



Missouri Technology Corporation

IDEA Fund Grant

I. BUSINESS CONCEPT / ABSTRACT

The North American power grid was once called the “...supreme engineering achievement of the 20th century.” Unfortunately, the power grid is quickly aging such that outages and inefficiencies result in great costs to end users.

A growing movement to provide clean energy, utilizing such sources as wind, currently suffers from significant inefficiencies due to limitations within the power grid. Commercial wind farms often produce much greater energy than is realized, but because the transmission lines cannot accommodate the amount of energy produced, it results in large amounts of wasted effort.

Residential applications are often seen as impractical due to costs, lack of providing enough energy during peak demand, and wasted energy during off-peak times. In addition, there is no application that provides two-way communication between end users and the distribution source.

Current efforts to develop a Smart Grid are ongoing, but these efforts are generally limited to and focused on increasing reliability, efficiency, and safety of the power grid, largely due to an effort to reduce threats of terror attacks, resulting in large-scale power outages. Unfortunately, there is no system that currently provides the end user the ability to utilize and manage distributed energy sources. Further, there is no system that currently provides the capability of the distributed energy sources, such as in residential applications, to return unused energy to the power grid or store excess energy for later use by the end-user. Still further, there is no system that provides the end user, or other interested stakeholders, the ability to collect usage and generation data, to deliver electricity more efficiently and detect problems within the system, and provide information that allows for strategic placement of distributed generation sources for overall performance improvement.

New developments in the Smart Grid provide promise for consumers of electric power, the electric utilities, and the environment. The National Institute of Science & Technology (NIST) released the Smart Grid Interoperability Standards in September 2009. This set of rules and standards will pave the way for private development of Smart Grid solutions. Original equipment manufacturers of consumer appliances, as well as manufactures of Smart Meters, electric utilities, and consumers of electric power at every stage, can plan for the benefits of the Smart Grid. Figure 1 below shows the Smart Grid Interoperability Framework.

