



Franconia Municipal Electrical Power with a Ground Mount Solar Array: Design and Analysis

Franconia Energy Commission
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Outline and Background

▶ Outline

- ▶ Why solar energy?
- ▶ Proposed solar array
- ▶ Project cash flow analysis
- ▶ Funding
- ▶ Conclusion

▶ Solar Array Background

- ▶ Solar cells are connected together in series and in parallel and encapsulated in a hermetic package called a panel. The panel generates DC electrical power under illumination.
- ▶ Multiple panels are connected to form an array.
- ▶ An inverter converts array DC electrical power to AC power for household use.

Solar Energy: Its abundance, its limitations and implications

- ▶ The source of solar energy-the sun- is limitless in its availability
 - ▶ Except when it isn't, such as at night, or at reduced availability on cloudy days
 - ▶ A solar array is integrated with the electrical grid for 'storage' and backup
- ▶ Solar energy technology (solar cells and panels) are a robust technology
 - ▶ System warranty is for 25-30 years, depending on the technology
 - ▶ Array is modular, so array can be readily expanded and serviced
- ▶ Solar energy pays for itself and reaps savings over the lifetime of the system
 - ▶ This means a long-term reduction in taxes for municipal electricity
 - ▶ Anticipate 2-4% annual increase in NH electrical energy cost*, which compounds town's energy savings over lifetime of array
- ▶ Solar energy systems do not produce greenhouse gases and they replace or reduce use of fossil fuel sources that have larger

Franconia Municipal Electrical Power Solar Array

- ▶ Array provides electrical power for the Town Hall, Library and Welcome Center
 - ▶ Annual electrical budget ~19,300 kWh
 - ▶ Town Hall ~ 8997 kWh
 - ▶ Library ~ 7294 kWh
 - ▶ Proposed Welcome Center ~ 2927 kWh
- ▶ **Solar Array Proposals**
 - ▶ New England Commercial Solar Systems 16.2kW DC, 13kW AC, 19,000 kWh AC
 - ▶ 36 x 450 W modules, single row
 - ▶ \$54,000
 - ▶ Revision Energy 18.2 kW DC, 14.6 kW AC, 22,500 kWh AC
 - ▶ 38 x 480 W modules, single row
 - ▶ \$55,000

Proposed Town Hall Array



To scale, courtesy of NECSS

Solar Array Project and Budget

- ▶ **Solar installer statement of work (SOW)**
 - ▶ Pre-installation: obtain approvals for local permitting and utility interconnection
 - ▶ Installation: Install equipment per manufacturer's recommendations and building codes
 - ▶ Post-installation: Obtain sign-off from local permitting authority and electric utility, complete system test
- ▶ **Solar Array Installation Budget**
 - ▶ \$60,000
- ▶ **Anticipated operations, maintenance and insurance for solar array ~ \$650/yr***
 - ▶ Cleaning annually
 - ▶ System inspection and monitoring
 - ▶ Servicing/replacing inverters and/or components

Array Cash Flow Analysis: Net Present Value (NPV)

	Initial Investment	Maintenance & Insurance	Behind-the-Meter Savings	Offset to Other Uses Savings	Net Present Value
Present Value	-\$60,000	-\$23,000	\$71,532	\$41,632	\$30,135
Electricity Inflation			4.0%	4.0%	
Maintenance Inflation		4.0%			
Discount Rate		2.0%	2.0%	2.0%	
Electricity Cost/kWh				\$0.11	
Total Cost/kWh			\$0.21		
kWh			9,000	10,000	

- ▶ NPV analysis for 30-year lifetime shows:
 - ▶ System pays for itself in ~ 20 years
 - ▶ Generates an additional savings of \$30,000 over array lifetime
- ▶ NPV input parameters are best estimate, to be vetted through state and federal
- ▶ 7 sources

Solar Array Funding and Net-Metering

▶ Funding and Rebates

- ▶ Municipal solar energy projects are eligible for a one-time NH Public Utility Commission (PUC) rebate of \$0.20/watt (~\$3,800)
- ▶ Sales of Renewable Energy Certificates (RECs) from array through NHPUC (~\$400/yr)
- ▶ Franconia Energy Capital Improvement Fund: \$3,500
- ▶ ARPA Funds (American Rescue Plan Act)
 - ▶ Will Select Board allocate some ARPA funds for the solar array?
- ▶ Consider a tax rate adjustment for some portion of budget?

▶ Net Metering: a billing mechanism that credits solar energy system customers for electricity they add to the grid

- ▶ Can the three buildings be tied to a single meter?
 - ▶ This enables net-metering for all three buildings at 1:1 rate
 - ▶ If Group Net Metering, what is rate for buildings not behind the meter?

▶ Future outlook: How to expand the array to power additional buildings



Conclusion

- ▶ Franconia solar array can be located behind Town Hall and support Town Hall, Library and new Welcome Center
- ▶ Project benefits are predicted to be ~\$113,000 over 30 years
- ▶ Project costs are predicted to be ~ \$83,000 over 30 years.
- ▶ Project net savings to Franconia of ~ \$30,000
- ▶ Project funding is possible through multiple resources

Thank you

