Application Scoring Results » Segmented Scores

Overall scores, segmented by percentile

25<sup>th</sup> Percentile

- Dynamic Pricing and Demand Response Trading Market
- Renewable DG Monitoring and Forecast System
- Personal Data Collection Coordinator
- Retrocommissioning Sensor Suite

50<sup>th</sup> Percentile

- Vehicle-to-Grid Optimization System
- Microgrid Optimization System
- Safety, Security, and Operations
- Advanced Irrigation System

75<sup>th</sup> Percentile

- Energy Storage Optimization System
- Advanced Building System Control
- Virtual Power Plant System
- Automated Energy Benchmarking

Aggregated DG for Capacity Options Contracts

Connected Buildings
- Gas/Electric Utility Infrastructure Monitoring System
- EV Carsharing Monitoring System
- Inventory Tracking System
- Energy Reliability Trading Market
- Building Services Trading Market
- Renewable Energy/Carbon Emissions Trading Market
- Traffic/Transportation Coordination System
- Water Trading Market

Smart Cities
- Automated Load Control/Sequencing System for Black Starts
- Advanced Load Sequencer
- Advanced FLISR Monitoring and Control System

Multi-Directional Energy Systems
- Renewable DG Optimization System
- Aggregated Load Sequencer
- Advanced Controller for Interconnected Building Systems

Energy Reliability Trading Market
- Long-Range, Whole-Building Incentive
- Advanced HVAC Distribution Systems

Grid/Utility Services
- Renewable DG Optimization System
- AMR Enhancement System
- Non-Renewable DG Optimization System

Advanced Data Collection & Benchmarking
- Parking Sensor Network
- IoT/TE Starter Kit
- Water Utility Infrastructure Monitoring System

Wide-Area Asset Monitoring
- Building Automation System
- Aggregated DG for Ancillary Services

Financial and Asset Exchanges
- Whole Building FDD Systems
- Automated Energy Benchmarking

- Whole Building FDD Systems
Interviewees believe DOE and PNNL should take a lead role in developing Transactive technologies and demonstrating their opportunities to utility, regulatory, and policy stakeholders.

Opportunities for DOE/PNNL Leadership

» Many believe that a national organization, such as DOE, could create a branded program or certification to show that a Transactive product meets certain communication and connectivity criteria.
  – Eventually the market will encourage all actors to participate.

» Interviewees believe that utilities, regulators, and other policy makers need demonstrations of the value and economics of Transactive capabilities, and this is a good role for DOE and PNNL.
  – These demonstrations could help develop the energy pricing markets necessary for some TNs.

» In addition, several interviewees identified the need for more utility and regulator participation Volttron and Transactive development by DOE/PNNL.
  – This will help ensure that technologies operate within a utility’s regulatory, security, communication, and compensation frameworks.
Key Finding: There are dozens of companies investing billions into their own proprietary solutions and platforms.

New and Emerging Companies and Standards Bodies

- Retroficiency
- GRIDium
- Daintree Networks
- SkyCentrics
- AMERESCO
- VERDIGRIS
- Spirae
- AutoGrid
- NOVEDA Technologies
- ecova
- enbala

Mainstream Companies Expanding Their BMS, IoT, and MicroGrid Offerings

- Cisco
- Johnson Controls
- RTI
- Honeywell
- Schneider Electric
- United Technologies
- Duke Energy
- Siemens
- IBM

Our Perspective: The market is highly fragmented and saturated with dozens of competitors who are investing billions in capital. Some are already using and/or are considering VOLTTRON.
Our Recommendation

Create or join an open-source foundation to manage VOLTTRON code

What it is
A non-profit, open-source organization that is responsible for managing the VOLTTRON code base and advocating and supporting greater market adoption.

What it Focuses on
Strengthening and expanding the VOLTTRON code base so that companies can more effectively build commercial products on the platform.

How it Operates
Not-for-profit entity that is funded through financial contributions / membership fees and staffed with business and technical VOLTTRON experts

Mission / Value Proposition
Ensuring the sustainment, growth and adoption of VOLTTRON as the platform for market spaces such as transactional energy, industrial IoT and BMS, among other possibilities.

Revenue Model
Membership fees, professional services, training, conferences, technical design, customer support
Transitioning Our **Vibrant** Open Source Volttron Eco-system...

- PNNL developed Volttron Core internally for Future Power Grid Initiative in 2010 – BTO and PNNL agreement follows to continue with BTO support.
- DOE’s committed to Volttron started in 2012 while investing in what you know it as today –
  - core development in foundational code (cybersecurity, messaging, etc.),
  - core development to build applications (cyber secure applications to deliver solutions to owners/operators leveraging building components), &
  - support for users, code, and open source distribution.
- DOE PNNL in discussions on migrating code and ownership to an Open Source Foundation.
  - DOE would continue to invest at PNNL/ORNL/Labs in core areas and contribute that code.
  - DOE would fund the initial care and feeding at the Open Source Foundation.
- **DOE-PNNL will be communicating that direction in Summer 2017.**
Maintaining and Supporting the Eco-system...

• We continue to need help...
  • Users to develop applications that become solutions,
  • Businesses – what can we do to help build and support small businesses, new, or existing businesses,
    • Your success = Our success = Volttron’s success
    • “Steal our available research” → Actually, we will give it to you
  • Contributions in code and as members commits,
  • Contributions as members for direction, and
  • Support for students, academics to increase complex control sciences.

Thank you.
- Joseph Hagerman, Joseph.Hagerman@ee.doe.gov