

Solar in Schools for Essential Education and Energy

By Thomas Beck, AIA, NCARB

The infrastructure of renewable energy is a growing field which already employs more American workers than fossil fuel infrastructure. Solar school buildings have the potential to contribute a great deal more than the current 5.5% of all K-12 schools in the United States. The 7332 schools which already (in 2019) have solar photovoltaic arrays represent more than 5.3 million students attending a solar school. "If all schools are 100% solar we could reduce carbon emissions equal to shutting down 18 coal fired power plants" (Tish Tablan, <https://generation180.org/mashable-video-captures-solar-on-schools-trend/>) Much of the information and statistics used for this article come from Generation180, a "non-profit working to inspire and equip people to take action on clean energy." One of the awesome resources they provide is a map which shows us how many solar schools we have in every state. Colorado has 115, total solar capacity 9198 kilowatts (kW), making us number 17 in the US.

(https://www.generation180.org/hubfs/Solar%20Schools/SS_Map_New/hubspot.html) Most of our schools with solar arrays are in Boulder and Denver Metro areas, broadly representing cities as far north as Longmont and south by Highlands Ranch. Scattered throughout the rest of the state are schools with solar arrays as small as under 2kW and much larger systems, like the 500kW system being completed in the Fremont RE-2 School District of Florence.

(<https://www.solarpowerworldonline.com/2021/04/colorado-school-uses-on-site-solar-array-for-science-class-curriculum/>) According to the Generation180 map, that system will exceed the four 300+ kW systems currently in Colorado. For perspective, a 5 to 6kW solar array will generate enough power for an average size house that uses LED lights, energy efficient appliances, excluding air conditioning.

A story from the National Renewable Energy Laboratory (NREL) highlights the educational opportunities the 100kW solar array at Chatfield High School in the Jeffco school system has provided. A class of 32 engineering students at the high school benefit from hands on experience, and according to the teacher, emphasizing the renewable energy content in his curriculum increased his enrollment numbers by 60%. In 2012, when the NREL story was written, 30 of Jeffco's 154 schools had rooftop solar panels. The school district paid no upfront costs, "and the "Solar on Schools" project is expected to save Jefferson County taxpayers \$2.88 million in energy costs over the next 20 years."

(<https://www.nrel.gov/news/features/2012/2012.html>)

So how does that work, no upfront costs? Third party developers build and maintain the solar arrays, charge the school district less than the current utility rate, and often the school district will eventually own the array after a period of years, typically around 20 years. One of the factors in states which have very few, if any, solar schools is state laws prohibiting the 3rd party funding aspect. Fortunately, this is not the case in Colorado. The Generation180 map includes details about the type of funding used when available.

According to the Third Edition of Generation180's Brighter Future Report, solar schools are now generating enough energy to power 254,030 U.S. homes. Over five years the number of solar schools increased 81%. (<https://generation180.org/brighter-future-2020/>) A video (link in the first paragraph above) summarizes some of this report including statements by school district superintendents from the Tucson Unified School District in Arizona and the Batesville School District in Arkansas. The small Batesville district is applying a portion of the money saved directly to teacher salaries, and has changed the turnover rate of the district's total 250 teachers from 30 to 40 yearly departures to single digits. The Tucson district has installed arrays at 80 schools, in the form of 73,000 photovoltaic (PV) panels on shade canopies in parking lots and school yards, and the district projects energy cost savings of up to \$43 million over 20 years. The funding is used for buying buses, funding computer labs, and for supporting the public education of all students, many of whom fall into categories of those with disabilities, those in poverty, and those in non-English speaking households.

Here are some other Generation180 links for help with solar schools, including a “how to” guide: <https://generation180.org/pathways/solar-schools/>; <https://generation180.org/brighter-future-2020-how-to-guide-download/>

In the course of researching our topic, we learned about a Colorado grant program, Building Excellent Schools Today (BEST), which, since 2008, has awarded approximately \$2.5 billion in grants to more than 525 Colorado schools. (<https://www.cde.state.co.us/capitalconstruction/best>) The website includes a pdf summary of the 43 applications submitted this year, as well as resources for application, and BEST Legislative Reports of previous grant cycles. Among the criteria are “Projects that incorporate technology into the educational environment” and “Projects that will provide career and technical education capital construction in public school facilities.” We feel that solar schools fit these criteria.

We do not have any insider knowledge about what our Estes Park schools are planning in this area. We do know that the Estes Park High School has a new vocational training lab. If the school district were to start installing solar panels on their buildings, it could support vocational training for numerous job types including electrician and solar PV installer job paths. As in the NREL story about Jeffco, the infrastructure could support course material for math, science, and engineering in K-12.

We encourage our local school district to pursue the path of solar schools. The ROI will be worth the effort.

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