

Better Buildings Webinar Series

We'll be starting in just a few minutes....

Tell us...please send your response to the webinar organizers via the question box:

What topics are you interested in for future webinars?





Mission Complete

Outcomes from the Challenge
to Develop a \$100 Wireless
Submeter

July 27, 2017
2:00-3:00 PM ET

Today's Presenters

Name		Organization
Bruce Lung		DOE
Anne Wagner		Pacific Northwest National Laboratory (PNNL)

Polling Questions

(slide not visible on Thursday)

- Have you ever submetered?
- Are you considering submetering?
- What is the biggest obstacle in implementing energy submetering? (select all that apply)

Anne Wagner

PNNL

Overview

- Objective
- Background
- Process
- Results
- Lessons Learned

Current Electricity Use

CONSUMPTION & EFFICIENCY

COMMERCIAL BUILDINGS ENERGY CONSUMPTION SURVEY (CBECS)

OVERVIEW

DATA ▾

ANALYSIS & PROJECTIONS

GLOSSARY >

FAQS >

BACK TO ALL 2012 CBECS TABLES

\$120,000,000,000

Table C13. Total electricity consumption and expenditures, 2012

Released: May 2016

	All buildings using electricity			Electricity consumption		Electricity expenditures	
	Number of buildings (thousand)	Total floorspace (million square feet)	Floorspace per building (thousand square feet)	Primary	Site	Total (billion kWh)	Total (million dollars)
				Total (trillion Btu)	Total (trillion Btu)		
All buildings	5,234	84,869	16.2	12,934	4,241	1,243	121,875



Electricity Use Reduction Basics

- **Intent:** Reduce electric energy use
- **Essential Information required:** Current energy use status (baseline)
- **Acquire:** Measure, estimate
- **Analyze:** Visualize, evaluate
- **Act:** Adjust, upgrade



Submetering Definition

“Submetering is defined as the application of metering technology below the level necessary for utility billing.”

Sustainable Facilities Tool

(General Services Administration)

<https://sftool.gov/>

Forrestal Building – U.S. DOE Office



\$\$\$\$

Announcement

June 6, 2013, DOE's Better Buildings Alliance issued the Wireless Metering Challenge

- ✓ Low Cost
- ✓ Electrical energy measurement
- ✓ Wireless data transmission
(independent from existing building networks)



System Qualification Process

Communication test (1)

Accuracy & UL certification (2)

Qualified product & cost (3)

Product submission (9)

Launch (30 manufacturers)

Specification

Key System Specifications	Benefits
Measure electrical watt-hour energy consumption for a three-phase circuit	Data accuracy - measurement, not calculation
Comply with NFPA 70 (National Electrical Code) and UL 61010	Risk reduction - tested to high level safety standards
1% of reading accuracy (device with sensors)	Data accuracy - practical for energy management & Lower cost than revenue grade accuracy (+/- 0.2%)
Communication success rate $\geq 95\%$ (In-building test)	Dependable data communication
Data encryption: 128-bit (or greater) Advanced Encryption Standard (AES-128)	Data security
Stand-alone wireless communications network	Eliminates security concerns of using facility's network

