1.62E+00

Category	Average Fiber Cement	Average Vinyl Siding
Ozone Depletion	100%	19%
PED - Non-Renewable	100%	43%
PED - Renewable	100%	57%
Global Warming	100%	21%
Smog	100%	18%
Acidification	100%	34%
Eutrophication	100%	19%
Carcinogenics	100%	17%
Non-carcinogenics	100%	1%
Respiratory Effects	100%	18%
Ecotoxicity	100%	47%

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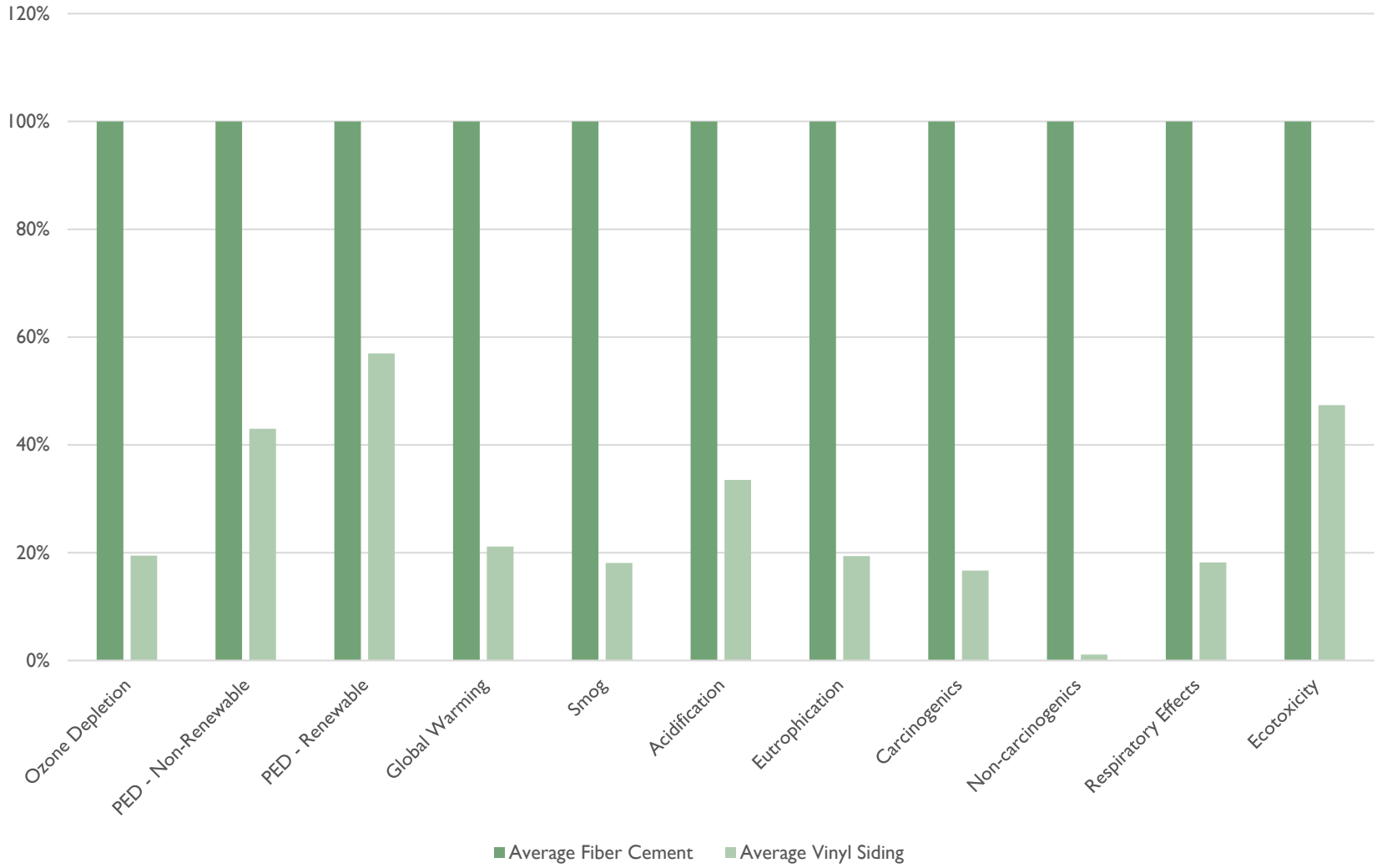
AVERAGE FIBER CEMENT VS. AVERAGE VINYL SIDING



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AVERAGE FIBER CEMENT VS. AVERAGE VINYL SIDING

Compared to average fiber cement, average vinyl siding has lower impacts in every TRACI 2.1 environmental impact categories. The impact category with the most favorable performance for vinyl siding is the non-carcinogenics category, where impacts are 1% of those for fiber cement.

AVERAGE FIBER CEMENT VS. AVERAGE INSULATED VINYL SIDING

Category	Unit	Average Fiber Cement	Average Insulated Vinyl Siding
Ozone Depletion	kg CFC_{-11} eq	1.29E-07	2.72E-08
Primary Energy Demand - Non-Renewable	MJ	3.00E+01	1.69E+01
Primary Energy Demand - Renewable	MJ	4.81E-01	2.79E-01
Global Warming	kg CO_2 eq	2.36E+00	6.40E-01
Smog	kg O_3 eq	1.31E-01	3.27E-02
Acidification	kg SO_2 eq	1.28E-02	5.36E-03
Eutrophication	kg N eq	1.65E-03	3.44E-04
Carcinogenics	CTU_h	6.95E-08	1.24E-08
Non-carcinogenics	CTU_h	5.39E-06	6.97E-08
Respiratory Effects	kg $PM_{2.5}$ eq	1.50E-03	3.29E-04
Ecotoxicity	CTU_e	3.42E+00	1.86E+00

Category	Average Cedar Boards	Average Insulated Vinyl Siding
Ozone Depletion	100%	21%
Primary Energy Demand - Non-Renewable	100%	56%
Primary Energy Demand - Renewable	100%	58%
Global Warming	100%	27%
Smog	100%	25%
Acidification	100%	42%
Eutrophication	100%	21%
Carcinogenics	100%	18%
Non-carcinogenics	100%	1%
Respiratory Effects	100%	22%
Ecotoxicity	100%	54%

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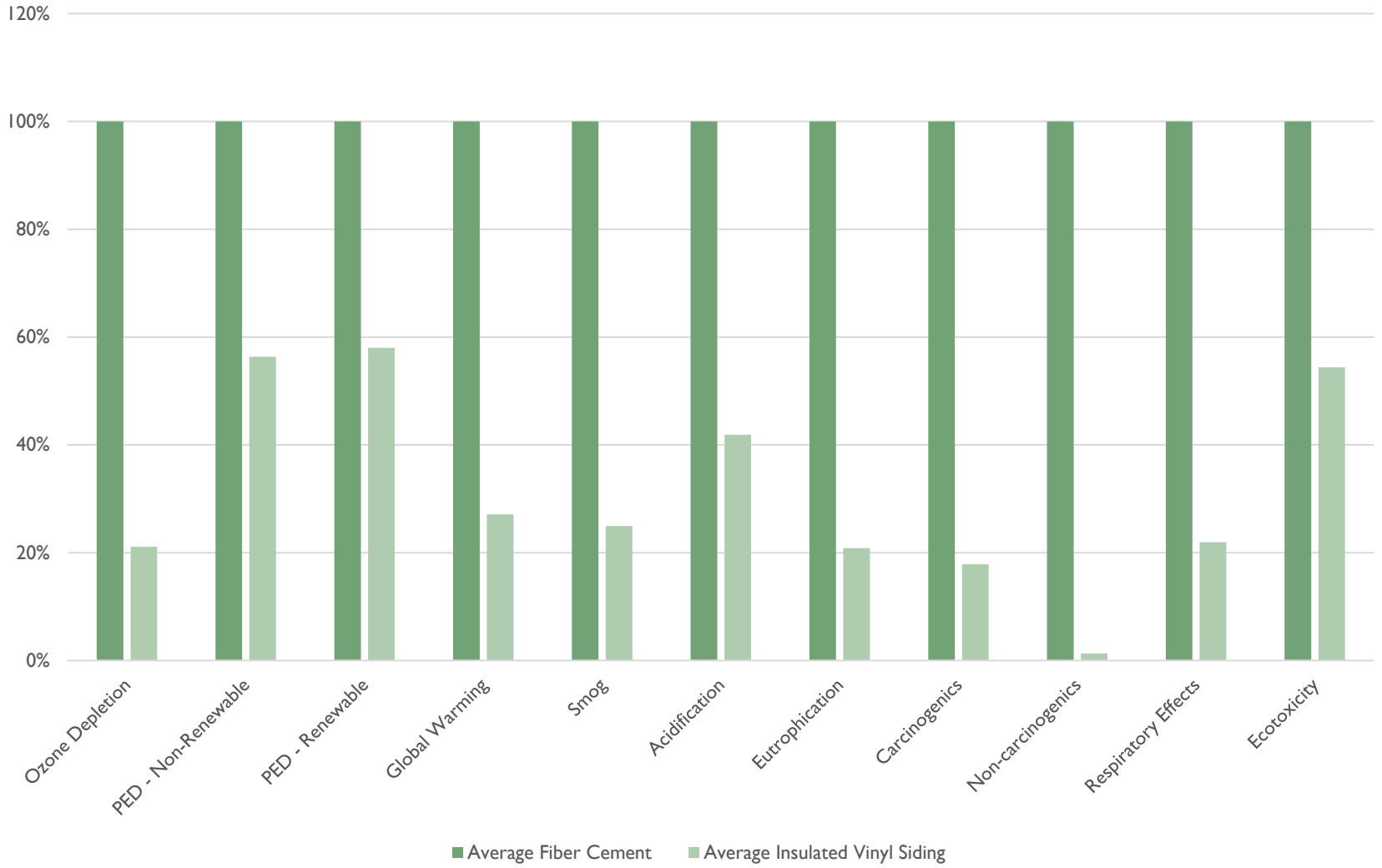
AVERAGE FIBER CEMENT VS. AVERAGE INSULATED VINYL SIDING



