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MAKING OUTDOOR EASY TO BUY

Going Green

Wind Power
&
Solid State LED Lighting
for
Out of Home Media
Applications

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Abstract: *As a result of increasing energy costs and negative environmental impacts caused by Out Of Home Media, SSL Industries presents a solution utilizing alternate energy providers. With the implementation of LED lighting and Vertical Axis Wind Turbines in OOH Media companies, energy costs will greatly decrease. Converting to wind power and LED light will ultimately reduce the carbon footprint caused by OOH Media companies.*

Introduction

Outdoor advertising is the oldest form of advertising known to man. The Egyptians' started by advertising for "lodging vacancies" on boulders along walking paths.

The modern Billboard display was invented in the early 1900's. Until the 1990's not much changed in the industry. The Telecommunication Act of 1997 revolutionized the OOH industry. The act allowed for companies to expand their market share without violating anti trust laws. In essence, companies could expand their media ownership to other mediums. For example, a local television broadcasting company could also own a local radio station without penalty. Previously this was not permitted due to the anti trust laws related to media ownership.

The passage of this act increased demand of various advertising mediums. As a result, many private companies went public. The influx of shareholder investment allowed for the three largest OOH Media Companies to acquire (85%) eighty-five percent of the billboard displays in the country. For over ten years, these companies operated profitably.

The recent crisis on Wall Street has had a tremendous impact on the Out of Home Industry. This harsh financial awakening has affected the three largest publicly traded Out of Home Media companies.

Lamar, Clear Channel Outdoor, and CBS Outdoor make up an astonishing 85% of the OOH Media in the US.

- **Lamar:** Q3 Income drops by 74% over 2007. (3)
- **Clear Channel Outdoor:** Clear Channel Outdoor reported that third-quarter 08 profit dropped 83 percent on an impairment charge and a decline in U.S. advertising spending. (2)
- **CBS Outdoor:** Privately held organization; limited quarter information available.

To make matters worse; Industry Analysts predict a six percent (6%) point drop in advertising spending in the OOH category in 2009.

Traditionally, ongoing costs associated with operation of Out of Home Media displays are traditionally broken down into three main categories:

- ***Land Costs****:* These include real estate lease payments, real property taxes liability, and property insurance.
- ***Electrical Costs****:* These include expenses associated with illumination and maintenance of the advertising message.
- ***Labor Costs****:* These include expenses associated with maintenance and installation of the advertising message.

The traditional technology used to illuminate billboards is Metal Halide, High Intensity Discharge lighting. For over a decade this type of light has been the industry standard. Metal Halide lights are primarily used for larger billboard applications, such as 14' x 48' bulletins. The most popularly used fixture is the 400 watt Metal Halide fixture, Sign-Vue® (501 watt usage including ballast), is manufactured by Holophane Lighting Corp. The average half life of this metal halide fixture is 5,000 hours per bulb.

Sign-Vue® II - The one-piece hydro formed aluminum reflector is contoured to distribute light through the borosilicate glass refractor. Precisely cut prisms direct the light onto the billboard.

Housing - Rugged die cast aluminum housing contains the precisely engineered reflector, high efficiency ballast, Metal Halide lamp and socket, available on/off switch, and heavy-duty die cast door. All of which are sealed with harsh element resistant gaskets.

Costs Rise with Demand

In 2006 the average retail price of electricity rose nine percent (9%), the largest jump in the past twenty five years (4). In 2008 OOH Q3 operational costs increased by seven percent (7%) over the same period in 2007. Total electricity sales are projected to increase by twenty-nine percent (29%) in the Average Energy Outlook (AEO) 2008 reference case. At an average rate of 1.1 percent per year, sales are projected to increase from 3,659 billion kilowatt hours in 2006, to 4,705 billion in 2030 (1).

To combat the rise in costs, OOH Media companies are beginning to utilize alternative energy sources, and technologies.