Specification

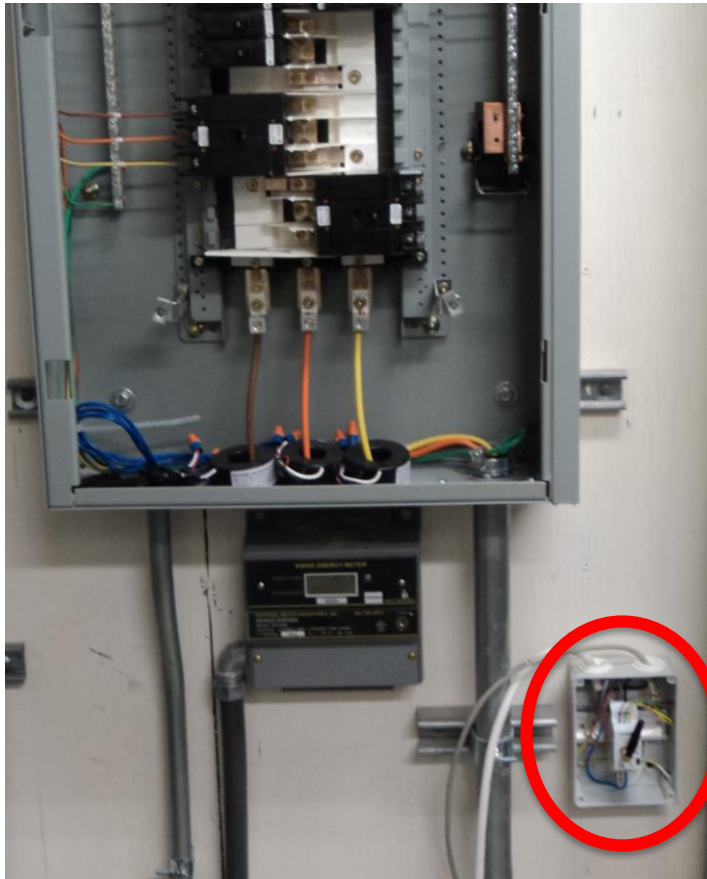
Key System Specifications	Benefits
Open protocol data measurement, transmission and collection	Eliminates dependence on and additional costs resulting from proprietary provider
The submeter is self-contained	Eliminates need for additional components and associated space requirements
Power source from within the power panel it connects to or the system being monitored.	Eliminates risk from interruption of separate power source
No additional software required by the user	No hidden/additional system operational costs
Two-way communication is not required.	Reduced system complexity
Wireless, but can be wired	Broad installation (eliminates need for multiple meter types)

In-Building Communications Test

GSA Headquarters, Washington, D.C

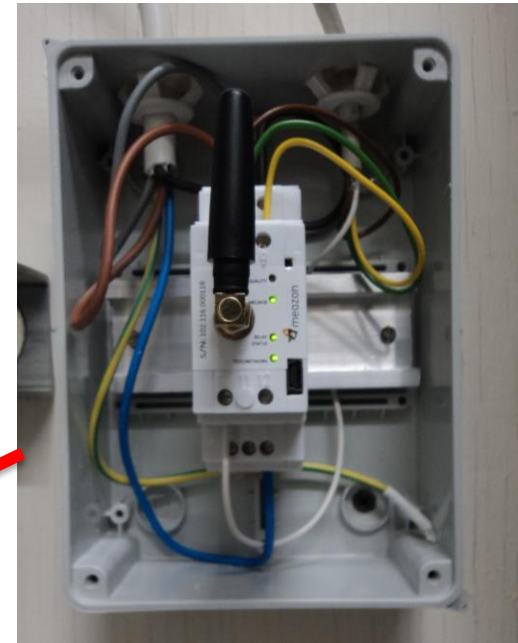


In-Building Test Components



Panel with meter

Meter



In-Building Test Components



Repeater



Gateway (base station)



Cellular station, gateway and user device (PC)

Successful System – Meazon





www.Meazon.com

Key Takeaways

- A Champion is essential
- Friendly and supportive test facility/staff
- Manufacturers with feature rich products didn't want to remove features
- Companies constantly determining business direction
- Patience and persistence are essential

Today's Presenters

Name		Organization
John Gionas		Meazon
Stelios Koutroubinas		Meazon

John Gionas and Stelios Koutroubinas

Meazon

ENERGY EFFICIENCY

Value Proposition



meazon

measure | monitor | manage



See behind the utility meter.



