



## Human Factors: Resident Behavior and Facilities Management

Better Buildings Summit

May 10, 2016

11:15-12:30 PM



# Today's Presenters



**Patti Ziegler**  
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Development  
Authority of the City of  
Mankato, MN



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Group14  
Engineering





# The Rehabilitation of Orness Plaza

Patti Ziegler

# Human Factors:

Resident Behavior & Facilities Management

The Rehabilitation of Orness Plaza





# About Orness Plaza


- 101 units of Public Housing, fully occupied by frail elderly and disabled tenants
- Built in 1972, the building was falling apart
  - Windows had leaked since installation, mold a constant concern
  - Concrete exterior cracked and failing
  - Limited ventilation
  - Plumbing system failing
  - Units very outdated
  - Little insulation



Before



After



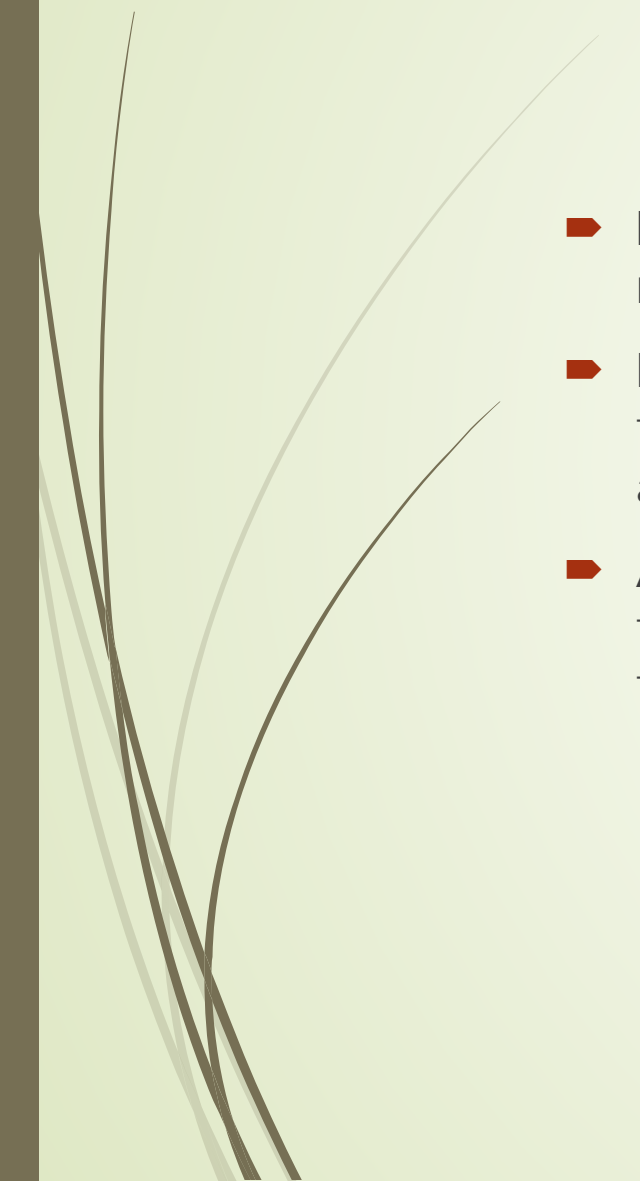
# Planning the Disruption – A Two Pronged Approach

## ► Resident participation

- Residents were educated to the possibilities. A presentation showing different styles of kitchens, baths, community rooms, fitness centers, patios and atriums was provided. Discussion about full size or apartment size stoves, flooring types, etc. took place before a survey was distributed. We encouraged all ideas.
- The architect incorporated the survey results into the scope of work, deleting the swimming pools and other ideas deemed inappropriate for public housing.
- The Blue Cross/ Blue Shield Foundation funded the Green Planning Charrette process to incorporate design ideas and products that would promote healthy housing. Experts in the areas of building ventilation, building envelopes, green technology and healthy housing met several times to plan the building re-design. This effort was led by the University of Minnesota Center for Sustainable Building Research in partnership with the National Center for Healthy Housing.



