New Service-Based Business Models of Lighting
Utility Perspective:
Why Service-based Business Models?

• Improve short and long-term performance of advanced lighting systems
• Reduce or eliminate initial cost barriers of advanced lighting systems
• Expand market for advanced lighting systems to less sophisticated customer types
Panelist

Benjamin Freas
Principal Research Analyst
Navigant Research
Panelist

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Benjamin Buchanan
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Daintree
NEW SERVICE-BASED BUSINESS MODELS OF LIGHTING

LIGHTING-AS-A-SERVICE

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BENJAMIN FREAS
PRINCIPAL RESEARCH ANALYST
NAVIGANT RESEARCH INTRODUCTION

NAVIGANT RESEARCH PROVIDES IN-DEPTH ANALYSIS OF GLOBAL CLEAN TECHNOLOGY MARKETS.

The team’s research methodology combines supply-side industry analysis, end-user primary research and demand assessment, and deep examination of technology trends to provide a comprehensive view of the Energy Ecosystem.

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RESEARCH SERVICES

ENERGY TECHNOLOGIES

Wind Energy
Grid-Tied Energy Storage
Microgrids
Distributed Generation

UTILITY TRANSFORMATIONS

Grid IT and Communications
Grid T&D
Residential Energy Innovations
Demand Response
Utility Innovations

TRANSPORTATION EFFICIENCIES

Electric Vehicles
Advanced Transportation Technologies
Transportation Forecast
Natural Gas Vehicles and Infrastructure
Advanced Batteries

BUILDING INNOVATIONS

Intelligent Building Management Systems
Energy Efficient Buildings
Lighting Innovations
Smart Cities
1. Lighting is going through transformative change

2. Lighting business models must also change

3. Market forecasts of LaaS deployments
THE SHIFT TO LEDS IS DRAMATIC

- Due to their continual improvements in performance and decreases in cost, LEDs are transforming the commercial lighting market
- The installed base of LEDs increased 121% between 2014 and 2015
  - LEDs now represent 6.4% of the installed base in the United States
- LEDs accounted for about 23% of luminaire shipments in North America in 2015

**Installed Base by Lamp Type, United States: 2014-2015**

(Source: Department of Energy)
LEDS ARE CHANGING THE NATURE OF LIGHTING

- Lamps sold as replacements for existing lamps that have reached the end of their life are a substantial portion of annual unit sales.
- The longer lifespans of LEDs will lead to overall declines in the global lamp and luminaire markets.

**Average Lamp Life by Technology**

**Lamp Revenue by Lamp Type, World Markets: 2014-2023**

(Source: Navigant Research, U.S. Department of Energy)

(Source: Navigant Research)
TECHNOLOGY CHANGES

• Maturation of LED equipment, including long lamp lifetimes, light quality, and cost decreases
• IT advancements that provide increased access to intelligent sensors, network components that can integrate with luminaires, and cloud-based data management platforms
• Innovative thinking that merges IT with lighting, following the general trend of the information technology/operational technology (IT/OT) convergence

(Source: Navigant Research)
THE PERFECT STORM FOR LIGHTING SERVICE

Changes in Needs
Data from lighting systems can be used to deliver better energy and operational efficiency

Changes in Technology
It is easier to get data from lighting systems

Changes in Markets
Lighting companies need new revenue streams

LaaS
MARKET BARRIERS

• Service providers and end-use customers each face their own set of barriers that limit growth a more rapid switch to service-based models

Service Providers

• Lack of clarity about what customers want
• Lack of focus on the value of long-term service agreements

End-Use Customers

• Uncertainty of when to enter the market
• Who to select as a provider
• Competing priorities
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SERVICES IN LIGHTING ARE NOT NEW

• The range of services falling under the Lighting as a Service (LaaS) umbrella definition draw many models
  - ESCOs pioneered the business model of delivering energy efficiency upgrades as a service through performance contracts
  - The solar PV market uses power purchase agreements (PPAs) to sidestep upfront cost hurdles
• LaaS is charting new territory by leveraging the physical location of luminaires and networked lighting system features
SO, WHAT EXACTLY IS LAAS?

