More Value to Metering Than Ever Before

2015 ACEEE Industrial Summer Study

Nick O'Neil, Energy 350
Ray Hawksley, Energy Trust of Oregon

What We Will Talk About

- Why do programs meter in the first place?
- What is involved with metering and what are common barriers?
- Demonstrating value with examples from the field
- What is the upfront and long-term value to metering? Value from 3 perspectives:
  - End-user
  - Utility efficiency program
  - Regional planner
- What to do with all this data?

Who Meters Now?

Understanding when it happens

Sometimes Information Is Hard To Get

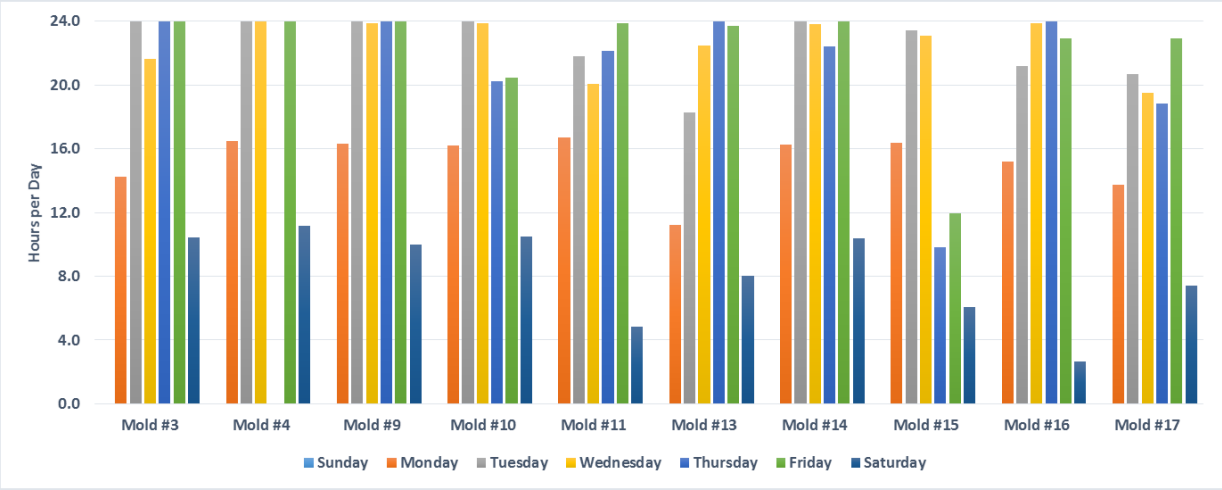
Talking to facility staff is vitally important to understanding facility operations

But reading motor nameplates is important too

Without this data, and no metering, engineering estimates are likely to be the next recourse

Engineering Estimates Aren't Always Reliably Accurate

- Site visit with facility manager notes mold operations are 6 days a week
- 17 mold machines said to run "most of the day" (~20 hrs/day, ~6,200 hrs/yr)
- Metered data on sample of molds showed variation by day and mold number
  - Range from 3 hrs/day to 24 hrs/day, ~5,600 hrs/yr average



- 600 hrs/yr difference, but with 1,900 HP, ~800,000 kWh difference in energy use

When Will We Typically Meter?

- Facility manager has little time to talk to us about usage/operations (or the site doesn’t have a facility manager)
- Energy use of systems closely tied with production schedules or fluctuating ambient temperatures
- Missing information to inform a reliable engineering estimate
- No control system present (or piece of equipment not on existing control system)
- Control system **IS** present (don’t always trust information being displayed)
- Customer has a hunch about the operation of a piece of equipment
- Customer is interested in data on a specific piece of equipment

What Is Involved With Metering?

