



WASHINGTON STATE UNIVERSITY
Energy Program

Occupant Engagement Case Study: WSU's Energy & Comfort Campaign

WSU Energy Program
Resource Conservation Management
June 5, 2024

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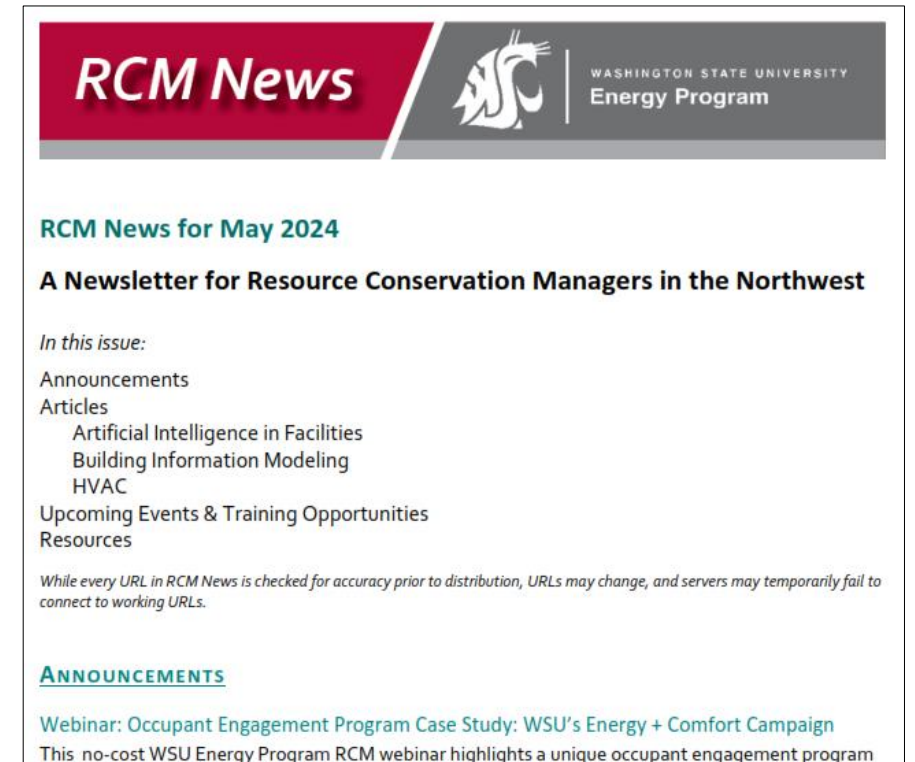
WSU Energy Program

- Self-supporting department within Washington State University based in Olympia
- This presentation part of the Resource Conservation Management (RCM) Program
- Other programs: green transportation education and outreach, community solar, Washington state energy codes (residential) support, community energy efficiency, emerging technologies, renewable energy studies, and more

<https://www.energy.wsu.edu>

Resource Conservation Management Program

- RCM support and workforce development
- Public agencies in Washington State
- Provides
 - Monthly newsletter
 - Webinars
 - Publications
 - Technical assistance
 - RCM position announcements & promotion



To receive the newsletter, send email to rcm@energy.wsu.edu

** Must perform RCM work at public agencies in Washington State **

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Grant funds are administered by the Energy Program, Washington State Department of Commerce.



Occupant Engagement Programs:

