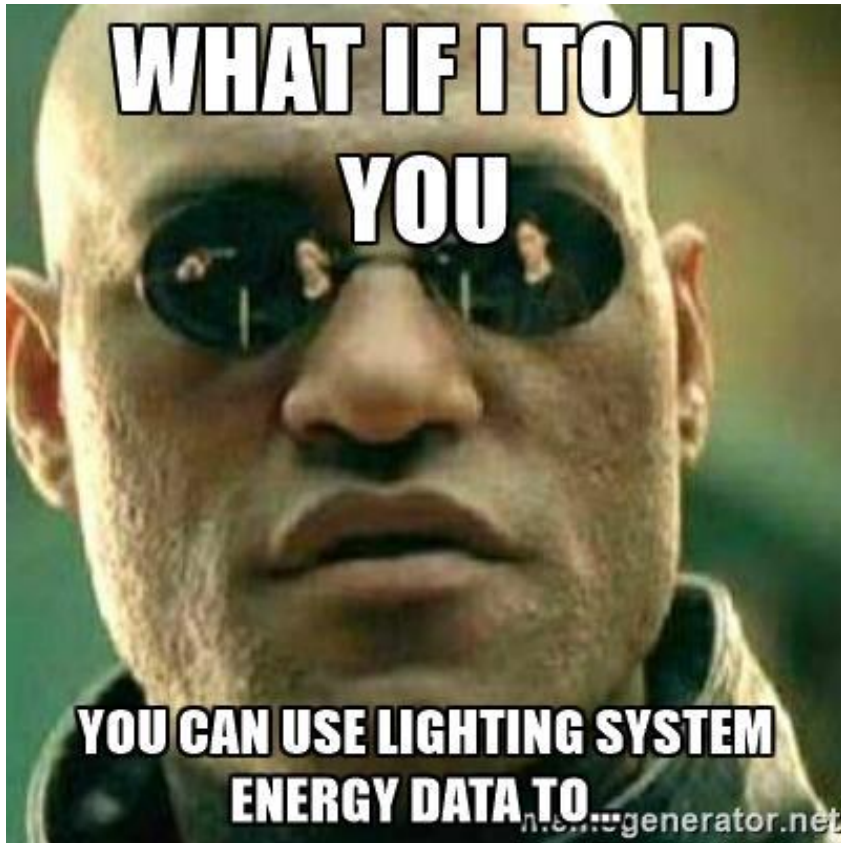




Bringing Efficiency to Light<sup>SM</sup>

# **The AMAZING Future of Lighting System Energy Data**

June 8, 2017



Eliminate Capital  
Cost Barriers

Save Millions  
in M&V Costs

Quadruple  
Project  
Close Rates

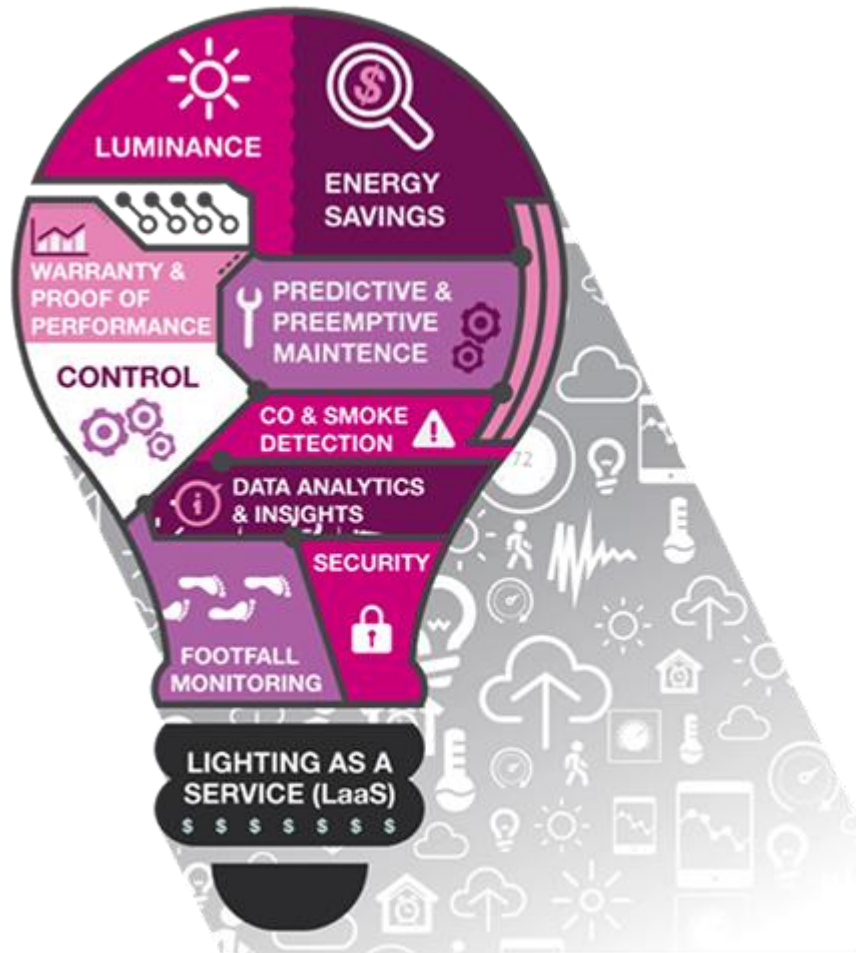
Enable and  
Expand  
Business  
Models

Create Financial  
Mechanism for  
Continual System  
Upgrades

Improve  
Customer  
Experience

Create  
Guaranteed Long-  
Term Revenue  
Streams

# Lighting as a Service (LaaS)!



- Energy Data is a key enabler for the “as-a-service” business model
- Energy savings and data underpins the financial model behind “as-a-service”