And some common barriers

First things first

You need to know what you're getting into

Safety is a primary concern for all involved

Continual operation of equipment is also of primary concern to the site

Coordination with facility staff is critical, especially the electricians

A Few Barriers That Can Exist

Equipment overuse

Nothing to attach to

Broken equipment

Other Common Barriers

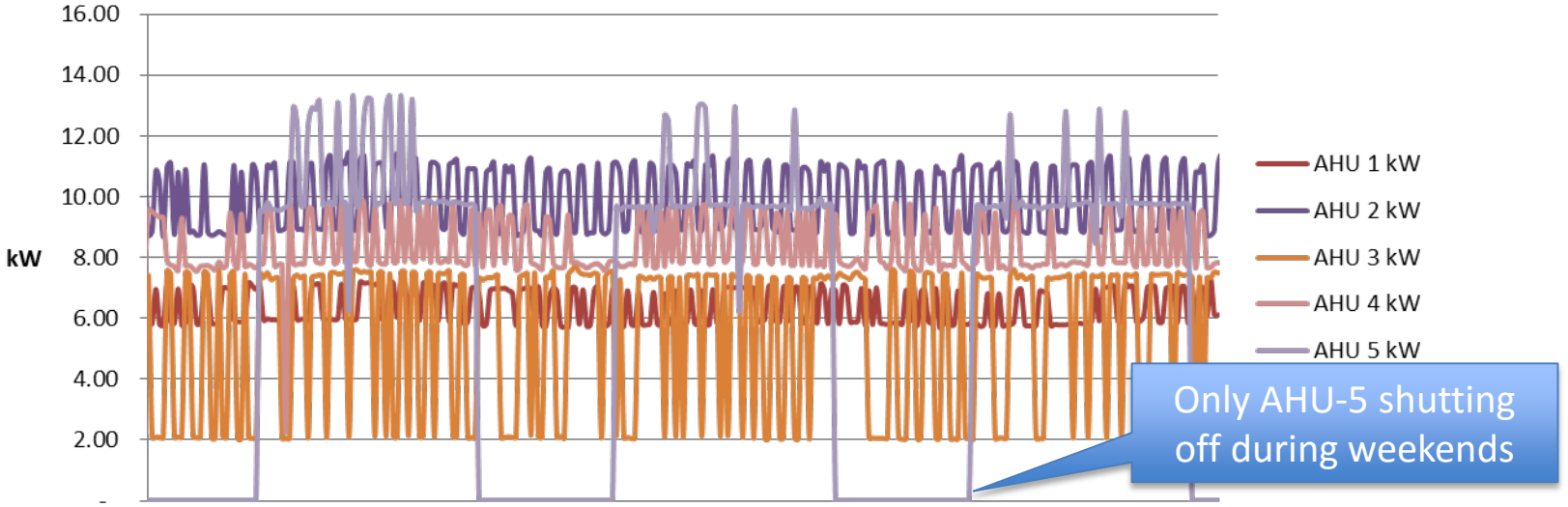
- Electrician is busy and unable to assist with metering install
- Unable to shut down equipment to safely install data loggers
- Limited number of data loggers available to deploy
- Logger failure after being deployed (personal favorite of engineers)

As A Rule, These Concerns Have Not Actually Been Barriers

- Participant unwilling to allow us on site during pre or post period
  - Most of the time the pre period is the easier to manage
- Electrician unwilling to install metering equipment
- Participant unwilling to let us see/use the data
- Participant uninterested in results

How Long Should You Meter?

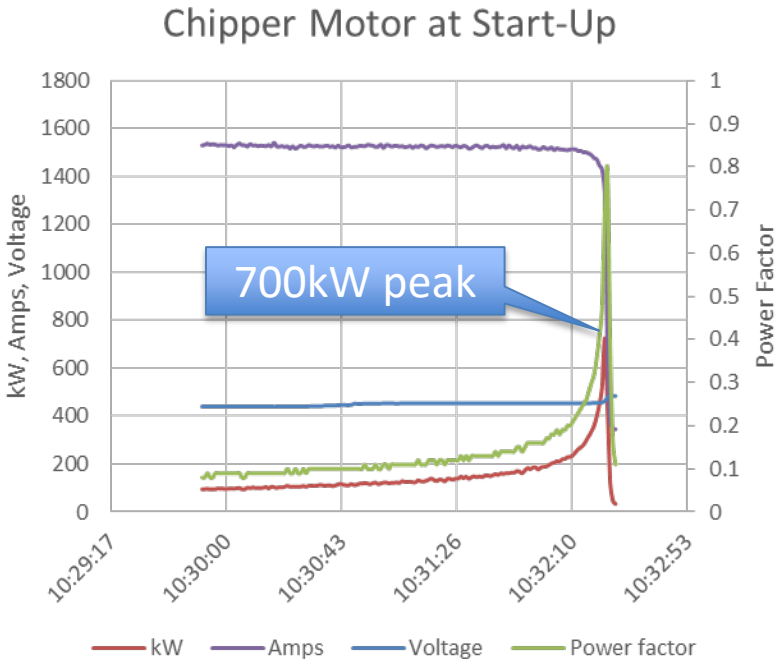
- Depends on each unique site
- Generally 2 weeks establishes a baseline (as long as you get 2 weekends)
- Longer is better if possible
- Seasonality is important for equipment highly dependent on temperature

