

NESEA Conference 2017

Using Large-Scale Energy Simulation Tools to Improve Energy Efficiency Rollouts

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“I’ve Got a Portfolio...and now I Want to Rollout an IoT Strategy...”

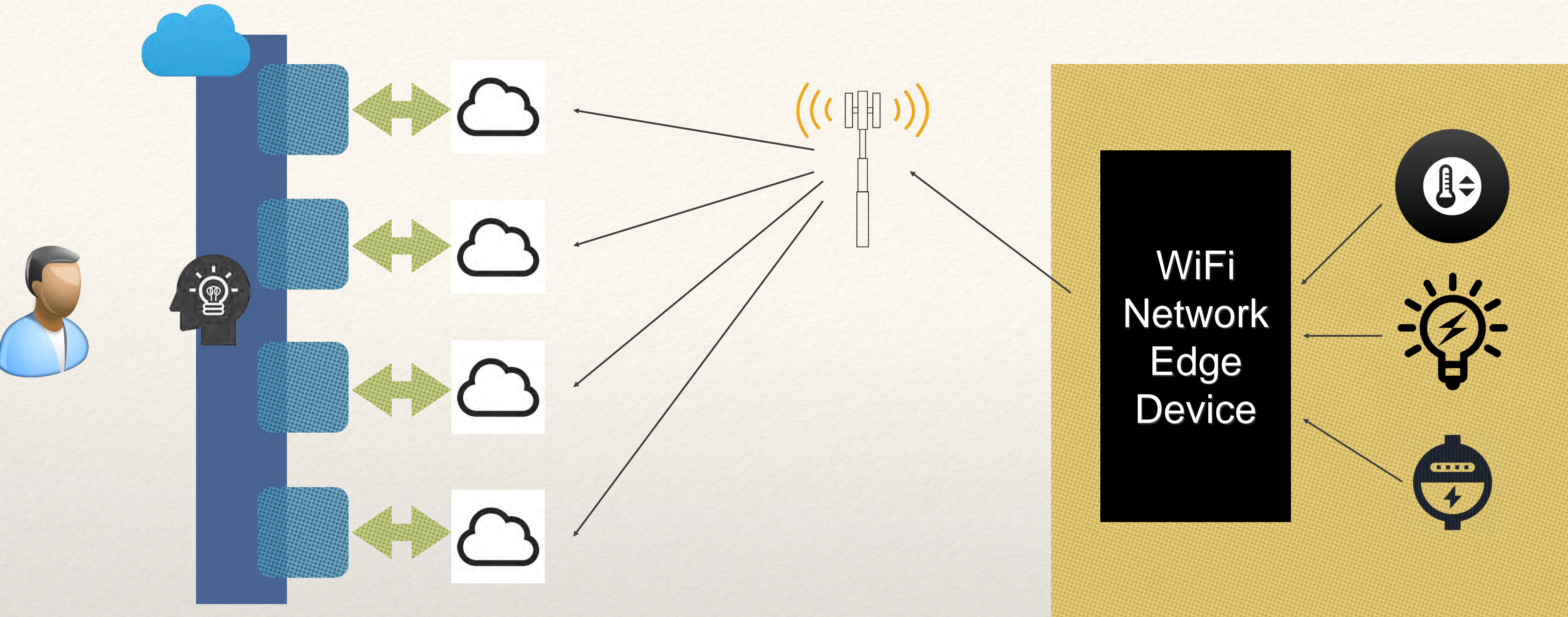
- ❖ Canadian Bank with a portfolio of 1000+ locations across the entire country, including remote locations
- ❖ Data about the buildings primarily consisted of:
 - ❖ location
 - ❖ historical energy bills
- ❖ The vision of a powerful IoT strategy:
 - ❖ no vendor lock-in
 - ❖ cheap, commercial off-the shelf devices
 - ❖ internet security a top concern



Before we release a large sum of money...a Proof of Concept...