- Verified, standardized, accessible data needed to scale the service based model

# Some LaaS Benefits

## For Industry

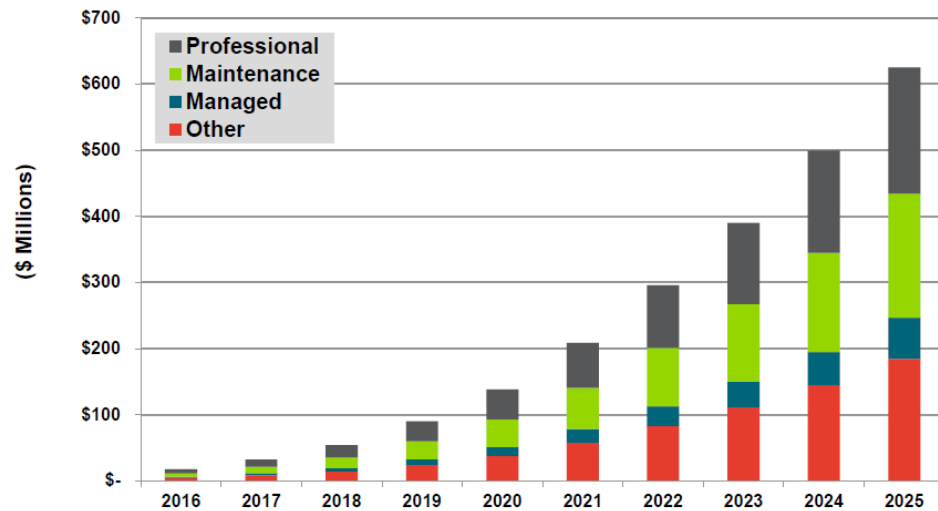
- Higher equipment sales and project close Rates
- More customer value; improved customer experience; long-term customer relationships
- New and guaranteed long-term revenue streams
- Financial mechanism and motivation for continual tech upgrades

## For Customers

- Better lighting; latest technology
- No capital costs; increase net operating income (NOI) and cash flow
- Reduce risk of ownership; guaranteed performance
- Leave the complicated lighting to the experts; focus on core business

