Santa Monica-Malibu Unified School District
Board of Education Meeting
SPECIAL MEETING MINUTES

October 29, 2010

On Friday, October 29, 2010, the Board of Education, along with other invited guests, heard a presentation on geothermal technologies. A quorum of board members was present, and therefore this presentation was posted as a special meeting. The special meeting was called to order to 12:28 p.m. in the Board Room of the District Offices: 1651 16th Street, Santa Monica, CA.

I CALL TO ORDER

A. Roll Call – Board of Education

Barry Snell
Kelly Pye
Ben Allen
Oscar de la Torre – *excused absence*
Jose Escarce – *excused absence*
Maria Leon-Vazquez
Ralph Mechur

II PUBLIC COMMENTS

Public Comments is the time when members of the audience may address the Board of Education on items not scheduled on the meeting's agenda. All speakers are limited to three (3) minutes. When there is a large number of speakers, the Board may reduce the allotted time to two (2) minutes per speaker. The Brown Act (Government Code) states that Board members may not engage in discussion of issues raised during "III. Public Comments," except to ask clarifying questions, make a brief announcement, make a brief report on his or her own activities, or to refer the matter to staff. This Public Comment section is limited to twenty (20) minutes.

None

III WORKSHOP – Green Development, Specifically Geothermal Technologies

The primary purpose of this workshop is for the Board of Education and other invited guests to learn more about the financial, environmental, functional, and educational benefits of Design Build Green Development, specifically Geothermal HVAC. Because a quorum of the board is anticipated to participate in the discussion, this presentation has been agenized as a special meeting. The public is welcome.

***** ***** ***** ***** ***** *****

The presentation that was given can be found at the end of these minutes.

IV ADJOURNMENT

It was moved by Mr. Mechur, seconded by Ms. Leon-Vazquez, and voted 5/0 (Dr. Escarce and Mr. de la Torre were absent) to adjourn the special meeting at 1:45 p.m. The next regular meeting will be held on **Thursday, November 4, 2010**, at **5:30 p.m.** in the **Malibu City Council Chambers**: 23815 Stuart Ranch Road, Malibu, CA.

Approved: 11-18-10

Barry A Snell
President

Superintendent

Design Build Green Development

www.greenovation-us.com

The Building Sector in America Accounts for:

- 72% of all Electricity consumed
- 55% of all Natural Gas consumed
- 40% of all Greenhouse Gas Emissions
- 40% of all Raw Materials consumed
- 40% of all Energy consumed

Santa Monica Malibu Schools

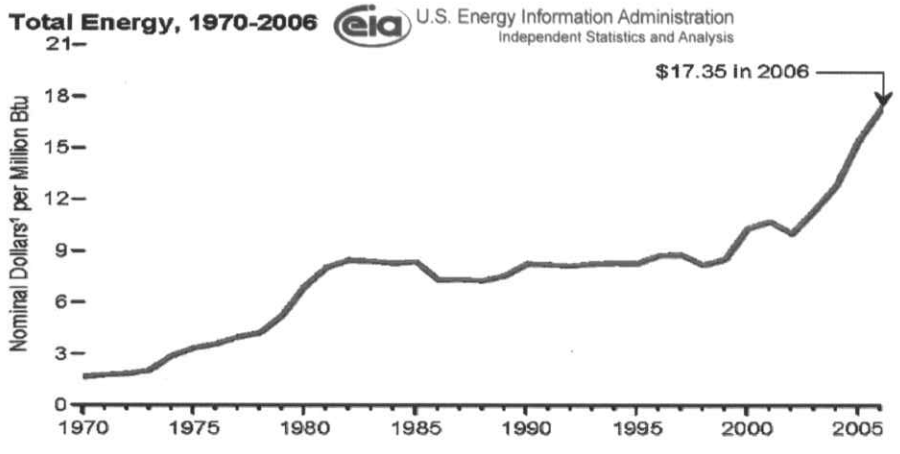
GREENOVATION

Design Build Green Development

www.eia.doe.gov

The Future Cost of Energy

Geothermal HVAC combined with on-site renewable energy, provides future energy stability in a very unstable energy market!