- ❖ Bank Approves a Proof of Concept
 - ❖ Study a wide array of COTS IoT devices
 - ❖ Limit the study to a single ASHRAE Climate Zone
- ❖ We'll Provide you with a small sample of Canadian Commercial Buildings...
 - ❖ Budget for 4 buildings
- ❖ Study goal: *"Tell me what IoT technologies will work with the remainder of my building stock, given what we learn in this Proof of Concept?"*



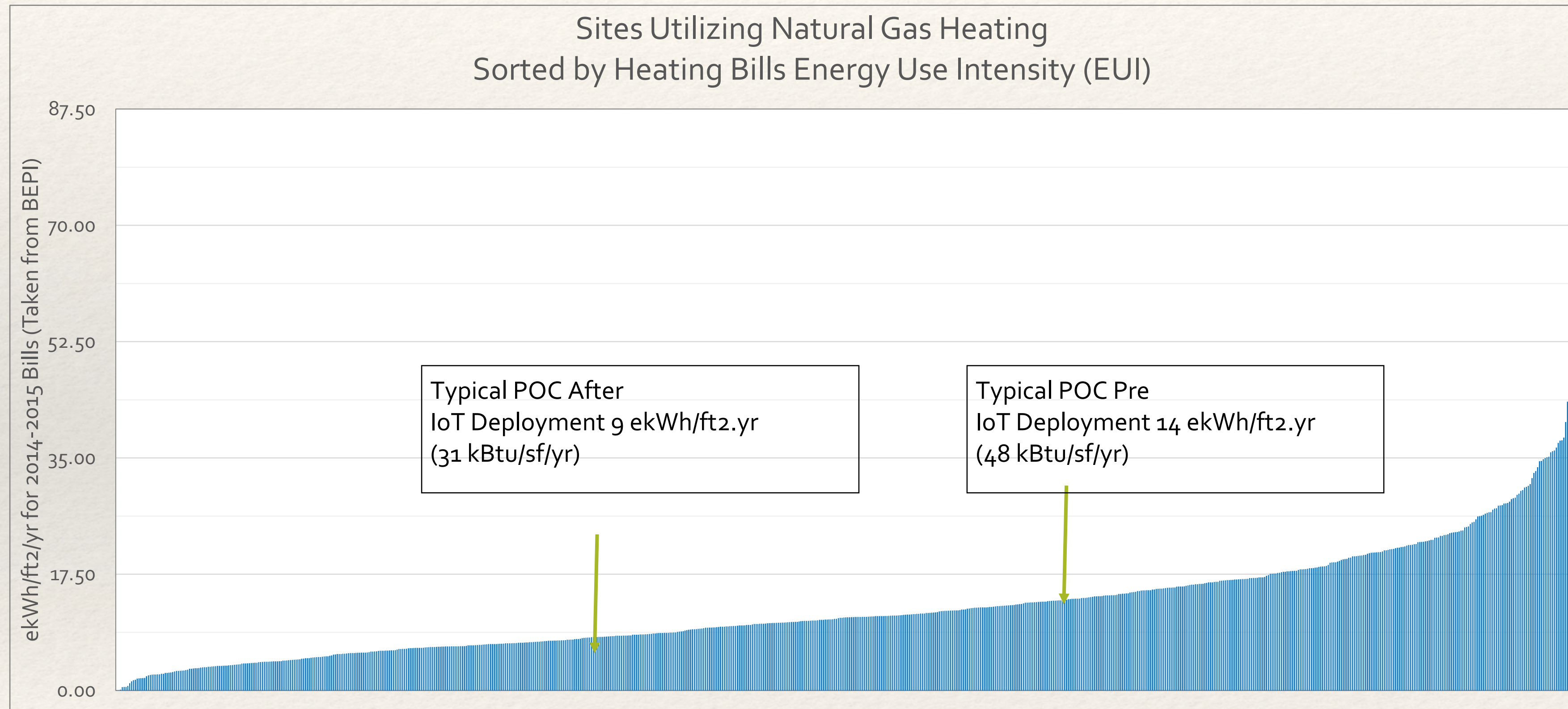


A Scalable Edge Network and Cloud Analytics Platform

IoT Solution

Network Diagram

