

- Please be sure to sign in at back of room
- Restrooms located in the lobby west of the floating wall
- Emergency exits located at the northwest exit and west entrance

New Technologies for HVAC and Demand Control

October 17, 8:30-10 a.m.

Colorado River Community Room, 222 Laporte Ave

Have you wondered if those trendy new products actually deliver the savings they promise? Find out the answer, while joining us to discuss a variety of emerging energy efficiency technologies.

Second Annual Efficiency Works Contractor Appreciation Social

November 15, 4-6:30 p.m.

Budweiser Event Center

Suite Level - Ranch Bar and Grill

Join your peers in celebrating another successful year of Efficiency Works projects. Platte River Power Authority and Fort Collins Utilities staff will share project successes and highlights from 2017. The evening will also feature a cash bar, door prizes, a sneak peek at 2018 program changes and an Efficiency Works project/contractor award ceremony. Join us to see if you are a recipient.

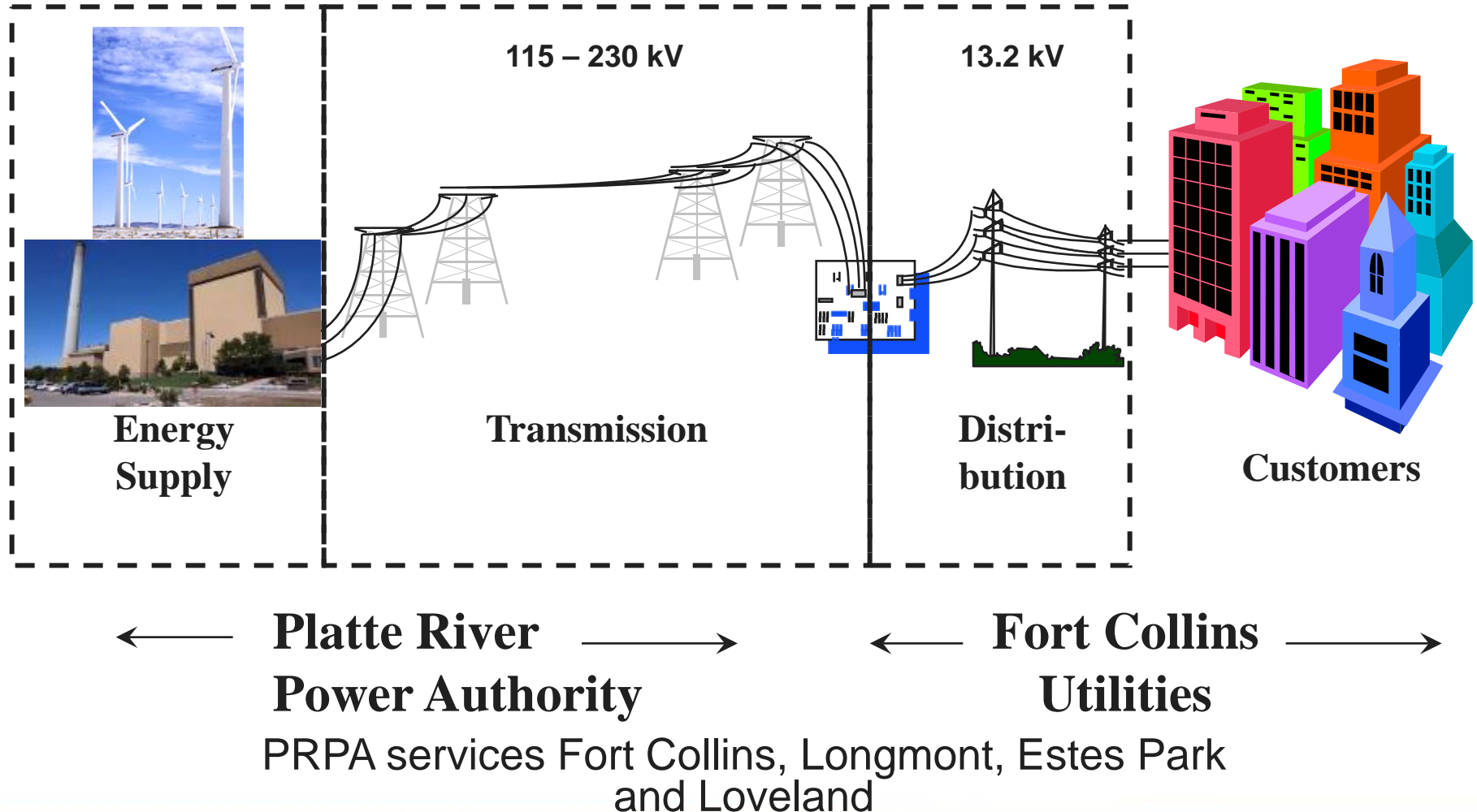
Bonus Lighting Rebate

- For a limited time, customers can save an additional 50 percent on efficient lighting improvements.
- This offer is valid on all commercial building projects that are pre-approved, completed and submitted for payment from August 15 through November 15, 2017.
- The bonus rebate will be applied *in addition* to current Efficiency Works incentives.
- Details, requirements and annual maximums available at fcgov.com/bonus-lighting-rebate.

Demand Management Options for Commercial Customers

Pablo Bauleo, Ph.D.
Sr. Energy Services Engineer
Fort Collins Utilities

- Electric bill components
 - Facility Demand vs Coincident Peak Demand
 - PRPA *Peak Hour*
- Tools
 - MVWeb, Email notifications, Peakload & OpenADR
- OpenADR 101
 - VTNs, VENs, etc



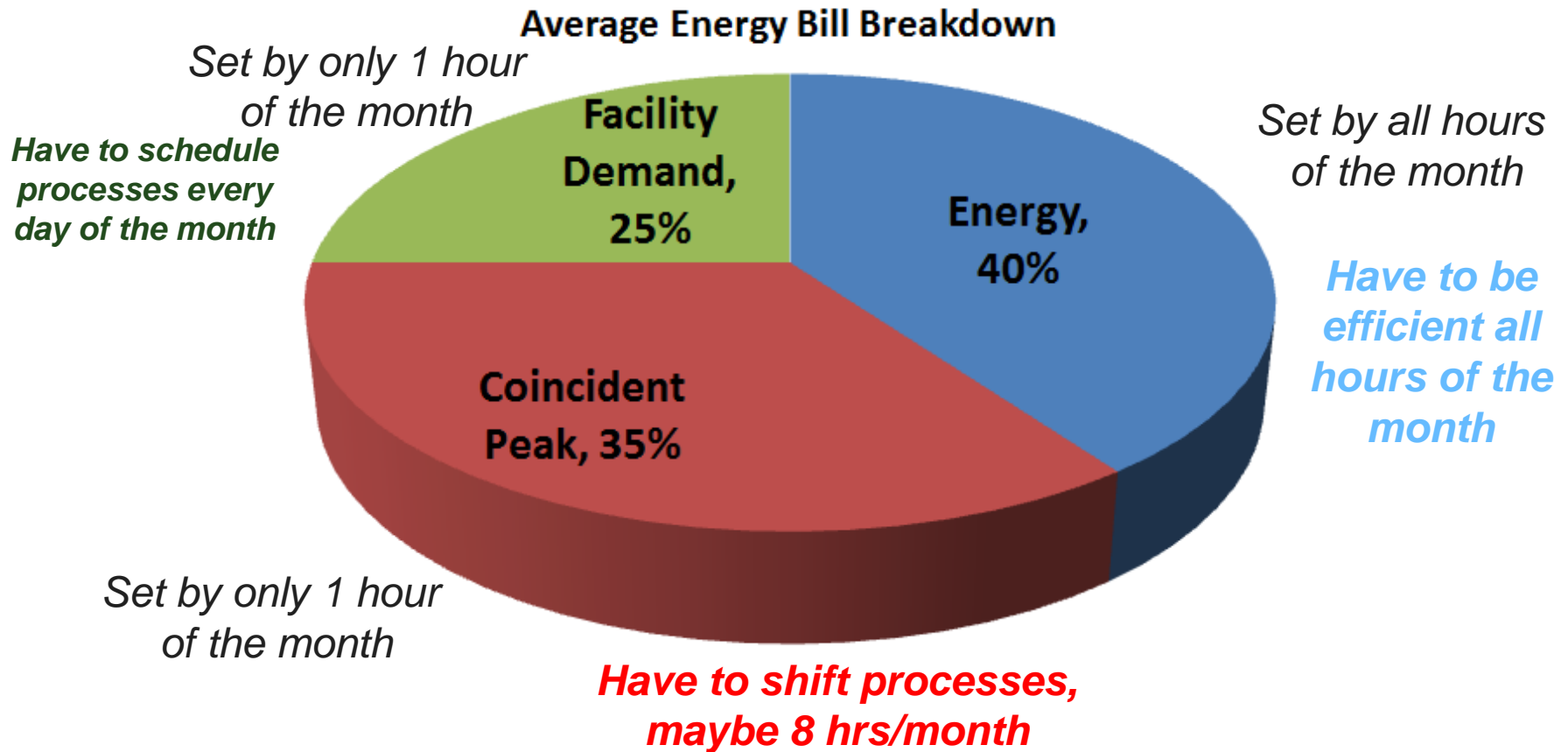
Electric Bill Components Large Commercial & Industrial