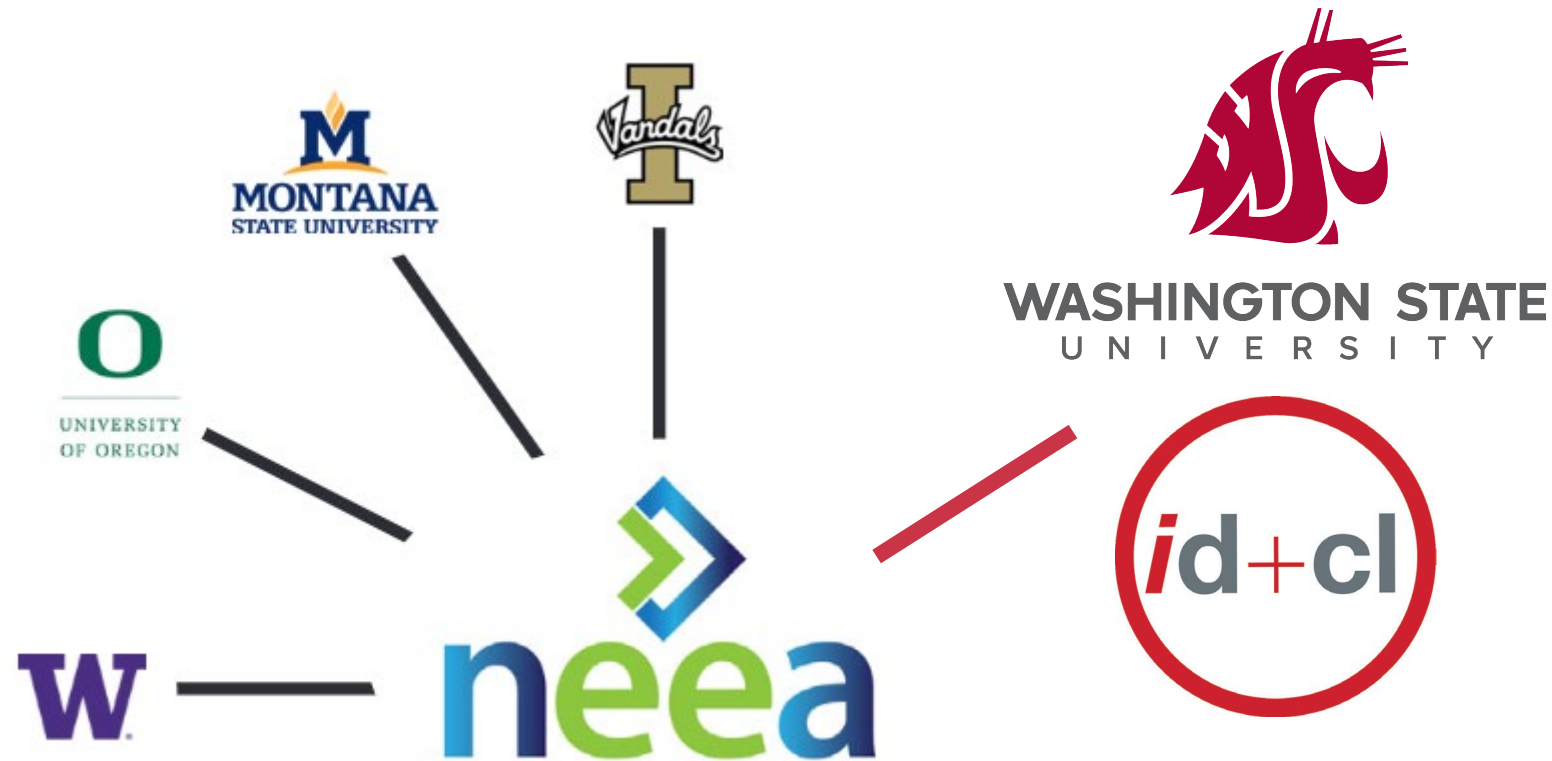
WSU's Energy & Comfort Campaign

June 5th, 2024

Julia K. Day; Shelby N. Ruiz; Zachary Colligan



About the Integrated Design Laboratories



About the Integrated Design + Construction Laboratory

The ID+CL seeks to transform design, construction and building operational practices to **advance high-performance buildings** that are more comfortable for people, **require less carbon** and **energy** to construct and maintain, and enhance the **health and productivity of occupants**.

Research topics include but are not limited to occupant comfort (thermal and visual), adaptive behaviors, energy efficiency, high-performance buildings, human-building interfaces and controls, and management of human satisfaction and behaviors.

HEALTHY PEOPLE + HEALTHY BUILDINGS + A HEALTHY PLANET



Meet the ID+CL Team!

Julia Day



Shelby Ruiz



Zach Colligan



Sierra Wilson



Harleen Kennedy



Nick Mayer



Jacob Roibal



Ethan Baum

Integrated Design + Construction Lab

Key Research Areas + Outcomes

Energy + Carbon



Occupant behaviors, user-interfaces (such as lighting controls and thermostats), and the ways in which occupants engage with building interfaces all affect building energy use. The ID+CL specializes in occupant centric energy efficiency research. We are well known for our tenant engagement programs and behavior-based energy saving strategies. By understanding occupant behaviors, interfaces, and technologies, we can help to reduce energy and carbon impacts from buildings.

Health + Wellbeing



Occupant health, wellbeing, and satisfaction are a critical piece of our research, as we seek to facilitate a comfortable and supportive environment for occupants of any building type.

Across all demographics, occupants can benefit from well designed building controls, daylighting, and access to nature, etc. and we enjoy investigating these aspects of humanity and health in buildings.

Healthy buildings are essential for healthy people.

Business + Productivity

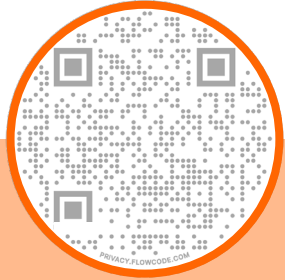


We work within the construction and design industry to better understand the benefits and factors that affect building methods, such as modular and industrialized construction.

In addition, we investigate how these environments, processes, and features affect the workforce and/or building operator.

In order to support productive and satisfied occupants, we must consider how their environments affect them daily.

Energy + Carbon



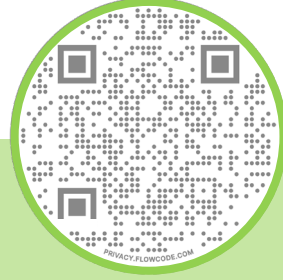
The Human-building interface

- Day, J., Agee, P., O'Brien, W., Abuimara, T., Tabadkani, A., & Andrews, C. (2023). Chapter 9: Building interfaces: Design and considerations for simulation. In (eds.) *Occupant-centric simulation- aided building design: theory, application, and case studies*. Routledge Publishing,
- Heschong, L. & Day, J. (2023). Chapter 3: Why Occupants Need a Role in Building Operation: A Framework for Resilient Design. In (eds.) *A Handbook of Resilient Thermal Comfort*. Routledge.
- Ruiz, S. & Day, J. (202). *Re-thinking Building Interface Characteristics in Senior Living Facilities: Equity and Energy*. ACEEE Summer Study on Energy Efficiency in Buildings. Pacific Grove, CA.

Energy Saving Technologies

- Day, J., Ruiz, S., Wilson J. A. (2022). *Qualitative evaluation of barriers, awareness, and adoption of LLLC technologies*. ACEEE Summer Study on Energy Efficiency in Buildings. Pacific Grove, CA.
- Ruiz, S. & Day, J. (2022). *Capturing Energy Savings Through Tenant Engagement on a University Campus*. September 15, 2022. BECC Virtual Webinar Series.

Health + Wellbeing



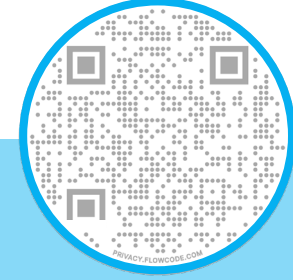
Comfort, Health + Occupant Behaviors

- Day, J. (2022). Chapter 19: Tools and Rules for Behavioural Agency in Buildings: Minimising Energy Use while Maintaining Comfort. In (eds.) *A Handbook of Resilient Thermal Comfort*. Routledge.
- Day, J. & Heschong, L. (2023). *Rethinking building interfaces for resilience, health, and well-being*. Healthy Buildings Europe. Aachen, Germany.
- Day, J., Moore, Z., Ruiz, S. (2020). Snuggies at work: Case study examples of thermal [dis]comfort, behaviors, and environmental satisfaction in the workplace. *Windsor Conference on Resilient Comfort in a Heating World 2020*. Windsor Park, Berkshire UK.