# “Lumens as a Service” Can Unlock a \$63 Billion Opportunity in the Commercial Building Sector“

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

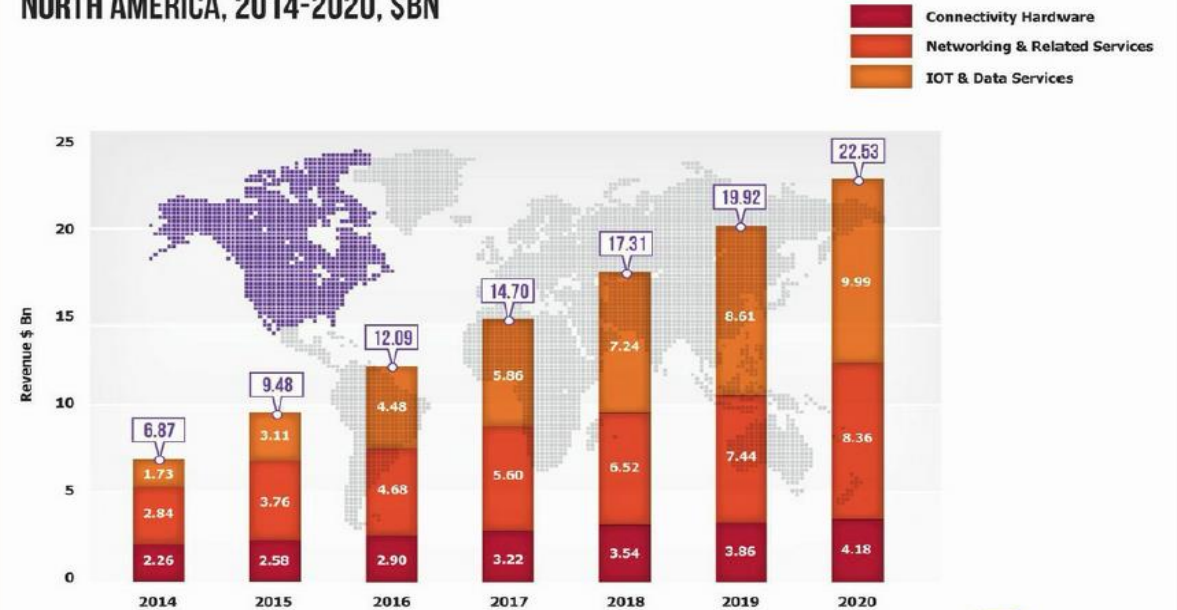


(Source: Navigant Research)

Share of Global Market BioT Market in 2020 (%)	Percentage of global IoT connections		BioT Market Revenue (\$Billions)	
21.2%	2014	2020	2012	2020
	25.0%	23.4%	\$6.87	\$22.53

Fig 6.1

## THE MARKET FOR THE INTERNET OF THINGS IN BUILDINGS - NORTH AMERICA, 2014-2020, \$Bn



memoori

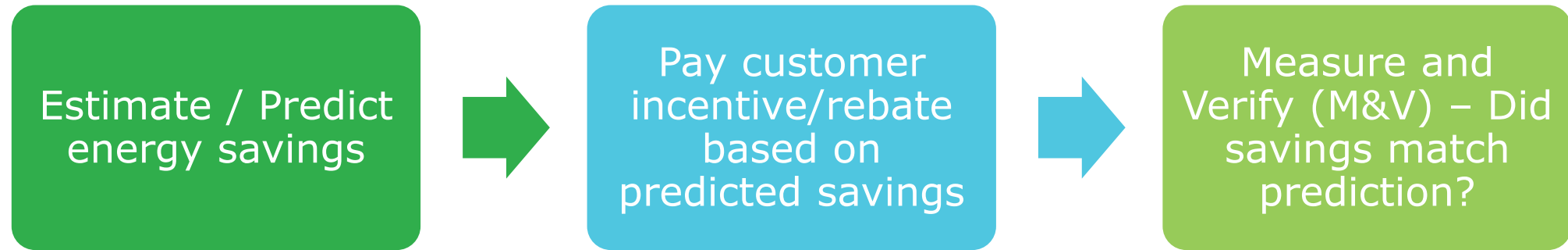
# Utility Efficiency Program Perspective: Why Service-based Business Models?