- Energy: ($\sim \$0.045/\text{kWh}$, seasonal dependent)
 - How many kWh you used
 - Covers fuel costs
- Facility demand: ($\sim \$6.50/\text{kW}$)
 - Your highest hourly demand in the month
 - Covers transformers, cables, equipment, etc. for Fort Collins.
 - *Known at the end of the month*
- Coincident peak ($\sim \$12/\text{kW}$ summer, or $\sim \$9/\text{kW}$)
 - Your demand at the time of PRPA monthly peak (peak hour)
 - Covers PRPA generation & transmission needs
 - *Known at the end of the month*

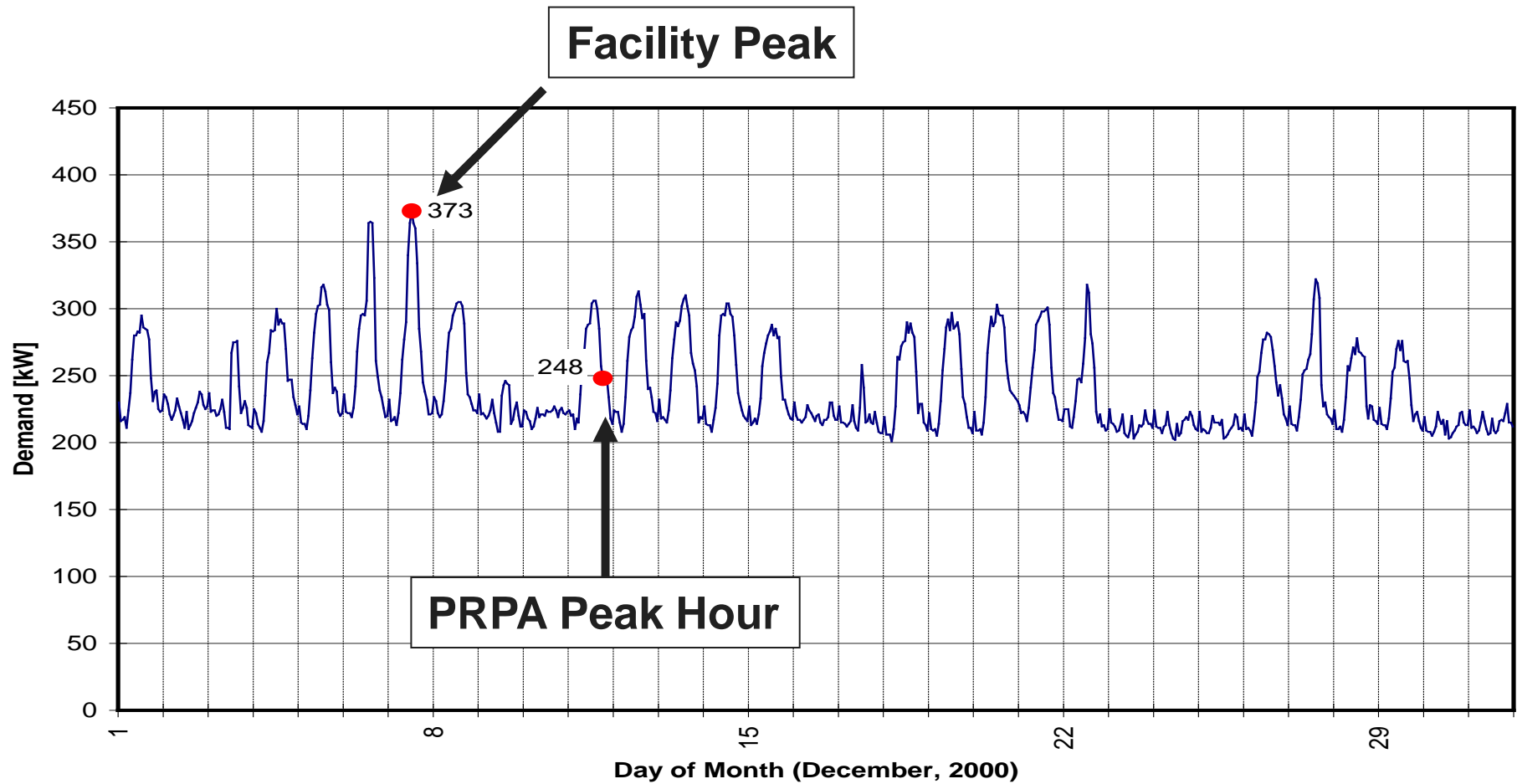


Energy Bill Breakdown

What can I do to save?



Facility Demand and Coincident Peak Demand



Peak Hour: *Highest hourly demand combining Fort Collins, Loveland, Longmont and Estes Park*

Determined at the end of the month
(no way to know when the highest hour was until all hours are known)

Coincident Peak Demand Charge is your own contribution to the PRPA regional peak

Peak Hour Occurrence

Tend to happens on weekdays

- Rare (but known) weekend Peak Hours

Summer (AC load)

- Between 2 to 6 pm on a very hot afternoon

Winter (Lights + Electric Heat)

