Behind the Meter Opportunities
## Parks Associates Products and Services

### Syndicated Research

<table>
<thead>
<tr>
<th>Primary Research</th>
<th>Industry Reports</th>
<th>Market Forecasts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Surveys</td>
<td>Value Chain, Ecosystem, Partnership, Competitor, Analysis</td>
<td>Core Numbers on Households, Broadband, PC Adoption</td>
</tr>
<tr>
<td>Channel Surveys</td>
<td>Company Profiles, Case Studies, Disrupters</td>
<td>Detailed Market Breakdowns on Unit Sales, Revenue, and Adoption</td>
</tr>
<tr>
<td>Industry, Small, Medium Business Surveys</td>
<td>Trends, Technology Analysis, Topline Forecasts</td>
<td></td>
</tr>
</tbody>
</table>

### Custom Services

<table>
<thead>
<tr>
<th>Custom Primary Research</th>
<th>Workshops and Consulting</th>
<th>Marketing Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surveys, Segmentation, Product, Brand Analysis</td>
<td>Market Sizing, Business Model Assessment, Landscape Analysis</td>
<td></td>
</tr>
<tr>
<td>Consumer One-on-Ones, Focus Groups, Needs Analysis, Messaging</td>
<td>Product Roadmap Development, Feature, Price Evaluation</td>
<td></td>
</tr>
<tr>
<td>Industry, Channel Interviews, Focus Groups, Surveys</td>
<td>Go to Market Strategy, Channel Analysis, Messaging</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Whitepaper Development and Marketing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Webcast Development, Hosting, and Marketing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Events, Sponsorship</td>
<td></td>
</tr>
</tbody>
</table>

For More Information — 972.490.1113 | info@parksassociates.com

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Behind the Meter Opportunities

- Smart home trends
- Disruption
- Utility participant in the smart home
- Incremental revenue opportunities
- Hardware as a service
- Energy management opportunities
Smart Home Market Overview

Unit Sales of Connected Home Solutions

- Smart Speakers
- Smart Products
- Smart Home Controllers

Unit Sales (Millions)

2017 2018 2019 2020 2021
Technology Evolution – User Interface

User Interface, User Experience

Physical UI

Digital UI

Voice UI

No UI

Data Analytics

MACHINE LEARNING

Artificial Intelligence
Technology Evolution – Data Analytics

Connected Home

- Data Collection
- Display, Reporting
- Follow Orders
- Modeling
- Knowledge Based Reporting
- Prediction
- Intelligent Control
- Adapt and Learn Environment

Smart Home

Ability to use Data for Homeowner and Industry Benefit
Business Model Innovation

Operational Models

Operational Efficiency
- Product Management, Design
- Marketing, Sales
- Supply Chain, Manufacturing
- Distribution, Installation
- Warranty, Support

Business Transformation
- Crowd Sourcing
- Distributed Decision Making
- Decoupling HW, SW Development
- Integrated Sales Channel Models
- IoT-Enabled CRM

Direct Models

Product Models
- Expand Product Portfolio
- Expand Sales Channels
- App Sales, Upgrades
- Complementary, Accessory Products
- Market, Industry Invention

Service Models
- Hardware as a Service
- Bundling with Home Services
  - Energy, Solar, Storage
  - Insurance, Insurance Gaps, Home Warranty
- HVAC Contracts, Home Maintenance
  - Security, Broadband, Video, Voice
  - Finance, Home Mortgage

Indirect Models

Software Models
- Data Sales
- Connection, Transaction Charges

Marketplace Models
- Advertising, Lead Generation
- Reduce friction for buyers
- Lower acquisition costs for sellers

Operational Efficiencies for Partners
- Grow Loyalty, Reduce Churn
- Reduce Customer Acquisition Cost
- Reduce Customer Support Costs
- Reduce Operating Costs
- Business Transformation
Business Model Innovation – Partner Operating Cost

The Internet of Things

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Behind the Meter Opportunities

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Innovators Dilemma and Disruption

