



ACEEE NATIONAL SYMPOSIUM ON MARKET TRANSFORMATION
WASHINGTON D.C. APR 22, 2015

Exploring Real-time Measurement & Verification

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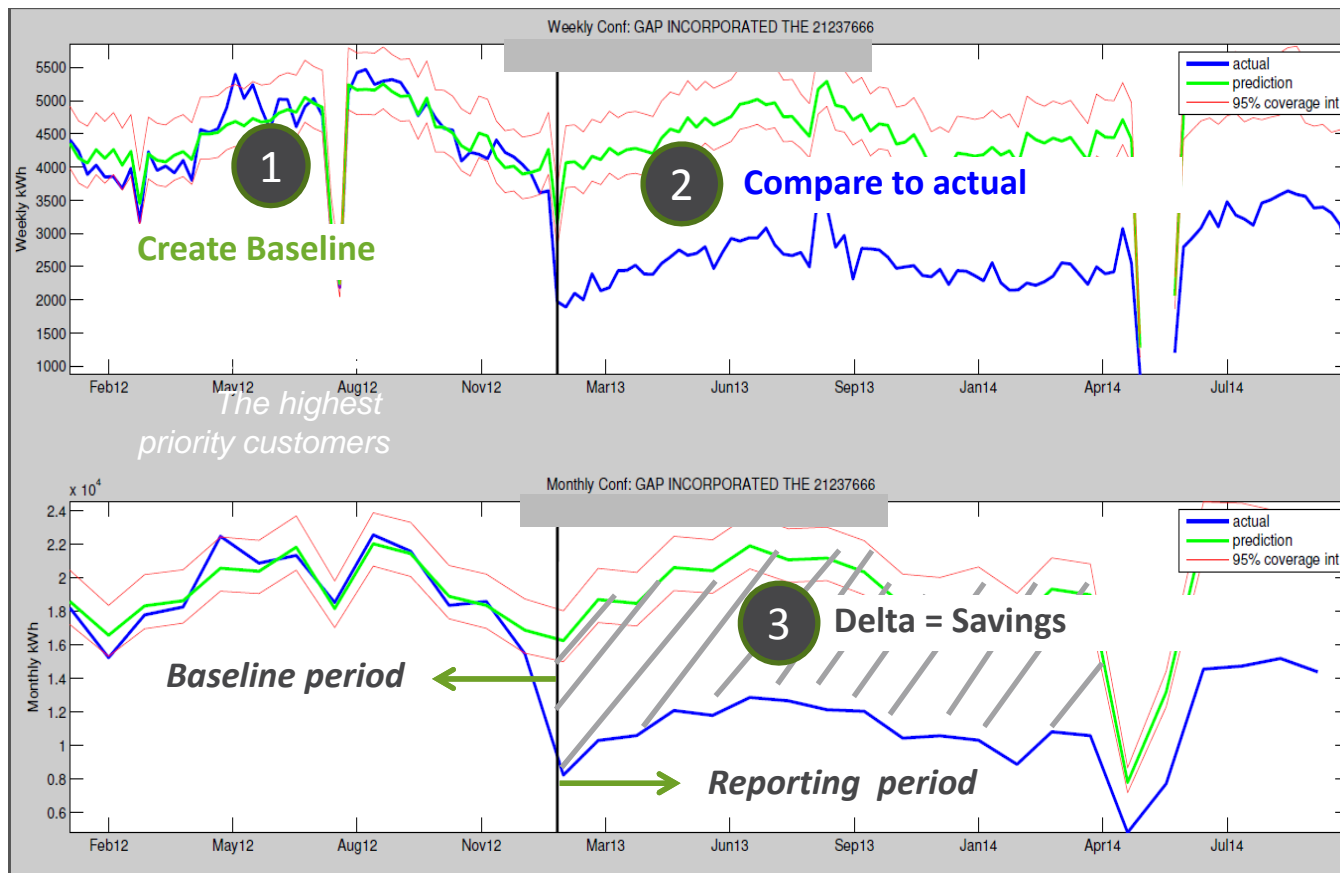
FIRST FUEL
ANALYTICS | BUILDING SCIENCE | SOFTWARE

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“REAL TIME” M&V METHODOLOGY

Industry consensus: Lack of verifiable savings at scale is one of the biggest obstacle to widespread energy efficiency adoption.

