



Greater efficiency supports patient care.

Evaluate Opportunities to Use Alternative and Renewable Energy Sources

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Description

When feasible, alternative or renewable energy development can provide a cost-effective method for building owners to reduce energy use, lower electric bills, and reduce exposure to energy market price volatility. On-site renewable energy can provide significant cost savings and can be funded through many mechanisms, depending on the state.

Project Talking Points

- Development of on-site energy sources can:
 - Reduce energy consumption
 - Hedge against the volatility of energy prices
 - Provide cleaner energy solutions to the building and community
 - Accumulate or sell environmental benefits such as carbon offsets and renewable energy credits.
 - Reduce utility costs, freeing up money for clinical operations.
 - Take advantage of the public relations (PR) benefits of on-site energy production by communicating the environmental and community benefits associated with it.
 - Offset load during peak demand events (when combined with battery storage)
- Owners can take advantage of federal, state, and utility programs to supplement the capital cost of a development. The DSIRE Database offers a [search tool for incentives](#) by state.
- Implementing energy efficiency strategies before installing solar power or another form of generation will prevent over-sizing of the system. Use ENERGY STAR Portfolio Manager or another tool to track existing energy performance.

Triple Bottom Line Benefits

- Cost benefits: Cost and savings will vary depending on the type of alternative or renewable technology implemented, the facility's energy demand, and the funding mechanism (i.e. lease, grant, power purchase agreement (PPA), or direct purchase).
- Environmental benefits: Environmental benefits from on-site developments include renewable energy certificate creation, carbon offset accounting, a reduction in overall utility consumption, and reduced emissions.
- Social benefits: These projects set an example for the community and send a message that health care is not just about treatment of illness but building a better environment.

Purchasing Considerations

- The cost of equipment for any renewable or alternative energy project deployment
- Associated permitting fees
- Costs of training/ hiring staff to troubleshoot or operate systems
- Budgeting for additional operations and maintenance costs
- Cooperation from the local Public Utility Commission
- Consider a facility audit to reduce energy usage prior to installation of alternative or renewable energy, as this will prevent over-sizing of the system and save money

How-To

Follow these steps to assist with on-site renewable or alternative energy development. Always consult with an experienced professional before beginning a project of this magnitude.

1. Determine who's on the team. Identify who will be doing the feasibility study and who will be managing project implementation.

- Facility operators and chief engineers can confirm off-peak and peak facility demand.
- Facility operators and chief engineers can identify locations for facility connection.
- The team should consist of:
 - Point of contact (project manager)
 - Chief engineers
 - Facility operators
 - An authority having the power to approve the project
 - Funding Sources
 - Local Utility (Some will assist with studies as it will impact their grid)
 - Others, such as qualified installers consultants

2. Identify the facility goals. Goals will influence system design (for example, reducing peak load to be compliant with peak demand management would require battery storage)

3. Establish a load profile using the following information:

- Collect 24 months of historical utility data, either interval data or utility bills.
- Identify the minimum heating load (Btu/hr.).
- Identify annual electrical consumption (kWh).
- Identify the maximum annual facility demand (kW).
- Identify the minimum annual facility Demand (kW).

A sample facility electricity load is shown below in Figure 1. As evidenced, there is higher demand for electricity from 11 a.m. to 5 p.m. (peak periods) and less consumption outside of that time range (off-peak periods). Generally, electrical demand is greater during summer months than winter months due to cooling needs Figure 2 shows the effects of a 1 MW solar PV array on the same electric load.

