PRESENTATION TO
California Energy Commission

This document lists proposals in respect to RFI areas of interest listed below:

Innovative Energy Technologies and Systems (IOc1)

LED Lighting Upgrades (EAc1)

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PRESENTATION

based on the following Patented and Patent-pending Technologies

Plug-n-Power™ Distribution Systems with *Parallel-View*™ LED lighting

Patent No. US 8,341,837
Modular Power Distribution and Control System

Patent Pending No. US 13,731,103
Plug and Power Distribution and Control Apparatus

Patent Pending No. US 61,859,723
Apparatus DC Power Splitter to a Device from Several Power Sources with Controls

Patent No. US 8,099,261
Low-cost Solid-state Identification Device

Patent Pending No. US 61,902,124
Apparatus Intelligent Parallel View LED Light, Methods of Configuration and Controls

NOTE: All products by ADVS-technologies are in compliance with NEC, and are configurable to meet additional requirements of local agencies.

NOTE: FIGURES – ARE NOT TO SCALE, AND ARE FOR ILLUSTRATION PURPOSES ONLY.

1.0 GENERAL

I am pleased to have an opportunity to work on this proposal, and bring to your attention innovative technologies in process of being developed by my company.

ADVS-technologies ("ADVS") is a young and ambitious company specializing in the development of innovative proprietary technologies with an extensive portfolio of Patented technology in the areas of illumination systems, power distribution systems, pharmacy, store automation, and transport systems.

The objective of ADVS is to provide effective and efficient environmentally friendly solutions with the intent of improving quality of services.

The proposal includes respective technology innovations suggested for:

- Improvements to the existing Energy Commission Building located in Sacramento, CA, as requested in RFI, and
- Designs and Construction of New Residential Housings and Commercial Buildings

Each proposal will include estimated:

- Costs for development, production, and installation
- Development and installation schedule

It is important to recognize that despite significant improvements in variety of technologies related to housing and building construction methods, there are still a number of old fashioned technologies, which remain practically unchanged for the last 30+ years.

The next several paragraphs include:

- Introduction to patented and patent-pending products being developed by ADVS
- Brief description of deficiencies of old technologies previously installed, and inefficiencies of some of technologies being currently used
- Proposal to resolve numerous noted problems by introducing innovative technologies in-process of being developed by my company

2.0 INTRODUCTION

The ADVS product lines presented in this proposal include:

- *Plug-n-Power*™ AC/DC Power Distribution and Control Systems, and
- *ParallelView*™ LED Intelligent Lighting Systems

Combination of these two innovative technologies, enables ADVS to provide a ***COMPREHENSIVE*** solution, as described further below.

2.1 *Plug-n-Power*™ AC/DC Power Distribution and Control Systems

2.1.1 PROBLEM with EXISTING AC Power Distribution

The existing methods of electrical wiring of residential and commercial structures has fallen drastically behind the progress attained in other areas of construction.

2.1.1.1 KEY points

- **Time consuming** installation, as each electrical device must be wired manually
- **Costly**, as manual labor rates are increasing
- Presents potential **safety hazards**, as practically every electrical device installed behind the walls has at least one hot wire lead clearly exposed. Safety hazard extends to the installers, service, maintenance and inspection personnel.
- **Inconsistent quality**, as each electrical connection is performed manually on-site under a number of potentially unfavorable conditions, including surrounding ambient environment (temperature, light, rain, snow, etc.). Compliance to NEC and other regulations maybe compromised.
- **Poor quality control**, as it is practically impossible for city inspector (or anybody) to verify quality of each connection made
- **Environmentally not friendly**, as a lot of waste in the form of stripped insulations is generated as each connected wire must be stripped at both ends for installation. In addition, high power connections are not shielded, and as result will generate EMI when connected to high power switching loads, which may present a health hazard
- **Inadequate quality**, as all devices have no water-proof rating of any grade

- The construction and quality of electrical distribution panel is not adequate, as in time it rusts, lowering efficiency, and creating **potential electrical shock hazard** when must be approached by an ordinary user
- The design principals are focused entirely on **distributing AC power only**, completely ignoring the fact that for some time now (and this trend is growing) there are a significant number of household devices which are powered by DC, 12VDC in particular
- There is **no real-time on-site monitoring of power consumption** and power quality, with basic guidance to the user to avoid increase in energy costs and promote energy conservation

2.1.1.2 DETAILS

Existing methods of wiring AC electrical power, such as the installation time, installation quality, reliability, repeatability and end-result safety of installations - depends heavily on hi-skill manual labor. Currently, every power wire has to be stripped on both ends and then attached to tie-grip connectors. This operation is time consuming, and to verify the quality of each connection is nearly impossible. As result, sections of the stripped wires with high AC voltages are being clearly exposed, and the quality of their connections is not guaranteed.

Although located behind the walls, the quality of connections is a great concern, since it may get loose during vibrations, such as minor earthquakes, etc., and as result presents a potential fire hazard.

The current process is not environmentally friendly as produced waste in a form of stripped cable insulation needs to be disposed of after installation.

Additionally, the existing electrical power panels are not user-friendly, and require costly maintenance. Potentially poor quality of AC connections within a rusty panel will lower power efficiency (increasing energy costs), and can increase EMI, depending on the load being connected.

The existing AC power entry and AC power distribution methods do not provide convenient on-site power monitoring and diagnostics to inform the end user of potential problems that may affect the energy usage and costs.

2.1.2 PROPOSED SOLUTION: *Plug-n-Power*™ AC/DC Power Distribution and Control Systems

Estimated development costs: $75,000
Estimated availability: June 2014

2.1.2.1 KEY points

- **Highly efficient**, as a completely tested kit in full compliance to agency regulations, including NEC, local ordinances, is designed and delivered to the project site for Plug-n-Power™ installation.
- **Superior safety** at all times, as there is no exposed hot power wire leads throughout the entire system. This includes hi-power devices such as electric stove, unless required by local regulations to be hard-wired.
- **Consistent quality**, as each electrical connection is performed using Plug-n-Power™ pre-fabricated, tested, agency approved standardized modules, and with custom length cables with agency approved standardized connections (IEC for example), with each connection having adequate strain-reliefs to withstand required vibrations.
- **Efficient quality control**, as the entire power distribution system or sections thereof can be tested, without load being attached, automatically for proper continuity and resistance level, including cold tests (no power applied) and hop pot test (specific high voltage power applied) to verify quality of all connections made.
- **Environmentally friendly**, as no waste produced. The entire Plug-n-Power™ kit is designed per specific housing floor plans and construction drawings, with number of devices, such as: outlets, switches, light, and length of interconnecting cables between them optimized with only service loop provided for convenience. In addition high power connections can be installed using shielded cables, and as result will minimize EMI with practically no impact on environment.
- **Superior quality** as devices and cables are assembled and tested at the factory, and then deliver to the site for Plug-n-Power™ installation. As needed, components of Plug-n-Power™ system can be designed per required water-proof rating of any grade.
- The construction and quality of Plug-n-Power™ electrical distribution panel is durable and also safe for maintenance services, such as replacement of modules due to normal wear and tear, **with no safety hazard to an ordinary user**.