- Service arrangements do not represent new business models or disruptive market developments
- Some companies provide a continuum of offerings, others simply layer additional services on the equipment they sell
- The common thread among the definitions is that there is a long-term engagement and predictable flow of payments from end user to service provider

Some form of long-term third-party management relationship

Lighting equipment gathers and manages data to inform decisions

Lasts between approximately 2 and 12 years

May include technical, maintenance, or other services

The vendor or a third party can own the equipment
THE LAAS SPECTRUM

- Services falling under the LaaS definition span from relatively basic to highly sophisticated
  - Service agreements that address lighting upgrades alone and do not span into the realm of network-driven, cloud-based data services
  - Long-term lighting system management agreements can include financing
  - The advanced side of the spectrum captures service arrangements that expand into the new world where leveraging the position of networked lighting equipment to gather and manage data can inform actions or decisions

(Spectrum of Service Arrangements Deemed LaaS)

(Source: Navigant Research)
COMMERCIAL BUILDINGS

- The disruptive effect of LED advancements and networked LaaS applications could change the value chain within the commercial lighting market.
- Medium-sized commercial buildings (100,000 to 1,000,000 square feet) present a robust opportunity: they are large enough to provide economies of scale, but too small to be the target of incumbent competitors.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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<tbody>
<tr>
<td>Retail</td>
<td>Currently the focus of the greatest amount of networked LaaS market activity</td>
</tr>
<tr>
<td>Hospitals &amp;</td>
<td>Strong potential for LaaS because of their size and operational characteristics</td>
</tr>
<tr>
<td>Universities</td>
<td>Benefit from the improved ambiance and aesthetics</td>
</tr>
<tr>
<td>Hotels &amp;</td>
<td></td>
</tr>
<tr>
<td>Restaurants</td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>Challenges due to the often complex decision-making structures</td>
</tr>
</tbody>
</table>
OUTDOOR LIGHTING

- Street lighting in particular is more often managed by third parties than by municipalities themselves.
- Other outdoor lighting opportunities for LaaS include universities, healthcare facilities, and parking garages.
- Common areas and outdoor lighting at large-scale residential communities served by homeowners associations (HOAs) are often overlooked and could be particularly valuable for LaaS upgrades.

*Before and After of a Parking Lot That Upgraded to LED Lighting*

(Source: Oetlinger Precision Manufacturing Company)
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GLOBAL FORECAST

• Over the next 10 years, square footage under LaaS management is expected to grow at a CAGR of 49.0%

• As a point of comparison, the annual number of buildings with newly installed networked lighting controls is expected to increase annually by a CAGR of 25.7%

Square Footage under Management by Building Type, World Markets: 2016-2025

(Source: Navigant Research)
MARKET FORECAST – BY SERVICE TYPE

- LaaS deployment is primarily driven by economic incentives to improve building performance
  - Professional and maintenance services account for the largest share of 2016 market revenue
- Other categories of service types that can boost the economic efficiency of lighting systems are forecast to eventually grow rapidly as well

**LaaS Revenue by Service Type, North America: 2016-2025**

(Source: Navigant Research)
KEY TAKEAWAYS

• There are no standard definitions for LaaS but it is generally a long-term service engagement with a predictable flow of payments from end user to service provider.

• LaaS can be the addition of services to hardware offerings but should be the evolution beyond lighting hardware.

• The LaaS market is poised for significant growth in the next decade as intelligent building solutions gain deeper market penetration across customer segments and geographies.
Agenda

• Overview
• As-a-Service Definition
• Comparison to Financing
• Benefits to Provider and Customer
• SparkFund’s Experience in the Market
• Market Demand, Case Studies
• Moving Forward
SparkFund Overview

• Domestic Partner Network
• Shift to a “pay over time” sale
• Infrastructure facilitating As-a-Service
• $50,000 - $3,000,000 project size
• Wide range of end-customers
• In-house fund warehouse, underwriting, credit services
As-a-Service

Bundled package of equipment and service, third party ownership. Worry free upkeep, paid through simple monthly payments.