- Between 6 to 9 pm on a very cold evening

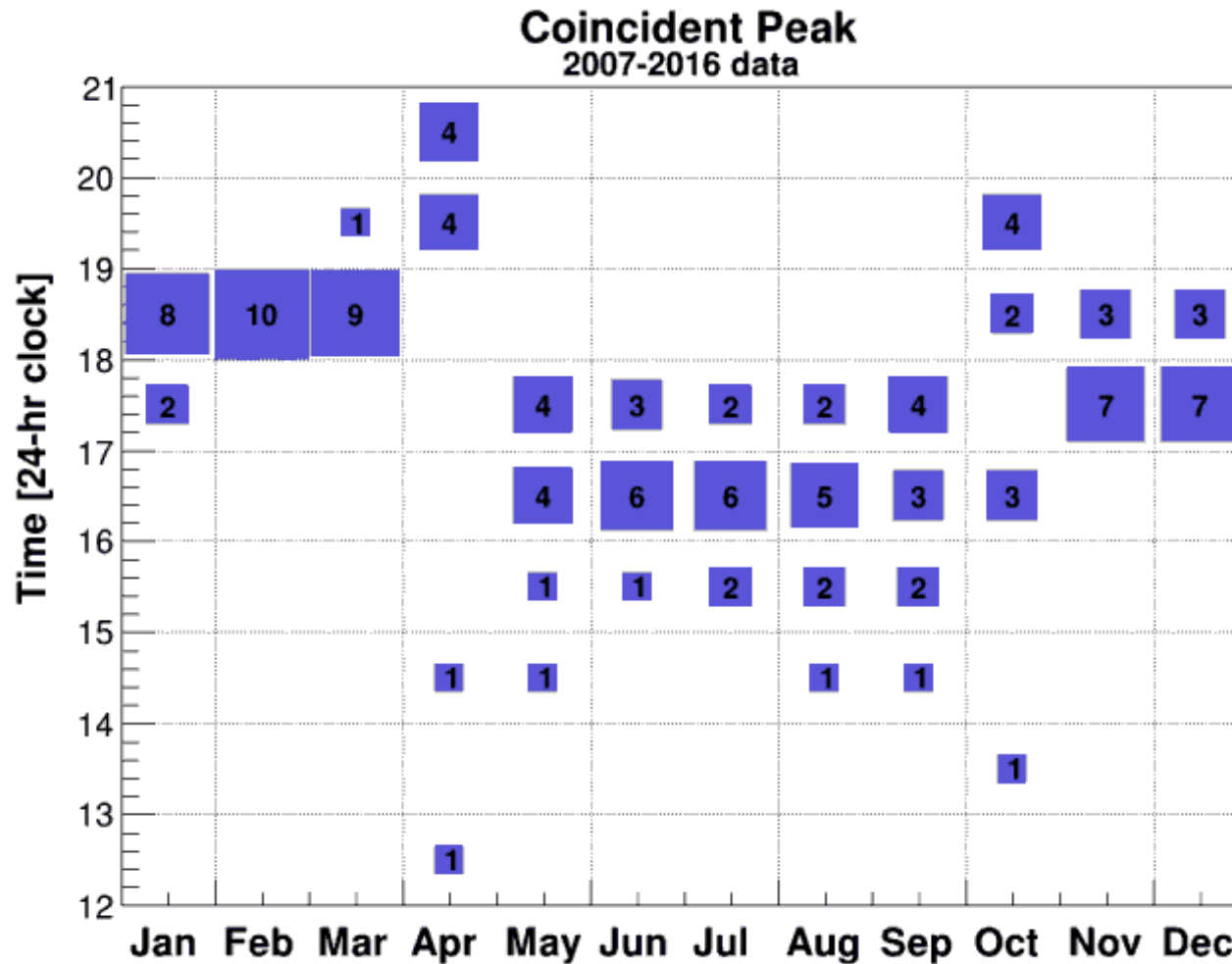
Spring/Fall

- Anytime from noon to 9 pm (weather driven)



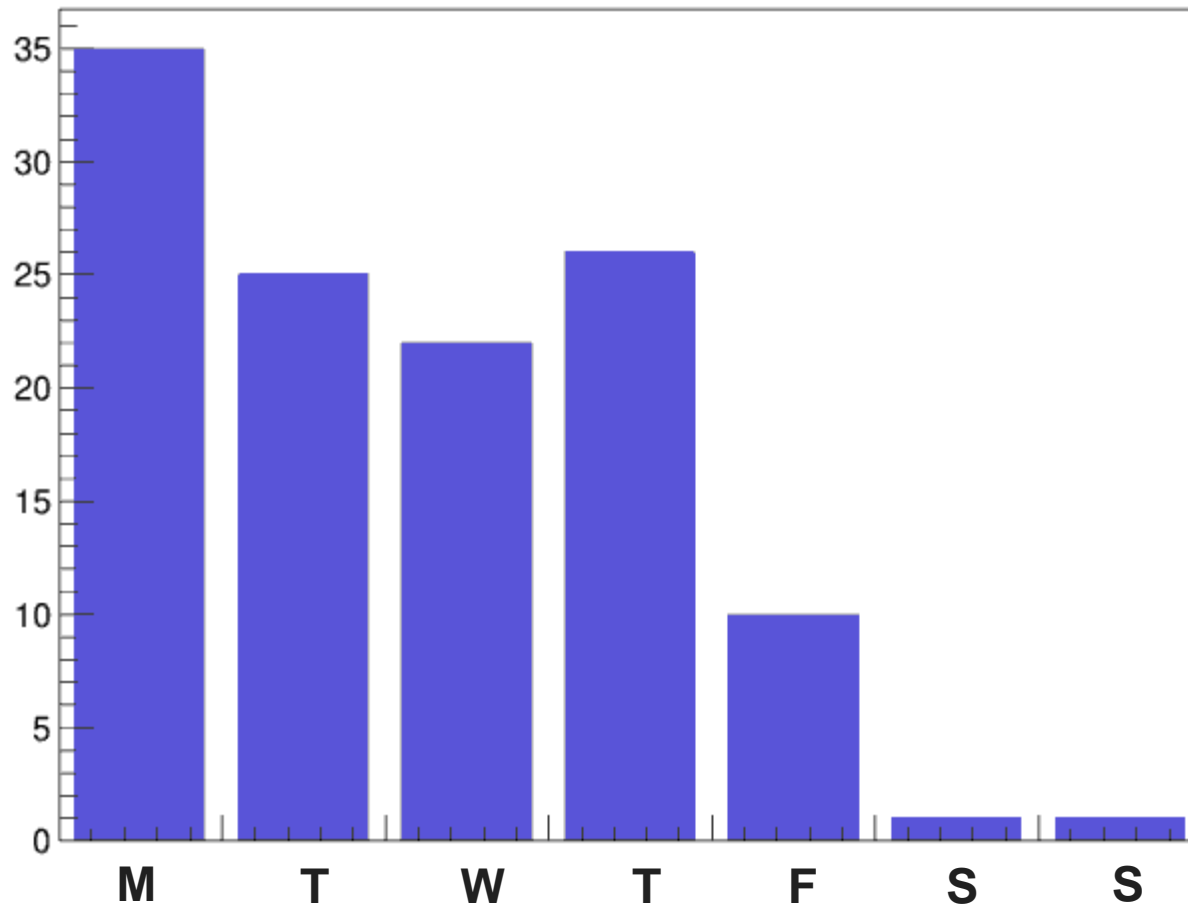
Prague Astronomical Clock

Peak Hour Occurrence



Peak Hour Day of week distribution

Day of Week - Coincident Peak (2007-2016)



“Hot Shot” to “Peak Partners”

Hot Shot (“The Light”)

- Started in 1982
- One-Way devices / Hardwired
- Equipment discontinued
- Support ended in 2016



Peak Partners

- Started in 2014 (Residential)
- Two-Way devices
- Wi-Fi Thermostats / Water Heaters
- Automation via OpenADR (vendor agnostic)



Facility Demand

- Your own peak
- ElectriConnect (MV-Web)
- Identify Energy Use Patterns
- Want access to tool? Email to utilitiescustomeraccounts@fcgov.com



Peak Partners C&I Program

- Your contribution to the NoCo electric grid peak
- Peakload page (fcgov.com/peakload)
- Email notifications
- OpenADR

It is not possible to know when the Peak Hour will be.

However with analytics and operational experience we can identify a few hours per month as “*candidate hours*”.