- **Superior safety**, as the design principals are focused to provide optimum distribution of AC and DC power, improving overall efficiency, with adequate power backup of selected DC powered devices.
- User-friendly information to further conserve energy by avoiding use of "bad" power devices within a household, or avoiding power spikes by using devices unnecessarily at the same time, as **guided by real-time on-site monitoring of power consumption** and power quality devices installed at the power distribution panel, and throughout the system as needed.

2.1.2.2 DETAILS

ADVS has recognized this issue, and addresses it head on.
The Patented *Plug-n-Power*™ environmentally friendly, waste-free distribution technology represents a significant step forward, delivering superior level of quality, safety and efficiency for every power distribution installation regardless of size, complexity, location or time schedule.

The Patented invention No. US 8,341,837.

ABSTRACT:

Invention describes apparatus for designing and installing power distribution systems for: residential, commercial and industrial applications, as well as for power distribution within electro-mechanical devices.

The invention transforms existing labor-intense installations into practically plug-and-power type modular systems.

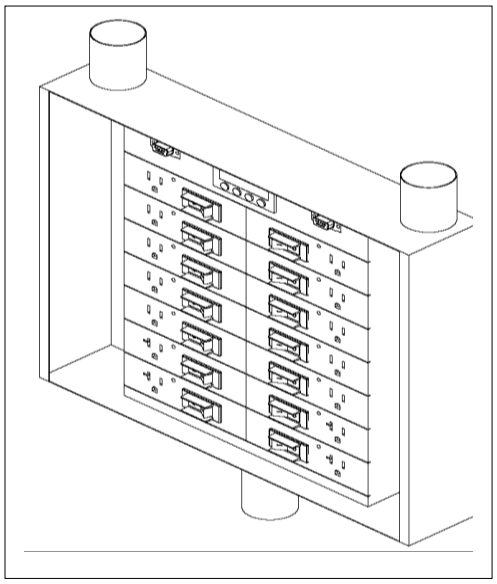
For a specific project, pre-designed, fabricated and tested kit, including factory assembled and tested: power and control enclosures, power outlets and junction boxes, interface cables, as specified by the invention, will be delivered directly to the installation site.

No labor intense operations: wire stripping, outlet/switch wiring, junction box wiring, load wiring. No exposed hot wires or leads at any point outside enclosure.

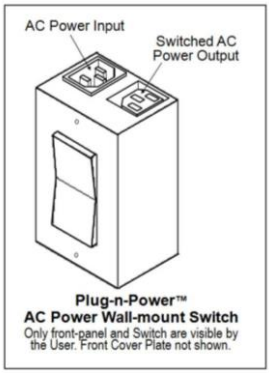
The invention will: significantly lower labor costs, reduce installation time, and improve safety, reliability and quality.

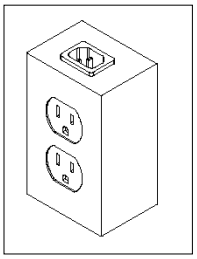
Utilization of shielded cables and shielding of other components within a system, will significantly lower electrical power emissions, benefiting the environment for all – the end users and other technologies. The Patented process is environmentally friendly as no waste produced during installation.

FIG. 1 illustrates *Plug-n-Power*™ components based on drawings and specifications listed in the Patent.

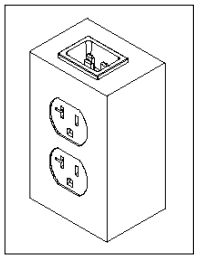


***Plug-n-Power*™ Distribution Panel with optional real-time power monitoring, guidance and safety controls**

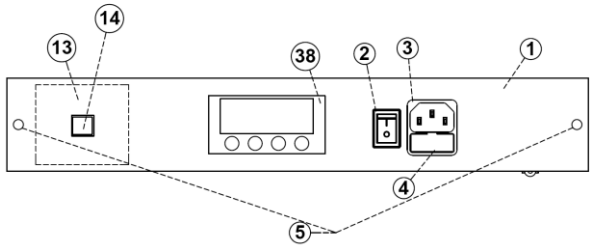




115VAC 10A Dual Outlet top power inlet



115VAC 20A Dual Outlet top power inlet



***Plug-n-Power*™ Strip with Power Inlet on opposite side to Power Outlets, with optional real-time power guidance and safety controls**

FIG. 1

As described in the Patent, the illustrations of *Plug-n-Power*™ interface principals are based on utilization of IEC standard series of AC power connections. Other industry recognized and agency approved interfaces can be used.

FIG. 2 illustrates an example of *Plug-n-Power*™ AC Power Distribution for Residential Housing, listed in the Patent.