Focus on assets



Multi tenant billing



Green energy retrofits



Demand side response



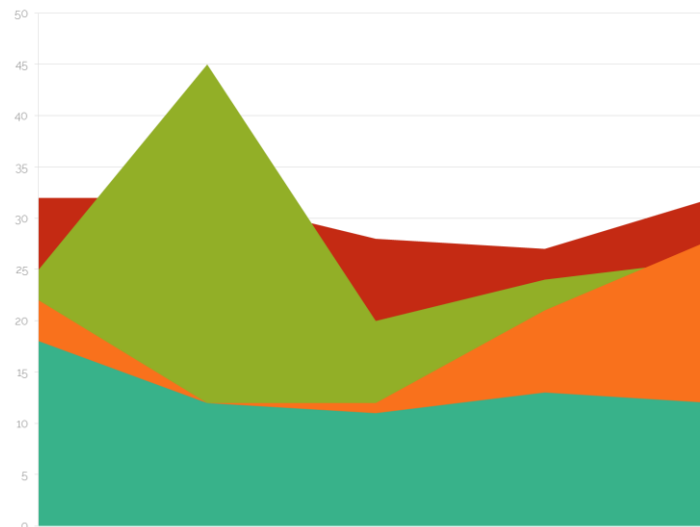
NZEB



Multi site energy mgt.