New Technology Shift: Solid State Lighting featuring LED's

Solid State Lighting (SSL) Technology, featuring Light Emitting Diodes (LEDs), has been labeled as "disruptive" by the US Government. An LED is a diode that is chip-mounted in a reflector cup and held in place by a milled steel frame connected to a pair of electrical wires. When current flows across the junction of the two different materials, light is produced from within the solid crystal chip. Recent Improvements in SSL Technology have increased brightness by three hundred percent (300%). SSL uses bright white LEDs, which are developed by coating a blue LED with a phosphor, and thereby generating a white color. LEDs are the next wave of light technology; they offer a better quality light, and more electrical usage. Technological demonstrations have proven that LED lighting on OOH companies' 14x48 bulletin structures reduced energy costs by 45% and maintenance costs by 90%. The reduction in demand allows for the usage of renewable energy sources such as Wind and Solar energy. Generation of Wind power leads projected growth in renewable generation of all renewable sources. (2) Tables #1 and #2 provide energy and cost savings provided by LEDs.

Provided below are benefits of LED technology:

- LEDs provide a longevity that is up to 20 times that of standard incandescent lamps translating to low maintenance.

- LEDs are solid-state devices, meaning no moving parts, glass or filaments to break.
- LEDs don't waste energy in the form of non-light producing heat. Therefore they are cool to the touch and as a result, lighting fixtures and lenses are cool.
- LEDs are small in size and resistant to vibration or shock.
- LEDs contain no mercury and are environmentally friendly.
- LEDs are more efficient, using up to 90% less energy than other light sources based on watts.

Along with the implementation of LED lightning technology, Vertical Axis Wind Turbines are intended to reduce energy costs related to OOH media.

Wind Power System – VAWT-Vertical Axis Wind Turbine:

Vertical Axis Wind Turbines offer a reliable, simple, and most importantly, inexpensive alternative to provide energy for your OOH Media. Compared to Horizontal Axis Wind Turbines (HAWTs), VAWTs have more positive attributes. Unlike the HAWT, VAWTs catch wind from all angles because of their helix-shaped body. VAWTs can be mounted up to thirty-five (35) feet high, and operate in winds as low as 8 mph winds. When wind is not present, Bulletin Display Lighting is powered by the energy grid, as usual. When winds are present, and energy exceeds that consumed, the power meter will spin backwards (5). In thirty-five (35) states utilities are required to purchase excess

power generated by private individuals/businesses of fair market value. Tables #3-6 and Table #8 provide additional information on VAWTs.

Provided below are benefits of VAWTs:

- VAWTs environmentally safe, causing no harm to wildlife.
- VAWTs spin at a non threatening speed unlike horizontal turbines that kill birds and bats.
- The nearly silent VAWTs will not cause any acoustic disruptions to the environment, unlike HAWTs. HAWTS emit a whistling sound, unpleasant to the surroundings.
- Not only are VAWTS aesthetically and acoustically pleasing, but they are also 30% more efficient than the horizontal axis wind turbines (5).

Conclusion:

In the last few years, LEDs have emerged as a competitive lighting technology, capturing market share in several niche applications from incandescent, halogen, neon, high intensity discharge, and certain types of fluorescent light sources.

In OOH, Solid State Technology, featuring LED's (Light Emitting Diodes), has proven to reduce costs associated with lighting by 45%. The amount of electricity consumed is reduced by 65% in wattage plus delivery charges that vary per electricity provider. The addition of a VAWT to a Solid State LED Lighting system considerably reduces the energy required of each converted

display by an additional 40% per year. OOH operators in (35) thirty five US states can generate revenue by selling excess power generated to the local utility. This will provide a cash profit of between $300.00- $900.00 per location per year.

The cost of the system that includes installation of the LED lights and a Vertical Axis Wind Turbine cost around $25,000. The variance is based on the site conditions. The initial cost of converting to LED and wind power may seem benefits far out-weigh the initial investment. It is estimated that the lights will last for thirty years; seventeen if they are run from dusk until dawn. In that time period you can expect an ROI of ten years. However, during the lifetime of the lights, an average OOH company will not incur any cost related to energy and/or maintenance.

Also, the Federal U.S Government recently passed the *Emergency Economic Stabilization Act of 2008, H.R. 1424,* which provides grant opportunities up to $4,000 for the cost of the system; directly reducing your ROI. Many states have grants/incentives to assist consumers in purchasing the previously mentioned technology. For example, in New York State, the grant incentive equals about fifteen percent (15%) of the system cost. The attached tables provide additional specific information on costs saved by switching to the alternative forms of energy.