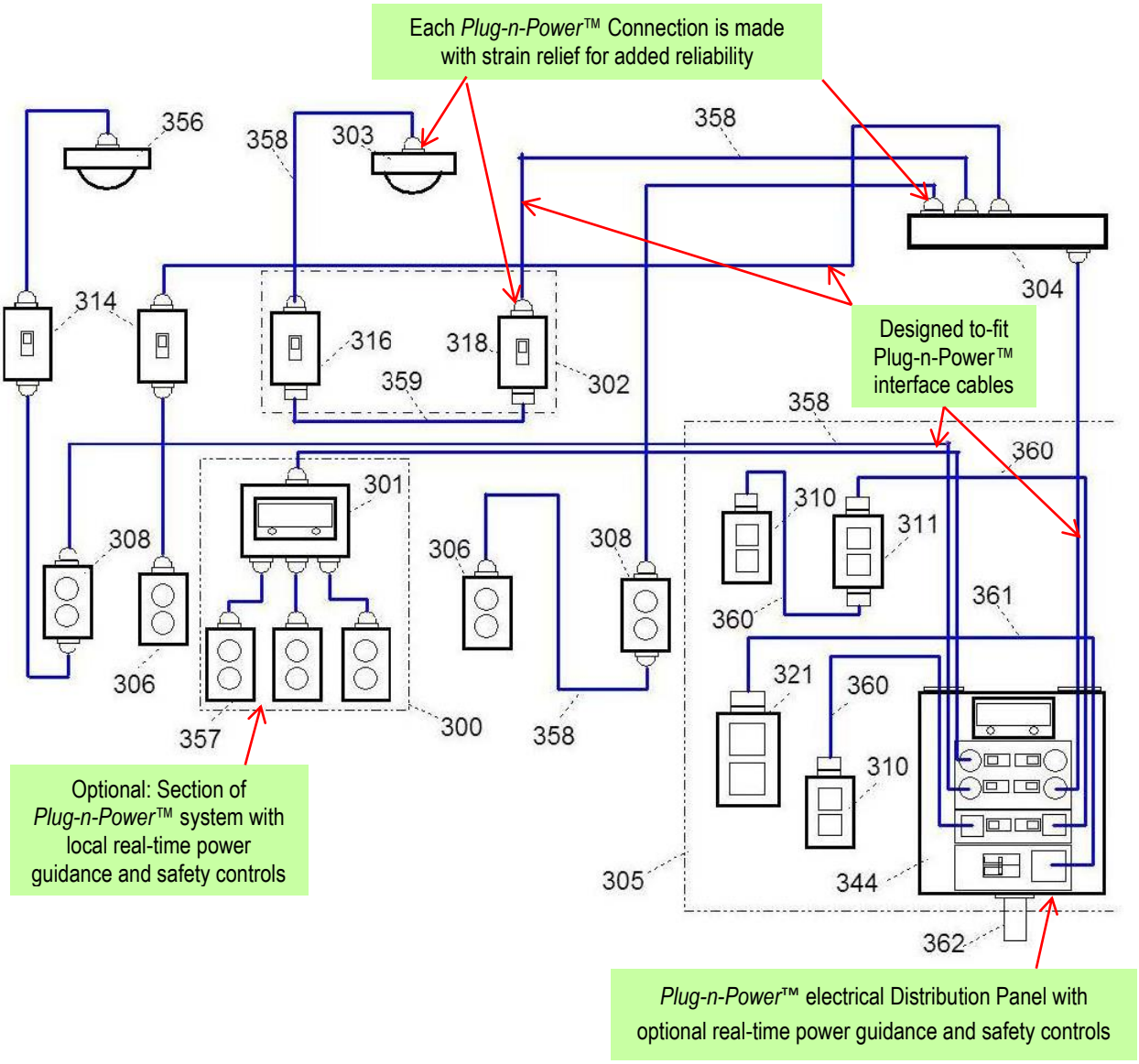


FIG. 2

Other *Plug-n-Power*™ Components shown:

306	Dual Receptacle, Wall-mount
308	Dual Receptacle, with power feed-through *Plug-n-Power*™ connection
301	Controller monitoring (3) *Plug-n-Power*™ Dual Receptacles (357)
314	Switch, Wall-mount
316,318	3-way wired Switch, Wall-mount
304	Strip with power entry inlet on opposite side of the power outlets
303,356	Lamp fixtures
321	Dual Receptacle, 230VAC, Wall-mount

ADVS filed a Patent pending application No. US 13,731,103 “Plug and Power Distribution and Control Apparatus”, which further describes the new technology of *Plug-n-Power*™ distribution, including power distribution of AC and DC power, representing a significant step forward in conserving energy and lowering costs.

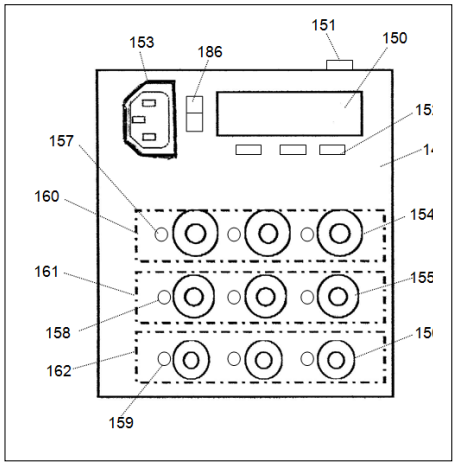
ABSTRACT:

The Patent pending invention describes apparatus providing plug-and-power distribution of power and communications for: residential, commercial, industrial applications, and for electro-mechanical devices and computer systems. Invention transforms existing labor-intense installations into plug-and-power modular systems.

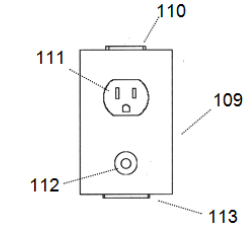
For specific project, pre-designed, pre-fabricated kits, including factory assembled and tested: power and control modules, interface cables, will be delivered directly to the installation site. Labor intense operations, including: wire stripping, wire crimping are replaced with plug-and-power components. Apparatus has no exposed hot leads accessible by bare hands, including service personnel. Invention will: significantly lower labor costs, reduce installation time, improve power distribution safety, reliability, utilization efficiency, and quality.

Application of shielded cables and shielding of other components within the apparatus, will significantly lower electrical power emissions, benefiting the environment for all – the end users and other technologies. The invention describes plug-and-power DC power distribution replacing existing AC power distribution, further improving safety and efficiency.

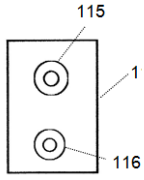
FIG. 3 illustrates examples of *Plug-n-Power*™ components based on drawings and specifications listed in the Patent Pending application.



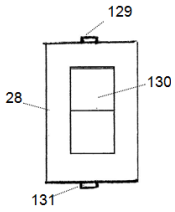
***Plug-n-Power*™ DC Power Distribution Panel with optional real-time power monitoring, guidance and safety controls**



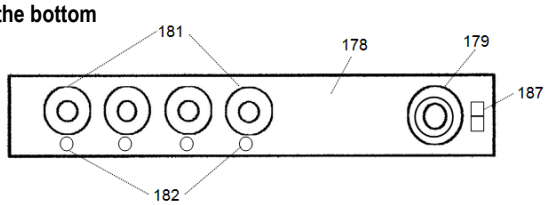
115VAC 10A, and 12VDC Outlets with Power Inlet on top and feed-through 115VAC outlet at the bottom



12VDC Dual Outlet



12VDC Switch with 12VDC entry on top and switched 12VDC at the bottom



***Plug-n-Power*™ 12VDC Distribution Strip**

FIG. 3

FIG. 4 illustrates an example of *Plug-n-Power*™ DC Power Distribution for Residential Housing, listed in the Patent.