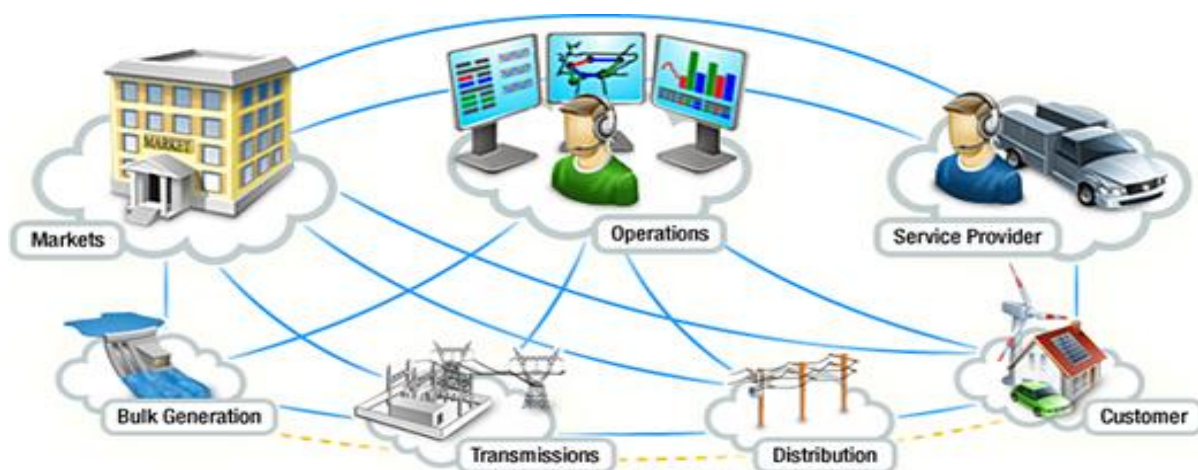
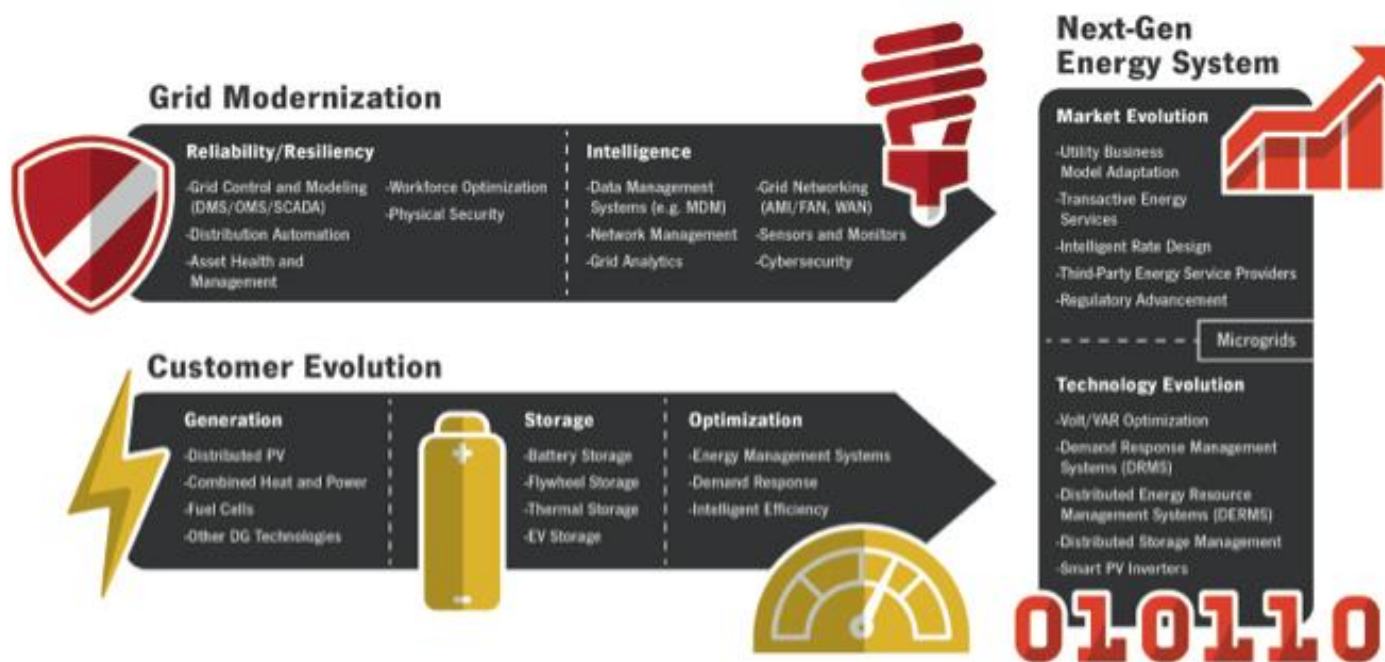


Figure 1: Smart Grid Interoperability Framework

The Wall Street Journal reported in a March 12, 2014 article that the U.S. could suffer a coast-to-coast blackout if saboteurs knocked out just nine of the 55,000 electric-transmission substations on a scorching summer day, according to a previously unreported federal analysis. Power outages caused by severe weather events already cost the U.S. between \$25 to \$70 billion a year, according to a report from the Executive Office of the President in August 2013.

Advances in battery technology have provided rapid development of an intelligent energy storage industry. A March 2015 article in Renewable Energy World, an online magazine cites a report by Navigant research titled Tracking The Rise of Intelligent Energy Storage. The Navigant Q1 2015 edition of Energy Storage Tracker, reports demand for both utility-side and customer-sited, “behind the meter” intelligent energy storage systems is on the rise. Falling manufacturing costs, improved performance and utilities’ drive to reduce greenhouse gas emissions while at the same time enhancing the resilience and efficiency of the power grids is adding to the momentum.

New regulatory mandates in the U.S., such as those set out in California’s landmark AB 2514, highlight the lower emissions and infrastructure costs, as well as greater efficiency, flexibility and affordability of today’s intelligent energy storage. Lux Research reports the energy storage market will rise to \$50 billion by the year 2020. The “stationary applications” used in residential and small business systems is expected to rise to \$2.8 billion by 2020.



Green Tech Media – Grid Edge Council Diagram

The next generation electric grid will empower consumers like never before. Electric utility customers will have tools available to manage electric usage and store excess electricity to use later. The new capabilities include integration with smartphones and other devices to control outlets, switches, and electronic devices in the home.