# Renovating an Occupied Building

- ▶ For twelve months prior to construction start vacant units were not filled, meeting a goal of 25 units available for rehab.
  - ▶ Meetings were held to inform tenants that a moving company would place their belongings in the new apartment just like they were in the old apartment. Few issues arose with the relocation process.
  - ▶ At the start of the first phase, tenants were relocated from the east side of the building. After that phase was completed, tenants were moved from the south side (phase two) and so on until the renovation was complete.
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Before


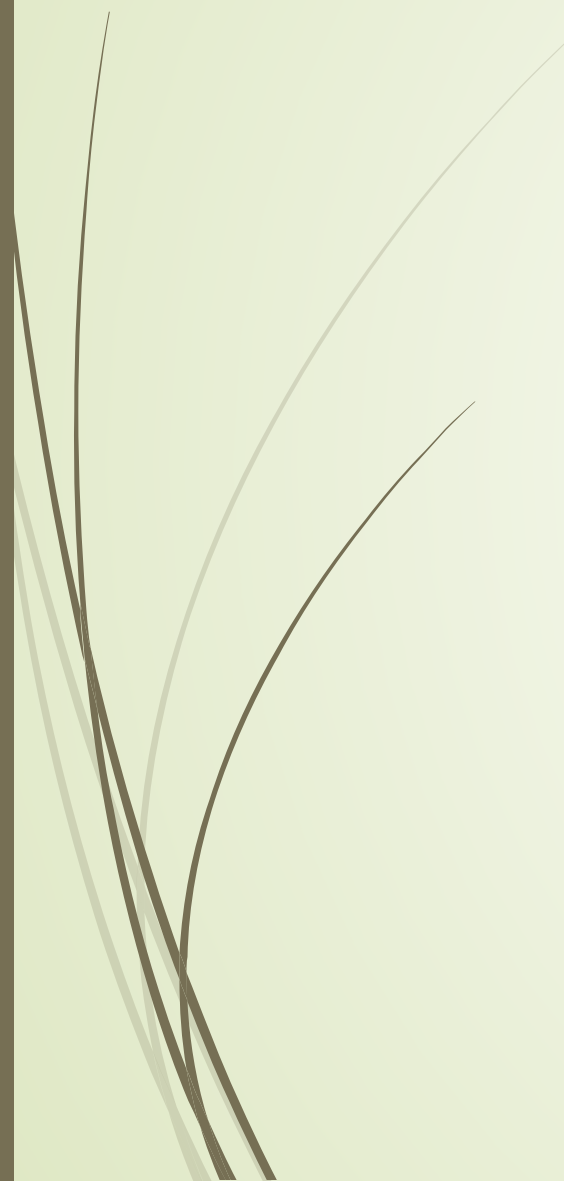


After

# Considering the Human Factor

- ▶ The “new” Orness Plaza was designed with the residents’ well-being in the forefront.
- ▶ Building materials, such as low VOC paints and hard flooring were used to minimize allergens and falls.
- ▶ Equipment recommended by the Minnesota State University - Mankato Department of Human Performance was purchased for the new fitness center. Human Performance graduate students provide personal training for residents. The Wii bowling league is a hit.
- ▶ A walking track with a padded surface weaves around the gardens in the atrium.
- ▶ Fitness classes are held in the community room.
- ▶ Raised beds in the garden area allow for gardening without having to bend over.



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- The community room, game room, and other meeting spaces were enlarged making use of previous “dead” space.
  - The lobby was enlarged.
  - New, comfortable furniture was purchased.
  - Art work created by local artists was purchased.
  - Televisions were donated by local businesses for the fitness center, community room and lobby area.
  - A billiard table and piano are available for the residents’ use.



# Going Smoke Free

- Smoke free housing was an important goal.
- Tenants were informed that the building would become smoke free during the renovation.
- Smoke free polices were approved by the Board and tenants were asked to sign smoke free lease addendums.
- The American Lung Association provided education and resources to help residents quit smoking.
- A smoking area was constructed away from the building.