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

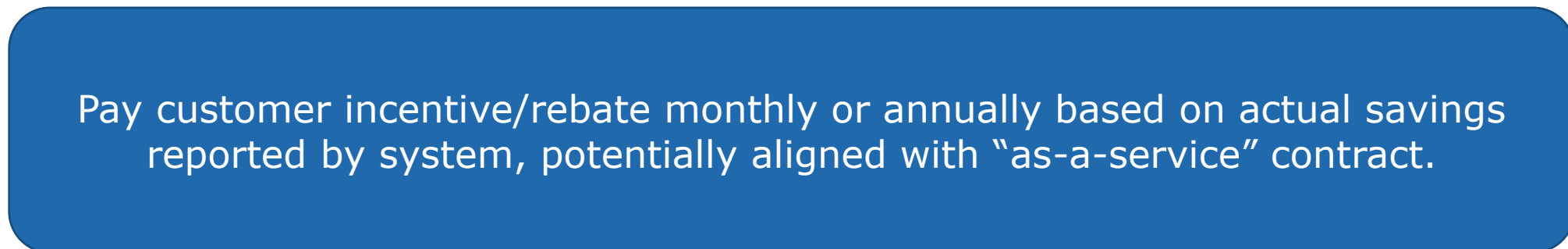
Greater adoption, improved performance = more energy savings

# Services + Energy Data enable new Efficiency Program Models

## Traditional Utility Program Model



## Future Utility Program Model





# Even with Traditional Programs, Energy Data can save on M&V Costs

- Efficiency Programs spent **\$8.7B** on DSM programs in 2015
- Efficiency Programs spent **\$157M** on EM&V, ~2% of program budgets

- Source: Consortium for Energy Efficiency. State of the Efficiency Program Industry: Budgets, Expenditures, and Impacts 2016.  
<http://www.cee1.org/annual-industry-reports>



Real-time or Automated M&V  
Image Source: **ENERGYSAVVY**



# Traditional Utility M&V



- Follows International Performance Measurement and Verification Protocol (IPMVP)
- Typically done on a sample of projects for simpler measures/projects, sometimes every project for more complex
- Targets 10% error with 90% confidence

# Automated M&V Savings

- New LBNL report gives indication of the savings that might be possible


**Table 4. Estimates of time required to conduct traditional M&V and automated M&V for the data sets in this study.**

<b>Data Set</b>	<b>Time to Conduct Traditional M&amp;V</b>	<b>Description of Traditional M&amp;V Approach</b>	<b>Time to Conduct Automated M&amp;V</b>
Data Set 1	4 days	Manual whole-building M&V	1 day
Data Set 2	6 days	Custom engineering calculations,	1 day
Data Set 3	Information not available	Information not available	Information not available

Granderson, J, Touzani, S, Fernandes, S, Taylor, C. 2017. Application of automated measurement and verification to utility energy efficiency program data. Energy and Buildings 142:191-199.

# Efforts Underway

## Networked Lighting Controls Data Project



CREATING  
ONGOING VALUE  
BY CATALYZING  
INCREASED  
UTILITY  
SUPPORT &  
AWARENESS

**PROJECT PURPOSE**

The primary goal of the DLC Networked Lighting Controls (NLC) Data Project is to create a citable report quantifying the savings potential of NLC systems in commercial buildings and thereby overcome the data gap that is a key obstacle blocking widespread support for NLC systems from utilities and other stakeholder groups.

