Energy-as-a-Service
A New Business Model for Motive Battery and Charger Asset Management

Presented by:
Dr. Nasser Kutkut, CTO
Agenda

• Introduction
• What is Energy-as-a-Service?
• Current Business Model
• NEW Managed Services Business Model
• Customer Benefits
• Technology Requirements
• Future Energy-as-a Service Business Model
• Conclusions
• Q&A
Dr. Nasser Kutkut

- Holds a PhD in EE
  - Focus: EV Battery Charging
- Founder / Co-founder of several high tech firms
- Developed innovative & patented battery charging, monitoring & cloud management technologies

Advanced Charging Technologies

- A design & manufacturing high tech firm of industrial battery chargers & monitors
- First to offer Industrial IoT battery chargers & monitors
- Developed an industry first cloud asset management of industrial batteries and chargers
What is X-as-a-Service?

• A third-party supplies all services
• Service is “on demand”
  – Little or no customer investment required
  – Delivery is “on-demand” at the request of the user
• Payments are recurring by contract / subscription
  – Rather than a one-time purchase with ongoing O&M
• Offerings are continually upgraded by the provider, not the user
• Service is provided “centrally” through a single “platform”
Examples of X-as-a-Service

Transportation as a service → Uber

Software as a service → Office 365, DropBox, QuickBooks on-line

Payroll as a service → ADP

LED Lighting as a service → Philips contract with DC Metro
  • Shared savings program
Energy-as-a-Service

• An outside service company guarantees an end user’s future energy costs
  – If end user’s energy use > predicted → The service company pays the difference
  – If end user’s energy use < predicted → The service company profits

• Motivation for end users
  – A way to manage fluctuating electricity costs
    • Time-of-day rates, demand peaks, and fossil fuel costs

• Motivation for service companies
  – A way to be creative in energy supply and management
  – An incentive for efficiency improvement
Example: Energy Service Companies, ESCOs

- Audits and baseline energy usage
- Designs and implements energy savings projects
- Signs a contract with an end user
- Guarantees the energy savings during the contract duration
- Can sustain energy-savings performance over a long period of time through O&M / verification
- Makes financial arrangements (may provide funding)
ESCO Business Model

Before ESCO
- $ for Energy + Related Operations & Maintenance

Performance Period
- Excess Savings
- Payments to ESCO
- E+O&M Cost Savings

After ESCO Term
- Savings
- $ for Energy + O&M
Current Battery & Charger Business Model

• Inefficient Equipment Acquisition & Deployment
• Uncontrolled O&M
Current Business Model

• End users purchase or lease batteries and chargers
  – Capital expense
  – Challenge of sizing equipment for large fleets / multiple sites
• Batteries and chargers are warranted for 3 – 5 years
  – Claiming warranties is a challenge
• Battery & charger service is provided by local battery dealers
  – Primarily manual, on site visits, on site/off site service
Customer Pain Points – Current Business Model

• Large end users with large fleets / multiple sites deal with multiple vendors / dealers
• Equipment **down time** can be **significant**
  – Multiple service calls / visits
  – Lack of on demand spare parts
  – Need to call to schedule service
• Multiple service / warranty claims
  – Batteries, chargers, monitoring equipment, battery management rooms
• Inefficient equipment usage across multiple sites
Challenge?

- Inefficient
- Over / Under sized
- Mismanaged

- Efficient
- Right Sized
- Optimally Managed
Business Model Innovation

- Multiple points of contact
- Significant equipment down time
- Call (multiple calls) to schedule service
- Multiple service / warranty claims
- Non-optimal equipment usage

- Single point of contact
- No / Minimal equipment down time
- Automated service scheduling
- Single service / warranty claims
- Optimal equipment usage
New Managed Services Business Model

• **Full asset monitoring and management** of battery and charger assets
  – Customer acquires battery & charger assets, monitoring equipment
  – Customer signs asset management contract

• Revenue Models → **Subscription**
  – Monthly Service Contract for batteries and chargers
  – Partner with battery dealers to provide local service
Benefits to End Users

- **Single point of contact**
  - MSC entity monitors and manages battery and charger assets across all customer sites

- **No / Minimal Equipment Down Time**
  - Equipment is remotely monitored and performance tracked
  - Service is automatically scheduled once equipment issues are detected

- **Optimal / Efficient Equipment Usage**
  - Right size / optimize equipment utilization

- **Lower Operating Costs**
Is the Managed Services Concept New?