Value Added Services



THE VALUE OF NETWORKED SUBMETERING



Unlock
building
data
potential



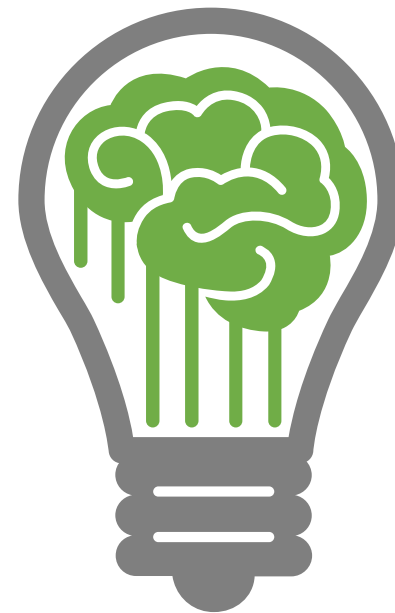
Actionable
insights



Create
business
cases



Asset
management



Track &
evaluate
results



Cost
efficient

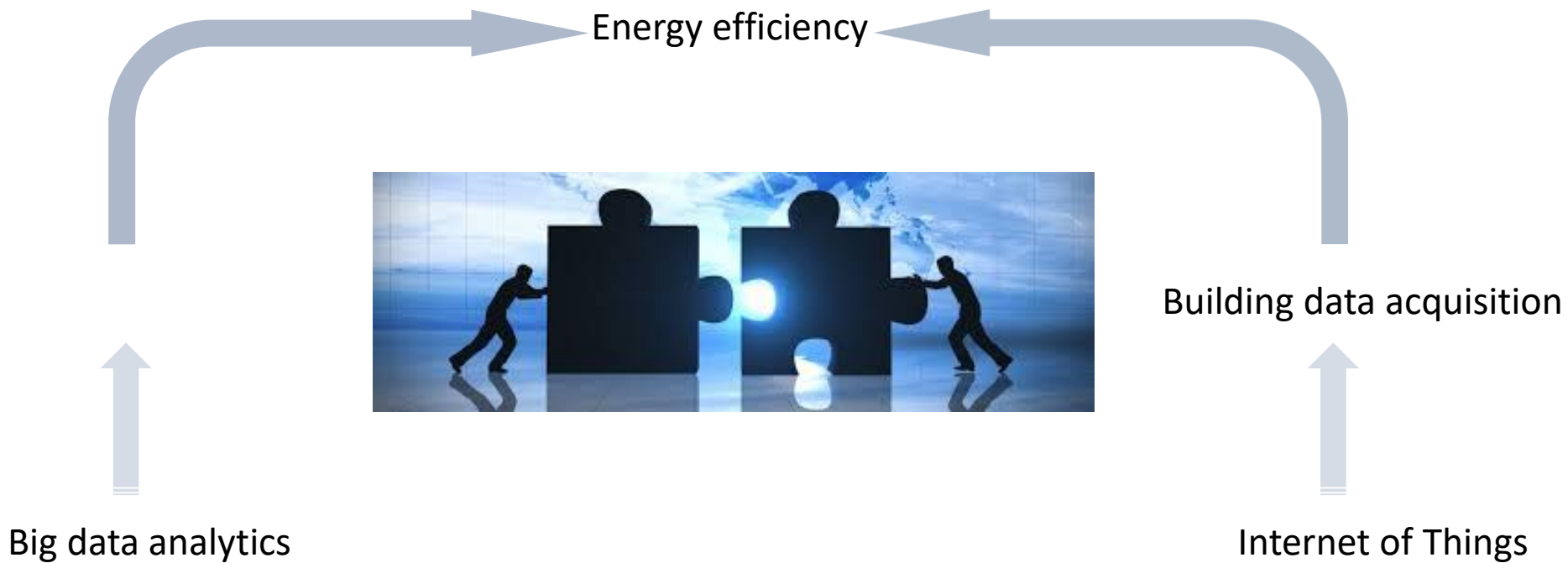


Leverage on
huge BI/AI
investments

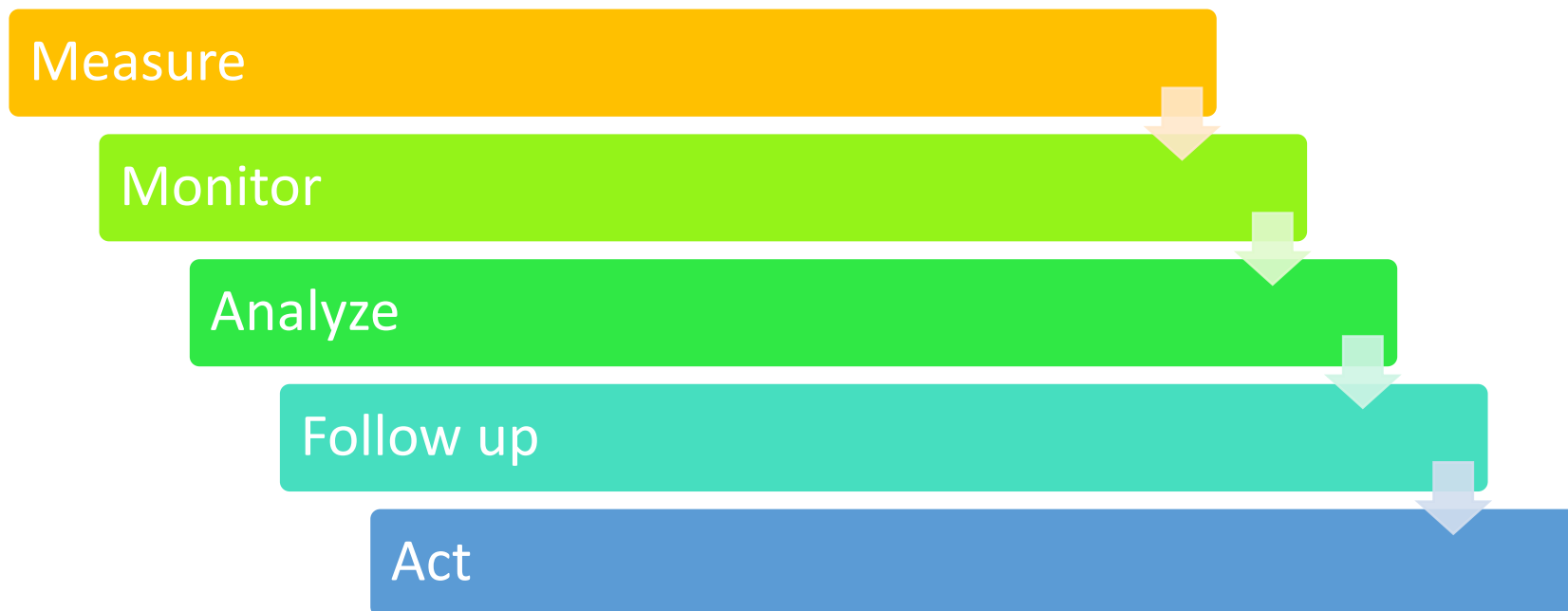


Secure &