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AVERAGE FIBER CEMENT VS. AVERAGE INSULATED VINYL SIDING

Compared to average fiber cement, average insulated vinyl siding has lower impacts in every TRACI 2.1 environmental impact categories. The impact category with the most favorable performance for vinyl siding is the non-carcinogenics category, where impacts are 1% of those for fiber cement.

AVERAGE BRICK & MORTAR VS. AVERAGE VINYL SIDING

Category	Unit	Average Brick & Mortar	Average Vinyl Siding
Ozone Depletion	kg CFC_{-11} eq	3.77E-08	2.51E-08
Primary Energy Demand - Non-Renewable	MJ	4.99E+01	1.29E+01
Primary Energy Demand - Renewable	MJ	2.56E-01	2.74E-01
Global Warming	kg CO_2 eq	3.36E+00	4.99E-01
Smog	kg O_3 eq	2.11E-01	2.37E-02
Acidification	kg SO_2 eq	2.32E-02	4.29E-03
Eutrophication	kg N eq	7.48E-04	3.20E-04
Carcinogenics	CTU_h	2.05E-08	1.16E-08
Non-carcinogenics	CTU_h	2.21E-07	5.89E-08
Respiratory Effects	kg $PM_{2.5}$ eq	1.27E-03	2.73E-04
Ecotoxicity	CTU_e	4.38E+00	1.62E+00

Category	Average Brick & Mortar	Average Vinyl Siding
Ozone Depletion	100%	67%
PED - Non-Renewable	100%	26%
PED - Renewable	100%	107%
Global Warming	100%	15%
Smog	100%	11%
Acidification	100%	18%
Eutrophication	100%	43%
Carcinogenics	100%	57%
Non-carcinogenics	100%	27%
Respiratory Effects	100%	21%
Ecotoxicity	100%	37%

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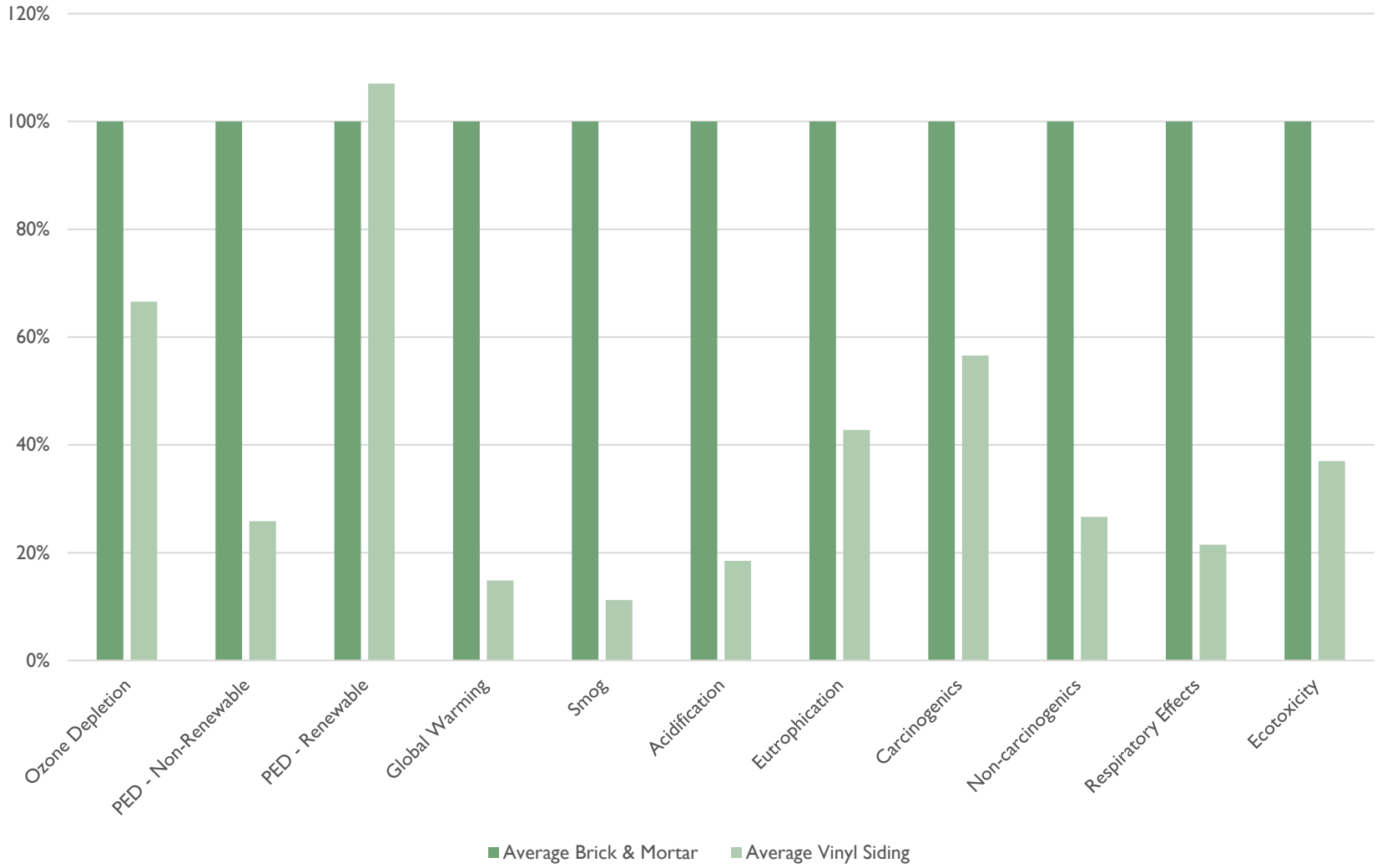
AVERAGE BRICK & MORTAR VS. AVERAGE VINYL SIDING



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AVERAGE BRICK & MORTAR VS. AVERAGE VINYL SIDING

Compared to average brick and mortar, average vinyl siding has lower impacts in every TRACI 2.1 environmental impact category except Primary Energy Demand (PED) - Renewable. The impact category with the most favorable performance for vinyl siding is the smog category, where impacts are 11% of those for brick and mortar.

