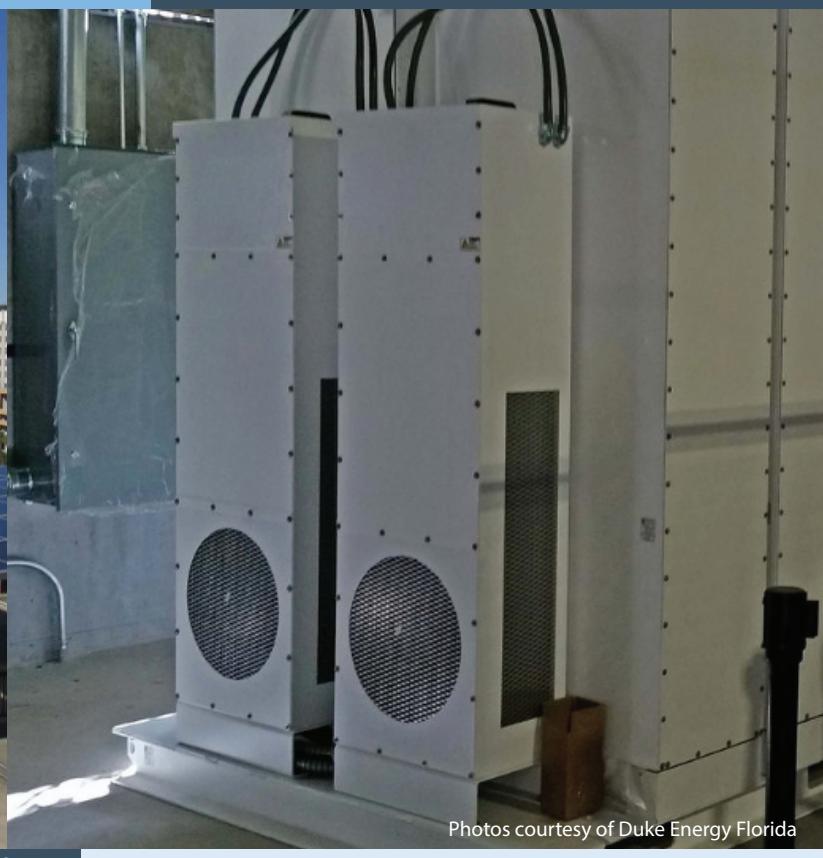
4 GRID-TIED SOLAR WITH ENERGY STORAGE

Grid-tied solar combined with energy storage systems are designed to offset purchased electricity and to provide backup power to critical operations, such as emergency services, during outages or over extended periods of time. These systems can store and shift energy consumption to minimize capacity charges in commercial uses, or to reduce usage during peak pricing periods where applicable.

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.



Photos courtesy of Duke Energy Florida

CLOSE UP

UNIVERSITY OF SOUTH FLORIDA, TAMPA

A 2015 solar and energy storage installation at the University of South Florida combines a 100 kilowatt solar array with 200 kilowatts of battery storage. The solar array provides shaded parking spaces on the roof of a parking structure, and the combined system also consists of two electric car chargers within the parking garage. Duke Energy Florida installed the system with support from a $1 million federal grant.

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

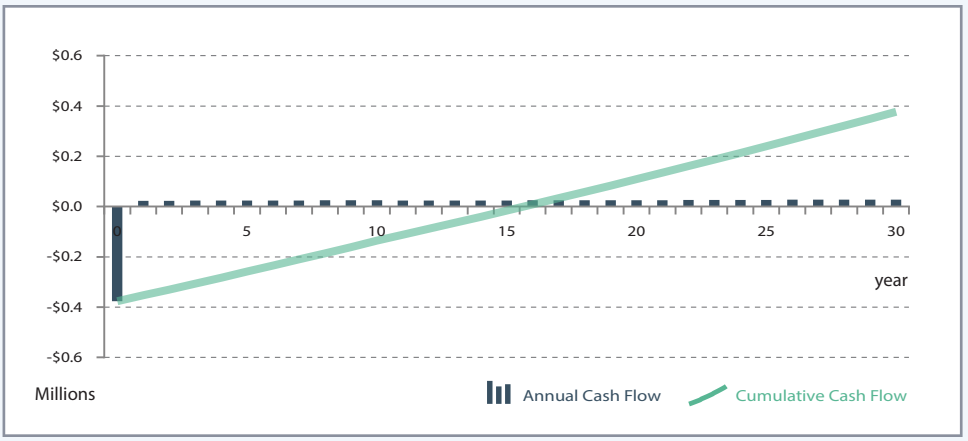
200 kWdc rooftop solar on a public facility in Fort Worth, directly purchased by local government

ANNUAL ENERGY PRODUCTION – 299,993 kWh/year

KEY FINANCIAL ANALYSIS METRICS

INTERNAL RATE OF RETURN — 2.5%	NET PRESENT VALUE — -$35,423
SIMPLE PAYBACK YEARS — 16	BENEFIT/COST RATIO — 1.1

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
26.4 kW, 25.6 kWh of energy storage

Installed Cost
Total installed PV system cost $500,000
Total installed storage cost $26,000
Utility incentive of $150,000
No federal tax credit or other grants
Net installed cost $376,000

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

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
Time of use arbitrage value: $0.02
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
Time of use arbitrage (for storage)

Additional Community Impacts
Local jobs and economic development
Avoided air emissions (CO_2, NOx, SO_2)
Resiliency value (for storage)
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)
- 3.9 jobs
- $263,412 in earnings
- $558,674 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)
- 616 pounds of sulfur dioxide (SO_2)
- 365,873 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 397,742 miles driven by an average passenger vehicle, or
- the CO_2 emissions from 24.5 average homes' electricity use for one year, or
- the carbon sequestered by 4,301 tree seedlings grown for 10 years

OTHER IMPACTS
Resiliency valued at $1,804.50 annually to electric utility
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
Produced by FRONTIER ASSOCIATES