- Performance Demand at High End of the Market
- Progress Due to Sustaining Technology
- Performance Demand at Low End of the Market
- Disruptive Technology
Cost Reductions of Wind, PV, Battery Storage

IEEE Grid Vision 2050

**Today**

- Balance
- Make
- Move
- Use

**2050**

- Balance
- Make
- Move
- Use
Customer Relationship with the Grid

Source: The Economics of Load Defection, Rocky Mountain Institute, May 2015
Economically Optimal Residential Configuration

Source: The Economics of Load Defection, Rocky Mountain Institute, May 2015
Dimensions of Change for Utilities

**Generation**
- Centralized
- Distributed, Renewable, Variable

**Energy Pricing**
- Fixed, Tiered
- Variable
- Transactive

**Energy Programs**
- Fixed, Structured, Limited
- Open, Diverse, Broad

**Buildings**
- Non Controllable
- DR / Storage
- Net Zero, Off Grid

**Loads**
- Fixed, Uncontrolled
- Mobile, 2-way, Flexible, Fault Detection

**Energy Mgmt**
- Product
- System
- Micro-grid
“Skate to Where the Puck is Going!” Wayne Gretzky

Understand the Future State

• Generation co-located with consumption
• Net zero homes

Develop a Strategy to be Competitive in the Future State

• Investments in the grid edge
• Eliminate / minimize central generation investment
• Eliminate / minimize transmission investment
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Smart Product Architecture

- Connected
- Virtual Device
- Device Monitoring and Control
- Gateway
- Device Analytics, Modeling and Control
- Data Services
Smart Meter Architecture

Connected

AMI

Backhaul Network

Meter Data Management

Virtual Device

Device Monitoring and Control

Device Analytics, Modeling and Control

Data Services
Value of Disaggregated Energy Data

Image: National Institute of Standards and Technology
Win the Energy Monitoring Service Business

Real Time - Detail
- High frequency data with disaggregation
- Circuit level monitoring

Real Time - Major Loads
- Disaggregated smart meter interval data

Real Time – Whole Home
- Smart meter paired with bridge, app
- In home display paired to smart meter

Historic – Whole Home
- Day old smart meter reads, web portals
- Monthly meter reads, weather normalized

Online Audit
- Feedback on home construction data
Win the Energy Monitoring Service Business

Sensor
Network
Data Storage
Data Analytics
Value Added Service

Utility Meter
Backhaul Network
Meter Data Management
Home Area Network
In Home Device Gateway

Graphical Usage Summary
Modeling Consumption
Modeling Consumption
Disaggregation

Bill Analysis and Inquiry Tools
Daily Budget Notifications
Real Time Alerts
Itemized Billing Breakout

Identify Inefficient Appliances
Understand Contribution to Load Shape
Model Normal Daily Routine
Identify Signs of Impending Failure

Data Analytics
Value Added Service

Appliance Replacement Leads
Targeted Rate Plans and DR Programs
Health Monitoring Service
Equipment Failure Notification

Thermostat Data
Lighting Data
Weather Data

Thermostat And Lighting Optimization
Value of Real Time Energy Usage Monitoring
Real Time Energy Usage Monitoring – DTE Insight

- **Electricity Usage**
  - Day: Under Target
  - Total Usage: 15.9 kWh

- **Gas Usage**
  - Week: You’re On-Target
  - Month: 232 CCF
  - Target: 125 CCF

- **Energy Tips & Projects**
  - Estimated Energy Savings Per Year:
    - Completed: 2
    - To-Do List: 0 / 2
  - Tips & Projects:
    - Spring: 0 / 2
    - Summer: 1 / 4
Win the Energy Monitoring Service Business