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AVERAGE BRICK & MORTAR VS. AVERAGE INSULATED VINYL SIDING

Category	Unit	Average Brick & Mortar	Average Insulated Vinyl Siding
Ozone Depletion	kg CFC_{-11} eq	3.77E-08	2.72E-08
Primary Energy Demand - Non-Renewable	MJ	4.99E+01	1.69E+01
Primary Energy Demand - Renewable	MJ	2.56E-01	2.79E-01
Global Warming	kg CO_2 eq	3.36E+00	6.40E-01
Smog	kg O_3 eq	2.11E-01	3.27E-02
Acidification	kg SO_2 eq	2.32E-02	5.36E-03
Eutrophication	kg N eq	7.48E-04	3.44E-04
Carcinogenics	CTU_h	2.05E-08	1.24E-08
Non-carcinogenics	CTU_h	2.21E-07	6.97E-08
Respiratory Effects	kg $PM_{2.5}$ eq	1.27E-03	3.29E-04
Ecotoxicity	CTU_e	4.38E+00	1.86E+00

Category	Average Brick & Mortar	Average Insulated Vinyl Siding
Ozone Depletion	100%	72%
Primary Energy Demand - Non-Renewable	100%	34%
Primary Energy Demand - Renewable	100%	109%
Global Warming	100%	19%
Smog	100%	15%
Acidification	100%	23%
Eutrophication	100%	46%
Carcinogenics	100%	60%
Non-carcinogenics	100%	32%
Respiratory Effects	100%	26%
Ecotoxicity	100%	42%

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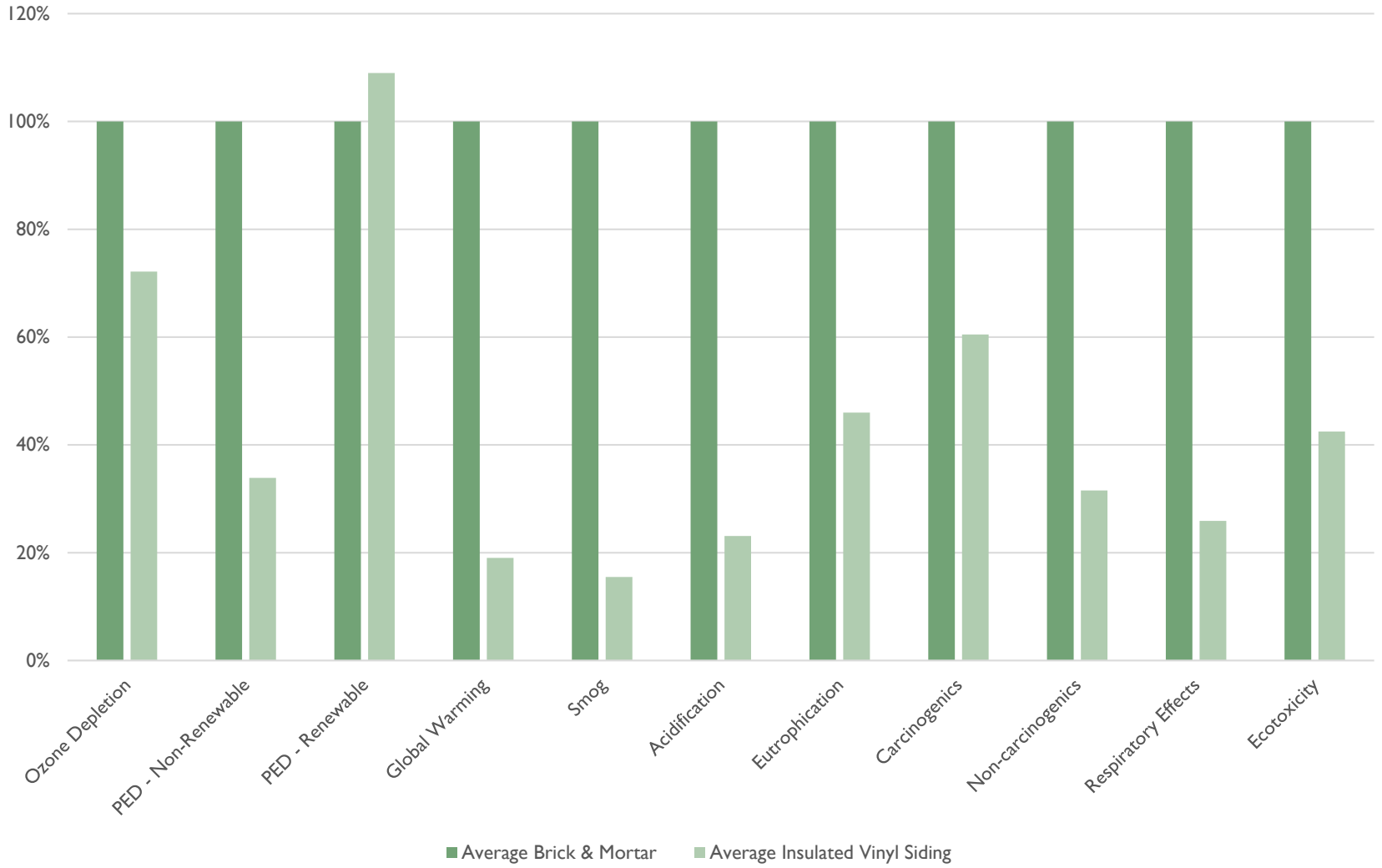
AVERAGE BRICK & MORTAR VS. AVERAGE INSULATED VINYL SIDING



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AVERAGE BRICK & MORTAR VS. AVERAGE INSULATED VINYL SIDING

Compared to average brick and mortar, average insulated vinyl siding has lower impacts in every TRACI 2.1 environmental impact category except Primary Energy Demand (PED) - Renewable. The impact category with the most favorable performance for vinyl siding is the smog category, where impacts are 15% of those for brick and mortar.