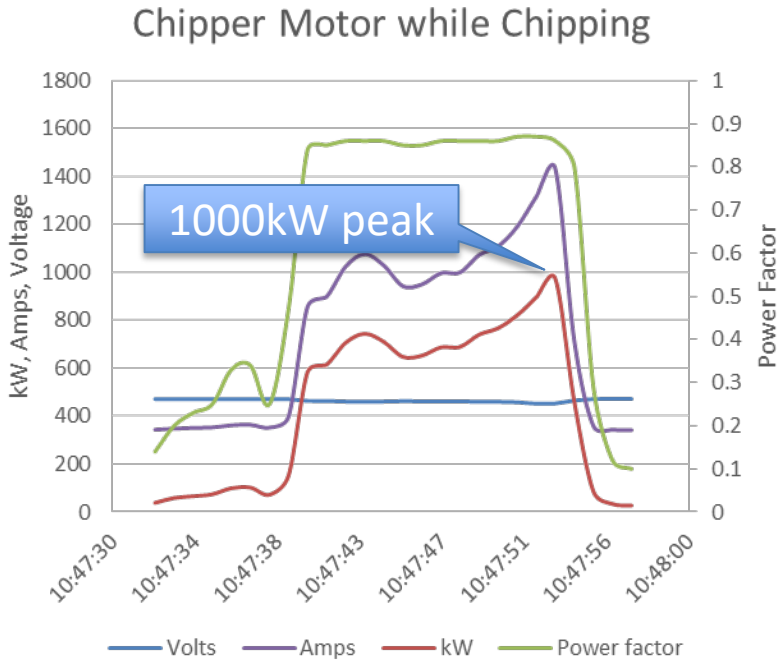


Examples From The Field

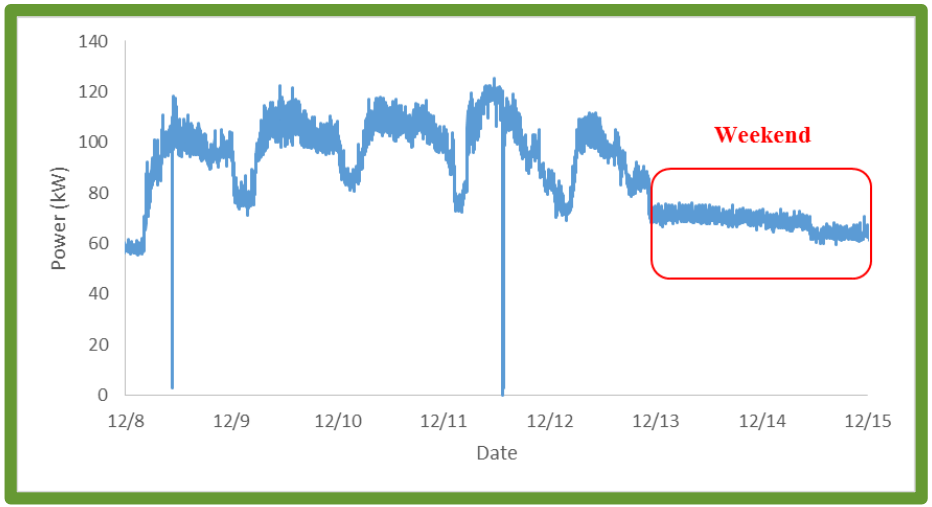
Where metering has proven to be valuable

Wood Chipping Example





Customer was ready to invest in (2) 600HP motors to avoid kW spike they thought occurred during startup

