



Godsmen Elementary

How Solar and Shade are Reshaping Playgrounds

Lessons Learned from Denver Public Schools

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LUMOS

Executive Summary

Playgrounds are critical environments for children's physical, emotional, and cognitive development. Yet, studies show that shade, especially in active play areas, is severely lacking, leaving students vulnerable to heat-related health risks and cognitive fatigue. When Lumos was approached to address this issue in Denver schools, we knew that our modular, solar-powered shade structure, the SolarScape, would be the perfect solution. There are now 15 Lumos SolarScapes across Denver Public School playgrounds, providing vital shade for students and generating solar energy for schools.

Through interviews with Denver school administrators, Lumos found that SolarScapes delivered numerous benefits: (1) Improved student well-being through temperature regulation and safe spaces to rest; (2) Cost savings and reduced reliance on nonrenewable energy by feeding solar power back to the grid; (3) Modernized school grounds with visually appealing, multipurpose structures used for learning, reading, and events; (4) Enhanced weather protection, ensuring year-round usability regardless of rain, snow, or extreme sun.

More than just infrastructure, SolarScapes serve as real-world teaching tools for climate-conscious education and energy innovation in Denver Public Schools. This case study examines how sustainable design, focused on integrating solar with shade, can transform playgrounds into safer, smarter, and more resilient environments, setting a precedent for school districts nationwide.





Introduction

Energy is the second largest expense for schools in the United States (Lumos Solar, 2024). Fortunately, these solar & shade solutions are saving schools money that can be better spent enhancing other aspects of education. As climate change accelerates and outdoor temperatures rise, school playgrounds must evolve to better protect students' health, support development, and promote sustainability. SolarScapes tackle this problem directly, offering year-round protection from extreme weather while extending outdoor playtime, cooling playground equipment, and supporting academic focus.

Playgrounds are a vital component of school life. These spaces are where children form important physical, social, cognitive, and emotional skills in an unstructured, outdoor environment. Well-designed playgrounds help meet these developmental needs, and carefully planned playgrounds should consider the benefits that shaded areas promote. Lumos Solar has recognized the advantages that shade offers and has sought to integrate renewable energy into shade structures - since where solar is most powerful, shade is most needed.

By incorporating solar energy into shade structures on playgrounds students can experience the benefits of shaded play areas, and a community that demonstrates their commitment to a sustainable future. These structures present an opportunity to protect students from high temperatures and harmful UV rays, to cool playground equipment, to extend outdoor time, and to promote physical activity. Schools are also given the chance to incorporate energy efficiency and modernization into their educational and community ethos.

In 2024, Lumos Solar supplied SolarScape structures to 15 Denver Public Schools to advance renewable solar energy production and create shaded spaces for students to play. In partnership with solar installers Sandbox Solar and The Solar Revolution, as well as general contractor Palace Construction, Lumos' vision of combining functional solar energy with a beautiful shade structure in Denver playgrounds came to fruition. SolarScapes have been promoting students' well-being, sustainability efforts and cost-savings in schools, while modernizing the playgrounds' landscape and contributing to weather protection. To fully understand the impact and importance of this initiative, it's essential to first explore the broader context that shaped the need for SolarScapes in schools.





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Context

Shade is a critical component of playground design, however, many playgrounds do not account for the diverse benefits that shade offers students, and conversely the harm a lack of shade causes. Primary studies and secondary reviews have demonstrated that shade is often lacking when it comes to areas where children are most active (Gage et al., 2019; Schneider, 2019). Internationally, it has been found that only around 40% of playgrounds will have shade structures implemented into their designs (Schneider, 2019). Of those 40% of playgrounds, there would only be shade covering, at most, 20% of the areas where children play - the rest - reserved for parents seated viewing areas (Schneider, 2019).

When older children are exposed to heat exhaustion, they are more likely to make choices that can reduce discomfort by avoiding direct sunlight and excessive activity or by staying inside during breaks. Yet, younger children, like those who play on playgrounds, have yet to develop those same protective skills and ability to acknowledge and verbalize their experience. Indicating that to protect the wellbeing of children, schools must take a proactive, holistic approach. Education is an essential component of development and must be safeguarded to enhance the student experience. Yet, there are many variables which can compromise that experience, heat exposure being a major factor.

It has been well established that exposure to heat, and the stress it causes, has serious implications for long term health, and is the leading cause of climate related mortality (World Health Organization). Children, having a smaller ratio of body mass to surface area, are more vulnerable to the risks of heat exhaustion (United States Environmental Protection Agency, 2025). In order to reduce the risk of exposure to heat exhaustion, these findings indicate a need for protective factors, such as shade structures, in areas where children play.

Analysis

SolarScapes enhance student well-being

In the Denver elementary schools where Lumos SolarScapes were installed, there was a noticeable benefit for students in terms of the shade that the solar structures provide. Lumos SolarScapes were reported to have a positive impact on the playground environment and student wellbeing.

One principal shared that the structure fits into the school's goals by "ensuring students are kept cool and playing in a way that listens to their bodies" (Principle A, Personal Communication, October 2025). She noted how the structure is particularly supportive of their 3-5 year olds who need to cool off: "Before the solar shade structure and the playground was redone, the area had no shade. I think it is a great respite area when the ECE students are done running around or need a break and they are able to cool off" (Principle A, Personal Communication, October 2025). The shade from the SolarScape protects students, ensuring their valuable play time is not compromised by exhaustive heat (Vanos et al, 2017).

