All Weather Insulated Panels

Reducing Carbon & Cost of Roofing – The OneDek Advantage

U.S. - California, Georgia, Texas, Washington D.C, Minnesota

This study evaluates whether an integrated, panelized roof deck can reduce environmental and construction burdens by systematically comparing AWIP's OneDek product to a conventional low-slope warehouse roof across five U.S. regions on embodied carbon, raw material mass, and installation effort.

PLANET PASSIONATE

To learn more about AWIP's sustainability commitment, please visit https://www.awipanels.com/sustainability-2/

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Summary

All Weather Insulated Panels (AWIP) is committed to sustainability, with goals to achieve net zero carbon by 2030. As part of this commitment, AWIP has commissioned a comprehensive study to evaluate the environmental and performance benefits of its OneDek roofing assembly in comparison to a typical low-slope warehouse roof assembly

The OneDek insulated roof deck assembly consists of a rigid foam core enclosed between two steel panels, forming a prefabricated unit that is covered with either a PVC or TPO membrane. This modularized system reduces the number of material types, installation steps, and specialized labor needed to create a full roof system. The OneDek assembly also has a streamlined maintenance and reroofing process, which allows users to preserve the majority of the initially installed materials. This study compares key performance metrics between the OneDek assembly and a typical low-slope warehouse roof assembly.

Evaluated metrics include embodied carbon; material and labor costs; construction timeline efficiency; and operational performance factors such as thermal performance, maintenance requirements, and lifespan. Five regional scenarios - Washington, District of Columbia (DC), Atlanta, Georgia (GA), Minneapolis, Minnesota (MN), Dallas, Texas (TX) and Sacramento, California (CA) - were analyzed to assess how climate and regional markets influence these performance metrics across the United States.

Embodied carbon now accounts for a growing share of a building's total emissions, especially as operational energy becomes cleaner.
A reduction of 19–21% in roofing system emissions represents a significant win for early-phased decarbonization and can directly support compliance with emerging embodied carbon policies (e.g., Buy Clean, CALGreen), as well as corporate ESG targets.

Key Findings:

Drawing on modeled data across a range of U.S. regions and climates, the analysis highlights quantifiable reductions in global warming potential (GWP) and raw material mass. The findings below summarize the most significant sustainability outcomes observed in this comparison.

OneDek outperformed typical roofing systems in embodied carbon across all modeled locations.

- In Minnesota and Washington, D.C., OneDek achieved a 21% reduction in global warming potential ($kgCO_2e$) per square foot.
- In Georgia, California, and Texas, OneDek achieved a 19% reduction in global warming potential ($kgCO_2e$) per square foot.

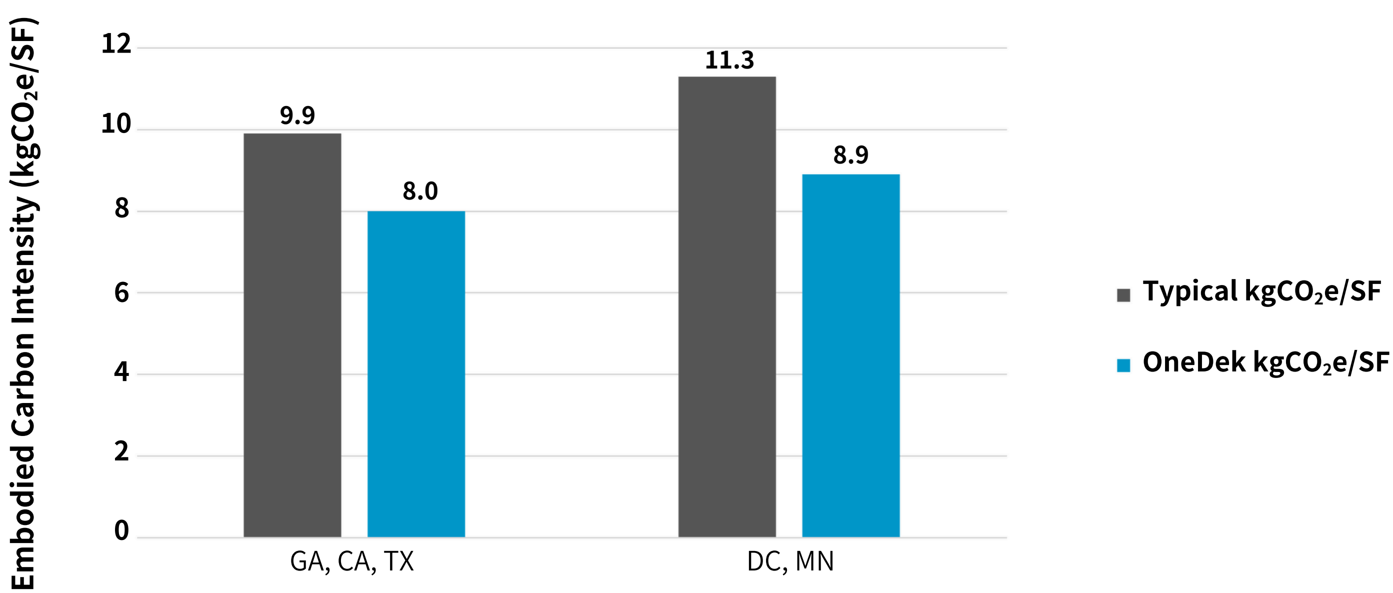
To learn more about OneDek and other AWIP products, visit www.awipanels.com.

Applicability Across Diverse Regions
The OneDek assembly maintained its carbon advantage across hot-humid (FL, TX, GA), mixed-humid (DC), and cold (MN) climates. This suggests the system's lower- impact material profile and integrated design are resilient to regional construction standards.
Why This Matters:
Climate consistency makes the system scalable for national portfolios. Unlike some products that only show favorable results in niche climates or specific assembly types, OneDek's uniform performance enables standardization across a company's building stock, reducing design and procurement complexity.

Lower Material Mass
The OneDek assembly showed significantly reduced raw material mass per square foot with more than 50% fewer materials in each region.
Why This Matters:
Lower material demand reduces environmental burdens tied to extraction, manufacturing, and transport, while also streamlining construction timelines, construction labor, and waste management.