Senior Living and Biophilia

- Ruiz, S. & Day, J. (2022). *The older I get: Implications of design choices on older adults in senior living communities*. Interior Design Educators Council (IDEC) 2023 Annual Conference. Vancouver, BC, Canada.
- Ruiz, S. N., Rothlisberger, S., Day, J. K. (2023). *Time marches on: Supporting holistic health in older adults through the built environment*. Healthy Buildings Europe. Aachen, Germany.

Business + Productivity



Industrialized Construction

- Industrialized Construction: Surveys and Interviews w/ the National Renewable Energy Laboratory (NREL)

Daylight, Productivity, & Satisfaction

- Day, J., Futrell, B., Cox, R., & Ruiz, S. (2019). Blinded by the light: Occupant perceptions and visual comfort assessments of three dynamic daylight control systems and shading strategies. *Building and Environment*, 154, 107–121.

Building relationships between occupants and operators

- Kane, M., & Day, J. (2022-2025). *Building Operators: Grid and Occupant (BOGO) Training*. Department of Energy: BENEFIT. \$750,000
- Ruiz, S., Day, J. K., Govertsen, K., & Kane, M. (2022). *Communication Breakdown: The Disconnect between Building Operators and Occupants*. *Energy Research and Social Science*.

Building HEROes Podcast

- <https://idcl.wsu.edu/building-heroes-podcast/>



Presentation Agenda

- Introduction:
 - Meet the team
 - Tenant engagement origins & rationale
- Campaign Approach
- Lessons Learned
- Conclusions and final questions
 - Acknowledgements

Context + Project Background



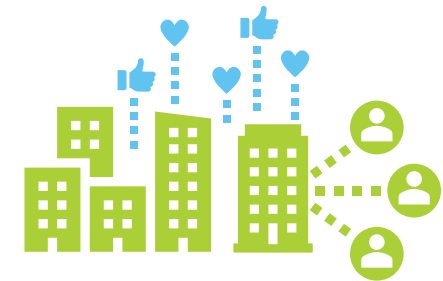
House bill 1257
→
Clean Buildings
Performance
Standard



