Solar Power Electronics Modular Integrated Node

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energy.gov/solar-office

Solar Power Electronics Modular Integrated Node

Agenda

- **Program Overview**
- **Program Team**
- **Program Objectives**
- **Expected Outcomes**
- **SPIN System Diagram**
- **SPIN System Description**
- **Budget by Budget Period**
- **Questions**

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Program Overview

- **Budget Period 1 (9/1/18-8/30/19)**
  - **Requirements Development**
  - **Hardware Development**
  - **Analytics Development and Refinement**
  - **Univ. Of Kentucky System Simulations**
    - **Report on Benefits of SPIN on Household and Grid**
- **Budget Period 2 (9/1/19-8/30/20)**
  - **SPIN Hardware Integration and Test (Lab Equipment)**
  - **SPIN System Integration and Test (Hardware, Analytics, and User Interface)**
- **Budget Period 3 (9/1/20-8/30/21)**
  - **SPIN System Integration with PV Array and RESS**
  - **SPIN System Integration with Vehicle Battery/Vehicle**
  - **6 month system demonstration at NTRC at Oak Ridge National Lab**
- **Total Program Budget $3.2M**

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Program Team

- **Flex Power Control, Inc.**

- **LG Chem for RESS**

- **University of Kentucky**

- **Kitu Systems**

- **Oak Ridge National Labs (NTRC)**

- **FCA and EPRI for V2G Integration and Demonstration**

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Program Objectives

The development of a Solar Power Electronics Modular Integrated Node Platform that optimizes the use of Solar Energy and enables Distributive Energy Resource Management

- **Develop low-cost highly-reliable SiC power electronics, leveraging automotive design topologies and supply base**

- **Development of advanced controls built on system awareness and communications**

- **Development of cloud-based analytics for optimized system control and energy utilization**

- **Local SPIN unit control provides: fast response and default operation in absence of the cloud analytics; arbitration between analytics recommended operation and actual conditions**

- **System prototype design to meet UL, IEEE, ISO/IEC, and SAE standards**
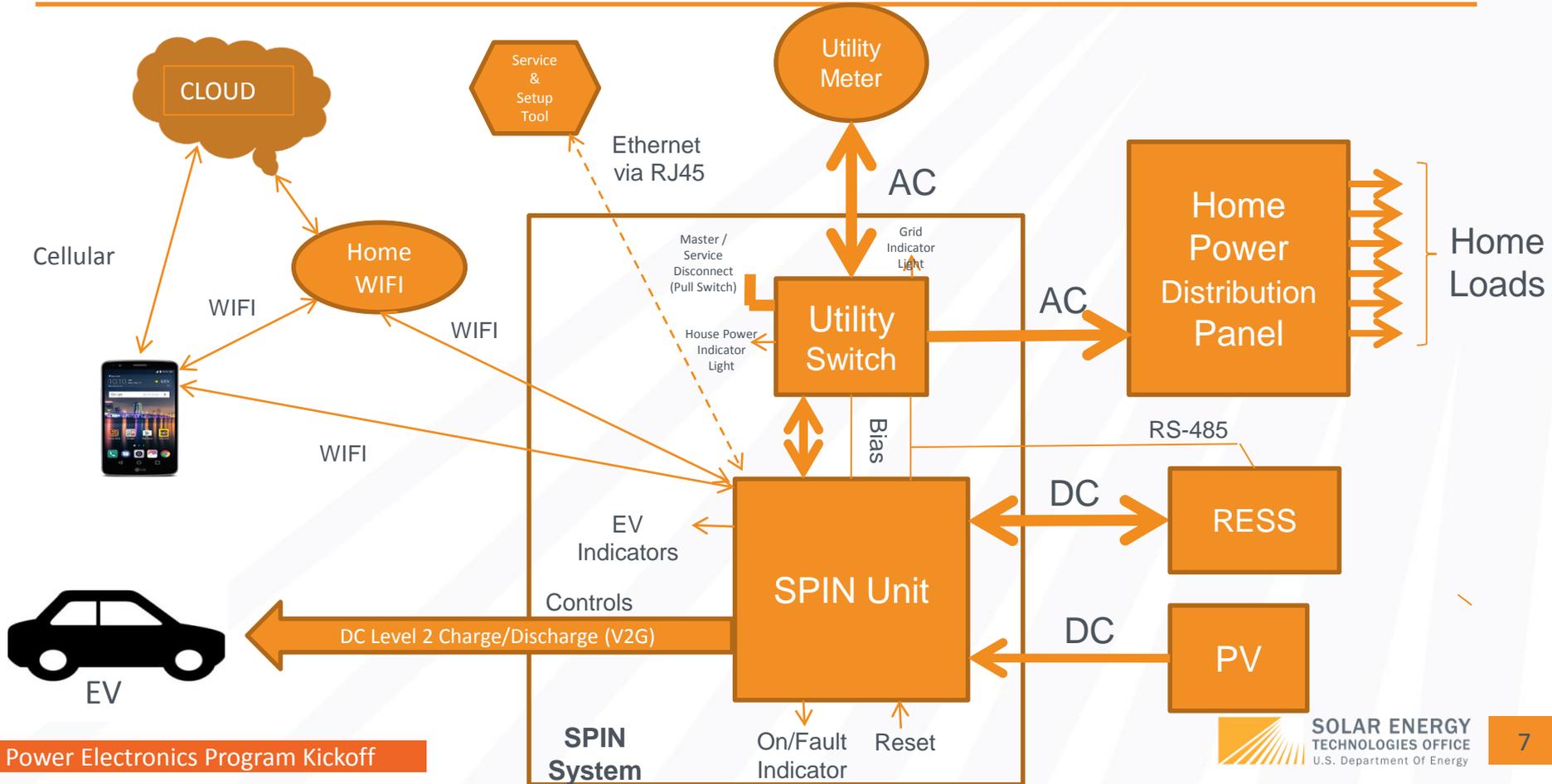
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Expected Outcomes

- Deployable prototype SPIN unit with advanced power electronics demonstrating significantly improved reliability (greater than 2X existing products) and lower product cost (over a 50% reduction in cost compared to existing systems)

- Integrated solar/home energy system with real constituent DER technologies that operates autonomously through a fully developed data analytics database

- Proven product market fit with builders, homeowners, EV OEMs, utilities, aggregators, and government officials

- The optimal system based solution for real time distributive energy resource management and market based energy transactions

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SPIN System Description

- SPIN Unit employs reconfigurable power electronics for optimal deployment and minimal cost
- SPIN integrates PV, RESS, and Vehicle battery to manage home energy usage for optimal performance and cost of energy
- Provides DC Level 2 and V2G without modifying home panel
- Cloud based analytics provide optimized autonomous operation without the need for homeowner intervention

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($K)	BP 1	BP 2	BP 3	Total
Labor	$1,015	$643	$304	$1,962
Material	$933	$170	$135	$1,238
Total	$1,948	$813	$439	$3,201
Cost Share	$272	$250	$183	$705
Federal	$1,677	$563	$256	$2,496

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