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.

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.

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.
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.

**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 (CO₂, NOₓ, SO₂)
Resiliency value (for storage)
Reduced risk/exposure to changes in electricity rates
Increased public awareness

**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**

**ADDITIONAL COMMUNITY IMPACTS**

**LOCAL JOBS/ECONOMIC DEVELOPMENT**

**ANNUAL AVOIDED AIR EMISSIONS**

<table>
<thead>
<tr>
<th>Local jobs/</th>
<th>Economic Development from NREL JEDI model</th>
</tr>
</thead>
<tbody>
<tr>
<td>During Construction Period ($2016)</td>
<td>3.9 jobs</td>
</tr>
<tr>
<td></td>
<td>$263,412 in earnings</td>
</tr>
<tr>
<td></td>
<td>$558,674 in total output</td>
</tr>
</tbody>
</table>

| During Operating Years ($2016) | 0.1 annual jobs |
| | $3,451 in annual earnings |
| | $5,700 in annual output |

| Annual CO₂ avoidance is equivalent to |
| the greenhouse gas emissions from 397,742 miles driven by an average passenger vehicle, or |
| the CO₂ emissions from 24.5 average homes’ electricity use for one year, or |
| the carbon sequestered by 4,301 tree seedlings grown for 10 years |

Resiliency valued at $1,804.50 annually to electric utility
Reduced risk/exposure to changes in electricity rates
Increased public awareness

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