**DRIVING VALUE AND INVESTMENT**

North American utilities provided hundreds of millions of dollars in incentives to LED lighting in 2016, with a miniscule fraction going to NLCs. Current utility support for NLCs is at a critical junction: investment to date is through small scale programs or pilot demonstrations, and the lack of available energy savings data is one of the greatest barriers preventing further utility investment. By contributing anonymized performance data to the NLC Data Project, you are generating new business value in four key ways:

- **Obtaining Regulator Support for Scaling Incentive Programs:** Most utility NLC programs are small-scale pilots, which typically have more relaxed savings validation and cost-effectiveness requirements. However, utility regulators require more robust savings data in order to scale programs and access more utility funding. The lack of a 3<sup>rd</sup> party, citable report significantly limits future available funding pools for NLCs.
- **Better Data can Unlock Higher Rebates/Incentives:** Many utilities use highly conservative assumptions when calculating energy savings for NLCs, significantly limiting incentives. Data that more accurately estimates savings will increase the incentives available to each project and improve cost-effectiveness. The results from this report will have an immediate impact on how utilities fund and structure their 2018 NLC programs, and so it is critical that this project has as robust a data sample as possible.
- **Expanding Programs Beyond the Early Adopters:** The existing NLC pilots and small programs are by early-adopter utilities; there are dozens of other utilities that may consider adopting NLC programs, provided that there is sufficient data to make the case. Without this, utility support of NLCs will continue to be on the fringes.
- **Increasing Awareness in the Broader Market:** Utility programs increase awareness and build trust with distributors, contractors and customers. Expanding the number and scale of NLC programs will build the market for NLC products.

## Building a database of Networked Lighting Control savings data

### Objectives:

- Equip utilities with key resource needed to increase & scale support of technology
- Inform efforts to get to future efficiency program models

Contacts: Levin Nock, Teddy Kisch, Kelly Sanders, [info@designlights.org](mailto:info@designlights.org)

# Efforts Underway

## The Performance and Energy Data Program

PEDP is a comprehensive, iteratively designed program, guided by utility business priorities, supported by industry, to discover and demonstrate the real business value of device level performance and energy data to utilities, their customers, and industry.



The diagram features a large green arrow pointing upwards and to the right, set against a background of Earth from space. Inside the arrow, four grey circles are arranged in a sequence: 'Products', 'Systems', 'Processes', and 'Services'. To the left of the arrow is the 'ENERGY SOLUTIONS' logo, which consists of a stylized green and grey 'e' icon followed by the text 'ENERGY SOLUTIONS'.