LEED Credit Contributions
OneDek's carbon profile supports several credits in LEED v4/v4.1 and LEED v5, particularly MRc1, Option 1 Whole Building Life- Cycle Impact Reduction, and aligns with common ESG reporting frameworks seeking material transparency and life cycle reductions.
Why This Matters:
As developers and asset managers face growing pressure to quantify and reduce carbon impacts, product-level solutions that contribute to third-party certifications and climate disclosures are increasingly valuable. A roofing system with a proven emissions advantage supports not only project- specific goals but also broader organizational decarbonization strategies.

Figure 1. Comparison of OneDek vs Typical Assembly Embodied Carbon, by Region



Introduction

This whitepaper provides a foundation for making informed, impact-driven roofing decisions in a critical time where carbon-conscious approaches are necessary. AWIP's panelized approach shows strong potential not just as a better roofing system, but as a model for how thoughtful design and innovation can accelerate the building industry's transition to a lower-carbon future, while continuing to be cost-competitive.

Selected Regions

Selected Regions The selected regions—Washington, District of Columbia (DC), Atlanta, Georgia (GA), Minneapolis, Minnesota (MN), Dallas, Texas (TX) and Sacramento, California (CA)—were chosen based on AWIP's market presence. These locations represent five distinct U.S. regions—the Mid-West, Mid-Atlantic, Southeast, Southwest and West—allowing for a comprehensive evaluation of the OneDek assembly's performance across different climatic and seismic zones. This study examines how these regional variations influence key metrics such as cost, thermal performance, and embodied carbon.

Roof Assemblies

The AWIP OneDek assembly is a panelized roof deck assembly. An assumed 5" rigid foam insulation core is sandwiched between two 26-gauge galvanized steel panels.

To complete the system, OneDek is then overlayed with either a PVC or TPO waterproofing roofing membrane. This study assumes 60 mil TPO membrane. The assembly meets the building codes of each selected region.

OneDek Assembly Bill of Materials

All Locations

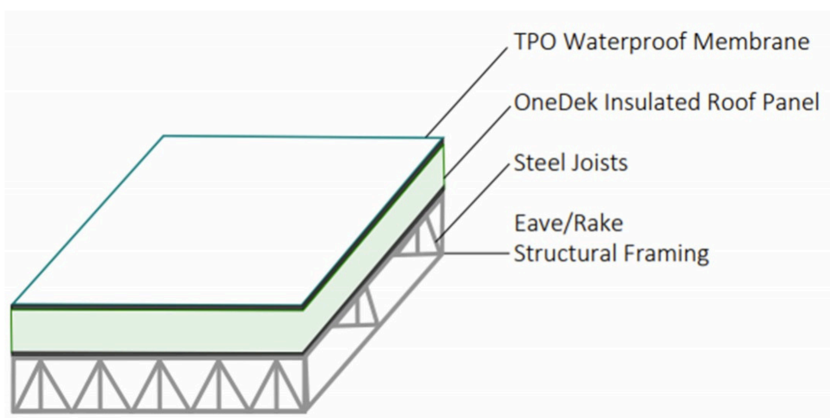
- 26 GA exterior – 26 GA interior 5" OneDek insulation Panel (2.8 psf)
- TPO Waterproofing Membrane, 60 mils thick (0.8 psf, includes added layers for re-roof)

California, Georgia, Texas

- Steel Joists, 8' on center (1.5 psf)
- Steel Bridging (0.4 psf)
- Steel Joist Girders (0.8 psf)

Minnesota, Washington, D.C.

- Steel Joists, 5.33' on center (2.2 psf)
- Steel Bridging (0.4 psf)
- Steel Joist Girders (1.4 psf)

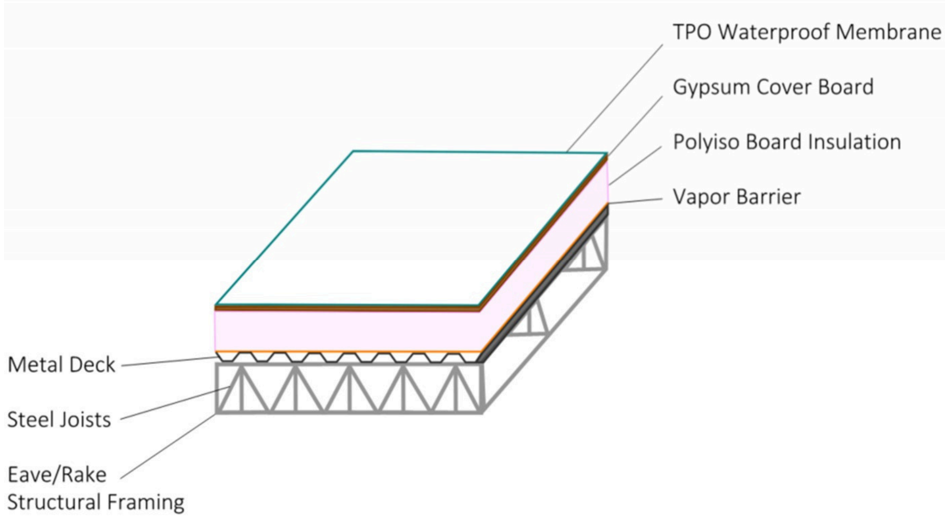


Typical Warehouse Low-Slope Roof Assembly

This study assumes a typical warehouse low-slope roof assembly consists of 22 ga steel TypeB/WR deck, polyisocyanurate (polyiso) insulation board, gypsum cover board, vapor barrier, and a 60 mil TPO waterproofing membrane. The thickness of the polyiso insulation board is determined by the region's building codes.

All Locations

- 22 ga steel type B/WR deck (1.9 psf)
- TPO Waterproofing Membrane, 60 mils thick (0.8 psf, includes added layers for re-roof)
- Vapor barrier, 12 mils thick (0.2 psf, includes added layer for re-roof) Gypsum Coverboard, 5/8" thick (2.8 psf)



California, Georgia, Texas

- Polyiso board insulation, 2 layers of 2.6" board (1.0 psf)
- Steel Joists, 6' on center (1.8 psf)
- Steel Bridging (0.4 psf)
- Steel Joist Girders (1 psf)

Minnesota, Washington, D.C.

- Polyiso board insulation, 2 layers of 3" board (1.1 psf)
- Steel Joists, 5.33' on center (2.8 psf)
- Steel Bridging (0.4 psf)
- Steel Joist Girders (1.6 psf)

The structural assumptions for both scenarios can be found in the Appendix.

