

## **Plug-n-Power™ Distribution Systems**

**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**

**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.

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## 1.0 GENERAL

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 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

### 2.1 *Plug-n-Power*<sup>™</sup> 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*<sup>™</sup> AC/DC Power Distribution and Control Systems

### 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<sup>™</sup> 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<sup>™</sup> 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<sup>™</sup> 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<sup>™</sup> installation. As needed, components of Plug-n-Power<sup>™</sup> system can be designed per required water-proof rating of any grade.
- The construction and quality of Plug-n-Power<sup>™</sup> 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*<sup>™</sup> 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.*

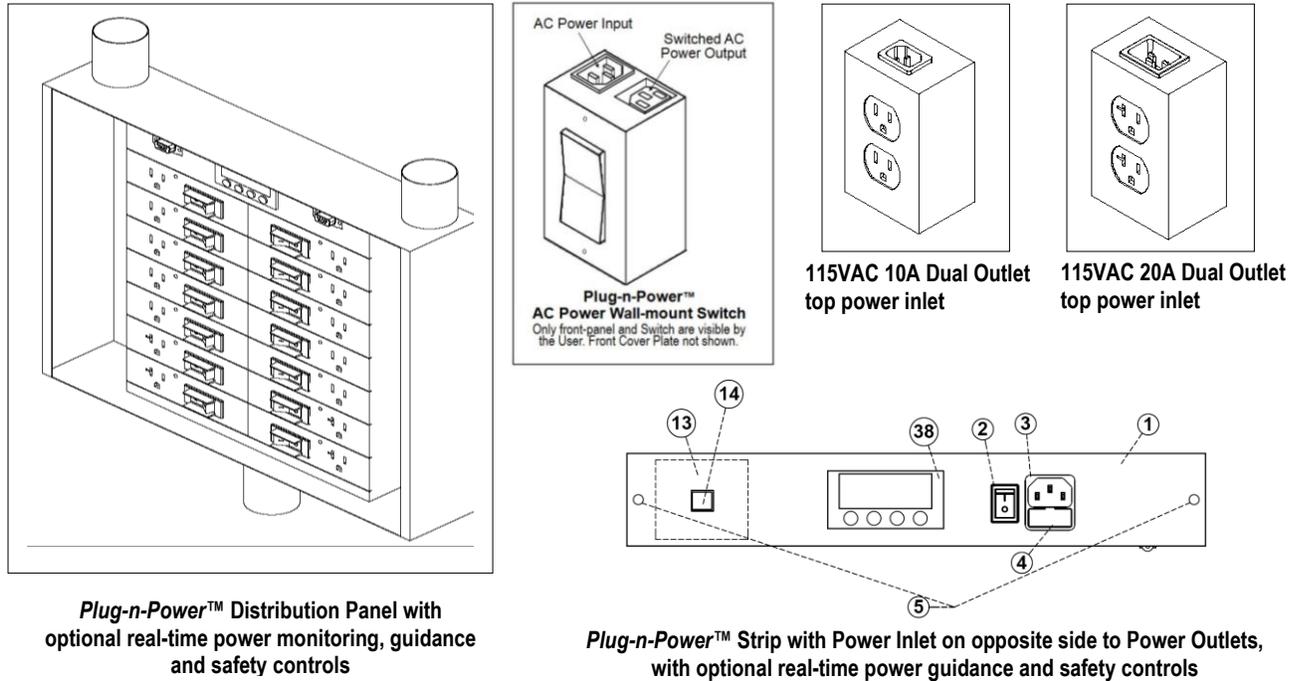
*For a specific project, pre-designed, fabricated and tested kit, including factory assembled and tested: power and control enclosures, power outlets and junction boxes, interface cables, as specified by the invention, will be delivered directly to the installation site.*

