

First Net Zero Electric  
Commercial  
Building in the U.S.

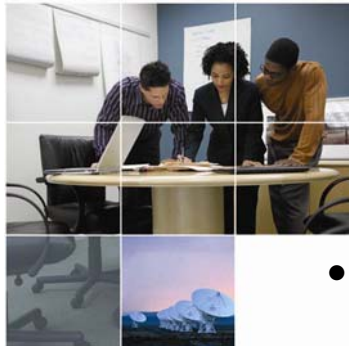
“31 Tannery Project”



Presented by: John Grabowski  
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NTIS Joint Venture  
**Federal Information Experts**

*Bridging the gap between government information and those who put it to work*

# What is net zero energy?



- Term applied to a building with a net energy consumption of zero over a typical year.

Equation: energy produced - energy used = 0

- Buildings that produce a surplus of energy over a typical year may be known as “energy Plus+”

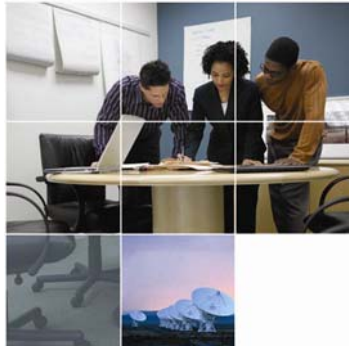
Equation: energy produced - energy used = +

*At the end of the year the 31 Tannery project net result was 1 full month of excess energy!*





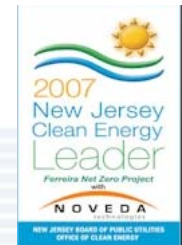
# “31 Tannery Project” Awards



- Perfect 100 pt Energy Star Rating
- ASHRAE (American Society of Professional Engineers) award for High Performance Building
- Radiant Flooring Association Commercial Project of the Year



- Nominated for two Governor's Excellence Awards for Environmental Project and New Technology )
- 2008 DIGGIE award from REALCOMM for excellence in innovation and application of energy technology
- 2008 Globe award form ARTBA for environmental project of the year



- Clean Energy Market Innovator award from State of NJ
- Business and Industry Environmental Quality Award
- Two U.S. Senate Citations for work in energy efficiency and reducing green house gases



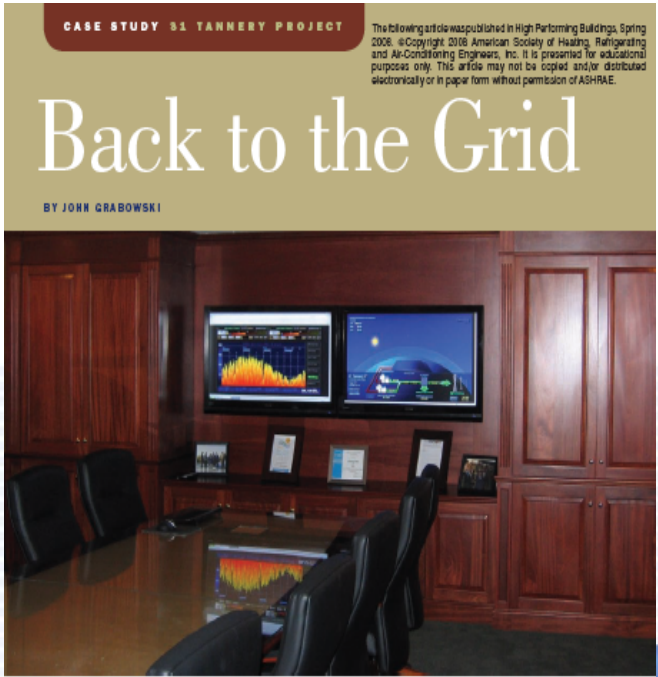
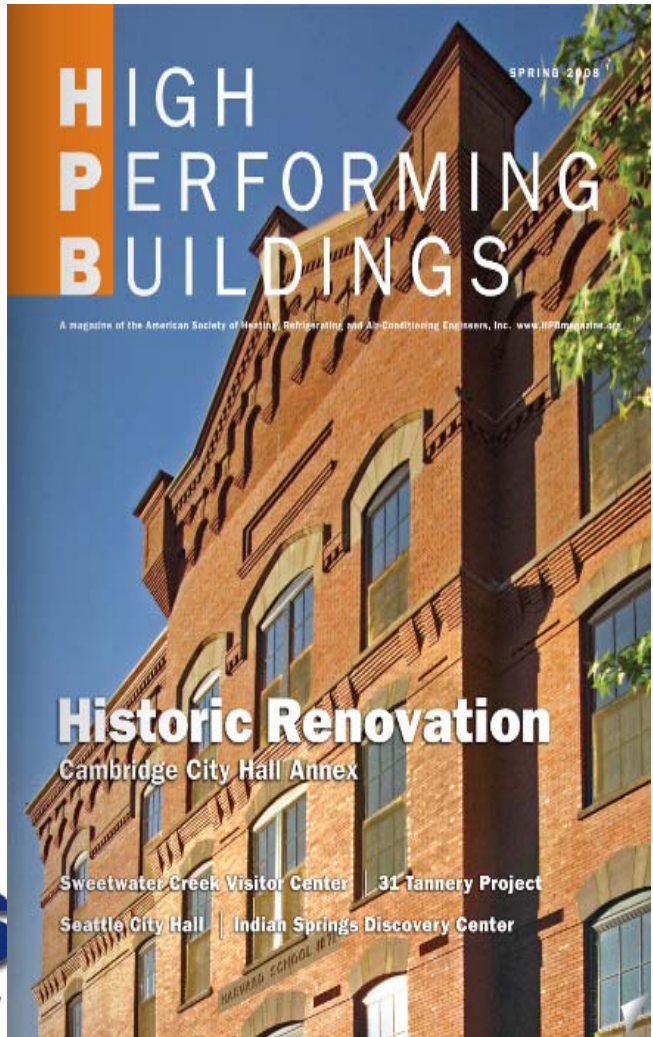