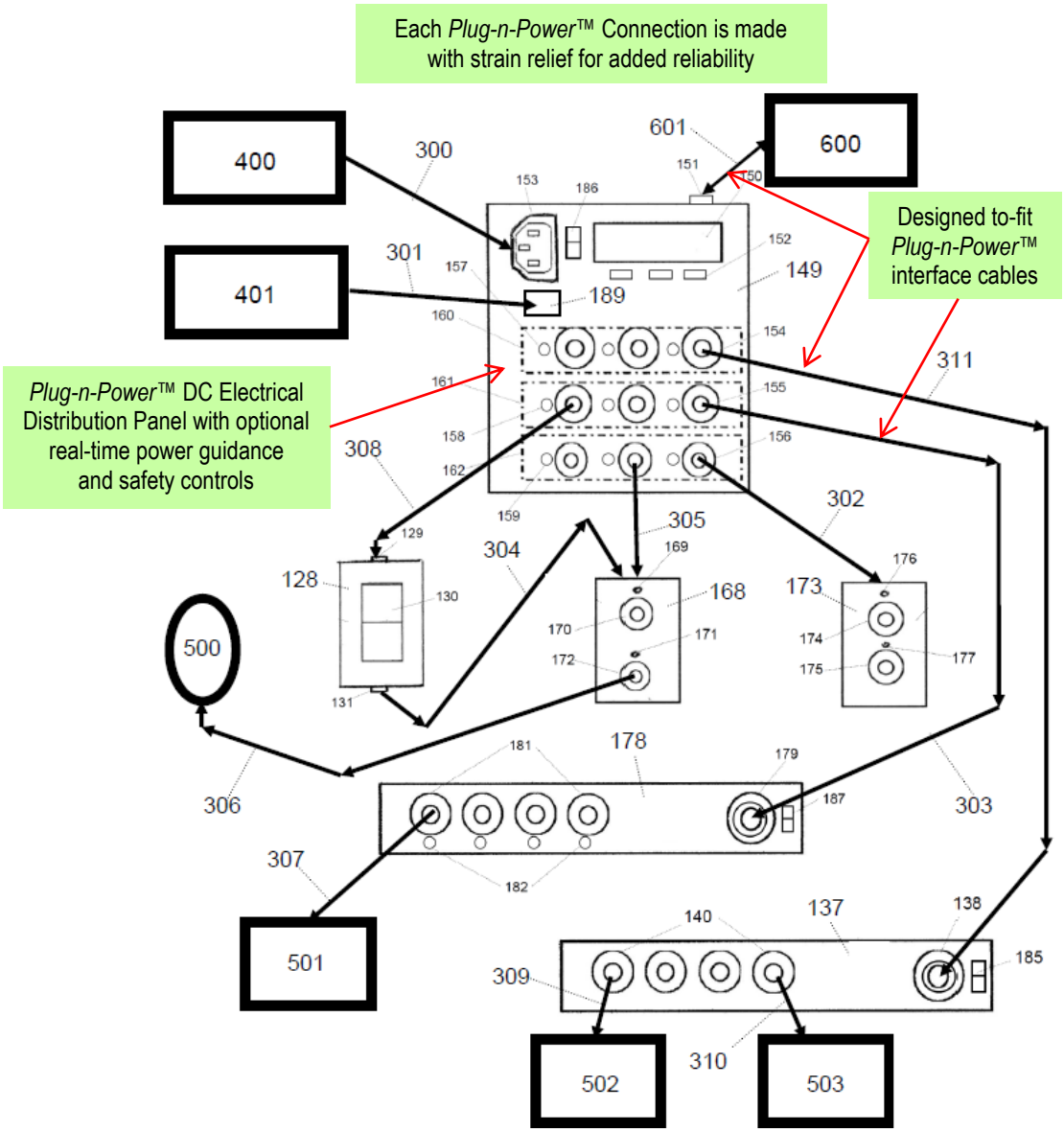


FIG. 4

Other *Plug-n-Power*™ Components shown:

400	115VAC Power Source
401	DC Power Source
500	DC powered LED Lamp
501-503	DC powered devices (Laptops, Printers, Routers, Land Phones, etc.)
600	Remote Host Controller

ADVS filed a Patent pending application No. US 61,859,723 “Apparatus DC Power Splitter to a Device from Several Power Sources with Controls”, which complements the *Plug-n-Power*™ DC distribution systems with an ability to connect within the system to alternate power sources, including power backup DC supplies, such as solar batteries. The switch-over to stand-by power backup DC supplies can be performed automatically in real-time during a loss of main power, or by controls for systems equipped with controller. This creates a “DC battery-backed network” of DC powered devices within a residential housing. The type of devices and the number of devices connected to the “DC battery-backed network” can be selected to provide required level of safety and security of a residence during partial or complete loss of AC power, such as power outage conditions. The Patent pending application will include low voltage AC power distribution.

ABSTRACT:

The Patent pending invention describes configurable apparatus providing DC plug-and-power distribution from DC power sources to DC power loads. Configuration of apparatus includes combination of input power interfaces configured to distinguish or interlock power supplies connected to the apparatus. Configuration of apparatus includes combination of output power interfaces configured to distinguish or interlock power loads connected to the apparatus.

Apparatus configurations include controller to monitor and control each device connected to the apparatus. Monitored parameters include: voltage, current, temperature. Controller will execute pre-defined algorithm to prevent measured parameters from exceeding set operating criteria for the apparatus and devices connected to the apparatus. Apparatus can be configured as a harness with components and interfaces embedded into the harness, or enclosure with components and interfaces inside enclosure.

Apparatus can be configured and controlled by a HOST over wired or wireless network, including INTERNET. Apparatus can be configured to execute real-time commands without operator assistance.

The AC power distribution is more efficient vs. DC power distribution, and the cumulative effect can be significant, as function of the length of the power transmission lines and the amount of power transmitted over the transmission lines.