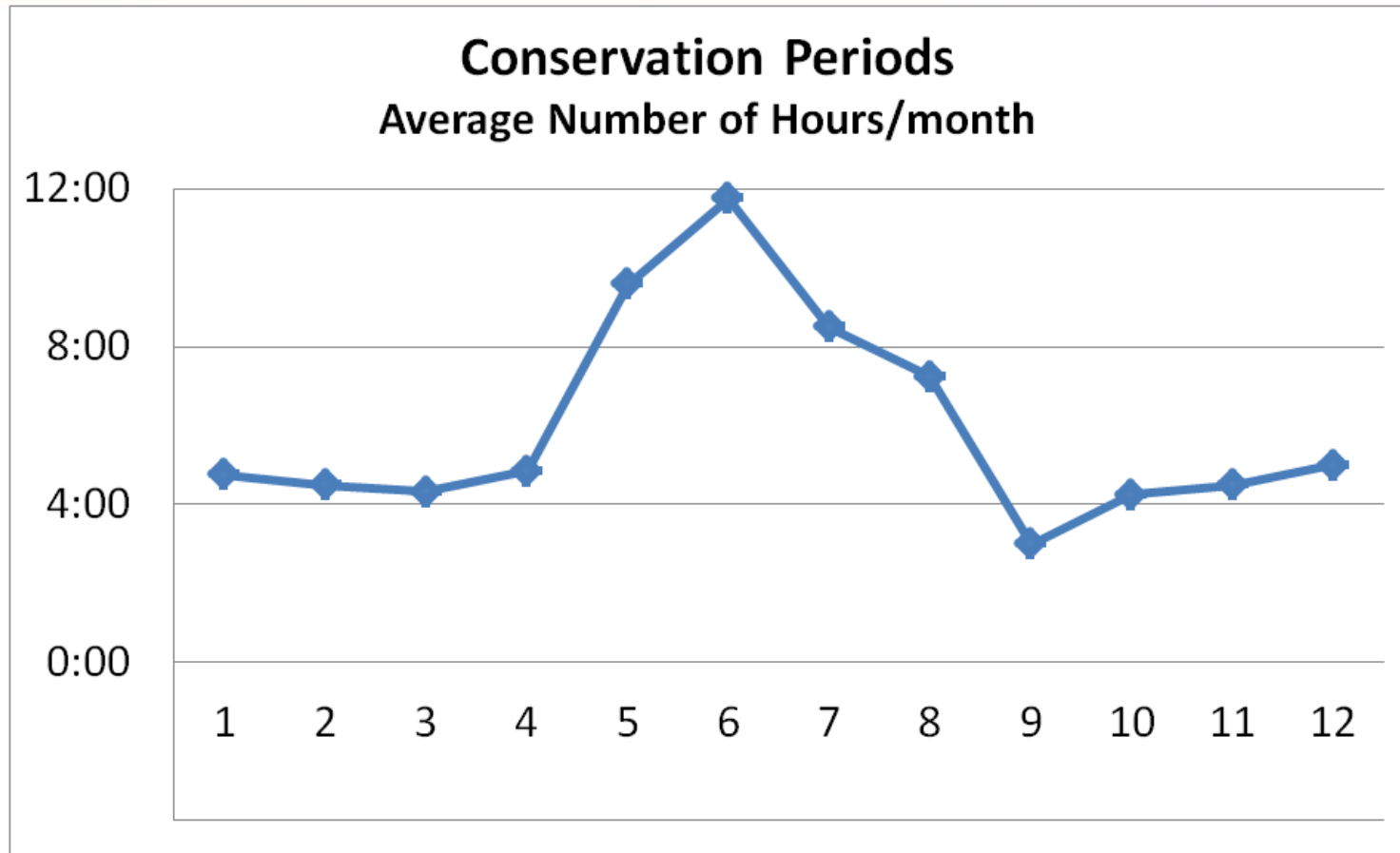
Conservation Event

Candidate hours for peak hour of the month



**If you reduce energy use
during a conservation event
you can save \$**





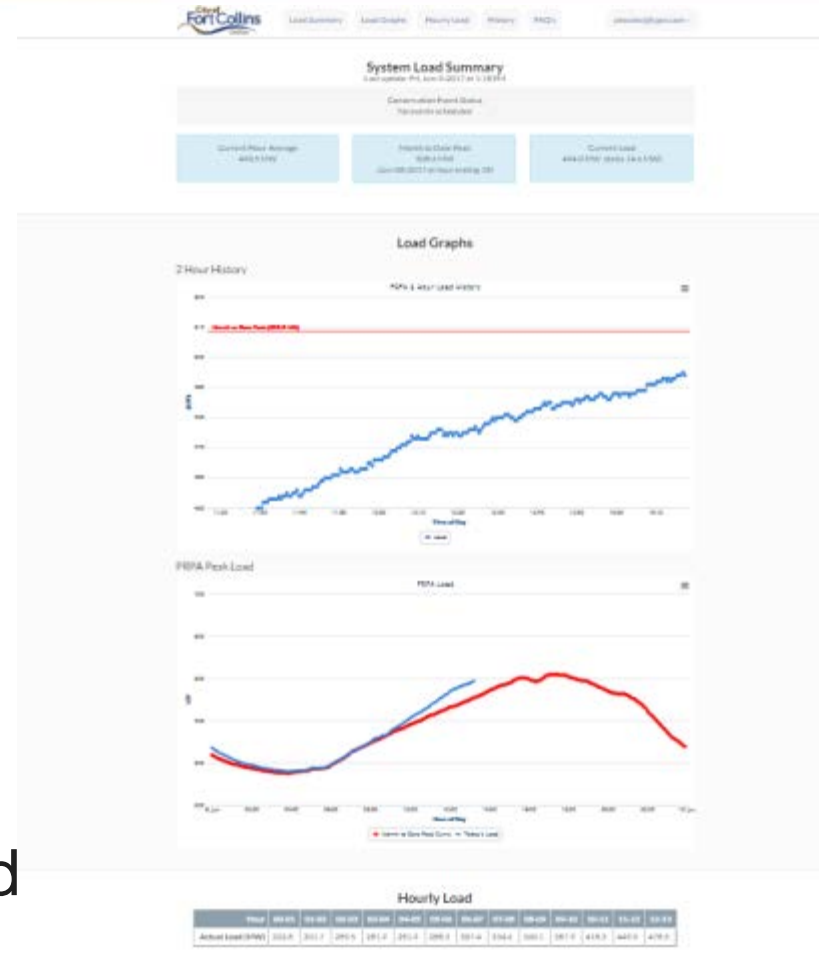
Typically between 75 and 100 hours/year

Current load information

- Trends in the load
- Information on upcoming “conservation events”

Historical data

- Previous Peak Hours
- History of Conservation Events
- Want access? Visit the page and follow instructions



System Load Summary

Last update: Fri, Jun-9-2017 at 4:02 PM

Conservation Event Status

▲ One or more events are underway

Status	Event Start/Stop	Event Type(s)
Underway	4:00-7:00 p.m.	COMM, HVAC, WH

Current Hour Average
548.0 MW

Month to Date Peak
539.3 MW
(Jun-09-2017 at hour ending 16)

Current Load
546.0 MW (delta -6.7 MW)

Load Graphs

2 Hour History

PRPA 2 Hour Load History



[Load Summary](#)
[Load Graphs](#)
[Hourly Load](#)
[History](#)
[FAQ's](#)
[pbauleo@fcgov.com ▼](#)
[CSV Export](#)

Date	Time	Event Duration	Event Type(s)
Tue, Aug-01-2017	4-6:05 p.m.	125 min	COMM
Wed, Jul-19-2017	4-4:20 p.m.	20 min	COMM
Mon, Jul-17-2017	5-6 p.m.	60 min	HVAC, WH
Tue, Jul-11-2017	4-6 p.m.	120 min	HVAC, WH
Wed, Jul-05-2017	4:15-6:15 p.m.	120 min	HVAC, WH
Wed, Jul-05-2017	4-6:15 p.m.	135 min	COMM
Wed, Jun-21-2017	3-5:35 p.m.	155 min	COMM, HVAC, WH