scalable

THE VALUE OF CLOUD ANALYTICS



TRANSFORMATIVE TECHNOLOGY



ENERGY EFFICIENCY AS A PROCESS

Measure

Monitor

Analyze

Follow up

Act

Challenges:

Utility meter not enough (Analogue or Smart Meter)

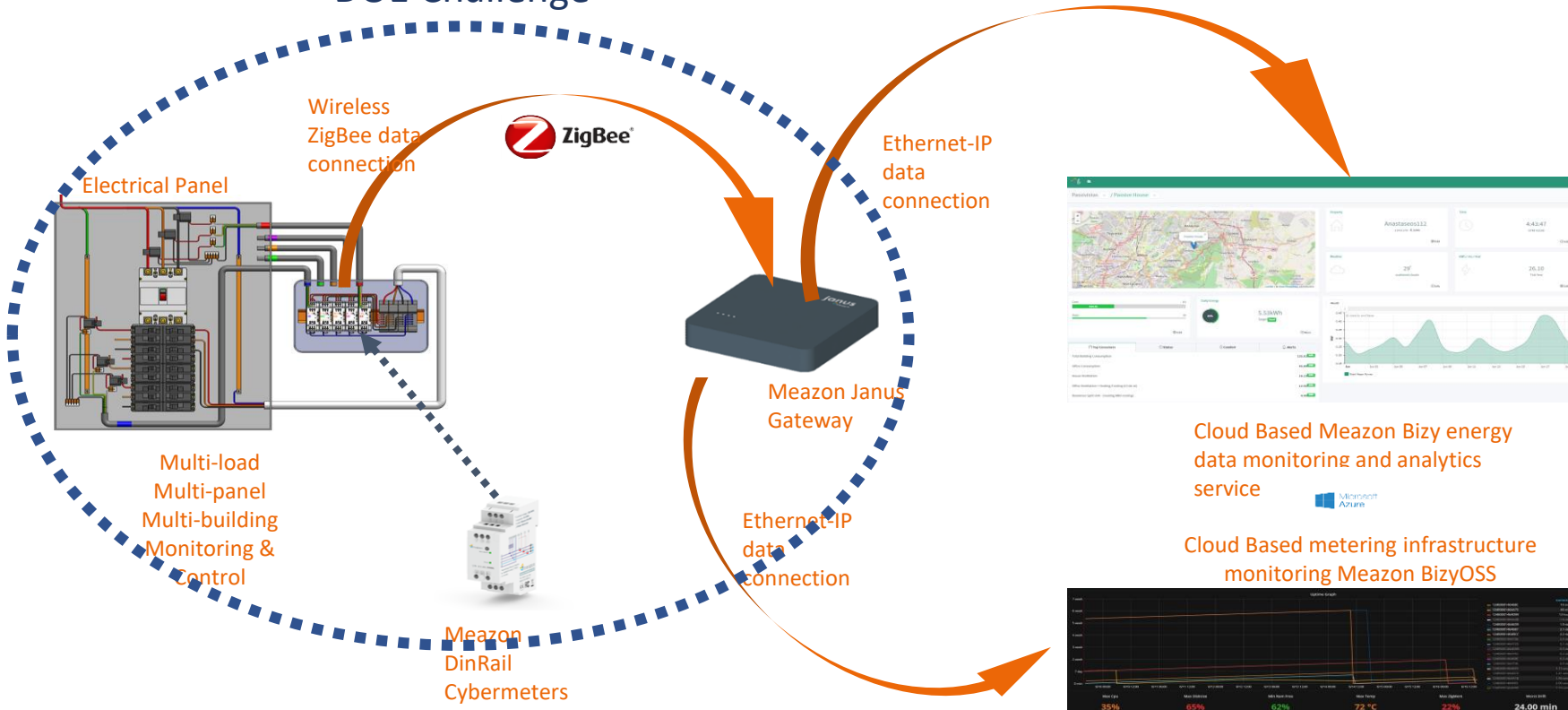
Need to measure per (important) load

Today's submeters are usually: large, expensive, wireline and closed to one vendor