Embodied Carbon Methodology

Life Cycle Assessment (LCA)

LCAs combine individual product LCA data into one model that captures the embodied carbon of all the primary materials in a system. LCAs consider the environmental impacts of key life cycle stages during a system's lifetime or chosen assessment period. Depending on the LCA's scope, those life cycle stages may include the extraction, transport, manufacturing, replacement, use, and final disposal of the materials associated with the system. The physical scope of the LCA and what data is used can also vary depending on the purpose of the LCA.

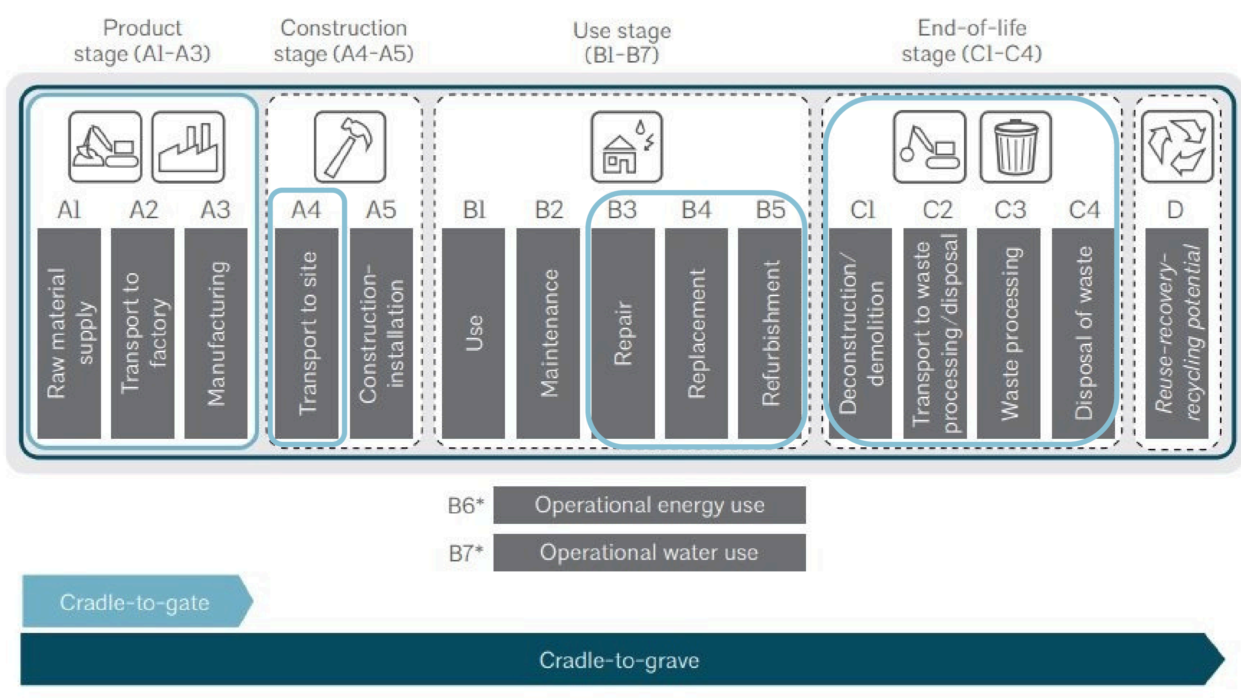
System Boundary: Life Cycle Stages

The different life cycle stages from which emissions arise in an LCA are formally categorized into the Product Stage, Construction Process Stage, Use and Maintenance Stage, and End of Life Stage. These categories are further subdivided as shown in Figure 5. To stay consistent with the OneDek environmental product declaration (EPD), this study includes the Product and Construction Process Stages (A1-A4), Use and Maintenance Stages (B3-B5), and End of Life Stages (C1-C4).

System Boundary: Physical Scope

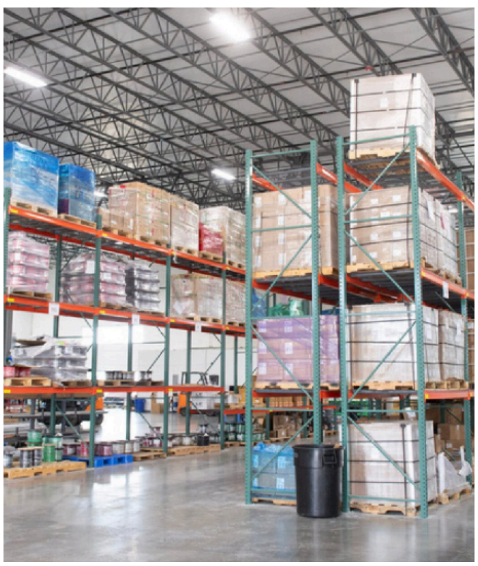
Each LCA modeled a mock-roof representing either the OneDek Scenario or the Typical Scenario in a given region. The mock-roof was assumed to be 2,304 square feet (SF) (48 feet x 48 feet) to maximize the structural capacity of the OneDek panel. The bill of materials was provided by AWIP, and each scenario reflects what is listed in the section titled "Roof Assemblies" (pg. 6-7). The OneDek systems include steel joists/bridging/girders, OneDek panel, and a TPO waterproof membrane. The typical low-sloped warehouse roof systems include steel joists/bridging/girders, 22 ga steel type B/WR deck, gypsum coverboard, vapor barrier, polyiso insulation board, and TPO waterproof membrane. All fasteners are omitted from the model as they would provide insignificant impact to the structural assembly or overall embodied carbon.

Figure 2. LCA Life Cycle Stages



General Assumptions

- Comparative LCA is modeled cradle-to-grave (A1–A4, B3–B5, C1–C4).
- Physical scope is a 2,304 SF (48′×48′) mock roof per region; assemblies follow Roof Assemblies; fasteners are omitted as de minimis.
- Regions include DC, GA, MN, TX, CA; insulation thickness for the Typical assembly is set by regional building codes.
- EPD handling keeps identical EPDs for materials shared across scenarios and regions to isolate design effects.
- Service life assumes 60 years; replacement is modeled as full panel + membrane with a membrane-only sensitivity noted.
- Structural basis is deck continuous over ⩾3 spans, joists evenly spaced by capacity, lateral systems well distributed; see the Appendix.
- Reporting units are $kgCO_2e$/SF for embodied carbon and kg/SF for material intensity.
- There is no sufficient industry average vapor barrier EPD, so the project team assumed a polyethylene vapor barrier membrane as a proxy. The thickness and GWP values match closely with similar vapor barrier products in the Carbon Leadership Forum (CLF) EC3 database, such as Dupont Tyvek Air and Weather Barrier products.