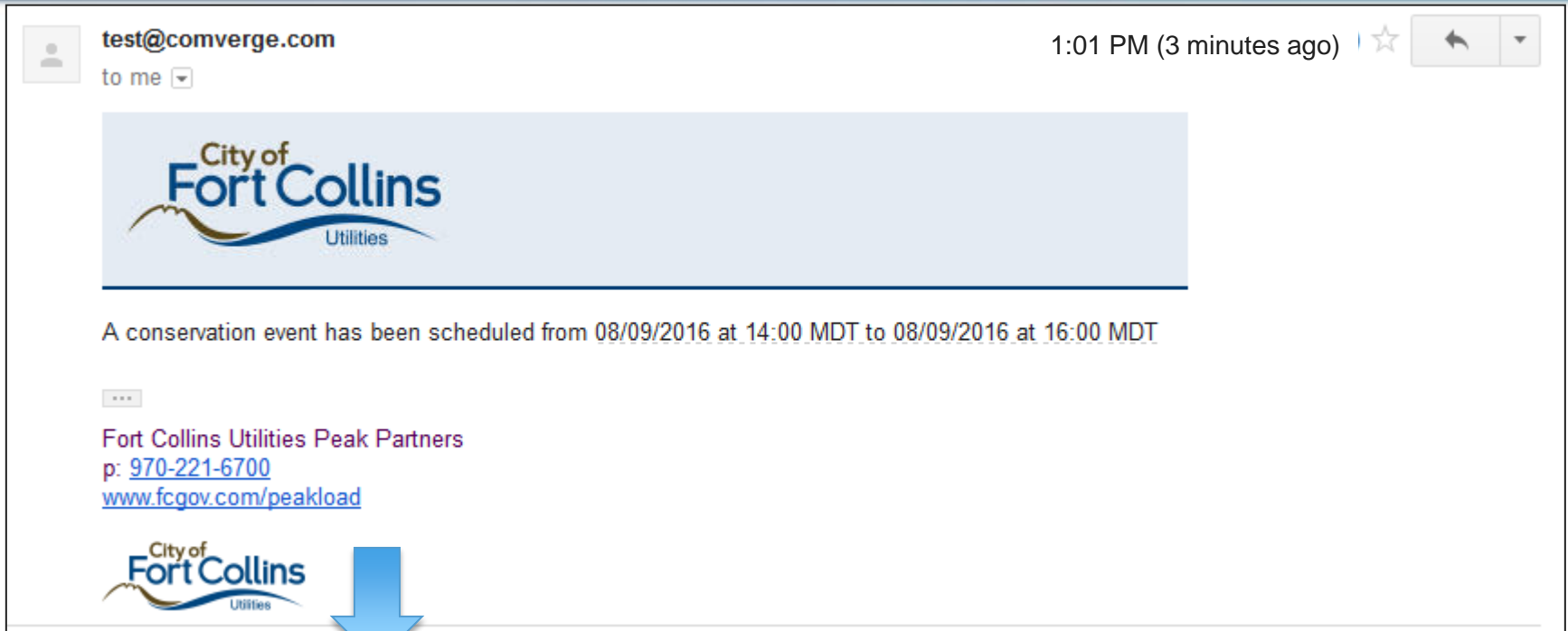
Sign up for Email Notifications
(utilitiescustomeraccounts@fcgov.com)

Emails include

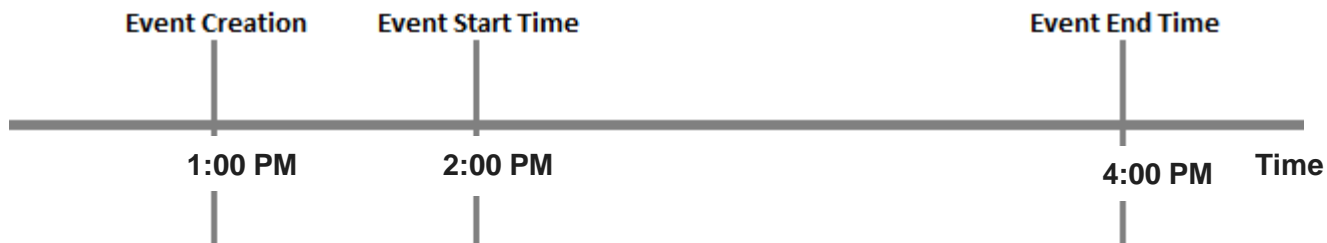
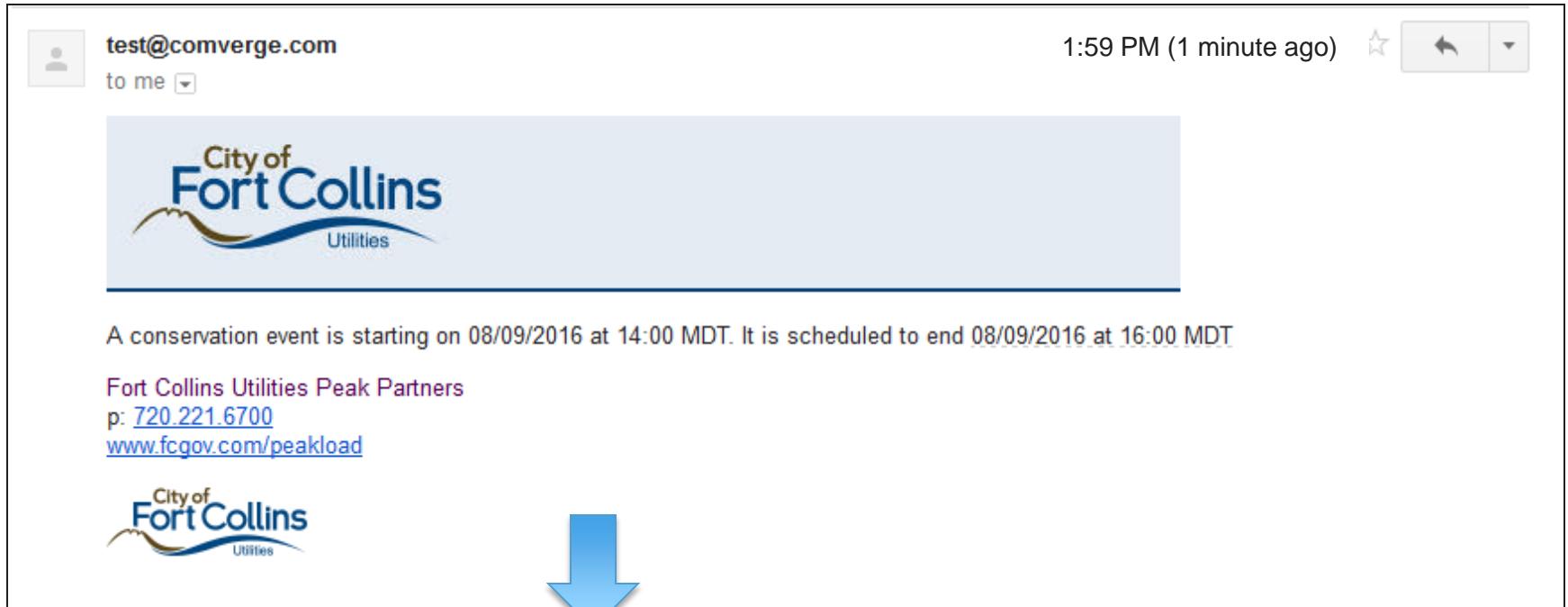
- Advanced notice of upcoming event
 - Often 1 (and up to 2) hrs notice
- Details on start/end time
- Event reminders (Starting now, Ending now)
- Updates (shortening, canceling)
- *Email will only notify you of “Commercial” events*