With the progress achieved in lowering power consumption of many household appliances, and with emerging of highly efficient DC LED lighting products, it is clear – the losses of switching from AC to DC power distribution for powering LED lighting products are negligible compared to benefits listed above. In mathematical terms: 20% of 100W is 20W, while 20% of 10W is only 2W. LED lighting products fall well under 10W!

There is no need to have only HI-VOLTAGE AC power distribution in the areas of new or even existing buildings, which are dominated by DC loads!

2.2 *ParallelView*™ Intelligent LED Lighting Systems

2.2.1 PROBLEM with EXISTING LED Lighting

For several years LED's been clearly recognized as superior light producing devices vs. existing incandescent and fluorescent illumination technologies.

The advantages of LED's include: superior efficiency and longevity.

The current trend of converting to LED lighting is primarily based on replacing existing light bulbs with LED based products, which do fit into the same AC powered sockets. This approach is not the best solution.

2.2.1.1 KEY points

- Presents potential **safety hazard**, as practically every DC powered LED light is connected to the existing AC power through an add-on AC-DC converter. As result, AC power distribution with exposed hot wire leads behind the walls remains, despite that it is no longer needed.

- **Inconsistent quality**, as each electrical connection is performed manually on-site under a number of potentially unfavorable conditions, including surrounding ambient environment (temperature, light, rain, snow, etc.). Compliance to NEC and other regulations maybe compromised.

- **Poor quality control**, as it is practically impossible for city inspector (or anybody) to verify quality of each electrical connection made

- **Environmentally not friendly**, as AC-DC converters will generate EMI, and considering amount of then to be installed, may present a health hazard

- **Inadequate quality**, as a vast majority of existing light fixtures, and newly designed LED lights have no water-proof rating of any grade

- **Unnecessary complications in providing emergency lighting** upon loss of electricity. Current method of wiring LED lights to existing AC lamp sockets makes this task far more complicated, as batteries produce DC power only.

- There is **no real-time diagnostics** to maintain the product and the environment within specifications

2.2.1.2 DETAILS

The vast majority of LED based lighting solutions, just as the conventional lighting preceding it, shines its full illumination straight into the eyes of an observer looking at the light. It prevents people looking at their ceilings when the lights are on, because the direct light produced by the lights installed into the ceiling is making them blind.

Some LED products, such as Edge-Lit LED Flat lighting products available from Pixi Lighting, LLC, have made a significant progress. Still, these products are powered by AC power distribution of voltages 90-130VAC. In addition, the design of these products is far too complicated, which is reflected in the pricing.

With all these products, the addition of AC-DC converters to provide required DC power for LED lighting, impacts the energy efficiency, as converters are not ideal, and as a result, have efficiency factors below 100%.

The addition of components to accommodate LED lamps to mechanically fit into existing AC sockets, and/or to be electrically compatible with the existing AC power distribution systems, lowers reliability of the product installed.

The vast majority of existing LED lighting products lack self-diagnostics, such as monitoring the operating ambient environment. Regulating power to LED devices to avoid overheating, would sustain product longevity defined by product specifications. LED devices, when operated within the environment listed in their specifications, are projected to last at least 50,000 hours of continuous use.

The opportunity to switch to DC power distribution is sacrificed for the convenience of retrofitting existing AC lighting fixtures. As result, safety hazards associated with the presence of AC power remains.

2.2.2 PROPOSED SOLUTION: *ParallelView*™ Intelligent LED Lighting Systems

Estimated development costs: $35,000
Estimated availability: May 2014

ADVS Patent pending application No. US 61,902,124.

ABSTRACT:

Application describes apparatus intelligent parallel view LED light comprising: controller, sensors, LED's, interfaces, enclosure.

Sensors comprising: ambient light, proximity, temperature, voltage, current.

Operator and remote controller interfaces include: wireless, INTERNET. LED's configurations include: single color, multicolor, flexible PCB.

Enclosure configurations include: water-proof, recess and surface mounting.

Control configurations include: setting sensor trigger points; defining real-time control algorithm based on sensor status; time based controls; operating limits; acceptance criteria. Operating limits include: illumination intensity; energy consumption; internal temperature.

Control algorithm includes real-time diagnostics and controls to achieve criteria set by configuration. Apparatus configuration stored in non-volatile memory. Enclosure configurations include: light retaining and reflection; hidden magnets for latch-in mounting.

Discrete LED's not visible by observer, produce illumination parallel to the viewing surface.

Apparatus powered by low AC/DC, compatible with plug and power distribution. Apparatus in compliance with local and national regulations.

Applications: residential ceilings, walls, floors; furniture; appliances; lamps; aquariums; billboards; backlighting art.

The *Parallel-View*™ Intelligent LED Lighting Systems include state of the art configurable modules, which are compatible with DC *Plug-n-Power*™ distribution systems.

For illustration purposes two types of modules are presented below.

FIG. 5: ML0-600-T-1-RDM

ML0-600-T-1-RDM Specifications

Dimensions	6” overall diameter with *Parallel View*™ illuminated dome for recess mounting; 0.5” overall height
Enclosure	Water-proof NEMA 4 rating
LED source	Single color warm white flexible LED strip attached along the entire inner perimeter inside the housing (15 discrete LED’s for 6” diameter)
Power interface	12VDC, 0.2A, 12VDC *Plug-n-Power*™ distribution compatible cable
Environment	-10 to 50°C
Mounting	Light-weight construction. The mounting base configured with hidden magnets for snap-to metal bracket. Four mounting holes are optional. Recess mounting: ceilings, walls, furniture, appliances. Installation time – 20 minutes, max.
Longevity	50,000 hours of continuous use
Warranty	One year
Estimated cost	Unit price $10 in quantities 1K+. Installation costs $10-30.
Application	General lighting, super low cost (simple mounting), high efficiency, snap-in installation

NOTE: The overall diameter of the MLX-600 series is 6”. Other models with different diameter and/or shape are described in the Patent-pending application, and can be developed as needed.