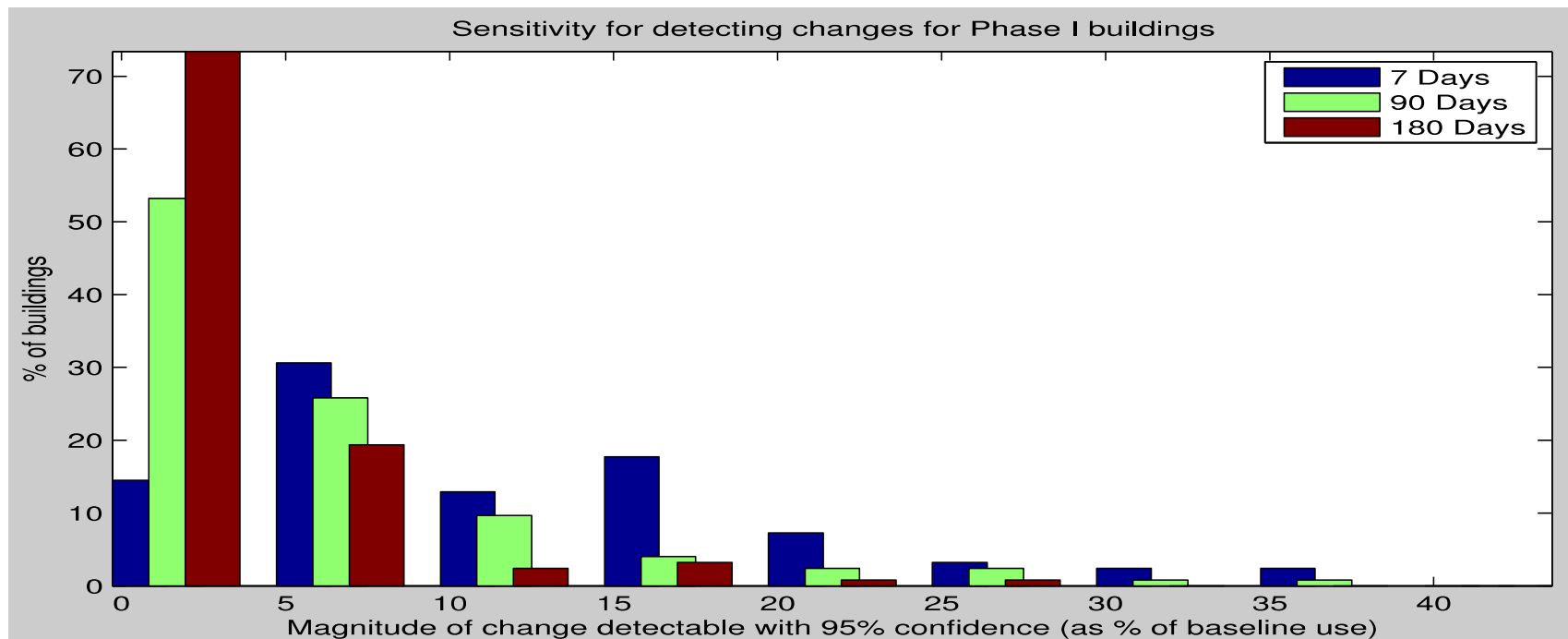


Challenges

- Baseline Accuracy
- Anomaly Detection
- Scalability

CHALLENGE #1: ACCURACY

QUESTION: How accurate is the technology? If I have an ECM with an expected 5% savings, will this technique detect/validate it?