*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.*

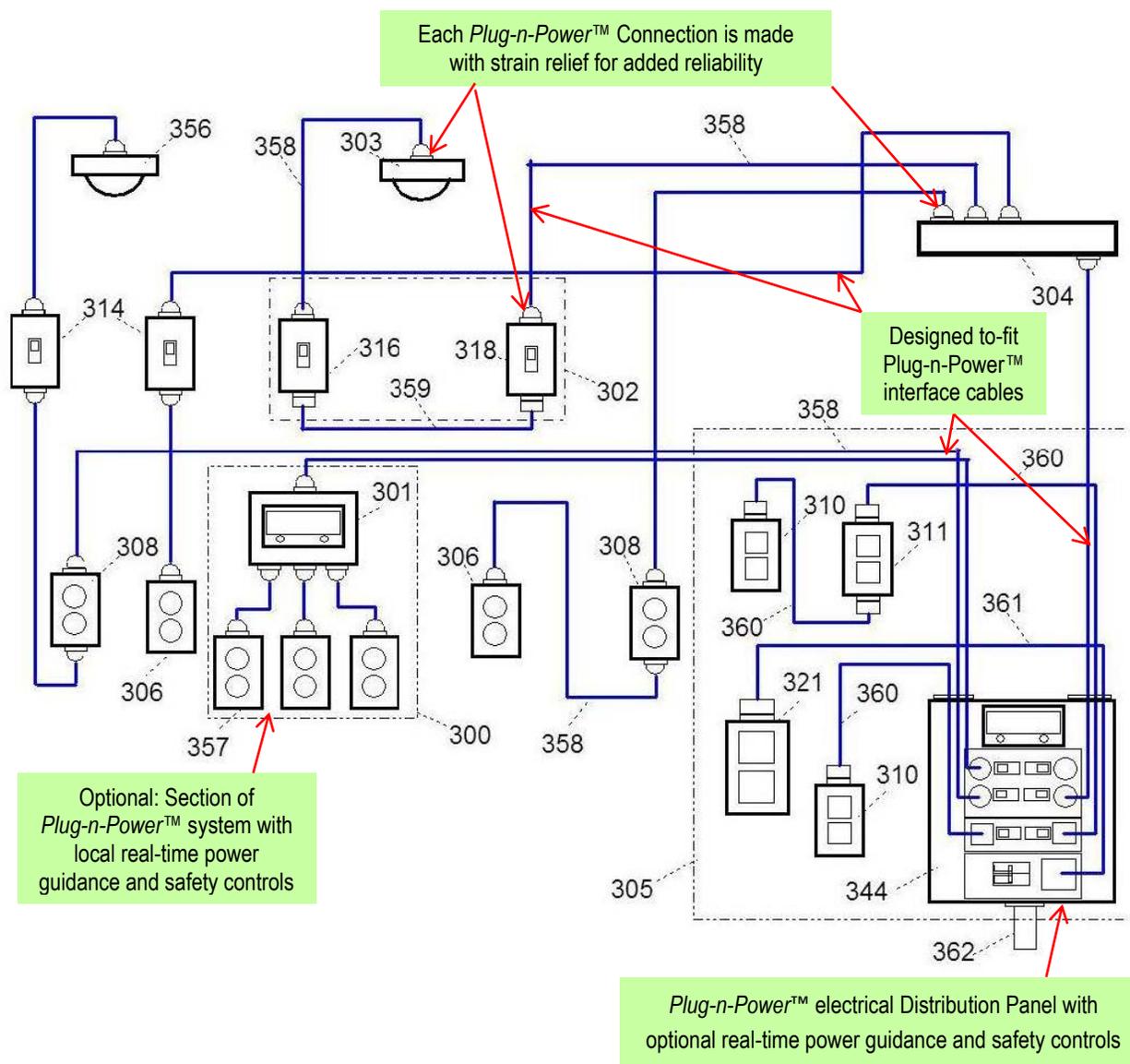
FIG. 1 illustrates *Plug-n-Power™* components based on drawings and specifications listed in the Patent.