WSU Facilities
Services
Relationships and
Resources

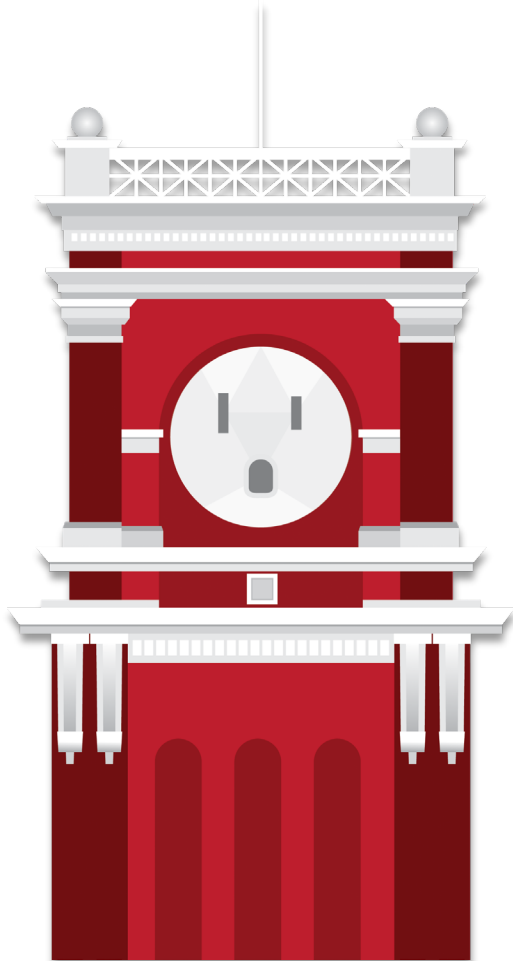


ID+CL was hired by
McKinstry's PowerEd
team to develop a TE
program for Catalyst

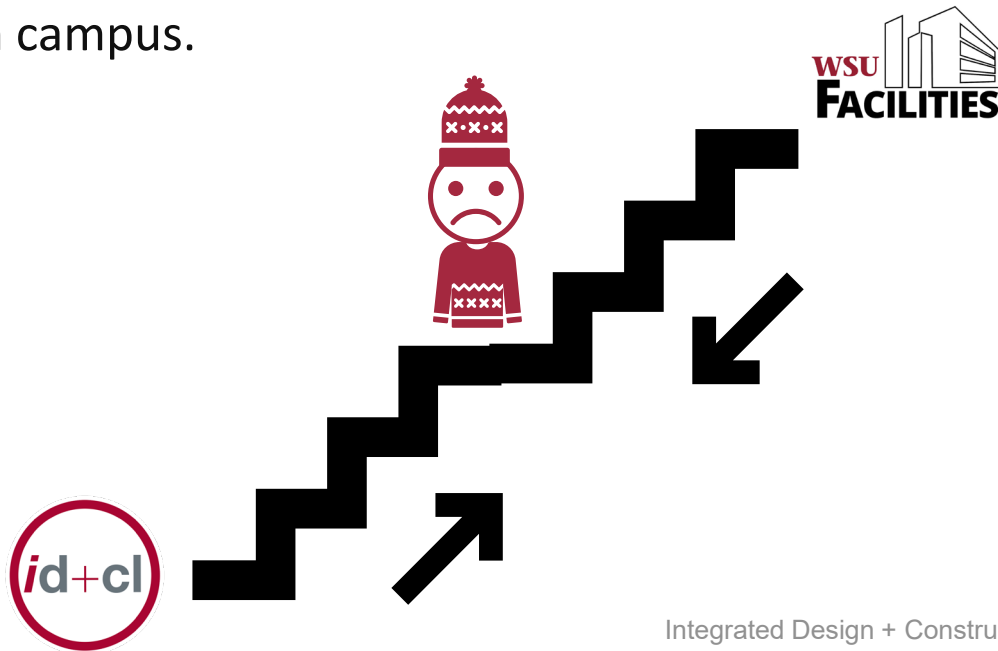


System wide WSU
survey and targeted
interviews to measure
population

Introduction



With support from WSU's Revolving Energy Fund (REF), the ID+CL is responsible for implementing a tenant engagement program designed to help building occupants on the WSU Pullman campus manage their personal comfort while learning strategies to save energy while on campus.



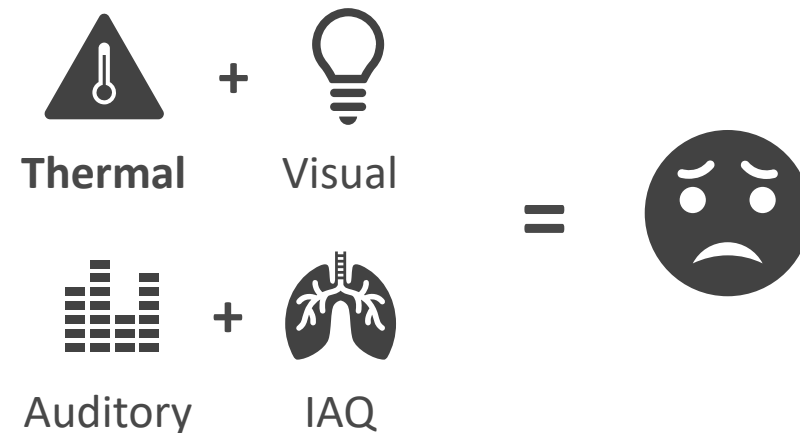
Role of 2020 Energy & Comfort Survey

Conducted Surveys & Interviews:

- Responses indicated significant comfort issues, especially thermal
- And an overwhelming lack of control

Going forward:

- Future targeting of gaps in feedback for additional understanding
- Develop a TE program to address current findings