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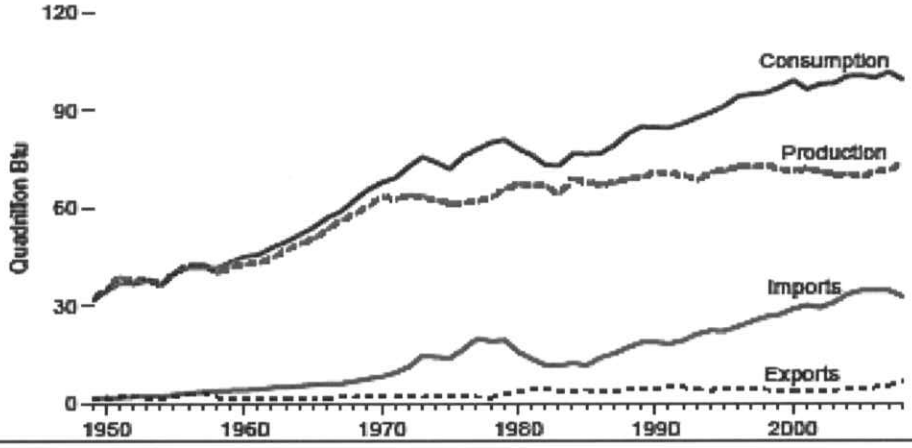
The Future Cost of Energy

Economics 101 – The Laws of Supply and Demand

Overview, 1949-2008

U.S. Energy Information Administration
Independent Statistics and Analysis



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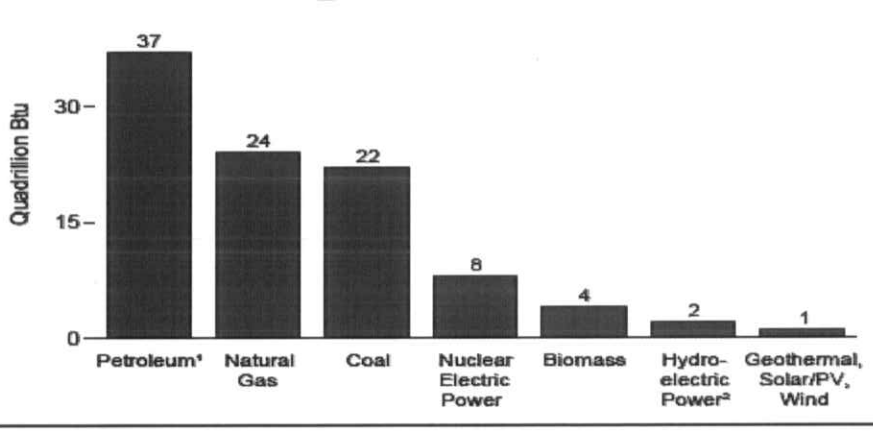
The Future Cost of Energy

The elimination of Coal as a fuel source will dramatically increase the cost of energy; necessitating the need for alternative sources of renewable energy!

By Source, 2008

U.S. Energy Information Administration
Independent Statistics and Analysis



Design Build Green Development

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The Future Cost of Carbon

Geothermal Water Source Heat Pumps (WSHP) produce Zero Greenhouse Gas (GHG) emissions!

20% Cut in US GHG Emissions by 2020!
Future carbon emissions will cost money!

- Cap and Trade
- Carbon Tax
- $$?

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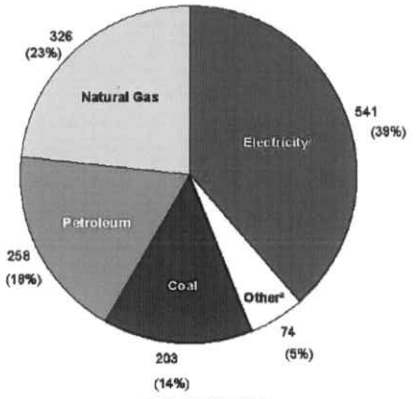
U.S. Energy Information Administration
Independent Statistics and Analysis

Carbon Dioxide Emissions by Energy Source



Total Emissions:
1,401 million metric tons carbon dioxide[1]

Design Build Green Development

The Vision

To effectively solve our energy, infrastructure and environmental problems, new and existing buildings must be improved with comprehensive green development solutions!

GREENOVATION

Comprehensive Green Development Solutions

Renewable Clean Energy Resources

Proven technologies for anchoring comprehensive green development solutions.