Smart Meter

Current Transformer

Magnetic Sensor
Real Time AC Diagnostics
<table>
<thead>
<tr>
<th>Energy Monitoring</th>
<th>Energy Management</th>
<th>Bill Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides information:</td>
<td>Provides recommendations:</td>
<td>Provides recommendations:</td>
</tr>
<tr>
<td>• How well insulated my home is</td>
<td>• The most cost effective way to reduce my energy bill</td>
<td>• Identifies the best rate plan or tariff for me</td>
</tr>
<tr>
<td>• How leaky my doors or windows are</td>
<td>• Specific changes in my behavior – or the behavior of others in my household – that could save me the most money</td>
<td>• Anticipates what my energy bill will be each month</td>
</tr>
<tr>
<td>• What products in my home consume the most power</td>
<td>• Ways to change how I use my major appliances to save money</td>
<td>• Helps me set a budget for my energy use</td>
</tr>
<tr>
<td>• What products consume power even when they are turned off</td>
<td>• How to operate my furnace or air conditioner to save money while still being comfortable</td>
<td>• Recommends ways I can minimize a high bill before it comes</td>
</tr>
<tr>
<td>• How energy efficient a specific device or system in my home is</td>
<td>• How to maintain my AC, furnace, or other major appliances to keep them running efficiently</td>
<td>• Alerts me when my energy usage is abnormally high</td>
</tr>
<tr>
<td>• When an appliance or system starts running less efficiently than normal</td>
<td>• Identifying how my home is wasting energy and how I can eliminate that waste</td>
<td>• Helps me understand why my bill is higher or lower in a certain month</td>
</tr>
<tr>
<td>• How my home energy consumption compares to similar homes near me</td>
<td>• The most effective way to control the thermostat to be comfortable and save money</td>
<td>• Provides seasonal weather projections and the potential impact on future bills</td>
</tr>
<tr>
<td>• When I am using the most energy, what time of day</td>
<td></td>
<td>• Provides energy-related news and its potential impact on future bills</td>
</tr>
</tbody>
</table>
## Win the Energy Monitoring Service Business

### Asset Management
**Provide notifications:**
- Notification of a minor problem before it turns into a major repair
- Identification of improper operation and recommendation on how to fix the problem
- Identification of issues with new equipment that are still under warranty
- Recommendations for periodic maintenance

### Safety Monitoring
**Provide notifications:**
- Notification of a clogged dryer vent that could cause a fire
- Notification of electrical shorts in equipment
- Notification of wiring issues that pose a hazard
- Notification if the stove, space heater, or other hazardous equipment is left on

### Home Monitoring
**Provide notifications:**
- Notification that the dishwasher is done
- Notification that the clothes washer is done
- Notification that the dryer is done
- Notification of a power outage at my home
- Notification that the garage door is open
- Notification that a specific product has been left on (e.g. lights, TV, curling iron).
- Notification that someone is home
Energy Monitoring Service Top 10

Safety Monitoring
- Notification of electrical shorts in equipment
- Notification of wiring issues that pose a hazard
- Notification of a clogged dryer vent that could cause a fire
- Notification if the stove, space heater, or other hazardous equipment is left on

Energy Management
- The most cost effective way to reduce my energy bill
- Identifying how my home is wasting energy and how I can eliminate that waste
- How to maintain my AC, furnace, or other major appliances to keep them running efficiently

Asset Management
- Notification of a minor problem before it turns into a major repair

Energy Monitoring
- How well insulated my home is
- How leaky my doors or windows are
Behind the Meter Opportunities

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- **Incremental revenue opportunities**
- Hardware as a service
- Energy management opportunities
## Value-Added Monitoring Services

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Monitoring</td>
<td>An ENERGY MONITORING SERVICE that tells you how much energy your home uses each day, how much energy is used by each major appliance, when your usage is high, and how to improve energy efficiency.</td>
</tr>
<tr>
<td>Appliance Monitoring</td>
<td>An APPLIANCE MONITORING SERVICE that automatically adjusts appliances to minimize energy use and sends alerts when appliances are not functioning properly or are likely to stop working.</td>
</tr>
<tr>
<td>Heating and Air Conditioning Monitoring</td>
<td>A HEATING AND AIR CONDITIONING MONITORING SERVICE that automatically adjusts thermostat settings to minimize energy use, notifies you when filters need to be replaced, and alerts you when heating and cooling systems are not functioning properly or are likely to stop working.</td>
</tr>
</tbody>
</table>
**Appeal of Value-Added Monitoring Services**