# The Health Study



- ▶ The National Center for Healthy Housing received a HUD grant to assess the benefits of “green” renovation on a population of primarily elderly residents.
- ▶ Residents were interviewed before the renovation began, then again one year after the renovation was completed.
- ▶ Results of the study showed a great increase in mental health and well-being, fewer falls and a decrease in cigarette smoke exposure.

# Energy Savings

- ▶ Orness Plaza is now enjoying a 44% savings in energy use with the addition of a geothermal heating and air conditioning system. Fresh air is now delivered to the units. The residents enjoy the central air conditioning they never had before.
- ▶ Potable water usage is 54% less than pre-renovation.
- ▶ Orness Plaza has a Silver LEED certification.



Digging Geothermal Wells

# After Renovation Education

- ▶ Tenants were trained to properly clean and care for the fixtures in their apartments.
- ▶ A tenant handbook was provided that suggested “green” cleaning products and procedures.



Interior of Lobby Atrium



# Orness Plaza Team

➤ The following organizations helped create the “new” Orness Plaza:

- The Southwest MN Housing Partnership
- Blumenthal's Architecture Inc.
- Carlstrom Construction Company
- Mankato Economic Development Authority
- US Department of Housing and Urban Development
- Blue Cross Blue Shield Foundation of Minnesota
- National Center for Healthy Housing
- The McKnight Foundation
- Center for Sustainable Building Research





# Contact Information:

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# Human Factors: Facilities Management

## Michael Levinson

# HUMAN FACTORS: FACILITIES MANAGEMENT



# WHY ENGAGE FACILITIES STAFF?







# A TALE OF THREE HOUSING PROVIDERS



What did they do, and what was the impact?

The background features a close-up of green leaves with numerous small, dark insects (possibly aphids or mites) clustered on their surfaces. A dark blue circular graphic is centered over the image, containing the text 'IPM INTEGRATED PEST MANAGEMENT'. Several blue beetle icons are scattered around the circle, some appearing to be on the leaves and others floating in the air.