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PRODUCT COMPARISONS – SINGLE ENVIRONMENTAL SCORE

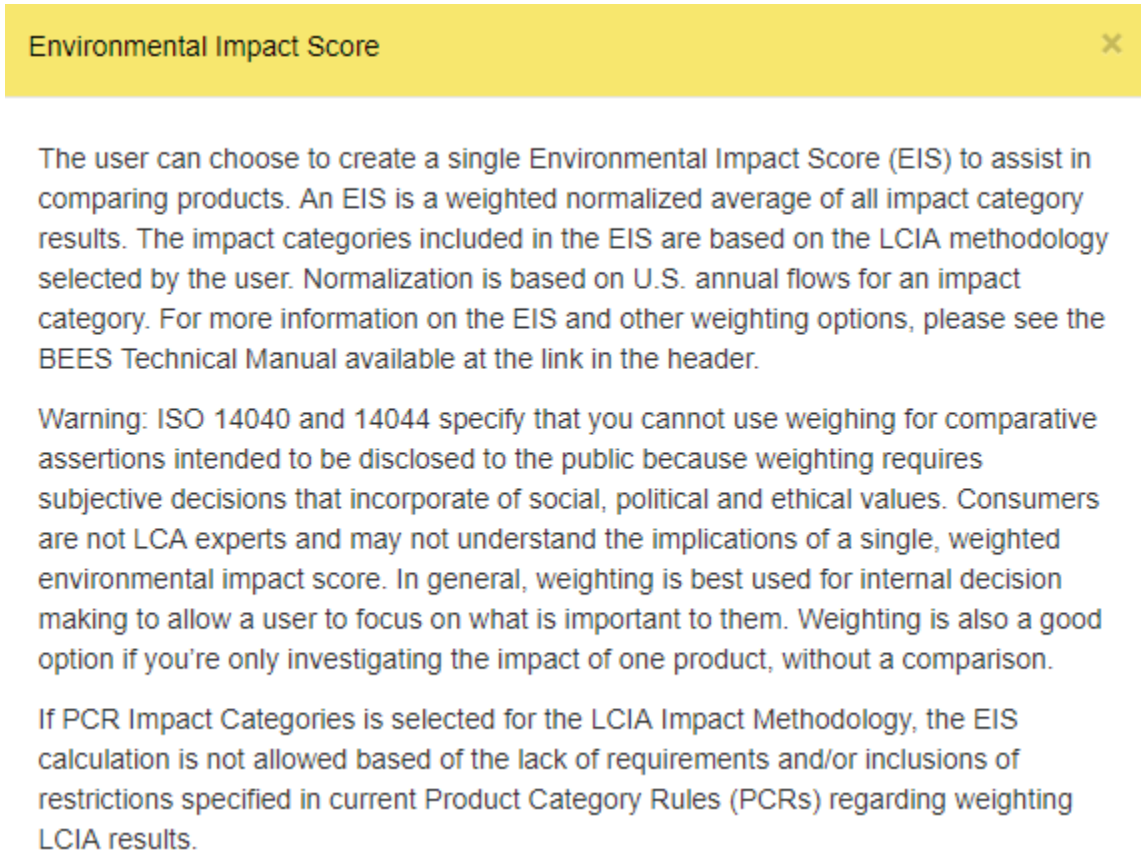
LIFE CYCLE ASSESSMENT IMPACT NORMALIZATION - SINGLE ENVIRONMENTAL IMPACT SCORE

Life cycle assessment (LCA) quantifies environmental impacts of a product or system using selected impact assessment methodology such as US EPA Tool for Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI). Results shown above utilize TRACI methodology, and this methodology outputs individual environmental impacts for each included impact category such as global warming potential, smog, etc. Normalization is an optional step in LCA that weights the relative importance of each impact category in order to calculate a single overall environmental impact score (EIS). The results in this section show a normalized EIS using two separate weighting methodologies used in the BEES Sustainability Software: US EPA Science Advisory Board Impact Category Weighting and BEES Stakeholder Panel Impact Category Weighting. The weightings utilized by these methodologies are shown to the right:

IMPACT	EPA Science Advisory Board Weighting	BEES Stakeholder Panel Weighting
Global Warming	16	29
Acidification	5	3
Eutrophication	5	6
Fossil Fuel Depletion	5	10
Indoor Air Quality	11	3
Habitat Alteration	16	6
Water Intake	3	8
Criteria Air Pollutants	6	9
Smog	6	4
Ecotoxicity	11	7
Ozone Depletion	5	2
Human Health	11	13
Sum:	100	100

LIFE CYCLE ASSESSMENT IMPACT NORMALIZATION - SINGLE ENVIRONMENTAL IMPACT SCORE

The BEES Sustainability online tool offers the following guidance about the use and comparability of single environmental impact scores:



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SINGLE ENVIRONMENTAL IMPACT SCORE (EIS)– US EPA SCIENCE ADVISORY BOARD IMPACT CATEGORY WEIGHTING

Product	Ozone Depletion	Water Use	Land Use	IAQ	PED - non-renewable	PED - renewable	Global Warming Potential	Smog	Acidification	Eutrophication	Carcinogenics	Non-carcinogenics	Respiratory Effects	Ecotoxicity
Generic Brick & Mortar	1.26E-06	2.38E-03	8.40E-06	0.00E+00	8.91E-04	0.00E+00	2.37E-03	9.84E-04	1.36E-03	1.85E-04	2.34E-03	1.24E-03	3.36E-04	4.75E-03
Fiber Cement	4.32E-06	2.93E-03	8.34E-06	0.00E+00	5.36E-04	0.00E+00	1.67E-03	6.10E-04	7.47E-04	4.08E-04	7.96E-03	3.02E-02	3.98E-04	3.70E-03
Average Vinyl Siding	8.36E-07	5.81E-04	9.36E-06	0.00E+00	2.30E-04	0.00E+00	3.53E-04	1.11E-04	2.51E-04	7.93E-05	1.33E-03	3.30E-04	7.25E-05	1.75E-03
Average Insulated Vinyl Siding	9.07E-07	6.14E-04	9.26E-06	0.00E+00	3.01E-04	0.00E+00	4.52E-04	1.53E-04	3.13E-04	8.52E-05	1.42E-03	3.90E-04	8.72E-05	2.02E-03

Product	Total EIS	Benchmarked to VS	Benchmarked to IVS
Generic Brick & Mortar	1.68E-02	330%	288%
Fiber Cement	4.92E-02	965%	841%
Average Vinyl Siding	5.10E-03	-	-
Average Insulated Vinyl Siding	5.85E-03	-	-

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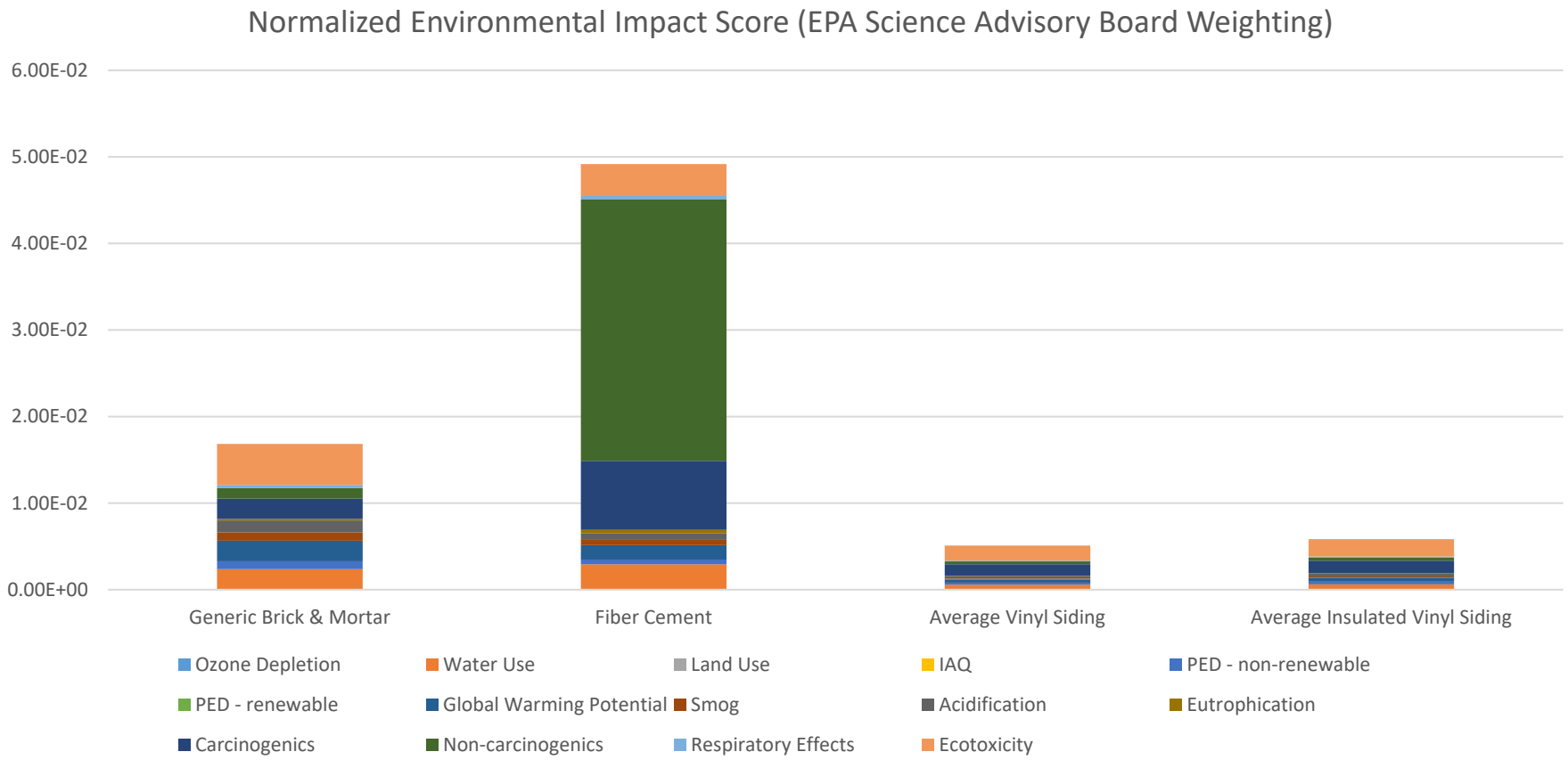

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SINGLE ENVIRONMENTAL IMPACT SCORE (IES)– US EPA SCIENCE ADVISORY BOARD IMPACT CATEGORY WEIGHTING

Utilizing the US EPA Science Advisory Board impact normalization methodology, average vinyl siding has a lower environmental impact compared to both brick and mortar and fiber cement per unit area. The combined environmental impact score (EIS) for generic brick and mortar is 330% the EIS for the same area of average vinyl siding, while the EIS for fiber cement is 965% the EIS for the same area of average vinyl siding.