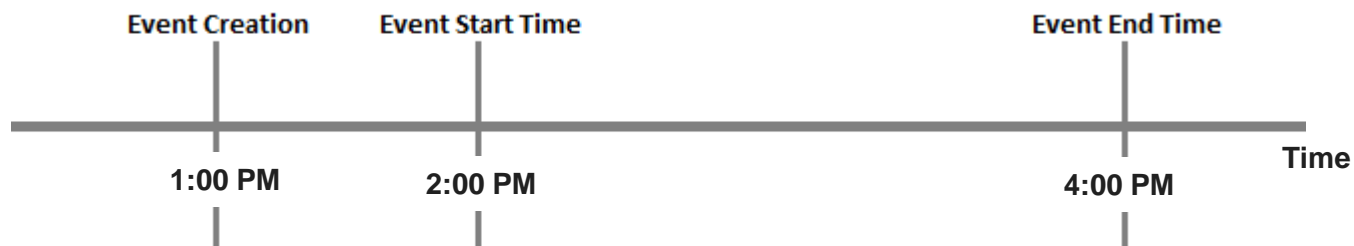
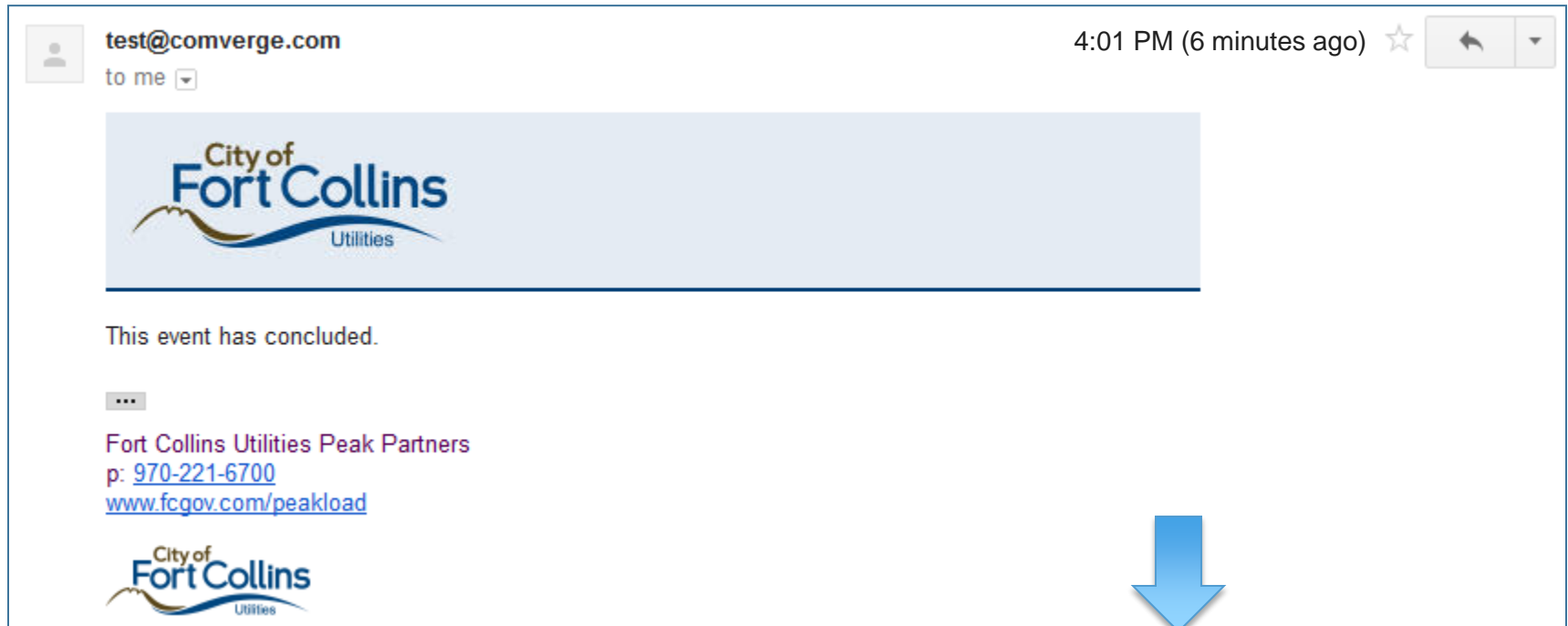
Email Notification Sample



Email Notification Sample



Email Notification Sample



How about automated response?

If you have a
Building Automation System

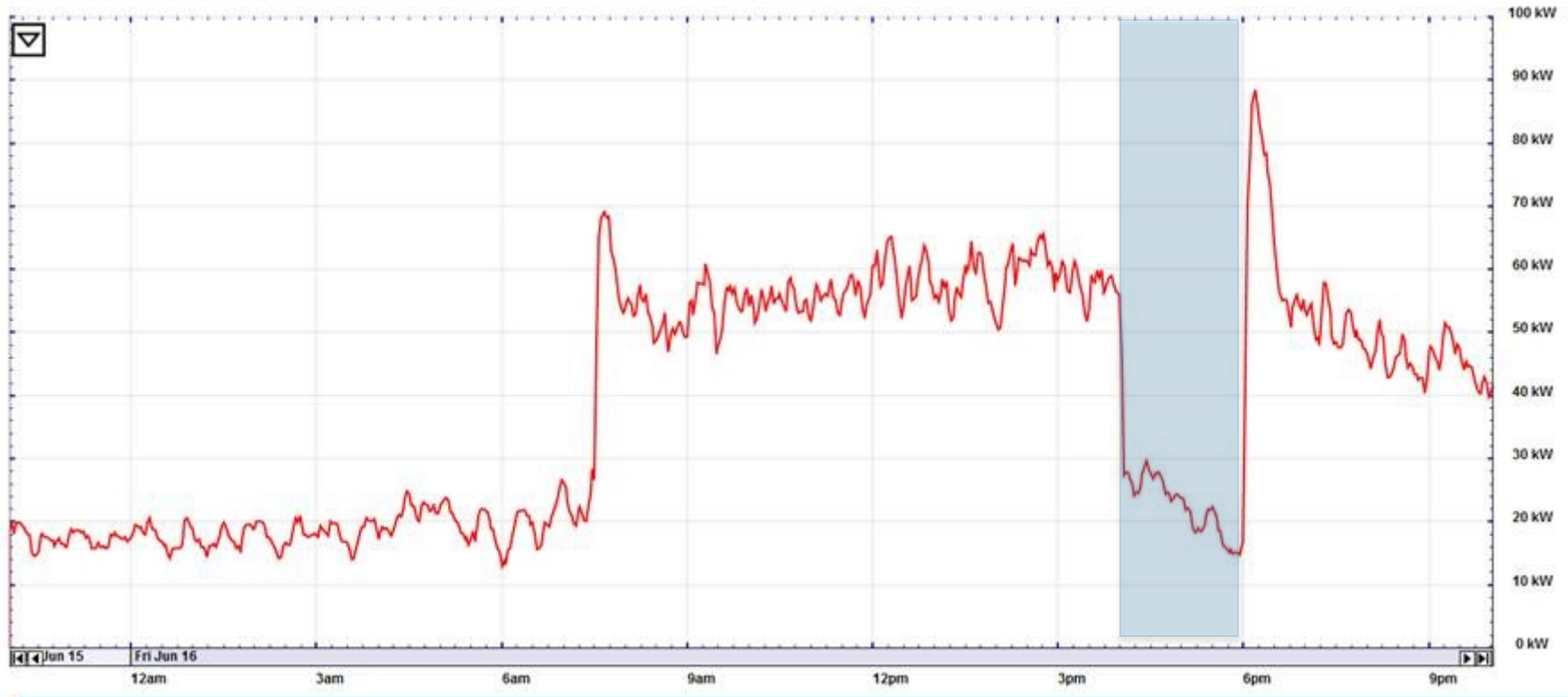
- Turn off lights
- Setback HVAC
- Turn off higher stages of HVAC system
-

If you have notification of upcoming events

- Precool/Prewarm your building
- Run up compressors before event (fill up tanks for compressed air)
- Other things?