- Geothermal (GeoExchange) HVAC
- Photovoltaics (Solar Power)
- Fuel Cells
- Intelligent Energy Storage

Additional Sustainable Building Solutions

- LEED / CHPS Certification
- Build Automation Systems
- Energy Management
- Intelligent Energy Storage
- Lighting Systems
- Retro-Commissioning

GREENOVATION

Comprehensive Green Development Solutions

Net-Zero or Zero Energy Buildings (ZEB)

It is estimated by 2030 the U.S. building code will call for Net-Zero Development; however we are not waiting until 2030 to incorporate the future of infrastructure development.

Installing a Geothermal Water-Source Heat Pump System will enable you to reach the building's lowest energy consumption level, allowing you to offset the remaining energy demand with on-site renewable energy; this concept is what spurred the creation of the GeoSolar and GeoCell solution.

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GREENOVATION

Geothermal (GeoExchange) HVAC Solution

Geothermal water source heat pump systems, also known as "geoexchange," are the most energy efficient, environmentally clean, and cost-effective space conditioning systems available, according to the Environmental Protection Agency.

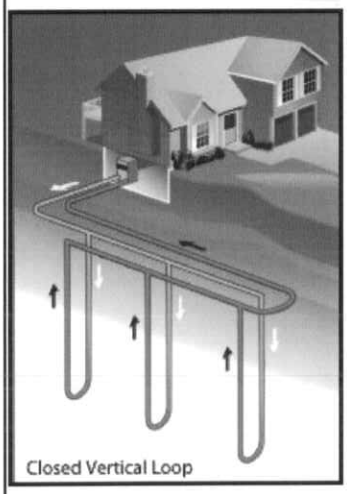
Geothermal Loop-Field Piping Distribution Options

Ground Coupled - Vertical Bore Field

Water Coupled Loop

GREENOVATION

Geothermal (GeoExchange) HVAC Solution



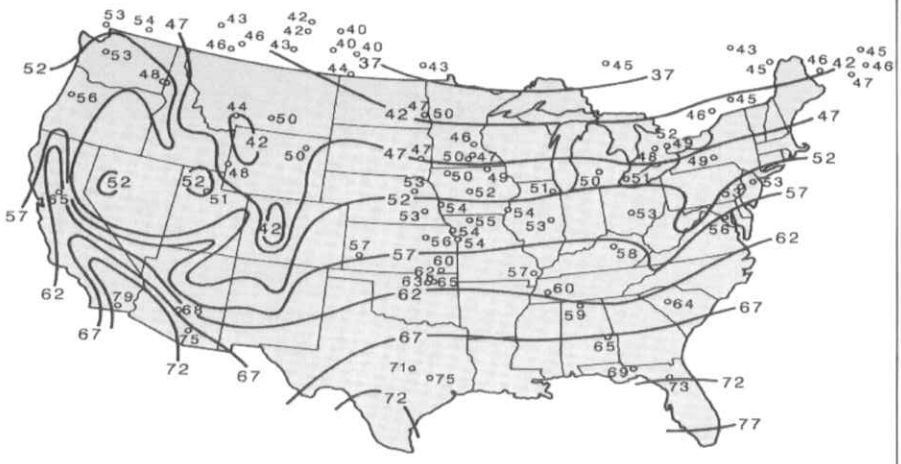
Closed Vertical Loop

The earth is a huge energy storage device that absorbs 47% of the sun's energy; 500 times more energy than mankind needs every year, in the form of clean renewable energy.

Geoexchange systems use the Earth's stored energy to heat and cool buildings, and provide domestic hot water at a fraction of what you're currently paying!

GREENOVATION

Geothermal (GeoExchange) HVAC Solution



VALUES OF MEAN ANNUAL EARTH TEMPERATURE FROM OBSERVATIONS AT INDIVIDUAL STATIONS ARE SUPERIMPOSED UPON COLLINS' ESTIMATED (1925) WELL-WATER ISOTHERMS.

FIGURE 4.17: Mean Earth Temperature, T_M (°F)

Geothermal (GeoExchange) HVAC Solution

Mitigate HVAC Equipment Replacement Costs

With many schools facing budget cuts and the reduction of State & Federal funding, it has never been more difficult to find the money needed for HVAC Equipment Replacement. **(ex. Malibu Boiler Replacement $58,000)**

Geothermal HVAC systems can eliminate the need for major HVAC equipment replacements, while extending the lifetime of the system.