Utilizing the US EPA Science Advisory Board impact normalization methodology, average insulated vinyl siding has a lower environmental impact compared to both brick and mortar and fiber cement per unit area. The combined environmental impact score (EIS) for generic brick and mortar is 288% the EIS for the same area of average insulated vinyl siding, while the EIS for fiber cement is 841% the EIS for the same area of average insulated vinyl siding.

SINGLE ENVIRONMENTAL IMPACT SCORE (IES)– BEES STAKEHOLDER PANEL IMPACT CATEGORY WEIGHTING

Product	Ozone Depletion	Water Use	Land Use	IAQ	PED - non-renewable	PED - renewable	Global Warming Potential	Smog	Acidification	Eutrophication	Carcinogenics	Non-carcinogenics	Respiratory Effects	Ecotoxicity
Generic Brick & Mortar	5.03E-07	6.35E-03	3.15E-06	0.00E+00	1.78E-03	0.00E+00	4.30E-03	6.56E-04	8.13E-04	2.22E-04	2.77E-03	1.46E-03	5.04E-04	3.02E-03
Fiber Cement	1.73E-06	7.81E-03	3.13E-06	0.00E+00	1.07E-03	0.00E+00	3.03E-03	4.07E-04	4.48E-04	4.90E-04	9.41E-03	3.57E-02	5.97E-04	2.36E-03
Average Vinyl Siding	3.35E-07	1.55E-03	3.51E-06	0.00E+00	4.60E-04	0.00E+00	6.40E-04	7.39E-05	1.50E-04	9.52E-05	1.57E-03	3.90E-04	1.09E-04	1.11E-03
Average Insulated Vinyl Siding	3.63E-07	1.64E-03	3.47E-06	0.00E+00	6.02E-04	0.00E+00	8.20E-04	1.02E-04	1.88E-04	1.02E-04	1.68E-03	4.61E-04	1.31E-04	1.28E-03

Product	Total EIS	Benchmarked to VS	Benchmarked to IVS
Generic Brick & Mortar	2.19E-02	356%	312%
Fiber Cement	6.13E-02	997%	875%
Average Vinyl Siding	6.15E-03	-	-
Average Insulated Vinyl Siding	7.01E-03	-	-

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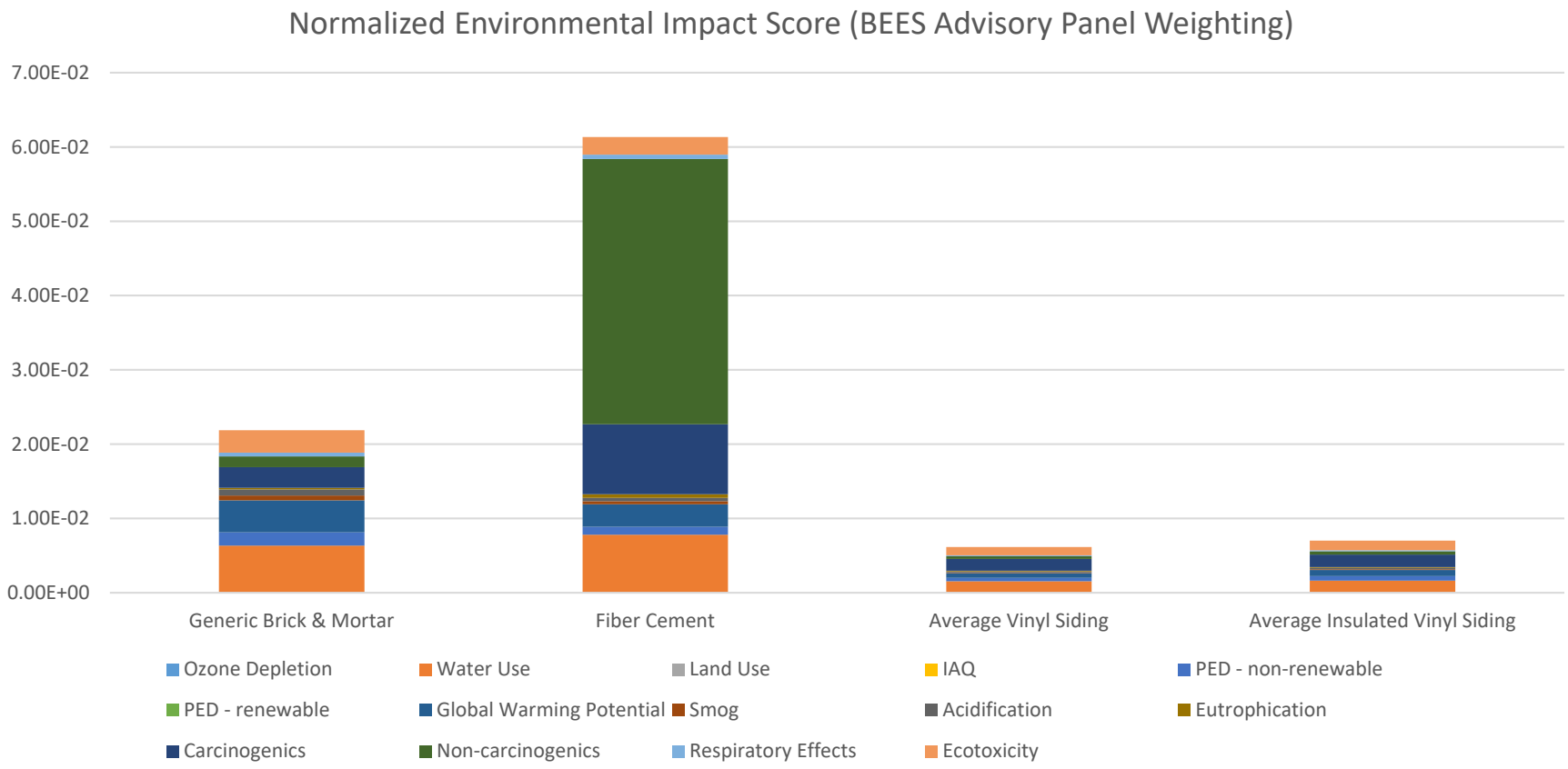

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SINGLE ENVIRONMENTAL IMPACT SCORE (IES)– BEES STAKEHOLDER PANEL IMPACT CATEGORY WEIGHTING

Utilizing the BEES Stakeholder Panel impact normalization methodology, average vinyl siding has a lower environmental impact compared to both brick and mortar and fiber cement per unit area. The combined environmental impact score (EIS) for generic brick and mortar is 356% the EIS for the same area of average vinyl siding, while the EIS for fiber cement is 997% the EIS for the same area of average vinyl siding.

Utilizing the BEES Stakeholder Panel impact normalization methodology, average insulated vinyl siding has a lower environmental impact compared to both brick and mortar and fiber cement per unit area. The combined environmental impact score (EIS) for generic brick and mortar is 312% the EIS for the same area of average insulated vinyl siding, while the EIS for fiber cement is 875% the EIS for the same area of average insulated vinyl siding.

TEMPORAL COMPARISONS

AVERAGE VINYL SIDING: 2012 VS 2016

Category	Unit	2012 Average Vinyl Siding	2016 Average Vinyl Siding
Ozone depletion	kg CFC_{-11} eq	2.35E-08	3.03E-08
Global warming	kg CO_2 eq	6.59E-01	6.13E-01
Smog	kg O_3 eq	3.77E-02	2.51E-02
Acidification	kg SO_2 eq	2.75E-03	2.31E-03
Eutrophication	kg N eq	9.51E-04	5.98E-04
Carcinogenics	CTU_h	2.22E-08	4.04E-08
Non carcinogenics	CTU_h	1.03E-07	9.56E-08
Respiratory effects	kg $PM_{2.5}$ eq	1.73E-04	2.39E-04
Ecotoxicity	CTU_e	2.73E+00	3.30E+00

Category	2012 Average Vinyl Siding	2016 Average Vinyl Siding
Ozone depletion	100%	128%
Global warming	100%	93%
Smog	100%	66%
Acidification	100%	84%
Eutrophication	100%	63%
Carcinogenics	100%	182%
Non carcinogenics	100%	92%
Respiratory effects	100%	138%
Ecotoxicity	100%	121%