**IPM**  
**INTEGRATED**  
**PEST**  
**MANAGEMENT**

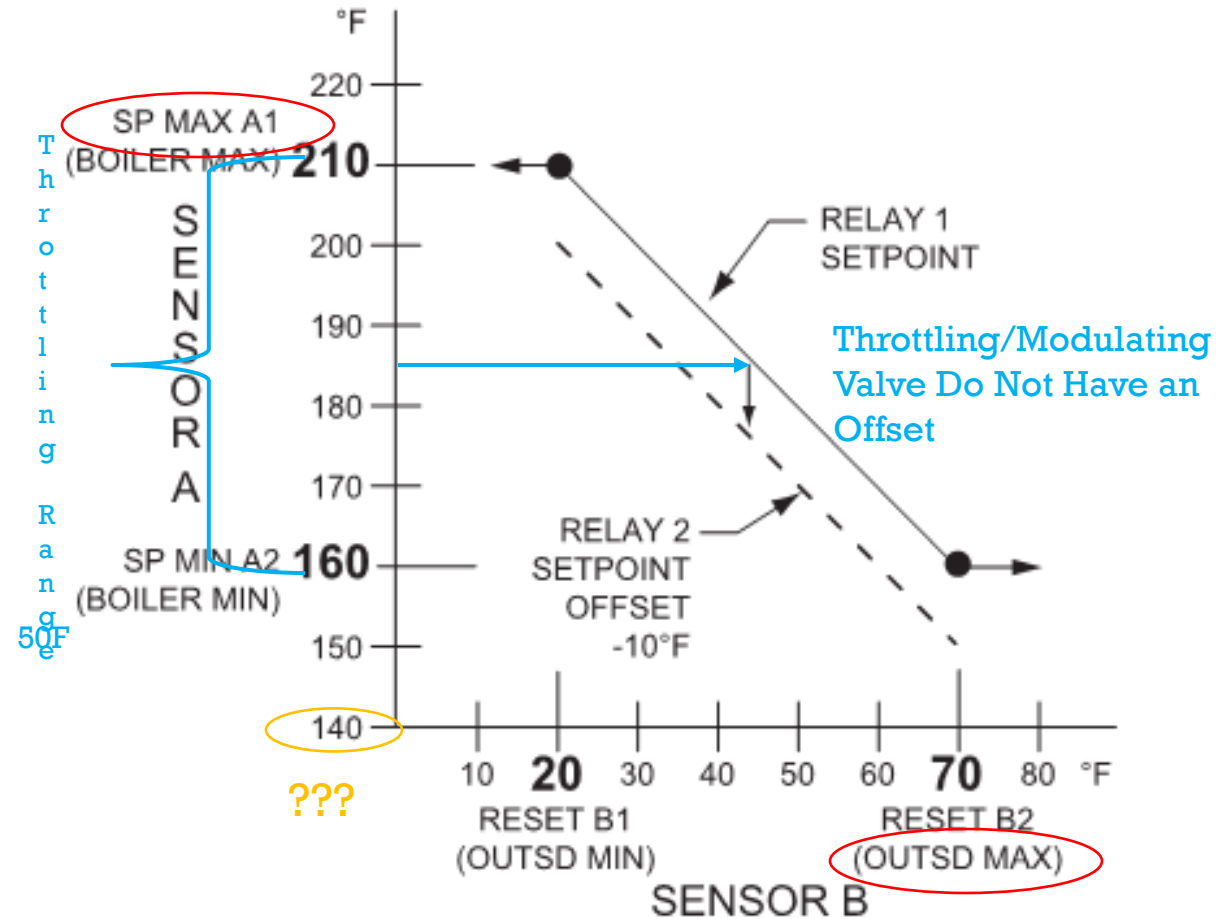




HEALTH



# STAGING / WITH A RESET VS MODULATING



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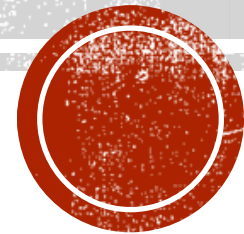
# DCHA ENERGY AND WATER CHECKLIST

ENERGY AND WATER CHECKLIST				
Date:	Identification			
EXTERIOR	Yes	No	Location	Notes
Are there uneven slabs, bumps, or cracks that pose a tripping hazard?				
If there is a screen door, does the door open properly?				
Does the porch light function?				
Is the porch light a compact fluorescent bulb?				
Is the exterior door(s) weather-stripping in good condition?				
Can you see light around the exterior door(s)?				
Are there cracks or holes in or around the walls, doors, or windows?				
Living Room and Bedrooms	Yes	No	Location	Notes
Are the light fixtures functioning?				
Do the light fixtures have compact fluorescent lamps?				
Are smoke detectors operational?				
Are there any electric space heaters?				
Are vents, baseboard, or radiators unobstructed?				
Are there any improperly installed window air conditioning units?				



# **\$1,000 IN 15 MINUTES**

- **2.2 gpm Kitchen Aerator - \$100**
- **2.2 gpm Bathroom Aerator - \$150**
- **2.5 gpm Showerhead - \$225**
- **Leaky Toilet - \$500**
- **Incandescent Light Bulb - \$90**



# Historical Water Use

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Site/Year	Water Consumption (gallons)	Water Cost
HPE - 2013	7,102,000	\$33,769.92
HPW - 2013	8,596,000	\$40,751.50
HPE - 2014	7,791,000	\$40,203.49
HPW - 2014	9,745,000	\$50,634.56

10-15% increase in water consumption, most likely due to leaks!



# Tracking Down Leaks – In Units

## Toilets:

1. Visually inspect for water draining into the bowl
2. Check how long it takes the tank to refill
3. Check the wall piping



Figure 24 - Toilet Components

- Improper chain length can interfere with flapper operation
- Bad flapper leads to a running toilet
- Adjusting water level (float cup) can also prevent a running toilet

# Tracking Down Leaks – Mechanical Rooms

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Pressure Relief Valves (PRVs):

- ✓ Check both heating boiler and domestic hot water heater
- ✓ Check for corrosion and mineral buildup
- ✓ Check drainpipe for water



If there is water or signs of water, replace the PRV.