- Geothermal eliminates the need for Chillers, Boilers and Cooling Towers.
- **Water-Source Heat Pumps have a 40-year plus lifetime expectancy.**
- **The underground loop has a 100-year plus lifetime expectancy.**
- No outdoor exposure to the elements (saltwater) or vandalism

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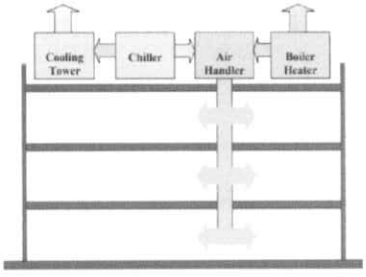
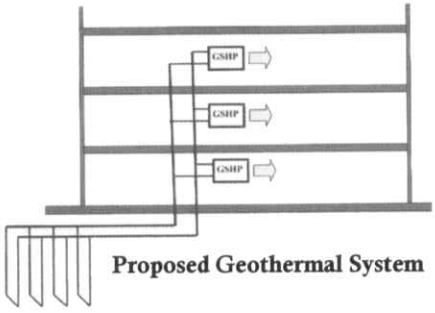
GREENOVATION

Geothermal (GeoExchange) HVAC Solution

Reduction / Elimination of Mechanical Equipment



Existing Mechanical Equipment



Proposed Geothermal System

Santa Monica Malibu Schools

GREENOVATION

Geothermal (GeoExchange) HVAC Solution

Water-Source Heat Pumps (WSHP)

- Provide highly efficient zone-controlled heating and cooling.
- The earth provides over 70% of the energy required to heat and cool.
- Utilize water circulating in a closed piping loop as a thermal energy transport and exchange medium.
- During cooling mode, BTU's of heat are extracted from the air and rejected into the water loop.

- During heating mode, the process is reversed, with BTU's of heat being extracted from the water loop and rejected into the air.

GREENOVATION

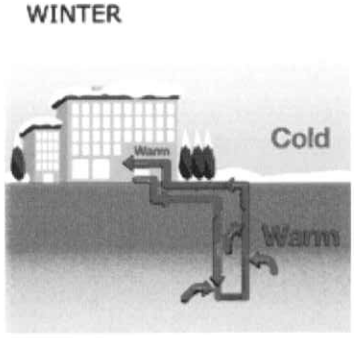
Geothermal (GeoExchange) HVAC Solution

How does the equipment work?

Water-Source Heat Pumps in Heating Mode:

•Heating Mode - The best WSHP can extract 5 kWh of heat from the water loop for every 1 kWh of electricity used, delivering all 6 kWh as heat into the air.

•This 6 to 1 ratio is called the COP (Coefficient of Performance), and can be equated to 600% efficiency. For comparison, the very best fossil fuel furnace and boiler produce heat at less than 100% efficiency.



GREENOVATION

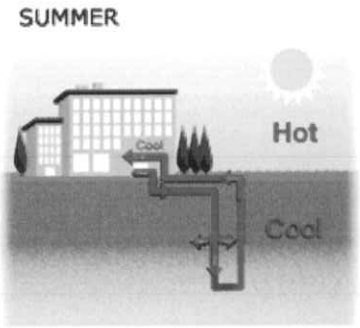
Geothermal (GeoExchange) HVAC Solution

How does the equipment work?

Water-Source Heat Pumps in Cooling Mode:

•Cooling Mode – WSHP deliver an ERR (Energy Efficient Ratio) ranging anywhere from 18 to 27 Btu/Watt. For comparison the ERR of the best air-cooled equipment is less than 13.

•This thermal energy can be transferred ("pumped") between the air and the water loop, in either direction, on demand. Hence the term "Heat Pump"



GREENOVATION

Geothermal (GeoExchange) HVAC Solution

Financial & Environmental Benefits

- 35% to 70% reduction in energy consumption
- Zero Greenhouse Gas Emissions (GHG)
- 25% to 50% lower maintenance costs
- 100-year plus lifetime expectancy for the loop field
- 40-year plus lifetime expectancy for a Water Source Heat Pump (WSHP)
- Elimination of chillers, boilers, cooling towers and the associated repair, replacement and maintenance costs.
- Substantial reduction in ductwork, steel, copper pipe, pumps and pipe insulation.
- Provides additional space for productive use, 50-80% less mechanical room space, no rooftop equipment, effectively increasing the square footage and market value of your facility.
- An upfront investment in green building design, on average, results in a life-cycle savings of 20% of the total construction costs!
- Curriculum development, vocational education and Job training opportunities.