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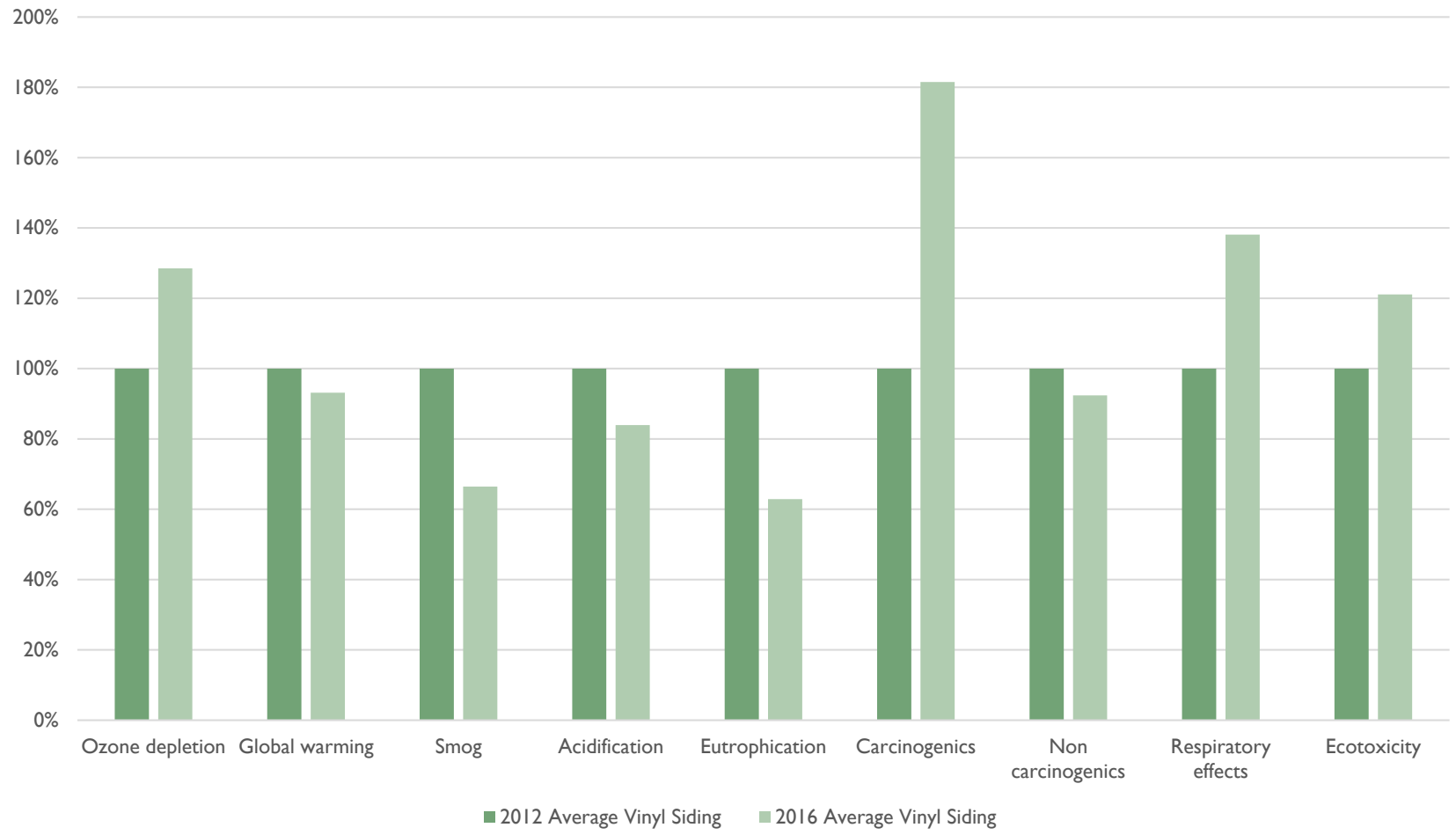
AVERAGE VINYL SIDING: 2012 VS 2016



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AVERAGE VINYL SIDING: 2012 VS 2016

Average vinyl siding has reduced environmental impacts from 2012 to 2016 in several impact categories, while other impact categories have shown an increase during that time. Specifically, 2016 average vinyl siding has lower impacts in the global warming, smog, acidification, eutrophication, and non-carcinogenic impact categories. 2016 average vinyl siding has higher impacts in the ozone depletion, carcinogenics, respiratory effects, and ecotoxicity impact categories. The largest improvement was in the eutrophication category where 2016 impacts are 63% of 2012 impacts.

AVERAGE INSULATED VINYL SIDING: 2012 VS 2016

Category	Unit	2012 Average Insulated Vinyl Siding	2016 Insulated Average Insulated Vinyl Siding
Ozone depletion	kg CFC_{-11} eq	2.46E-08	3.12E-08
Global warming	kg CO_2 eq	7.60E-01	7.42E-01
Smog	kg O_3 eq	5.64E-02	3.46E-02
Acidification	kg SO_2 eq	4.18E-03	2.91E-03
Eutrophication	kg N eq	9.83E-04	7.09E-04
Carcinogenics	CTU_h	2.55E-08	4.40E-08
Non carcinogenics	CTU_h	1.14E-07	1.24E-07
Respiratory effects	kg $PM_{2.5}$ eq	2.20E-04	2.73E-04
Ecotoxicity	CTU_e	2.95E+00	4.02E+00

Category	2012 Average Insulated Vinyl Siding	2016 Average Insulated Vinyl Siding
Ozone depletion	100%	127%
Global warming	100%	98%
Smog	100%	61%
Acidification	100%	70%
Eutrophication	100%	72%
Carcinogenics	100%	172%
Non carcinogenics	100%	109%
Respiratory effects	100%	124%
Ecotoxicity	100%	136%

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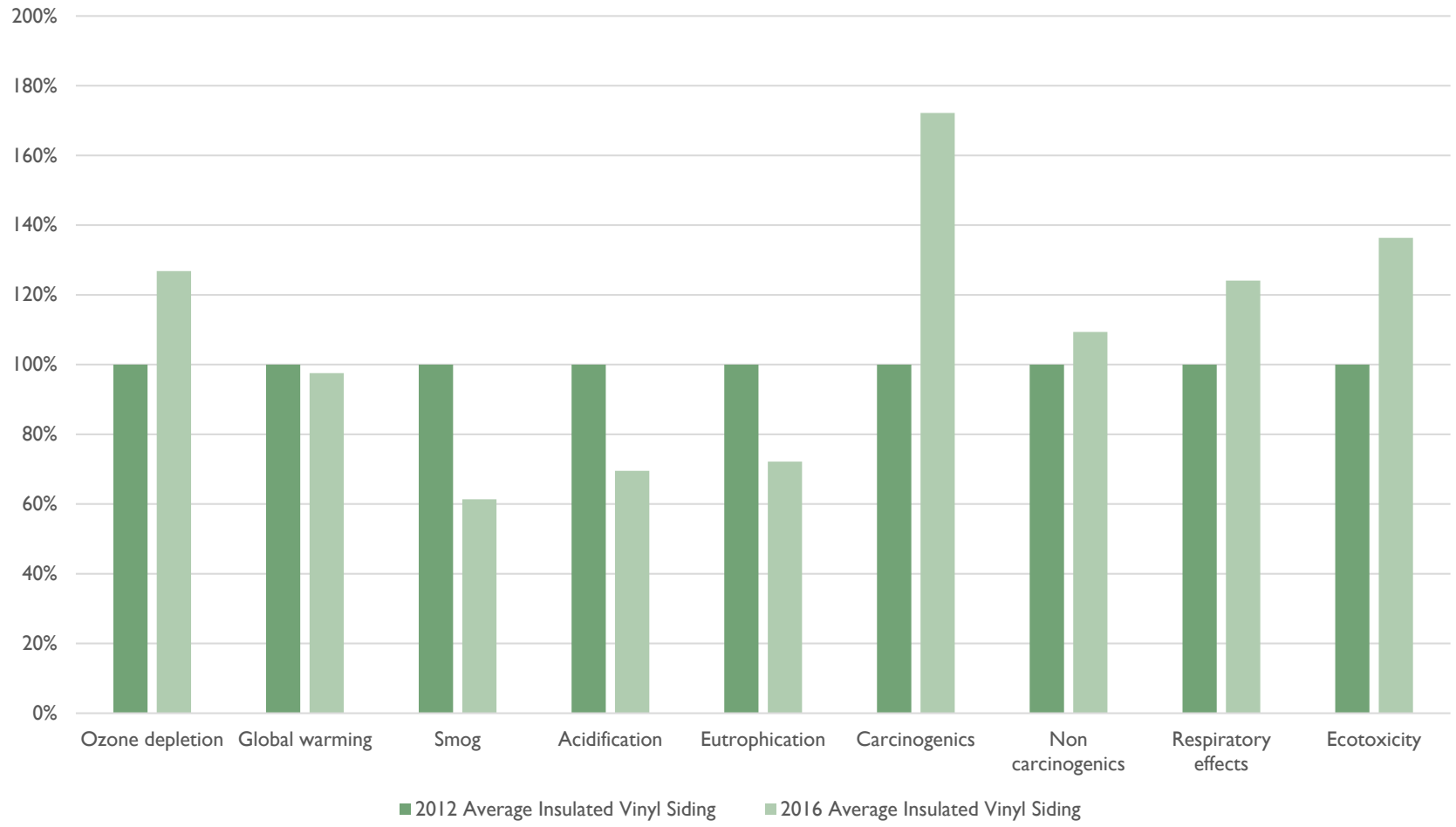
AVERAGE INSULATED VINYL SIDING: 2012 VS 2016