Design Scenario Assumptions

- A 60 year lifespan for the roofing system was assumed.
- R-Value of the polyiso insulation board in each comparative scenario was determined using the applicable regional building codes. The California, Georgia, and Texas scenarios had two layers of 2.6” polyiso insulation board. The Minnesota and Washington, D.C. scenarios had two layers of 3” polyiso insulation.
- There is no sufficient industry average vapor barrier EPD, so the project team assumed a polyethylene vapor barrier membrane as a proxy. The thickness and GWP values match closely with similar vapor barrier products in the Carbon Leadership Forum (CLF) EC3 database, such as Dupont Tyvek Air and Weather Barrier products.

Comparative LCA Approach

A OneDek roof assembly was compared to a typical low-slope warehouse roof assembly across five regions in the United States using LCA TRACI 2.1 impact methodology. This is a data driven, quantitative approach that provides clear results on how the embodied carbon of the various roof scenarios compare to one another.

The modeled area remained consistent across all models. Within a region, the same building codes were used to design the OneDek and Typical assemblies. Materials present in both the OneDek and Typical assemblies were assigned the same EPD to keep GWP metrics consistent. Across regions, the same EPDs were used for the OneDek and Typical assemblies. Material quantity for the structural components (joists, bridging, girders) and the polyiso insulation board were the only variables that changed by region.

Table 1 shows the EPDs used for each material across the scenarios and the GWP of each.

Table 1. Material and GWP Data for OneDek and Typical Scenarios

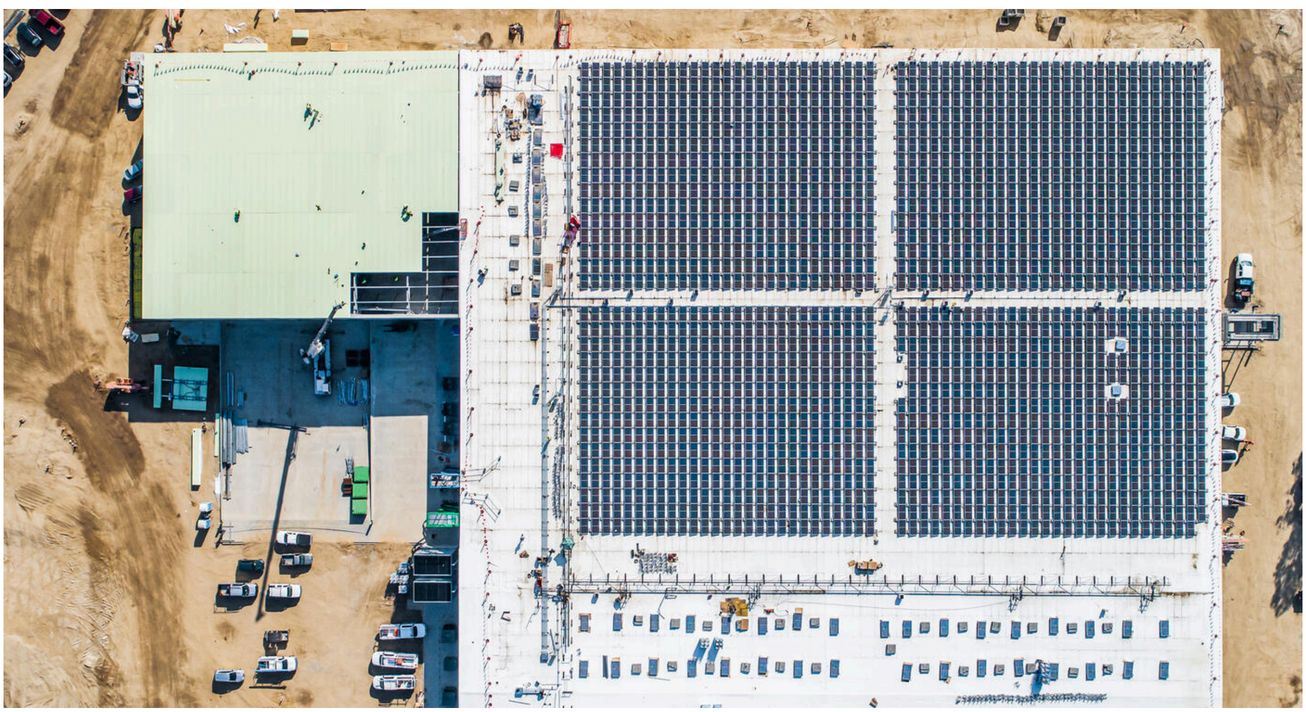
	OneDek Scenario		Typical Scenario	
Material	**EPD Name**	**GWP ($kgCO_2e$/unit)**	**EPD Name**	**GWP ($kgCO_2e$/unit)**
TPO Membrane	Thermoplastic polyolefin (TPO) single- ply roofing membrane, 60 mil, 1.48 kg/m^2 (Single Ply Roofing Industry)	3.9 kg CO_2e / m^2	Thermoplastic polyolefin (TPO) single- ply roofing membrane, 60 mil, 1.48 kg/m^2 (Single Ply Roofing Industry)	3.9 kg CO_2e / m^2
Joists, Bridging, Girders	Open web steel joists and joist girders, North America average (Steel Joist Institute)	1.43 kg CO_2e / kg	Open web steel joists and joist girders, North America average (Steel Joist Institute)	1.43 kg CO_2e / kg
OneDek	OneDek with TPO Membrane, 5" with 26ga steel panels (AWIP)	4.4 kg CO_2e / ft^2		
Vapor Barrier			Polyethylene vapour barrier membrane, 0.15 mm, 0.14 kg/m^2 (One Click LCA)	0.42 kg CO_2e / m^2
Polyiso Insulation Board			Polyisocyanurate (PIR) roof insulation boards, coated glass faced (CGF), 0.941kg/m^2 (2.07 lb/m^2), 25 mm (0.984 in) (Atlas Roofing Corporation, Carlisle Construction Materials, Firestone Building Products, GAF, IKO, Johns Manville, Rmax - A Sika Brand, Soprema, Inc. (USA))	2.95 kg CO_2e / m - RSI
Gypsum Coverboard 5/8"			Glass-mat gypsum boards, fire and moisture resistant, 15.9 mm, 13.59 kg/m^2, 855 kg/m^3, Type X (Gypsum Association (GA))	5.42 kg CO_2e / m^2
22 ga Type B/WR Steel Deck			Steel roof and floor deck, North America average, 38-76 mm (Steel Deck Institute)	2.32 kg CO_2e / kg

Cost Analysis Approach

The cost analysis has been broken down into a comparison of material costs, labor costs, and construction timeline converted to an assumed cost. Standard construction cost estimate methodology using historical data was applied to the bill of materials (BOM) of each scenario.