# Energy Data Challenges

# Challenge: Chicken and Egg Scenario

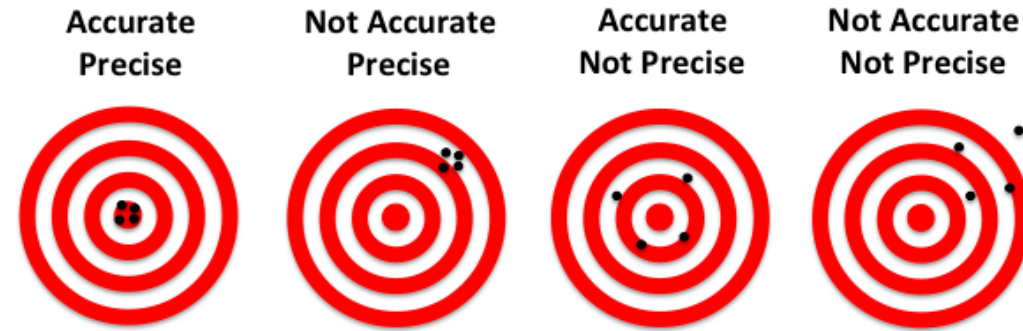


Can't develop value proposition without the data

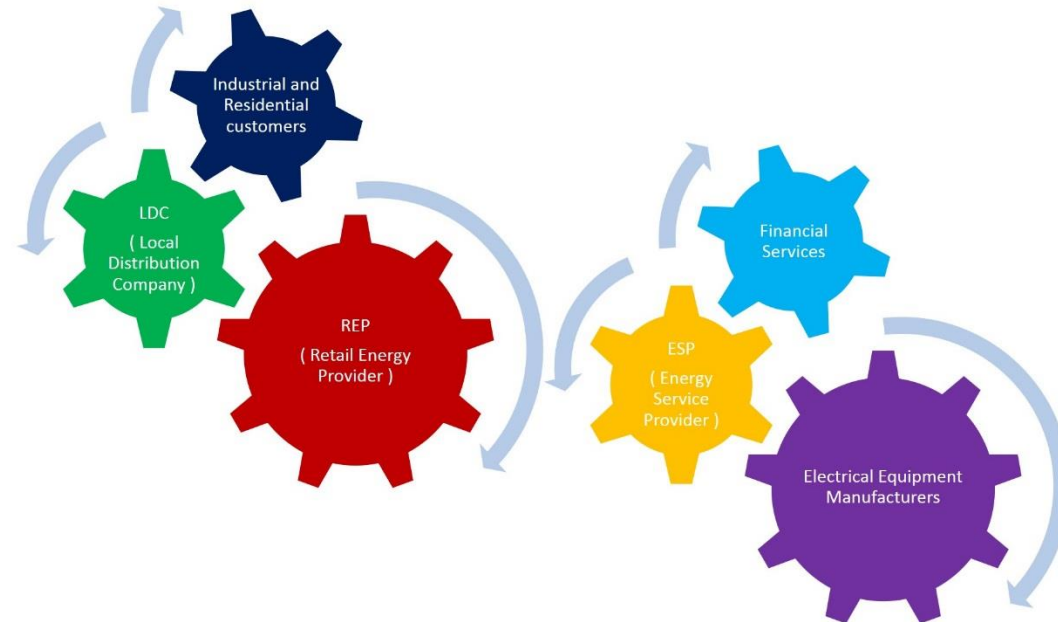
Can't get the data without the value proposition

# Challenge: Key Standards are Needed

- Accuracy



- Data Model





# Accuracy Needs are not One-Size-Fits-All

## Energy Reporting Use Cases (from ANSI C137)

**System energy management**

**Device or system performance verification and/or failure diagnosis**

**Energy performance verification for codes, standards, certification programs**

**Energy performance verification for utility energy efficiency programs**

**Energy performance verification for contracted services**

**Energy measurement for utility billing purposes**

# Challenge: Data Ownership, Sharing, Privacy

- Who has the data?
- Who owns the data?
- How can the data be shared?
- How can security and privacy be addressed?