Automated Response Utilities Administration Building



**Conservation Event Response at 222 Laporte
Connection via OpenADR – Automation via JCI**

OpenADR... what?

- OpenADR is a protocol designed to exchange information on demand response (conservation events)
- It runs over internet
- It is meant to be used in automated systems
- It is supported by many vendors (like Wi-Fi)



OpenADR 2.0a and 2.0b:

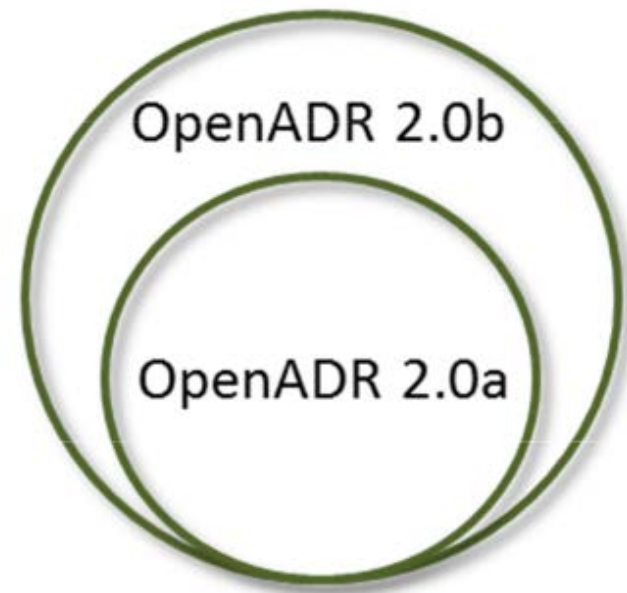
- Basic and Deluxe versions
- We support both

VTN: Virtual Top Node

- Typically the Utility
- Sends information out

VEN: Virtual End Node

- Typically a commercial or industrial facility
- Responds to VTN information (reduces energy use)



VTN, VEN and BAS



Utility

VTN
(server)

OpenADR

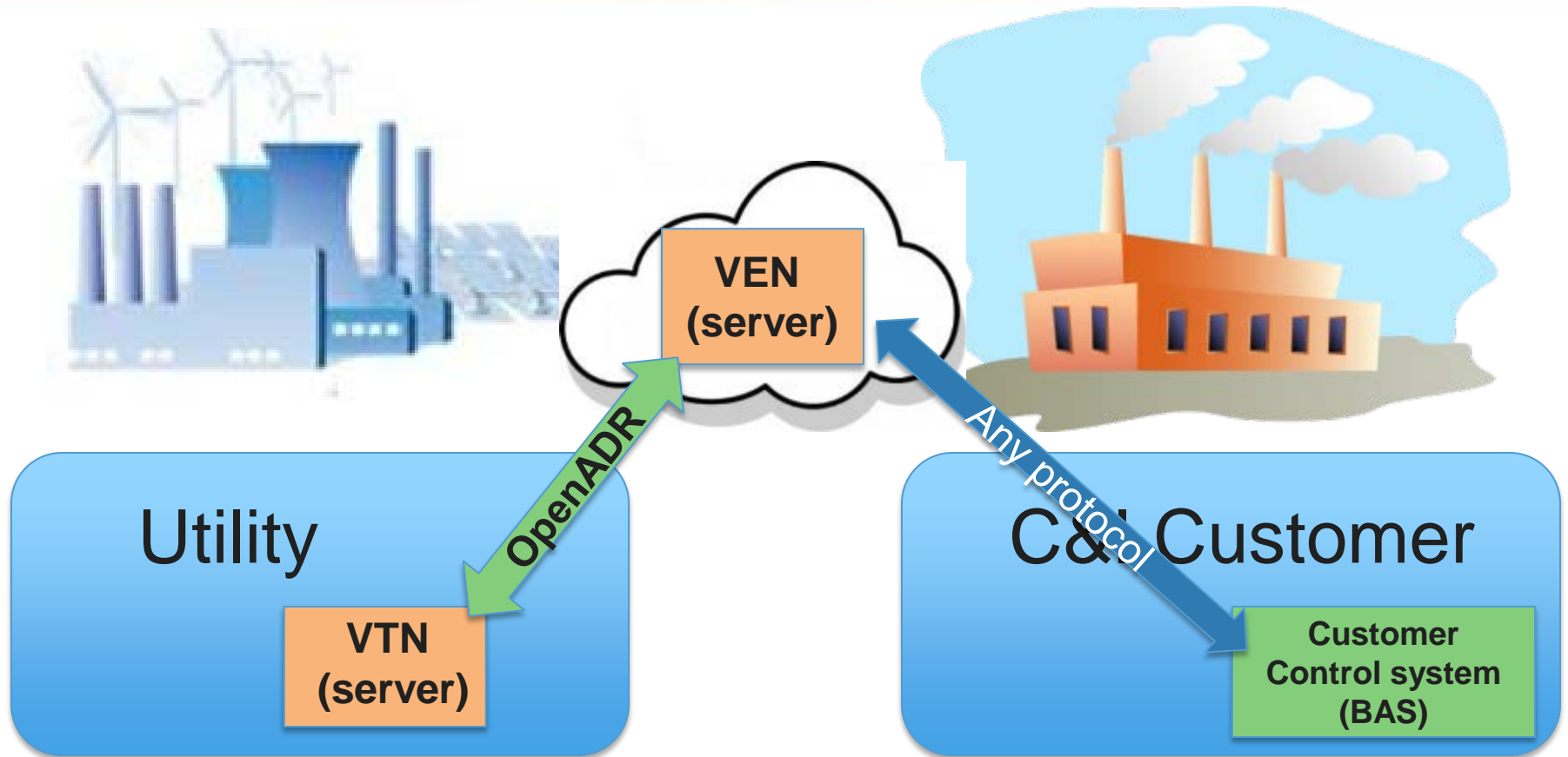
C&I Customer

VEN
(server)