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AVERAGE INSULATED VINYL SIDING: 2012 VS 2016

Average insulated vinyl siding has reduced environmental impacts from 2012 to 2016 in several impact categories, while other impact categories have shown an increase during that time. Specifically, 2016 average insulated vinyl siding has lower impacts in the global warming, smog, acidification, and eutrophication impact categories compared to 2012. 2016 average insulated vinyl siding has higher impacts in the ozone depletion, carcinogenics, non-carcinogenics, respiratory effects, and ecotoxicity impact categories compared to 2012. The largest improvement was in the smog category where 2016 impacts are 61% of 2012 impacts.

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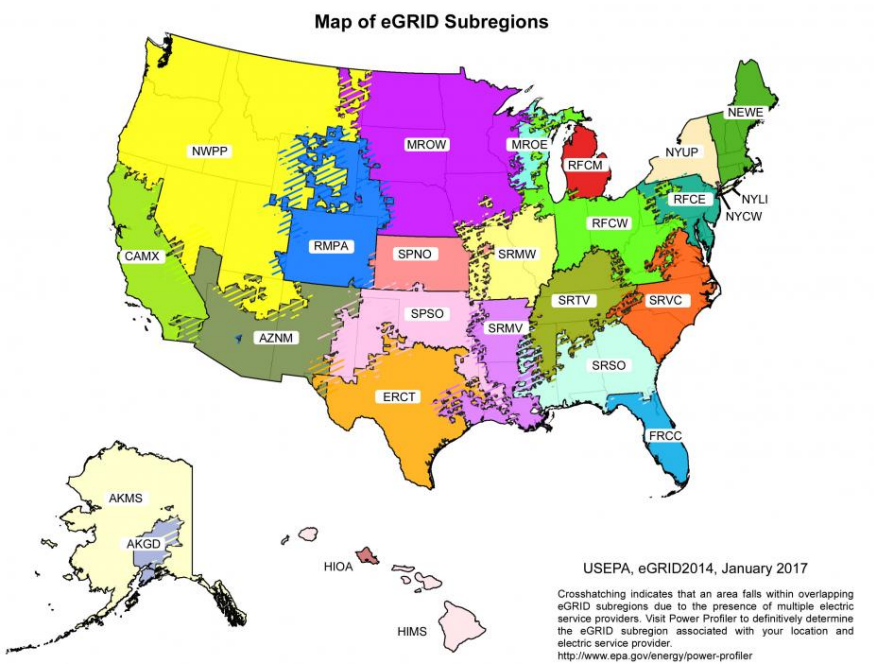
REGIONALITY ANALYSIS

REGIONALITY ANALYSIS METHODOLOGY

A regionality analysis was performed to understand the variability in vinyl siding and insulated vinyl siding environmental impacts that may result from different manufacturing locations. In order to assess this variability, four scenarios were compared to the baseline scenario. Each of these four assumes a different manufacturing location and the LCA model has been adjusted to use the electricity grid mix available in each location. The four alternative scenarios considered are:

- Northeast US (eGRID: NEWE)
- Southeast US (eGRID: SRSO)
- Upper Midwest US (eGRID: MROW)
- West Coast US (eGRID: CAMX)



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AVERAGE VINYL SIDING – REGIONALITY ANALYSIS

Category	Unit	Baseline Scenario	Northeast US	Southeast US	Upper Midwest	West Coast
Ozone depletion	kg CFC_{-11} eq	3.12E-08	3.12E-08	3.12E-08	3.12E-08	3.12E-08
Global warming	kg CO_2 eq	7.42E-01	7.39E-01	7.47E-01	7.44E-01	7.41E-01
Smog	kg O_3 eq	3.46E-02	3.40E-02	3.50E-02	3.53E-02	3.39E-02
Acidification	kg SO_2 eq	2.91E-03	2.86E-03	2.95E-03	2.95E-03	2.87E-03
Eutrophication	kg N eq	7.09E-04	7.08E-04	7.10E-04	7.10E-04	7.09E-04
Carcinogenics	CTU_h	4.40E-08	4.40E-08	4.39E-08	4.39E-08	4.41E-08
Non carcinogenics	CTU_h	1.24E-07	1.25E-07	1.24E-07	1.24E-07	1.25E-07
Respiratory effects	kg $PM_{2.5}$ eq	2.73E-04	2.72E-04	2.76E-04	2.73E-04	2.72E-04
Ecotoxicity	CTU_e	4.02E+00	4.04E+00	4.02E+00	4.01E+00	4.05E+00

Category	Baseline Scenario	Northeast US	Southeast US	Upper Midwest	West Coast
Ozone depletion	100.00%	100.00%	100.00%	100.00%	100.00%
Global warming	100.00%	99.58%	100.67%	100.32%	99.97%
Smog	100.00%	98.12%	101.00%	102.01%	97.99%
Acidification	100.00%	98.33%	101.63%	101.62%	98.78%
Eutrophication	100.00%	99.90%	100.08%	100.11%	99.92%
Carcinogenics	100.00%	100.14%	99.98%	99.90%	100.22%
Non carcinogenics	100.00%	100.42%	99.98%	99.77%	100.70%
Respiratory effects	100.00%	99.36%	100.97%	100.01%	99.68%
Ecotoxicity	100.00%	100.41%	99.95%	99.66%	100.62%