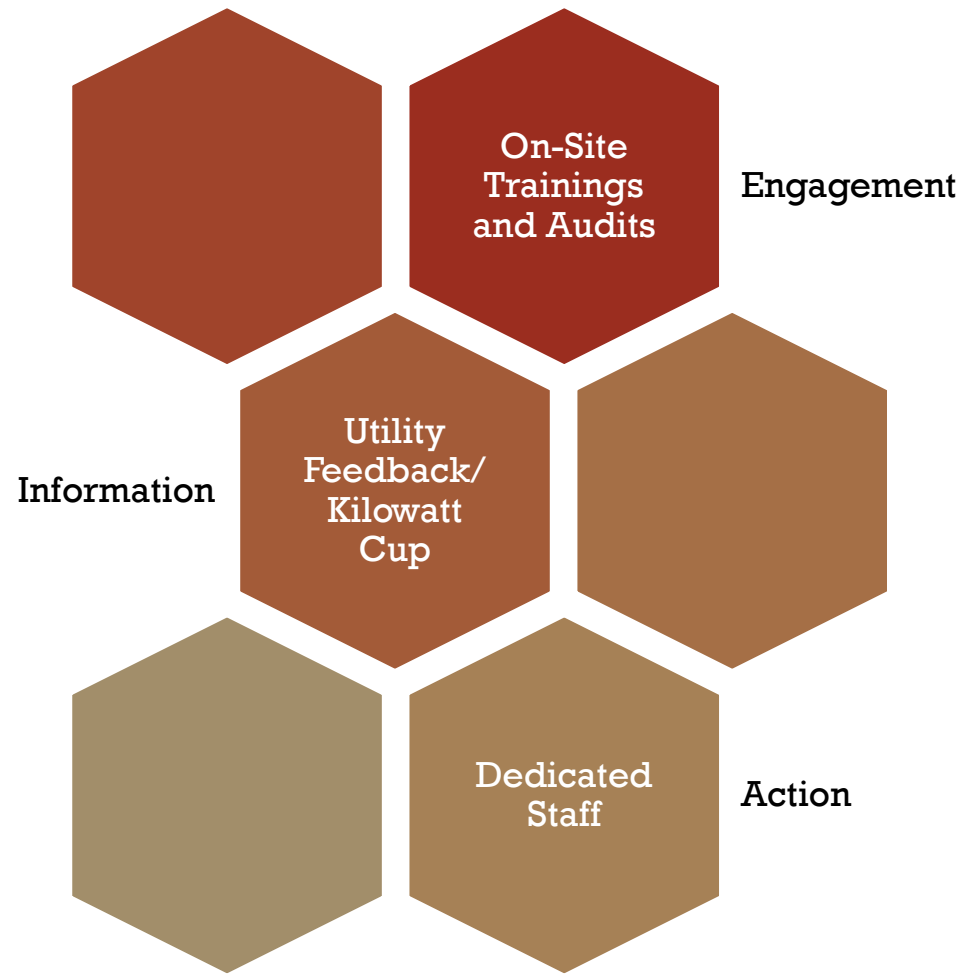
# Tracking Down Leaks – Irrigation

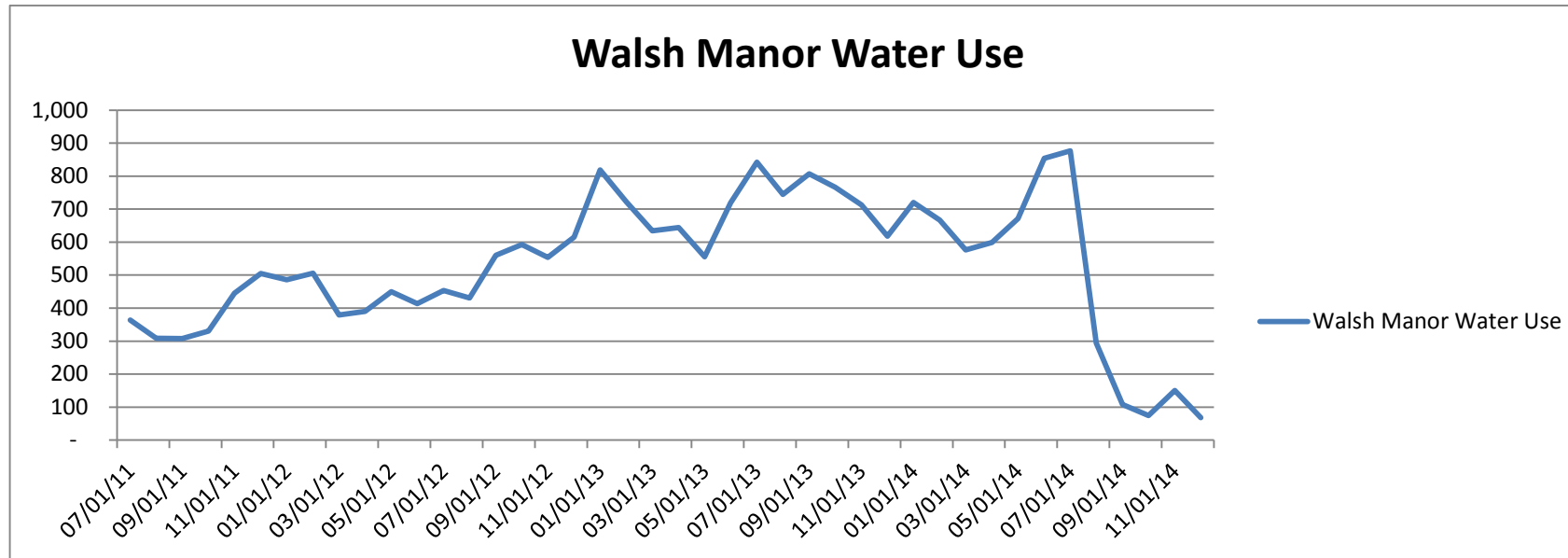
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## Sprinkler heads – test zone by zone:

1. Water flowing from sprinkler location = missing head
2. Odd spray pattern = clogged head
3. Not spraying the grass = misaligned
4. Flooding around base of sprinkler = grass is too high
5. Head is dripping, not spraying = cracked sprinkler head
6. Head is not popping up = obstruction, or needs replacing
7. spurts of water at head = leak at the sprinkler head or at connection to head
8. spurts of water not at head = break in irrigation line







# RESIDENT ENGAGEMENT FOR ENERGY SAVINGS AT DHA WESTRIDGE



## DEVELOPMENT

### 1) Understand the Community

*Purpose: To uncover community characteristics and context for resident behaviors; and to target specific ECMs & identify their barriers of action*

Methods: High utility user audits, DHA Stakeholder workshop, resident focus groups, on-site staff interviews, and resident surveys

### 2) Targeted Behaviors / ECMs

- Removal of space heaters
- Thermostat settings
- Plug loads – Turn off / unplug