**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.

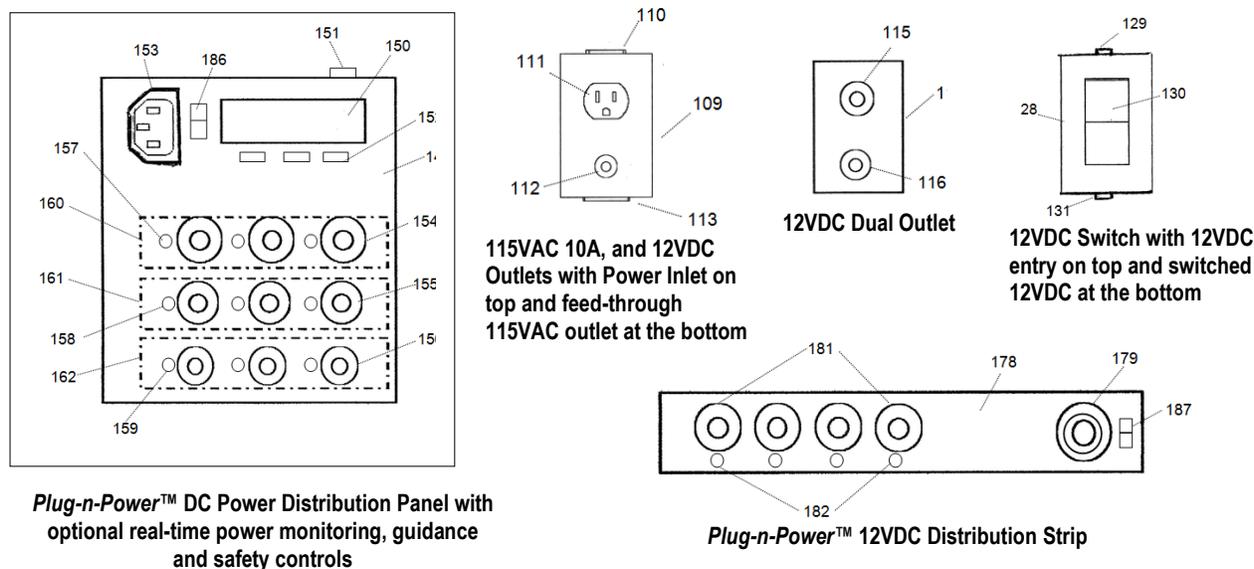
**ABSTRACT:**

*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.*

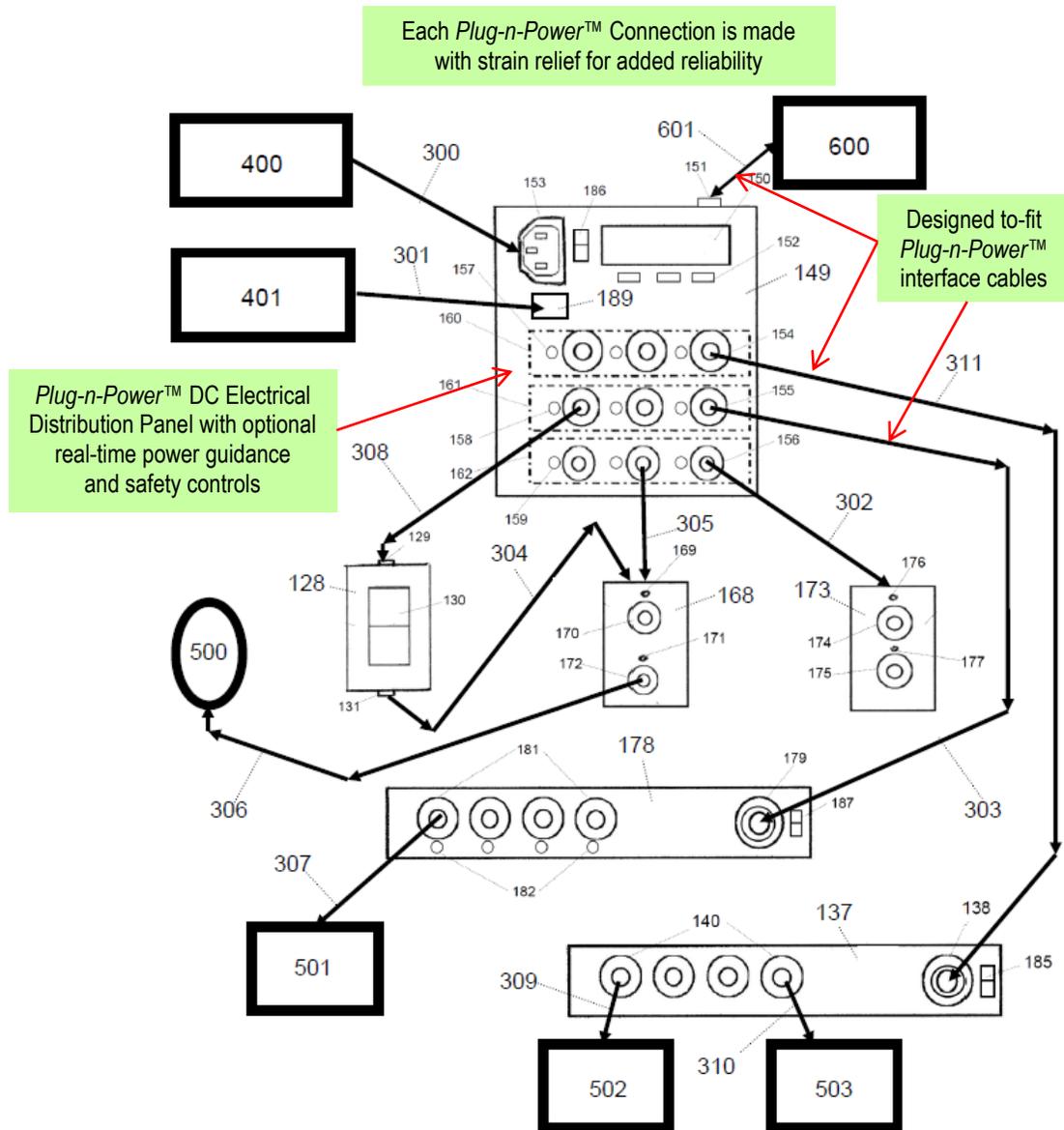
*Application of shielded cables and shielding of other components within the apparatus, will significantly lower electrical power emissions, benefiting the environment for all – the end users and other technologies. The invention describes plug-and-power DC power distribution replacing existing AC power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



**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

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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!*

### 3.0 Future Home Design Ideas and Technologies

For illustration purposes, an image FIG. 5, which is available from the link below, will be used