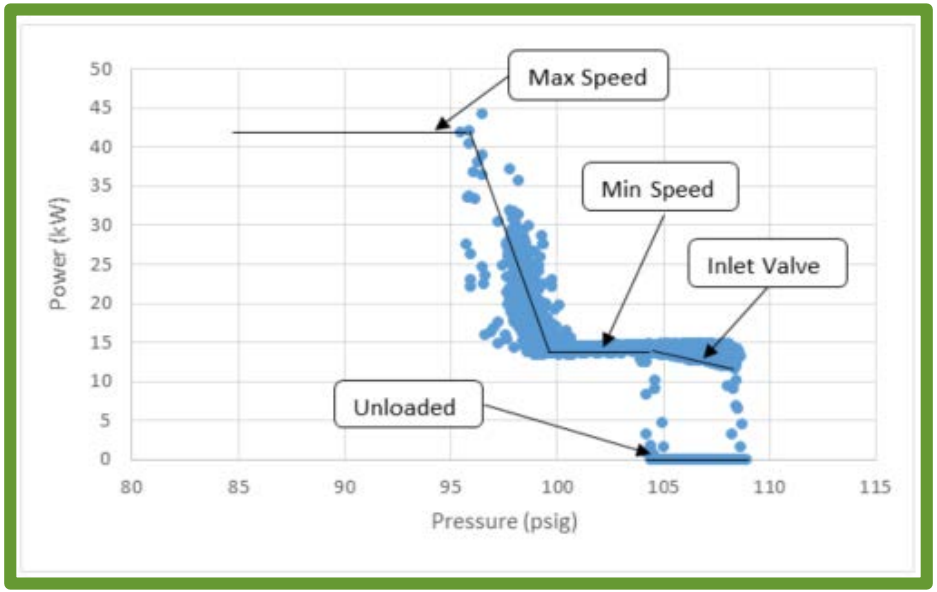


Weekend Shutdown

Common case where facility believes equipment shuts down over the weekend

In this case, compressor still operated at reduced load

Control system indicates unit is off even when it's not



Equipment Is Already Efficient

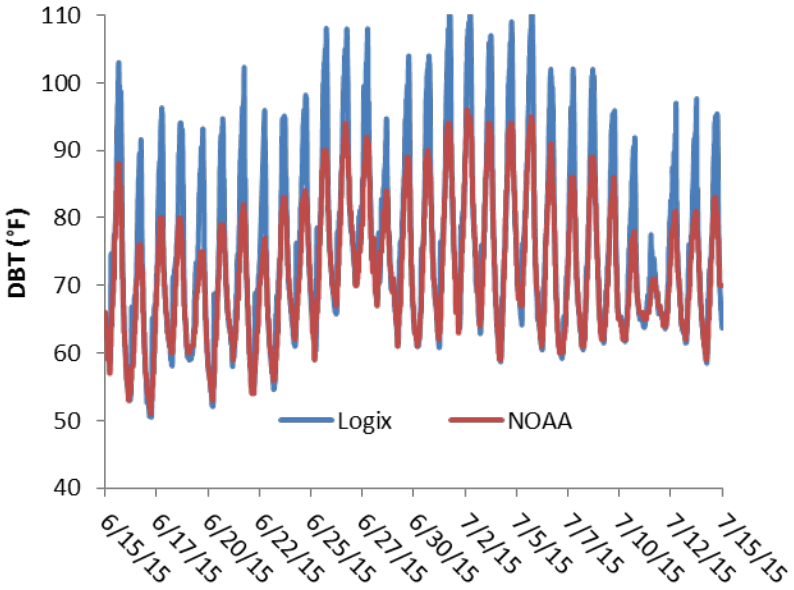
VFD installed on 50HP air compressor to vary speed