GREENOVATION

Geothermal (GeoExchange) HVAC Solution

Additional Benefits

- The highest indoor air quality of all HVAC systems - No odors or fumes
- Design Flexibility - capable of individual room or zone temperature control
- Ideal Humidity Control - maintaining about 50% relative indoor humidity
- Very quiet operation (**Meets ASHRAE noise criteria)**

TECHNICAL COMMITTEE
SOUND & VIBRATION

Santa Monica Malibu Schools

GREENOVATION

Geothermal (GeoExchange) HVAC Solution

Galt House East Case Study

Two Adjacent Hotels – 600 rooms each GeoExchange vs. Conventional Systems			
Comparison	*Peak Demand*	*Total Annual kWh*	*Total Annual costs*
Galt East Geoexchange	1,380	6,369,480	$318,316
Galt West Conventional	2,573	11,959,797	$591,018
Annual Savings	1,193	5,590,317 kWh	$272,702

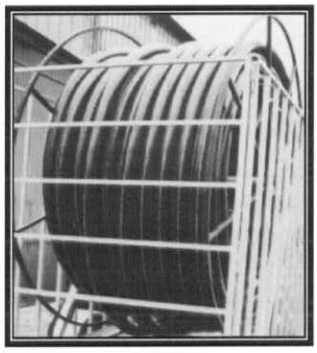
GREENOVATION

Geothermal (GeoExchange) HVAC Solution

What About Earth Quakes? High-Density Polyethylene Pipe (HDPE)!

High-density polyethylene pipe (HDPE) can carry potable water, wastewater, slurries, chemicals, hazardous wastes, and compressed gases. In fact, polyethylene pipe has a long and distinguished history of service to the gas, oil, mining and other industries. It has the lowest repair frequency per mile of pipe per year.

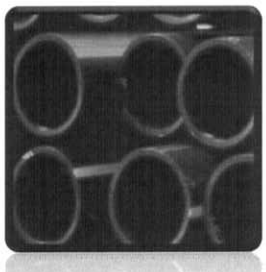
High-density polyethylene pipe (HDPE) is strong, extremely tough and very durable. Whether you're looking for long service, trouble-free installation, flexibility, resistance to chemicals or a myriad of other features, high-density polyethylene pipe will meet all your requirements.



GREENOVATION

Geothermal (GeoExchange) HVAC Solution

Benefits of High-Density Polyethylene Pipe (HDPE)



- Corrosion resistance, does not rust, rot or corrode.
- Leak tight heat-fused joints create a homogenous, monolithic system. The fusion joint is stronger than the pipe.
- Maintains optimum flow rates, does not tuberculate and has a high resistance to scale or biological build-up.
- Designed to withstand surge events, high strain allowance eliminates breakage due to freezing pipes.
- Additional cost savings are achieved by lower instance of repairs.
- With no exfiltration or infiltration, potable water losses and groundwater nuisance treatment costs encountered in traditional piping systems are eliminated.
- Used in directional boring, plowing, river crossings, pipe bursting and sliplining.
- Eliminates the need for thrust blocking, heat fused joints are fully restrained.
- Light weight and longer lengths allow for significant savings in labor and equipment.

GREENOVATION

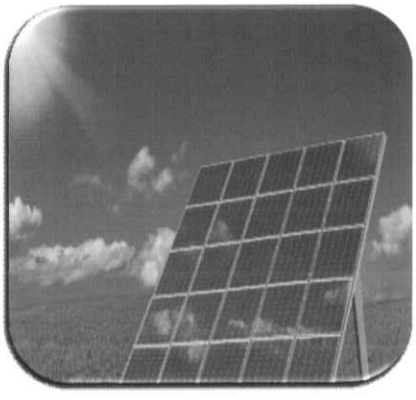
Renewable Clean Energy Resources

Photovoltaics (Solar Power)

•Photovoltaics (PV) emit no pollution, produce no greenhouse gases, and use no finite fossil fuel resources!