Transforming how goods are purchased across many industries - purchase to subscription.

Energy efficiency - Equipment bound, service component, paid through savings. Retire the simple payback idea
Service Plan

• FASB-19 Service Plan
• Fully-designed efficiency system
• Bundled equipment and ongoing service
• Third-party ownership and control
• Verified savings and performance
## Service Plan -vs- Financing

<table>
<thead>
<tr>
<th>Service Plans</th>
<th>Financed Deals</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Equipment-bound</td>
<td>• Equipment bound</td>
</tr>
<tr>
<td>• Service packaged, not a “rider”</td>
<td>• Possible service “rider”</td>
</tr>
<tr>
<td>• *Possible Operating Expenditure</td>
<td>• Capital Expenditure</td>
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<tr>
<td>• *Pay-for-Performance M&amp;V</td>
<td>• Debt and Assets</td>
</tr>
<tr>
<td></td>
<td>• Buy-out or title transfer</td>
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## Simplified Proposals

### LED Project-Purchase

<table>
<thead>
<tr>
<th>Products:</th>
<th>Total Cost:</th>
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<tbody>
<tr>
<td>LEDs</td>
<td>$16,458</td>
</tr>
<tr>
<td>Lighting Controls</td>
<td>$2,204</td>
</tr>
<tr>
<td>Building Controls</td>
<td>$850</td>
</tr>
<tr>
<td>Labor:</td>
<td>$6,573</td>
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<tr>
<td>Service:</td>
<td>$1,200</td>
</tr>
<tr>
<td>Ongoing M&amp;V:</td>
<td>$800</td>
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</table>

### LEDs As-a-Service

<table>
<thead>
<tr>
<th>Products:</th>
<th>Monthly Payment:</th>
<th>Monthly Savings:</th>
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</thead>
<tbody>
<tr>
<td>T8 LEDs</td>
<td>$2,200</td>
<td>$2,800</td>
</tr>
<tr>
<td>224 Lighting fixtures to be installed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting Controls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Panel and monitoring system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services:</td>
<td>Installation</td>
<td></td>
</tr>
<tr>
<td>Ongoing M&amp;V</td>
<td>Upkeep and monitoring every 3 months</td>
<td></td>
</tr>
<tr>
<td>Installation</td>
<td>Upkeep and monitoring every 3 months</td>
<td></td>
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</tbody>
</table>
Service Provider Benefits

Maximize project profit

Long-term customer relationship

Faster sales cycles

Higher close rates
Customer Benefits

Bundled monthly payment

Worry-free ownership

*Possible expense payment

Increased value to facility
Selling “As-a-Service” is Effective

4.4X Increase In Conversions

Traditional Financing: 12%
As a Service: 53%

4.8X Faster Time to Close

Traditional Financing: 130 Days
As a Service: 27 Days

1.3X Larger Projects

As a Service: $172,000
Traditional Financing: $128,000
Market Demand

GE Current’s MaryRose Sylvester calls Energy-as-a-Service The Great Simplifyer “reducing complexity, cutting costs, scaling quickly, and keeping adopters running on the best and latest solutions”.

The Air Force is pursuing Energy as a Service to simplify the complicated web of contractors and business arrangements that power its bases and support its energy resiliency.
Lighting as a Service

New York City

Mixed-Use Commercial and Industrial Redevelopment

Equipment: Lighting
Term: 72 Months
Total Cost: $1,240,800
Annual Savings: $266,000
Monthly Payment: $21,363
Lighting as a Service

Parochial School

Equipment: Lighting

Term: 60 Months

Total Cost: $35,000

Annual Savings: $11,354

Monthly Payment: $770

Olympia, WA
Moving Forward

Utility incentive structure - incentivise term, verify performance, claiming performance over a term

Technologies - new and different technologies expand the market. Long-livedness, customer control

Expand The Market - Customers of all sizes are demanding this mode of purchase,
Thank You

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Daintree Networks

DesignLights Consortium

Software as a Service: Commercial IoT
Agenda

• **Daintree Networks Overview**
  – Internet of Things

• **The End User**
  – Pain Points
  – Goal of a Service Plan

• **Software as a Service, the Vehicle**
  – Software as a Service Overview
  – The Link to Lighting and all things IoT

• **Project Details**
  – Salk Institute
Daintree Networks, in the Current family, Powered by GE!