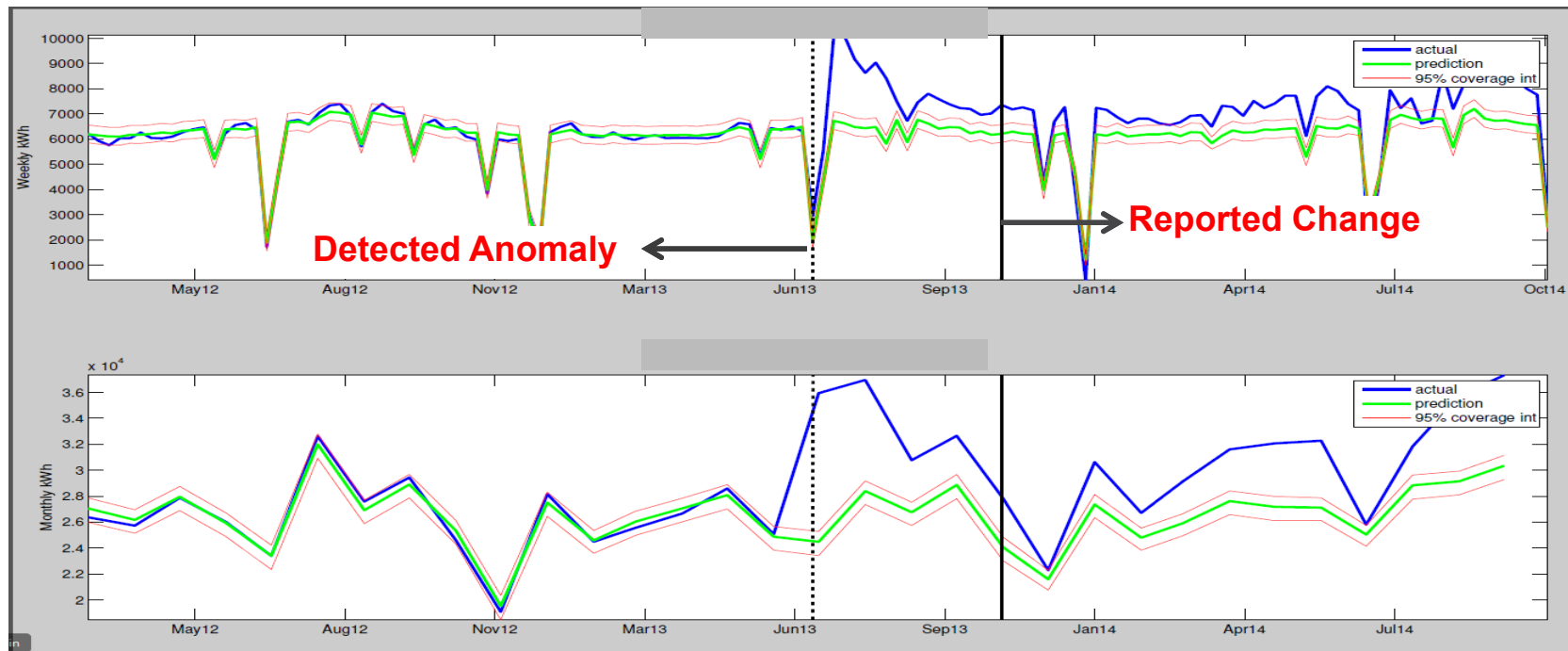


ANSWER: New techniques (e.g., from FirstFuel) are very accurate.

With new techniques, for >75% of a portfolio, energy savings of <5% can be reliably detected.