II. PROJECT ABSTRACT

WillCo Technologies, Inc. (WillCo) is headquartered in Kansas City, MO. The company was founded by President & CEO Kevin Williams in December 2005. The company currently has 9 fulltime employees and one part-time employee working in the corporate headquarters located at 4033 Central in Kansas City, MO. WillCo also maintains a satellite office in Alexandria, VA to service its Department of Defense clients. Founder – Kevin Williams filed a Utility Patent application for a Distributed Energy Source System in February 2010 following the publication of the NIST Smart Grid Interoperable Standards. A Continuation In Part was filed for a second patent in November 2012 for a Personal Power Preserver which included energy storage to increase the efficiency of electric power generation. Additional patents were filed in March 2013 for a Personal Energy System which integrated software systems that allow users to input device data. The System provides users with a comprehensive Home Energy Management System that stores the energy required to power a dwelling through peak demand periods. The system features automated commands and user defined settings to remotely by-pass electric utility charges by going off grid each day. This project seeks seed capital to monetize the patents in this new rapidly emerging Intelligent Energy Storage industry.

WillCo will launch a new division called **WillCo Intelligent Stored Energy (WISE)**. The WISE project will:

1. create mass-market prototypes of the invention
2. field test the prototypes for UL certification
3. cover legal costs for international patent filings
4. create the software platform to support the technology
5. create a value-added reseller network to install the technology
6. brand the patented technology
7. market the patented technology

III. CORE TECHNOLOGY

WillCo developed an intelligent energy storage technology that empowers consumers to gain greater control of electric power through efficient energy management. We integrate a web-based user interface at <http://www.getwisepower.com> with a home controller and battery storage. The patented technology represents a break-through for consumers to save money on electric bills by going off-grid each day. The system creates a **Home Energy Management System (HEMS)** that allows consumers to control virtually every electrical device in their home or small office from a smartphone or other mobile device. The web-based software and related hardware uses a controller, inverter, battery banks, and communications tools in a seamless delivery model titled **WISE™** (WillCo Intelligent Stored Energy).

The hardware device is installed at or near the home's breaker panel and communicates with the Energy Management System. In addition, the device stores electricity in a unique configuration using a series-tied lithium (ion, air, ceramic, Sulphur) battery banks along with an ultra-capacitor bank to power a dwelling during peak-demand periods. The system integrates with most alternative energy sources such as photovoltaic (solar), wind, and other intermittent renewables. The system can also interact with electric vehicles (EV) to swap power when needed. Consumer savings, convenience, safety, and outage prevention are bundled into a product and service delivery program.

This new Nano Technology is presented in scalable energy storage products we call NanoPODs or Nano Power On Demand. Consumers can go to our web portal and take an energy assessment to learn how much power they use room-by-room. The site also directs them to a storage product that matches their needs based on their own unique usage.

Nanogrid Technology



WillCo Intelligent Stored Energy

- 1 Thermostat
- 2 Lamp
- 3 Alarm Clock Radio
- 4 Computer
- 5 Television
- 6 Kitchen Appliances
- 7 Washer/Dryer
- 8 Security System
- 9 Landscape Lighting
- 10 Garage Door Opener
- 11 **Wall Outlet Storage**
- 12 **Wall Switch Storage**
- 13 **Controller**

www.getwisepower.com



NanoPOD Controller



NanoPOD Outlet



NanoPOD Switch

IV. VALUE PROPOSITION

WillCo is leveraging a software platform with energy storage to create this Energy Management System. The product development calls for creating a mass-market prototype to be sourced and field tested in 10 testing sites. The goal of this seed round is to produce a packaged consumer product with 4 kWh storage capacity, inverter, and controller. The storage solution is scalable and field testing will determine the final size of the market solution. Current storage pricing suggests that our cost will be around \$300 per kWh of storage with economies of scale. However these prices are falling rapidly and analysts predict storage prices under \$100/kWh by 2025. Our COGS target is \$1,500 which would result in a retail price of \$3,000. Installation cost using our certified installers is \$150. A retail price of \$3,150 using these metrics would yield a 40%-50% savings on the avg. consumer's electric bill. Additional features include:

- Powers entire home during peak electric demand period
- Sends email notices and alerts to users via computer or mobile device
- Accepts (Solar) systems, Wind systems, and other renewable power sources
- New electricity storage transfer and automation technology