

# Edison Technology Park



*Solar Power supplies 100% of the electrical energy used to power the 30 on-site businesses*

**E**dison Technology Park is an innovative, four building, 48 unit research and development business park located in the unincorporated area of San Mateo County adjacent to Menlo Park. Starting today, 100 percent of the electrical energy used by the over 150 people working in 30 businesses at the complex will be supplied by the sun. **The onsite solar generation plant, which cost over \$3.6 million, is the largest multi-tenant commercial solar project completed in the Bay Area this year and is one of the biggest privately funded alternative energy generation projects in the State of California.** Sunlight is converted into electrical energy by over 2,388 individual solar modules from three different manufacturers, wired together to produce an impressive 394,845 watts of peak (DC) power. On hot summer afternoons, when California's electric grid is under maximum stress, the system is designed to generate electricity far in excess of the complex's requirements. During such times of peak demand, the solar system will be exporting enough energy to power over 100 homes in the surrounding Atherton and Redwood City neighborhoods, reducing demand on the local electric grid.

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**Innovative Financing and Design**

In addition to its substantial public benefits, the project is a source of pride to existing tenants as well as to the building owners, Ronald and Agnes Newdoll of Woodside.

Ron acted as designer and general contractor for the project, which took approximately 2 years from concept to completion. Detailed system engineering and installation of the solar system was provided by Quantum Energy Group and Dr. Neway Argaw. Financing included over \$1.5 million in rebates from the State of California's Self-Generation Incentive Program.

**FACTS AT A GLANCE**

**Tenant Occupied Space**  
85,000 sq.ft.

**Solar Panels**  
2,388 (33,000 sq.ft.)

**Rated Power Output**  
394,845 watts (DC)

**CEC Rated Output**  
315,876 watts (AC)

**Annual Energy Production**  
570,000 KW hours (est.)

**Total System Cost**  
\$3.6 million

**Lifetime Avoided Pollution**  
10 million lbs. CO<sub>2</sub> (est.)

The solar system was installed as part of an extensive renovation and architectural facelift for the research and development complex. The design is attractively integrated into the architecture of the buildings and includes the innovative use of solar panels on the front facades to form multiple solar awnings. This interesting feature enhances the building's appearance while providing substantial passive solar benefits.

**Free Electricity?**

In order to take advantage of economies of scale, Newdoll replaced over 50 individual electric meters at the Edison

complex with four bi-directional PG&E meters (one for each building), unified the electrical systems and renegotiated the terms of the tenant leases include utilities. This allowed the construction of a large, efficient solar power plant and simplified interconnection with the electric grid. The system is sized to deliver over 570,000 KW hours of renewable electricity, more

plex, while at the same time tracking solar power production. This information is available online, updated every five minutes. Cumulative usage and power production data can also be accessed for period to date and by month, for the whole complex as well as for each individual suite. This is expected to be a valuable tool for managing energy use and spotting unusual



than adequate to meet 100% of the buildings' total consumption on an annual basis. However, in order to encourage responsible use of electricity by his tenants, a state of the art energy monitoring and management system was installed as part of the project.

This system, which tracks solar power production and building consumption on a real-time basis, involved custom design and programming by Sunnyvale based Wattminders.com. The system measures natural gas, electricity and water usage for all 48 suites in the com-

*Unique south facing solar wing contains 220 panels which supply 35KW while shading building number one.*

plexes in consumption which are often the result of equipment problems such as a leaky toilet or an improperly programmed thermostat. As an added benefit, the system facilitates remote monitoring of the solar system to insure its proper operation.

**Environmental Benefits**

Over the anticipated 30 year life of the system, it is expected to generate over 17,000,000 KW hours of pollution free electricity, avoiding the burning of non-renewable fossil fuels and the production of almost ten million lbs. of CO<sub>2</sub>. In addition, this installation and similar ones throughout California mean that fewer polluting power plants and controversial upgrades to the electric grid will have to be built to accommodate the increased consumption by the state's growing population.



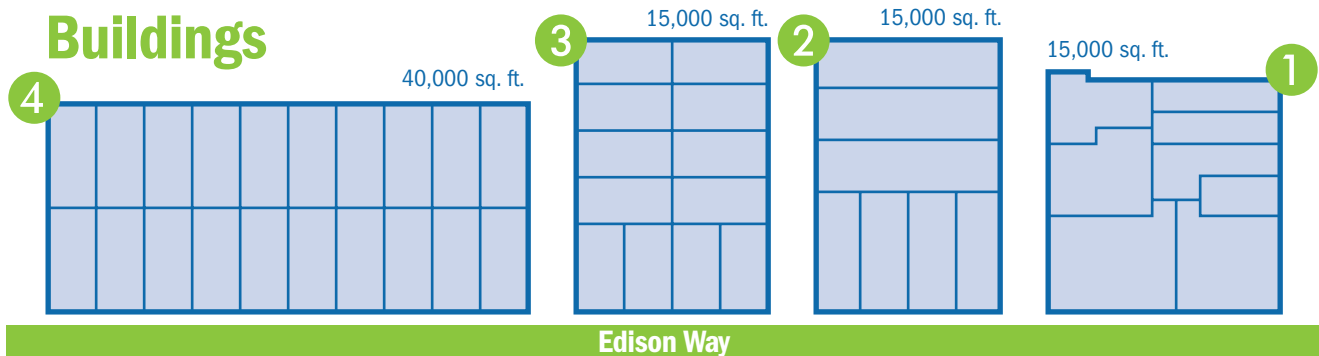
*16 inverters from three different manufacturers convert solar DC power to AC and interface with the local electric grid.*