Among Respondents Surveyed, n=5,009, ±1.38%

<table>
<thead>
<tr>
<th>Service</th>
<th>Not appealing (Rating 1-3)</th>
<th>Very appealing (Rating 6-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>An energy monitoring service</td>
<td>25%</td>
<td>37%</td>
</tr>
<tr>
<td>An appliance monitoring service</td>
<td>22%</td>
<td>42%</td>
</tr>
<tr>
<td>A heating and air conditioning monitoring service</td>
<td>26%</td>
<td>38%</td>
</tr>
</tbody>
</table>

"S7815. How appealing are the following services?" | Source: American Broadband Households and Their Technologies Q4 2014 | N=10,000, ±0.98% | © 2015 Parks Associates
Likelihood of Subscribing to Value-Added Monitoring Services
Among Respondents Surveyed, n=5,009, ±1.38%

<table>
<thead>
<tr>
<th>Service</th>
<th>Likely to Subscribe at $9.99</th>
<th>Likely to Subscribe at $4.99</th>
<th>Likely to Subscribe at $2.99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Monitoring</td>
<td>27%</td>
<td>42%</td>
<td>53%</td>
</tr>
<tr>
<td>Appliance Monitoring</td>
<td>26%</td>
<td>41%</td>
<td>51%</td>
</tr>
<tr>
<td>Heating/cooling monitoring</td>
<td>29%</td>
<td>44%</td>
<td>53%</td>
</tr>
</tbody>
</table>

"S7820-30. Would you subscribe to the following services if each one costs $9.99 per month?" |
Source: American Broadband Households and Their Technologies Q4 2014 | N=10,000, ±0.98% | © 2015 Parks Associates
Behind the Meter Opportunities

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### Transition from a Product to a Service Model

<table>
<thead>
<tr>
<th></th>
<th>Option A</th>
<th>Option B</th>
<th>Option C</th>
<th>Option D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy Efficiency</strong></td>
<td>Minimum</td>
<td>Minimum</td>
<td>10-15% more efficient than base equipment</td>
<td>20-25% more efficient than base equipment</td>
</tr>
<tr>
<td><strong>Brand</strong></td>
<td>Unknown brand</td>
<td>Brand I know and trust</td>
<td>Brand I know and trust</td>
<td>Brand I know and trust</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td>10 year parts</td>
<td>10 year parts</td>
<td>12 year parts</td>
<td>12 year parts 5 year labor</td>
</tr>
<tr>
<td><strong>Price of System and Installation</strong></td>
<td>$4,500</td>
<td>$5,500</td>
<td>$7,000</td>
<td>$9,000</td>
</tr>
</tbody>
</table>
Transition from a Product to a Service Model

HVAC System: Initial Choice (Q4/17)
Among U.S. BB HHs Homeowners, n = 710, ±3.68%

*Q7605. The next time you purchase a heating or cooling system for your home, which option would you choose?*

Asked of a Subgroup of 710 U.S. BB HH Homeowners
Source: American Broadband Households and Their Technologies Q4 2017 | N = 10,025, ±0.98% | © 2018 Parks Associates
### Transition from a Product to a Service Model

<table>
<thead>
<tr>
<th></th>
<th>Option A</th>
<th>Option B</th>
<th>Option C with Financing</th>
<th>Option C with Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy Efficiency</strong></td>
<td>Minimum Energy Efficiency</td>
<td>Minimum Energy Efficiency</td>
<td>10-15% more efficient than base equipment</td>
<td>10-15% more efficient than base equipment</td>
</tr>
<tr>
<td><strong>Brand</strong></td>
<td>Unknown brand</td>
<td>Brand I know and trust</td>
<td>Brand I know and trust</td>
<td>Brand I know and trust</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td></td>
<td>12 year parts</td>
<td>12 year parts</td>
<td></td>
</tr>
<tr>
<td><strong>Incentive from your Energy Company</strong></td>
<td>10 year parts</td>
<td>10 year parts</td>
<td>0% interest financing for 5 years</td>
<td>$500 REBATE</td>
</tr>
<tr>
<td><strong>Price of System and Installation</strong></td>
<td>$4,500</td>
<td>$5,500</td>
<td>$117/month for 5 years</td>
<td>$6,500 after rebate</td>
</tr>
</tbody>
</table>
Transition from a Product to a Service Model