We have attached a return on investment (ROI) spreadsheet for one hundred billboard displays is attached entitled, Table #10.

Since OOH companies have such few costs associated with their operations; being able to reduce energy and maintenance costs are fiscally justifiable. In addition to saving on operational costs, OOH Media companies would publicly be taking a “green” stance in the market, and strengthen the beginning of an environmental culture. For example, just by switching to LED lights on one billboard, OOH companies would be saving 35,800 lbs. of carbon dioxide (CO2) emissions; it would take 4 acres of trees to offset this much CO2 in the atmosphere. Please refer to Table #2 for more environmental details. Solid State Technology is the clearly the answer to environmental and energy concerns.

Table #1

Lighting Technology Comparison; LED verses Metal Halide HID

	400MH	**LED**	**Difference**
Cost per fixture:	$585	$660	$75.00 (400MH)
Lumen Output	23000	6500	
Wattage per light:	501 watts	126 watts	(315) (LED)
Lights per display:	(4)	(4)	
Lights per structure :	(8)	(8)	
Wattage per display:	2004	504	(1,500) (LED)
Wattage per Structure:	4008	1008	(3,000) (LED)
Annual Energy Consumption per Display:	8,777 KWH	2,207 KWH	(6,570 KWH)
Annual Energy Consumption per Structure:	17,555 KWH	4,415 KWH	(13,140 KWH)
Annual Energy Cost:			
Per Light:	$219	$ 55	($164)
Per Display:	$877	$ 220	($651)
Per Structure:	$1,755	$ 441	($1341)
Annual Maintenance Cost:			
Per Light:		0	
Per Display		0	
Per Structure	341	0	($341)

Assumptions:

Assumes lights are on 12 hours per day (6a-12a), and costs of electric is the national average of $.10 cents per kWh

Table #2

Impact of Energy Saved

	400MH		LED		Net Difference
Total Annual Coal Consumption (lbs.)	14,077		3,540		-10,537
Total Annual CO2 Emissions (lbs.)	38,940		9,793		-35,400
Total Annual SO2 Emission (lbs.)	225		57		-168
Total Acres of Trees needed to fix this much CO2 (acres)	5		1		4
Total Annual Energy consumption in kWh (lbs.0	17,315		4,355		-12,360

Table #3

VAWT-Vertical Axis Wind Turbine

S322 – 2.5 kW System

- Rated Capacity – 2.5 kW
- Peak power - 2.81 kW
- Rotor Dimensions - 1.21m x 2.65m (4ft x 8.66ft)
- Swept Area - 3.19m^2 (34.34 ft^2)
- Rotor Construction – Marine Grade Aluminum Alloy
- Type - Vertical axis helical Savonius rotor (VAWT)
- Generator - High efficiency Permanent Magnet Generator
- Cut-in Speed - 3.6m/s (8 mph)
- Braking - No braking needed for normal operation. Manual override for maintenance.
- Electronic Brake - Electronic disc brake for emergency shutdown.
- Grid Connection - 110VAC - 240VAC, 50-60Hz Grid Tied Inverter.
- Off grid - Battery charge systems available
- Weight - 140kg (310lb)
- Design Life - 30 years
- Monopole Tower - recommend 4.5m to 6.0m (15ft to 20ft) depending on obstructions
- Warranty - 5 year Limited Warranty. *Extended warranties available.
- Unique patent pending design.
- Rugged aluminum and steel construction for extreme environments
- Modular, 3D blade for easy assembly and toughness.
- Helical turbine for smooth power production.
- Reliable Low RPM Permanent magnet generator.
- Design gives nearly silent operation at less than 5 decibels above background noise.
- Completely safe for our friends, the birds and bats.
- Utilizes turbulent omni-directional air instantly, no yaw control required.

Wind Turbine Monitoring System (WTMS)

The Wind Turbine Monitoring System (WTMS) provides both Helix Wind and the turbine owner access to real-time data related to their wind turbine(s) in a secure web-based application. The data available will show the current and historical kWh generated, RPMs, inverter status & bearing temperatures. The actual piece of hardware will be located on the owner's site and will be connected via a high-speed Internet connection (over Ethernet) by the owner. More details on this can be provided if desired.