Remote Control
X=C, RGB color model

FIG. 6: ML5-600-X-1-RDM

ML5-600-X-1-RDM Specifications

Dimensions	6” overall diameter with *Parallel View*™ illuminated dome for recess mounting; 1.5” overall height.
Enclosure	Water-proof NEMA 4 rating
LED source	X=C RGB color X=T Warm white color X=W Cool white color Flexible LED strip attached along the entire inner perimeter inside the housing (15 discrete LED’s for 6” diameter)
Power interface	12VDC, 0.4A, 12VDC *Plug-n-Power*™ distribution compatible cable
Environment	-10 to 50℃
Mounting	Light-weight construction. The mounting base configured with hidden magnets for snap-to metal bracket. Four mounting holes are optional. Recess mounting: ceilings, walls, furniture, appliances. Installation time – 30 minutes, max.
Controls	Operator remote 24 functions IR controller (controller included). Wireless interface for remote controls by computer, mobile device. Real-time self-diagnostics, with visual indications of status. Real-time monitoring of ambient environment, and reporting to host controller, LAN, INTERNET.
Longevity	50,000 hours of continuous use
Warranty	Three years
Estimated cost	Unit price $18 in quantities 1K+. Installation costs $25-50.
Application	General lighting with built-in diagnostics, intelligence, with remote controls for added safety, security

3.0 Improvements to the Energy Commission Building

3.1 Current State

The Building itself is 31+ years old. A number of innovative technologies have been introduced over the years with moderate results due to the fact that some new technologies had to coexist or even be serviced by old-fashioned technologies.

Example 1: Modern heating and ventilation systems are serviced by 30+ years old AC power distribution system and methods. The original AC power distribution system was adequate up to a point. Innovations introduced for improving energy efficiency of power devices (central heating, cooling, water) systems, and in particular lighting systems (introduction of LED's for general lighting), presented a great opportunity to improve overall operating efficiency of the Building. Unfortunately, the benefits had not reached their potentials due to the old fashioned AC power distribution methods.

Example 2: While it is well known that LED lighting should be powered by DC electricity, the old fashioned AC power distribution systems installed at facilities such as the Energy Building, have forced manufacturers to develop LED lighting that will fit into existing AC outlets for direct replacement of old fashioned and highly inefficient incandescent light bulbs. Addition of the AC-DC power conversion components for the DC powered LED lighting, had lowered reliability, reduced efficiency, and increased costs.

3.2 Phasing-in Improvements

To be fair to the modern technologies, I would suggest testing the most suitable proposals on a small pilot scale installation.

Example: The Energy Commission Building is ~180,000 square feet. I would consider selecting 3-5 applicable proposals, and install them within an area ranging from 1000-5000 square feet. The scale of installation would allow for these systems to be installed within 1-3 months, in full compliance to the selected proposal, without any dependency on existing old-fashioned technologies, with few exceptions, including keeping the original construction and materials of the exterior walls, and other hard to replace (or justify) infrastructure of the building.

Within the following 3 months of operation, each proposed pilot system would be tested in-parallel, and evaluated vs. the current system, and vs. each other. The results would be compiled and analyzed per acceptance criteria defined by the Energy Commission.

The winner(s) will be awarded to complete modernization of the remaining part of the Energy Commission Building.

3.3 Proposed ***COMPREHENSIVE*** Solution

If selected by the Commission, based on the construction drawings of the pilot area allocated for testing, ADVS will develop and deliver a KIT ("ADVS-pilot"). The "ADVS-pilot" KIT will include all necessary *Plug-n-Power*™ components:

- Standardized AC/DC *Plug-n-Power*™ wall outlets, switches
- Custom length *Plug-n-Power*™ AC/DC power distribution interface harnesses.

  NOTE: Includes ready to install *Plug-n-Power*™ interfaces for connecting LED lighting to AC/DC power supplies, and for connecting to the backup power sources, including Solar batteries
- *ParallelView*™ LED Lighting modules

In addition, the KIT will include accessories such as:

- DC power supplies for *ParallelView*™ LED Lighting modules
- Remote operator Infra-red controller for selected *ParallelView*™ LED Intelligent Lighting modules
- Wireless Interfaces for host controller monitoring and controls

Assuming the pilot area of ~1000 square feet allocated for installation and testing, I propose the following plan for the PHASE 1 of the "ADVS-pilot" installation and testing:

1) Disconnect the AC power to the pilot section from the existing AC power distribution panel. Estimated time: 16 man-hours
2) Remove or disconnect the AC power distribution from the ceiling, all the way down to the wall mounted AC power receptacles, which are located 2-3 feet high from the floors. This will leave existing old fashioned AC power distribution only to the wall mounted AC outlets. Estimated time: 24 man-hours
3) Remove AC power lighting fixtures, and respective devices (ballasts, etc.) from the ceiling. Estimated time: 24 man-hours
4) Install *Parallel-View*™ standard and intelligent LED lighting modules, with all required accessories.
   Estimated availability: May 2014, estimated installation time: 40 man-hours
5) Install *Plug-n-Power*™ DC power distribution from the 2-3 feet off the flooring (location of wall mount AC outlets) to the ceiling, and along the ceiling in support of DC lighting and DC power distribution required for other devices. Include into *Plug-n-Power*™ DC power distribution a number of DC Power Splitters to allow a designated number of *Parallel-View*™ intelligent LED lights to be powered by

batteries, such as solar, to sustain their full functionality when there is no electricity available
Estimated availability: June 2014, estimated installation time: 40 man-hours

6) Install new 115VAC electrical power distribution panel, with capacity of 50A in support of AC/DC power distribution for devices installed in the pilot area
Estimated installation time: 16 man-hours

7) Operate the system for specified amount of time (est. 3 months), and measure the performance parameters identified by the COMMISSION

Upon successful completion of the pilot, per COMMISSION recommendations, replace the existing old-fashioned:

- AC power distribution with *Plug-n-Power*™ AC distribution system, including upgrading the AC distribution panel with *Plug-n-Power*™ AC distribution intelligent panel, equipped with system self-diagnostics and operator guidance system aimed on energy conservation. Estimated availability: August 2014.
- AC lighting with *ParallelView*™ Intelligent LED Lighting System, providing lighting throughout the entire building, with such features as: emergency lighting on loss of electricity; remote controls by the operator and/or remote controller of each intelligent LED light with an objective to achieve the most optimum illumination while conserving energy at all times.

As result, in respect to ***AC power distribution and lighting systems***, the Energy Commission Building would fully benefit from using most advanced technologies.

Table 1 below summarizes the ratings on a scale (0-10) of improvements.