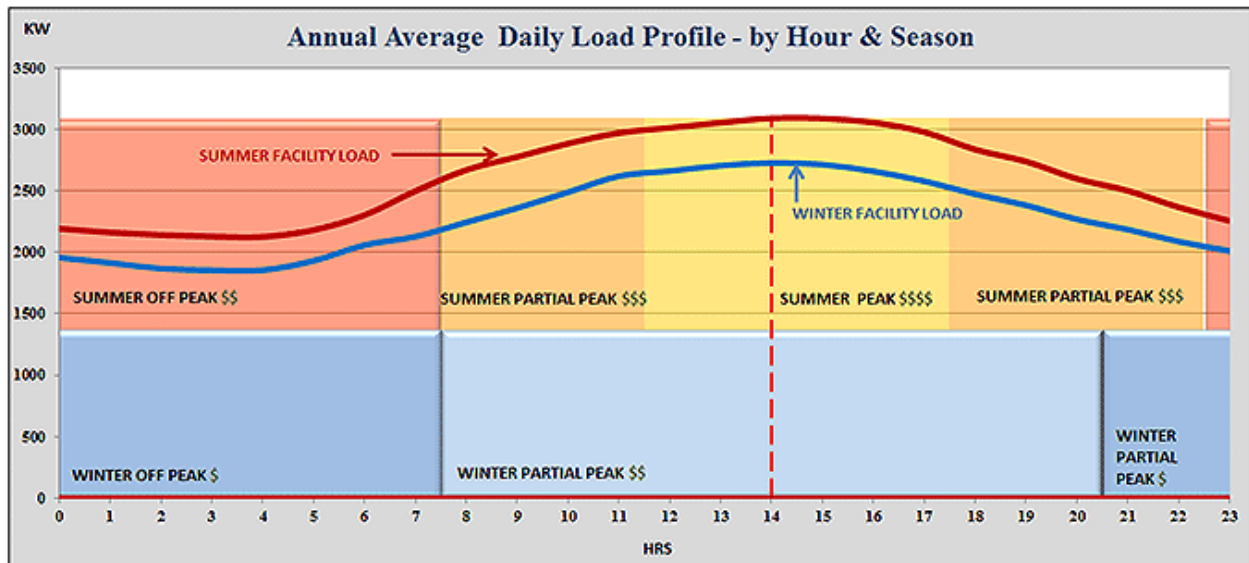


Figure 1: Representation of a facility's summer and winter electric consumption profiles

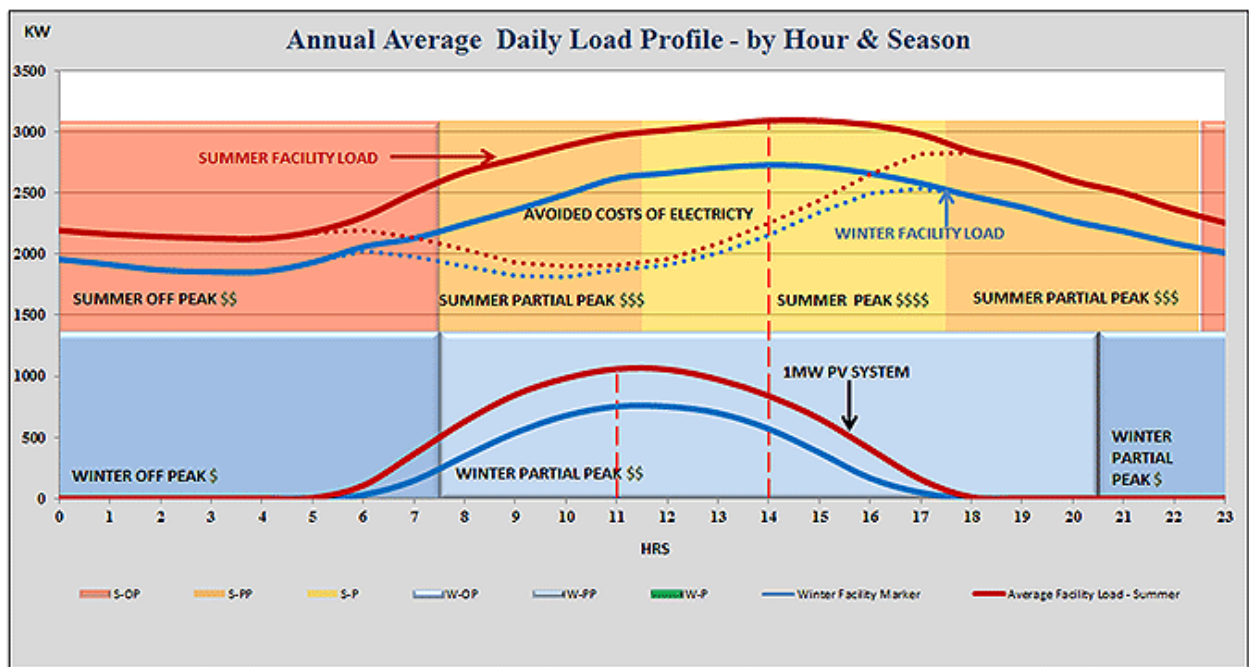


Figure 2: A facility's utility consumption profile representing an offset due to photovoltaic generation

4. Identify factors affecting deployment of alternative of renewable energy projects. For example:

- Future energy efficiency measures that will reduce your facility's demand
 - Please note: Implementing energy efficiency strategies before installing solar power or another form of generation will prevent over-sizing of the system
- The location of your facility and available land, roof and/or interior space
- The climate in your region, and how that impacts the technology you are looking into

- Utility programs for alternative energy and the availability of net-metering

5. Understand the following charges and how they affect your bill (sample bill in Figure 3)

- Transmission and Distribution Charges (associated with energy use)
- Generation Charges (associated with energy use)
- Demand Charges (associated with power)

Schedule TOU-8 Sheet 10
TIME-OF-USE - GENERAL SERVICE - LARGE
 (Continued)

