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

1 SIMPLE GRID-TIED SOLAR

Simple grid-tied solar installations can offset purchased electricity on public properties such as wastewater treatment facilities, city halls or libraries, etc. These systems are by far the most common solar application deployed by public and private entities.

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 Axium Solar

CLOSE UP

FIRE STATION #6 IN MCKINNEY

An example simple grid-tied solar energy system is the 52 kWdc solar array at Fire Station #6 in McKinney. The system produces an estimated 137,000 kWh of electricity annually, about 50 percent of the Fire Station's annual energy needs.

This project was funded in part by a grant through the Texas State Energy Conservation Office. It consists of 222 polycrystalline solar modules, rated at 235 watts each, installed on 3 different roof surfaces. The panels are attached to the roof seam utilizing clamps that allow the modules to be attached to the roof without making penetrations. It utilizes multiple string inverters due to limited space for a large centralized inverter, and includes a web-based monitoring system that provides real time energy production data through a standard web browser.

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

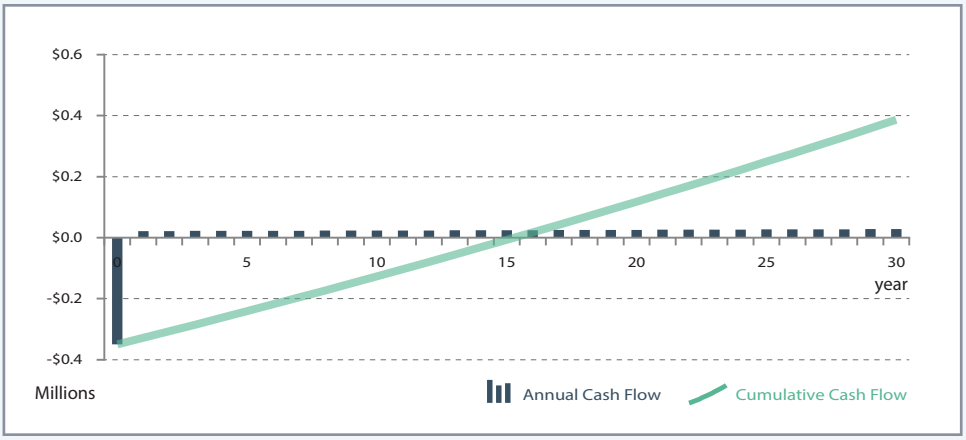
200 kWdc rooftop solar on a public facility in Fort Worth, directly purchased by local government

ANNUAL ENERGY PRODUCTION – 299,993 kWh/year

KEY FINANCIAL ANALYSIS METRICS

INTERNAL RATE OF RETURN — 2.8%	NET PRESENT VALUE — -$23,663
SIMPLE PAYBACK YEARS — 16	BENEFIT/COST RATIO — 1.2

CASH FLOWS OVER TIME



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 rooftop solar array oriented due south at 20 degree tilt. Estimated life 30 years.

Storage Specifications
No energy storage

Installed Cost
Total installed PV system cost $500,000
Utility incentive of $150,000
No federal tax credit or other grants
Net installed cost $350,000

Estimated Annual Operating Costs
$3,986 in year 1, escalated at 1.5% per year

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

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

ADDITIONAL COMMUNITY IMPACTS

LOCAL JOBS/ ECONOMIC DEVELOPMENT
from NREL JEDI model

During Construction Period ($2016)
- 3.7 jobs
- $250,392 in earnings
- $531,059 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 (NOx)
- 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

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