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

### 3.1 Current Methods



**FIG. 5**

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

### 3.1.1 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.

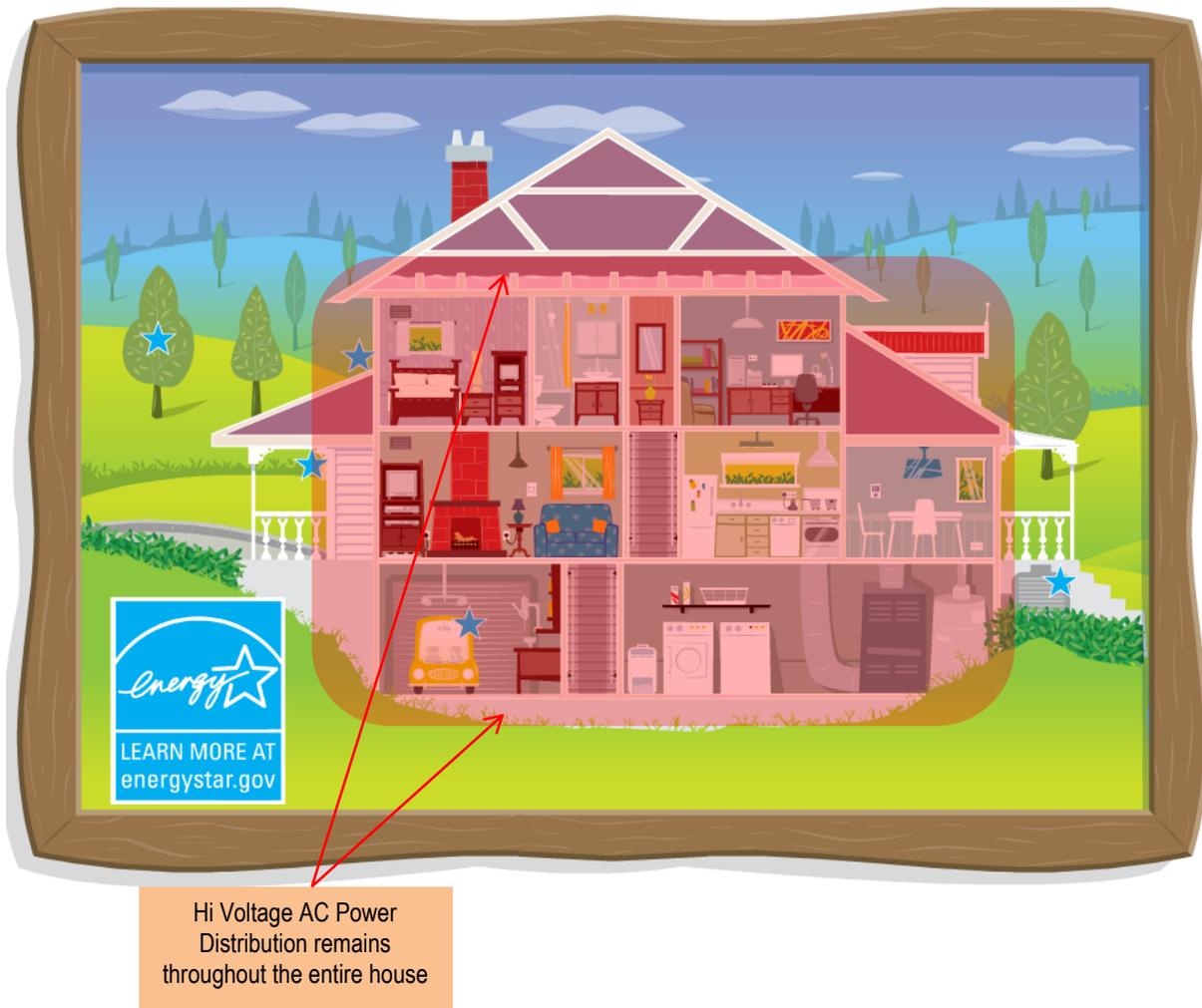
### 3.1.2 CONCLUSION

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. 6 below.



**Ratings on scale 0-10:**

|                               |            |
|-------------------------------|------------|
| <b>SAFETY</b>                 | <b>6</b>   |
| <b>ENERGY conservation</b>    | <b>7</b>   |
| <b>ENVIRONMENT protection</b> | <b>7</b>   |
| <b>Overall:</b>               | <b>6.7</b> |

**FIG. 6**

### 3.2 Proposed COMPREHENSIVE Solution

- *Plug-n-Power*<sup>™</sup> AC/DC Power Distribution and Control System, with
- *ParallelView*<sup>™</sup> LED Lighting System (as an add-on benefit!)

Both systems, the *Plug-n-Power*<sup>™</sup> AC/DC Power Distribution and Control, and the *ParallelView*<sup>™</sup> 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.