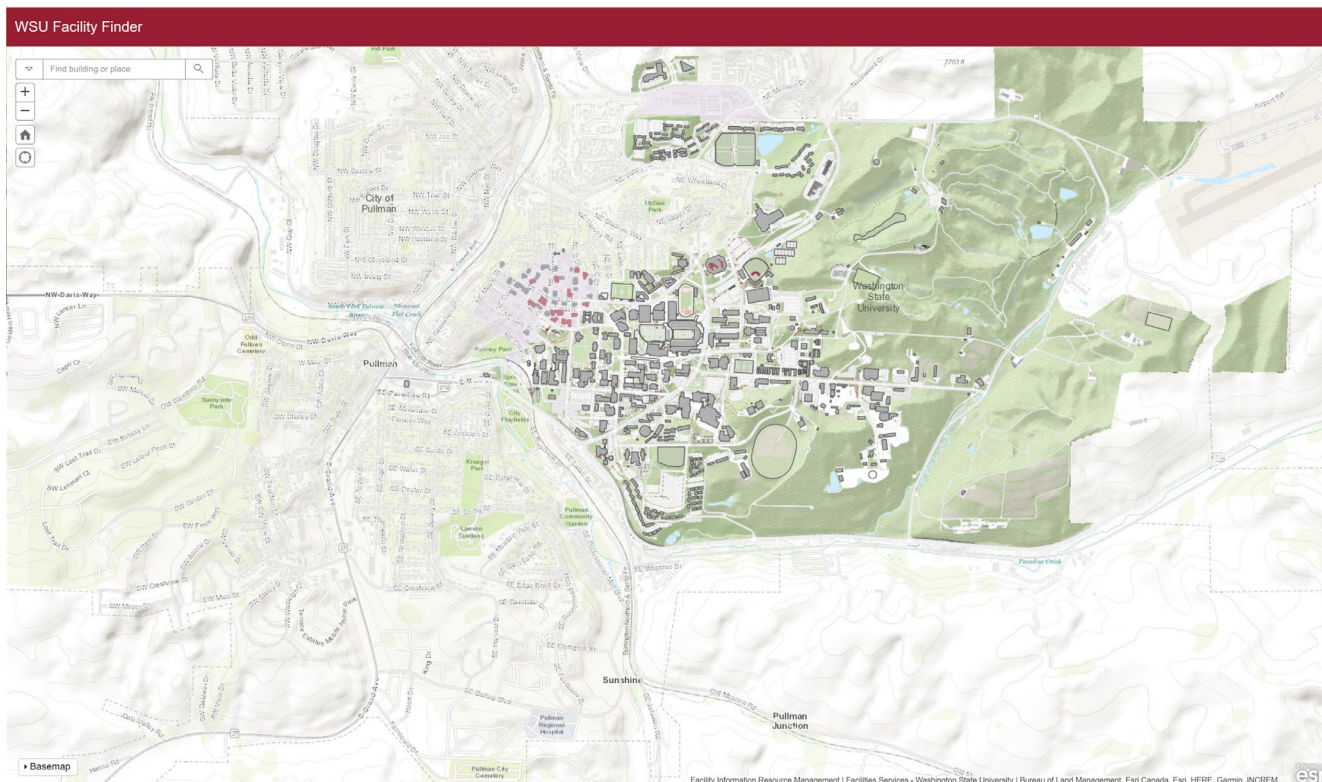


Project Pillars

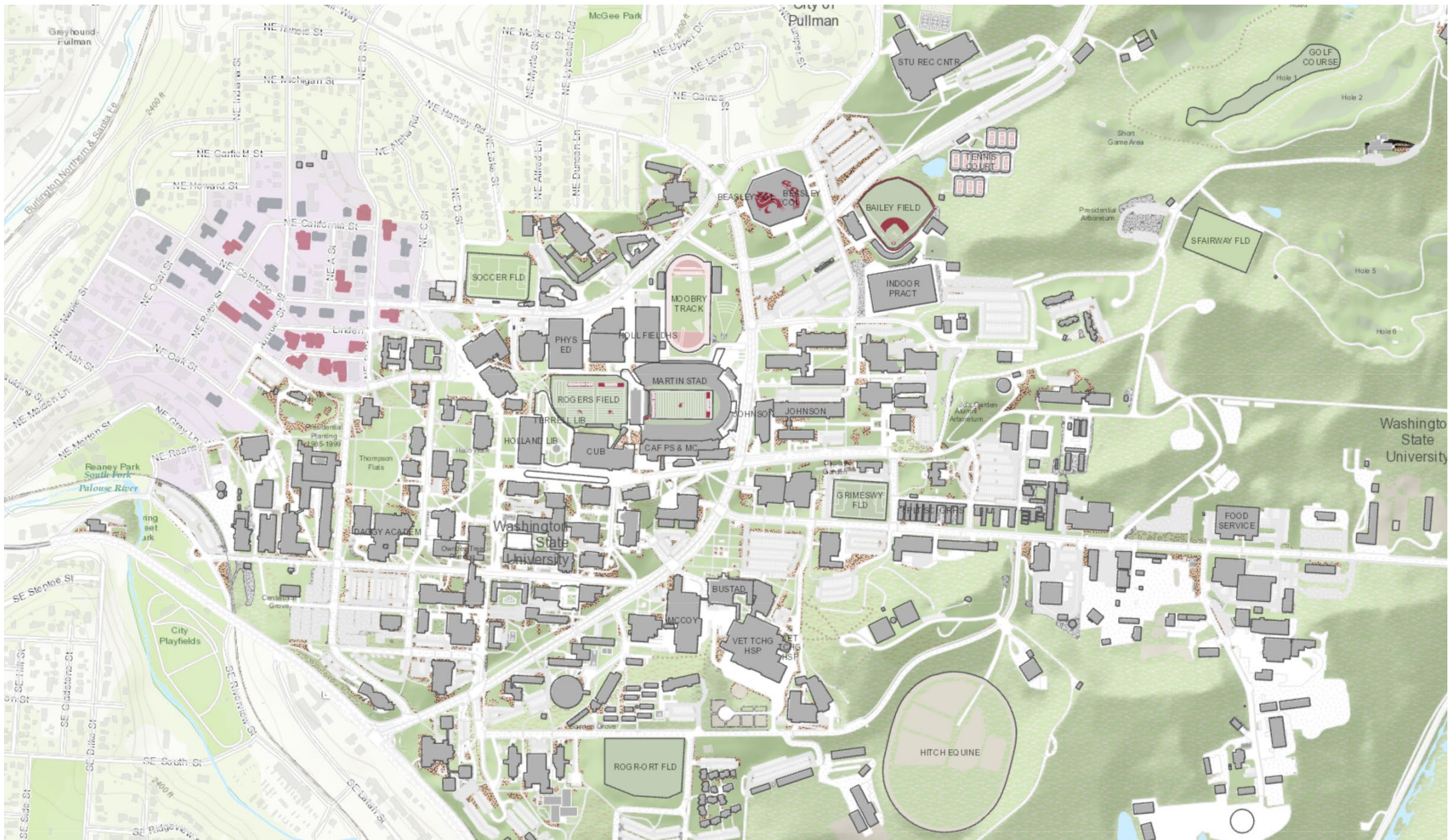
1. **Reduce energy use and costs at WSU:** *inform, educate, and empower occupants to help reduce their personal energy use and encourage their peers to be more conscious of wasted energy on campus.*
2. **Sustainable Community at WSU:** *foster the development of a social and active building culture that inspires community sustainability in meaningful ways.*
3. **Health and Well-being of WSU building occupants:** *empower occupants to take control of their physical and mental health, comfort, and well-being.*