SolarScapes installed in Denver Public Schools gave playgrounds a second life. One school playground was "just a field that was not used ever - full of weeds, mud, and abandoned" prior to the addition of the SolarScape (Principle C, Personal Communication, October 2025). Now, the SolarScape "gives students more opportunities to be outside" because of the shade and shelter the structure produces (Principle D, Personal Communication, October 2025). The principal of one elementary school mentioned that both faculty and students enjoy the structure: "The teachers are happy it is out there. The kids use it on those hot sunny days. They want to go underneath it. They'll sit there, relax, [and] they'll play under it" (Principle D, Personal Communication, October 2025). Further, the shady benefits that the SolarScape offers students extends to their families who "on any given day [will use] it" (Principle D, Personal Communication, October 2025).



Principal D also discussed how their SolarScape, installed on the ECE (Early Childhood Education) and MIS (Multi-Intensive Severe Needs) playground, functions as a critical structure for these students: “It’s a very important playground. It’s their first introduction to playgrounds” (Principle D, Personal Communication, October 2025). She even went as far to say that the structure had contributed to positively impacting student behavior as the “ECE kids and kindergarten children can stay out longer. They have more energy when they are not hot, and there are less arguments” (Principle D, Personal Communication, October 2025). These reports demonstrate the positive impact that Lumos SolarScapes can have on students from their first experience with the school.



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Emphasizing sustainability & cost savings in schools

Lumos SolarScapes contribute to sustainability goals that some schools have by reducing their reliance on commonly-used nonrenewable energy sources. SolarScapes generate energy, feeding it back into the grid, which also has cost-saving effects for schools. Grid tied solar shade structures rely on net metering, which allows a school's electricity meter to turn "backwards" on sunny days, reducing the schools overall energy consumption. This mechanism allows schools to offset their electricity bills. With less money spent on energy, schools have the opportunity to reinvest funding for other initiatives, supplies, or programs that can directly benefit students.

SolarScapes can also be used for purposes beyond the playground. In a classroom setting, educators can teach their students about renewable energy alternatives like solar, utilizing the SolarScape as a real-world example that students directly interact with everyday. One principal expressed how staff had taken their students to the SolarScape to teach them about solar energy, and felt "excited for the kids to learn about solar and [discuss their part] in conserving energy" (Principle D, Personal Communication, October 2025).

Installing a solar shade structure into a school's playground also normalizes solar energy for students, so as they continue to grow older, they have an expectation that renewable energy will be prioritized. At one elementary school, teachers promote an ethos that is grounded in becoming "involved citizens", welcoming students to conserve energy, protect the environment and care for their spaces as part of their "civic duty". As experienced by principals, their colleagues, and their students, SolarScapes present the opportunity to teach children about renewable energy - all while supporting schools in achieving sustainability goals and saving them money.

Modernizing playgrounds through solar & shade

Playgrounds serve as areas where students, faculty, and even parents build community with each other; it is important that these areas are well-maintained and do not become obsolete. Several school administrators, when interviewed about the SolarScape and their experiences with the structure, remarked that it “modernized” the playground. One school principal commented, “We are a fairly old building so it does modernize the outside of the school which parents have commented on” (Principle A, Personal Communication, October 2025). Another principal noted how “it is visually appealing, it’s nice, and it upgrades the playground. It made [it] a lot more striking” (Principle B, Personal Communication, October 2025).

A third principal illustrated how SolarScapes have turned into an outdoor classroom for faculty members: “Some of the teachers will take the kids out there to do lessons and events, and they’ll take them out there to do silent reading. In the spring they’ll go out for their end of year picnics, which normally would have been done across the street in the park. It’s nice to have a location on campus” (Principle C, Personal Communication, October 2025). SolarScapes elevate school playgrounds so that they are more comfortably used by students and faculty.



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Weather protection

In Denver, and other areas where solar is most productive, weather is often extreme. The sun is powerful, the wind is intense and the snow and rain comes in inches. These conditions can often make outdoor play time difficult to facilitate and maintain. Lumos SolarScapes are a year-round protective tool that continues producing energy even in the winter. The oasis of shade in the summer becomes a protective shelter in the winter.

Equipment under the shade structure remains secure while weather occurs all around, permitting children's play to continue. A principal mentioned that their SolarScape keeps children playing all year: "It is still used by students in the winter because there are tables under it and musical instruments" (Principle A, Personal Communication, October 2025). Other principles noted that "it will also provide less snow and less maintenance in the winter" (Principle B, Personal Communication, October 2025). Denver, Colorado is known for its intense weather, which can make it difficult to facilitate outdoor play in times of extreme heat or cold; Lumos SolarScapes meet the highest snow, wind, and hail ratings making them the perfect addition to these schools playgrounds.



Conclusions

The implementation of Lumos SolarScapes in Denver Public Schools reflects a forward-thinking approach to addressing both environmental challenges and student well-being through innovative design. By merging the urgent need for shaded outdoor spaces with the long-term benefits of renewable energy, these solar shade structures offer more than comfort; they represent a sustainable investment in healthier, more resilient learning environments.

The positive feedback from school administrators highlights how SolarScapes enhance daily school life: keeping students cool and safe, modernizing underutilized spaces, promoting sustainability measures, and protecting playground structures from harsh weather. SolarScapes serve as a model of how design, education, and clean energy can converge to support both present needs and future possibilities. Their success in Denver is a powerful reminder that small shifts in infrastructure can lead to meaningful, lasting change for schools and the communities they serve.



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