Table #3 Cont.

Functions:

- Continuous data collection and storage of wind regime via an integrated anemometer.
- Continuous data collection and storage of turbine system performance.
- Wifi enabled for internet access which supports Helix Wind remote technical support/troubleshooting.
- Fully flexible time based historical data analysis for reporting and forecasting capability (2009 Development) The owner will have the ability to manipulate their turbine data to give them forecasting capabilities as well as overlapping graphical data, similar to Google finance. They can see in graphical form how much power was produced between any two (or more) points in time.

Benefits:

- Easy access to actual (expected if off-grid) electricity savings.
- Efficient centralized remote monitoring of multiple locations/units.
- Further investment opportunities can be defined by the comparison of the multiple locations.
- Early warning system designed to avoid costly unplanned failures
- Alerts may be sent to service provider to proactively plan a service call out
- Remote access to data enables engineering support.

Table #4

VVAWT Scope of Supply:

- Helix Wind Turbine – S322 or S594 model - Unassembled
    - Blades – loose shipped
    - Generator Module (Wiring not terminated)
    - Inverter (Helix will scope for application)
    - Interface Module (Between Inverter & Turbine – Protection/Rectification)
- Wind Turbine Monitoring System (WTMS)
    - Anemometer
    - Data Collection & Transmittal System (Wifi enabled)
    - Installation, Setup and Positioning Instructions
- Documentation (English Language)
    - Wind Turbine Assembly Instructions
    - Electrical Drawings
    - Foundation Specification
    - Data sheets for Inverter
    - Installation Documentation
- Test Report: The seller understands that you will have your own testing protocol, which you will follow, however, as a condition of sale, the seller requests the customer to work with Helix engineering to gather performance data and submit incident reports on any equipment issues which appear during the testing period. Within one month of the end of the testing periods and receipt of data, The seller will work with the Buyer to develop a test report as a basis for a final performance assessment discussion with the following headings:
    - Wind Regime during Test Period (Using data from Anemometer)
    - Energy Production during Test Period
    - Fault Report – Helix Wind will be tracking operational performance. Buyer will report any concerns with photographic evidence.
    - Wear & Tear – Buyer to report any concerns with photographs
    - Animal Friendliness – Buyer to report any incidents.
    - Neighbor Survey Results - Helix Wind would encourage Buyers for residential markets, to canvas neighbors to test units for their opinions which may impact permitting (if applicable).