VFD worked, but compressor also used inlet valve modulation at low speeds

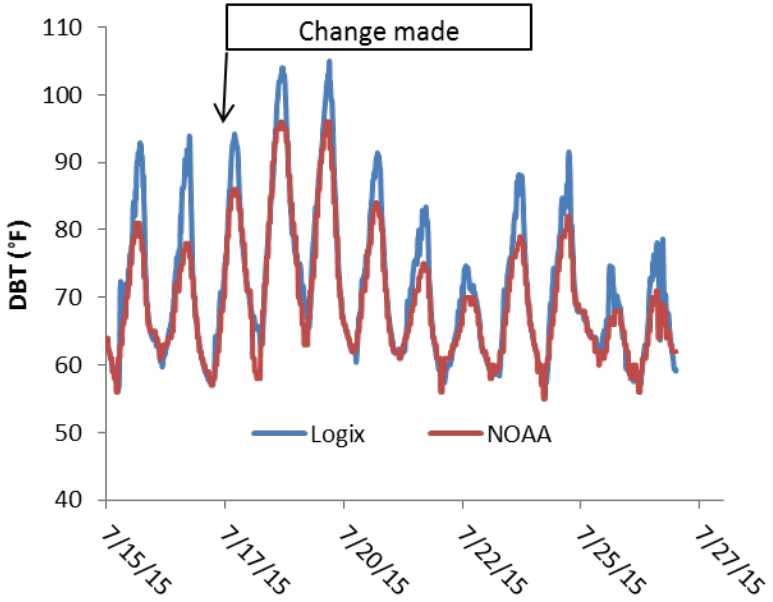
Metering showed that unit could be fully unloaded when high pressure setpoint was reached instead of running compressor

Overlooking Common Items

Local weather vs. Roof weather



Moving O/A sensor out of direct sun



Outdoor air weather sensor drives head pressure control on condensers

Value Among Different Entities

End-User / Utility Program / Regional Planner

Value To Metering In The Utility Efficiency Program Model

Immediate Value

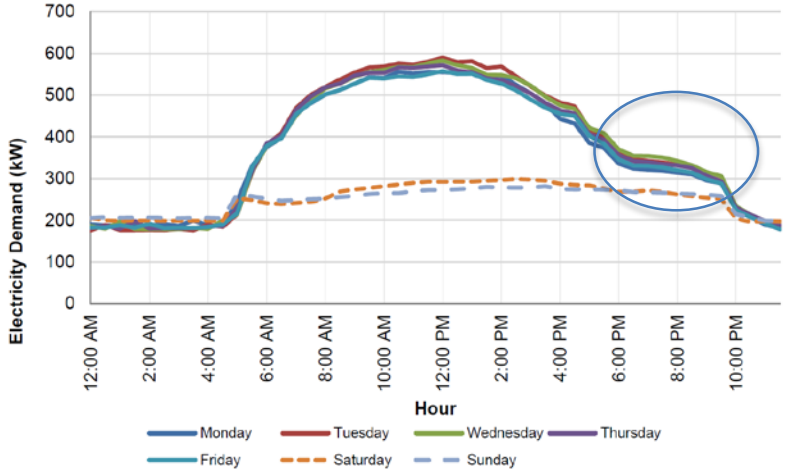
- Better insight into facility operations
- Alert the participant to operating deficiencies
- More reliable savings estimates developed
- Savings are more reflective of actual bill savings to the participant

Long-Term Value

- Lower risk of assumptions being invalidated during evaluation
- Increased knowledge of site and lower cost to the program for future projects
- Highlighting future savings potentials
- Building knowledge bank for future projects with similar operations where metering may not be as feasible