•PV systems can generate power in all types of weather. On partly cloudy days, they turn out as much as 80% of their potential energy. Even on extremely overcast days, they can still produce about 25% of their maximum output.

•PV modules are now available in a variety of colors and styles, allowing designers to use them as aesthetic elements built right into roofs, skylights, awnings, entryways, and facades. Today's modules can even be specified to transmit a percentage, usually 80% to 90%, of natural light.



GREENOVATION

Renewable Clean Energy Resources

Combined Heat and Power Fuel Cell

•A Fuel Cell is an electrochemical energy conversion device that combines fuel with oxygen to produce electricity, heat and water.

•If your application consumes all of the heat and power produced, a Fuel Cell system can generate electricity at about 6 cents per kWh.

•Distributed generation is the production of electricity at/or very close to the site of consumption.

•Scalable in size – 10W, 500W, 2kW, 300kW, 1.4MW, 2.8MW, 50MW.

Key Features – Highly Efficient & Reliable, Low Environmental Impact, Quiet Operation, Fuel Flexibility (biofuels, natural gas, ethanol, diesel, etc.)

GREENOVATION

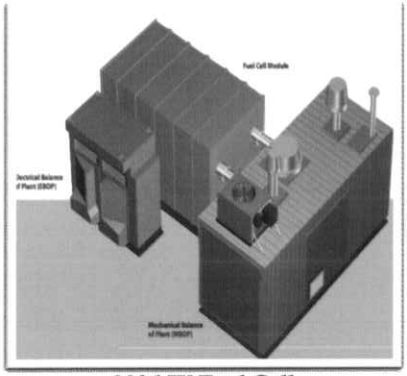
Renewable Clean Energy Resources

Combined Heat and Power Fuel Cell – How does it work?

• The Fuel Cell Module – Is comprised of multiple fuel cells operating in parallel. Hydrogen is reformed from the source fuel to support the electrochemical reaction and is then combined with oxygen from the air to produce energy.

• The Mechanical Balance – Upstream of the fuel cell it provides water, preheats and humidifies the source fuel, and provides the outside air supply. Downstream it extracts the heat energy produced in the chemical reaction and converts it to a usable form.

• The Electrical Balance – Converts DC electrical power to utility grade AC power.

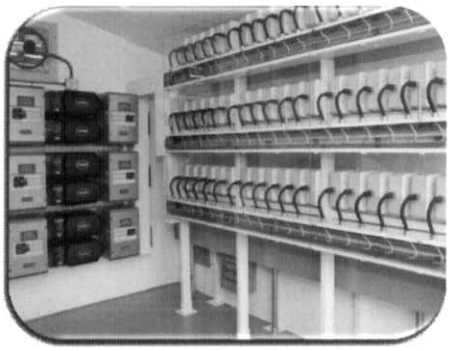


300 kW Fuel Cell

GREENOVATION

Sustainable Building Solutions

Intelligent Energy Storage System (IESS)



•An Intelligent Energy Storage Device (IESD) is able to simultaneously charge, discharge, store, and manage energy from multiple sources and loads.

•Whether you're generating kilowatts, megawatts, or gigawatts of energy, an Intelligent Energy Storage Systems (IESS) will provide renewable energy storage, load balancing and scalable energy on demand, complete with a uninterruptible backup power supply for any size facility.

Intelligent Energy Storage System will also allow you to benefit from "**Energy Arbitrage", which stores energy from the grid at night when prices are cheap and uses it during expensive daytime hours (Peak Demand).**

GREENOVATION

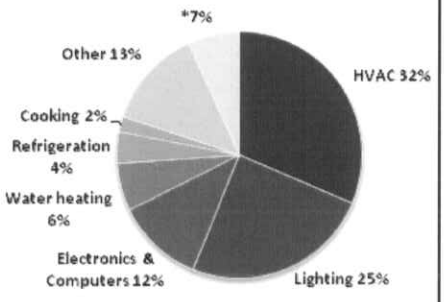
Sustainable Building Solutions

Interior & Exterior Lighting

Upgrading your property's lighting systems can reduce your lighting energy consumption by 50% or more, saving thousands of dollars each month!