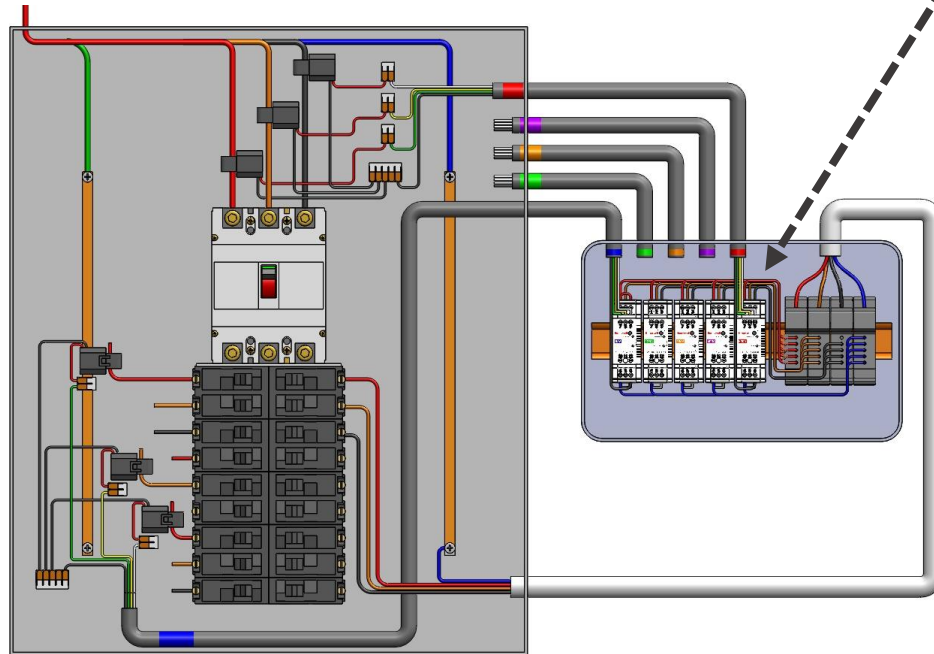
Metering technology not in line with latest IOT trends

MEASURE – DOE CHALLENGE

DOE Challenge



MEAZON ENERGY EFFICIENCY SOLUTION



Miniaturized, powerful Energy cyber-meters with embedded logic

Designed for fast installation

Automated remote commissioning

Measurements from 63A to 2000+A

Accuracy 99%+

Three levels of data redundancy on meter, gateway and cloud levels

Low Total Cost of Ownership (TCO)