Quick Overview of the Results

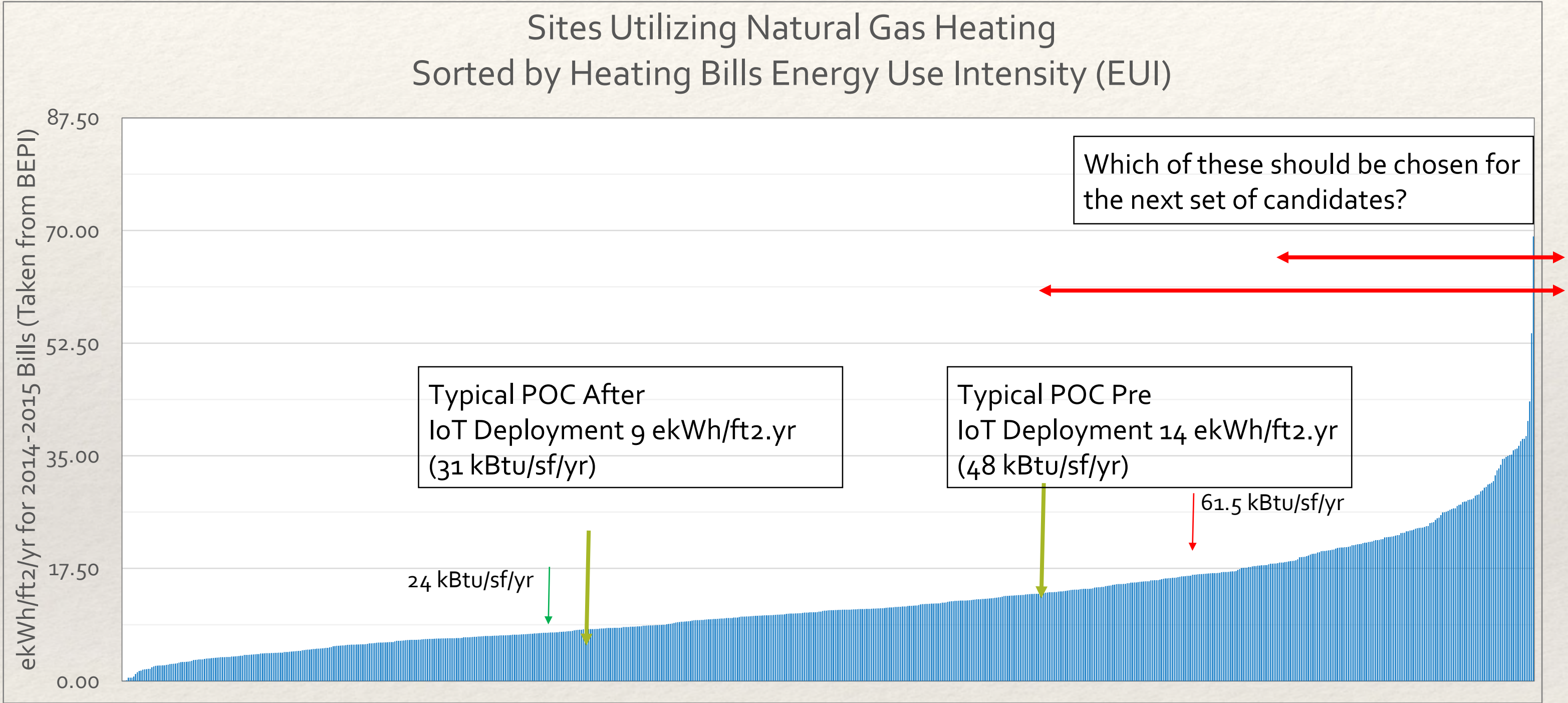


Crossing the Chasm

- ❖ Remember the study goal: “Where else will this technology work?”
- ❖ Becomes an exercise in picking new locations: Extrapolating from 4 Buildings -> 1000 buildings?
- ❖ Given Historical Energy Bills and Location Only
- ❖ Because it is a financial institution, there needed to be some sort of quantitative analysis of the proposal.



Picking New Locations: Finding The Right Selection of Candidates



A Risk Mitigation Exercise

Two approaches:

1. Traditional Statistical Outlier Tests
2. Building Energy Simulation utilizing US Department of Energy research tools

FACTORS AFFECTING HEATING BILLS



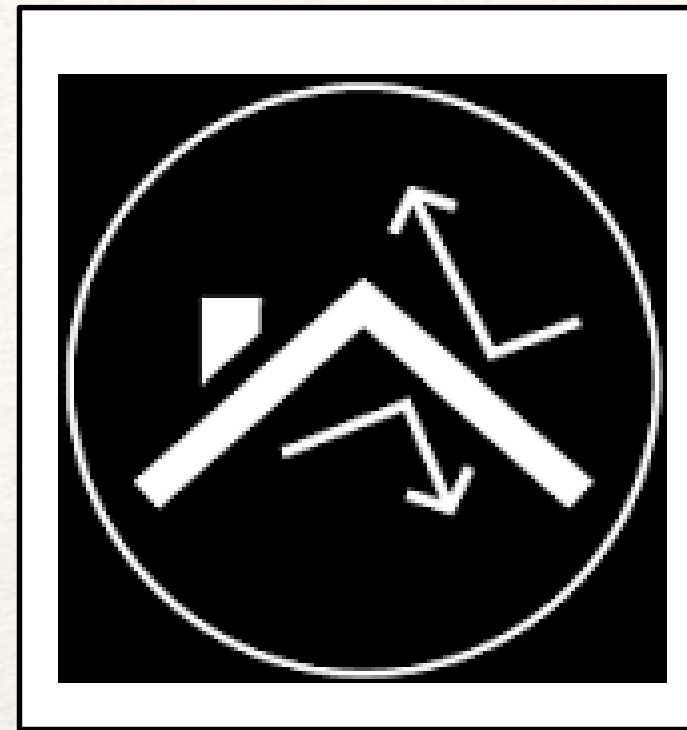
Infiltration

- customer turnover
- envelope leakage



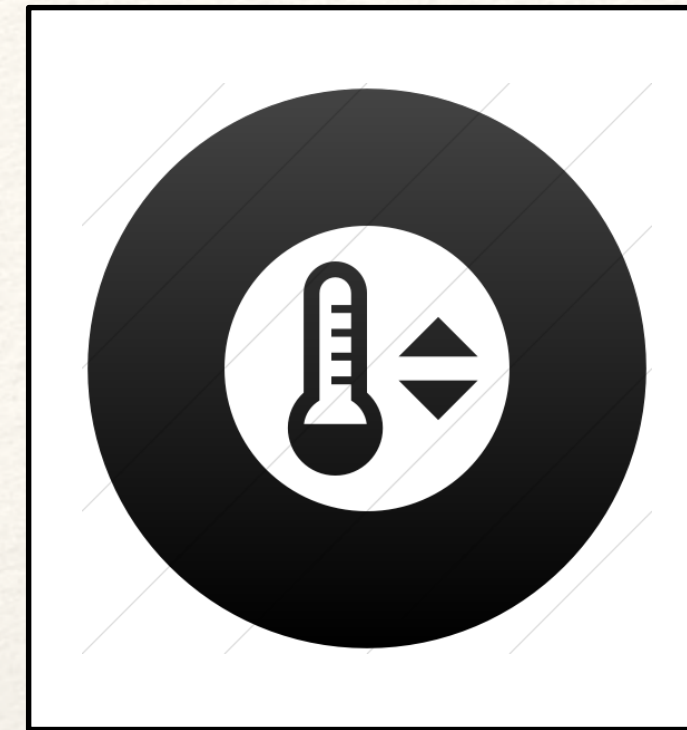
Equipment Failure

- Airside damper failure



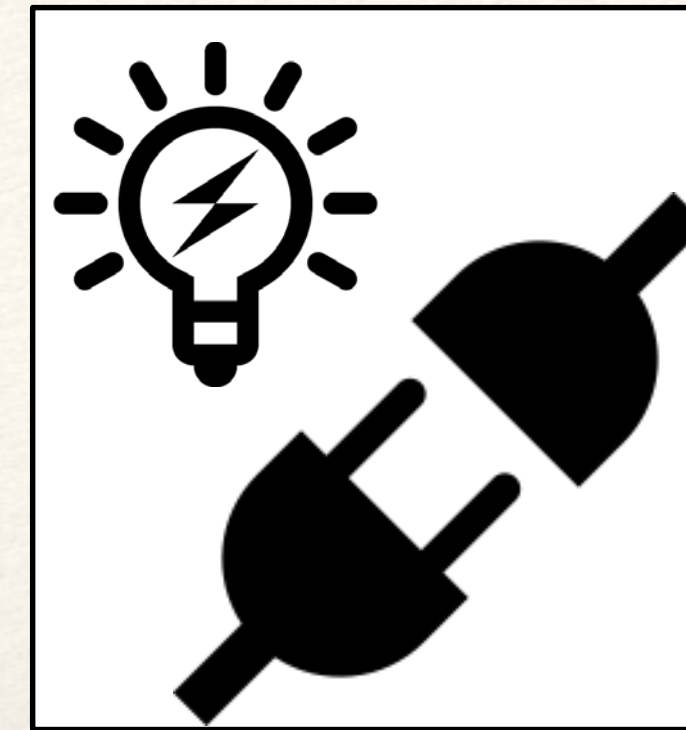
Insulation

- More or less insulation
- More or less Windows
- Quality of the Window



Thermostatic Controls

- Occupant Behavior



Internal Loads

- Lights
- Plug Loads



Climate

- Building Location

Approaching the solution as a Multi-Variate Study

What if our Assumptions are Wrong?

Playing out all the assumptions....