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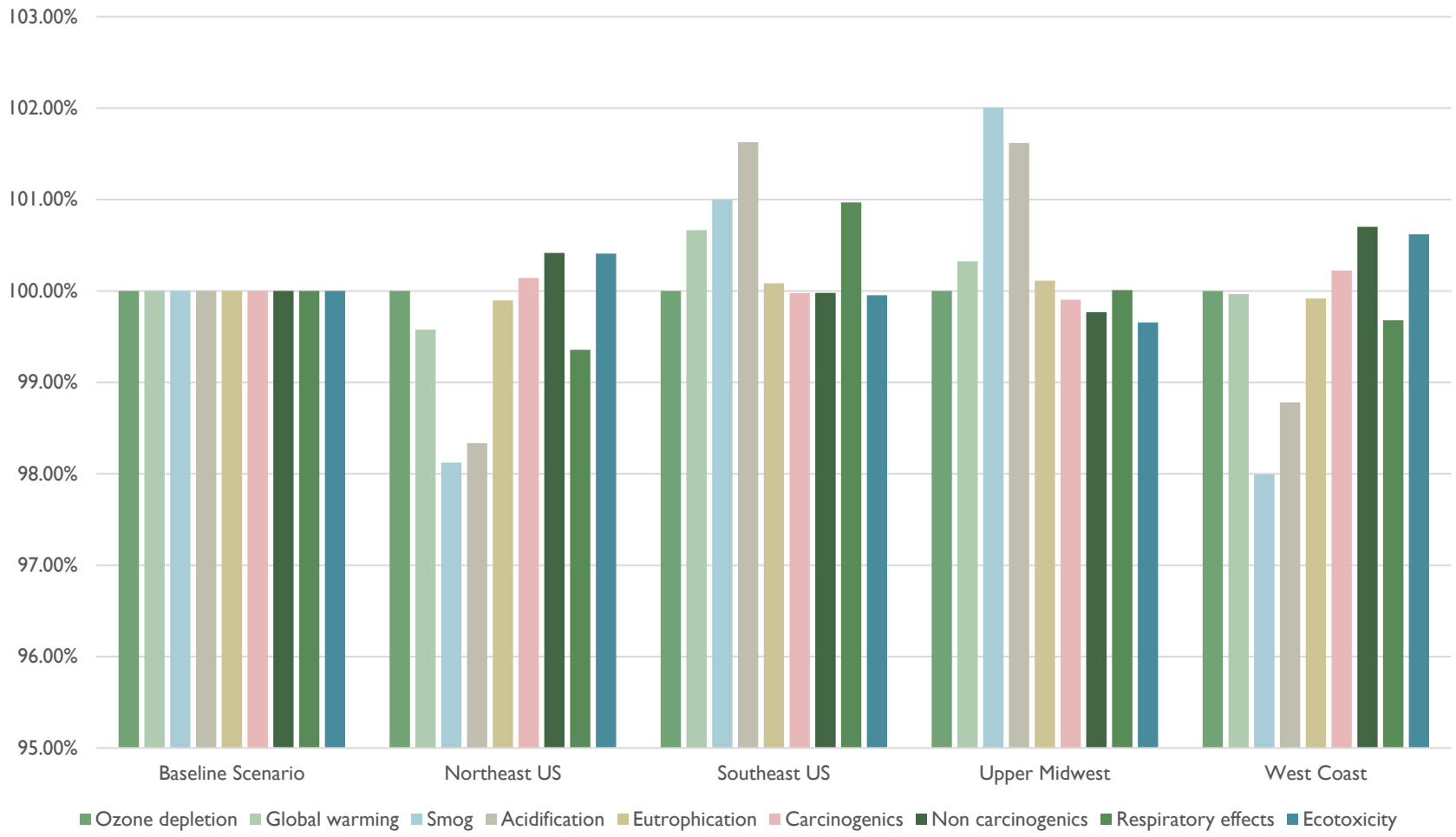
AVERAGE VINYL SIDING – REGIONALITY ANALYSIS



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AVERAGE INSULATED VINYL SIDING – REGIONALITY ANALYSIS

Category	Unit	Baseline Scenario	Northeast US	Southeast US	Upper Midwest	West Coast
Ozone depletion	kg CFC_{-11} eq	3.12E-08	3.12E-08	3.12E-08	3.12E-08	3.12E-08
Global warming	kg CO_2 eq	7.42E-01	7.39E-01	7.47E-01	7.44E-01	7.41E-01
Smog	kg O_3 eq	3.46E-02	3.40E-02	3.50E-02	3.53E-02	3.39E-02
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Eutrophication	kg N eq	7.09E-04	7.08E-04	7.10E-04	7.10E-04	7.09E-04
Carcinogenics	CTU_h	4.40E-08	4.40E-08	4.39E-08	4.39E-08	4.41E-08
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Respiratory effects	kg $PM_{2.5}$ eq	2.73E-04	2.72E-04	2.76E-04	2.73E-04	2.72E-04
Ecotoxicity	CTU_e	4.02E+00	4.04E+00	4.02E+00	4.01E+00	4.05E+00

Category	Baseline Scenario	Northeast US	Southeast US	Upper Midwest	West Coast
Ozone depletion	100.00%	100.00%	100.00%	100.00%	100.00%
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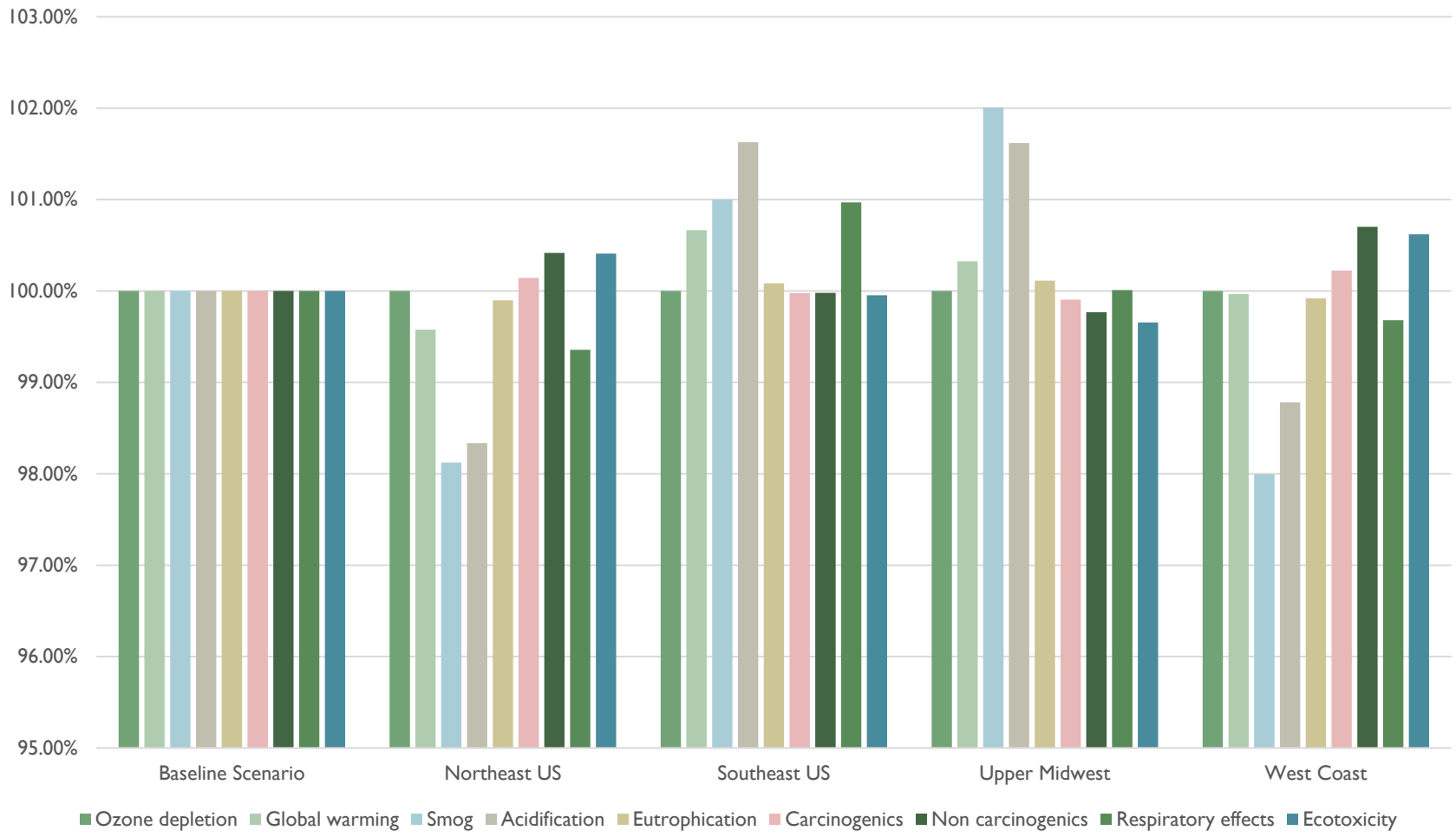
AVERAGE INSULATED VINYL SIDING – REGIONALITY ANALYSIS



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AVERAGE VINYL SIDING – REGIONALITY SENSITIVITY

The overall cradle to grave environmental impacts for both average vinyl siding and average insulated vinyl siding are not very sensitive to changes in manufacturing location. Across the four considered alternative manufacturing location scenarios, impact results did not vary by more than +/- 2% in any impact category for either product type. These differences are due to the composition of the energy production technologies in the various location. The most sensitive impact category is smog, for which impacts are approximately 2% lower for the West Coast US scenario, and approximately 2% higher for the Upper Midwest US scenario for both product types. The variation in impacts is relatively small because the bulk of siding impacts are due to the raw materials used, rather than the manufacturing process itself. This trend is consistent across both product types.

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