Parameter	Existing (estimated)	Attained (projected)
Safety of power distribution	7	9
Efficiency of power distribution	6	9
Efficiency of lighting	6	9
Efficiency of emergency lighting	7	9
Environmentally compliant	6	9
OVERALL rating	6.4	9

TABLE 1

4.0 Future Home Design Ideas and Technologies

For illustration purposes, an image FIG. 7, which is available from the link below, will be used

http://www.energystar.gov/index.cfm?fuseaction=popuptool.atHome

4.1 Current Methods

FIG. 7

The above illustration references a number of very valuable energy conservation measures, recommended to the occupants of the house.

4.1.1 Original electrical power distribution method

The entire house, starting from the basement and all the way up to the roof line, is wired using 115VAC and 230VAC power distribution circuits. Each electrical component such as wall mount receptacles and switches – are installed and wired to 115VAC using manually stripped and installed cabling, the method which has not changed much over the last 30+ years.

4.1.2 Current lighting method

In respect to house lighting, assuming modest modernization, the illumination will be provided:

- Garage and basement area
  Fluorescent 115VAC light fixtures

- Rooms
  Ceiling 115VAC light fixtures
  Desks 115VAC powered lams

NOTE: If there are LED lamps for general lighting, most likely the lamps are designed and installed into existing 115VAC sockets originally installed for incandescent light bulbs.

4.1.3 CONCLUSION

Measures recommended by the “energystar.gov” will improve energy conservation to a point.

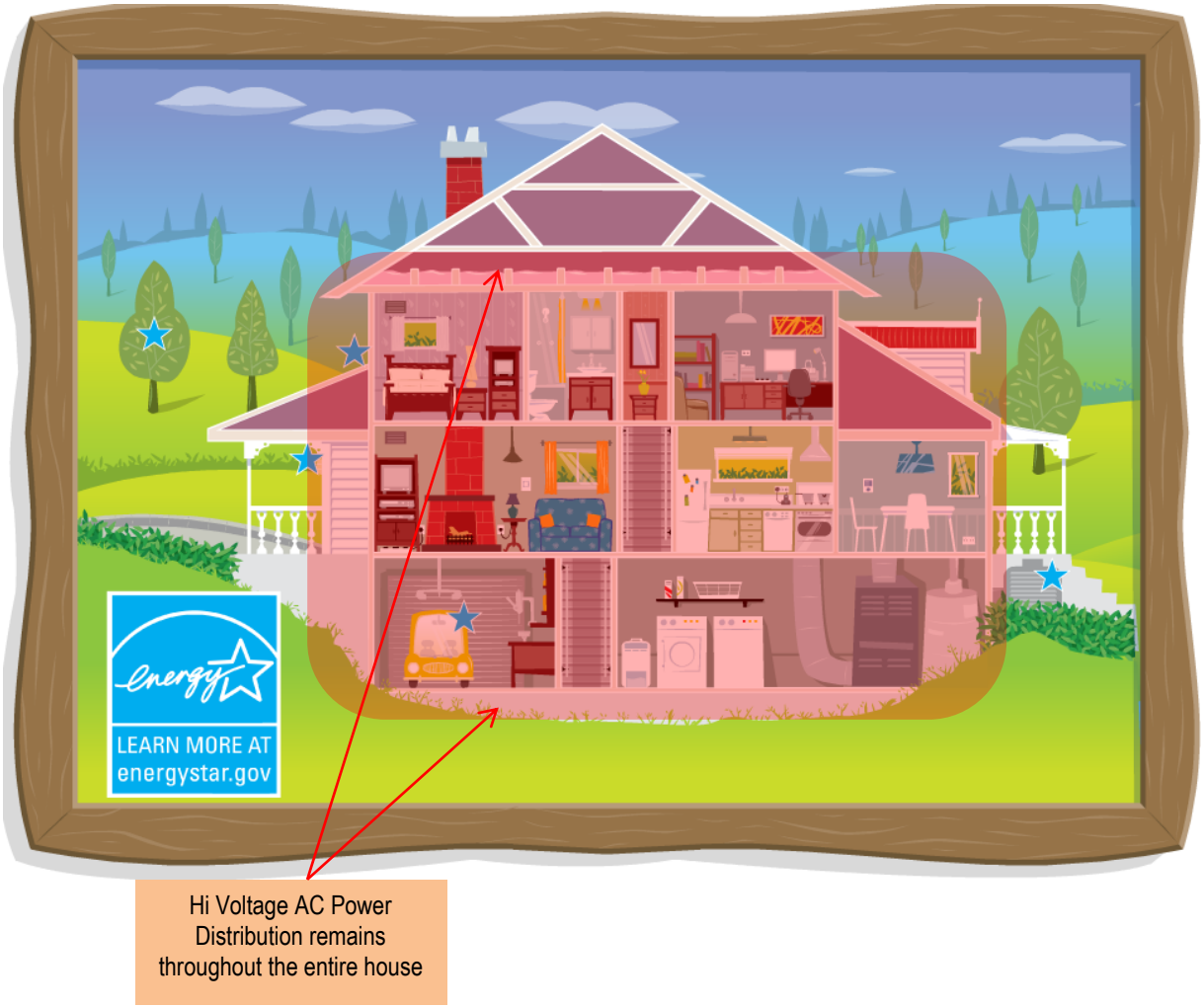
The house will remain subject to:

- **SAFETY concerns**
  AC power distribution is still present throughout the entire structure, while initial installation, and any followed up modernizations or maintenance performed, could not be verified by adequate quality control procedures. Aged AC electrical panel and AC electrical components, such wall outlets, switches, will deteriorate in-time (if not already), further impacting safety of the installation.

- **RELIABILITY concerns**
  Utilization of AC-DC converters for each LED light fixture unnecessarily complicates the installation in terms of adding parts, and as result, lowering reliability simply due to the fact that more parts are now installed in-sequence to sustain required energy flow.

- **ENERGY concerns**
  Utilization of AC-DC converters for each LED light fixture also impacts energy saving potentials from using LED lights, as added components have energy conversion factor below 100%. In addition, aged AC electrical panel, as well as aged AC electrical connections to such components as wall outlets, switches, will increase power wasted in those connections.

The above conclusion is summarized on FIG. 8 below.



Ratings on scale 0-10:

SAFETY	**6**
ENERGY conservation	**7**
ENVIRONMENT protection	**7**
Overall:	**6.7**

FIG. 8

4.2 Proposed ***COMPREHENSIVE*** Solution

- *Plug-n-Power*™ AC/DC Power Distribution and Control System, with
- *ParallelView*™ LED Lighting System

Both systems, the *Plug-n-Power*™ AC/DC Power Distribution and Control, and the *ParallelView*™ LED Lighting – are in full compliance with NEC, and are configurable to meet additional requirements of local ordinances and to satisfy quality of living environment desired by the occupants.