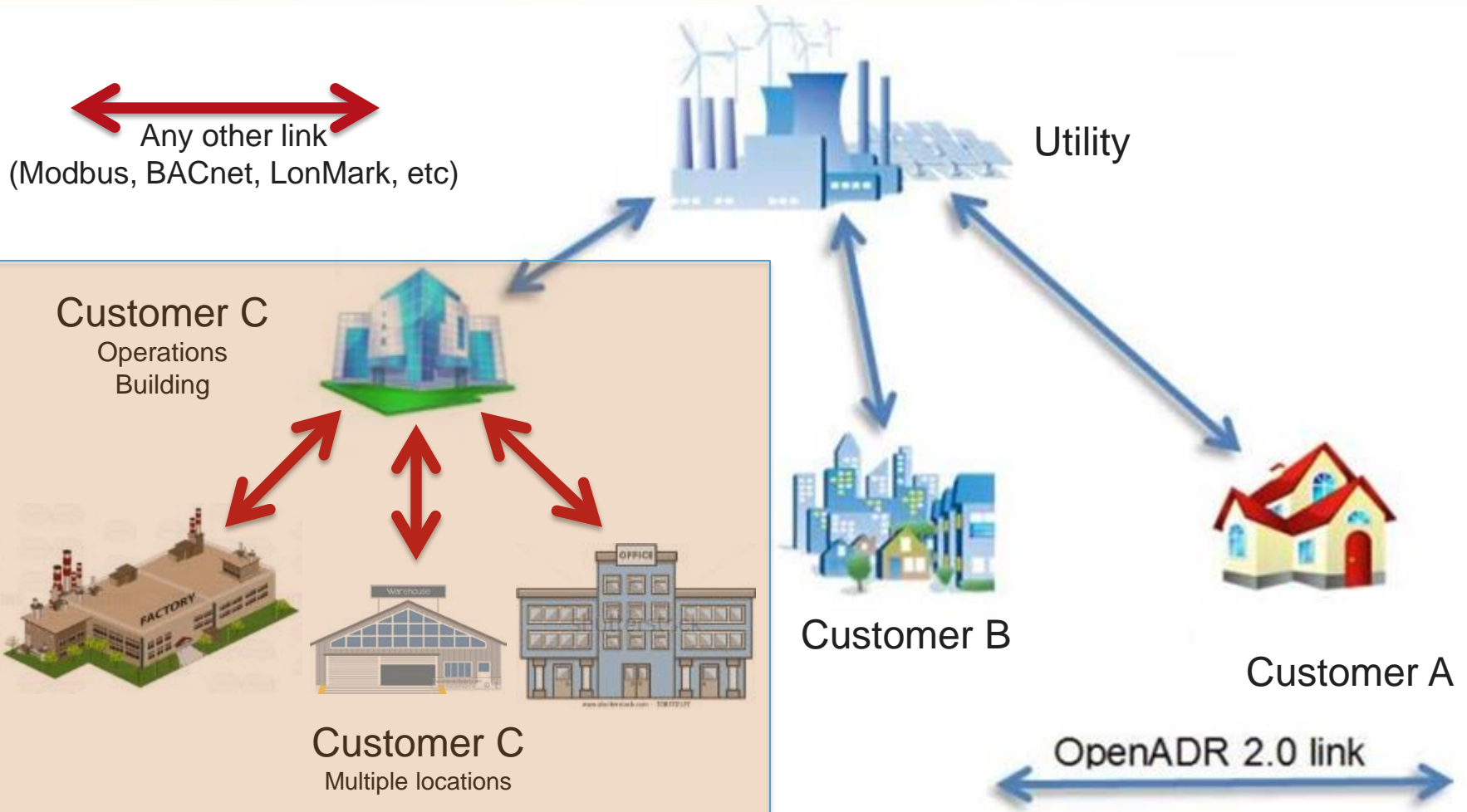
Any

Customer
Control system
(BAS)

VTN, VEN and BAS



OpenADR and other protocols



Implementing OpenADR in your facility

- If your Building Automation Systems support OpenADR
 - Work with your automation provider to implement it
 - Work with Fort Collins to get credentials
- If your Building Automation Systems does not support OpenADR
 - Look for interfaces
 - Relays (ISY994r, Eagle200, etc)
 - OpenADR 2 Modbus / OpenADR 2 BacNet
 - Often one device is enough
- If you don't have any automation system
 - Look for interfaces with relays (ISY994r)
 - Each HVAC/Compressor/Equipment will need its own ISY994r

Q & A

Open Standard **A**utomated **D**emand **R**esponse Protocol

Open Standard: Open to the public, vendor agnostic

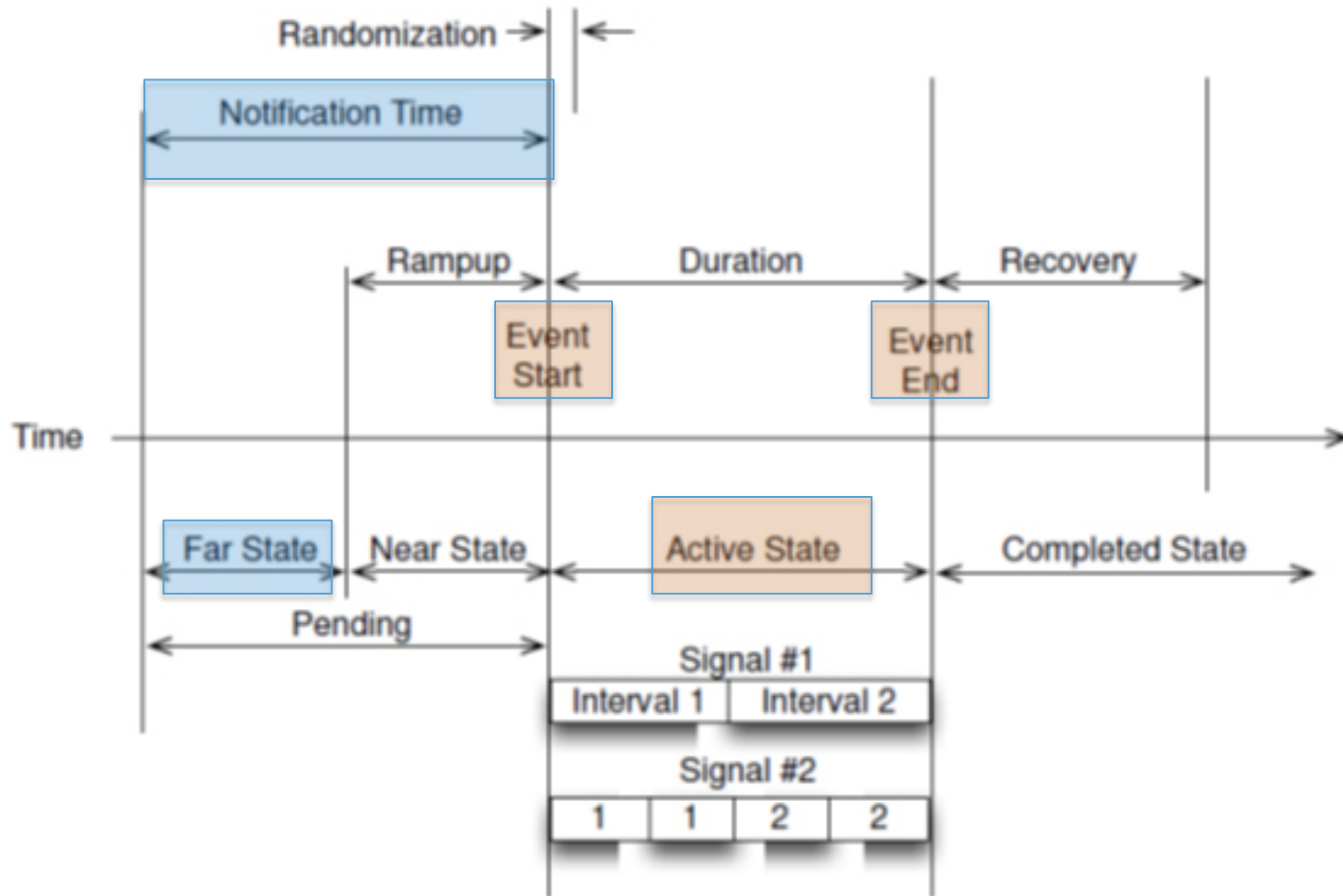
Automated: Machine-to-Machine (server to BAS)

Demand Response: Reduce energy use for a period of time

Protocol: Guidelines for network (computer) communication



OpenADR Event Parameters



VTNs, VENs and all that Jazz