Impact of Incentives on HVAC Equipment Choice (Q4/17)
Among U.S. Homeowners Choosing Specified HVAC Option Initially

*Q7615A/B/C. The next time you purchase a heating or cooling system for your home, which option would you choose?* Asked of a Subgroup of 710 U.S. BB HH Homeowners Source: American Broadband Households and Their Technologies Q4 2017 | N = 10,025, ±0.98% | © 2018 Parks Associates

- **Option A**
  - 17% willing to upgrade to option C with rebate
  - 33% willing to upgrade to option C with financing
  - 50% willing to stay with option A
  - (17% of Home Owners, n=121, ±8.91%)

- **Option B**
  - 25% willing to upgrade to option C with rebate
  - 47% willing to upgrade to option C with financing
  - 28% willing to stay with option B
  - (19% of Home Owners, n=138, ±8.34%)

- **Option C**
  - 21% willing to upgrade to option D with rebate
  - 53% willing to upgrade to option D with financing
  - 26% willing to stay with option C
  - (35% of Home Owners, n=251, ±6.19%)
## Transition from a Product to a Service Model

<table>
<thead>
<tr>
<th>1 – Purchase the System</th>
<th>2 – Finance the System</th>
<th>3 – Use the System as a Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>A premium heating and cooling system</td>
<td>A premium heating and cooling system</td>
<td>A service that includes:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use of a premium heating and cooling system for as long as you keep the service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Installation of the premium heating and cooling system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Monitoring to detect when the system is not operating properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Technical support</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maintenance to keep it running at peak efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Repairs when the system is operating poorly or breaks down, including all parts and labor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Must return hardware if you end the service</td>
</tr>
<tr>
<td>$7,999</td>
<td>$135/month for 5 years</td>
<td>$95, $135, or $175/month</td>
</tr>
</tbody>
</table>
Transition from a Product to a Service Model

**HVAC Systems: Purchase or Finance Options (Q4/17)**

Among U.S. BB HHs Presented with Potential Service Fee Options, n = ~840, ±3.38% for Each Price Point

- **$95/month**
  - Use the system as a service: 56%
  - Finance the system: 25%
  - Purchase the system: 19%

- **$135/month**
  - Use the system as a service: 47%
  - Finance the system: 32%
  - Purchase the system: 21%

- **$175/month**
  - Use the system as a service: 36%
  - Finance the system: 43%
  - Purchase the system: 21%

*ST2515. Which of the following would you choose?*

Asked of a subgroup of 2,510 U.S. BB HHs | Source: American Broadband Households and Their Technologies Q4 2017 | N=10,025, ±0.98% | © 2018 Parks Associates
Success in Selling Products-as-a-Service

Enercare (Direct Energy Home Services)

- 1.6M customers and 1.1M installed rental units.
- 20,600 HVAC unit sales annually, 66% of which are rentals.

![Graph showing HVAC transaction mix between rentals and sales for 2015 and 2016.](image-url)
Behind the Meter Opportunities

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Energy Management Ecosystem

- Energy Provider
- Smart Home
- Solar Storage EV
Drive and Broaden the Energy Management Ecosystem

Data Sources for Optimization
- Weather
- External Air Quality
- Energy Costs, Incentives
- Building Performance
- Interior Conditions
- Home Safety Status
- User Preferences
- Occupancy
- User Activity

Control Algorithms
- Comfort
- Lighting
- Air Quality
- Energy Cost

Control Devices
- Automated Shades
- Dynamic Window Glazing
- Lighting Controls
- Ceiling Fans
- Exhaust Fans
- HVAC Systems
- HRV/ERV
- EV charging
- PV Inverter, Battery Storage
- Water Heater
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Questions

Questions? Contact us today.

Tom Kerber
Senior Director, IoT Strategy
Parks Associates

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