Cost Assumptions

- All considered costs are at the subcontractor level, which includes the cost of materials, shipping, installation equipment (crane, specialty tools, etc.) materials, construction labour, and maintenance/replacement labour.
- Labour costs are based on normalized rates in 2024[1].
- Maintenance costs are estimated based on cleaning requirements listed in the OneDek installation guide[2], and on literature for best practice of maintenance of low-slope fully adhered membrane roofing system[3].
- Costs exclude general contractor overhead, fees, design contingency, construction contingency, permits, design fees, and other soft costs and owner costs outside of the maintenance and replacement costs over the lifetime of the assemblies.



1 U.S. Bureau of Labor Statistics Occupational Employment and Wage Statistics: Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates: https://www.bls.gov/oes/current/oessrcma.htm

2 OneDek Installation Guide: https://www.awipanels.com/wp-content/uploads/2024/02/awip-onedek-od-onedek-product-guide-en.pdf

3 AWIP Panels OneDek Panels: https://www.awipanels.com/products/onedek/

Comparison Results: Carbon, Materials, Cost, & Buildability

Operational Performance: Thermal Performance, Maintenance, and Lifespan

The information used to compare operational performance of the OneDek assembly to a typical low-slope warehouse roof assembly was sourced from literature, product information sheets, and interviews conducted with AWIP employees and commercial installers.

Comparative LCA

The comparative life cycle assessment (LCA) evaluates the embodied carbon (kgCO_2e) of the OneDek scenario versus a typical low-sloped warehouse roof assembly scenario across five regions in the United States. The five regions represented are Washington, District of Columbia (DC), Atlanta, Georgia (GA), Minneapolis, Minnesota (MN), Dallas, Texas (TX) and Sacramento, California (CA).

The calculated total embodied carbon accounts for emissions during the Product and Construction Process Stages (A1-A4), Use and Maintenance Stages (B3-B5), and End of Life Stages (C1-C4). The total emissions account for what is referred to as a “Cradle to Grave” life-cycle phase scope.

The results are broken down by region, material, and life-cycle phase, providing insight into why certain scenarios performed better than others.

The OneDek scenario outperforms the Typical scenario in embodied carbon intensity and material intensity.

Results by Region

The results are broken down by region, material, and life-cycle phase, providing insight into why certain scenarios performed better than others.

Across all the evaluated regions, the OneDek scenario outperforms the Typical scenario in embodied carbon intensity (kgCO_2e/SF) and material intensity (kg mass/SF).

The Georgia (GA), California (CA), and Texas (TX) OneDek assemblies had 24% less embodied carbon than the Typical scenario. The Washington, D.C. (DC) and Minnesota (MN) OneDek assemblies had 27% less embodied carbon than the Typical scenario.

The GA, CA, and TX OneDek assemblies had 55% less material than the Typical scenario. The DC and MN OneDek assemblies had 51% less material than the Typical scenario.

Table 2. Embodied Carbon Intensity and Material Intensity by Region

	Embodied Carbon Intensity ($kgCO_2e/SF$)			Material Intensity (kg mass/SF)		
Region	**Typical**	**OneDek**	**% Reduction**	**Typical**	**OneDek**	**% Reduction**
GA, CA, TX	9.9	8.0	**24%**	5.8	2.6	**55%**
DC, MN	11.3	8.9	**27%**	6.5	3.2	**51%**

The embodied carbon reductions across all regions are primarily driven by the OneDek's ability to consolidate the equivalent of polyiso insulation board and metal deck into a single, more compact product. OneDek's design also eliminates the need to install additional vapor retarder and gypsum coverboard.

Between regions, greater embodied carbon reductions are seen in DC and MN than in GA, CA, and TX. More intensive structural systems are required in DC and MN due to wind speed and snow load. Because the OneDek assembly provides structural benefit while requiring less material, greater embodied carbon reductions were seen where the structural system had more weight in the model.

Material Contribution

The Typical scenario exhibits higher embodied carbon impacts primarily due to its reliance on polyiso insulation board, which constitute the single largest material contributor to embodied carbon within the assembly. This is one reason the colder regions (DC and MN) have a higher embodied carbon; building codes in these regions require more insulation. Embodied carbon impacts from the structural steel components, including joists, girders, and bridging, are also more pronounced in the colder regions because increased support is required for wind speed and snow loads. Furthermore, the Typical scenario includes additional layers that are not present in the OneDek assembly, such as gypsum coverboard, metal decking, and vapor barrier. These additional layers collectively increase the overall embodied carbon and material footprint.

Conversely, the OneDek scenario employs an integrated panel design that consolidates several materials into a single, more compact product, thereby achieving a marked reduction in embodied carbon. The OneDek approach eliminates the need for separate metal decking, coverboards, vapor barrier, and multiple fasteners and adhesives typically required in conventional assemblies. While substructure elements such as joists and girders remain necessary, their quantities are equal or slightly reduced across the evaluated regions. This suggests structural design efficiencies inherent to the OneDek assembly. This streamlined component structure not only drives emissions reductions but also delivers additional benefits, such as decreased on-site waste generation, expedited installation timelines, and lower transportation emissions resulting from more compact packaging configurations. Together, these factors position the OneDek assembly as a more sustainable alternative with a substantially lower carbon profile compared to the Typical scenario.

Life-Cycle Phase Stage Breakdown

The life cycle assessment (LCA) of the OneDek and Typical scenarios reveal that certain life-cycle phases generally have a higher embodied carbon than others.

Most prominent is the Raw Materials and Manufacturing Phase (A1-A3), which contributes the most emissions across all scenarios and regions. In all regions, the OneDek scenario demonstrates lower embodied carbon emissions during the Raw Materials to Manufacturing Phase (A1-A3), with values ranging from 3.7 to 4.6 kgCO_2e/SF compared to the Typical scenario's higher range of 6.7 to 8.0 kgCO_2e/SF. This result reflects the streamlined, integrated panel design of OneDek, which reduces material intensity and manufacturing complexity.