CHALLENGE #2: NON-ROUTINE EVENTS

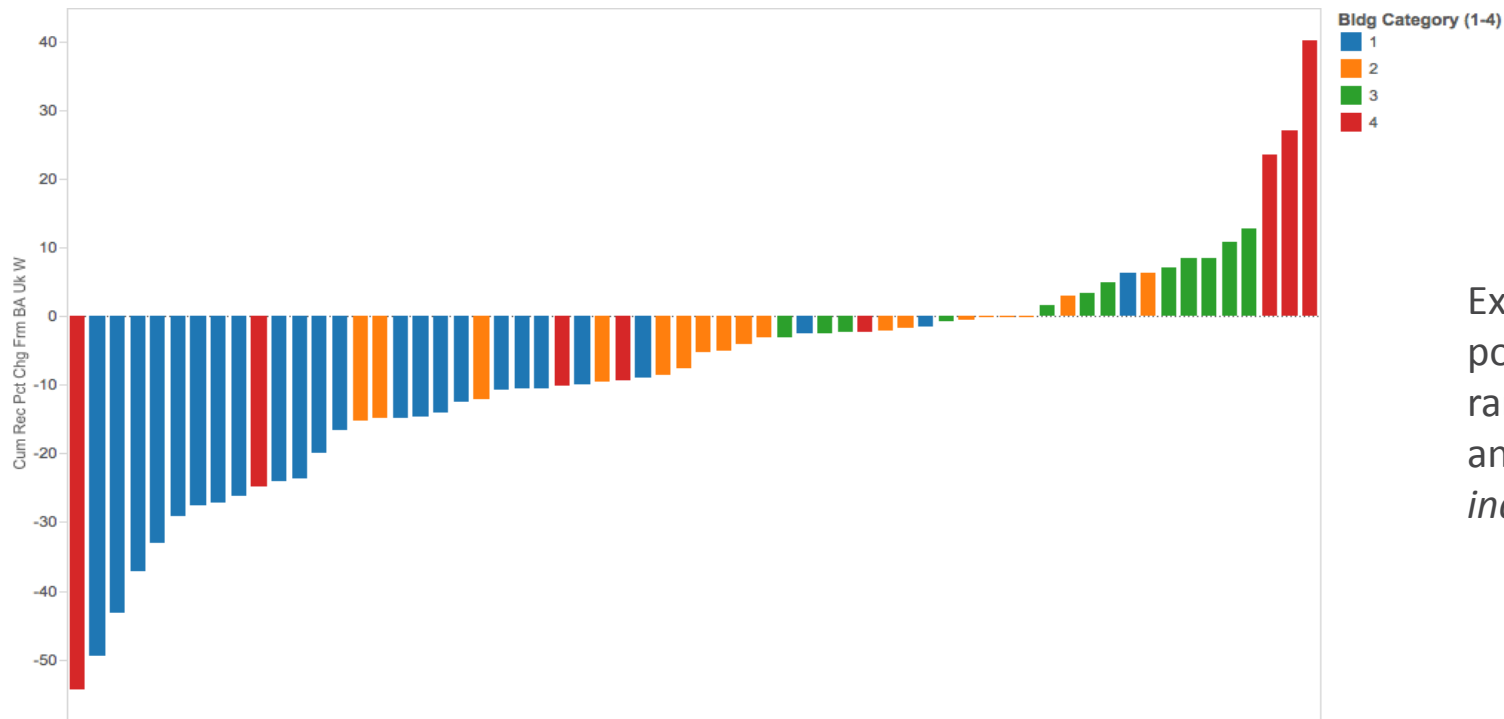
QUESTION: How do you deal with one-off, non-routine events *at scale*? Especially as these events are very common.



ANSWER: Statistically rigorous anomaly detection solutions that precisely identify events and quantify their impact.

CHALLENGE #3: SCALABILITY

QUESTION: How do you “do” M&V on a massive scale?



Example: Across portfolio, wide range of savings and some *increases*.

ANSWER: Analytics-enabled techniques should be an essential component of large-scale (“universal”) M&V.

MARKET APPLICATIONS OF REAL TIME M&V

1. Quantify Net Savings of EEMs at building and portfolio level.
 - By Building Type, Measure Category, Geography, etc.
2. Evaluate Grid Level EE Impact
3. Geo-targeted continuous monitoring
 - Pinpoint buildings and geographies where savings have dropped off
 - Enable greater alignment between EE programs and savings
4. Catalyze customer engagement to achieve desired savings