RATES (Continued)
SERVICE METERED AND DELIVERED AT VOLTAGES FROM 2 kV THROUGH 50 kV

Option B	T & D (\$/kWh)							Generation (\$/kWh)		
	Trans ¹	Distribn ²	NSGC ²	NUC ³	PPPC ²	DWRBC ³	PUCRF ²	Total ²	URG ⁴	DWREC ¹⁰
Energy Charge - \$/kWh/Meter/Month										
Summer Season - On-Peak (0.00106)	0.00244 (I)	0.00156 (R)	0.00015 (I)	0.01043 (R)	0.00513	0.00024	0.01889 (R)	0.03629 (R)	0.00463	
Mid-Peak (0.00106)	0.00244 (I)	0.00156 (R)	0.00015 (I)	0.01043 (R)	0.00513	0.00024	0.01889 (R)	0.06483 (R)	0.00463	
Off-Peak (0.00106)	0.00244 (I)	0.00156 (R)	0.00015 (I)	0.01043 (R)	0.00513	0.00024	0.01889 (R)	0.03950 (R)	0.00463	
Winter Season - On-Peak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mid-Peak (0.00106)	0.00244 (I)	0.00156 (R)	0.00015 (I)	0.01043 (R)	0.00513	0.00024	0.01889 (R)	0.05956 (R)	0.00463	
Off-Peak (0.00106)	0.00244 (I)	0.00156 (R)	0.00015 (I)	0.01043 (R)	0.00513	0.00024	0.01889 (R)	0.03542 (R)	0.00463	
Customer Charge - \$/Meter/Month										
		316.55 (I)						316.55 (I)		
Demand Charge - \$/kW of Billing Demand/Meter/Month										
Facilities Related	DEMAND (\$/kW)	2.84	9.47 (I)					12.31 (I)		
Time Related										
Summer Season - On-Peak		0.00					0.00	18.63 (R)		
Mid-Peak		0.00					0.00	5.22 (R)		
Winter Season - Mid-Peak		0.00					0.00	0.00		
Off-Peak		0.00					0.00	0.00		
Power Factor Adjustment - \$/kVAR										
		0.27						0.27		

* The ongoing Competition Transition Charge (CTC) of \$0.00070 per kWh is recovered in the URG component of Generation. (R)
 1 Trans = Transmission and the Transmission Owners Tariff Charge Adjustments (TOTCA) which are FERC approved. The TOTCA represents the Transmission Revenue Balancing Account Adjustment (TRBAA) of \$(0.00072) per kWh, Reliability

Figure 3: Sample utility rate schedule representing transmission and distribution, generation, and demand charges

6. Identify financial opportunities and incentives.

- Pursue grants, rebates, tax credits, and other incentives available in your area.
- Understand your utility's net-metering policy. These vary by state and by utility, so it is important to understand how these affect your project's return on investment.
- Discuss the funding option that is best for your facility, and understand your options for leasing, entering into a PPA, or buying the system outright.
- Discuss your project with any rebate or funding programs *before* purchasing equipment (many programs require pre-approval).

7. Identify project costs and requirements, which vary by technology. Always look up current costs, as prices fluctuate depending on the technology and energy markets. Commonly deployed technologies include:

- [Solar PV panels](#)
- [Solar thermal](#) (for domestic water heating applications)
- [Fuel cells](#)
- Please note: Cogeneration systems are generally used with natural gas (not alternative of renewable) but can be integrated with biomass and fuel cells.

8. Analyze cash flows.

- Cash flows vary greatly depending on the following parameters:
 - Utility Escalation (%) (The U.S. Energy Information Administration (EIA) has a database of past costs available for escalation forecasting
 - Natural gas data: <http://www.eia.gov/naturalgas/>
 - Electricity data: <http://www.eia.gov/electricity/data.cfm>
 - Installed Cost (\$/kW)
 - System Size (kW)
 - Annual Generation (kWh)
 - Federal, State, and Local Incentives and renewable energy credits (RECs)
 - System Cost (\$)
 - Avoided Cost or Average Cost

System Degradation, Operation, and Maintenance Costs and Escalation

- Discount Rate (i.e. the time value of money)

9. Using the information gathered and analyzed, select the best option for your facility.

Tools

- [Life Cycle Cost Tool](#)
- [NREL PV Watts](#)
- [NREL System Advisor Model](#)
- [ENERGY STAR Portfolio Manager](#)

Regulations, Codes and Standards, Policies

- [DSIRE Database of State Incentives for Renewables & Efficiency](#)
 - [Includes state policies](#)

Cross References: LEED

- [LEED for Existing Buildings: Operations + Maintenance](#)

- [LEED for Healthcare: New Construction and Major Renovations](#)
 - Energy & Atmosphere Prerequisite 2: Minimum Energy Efficiency Performance
 - Energy & Atmosphere Credit 1: Optimize Energy Efficiency Performance
 - Energy & Atmosphere Credit 2: On-site Renewable Energy

ECM Synergies

- [Establish a baseline for current energy consumption.](#)

Resources

- NREL PV Watts for PV Feasibility: http://gisatnrel.nrel.gov/PVWatts_Viewer/index.html
- NREL Overnight Costs Data: www.nrel.gov/gis/tools.html
- DOE Renewable Energy Building Technologies Program: http://apps1.eere.energy.gov/buildings/publications/pdfs/alliances/hea_renewables_fs.pdf
- [Energy University](#)

ECM Descriptors

Energy, Supply Chain

Category List:

- ENERGY
- Renewable power sources
- SUPPLY CHAIN
- Supply Strategies

Improvement Type:

- Alternative Sources
- Energy

Department:

- Engineering/Facilities Management

ECM Attributes:

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