Transport to Site (A4) impacts remain minimal and consistent at 0.1 kgCO_2e/SF in all scenarios and regions, indicating that differences in transportation logistics are not a significant differentiator.

Neither system registers emissions during Repair (B3), suggesting similar durability or maintenance requirements within the evaluated time period.

The OneDek scenario incurs higher emissions (3.7 kgCO_2e/SF) during Repair, Replacement and Refurbishment (B3-B5) compared to the Typical scenario (1.6 kgCO_2e). The OneDek replacement emissions value assumes that both the OneDek panel and TPO waterproof membrane are replaced. However, OneDek has the unique replacement benefit of being able to preserve the OneDek panel during replacement if a 22 ga exterior galvanized steel panel is used. In this case, only the TPO waterproofing membrane would need to be replaced, decreasing the OneDek Replacement (B4-B5) emissions to 0.9 kgCO_2e/SF.

Impacts during End-of-Life (C1-C4) are generally lower for OneDek (0.5 kgCO_2e) than for the Typical scenario, which reaches up to 1.6 kgCO_2e/SF in colder climates. This reflects the more material intensive nature of the typical scenario. More materials to dispose of/recycle requires leads to more emissions.

OneDek's streamlined panel design reduces embodied carbon in A1-A3 and across the product life cycle compared to the Typical assembly.

Collectively, the findings highlight that the OneDek assembly's integrated design not only reduces upfront manufacturing emissions but also offers potential efficiencies in the replacement and end-of-life phases, resulting in a lower overall carbon footprint compared to the Typical system across diverse climates.

Figure 3 and Figure 4 illustrate the findings of the study.

Figure 3. Embodied Carbon Broken Down by Material

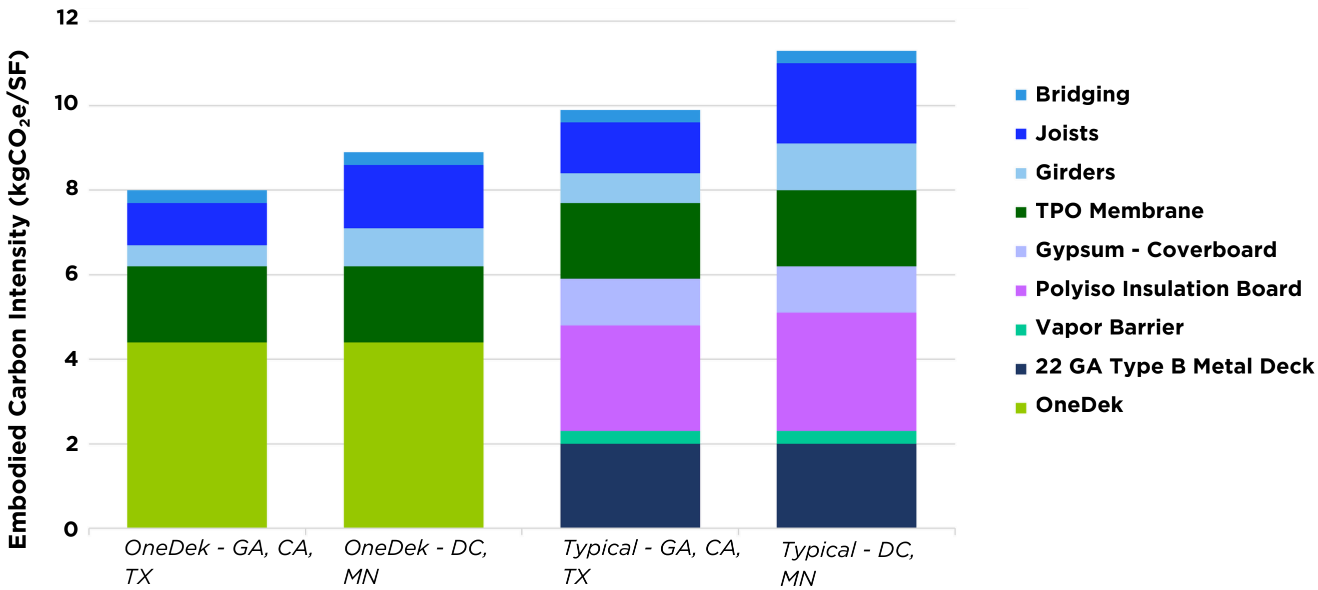
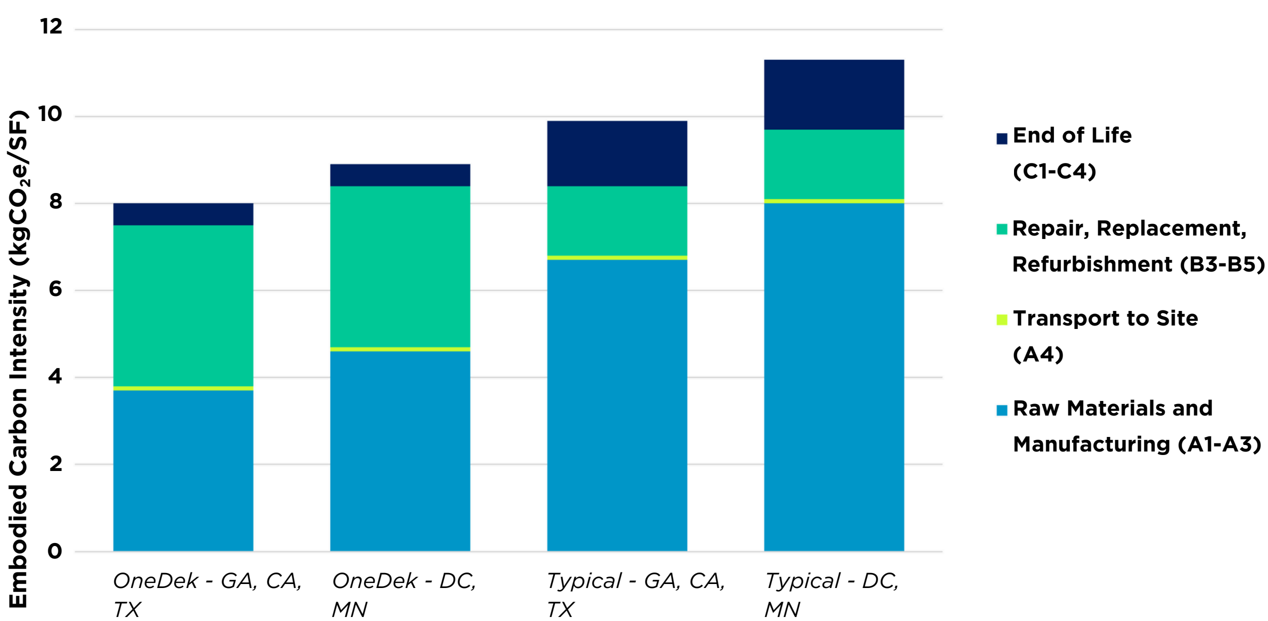