• The basic concept is not new
  – Local service programs are offered by battery dealers

• Limitations
  × Not scalable
    • Hard to manage large fleets of assets
  × Labor intensive
    • Manual data download, onsite troubleshooting
  × Technology limitations
    • Manual programming, firmware udpates
Limitations of Existing Technology

• Proprietary Wireless Technologies
  - X Require *custom dongles* for data downloads
  - X Require dedicated onsite equipment (computers) for data download & processing
  - X May require access to customer side network

• Manual Data Downloads
  - X Requires onsite personnel (techs) to download data
  - X Unavailability of recent data
Limitations of Existing Technology

• Locally Stored Data Files
  ❌ Hard to consolidate data from various sites / downloads

• Custom Software Application
  ❌ Manual downloads, installations, and updates

• Limited Reporting and Analytics
  ❌ Most limited to single battery / charger reports
  ❌ Lack of in depth troubleshooting / preventive analytics
Limitations of Existing Technology

✗ Inability to update firmware remotely

- **Battery Chargers**
  - Only local / manual updates
  - One charger at a time → Very time consuming

- **Battery Data Loggers**
  - Firmware can’t be updated, period!
  - Can’t add features / fix bugs

✗ Lack of data continuity when units are replaced

✗ Lack of remote control

- Remotely program / update of charge parameters
Requirements for New Managed Services Model

✓ **Scalable**
  – Ability to manage large fleets of assets across multiple sites

✓ **Minimal / Managed Labor**
  – Remote data download, remote troubleshooting

✓ **Leverage Technology Innovations**
  – Remote programming & firmware updates
Enabling Technologies for Managed Services Model

• Highly intelligent battery chargers & monitors
• Wireless / Remote monitoring & control
• Cloud based monitoring and asset management
• Network operation centers (NOCs)
• Advanced analytics
Highly Intelligent Battery Chargers & Monitors

- Industrial Battery Chargers/ Smart Appliances
  \( \rightarrow \) Industrial IoT (IIot) Appliances
  - Integrated 2-way wireless communication
  - Machine-to-machine (M2M) communication
  - Remote command & control
  - Continuous data capture & upload
  - Real-time firmware updates
Wireless / Remote Monitoring & Control

• Employ a standard, well established, wireless technology (e.g. 802.11 b/n/g Wi-Fi)
  – Allows connectivity to a large number of devices
  – Utilizes a dedicated private Wi-Fi network
  – Isolated from client’s Wi-Fi networks

• Utilize a dedicated and isolated wireless backhaul (e.g. 4G/LTE)
  – Fully isolated from client’s IT infrastructure
  – Leverages existing network infrastructure
Cloud Based Monitoring & Asset Management

- Web-browser based cloud application
- Centralized command & control
- Centralized data warehousing
- Centralized dashboard view & management
- Centralized reporting & analytics
Cloud App Required Functionality

- Auto upload of battery & charger data
- Automated software & firmware updates
- Historical logs of critical operational and performance data
- Role-based access control (RBAC)
- Maximum data security
Network Operation Centers (NOCs)

- Fully managed asset monitoring
- Application engineering staffed NOCs
- Remote troubleshooting and service dispatch
Advanced Analytics

- Battery & charger analytics
  - Battery & charger fleet utilization
  - Daily operation
  - Hours, Ahrs, and EBU usage
- Site and multi site assessment & performance reports
- Asset performance variance reports
- Diagnostics & troubleshooting reports
- Battery Aging / Replacement Reports
- Email alerts & exception reports
Future Business Model

• Innovation in IIoT is enabling new business models to emerge such as Energy-as-a-Service

• Energy-as-a-Service (EaaS) contracts
  – Revenue Model: **Usage Fee**
  – **End users sign energy contracts**
    • Fixed / adjustable monthly rates based on the amount of energy used (e.g. Ahrs) → PPA
  – **EaaS** provider funds its projects through equity / debt
EaaS- Future Business Model

- **Battery Dealers**
  - O&M Service
  - Service Payments

- **Equipment Suppliers**
  - Purchase Equipment

- **End User**
  - Supply Power for Trucks
  - EaaS Payment

- **Investors**
  - Investment
  - P + ROI

- **EaaS Provider**
  - Warranty Claims
  - EaaS Payment
Benefits of EaaS to End Users

• **No Capital Outlay**
  – *EaaS* Provider purchases all equipment, installs, manages contractors, etc.
  – *EaaS* Provider covers periodic maintenance services

• **Payments Treated as an Operating Expense**

• **“Off-balance sheet” Transactions**
  – Does not affect borrowing capacity or credit of client

• **Lower Operating Costs**

• **Optimal / Scalable Fleet Size**
EaaS Business Model Enablers

- Industrial battery and charger appliances (IIoT)
- Wireless real time control and monitoring
- Cloud based asset management & monitoring
- Network operation centers (NOCs)
- Partner dealer network
- Debt & equity financing
Conclusions

• Innovations in IIoT are enabling new business models for battery and charger asset management

• Managed Services business models can offer end users increased asset utilization & efficiency

• Future Energy-as-a-Service business models can become very attractive for operators of large fleets and multiple sites
For More Information:

info@act-chargers.com
www.act-chargers.com

Or visit, Advanced Charging Technologies
Booth #B4170