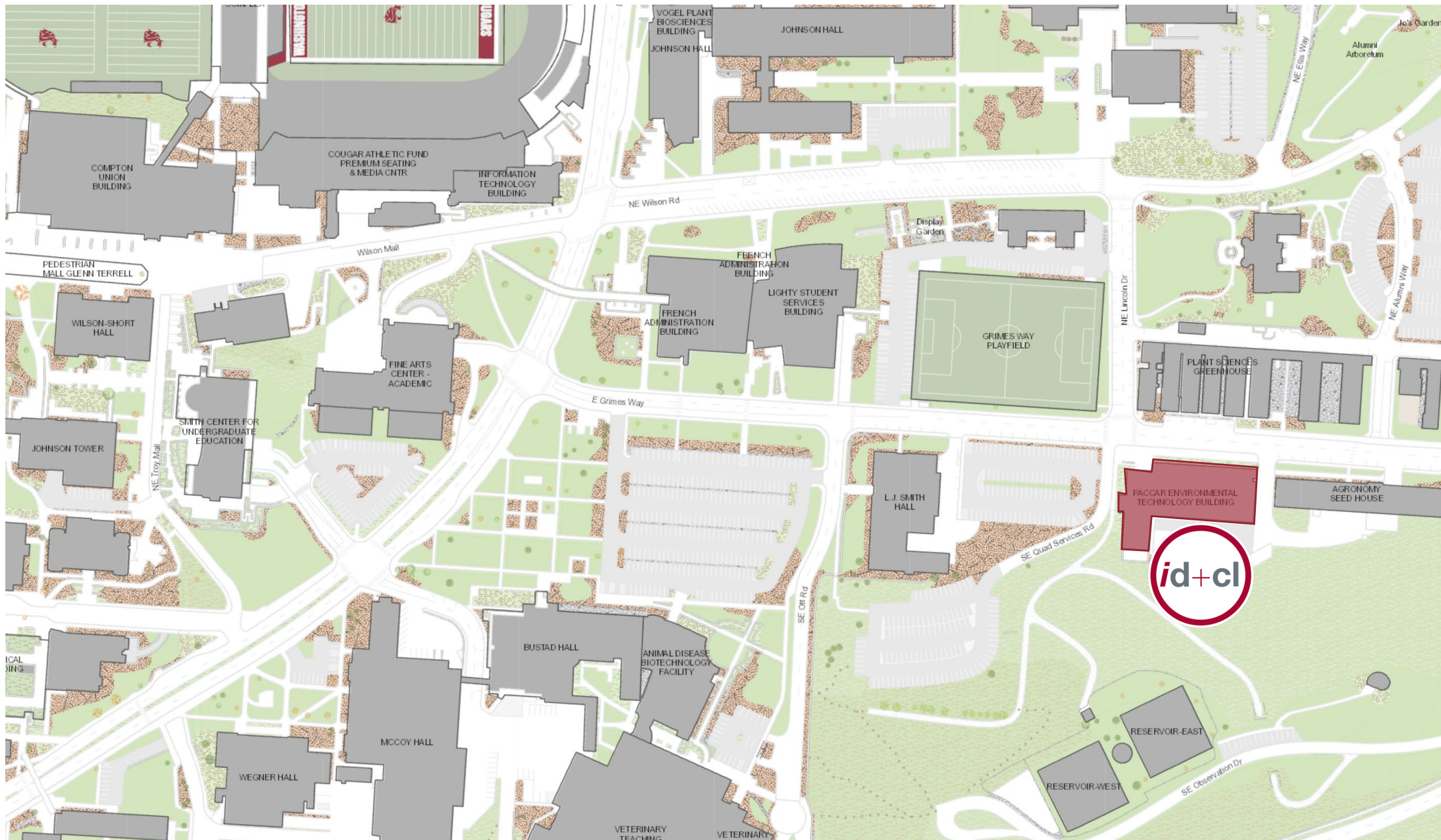
ENERGY & COMFORT @WSU

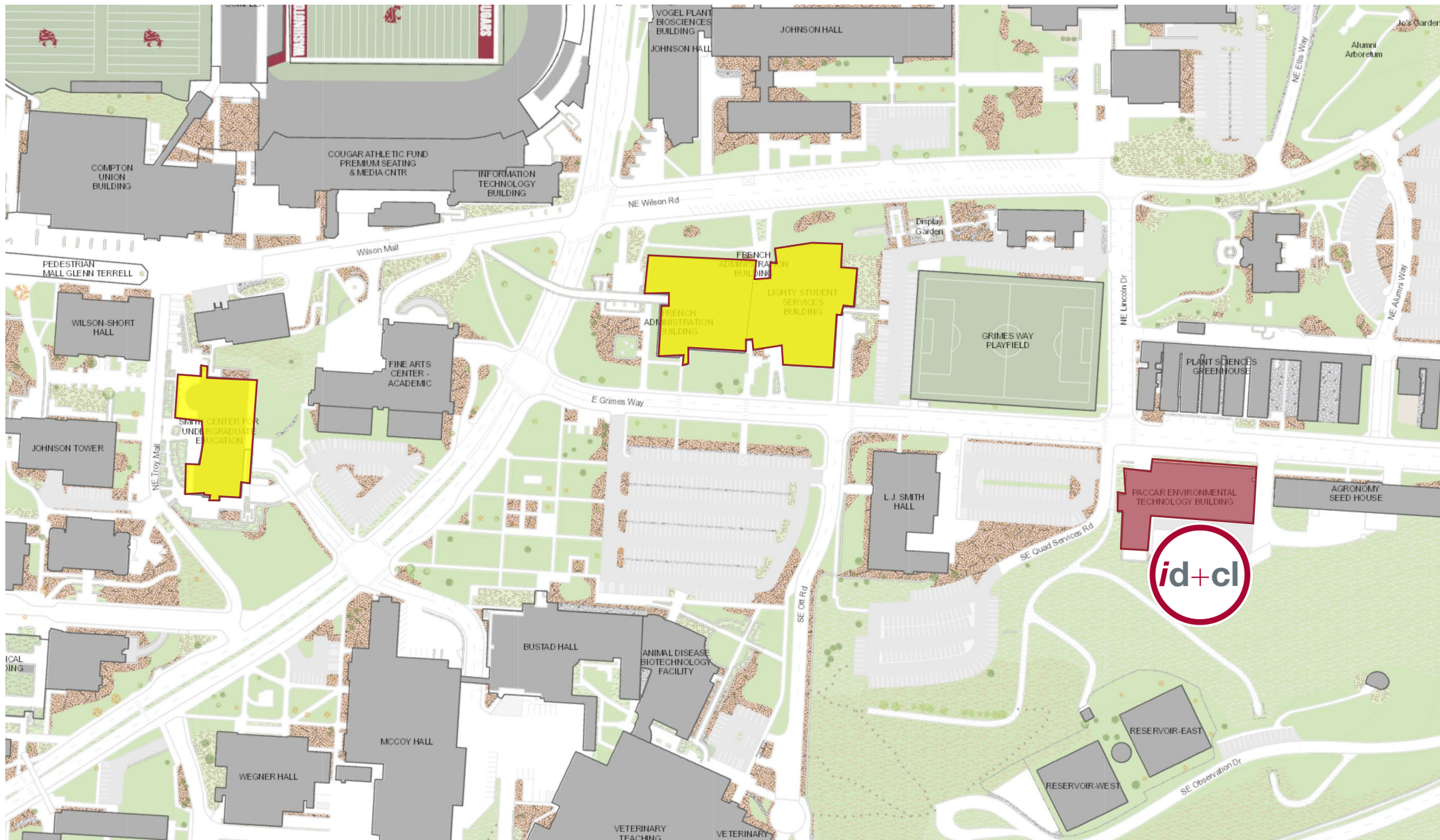


Impact

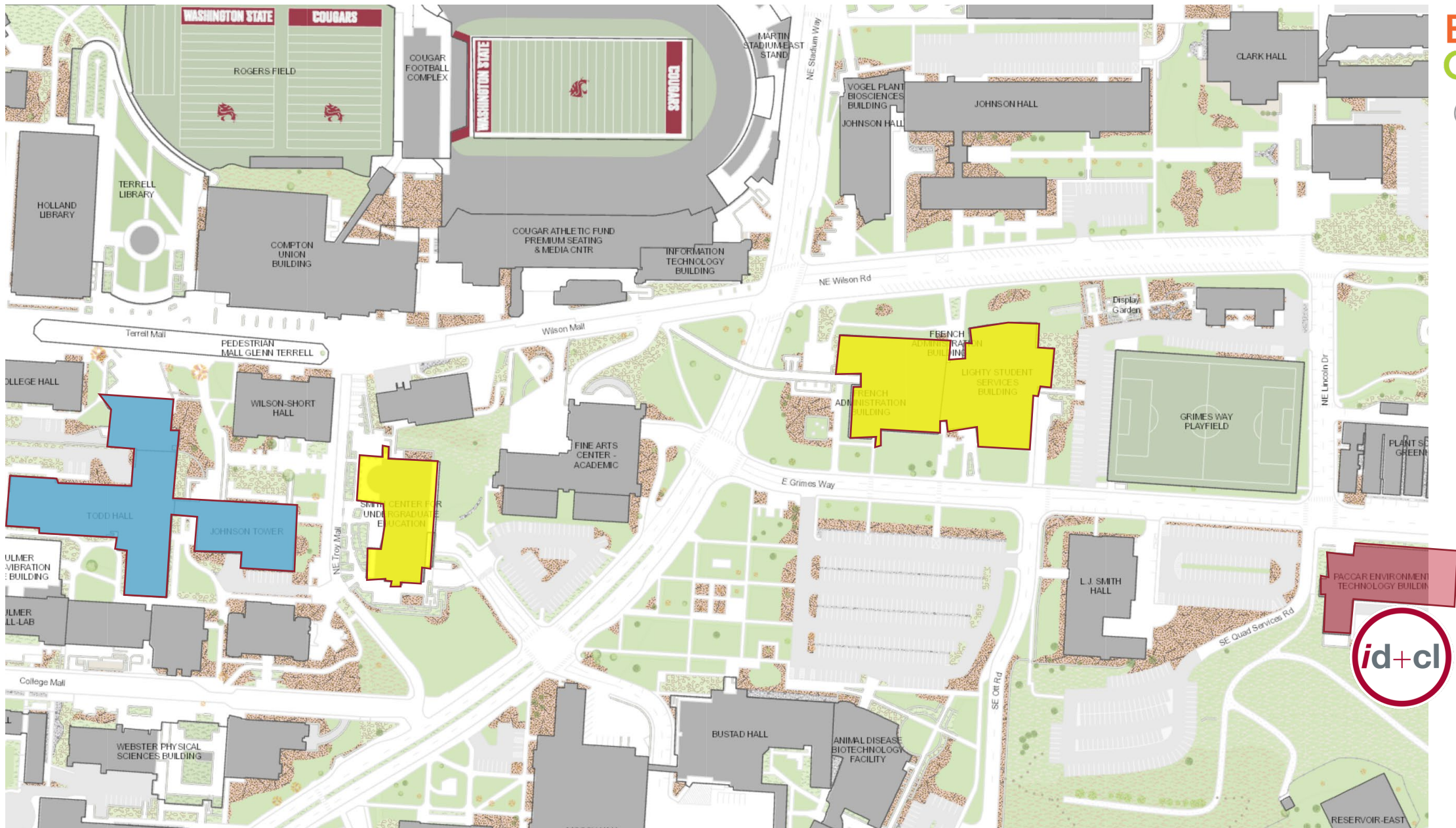


WSU Pullman Campus

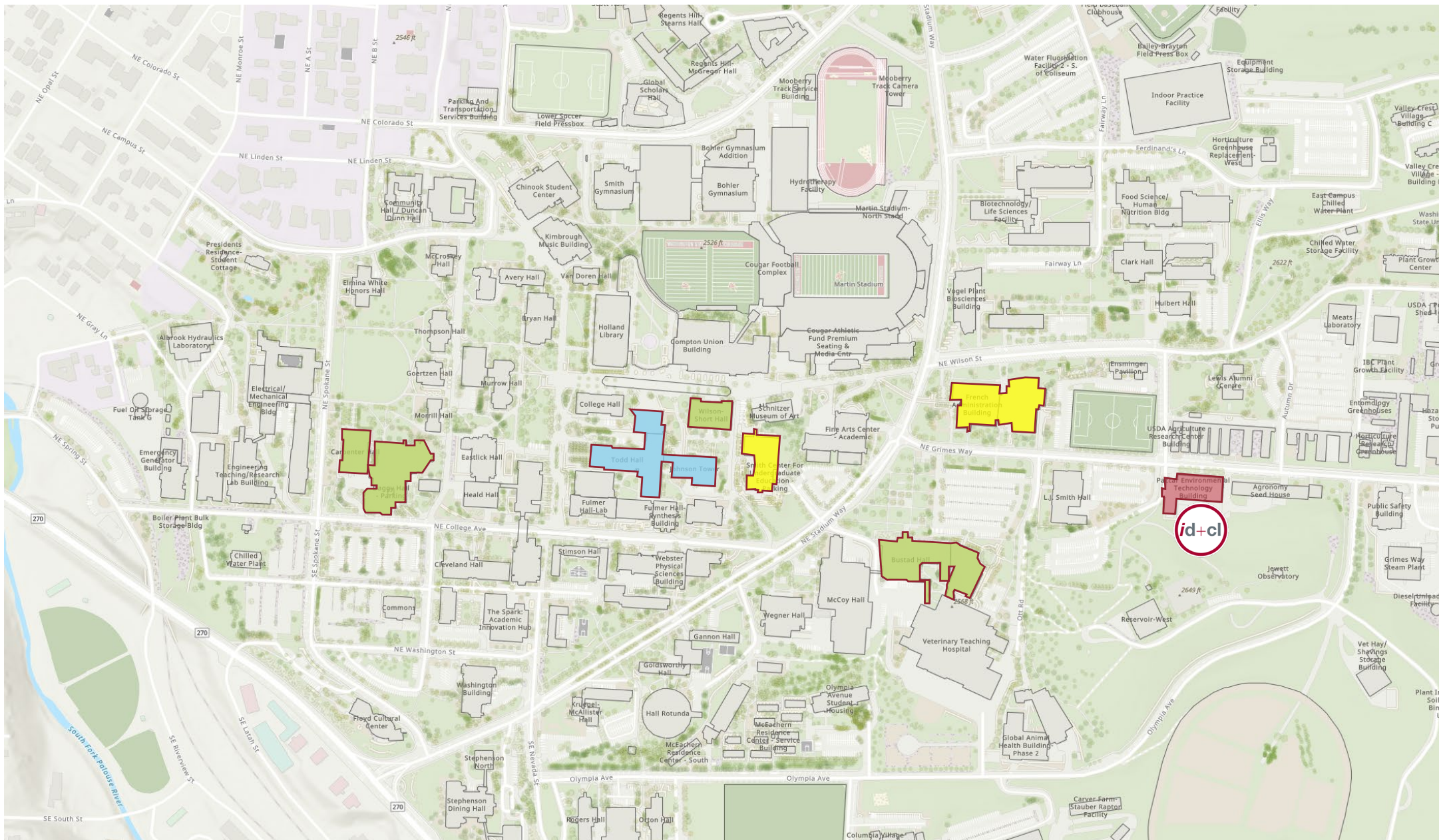




PHASE I



PHASE II



PHASE III

Decisions on targeted interventions:

- Facilities data
- Utility metrics
- Occupancy
- Survey feedback
- Interviews feedback
- Overlapped relationships between:
 - Visual, thermal, olfactory comfort
 - Satisfaction/dissatisfaction (PPD)
 - Ability to adjust environmental conditions
 - Desire and knowledge to conserve

LOOKING BACK...HEAT MAPS PROJECT

Building Selection was based on...

- Overall comfort ratings (from surveys/interviews)
- Occupant experiences in buildings
- Severity of deferred maintenance
- Importance of departments to university function
- Overall energy performance of buildings
- CBS compliance (first priority) + ASHRAE 2
- High occupancy spaces
- Primarily office workers

PHASE III and IV

Campaign targets



LAB/CLINIC



FULL-TIME



HOURLY PAY



HOTEL DESK