Figure 4. Embodied Carbon Broken Down by Life-Cycle Stage



Cost Analysis Results

Across all regions, the OneDek assembly provides cost savings compared to a typical low-sloped roof by reducing material quantities, construction-installation labor and timeline, and replacement materials and labor.

	OneDek Cost Saving Categories		
Project Phase	**Materials**	**Labor**	**Timeline**
Procurement	Conventional systems require multiple layers, including rigid insulation boards, vapor retarders, and cover boards, all of which add to material costs. In contrast, OneDek integrates structural support, insulation, and air/vapor control into a single panel, eliminating the need for these additional materials. According to OneDek installers, storage for typical systems can take up to 75% more space on-site prior to installation, creating logistical challenges.	The OneDek product simplifies architectural and structural roofing designs, streamlining the design process.	Less time may be spent procuring materials as multiple functions are served by the OneDek product.
Construction & Implementation	Need for specialized installation equipment is minimized as OneDek arrives pre-assembled.	OneDek streamlines labor by reducing the number of trades required. Conventional systems involve multiple specialized workers installing different layers. With OneDek, general contractors have the option to self-perform much of the work, reducing reliance on specialized trades.	With fewer specialized laborers, transition time between specialists is minimized and coordination is simplified. OneDek panels arrive ready for installation, minimizing the time required for cutting, fitting, and securing various layers. This efficiency not only shortens the timeline to achieve a watertight building envelope but also reduces labor costs and the risk of weather-related delays. The simplified four-step installation also shortens project timelines and minimizes schedule risk. See the Construction and Installation Comparison section for more details.

	OneDek Cost Saving Categories		
Project Phase	**Materials**	**Labor**	**Timeline**
Maintenance & Replacement	The materials requiring replacement are reduced. If the full OneDek panel and attached TPO waterproof membrane is replaced, less materials are needed than if a typical roof was stripped down to the metal deck. OneDek has the unique replacement benefit of being able to preserve the OneDek panel during replacement if a 22 ga exterior galvanized steel panel is used. In this case, only the TPO waterproofing membrane would need to be replaced.	Replacement labor is streamlined as fewer layers are considered, and fewer specialized trades are required.	Timeline for replacement and weather related risk is minimized with the OneDek Product, especially in the case where only the TPO waterproof membrane needs to be replaced.

Construction and Installation Comparison

OneDek's pre-assembled panelized approach offers significant advantages over conventional low-slope roofing assemblies by reducing complexity and accelerating project completion.

The OneDek assembly streamlines installation into just four key steps: laying and securing the OneDek panels, applying sealants for air barrier continuity, attaching the membrane, and seaming the membrane. In contrast, typical roofing systems require roughly 8 steps, including individual installation of metal deck, rigid insulation, vapor retarder, waterproofing membrane, and coverboard. These additional layers often require specialized equipment such as fastener tools, adhesives, and lifting machinery, as well as a broader range of skilled labor. By reducing both installation steps and the need for extra equipment and specialized labor, OneDek enables faster project completion, lower labor costs, and a reduced risk of scheduling delays.

Table 3. Breakdown of Installation Steps - OneDek vs Typical Low-Slope Roof

OneDek Assembly	Typical Low-Slope Roof
1. Lay down and secure OneDek. 2. Apply additional sealants for air barrier continuity. 3. Apply and secure waterproof membrane. 4. Seam waterproof membrane.	1. Lay down and secure metal deck. 2. Apply additional sealants for air barrier continuity. 3. Lay down and secure vapor barrier. 4. Apply and secure first layer of rigid insulation. 5. Apply and secure the second layer of rigid insulation. 6. Lay down and secure gypsum cover board. 7. Apply and secure waterproof membrane. 8. Seam membrane.

By simplifying the installation process, OneDek helps construction teams meet tighter project deadlines. Fewer materials and faster installation steps streamline coordination between trades, allowing other phases of construction to proceed without prolonged roofing work. This is particularly beneficial in regions with shorter construction seasons or for projects facing aggressive timelines.

OneDek Cost Regional Comparison

Based on data from the 2024 Bureau of Labor Statistics, labor for roof installation is most expensive in Minneapolis, MN. In descending order of labor costs, Minneapolis is followed by Sacramento, CA; Washington, D.C.; Dallas, TX; and Atlanta, GA with Dallas and Atlanta having nearly identical labor costs.

Operational Performance: Thermal Performance, Maintenance, and Lifespan

The operational performance of a roofing system is a key factor in assessing its long-term environmental impact. **The OneDek assembly demonstrates several advantages over a typical low-slope roof, particularly in thermal performance, lifespan, and maintenance requirements.**

Thermal Performance: The OneDek assembly provides enhanced thermal efficiency through its integrated insulated panel design, minimizing thermal bridging and therefore optimizing the building envelope. This increased efficiency may reduce HVAC loads, stabilize indoor temperatures, and lower operational energy consumption — all contributing to reduced carbon emissions and long-term energy cost savings.

Lifespan and Replacement Process: The OneDek assembly simplifies the reroofing process: when the roofing membrane reaches the end of its service life, it can be removed and replaced without disturbing the underlying insulated panel structure. This eliminates the need for extensive demolition, reduces material waste, and minimizes building downtime. In contrast, conventional low-slope systems often require multiple layers of material removal, potential deck repairs, and reinstallation of insulation — leading longer construction timelines, and increased labor requirements.