- First Net Zero Electric commercial building in the US
- First building in NJ to meet NJ State Executive order 54 for reduction of Green House Gas emissions – 80% by 2050. 31 Tannery has reduced emissions by 86% - that is 6% above target and 43 years ahead of schedule
- Reduced Ferreira CO2 emissions by 1 million pounds per year – equivalent of taking 100 cars off the road.
- Cited by Dru Crawley of the Dept of Energy as a “leading edge building” that is one of “only a small handful” in the entire US achieving these results
- 80% reduction in overall gas and electric energy use combined over typical construction building per ASHRAE and DOE standards

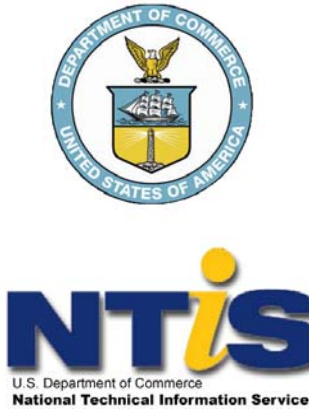
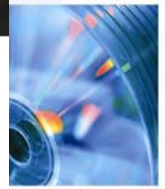


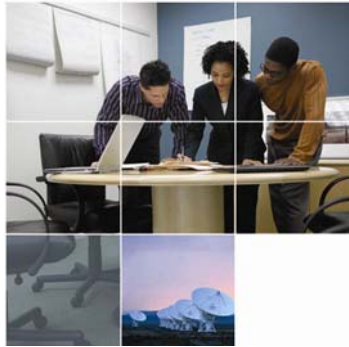


<http://www.hpbmagazine.org/images/stories/articles/Back%20to%20the%20Grid.pdf>



What appears as an ordinary prefabricated building produces from renewable energy all the electricity needed to run an approximately 42,000 ft<sup>2</sup> commercial facility for a full year. In addition, it produces a surplus of energy equivalent to a full month's electricity supply that is pushed out to the grid for others to use. Documented energy use for one year shows 31 Tannery Project generated more electricity from renewable energy than it consumed, making it a net zero commercial electric building.





Building started with “What If” computer models that analyzed energy efficiency (EE) and renewable energy (RE) systems. The building includes many EE/RE features that are not often found in one building with an integrated monitoring & control system to maximize their effectiveness.

- 42,000 square foot shop and office building -standard pre-fabricated building used by 50 to 100 employees daily
- Shop area is used for repair of heavy and light construction vehicles
- Energy sources - solar electric (grid tied), solar thermal, natural gas
- Unique features – Radiant flooring, high efficiency HVAC RTU, 96% efficient boiler, building controls and energy systems integrated into real time monitoring, diagnostic and historical tracking system



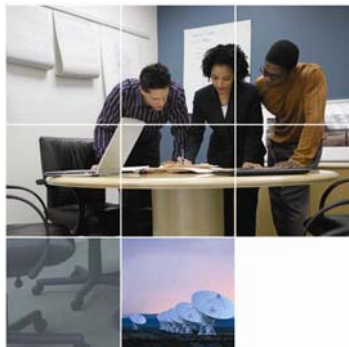


- Renewable energy is only part of the picture – the “exercise”
- Renewable without efficiency is like exercise without diet.
- Real time monitoring is the “personal trainer” of systems performance





**(Energy Conservation)**, Both the two story office wing (15KSF) and shop (26KSF) have in-slab radiant tubing. Approximately 9-10 miles of radiant tubing serves 80 zones under our digital control system.