# Edison Technology Park

## Solar System Component Specifications

	Vendor	Module No.	Kw	Watts	Quantity	DC Watts
<b>Building 1</b>						
<b>Solar Panels</b>	Shell	SQ 165-PC		165	220	36,300
<b>Inverters</b>	SMA Sunnyboy	SB 6000 U	6		7	
<b>Building 2</b>						
<b>Solar Panels</b>	BP	4170		170	165	28,050
	Schott	SAPC 165		165	297	49,005
					Subtotal	77,055
<b>Inverters</b>	SMA Sunnyboy	BP 6000 U	6		1	
	Solectria	PV175	75		1	
<b>Building 3</b>						
<b>Solar Panels</b>	Schott	SAPC 165		165	606	99,990
<b>Inverters</b>	SMA Sunnyboy	BP 6000 U	6		1	
	Satcon	AE-100-60-PV	100		1	
<b>Building 4</b>						
<b>Solar Panels</b>	Schott	SAPC 165		165	1,100	181,500
<b>Inverters</b>	Solectria	PV 113	13		4	
	SMA Sunnycentral	125 U	125		1	

<b>Total Panels</b>	2,388	<b>Solar Project Planning Commenced</b>	January 2004
<b>Total Inverters</b>	16	<b>Construction Commenced</b>	January 2005
<b>Rated Power Output</b>	394,845 watts (DC)	<b>Construction Completion</b>	January 2006
<b>CEC Rated Output</b>	315,876 watts (AC)	<b>Final PG&amp;E</b>	February 2006



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<b>SMART-microinverter</b> <i>for small commercial systems</i>	<b>SMART-DC boost</b> <i>for large commercial and utility central inverter systems</i>
15% boost & lower BoS costs from panel level conversion	12% active DC-DC boost from elimination of “weakest link” Stabilized high-voltage DC bus on each string

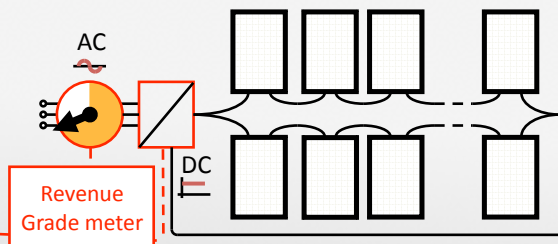
**SMART-monitoring and safety**  
*for systems of all sizes*

Panel level performance monitoring provides revenue grade data and O&M spend optimization  
Remote panel isolation and system shutoff for safety and security

**Traditional Solar Installation Challenges**

“Weakest link” effect, soiling and panel mismatch reduce real output to ≈ 70% of rated output

Aggregate data makes performance optimization a guessing game



Manual shutoff at string or inverter level for fire, fault or maintenance – does not isolate panels, leaving system electrified

Cleaning and maintenance scheduling assumptions not based on reliable data

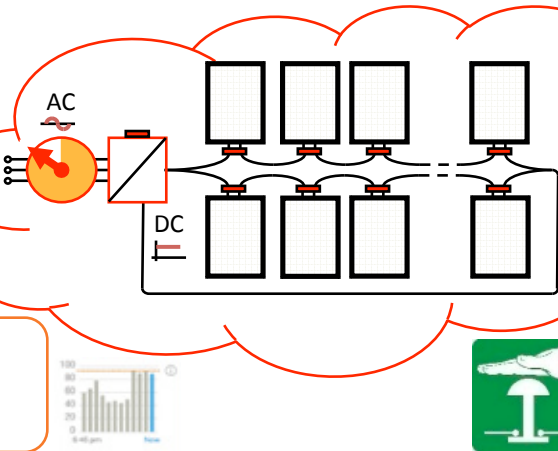
**Accurate-Enabled Solar Installations**

Real time, automated panel level output optimization improves yield by 10-15%

Real time data allows monitoring for:

- O&M spend optimization
- Warranty compliance
- Fault, theft and damage monitoring

Data feed accessible with end user tools (Energy Recommerce, AgileWaves). Local data storage and web mirror. Revenue grade data monitoring.



Industry standard mesh networking protocols provide a robust and upgradeable platform

Remote panel shutoff for cleaning, maintenance, or in emergency meets next generation safety requirements:  
“The day will soon come that we will make this required on all commercial installations”  
– Menlo Park Fire Chief

**The Accurate Advantage**

- **Cost** – aerospace design approach maximizes use of on board processing hardware to achieve durability and performance at low cost.
- **Reliability** – 15 year warranty & enhanced system availability projected. Internal monitoring, remote diagnostics & update delivery. On board “black box” for lifetime data logging.
- **Conversion efficiency** – state of the art power techniques enable conversion efficiency of >95%. Throughput de-rating analysis gives true picture of benefits.
- **Flexibility** – functions with panels up to 300W, making it ideal for large format thin film. Automatic ranging of MPPT to panel type eliminates need for customization and permits broad compatibility with central inverters.