- 1200+ Daintree Smart Buildings across the U.S.
- Over 150 million square feet under management
- Industrial, retail, banks, office, education, parking
- Industries largest node network: 25K+ nodes/140 sites
The Emerging IoT Market

**Daintree at the leading edge of the “Enterprise Internet of Things”**
- Connecting more commercial and industrial “things”*
- 13 years wireless leadership, know-how and IP

**Internet of Things: Assessed as $19 Trillion Market by Cisco**
- “The Internet of everything will have five to 10 times the impact on society as the Internet itself” - Cisco CEO John Chambers
- “Smart buildings are poised to generate $100B by lowering operating costs by reducing energy consumption” – Cisco Press Release, Jan 2014

The Internet of Things picked by McKinsey as one of top three most valuable technology trends for the next decade (May 2013)
- 50B to 1 trillion “things” connected with economic value of $4 trillion/yr by 2025

Nest acquired for $3.2B by Google in Jan 2014 – to jump into IoT

* Daintree “things” include lights, sensors, thermostats, plug-loads
The End User
Pain Points

• Ever Increasing Utility Bills
  – Increasing Peak Demand Charges hard to manage

• Out of Control Maintenance
  – Lacking enterprise management
  – Unperformed maintenance

• Where is the Low Hanging Fruit?
  – Solar, Lighting, HVAC, Analytics, Controls
  – Confusing Landscape of Solutions

• Antiquated Systems
  – Wired, Stand Alone, Panel Based, Proprietary, Failing, Engineer Required

• Limited Budget
  – Revenue Gen vs. Cost Reducing
Goals

• Understand your customer
  – Come over to their side of the table

• Stretch the Budget
  – IoT provides more measures to perform
  – Lighting is the beginning

• Sticky
  – Portfolios offer opportunity for expansion
  – Fixture spec less effective now

• Platform for Expansion
  – What’s next after lighting?

• Move from Asset to Service
  – Assets have limited margin potential than Software and Service
  – Commoditizing LED
Software as a Service: SaaS
Software as a Service

• **Reduced Startup Costs**
  – Moves software from CAPEX to OPEX
  – Infrastructure moves from facility to cloud

• **Painless Upgrades**
  – Upgrade and software maintenance rolled out by developer
  – Ensures performance
  – Regular security updates

• **Seamless Integration**
  – New technologies supported are with regular software updates
  • “We added thermostat control, sensor monitoring, power meter integration, with more applications on the roadmap”
**Lighting Based Platform**

- **Easily Manage Multiple Applications**
  - Leverages ubiquitous lighting network
  - Use both 3rd Party and Daintree IoT Bridge Hardware to connect, monitor and control

Delivered via on-site and hosted systems, with emerging SaaS deployments

- Centralized Software
- Real-time Processing and Mesh Network
- Wirelessly-Enabled End Devices

Delivered via on-site and hosted systems, with emerging SaaS deployments
Analytics Comes from Good Data

- bank
- retail
- commercial
- industrial
Salk Institute

- Over 4000 Lighting Nodes
  - Granular Dimming Control
  - Occupancy/Daylight Harvesting
  - ADR
- Multi-Building Campus w/ Central Plant
  - Single Point of Access
- Vast IoT Potential, and Analytics
  - Environmental Data
  - Laboratory
- Future Proof Required
  - State of the Art Lab must be at cutting edge
- No Upfront Software Costs, built into Service Platform
Thank You