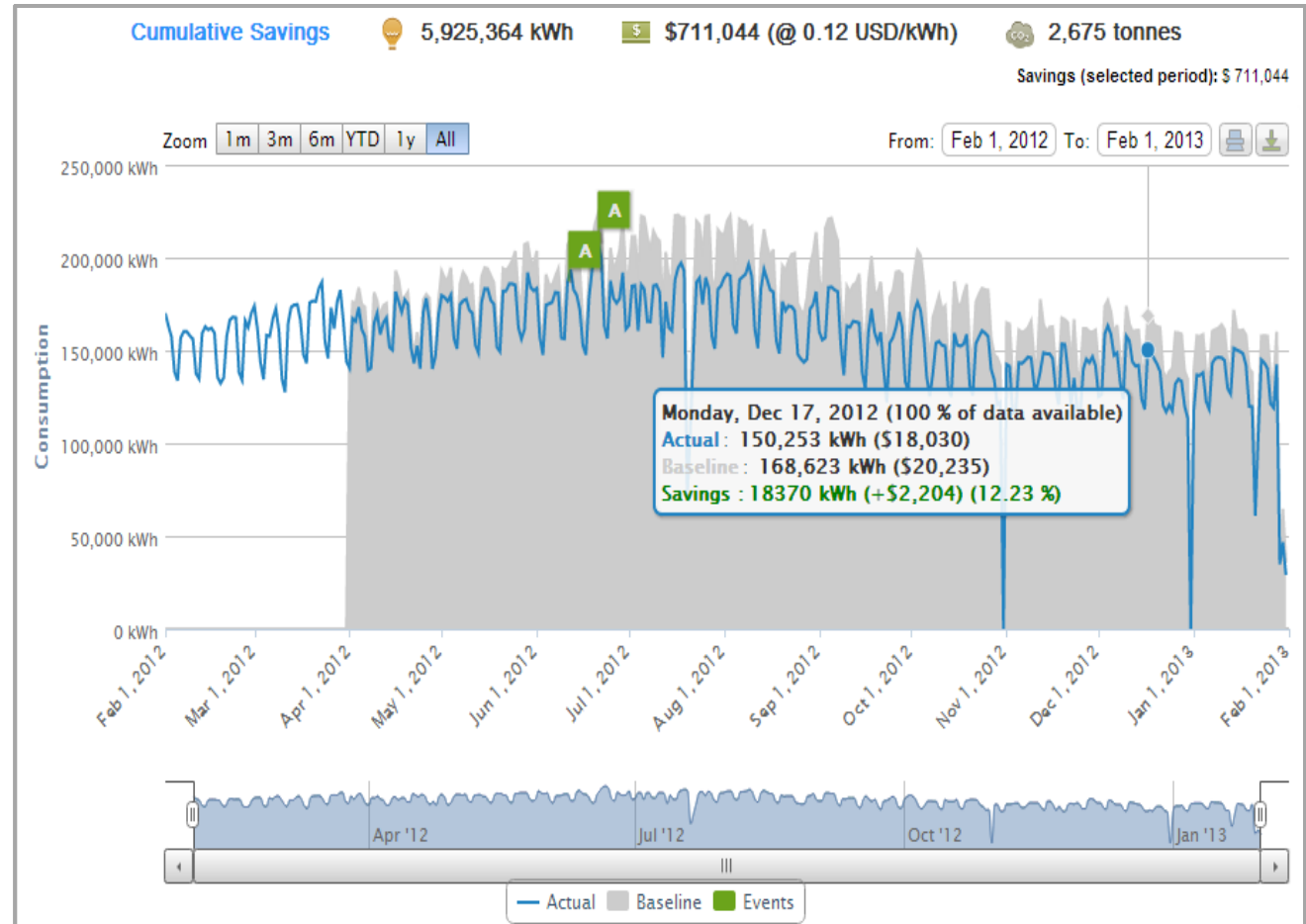
CASE STUDY 1: COMMERCIAL WHOLE BUILDING PERFORMANCE



Theory of Change

Building performance data, software technology and benchmarking can be leveraged to make efficiency programs:

- ✓ More productive & cost-efficient
- ✓ More attractive to customers
- ✓ More transparent