4.2.1 Modern electrical power distribution method

The *Plug-n-Power*™ AC/DC Power Distribution and Control System can be configured to support:

- Modern, energy efficient AC powered appliances and devices
- Provide most reliable and energy efficient power distribution solutions for powering modern DC powered appliances and devices, including: ceiling fans, laptops, central electric gas heating systems
- Provide most reliable and energy efficient power distribution in support of general, task and spot lighting using *ParallelView*™ LED Lighting modules

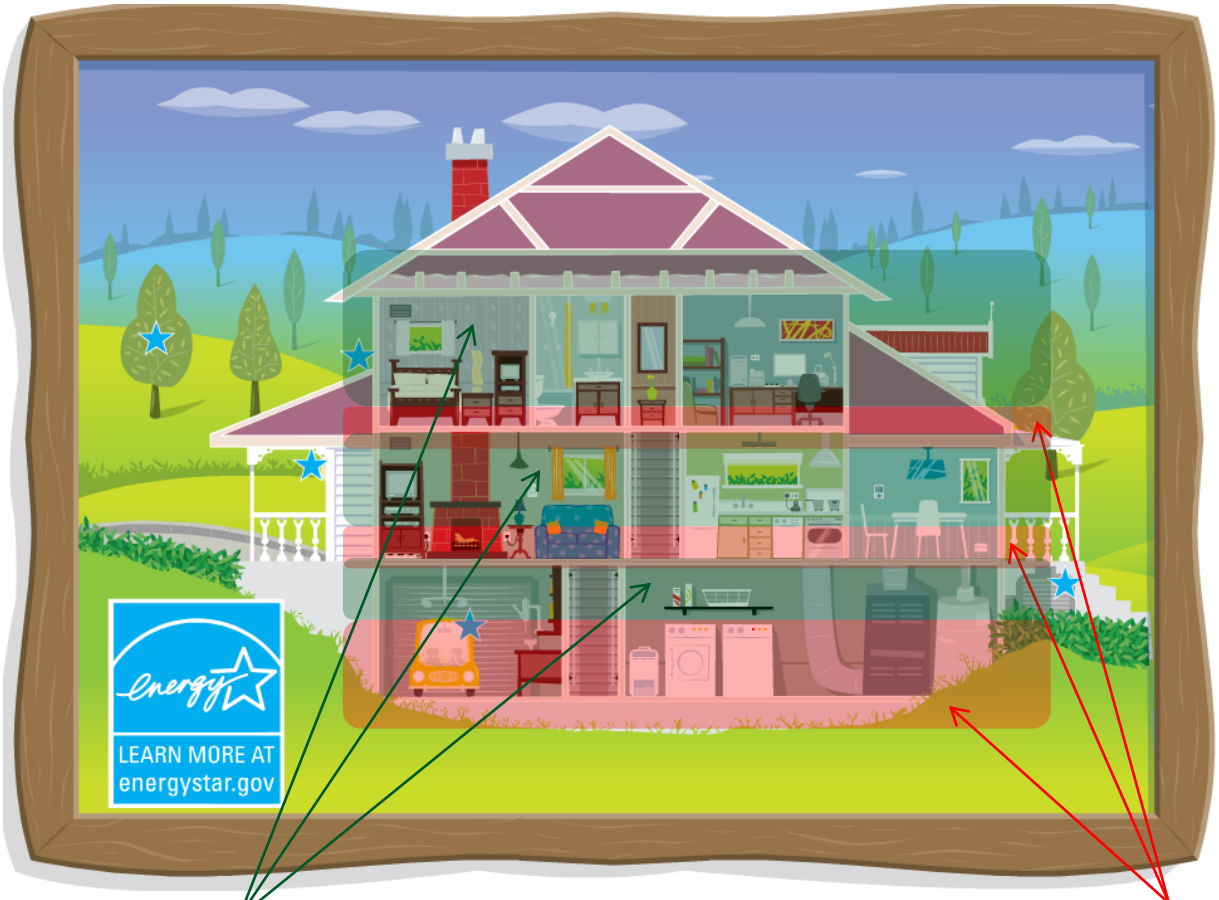
4.2.2 Modern lighting method

The *ParallelView*™ LED Lighting System will provide the most pleasant and energy efficient lighting methods, including:

- Recessed lighting in the ceilings, walls, furniture
- Task lighting via DC powered stand-alone LED lamps
- Emergency lighting, as selected LED lights will be connected via Patent pending DC Power Splitter to a battery backup source, including Solar Battery, and as result, remain fully operational for specified amount of time, when there is no electricity
- Environment monitoring intelligent LED lights, complementing to safety and security of the residency

Additional features will include Intelligent LED Illuminated Street Address Sign, such as Patented *MagicSign*™, which will make the street address visible from 100's of feet away consuming below 0.5W of electricity.

4.2.3 CONCLUSIION



Ratings on scale 0-10:

SAFETY	**9**
ENERGY conservation	**9**
ENVIRONMENT protection	**9**
Overall:	**9**

FIG. 9

Table 2 includes quantitative [0-10 scale] comparison of Existing Power Distribution Systems vs. *Plug-n-Power*™ Distribution Systems.

Considered Criteria	Existing Systems	Plug-n-Power™
Installation Time	Lengthy [3]	Short [9]
Installation material costs	Low [4]	Moderate [6]
Installation labor costs	Very High [3]	Very Low [9]
Safety hazard to installers, services, users	Moderate [6]	Very Low [9]
Quality of installed components	Good [7]	Very Good [9]
Quality of installed connections	Moderate [6]	Very Good [9]
Quality Control of installation, city inspection	Inadequate [4]	Very Good [9]
Environmental impact due to wasted materials	Moderate [7]	Very Good [9]
Environmental impact due to EMI	Low [8]	Very Low [9]
Optional water-proof ratings IP63-66 for moderate increase in installation costs (30% max)	None [0]	Available [10]
On-site real-time monitoring of power consumption with operator guidance to improve efficiency	Expensive [4]	Moderate [6]
Support for DC power distribution	Low [3]	Optional [9]
OVERALL RATING	**55**	**103**

Table 2