MEAZON MEASUREMENT SOLUTION



More than 6.000 lines of embedded SW

Features: robust, redundant, wireless mesh & uniquely small size

Build in data logger & scheduler

WHY WE 'RE DIFFERENT



Linux based powerful Gateway

Fast deployment of 10ths of meters

Local and cloud energy monitoring

Easy loads characterization

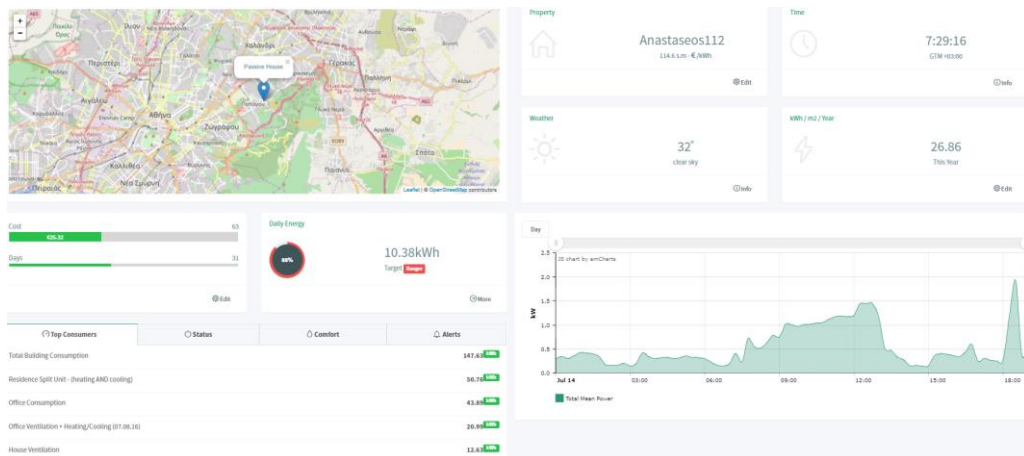
Fully configurable & controllable

Easy maintenance of multi-meter installations

Demand Response ready

Automation workflow scenario builder

POWERFUL IOT ENGINE



Cloud SaaS energy monitoring and analytics designed for geographically distributed portfolios

Energy Analytics services for multi-branch and multi-location organizations

Monitor & follow up post interventions energy data

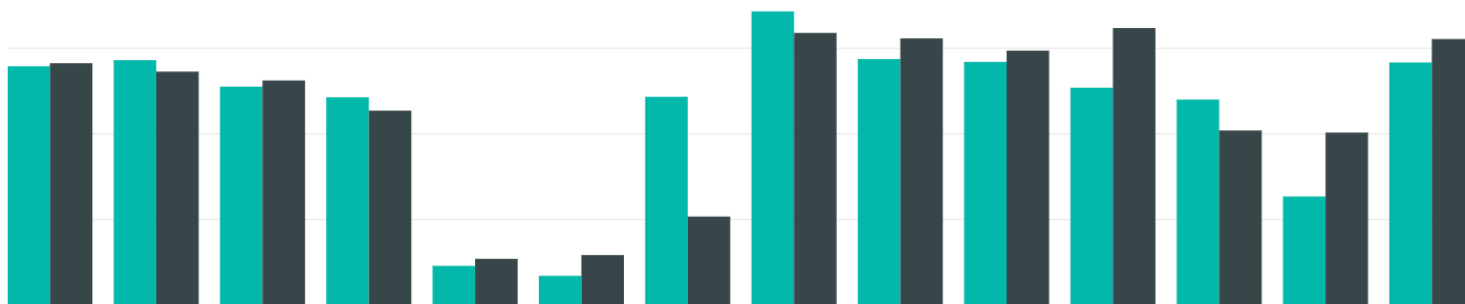
Identify energy trends, baselines and baseloads

Connect on-line services, hardware devices and APIs

MONITOR-ANALYZE-FOLLOW UP-ACT HIGHLIGHTS

Power(W) κατά Date και Meter

Meter ● 102116000118 ● 102116000119

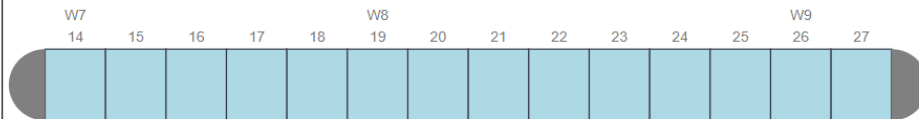


Date

Y Q M W **D**
day

Feb 14 2017 - Feb 27 2017

2017
Q1
Feb
W7



☰ ...