Maintenance Requirements:

Maintaining the OneDek assembly is relatively straightforward, focusing on preserving the integrity of the insulated metal panels and the roofing membrane. Periodic cleaning to remove dirt and debris, along with routine inspections of panel joints and caulking helps to prevent leaks and maximize performance. **The durable construction of OneDek reduces the frequency of repairs, while any necessary touch-ups can typically be addressed with minimal disruption. In comparison, conventional low-slope systems may require more intensive maintenance, such as repairing punctures, addressing insulation degradation, or mitigating water pooling[4].** By reducing long-term maintenance demands, the OneDek assembly lowers both operational costs and is associated with lower carbon impact over time.

4 OneDek Installation Guide: https://www.awipanels.com/wp-content/uploads/2024/02/awip-onedek-od-onedek-product-guide-en.pdf

Conclusion

This study demonstrates that AWIP's OneDek panelized roofing assembly offers a measurable and repeatable environmental advantage over conventional low-slope roofing assemblies.

Across multiple climate zones and construction contexts, OneDek consistently delivered 19-21% reductions in embodied carbon per square foot and reduced raw material use by up to 50%. These carbon and material savings are critical as building developers, designers, and owners navigate tightening sustainability regulations and strive to meet ESG goals.

Beyond embodied impacts, the OneDek assembly also provides operational and economic benefits that strengthen its overall value proposition. Its all-in-one design simplifies installation, shortens construction timelines, and reduces labor costs. The integrated assembly reduces the likelihood of installation errors, contributing to fewer maintenance needs and more predictable performance over the roof's life span. Moreover, its streamlined form minimizes thermal bridging and can improve insulation continuity, helping maintain long-term energy performance and occupant comfort.

These combined benefits contribute to lower total cost of ownership (TCO) over the life of the building. OneDek is more than a sustainable alternative, it represents a forward-thinking roofing solution that integrates environmental performance with constructability, durability, and long-term economic value.

OneDek delivers 19–21% embodied carbon reductions and up to 50% material savings while also lowering costs, improving performance, and providing long-term economic and sustainability benefits through its integrated, efficient design.

Appendix — Cost Estimation Tools & Tables

Table A-1 Labor Costs by Site

City	Roofer ($/hour)	Sheet Metal Worker* ($/hour)
Sacramento, CA	$31.99	$38.20
Atlanta, GA	$23.36	$28.47
Washington, D.C.	$28.52	$33.07
Dallas, Texas	$23.41	$26.65
Minneapolis, Minnesota	$36.36	$43.13

Data is from the Bureau of Labor and Statistics, Department of Labor, May 2024.

*Sheet metal worker used as proxy, since no national data was found in the government data for Steel Workers.

Appendix — Structural Analysis Assumptions

A structural engineering firm performed a warehouse study to size the joists for each region so that they met regional building codes. The following are the structural assumptions and quantities.

Notes:

- Warehouse bay size is 48 ft × 48 ft, the joist depth is limited to 2′-6″, and the girder depth is limited to 4′-0″.
- A OneDek assembly used for the design is a 26 ga exterior – 26 ga interior panel. The fastening system is assumed to be 40/5-12 fastening with 12″ o/c side-lap spacing along the span, as defined in the OneDek literature. The capacities of the OneDek assembly are based on the material information provided.
- The Traditional Deck System utilizes a 22 ga steel Type B/WR deck. Connections for this system can be assumed to be similar to those of the OneDek assembly to achieve similar diaphragm capacity.
- A summary of the roof elements included in each system is included on the next page.
- For both systems, the deck is assumed to be continuous over three or more spans for determining vertical capacity. The steel joists are evenly spaced along the bay; spacing is controlled by the capacity of the deck system and the capacity of the joists in the depth category.
- Lateral systems in the warehouse are assumed to be well distributed such that the listed panel stiffness/capacity will be sufficient and that standard deck connections can be used for diaphragm connections.
- Snow loading used for typical bay design does not include surcharge drift loading, which is dependent on the height of parapets. Design of roof drainage is assumed to be sufficient to avoid ponding. Where required by code, a rain-on-snowload is included.
- A superimposed load of 5 psf is assumed.
- This study is limited to steel open-web roof framing only.
- The designs included are for hypothetical projects only. Actual projects will need to be designed by licensed engineers for the site and conditions of the projects.

Roof Assembly Components

System A: OneDek BOM by Region

All locations:

- 26 GA ext – 26 GA int 5” Panel (2.82 psf)
- TPO Waterproofing Membrane, 60 mils thick (0.8 psf, includes added layer for re-roof)

System B: Typical Low-Slope BOM by Region

All locations:

- 22 GA Type B/WR Deck (1.9 psf)
- TPO Waterproofing Membrane, 60 mils thick (0.8 psf, includes added layer for re-roof)
- Vapor barrier, 12 mils thick (0.2 psf, includes added layer for re-roof)
- 5/8” gypsum coverboard (2.8 psf)

Atlanta, Sacramento, Dallas:

- Polyisocyanurate board insulation, 2 layers of 2.6” board (1.0 psf)

Minneapolis, Washington D.C:

- Polyisocyanurate board insulation, 2 layers of 3” board (1.1 psf)

Table A-2 Roof Joist Sizing

Location	Atlanta Georgia	Washington District of Columbia	Sacramento California	Minneapolis Minnesota	Dallas Texas
ASCE 7-22 Wind Speed	105 Vmph	113 Vmph	94 Vmph	109 Vmph	105 Vmph
ASCE 7-22 Ground Snow Load	19 psf	62 psi	6 psi	58 psi	12 psf
OneDek Assembly Joist Spacing	8′ on center	5.33′ on center	8′ on center	5.33′ on center	8′ on center
OneDek Assembly Joist Weight	1.5 psf	2.2 psf	1.5 psf	2.2 psf	1.5 psf
OneDek Assembly Bridging Weight	0.4 psf	0.4 psf	0.4 psf	0.4 psf	0.4 psf
OneDek Assembly Joist Girder Weight	0.8 psf	1.4 psf	0.8 psf	1.4 psf	0.8 psf
Traditional Deck System Joist Spacing	6′ on center	5.33′ on center	6′ on center	5.33′ on center	6′ on center
Traditional Deck System Joist Weight	1.8 psf	2.8 psf	1.8 psf	2.8 psf	1.8 psf
Traditional Deck System Bridging Weight	0.4 psf	0.4 psf	0.4 psf	0.4 psf	0.4 psf
Traditional Deck System Joist Girder Weight	1.0 psf	1.6 psf	1.0 psf	1.6 psf	1.0 psf

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