Table #5

System Schematic

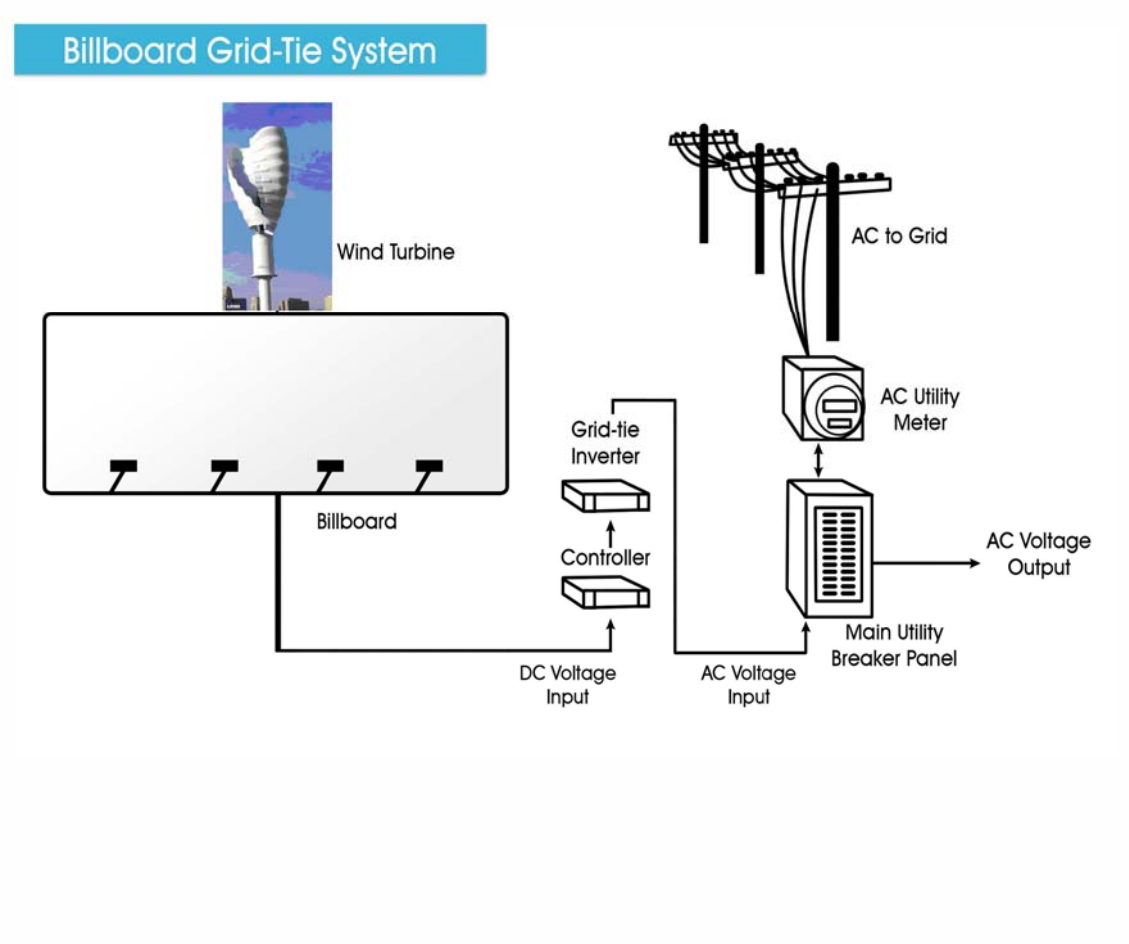

Table #6

VAWT Specifics

Product Performance Details:

From our theoretical analysis and empirical testing of our product designs, we have developed validated power curves to support end users forecast the productivity of the units.

Product Performance Details		
System	S322 unit	S594 unit
Rated Power (kW)	2.5	5.0
Peak Power (kW)	2.88	5.63
Avg. wind speed at 10m	Average Annual Output	
	kWh	kWh
6.5 (m/s)	1573	2909
7	1965	3636
7.5	2412	4467
8	2914	5402
8.5	3467	6439
9.0	4066	7567
9.5	4705	8778

Annual power output is primarily dependent on the wind regime and appropriate siting of the units.

Wind Regime:

Average annual winds speeds from 7m/s and above offer end users an attractive payback and energy production level. The table above depicts average annual outputs for the S322 and S594 models at average wind speeds based on a Weibull Distribution with a factor of 2. Ultimately, the performance of the units depends on the wind regime at the precise position of the turbine.

Turbine Positioning:

Recognizing the importance of testing to your own comfort with the units, as well as acting as a reference for your potential customers, careful consideration needs to be given to the positioning of these early units. A location with a suitably high wind regime will demonstrate more effectively what the unit can do while acting as a perfect reference for potential customers in the future.

After the average wind speed, the primary concern when choosing an installation site are the obstacles which may impact the quality of wind flow. Advice on choosing a suitable site for the unit is given in Appendix 1. Further advice if required can be provided by Helix Wind Engineering.

Table #7

Figure 60. Annual electricity sales by sector, 1980-2030 (billion kilowatthours)

