Number/code: OM/SM9

Title: STADIUM SOLAR PLANT

Guidelines section:

	Governance	X	Operational management

	Context of the event		*Procurement*
	Event		*Mobility and logistics*
X	*Stadium management*		

Description:

Sports facilities frequently offer sufficient space for the installation of photovoltaic plants – whether on roofs or in the immediate vicinity. Requirements for later installation of plant should be laid down in invitations to tender for construction of the sports facility. Such requirements include the positioning of the building, its usable (roof) area and statics as well as technical infrastructure for the feeding of generated energy into the power supply network. Photovoltaic plants are not only of interest for new buildings, they can also be retrofitted to existing sports facilities. An important point is that generated solar energy is generally not directly supplied to the sports facility but is fed into the power supply network.

1) Stade de Suisse: Since the summer of 2005 the Stade de Suisse in Bern operates the largest solar plant integrated into the roof of a football stadium anywhere in the world. For this it was awarded the EUROSOLAR Environment Prize and the Swiss Solar Prize. The roof modules together form an area of 8,000 square metres. In its first year of operation around 800,000 kWh of electricity were produced; this is equivalent to the average annual consumption of around 250 households. In its final form the roof will accommodate 12,000 square metres of modules and produce an annual total of 1.2 million kWh of electricity.
2) Kaiserslautern Stadium: Stadium roofs are generally open and relatively fragile structures. That the later installation of photovoltaic plants is nevertheless possible is demonstrated by the example of Kaiserslautern stadium, where installation of the largest photovoltaic plant that has ever been installed on the roof of a German football stadium began in 2006. In all, around 5,000 modules are being installed. They cover an area of 6,000 square metres and, fitted close together, they would more than cover a football field. In its ultimate configuration the plant will have an output of up to 800 kWp and generate up to 720,000 kWh of electricity each year – enough to supply 200 households with electricity for a whole year.
3) NASCAR's Pocono Raceway: In August 2010, NASCAR's Pocono Raceway in Long Pond, Pennsylvania, became the largest solar-powered sports facility in the world. Pocono installed

a 25-acre, 3-megawatt array in a former parking lot adjacent to the track. It consists of 40,000 American-made photovoltaic modules and is large enough to be seen from outer space. The solar array, which offsets more than 3,100 metric tons of CO2 annually, provides enough power to operate the entire raceway and 1,000 homes nearby (the raceway sells the energy it doesn't use to local utilities).

4) Forest Green Rovers FC: The New Lawn, home of the English Football Club Forest Green Rovers, is a stadium that is characterized by an ultimate energy management thanks to the installation of solar and wind panels. Regarding the environmental benefits, solar and wind panels guarantee 100% renewable energy and generate 65% of the total power. Only solar panels make 20% of the total energy. Regarding the economic benefits, the use of solar and wind power allows to reduce the costs related to the energy consumption. The practice adopted by the Forest Green Rovers F.C can be (potentially) applied in any stadium. However, the replicability potential is linked to the adequate climate conditions and incentives given from the local government.
5) Philadelphia Eagles' Stadium: Philadelphia Eagles is an American club of the National Football League that in 2003 started the program "Go Green" in order to be more environmentally responsible. In particular, among others, they focused on green energy. The club implemented in the stadium 11,108 solar panels and 14 wind turbines that power completely all the operations. Regarding the environmental benefits, Eagles' stadium runs completely on sustainable energy. This reduced electricity consumption more than 50%. About the economic benefits, the 'Green Energy' adopted by Philadelphia Eagles allowed to reduce the costs associated with energy consumption. The measure can be potentially applied even in other contexts. However, it is important to consider the high investments needed. Then, the replicability for other teams is only possible according to some political and economic requirements.
6) Stade de Bordeaux Solar pergola In Bordeaux, a pergola composed of 60,000 photovoltaic panels provides shade for 7,000 parking spaces and electricity for 5,000 households. That parking area is shared between the exhibition park and the stadium and is one of the largest photovoltaic plants in France.

Environmental benefits:

Prevent GHG emissions.
According to some estimates from the Natural Resource Defense Council (NRDC)[1], if all arenas and stadiums had solar installation equal to the Los Angeles' STAPLES Center[2], they would:
- Reduce carbon emissions by approximately 86.6 million lbs/yr, comparable to taking 8,340 cars off the road;
- Create enough electricity to power roughly 4,812 American homes for a year;
- Save the equivalent of 33,970 barrels of crude oil per year.

[1] https://www.nrdc.org/media/2010/100908
[2] Los Angeles STAPLES Center is another stadium that chose to go green in many different ways, including the switch to solar energy. It installed a 1,727-panel solar array covering 25,000 square feet of the arena's roof. The 345.6-kilowatt system supplies 5 to 20 percent of the building's energy use (depending on load) and produces 525,000 kilowatt-hours annually, saving an average of $55,000 per year. On a sunny day with a low base load of energy use, the panels provide up to 20 percent of energy use; because they have over 250 events per year, including mega-events like the Grammy Awards and NBA and NHL playoffs, the panels provide only 5 percent of our total annual energy use, which nevertheless translates in relevant energy savings (https://www.nrdc.org/sites/default/files/STAPLES-Center-Case-Study.pdf).

Economic benefits:

Renewable energy from solar plants provides many direct and indirect economic benefits on both a micro and macro level.

Lower energy provision costs represent the main economic benefit. Installing solar facilities requires a substantial upfront investment, but after installation, they allow to generate your own electricity, theoretically giving the ability to reduce your energy bill to zero (depending on many factors, such as climatic factors). This is in large part because they don't require the purchase of fuel. Eliminating fuel costs lowers the cost of the electricity produced. It also means the price of electricity isn't susceptible to changes in the price of fuels, like it is with natural gas or coal, which may lead to more stable energy prices over the long term.

Installing solar plants also increases the value of the property/venue.

Applicability and replicability potential

It can be considered easily replicable but the degree of its success depends on many factors, primarily climatic factors.

Sources

OEKO Guideline (p. 43)

Forest Green Rovers FC

Philadelphia Eagles' Stadium

Philadelphia Eagles' Stadium

NASCAR's Pocono Raceway

UEFA Guide to quality stadiums (pp. 31, 95)

Stade de Bordeaux (p. 37)

NRDC

Los Angeles STAPLES Center