Substantial Reduction in CO2 Emission – For example let's go from a 100 Watt incandescent to a 25 Watt Florescence. If the light is on for 8 hours a day. 1 lbs of CO2 per kWh & 75 Watts = .075kW used.

Average Commercial Building Energy End Use (2006)



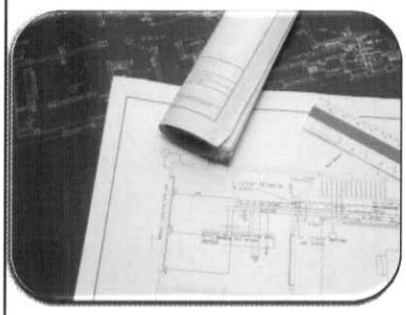
$$.075\ \text{kW} \times \frac{8\ \text{hr}}{\text{Day}} \times \frac{365\ \text{Days}}{\text{Year}} \times \frac{1\ \text{lbs CO2}}{\text{kWh}} = \mathbf{219\ \underline{lbs\ CO2}\ /\ Year}$$

Electricity saved from 1 light bulb

GREENOVATION

Sustainable Building Solutions

Retro-Commissioning (RCx)



RCx focuses on optimizing existing system performance rather than relying on major equipment replacement, typically resulting in improved indoor air quality, energy efficiency, occupant comfort, building control, and resource efficiency.

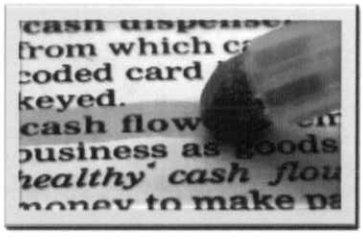
The process consists of an audit of the entire building, including a study of past utility bills and interviews with facility personnel. RCx helps to find and repair operational problems while identifying more complex issues that need to be brought to the attention of the building owner.

A comprehensive study of commissioning sponsored by the U.S. Department of Energy, completed in 2004, analyzed 106 existing building commissioning projects **that saved on average 15% of the total buildings energy consumption and had a one year payback from energy savings alone!**

GREENOVATION

Unique Financing Options

- Geothermal Pilot Program
- 1% & 3% Financing Based on Energy Savings
- Bank Financing & 3rd Party Financing Partnerships
- Power Purchase Agreements (PPA)
- Energy Service Agreements (ESA)
- Geothermal Utility Agreements (GUA)
- Energy Efficiency Incentive Programs
- Rebate Programs & Tax Credits
- Accelerated Depreciation
- Potential for New Revenue Streams



GREENOVATION

Educational Benefits

New Curriculum & Vocational Training Development

1. **New Curriculum Topics**
   - Man's Environmental Footprint, Finite Fossil Fuels, Global Warming, Renewable Clean Energy Resources, Sustainability.
2. **Advanced Curriculum Topics**
   - Inefficiencies of the Built Environment, Green Building Design - LEED, Comprehensive Retrofit Solutions, Net-Zero Buildings.
3. **Vocational Classes**
   - Geothermal HVAC Design & Installation, Photovoltaic Design & Installation, Wind Turbine Service, Fuel Cell Technologies.
4. **Define Each Topics Core Discipline**
   - Identify core disciplines (Math, Science, History, Sociology, Cultural, Vocational Training, etc) associated with each class.
5. **Create Lesson Plans**
   - Develop course outline, presentations and labs specific to each target grade level and discipline.
   - Select required reading, homework and exam questions.

GREENOVATION

Comprehensive Green Development

Solar Power

$51,761 Anticipated Annual Savings
207 kW System or 357,492 kWh annually

Geothermal HVAC

$25,471 to $50,942 Anticipated Annual Savings
35% to 70% reduction in energy consumption

Fuel Cell Power

Distributed Generation @ .06 kWh
$42,617 Anticipated Annual Savings
Net Surplus Compensation
2,000,000 kWh @ .03 kWh = $60,000

COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS

John Adams Middle School Dec. 08 – Nov. 09
502,620 kWh = $72,774 or $0.144 kWh

Retro-Commissioning

$9,097 Anticipated Annual Savings

Energy Storage – "Energy Arbitrage"

$24,248 Anticipated Annual Savings

Energy Efficient Lighting

$9,097 Anticipated Annual Savings

Comprehensive Green Development Solutions

Questions?

310 – 575 – 5500

www.greenovation-us.com