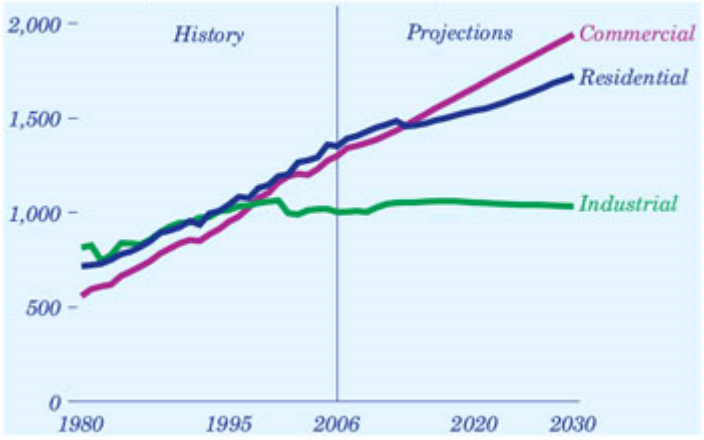

Figure 66. Nonhydroelectric renewable electricity generation by energy source, 2006-2030 (billion kilowatthours)

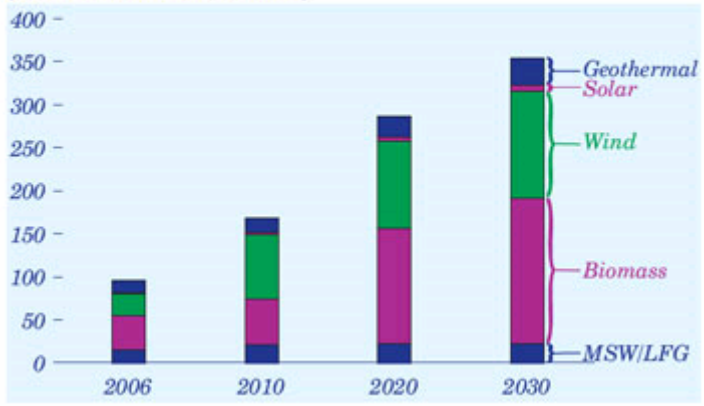

Table #8 * Images and Specs taken from www.Helixwind.com.

S322 – 2.5 kW System

Rated Capacity - 2.5 kW

Peak power - 2.81 kW

Rotor Dimensions - 1.21m x 2.65m (4 ft x 8.66 ft)

Swept Area - 3.22m2 (34.64 ft2)

Rotor Construction - Ultra tough Aluminum Alloy

S594 – 5.0 kW System

Rated Capacity - 5.0 kW

Peak power - 5.63 kW

Rotor Dimensions - 1.21m x 4.87m (4 ft x 16 ft)

Swept Area - 5.94m2 (64 ft2)

Rotor Construction - Ultra tough Aluminum Alloy

Table #9

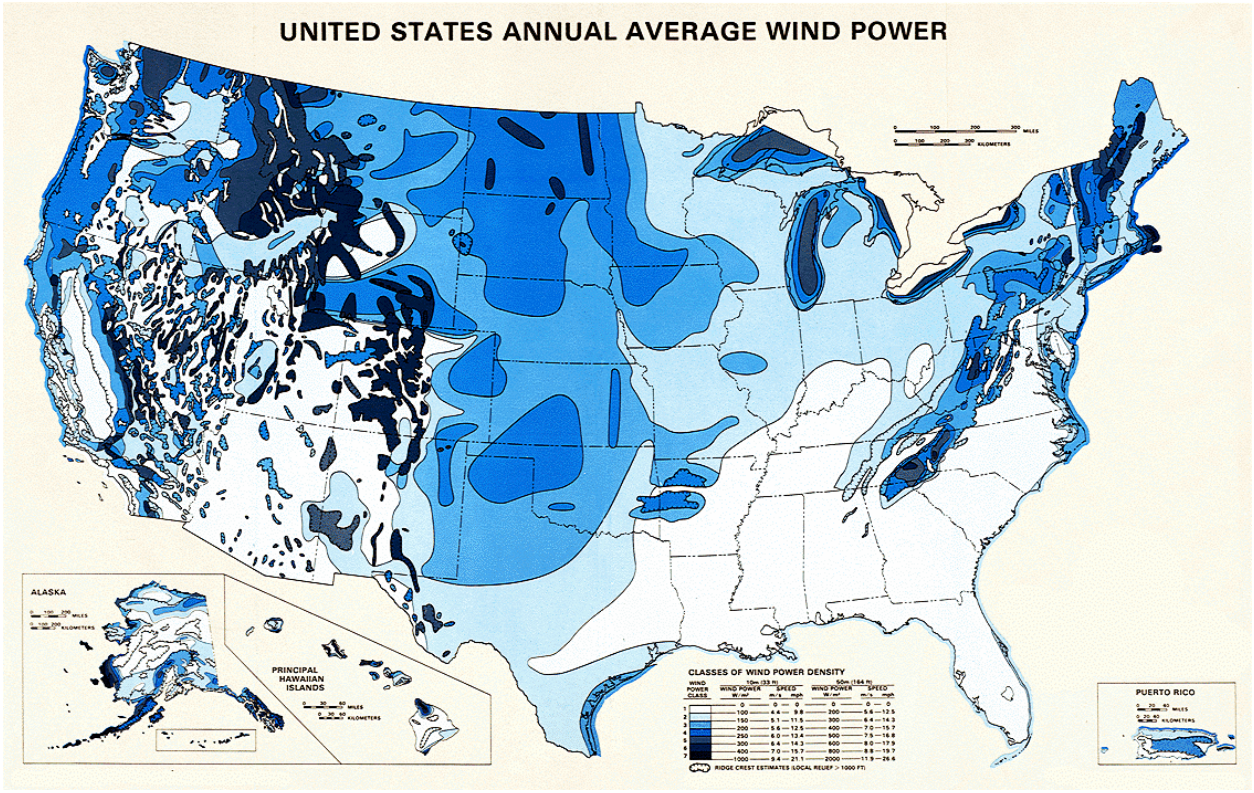
UNITED STATES ANNUAL AVERAGE WIND POWER
ALASKA
PRINCIPAL HAWAIIAN ISLANDS
PUERTO RICO
CLASSES OF WIND POWER DENSITY
RIDGE CREST ESTIMATES (LOCAL RELIEF > 1000 FT)