- Reporting leaks
- CFL swap out
- Maximize daylight



**WORKING TOGETHER WE CAN MAKE WESTRIDGE BETTER**

## IMPLEMENTATION



### 3) Execute Strategies

- Series of 4 Pledges
- Workshops
- Door to Door Outreach
- Energy Coaching
- Flyers and Reminders
- In-Unit Prompts
- Social Norming Decal
- Creating of Green Team

### Utilized Existing Infrastructure

Newsletter | Bill inserts | Flyers  
Resident's Council Meetings



## EVALUATION

### 4) Measure & Verify

*Utilized Quantitative (IPMPV Option B&C with control groups) & Qualitative (survey and feedback) evaluations*

Active vs. Inactive	Unit Count	kWh's Saved	Percent Change
Site Wide	200	24,864	4.5%
Program Participants	119	15,614	6%
Did not participate	81	3,290	1.6%

Program Goals vs. Results	Goal	Result
kWh Reduction	4%	4.5%
Program Payback	10yr	11yr
Reach 50% of homes	100	119

Limited focus on gas & water.

Water = lack of opportunities, unreliable data

Gas = structural barriers limited opportunity

*\*Active participants used 14% less gas than inactive, but site usage was above baseline*







**YOU ARE DONE!**

(Don't Forget to Recognize Achievement)



# Discussion