

**DEPARTMENT OF PARKS AND
RECREATION
DESIGN AND CONSTRUCTION**



CITY OF SAINT PAUL
Mayor Christopher B. Coleman

400 City Hall Annex
25 West 4th Street
Saint Paul, Minnesota 55102
www.stpaul.gov/parks

Telephone: 651-266-6400
Facsimile: 651-292-7405

Project Title: Lowertown Ballpark (CHS Field) Solar Arrays

Contract Number: EP4-34 **Milestone Number:** 2 **Report Date:** January 30, 2017

Principal Investigator: Name **Contract Contact:** Chris Stark

Phone

Phone: 651-266-6419

Congressional District: (Corporate office) Minnesota Congressional District 4

Congressional District: (Project location) Minnesota Congressional District 4

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MILESTONE REPORT

Executive Summary: Construction of a solar installation of 103.5 kW_{DC} photovoltaic (PV) capacity was completed on November 12, 2015 at CHS Field in St. Paul, home of the Saint Paul Saints (Saints) baseball club. The facility consists of two arrays: a 58.3 kW_{DC} PV shade pavilion over a spectator terrace and a 44.16 kW_{DC} structured array at the northeast corner of the site. This highly visible project is part of a larger sustainability initiative of the Saints and the City of Saint Paul and complies with the City of Saint Paul Sustainable Building Policy by meeting the guidelines of the Minnesota “Buildings, Benchmarks & Beyond” (B3) sustainability goals. The B3 policy for energy use requires that 2% of the overall energy demand is met with on-site solar or wind. Estimates indicate that approximately twelve percent of the ballpark’s energy will be produced by the solar arrays. Energy generated by the solar arrays will be used on site. As the arrays produce electricity, they will decrease the ballpark’s demands on the solar grid, and provide a hedge against increasing electric costs. Completion of this milestone marks the achievement of 45,000 kWh of energy production by the arrays at CHS Field. The actual energy produced in the first three months of operation was 47,288 kWh.

Due to adverse soil conditions and careful considerations of new legal agreements between Xcel Energy, the Saint Paul Saints, and the City of Saint Paul, completion of Milestone I was slowed, however the power generation still met the Milestone II timeline estimates of the electrical

engineers. This solar array project, with a prominent presence at CHS Field and through interactive kiosks in the stadium concourse, achieved significant positive exposure to park visitors. The Saints set an attendance record for the team, and the American Association Independent Baseball League, with over 404,000 spectators over 50 games in their first season, and had over 405,000 spectators in their second season. The exposure to solar technology, and engagement of social and educational initiatives at the ballpark, has met key goals and are successes of the project.

Technical Progress:

The energy generated by the two arrays is being used on site. Since the start of operation for the arrays on May 18th, 2016, the energy production has directly related to the estimates of the electrical engineers regarding the length of time required for reaching the second milestone for the RDF Grant. Over the first three month period of operation there was a total of 47,288 kWh of energy produced, exceeding the estimates by engineers by 1,085 kWh and surpassing the value of 45,000 kWh of production required for fulfillment of the second RDF Grant milestone. The following table notes the actual production values and the projected values for the first three months of operation:

	Projected Production (kWh)	Actual Production (kWh)
June	16,307	15,203
July	15,769	18,130
August	14,127	13,955
Total	46,203	47,288

The corresponding carbon dioxide, nitrogen oxide and sulfur dioxide reductions have been determined by using emission rates for the Upper Midwest from the 2015 Xcel Energy Corporate Responsibility Report. Considering a reported rate of 1,002 pounds CO₂/MWh, 47,288 kWh of energy relates to a reduction of 21.49 metric tons of CO₂ emissions over the solar arrays first three months of energy production. With a Nitrogen Oxide emission rate for 2015 of 1.1 lbs/MWh the solar array energy production corresponds to a reduction of 52.02 pounds of Nitrogen Oxide. Similarly, using a reported 2015 rate for Sulfur Dioxide of 1.3 lbs/MWh, there was an emission reduction of 61.47 pounds of Sulfur Dioxide with the energy produced from the CHS Field solar arrays.

Educating ballpark visitors about sustainable initiatives is an important characteristic of the CHS Field project. This is accomplished in part by two interactive kiosks in the stadium concourse. The kiosks are linked to the internet and feature a website dedicated to the sustainable practices at CHS Field, <http://sustainability.chsfield.com/>. The website shows a plan of the ballpark, and offers more information about the solar arrays by selecting number 5, “Renewable Energy,” from the list of sustainable design strategies at the bottom of the page. The anticipated total direct current capacity of the arrays is 103.5 kilowatts; more information about the impact of this amount of energy is available on the website. This information on the kiosks is also interfaced with a smart phone layout which helps make it more accessible to visitors.

As part of a nightly feature on the ballpark's video board, "The Greenest Ballpark in America," segment is featured, wherein the Saints highlight sustainability initiatives undertaken by the ballpark and the team. Several nights during the 2016 season the solar arrays were featured as part of the promotion in conjunction with other sustainability initiatives, e.g. rainwater harvesting, waste diversion, and sub-field filtration. The information was also conveyed through skits with the ball club's entertainment crew with a humorous delivery to nearly 8,100 spectators during each of the Saints' 50 home games. Although the delivery will change, these entertaining skits will continue in future seasons.

Additional Milestones: According to estimates by the electrical engineers, achievement of Milestone III, total production of 75,000 kWh, can be expected four or five months following the start of service, likely early in 2017, although this will vary with winter snow cover.

Project Status: The early energy production of the arrays has been very successful. There have not been any reports of glare issues or other concerns which could negatively impact a visitor's experience. They continue to provide an excellent educational opportunity and are reducing the power demands at the ballpark. The St. Paul Saints Baseball organization is in the process of investigating whether or not it is feasible to interface the meter that was placed on the array with the kiosks/mobile site, such that real-time information on the energy produced by the arrays can be displayed and translated into everyday uses or off-sets, with that messaging being communicated to baseball fans. Currently, information is gathered on power produced, but the Saints operation staff does not have a direct way to translate it into everyday uses and deliver it directly to the kiosks.

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