Meter

- 102116000118
- 102116000119

DATA VISUALIZATION EXAMPLE



Exists since 2012

Installations in 5 continents

Meters shipped to date: 10.000 units

Existing contracts for: 20.000 units

Looking for: Distribution partners &
VARs with local market leverage

ABOUT MEAZON

Contact details:

info@meazon.com,

j.gionas@meazon.com,

s.koutroubinas@meazon.com

<http://meazon.com/#contactsPage>

Package 1 (DOE Package): 2xDinRails (63A) + 1xJanus Gateway

Package 2 : Package 1 + pre-installed meters in a board + Installation training + dedicated support + energy data export in excel format

Package 3 : Package 2 + energy data cloud monitoring (1 year) + monthly customized reporting (1 year).

Avg. Delivery time: 10 weeks

ORDERING TRIAL PACKAGES



meazon

measure | monitor | manage

Additional Resources

- **Wireless Metering Challenge Webpage**
 - <https://energy.gov/eere/buildings/wireless-metering-challenge>
- **Wireless Metering Challenge Factsheet**
 - <https://energy.gov/eere/buildings/downloads/wireless-metering-challenge>

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Wireless Metering Challenge



Prototypes were tested at the General Services Administration (GSA) Headquarters in Washington, D.C. (Photo: FORT GSA)

Background

Commercial buildings spend over 120 billion dollars annually on electricity. Sub-metering data provides visibility to building energy use. Better understanding of energy-use profiles can help building owners reduce costs by taking actions to resolve problems identified through data. Where the savings potential justifies measurement, actual consumption data can be used to identify energy reduction opportunities, improve operations, verify improvements, and assess system performance. Although metering systems do not directly improve energy efficiency, they enable focused actions that can allow organizations to achieve energy management goals.

Historically, installing a metering system in an existing building has required expensive hardware, retrofitting, and new software. For many energy management applications, the investment in metering is too significant to be cost effective, thus leaving energy conservation opportunities unaddressed. To remedy this cost barrier, the Better Buildings Alliance issued the *Low-Cost Wireless Metering Challenge* in June 2013.

Objective of the Challenge

The Challenge objective was to encourage market introduction of a cost-effective, wireless system that could measure electricity use at various locations in a building and wirelessly communicate the data to a local collection point.

Attributes of the desired system included:

- Low cost meter with a target cost under \$100
- Electrical energy measurement
- Reliable wireless data transmission to an onsite collection point
- Operation independent from existing building internet and intranet networks as well as the cloud.

Ease of use was another desired characteristic of wireless metering systems resulting from the Challenge, and included:

- Ease of installation
- Ease of start up
- Ease of learning system operation
- Ease of data collection.

The Challenge specification contained features that met fundamental government and private industry needs including security.

Industry Response to the Wireless Metering Challenge

Initially, 30 companies indicated interest in the Wireless Metering Challenge. A phased review approach was used to evaluate the candidate technologies. For Phase 1, firms were asked to affirm their products' qualifications. Several firms met the basic criteria and approached the cost target to qualify for Phase 2. One system developed by Maxon was installed and tested in Phase 3.

Key Takeaways

- Better understanding of energy-use profiles can help building owners reduce costs by taking actions to resolve problems identified through metered data.
- Scalable, low cost wireless metering systems allow small initial installations that can easily and inexpensively be expanded in the future to measure additional loads.
- Low cost, wireless metering products that measure energy consumption, operate independently from the building's communications systems, and are easy to install and operate are available from at least one supplier.
- One product produced by Maxon passed all requirements of the Wireless Metering Challenge.
- The Technology Challenge process can spur companies to introduce new products to the market.

BUILDING TECHNOLOGIES OFFICE

Polling Questions

(slide not visible on Thursday)

- If you have submetered or are submetering, what challenges are you facing?
- What new opportunities for energy savings have you identified from the data?
- Would you like to connect directly with Meazon after this call?

Q & A



BETTER BUILDINGS WEBINAR SERIES

2017/2018 MONTHLY SERIES

Join us September through April to learn about partner success stories you can implement in your buildings to save energy, water, and money. Hurry and register; you won't want to miss this.

Additional Questions? Please Contact Us

betterbuildingswebinars@ee.doe.gov

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