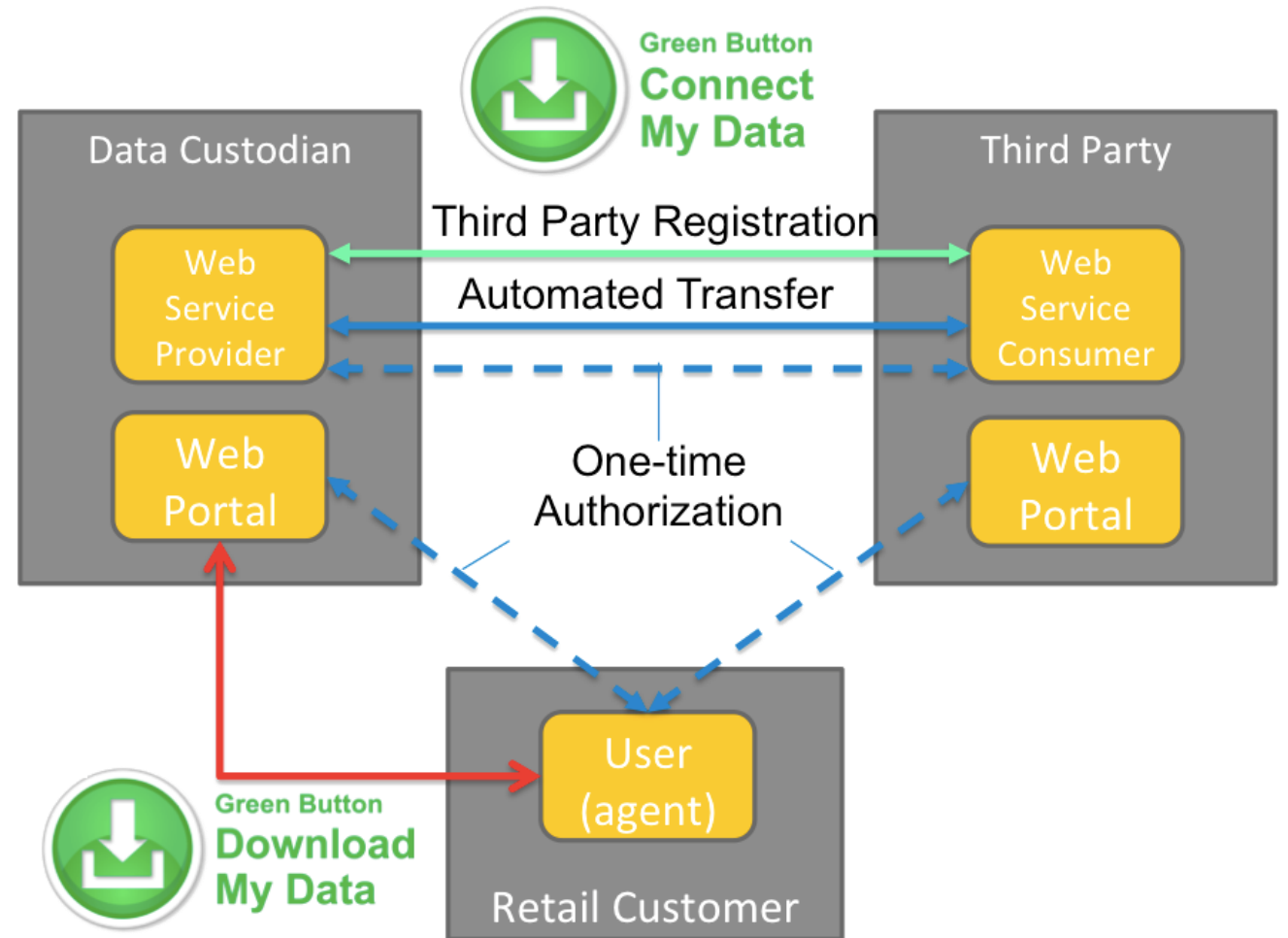
# Green Button: A Model to Use or Leverage?

## Green Button Alliance defines:

1. A common XML format for energy usage information
2. A data exchange protocol which allows for automatic transfer of data from utility to a third party based on customer authorization



# Green Button Model



# Utilities Committed To Green Button

- Ameren Illinois
- American Electric Power
- Austin Energy
- Baltimore Gas & Electric
- Bangor Hydro Electric Company
- Centerpoint Energy
- Central Maine Power
- Chattanooga EPB
- Commonwealth Edison
- Consolidated Edison
- Efficiency Vermont
- EVERSOURCE
- Glendale Water and Power
- JEA
- Kootenai Electric Cooperative
- National Grid
- Oncor
- Pacific Power
- PacifiCorp
- PECO
- Pepco Holdings Inc.
- PG&E
- PPL Electric Utilities
- Public Service New Hampshire
- Reliant
- Rocky Mountain Power
- Sawnee Electric Membership Corp
- SDG&E
- Southern California Edison
- United Illuminating
- TNMP
- TXU Energy
- Virginia Dominion Power
- Western Massachusetts Electric Company
- Yankee Gas

# Examples of 3<sup>rd</sup> Party Companies Using Green Button



# Challenge: Reinvent the Business Model





# References

- ANSI C137 – Working on multiple lighting system standards related to connected lighting and energy data  
<https://www.nema.org/Technical/Pages/ANSI-C137-Lighting-Systems-Committee.aspx>
- Performance Energy Data Program (PEDP) – email [PEDP@energy-solution.com](mailto:PEDP@energy-solution.com)
- DLC Networked Control Data Project -  
<https://www.designlights.org/lighting-controls/reports-tools-resources/>
- Green Button Alliance - <http://www.greenbuttonalliance.org/>
- Sparkfund - <https://www.sparkfund.co/>

# Thank You!

**Gabe Arnold, PE, LC**  
*Technical Director*

**DesignLights Consortium®**  
[www.designlights.org](http://www.designlights.org)