#### 3.2.1 Modern electrical power distribution method

The *Plug-n-Power*<sup>™</sup> 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*<sup>™</sup> LED Lighting modules

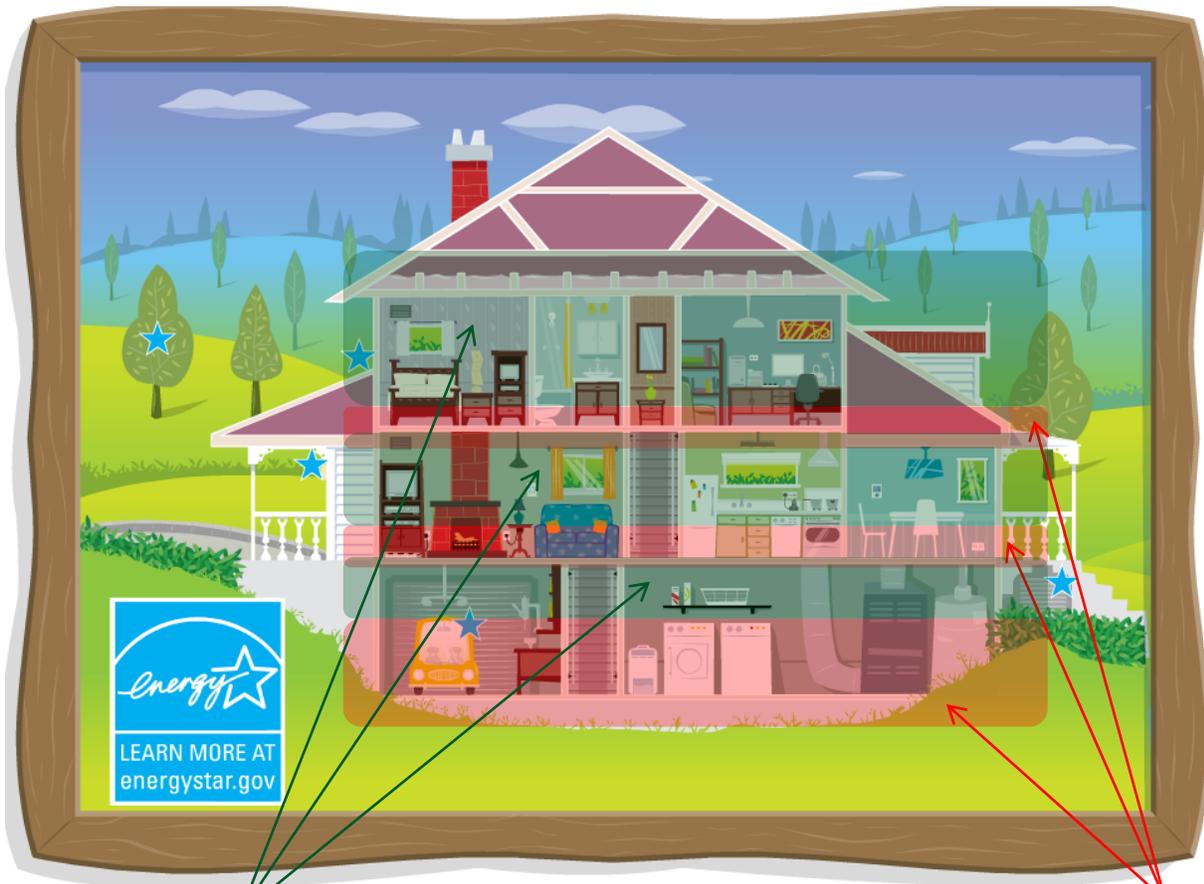
#### 3.2.2 Modern lighting method

The *ParallelView*<sup>™</sup> 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*<sup>™</sup>, which will make the street address visible from 100's of feet away consuming below 0.5W of electricity.

**3.2.3 CONCLUSION**



DC Power Distribution and LED lighting solutions are used as much as possible, saving energy, improving environment

Hi Voltage AC Power Distribution remains only in the designated areas where the need for AC power can't be replaced with DC

**Ratings on scale 0-10:**

|                               |          |
|-------------------------------|----------|
| <b>SAFETY</b>                 | <b>9</b> |
| <b>ENERGY conservation</b>    | <b>9</b> |
| <b>ENVIRONMENT protection</b> | <b>9</b> |
| <b>Overall:</b>               | <b>9</b> |

**FIG. 7**

Table 1 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]   |
| <b>OVERALL RATING</b>  | <b>55</b>        | <b>103</b>     |

**Table 1**