Table # 10

SSL Industries
1576 Sweethome road
Amherst, NY USA

Telephone: 888-493-8038 Ext 706
Fax: 888-493-8038
E-Mail:dennis@sslind.com

Base information

Customer	Outdoor Company			
Project Name	14 x 48 bulletin display		Project Nr.	112108A
Address			Type of Old	400 W MH
Contact			Type of LED	Cree
Phone			Voltage	110 Volt / 50 Hz

Technical Information	**400 W MH**	**120W LED**			
Old Technology /	6,000	75,000	Qty Lights / Daily	100	12
Old Technology/ LED, lifetime in years	1.37	17.12	Usage in / day's per month / day's per year	24.4	292.8

	400 W MH	**120W LED**			
Lifetime Maintenance Cost				**400 W MH**	**120W LED**
Bulb change (ballas	11.50	0	Maintenance costs (lifetime)	460,000	0
Service cost includ	400	0	**Maintenance savings (lifetime)**		**460,000**

Power consumpti	**400 W MH**	**120W LED**		**400 W MH**	**120W LED**
Bulb consumption	3200	576	al power consumption in watts per day	4,809,600	691,200
Ballast consumptio	808	0	Power cost per day	480,960	69,120
Consumption total	4008	576	Power cost per month	11,735.42	1,686.53
Cost's per kWh	0.100	0.100	Power cost per year	140,825.09	20,238.34
			Annual Power Savings		120,586.75
			Lifetime Power Savings		2,064,841.64

Results

(8) eight lights per

Maintenance savings (lifetime)	460,000.00
Lifetime Power Savings	2,064,841.64
e savings (maintenance and power)	**2,524,841.64**
l savings (maintenance and power)	**147,450.75**
Break even after (Years)	

Energy Calculations

KEY

400 W MH = 8/ 400 W Metal Halide Fixtures
LED Retro = 8/ 120
Lights on for 80% c
3456 Hours per yea

	Old Technology	**New Technology**
Total Annual Coal (	1,407,688	202,302
Total Annual CO2 e	3,894,045	559,623
Total Annual SO2 e	22,509	3,235
Total Acres of Tree	531	76
Total annual energ	1,731,456	248,832
Difference between Old and New		

References

1. "Annual Energy Outlook 2008 with Projections to 2030." Energy Information Administration. June 2008. U.S Government. 22 Nov. 2008 <http://www.eia.doe.gov/oiaf/aeo/electricity.html>.

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