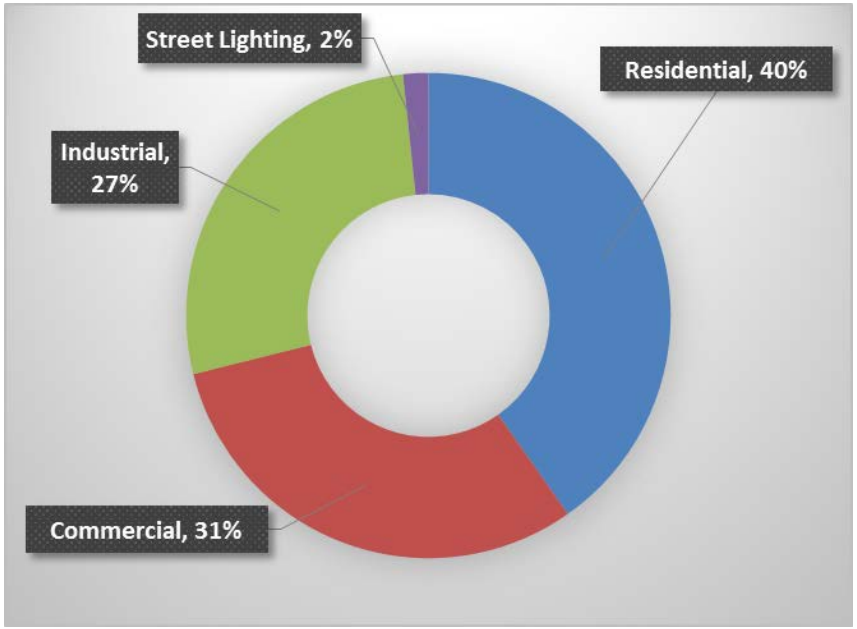
Typical Example Of Immediate Value

- School concerned over higher than expected energy bills
- Whole building interval meter data available for entire year
- Average annual data indicated larger than expected nighttime use
- Determined that custodial staff turned on all lights for most of the night
  - School had practices in place to turn off lighting over the weekend
  - Also discovered that HVAC & lighting was not scheduled off during summer school

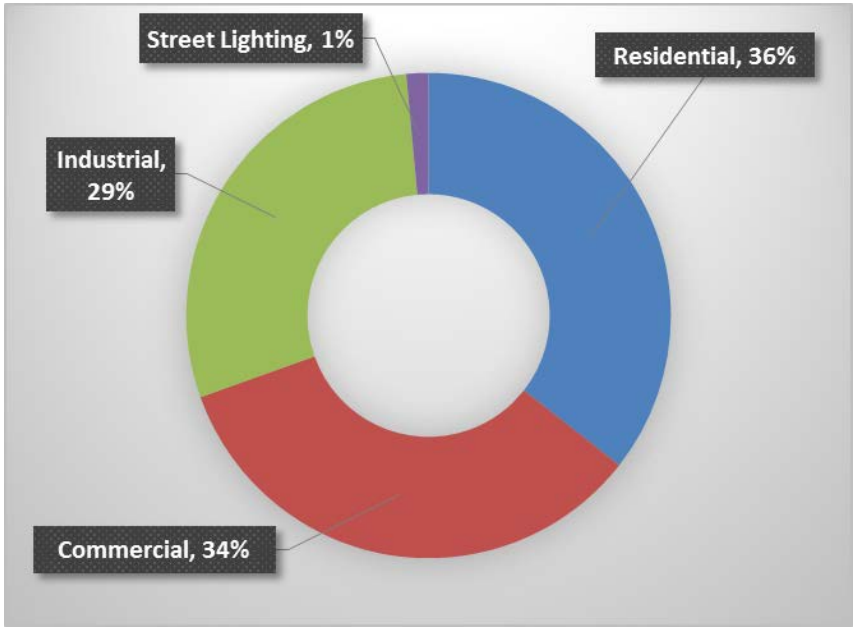


NW Regional Outlook

2012 Actual Load Splits



2035 Load Forecast



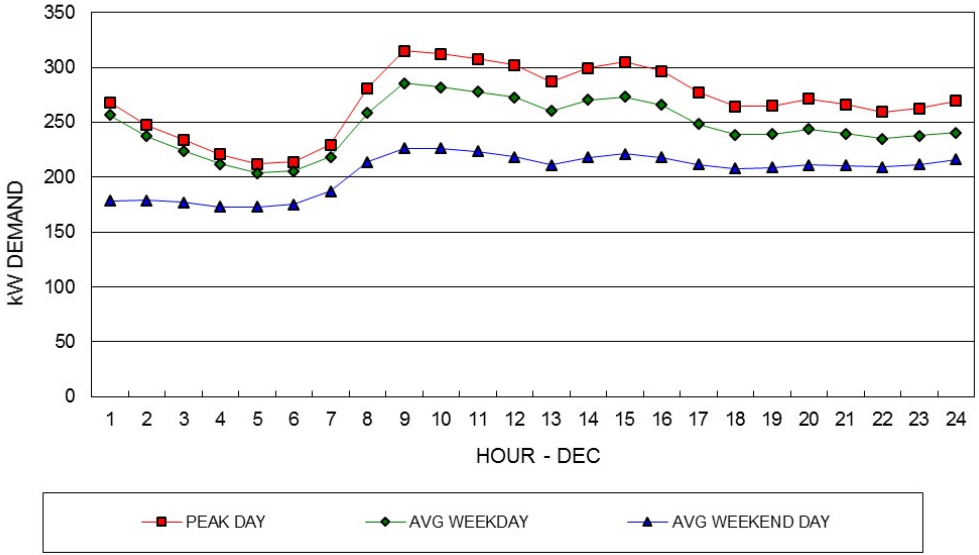
Industrial sector projected to grow by 75 aMW per year on average

