3 SOLAR ON SHADING STRUCTURES

Some solar installations are designed to offset purchased electricity and provide shade and shelter. These systems may be considered on public properties such as at parks, amphitheaters, parking lots or other outdoor facilities. The additional benefits of shade and shelter may be valued by comparing the alternative cost of providing shade and shelter in the absence of solar generation.

MODEL SOLAR APPLICATIONS

1. SIMPLE GRID-TIED SOLAR
2. SOLAR ON LANDFILLS OR OTHER UNDERUTILIZED SITES
3. SOLAR ON SHADING STRUCTURES
4. GRID-TIED SOLAR WITH ENERGY STORAGE
5. MOBILE SOLAR WITH ENERGY STORAGE

Solar and energy storage applications can provide energy, capacity, shade, mobility, resiliency and other benefits to local communities. The North Central Texas Council of Governments (NCTCOG), with support from the Texas State Energy Conservation Office (SECO), identified a need for efficient approaches to evaluating solar and energy storage costs and benefits. This fact sheet, developed by Frontier Associates, presents information and analysis about one of five model solar applications likely to be of interest to local government officials. Frontier also produced a detailed report and Microsoft Excel-based financial pro forma templates that can be customized and applied to specific projects under consideration. All of this information may be obtained at www.GoSolarTexas.org.

Photo courtesy of Solaire Generation

CLOSE UP

UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER, DALLAS

An example of a solar shade structure is at the University of Texas Southwestern Medical Center in Dallas, which constructed a 300 kWdc solar array in its open parking lot in 2011. The system is estimated to save the facility over 415,000 kilowatt-hours each year – the equivalent of taking the carbon output of 56 passenger vehicles off the road – and covers 116 parking spaces, providing employees and guests with a cooler place to park.

The parking lot and shade structures are located across the street from the main medical center building, and are adjacent to a physical plant that provides a point of electrical interconnection to the entire medical center campus.

BENEFIT-COST ANALYSIS

This fact sheet shows inputs and results from a benefit-cost model designed to illustrate current project economics for a selected solar application. Local government stakeholders may download the financial pro forma model and customize it to meet the specific requirements of projects being considered for their communities. In the hypothetical example modeled here, technical specifications, costs, and utility rates approximate current pricing in Texas at the time of original publication but do not represent any specific site or installed system.

MODELED APPLICATION

200 kWdc solar shade structure — on a public facility in Fort Worth, directly purchased by local government

ANNUAL ENERGY PRODUCTION – 299,993 kWh/year

KEY FINANCIAL ANALYSIS METRICS

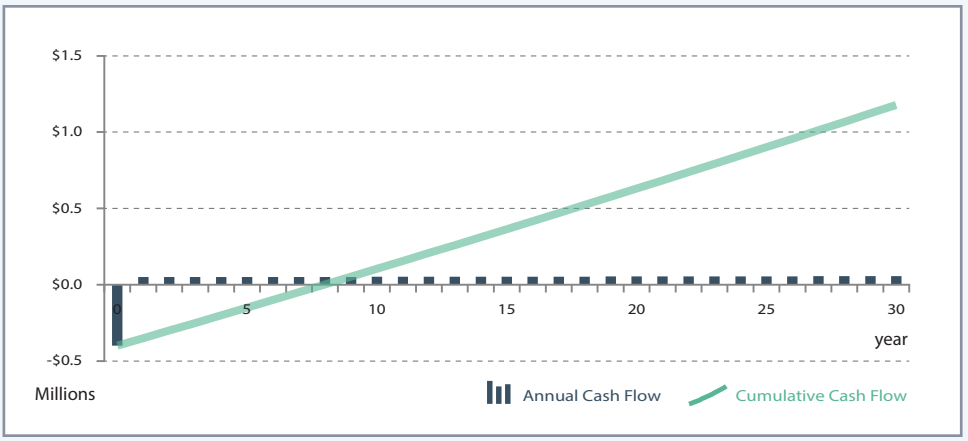
INTERNAL RATE OF RETURN – **11.2%**

NET PRESENT VALUE — **$307,385**

SIMPLE PAYBACK YEARS — **8**

BENEFIT/COST RATIO — **2.2**

CASH FLOWS OVER TIME



ADDITIONAL COMMUNITY IMPACTS

LOCAL JOBS/ ECONOMIC DEVELOPMENT
from NREL JEDI model

During Construction Period ($2016)

4.1 jobs

$275,431 in earnings

$584,165 in total output

During Operating Years ($2016)

0.1 annual jobs

$3,451 in annual earnings

$5,700 in annual output

ANNUAL AVOIDED AIR EMISSIONS from US EPA eGRID Power Profiler

195 pounds of nitrogen oxides (NO_X)

618 pounds of sulfur dioxide (SO_2)

367,003 pounds of carbon dioxide (CO_2)

ANNUAL GREENHOUSE GAS EQUIVALENCIES
from US EPA Greenhouse Gas Equivalencies Calculator

Annual CO_2 avoidance is equivalent to

the greenhouse gas emissions from **398,971** miles driven by an average passenger vehicle, or

the CO_2 emissions from **24.6** average homes' electricity use for one year, or

the carbon sequestered by **4,314** tree seedlings grown for 10 years

OTHER IMPACTS
Reduced risk/exposure to changes in electricity rates
Increased public awareness

ASSUMED COST, RATES AND SYSTEM SPECIFICATIONS

Deal Structure
Local government owned, directly purchased without financing utilizing available utility incentive. System located in Fort Worth.

Solar System Specifications
200 kWdc ground mounted array oriented due south at 20 degree tilt. Estimated life 30 years.

Storage Specifications
No energy storage

Installed Cost
Total installed PV system cost $550,000
Utility incentive of $150,000
No federal tax credit or other grants
Net installed cost $400,000

Estimated Annual Operating Costs
$3,986 in year 1

Site Loads and Excess Energy
10% of solar energy exported to the grid
12% of system capacity contributes to demand charge reduction

Site Electric Bill Rates
Charge for energy inflows: $0.08/kWh
Credit for energy outflows: $0.08/kWh
Demand charge: $5/kW
Annual escalation rate: 1.5%

Direct Financial Costs Modeled
Capital and operating costs

Direct Financial Benefits Modeled
Electric bill energy and demand savings
Increased parking fee revenue

Additional Community Impacts
Local jobs and economic development
Avoided air emissions (CO_2, NOx, SO_2)
Reduced risk/exposure to changes in electricity rates
Increased public awareness

Sponsored by North Central Texas Council of Governments

With support from SECO State Energy Conservation Office

Available at GO SOLAR Texas

Produced by FRONTIER ASSOCIATES