CASE STUDY 2: EE GRID IMPACT

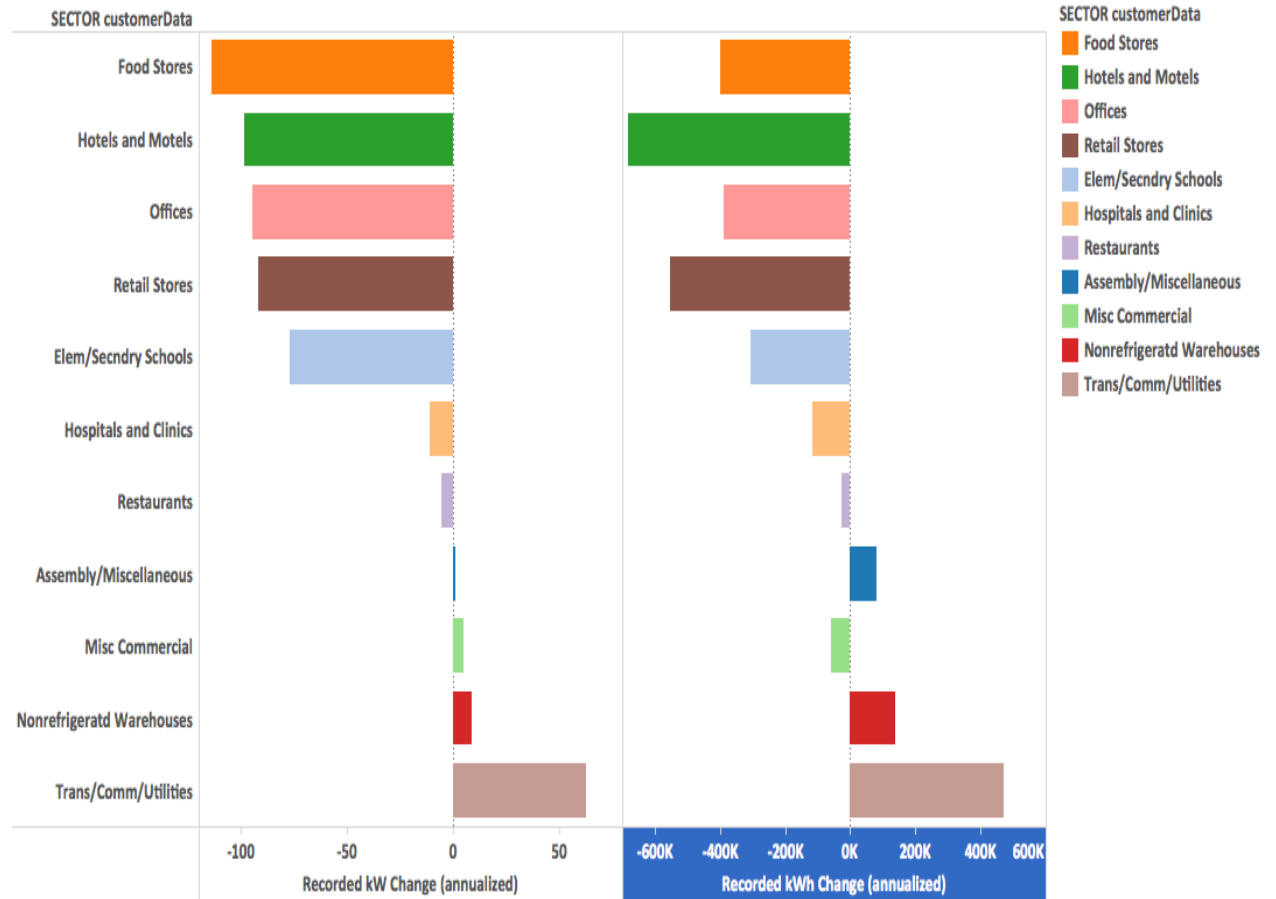


Theory of Change

Leverage advanced Analytics to:

- ① Determine individual building level savings from EEMs.
- ② Roll them up at portfolio level to determine Grid-level impact:

- ✓ Validate ex-ante estimate under actual, real-life operating conditions.
- ✓ Automatically detect and estimate effect of one-time events.
- ✓ Proactively address demand reduction opportunities across target territory.



* Preliminary Results from 62-building pilot.