Value To The Regional Planner

- In the NW, capacity is becoming an issue
  - Efficiency can help keep loads flat, but still losing generating resources
- Load shapes are used to assign value to efficiency (and DR) measures
- Very little information on industry-specific load shapes to support estimates
  - Well overdue for an update
  - A barrier to DR is reliability in estimates of when reductions occurs
- Benefits are increasing for deferring transmission and distribution costs when savings occur on-peak
- Large percent of system costs are driven by T&D costs, especially when large industrials land in a small service territory (ex. data centers in eastern OR)
  - Some utilities looking at rate restructuring to capture more from demand charges
- Biggest Need: Enough measurements to understand what happens on average
- Metering helps fulfill this need when done often, and provides significant value to better understanding of load shapes

Load Shapes Could Use An Update

- Compared to chipping example earlier, peak load estimates of SIC 24 (Lumber and Wood Products) are 1/3 of site metered data
- Only one site to draw conclusion from - Can't say much about whether this is typical



What Do We Do With This Data

Many programs collect data, but where can it go?

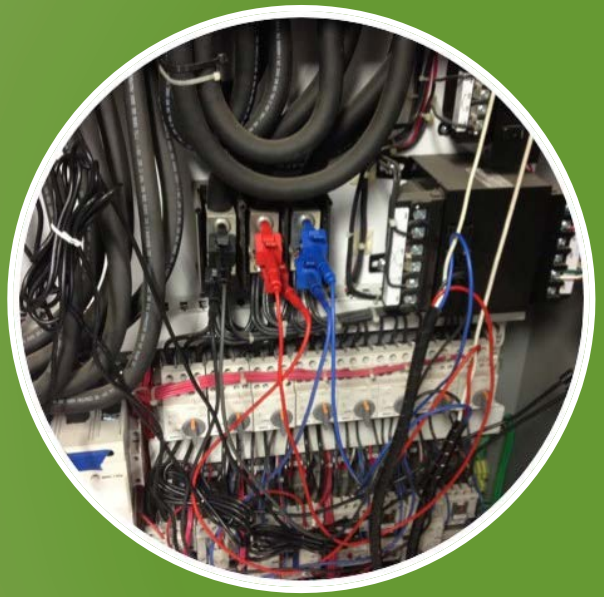
A Few Ideas For Using Data

- Regional planning entities (ex. NW Power Council) are always looking for aggregate data to inform load forecasts
  - Especially end-use metered data
  - Pre/post data for understanding both consumption and savings load shapes
- ACEEE recently requested data to develop performance labels
  - Specifically fans, pumps, and compressors including:
    - Hours of operation
    - Percentage loading
    - Product performance
    - Markets served
- Utility programs can benefit from aggregated data on loads for their own forecasts and IRP planning process
  - Some headway in the Pacific NW with several utilities beginning to scope target areas
  - Could use assistance on where to focus efforts in Industrial sector

Metering Value To All

- Lends insight into peak power consumption
  - Capacity reduction on a site yields immediate benefits to end-user (lower demand charges)
- Able to identify potential operational deficiencies
- Utility programs can use metering to inform future potential savings at that site
  - Or guidance on when to investigate similar operations at other sites
- Better information on load shapes are likely to increase cost-effective resources for program portfolios
- Help promote Smart Manufacturing by providing key indicators of measurement

- Consequences of doing nothing: misunderstood peak and misrepresented full value of efficiency
- The more metering we do, the more data we can share, the more value it brings

Questions?

Nick O’Neil, Energy 350 - noneil@energy350.com
Ray Hawksley, Energy Trust of Oregon - ray.hawksley@energytrust.org