Power trowels in Bay 3 level and finish surface after installation of radiant loops and staged concrete pours, October 2005



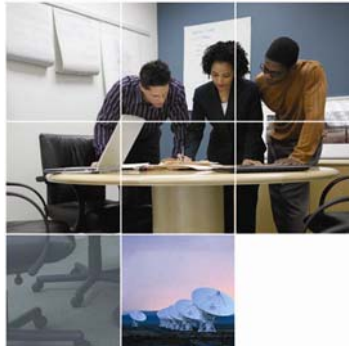
# Condensing Boiler Plant



**(Energy Conservation), High Efficiency, Condensing Boiler Plant (+96% efficiency) serving approximately 80 radiant zones and airside VAV coils heats the building.**



# High Performance HVAC



**(Energy Conservation)** High Efficiency HVAC (heating, ventilating, and air conditioning) systems, heat, cool and ventilate the building.



# Solar Domestic Hot Water



Solar Thermal (domestic hot water) system heats hot water for sinks, showers and dishwasher, eliminating the need for fossil fuels.



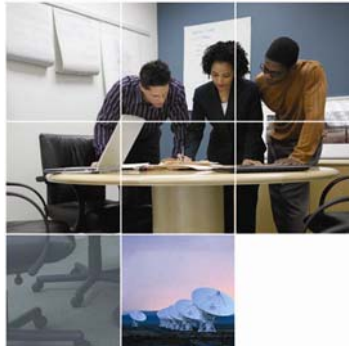
# Solar Photovoltaic (Renewable Energy),



The system on 31 Tannery using 1,276 Sharp 175W panels , producing 223 kWdc, using two Xantrex PV-100 inverters



# Lobby Kiosk and Command Center



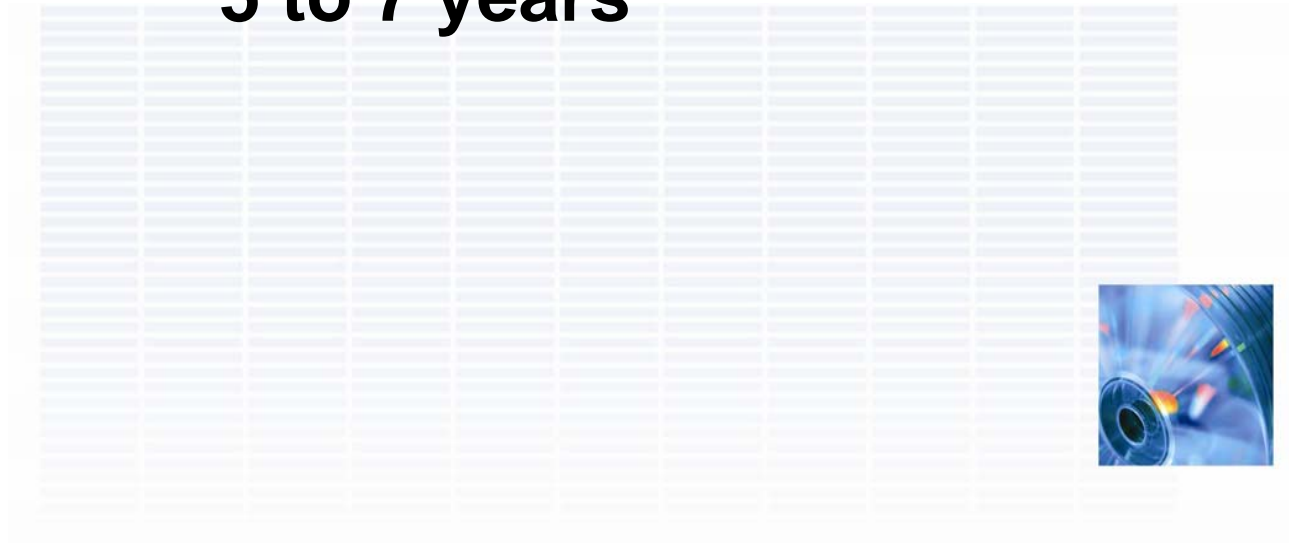
Provides our employees and visitors a dynamic graphic display that shows the “real time” operation of the building in a dashboard format.





**100% Return on Investment**

**5 to 7 years**





- You can implement renewable energy and high efficiency in a commercial environment and get a strong return on investment
- You **MUST** use high efficiency systems and renewable energy to get the greatest benefit
- **REAL TIME MONITORING** of your systems is critical





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