GRADUATE



FACULTY



KITCHENETTE

Elements of a Strong Tenant Engagement Program (more broadly)



WHO & WHERE



WHAT

WHY



HOW

- Consider largest energy impact (department or building) for initial targeting
- Determining tenant motivation to save or not to save
- Informing occupants of managerial reasoning is important
- Easy to understand educational material for multitude of audiences...

**Any questions before we
move on to engagement?**

ENERGY & COMFORT @ WSU

Campaign approach and design



Communicate

Directly engaged
with over **600+**
staff and faculty



Relate

Organized **9 in-**
person
engagement
activities



Educate

Published **17**
newsletters



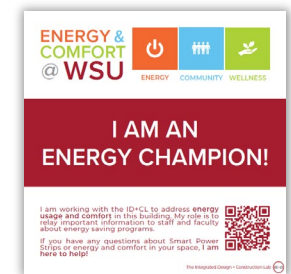
Intervene

Installed **402**
Smart Power
Strips



Disseminate

Engaged with **50**
departments
across 9 buildings



Advocate

Recruited **50**
Energy
Champions

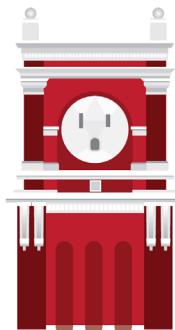
Newsletters + Material

UPCOMING EVENTS FOR SPRING 2023!



NATIONAL PLANT-A-FLOWER DAY (March 12th, 2023)

Lookout for the ID+CL staff as we come around on the 12th to engage with departments and staff in our target buildings!



WANT TO LEARN MORE?

Check out our website, <https://idcl.wsu.edu/> for more tips and tricks to save energy and stay comfortable in your home or office!

SPRING EQUINOX (March 20th, 2023)

Celebrate the day by spending time outside and limiting your energy usage. Try out recyclable and decomposable decorations and surprises!

National Plant-A-Flower Day: March 12th

Look out for the ID+CL staff throughout the week of the 12th as we celebrate this day by engaging departments and staff in our target buildings! Native wildflowers can increase the biodiversity of an area and provide habitats for all sorts of wildlife. We will be giving out wildflower seed packets to spread at home all week!

Spring Equinox: March 20th

Celebrate the changing of seasons outside this year, limiting your energy usage inside. Enjoy our natural landscape, plant your wildflower seeds, and watch the birds return. Take a moment to be mindful of the nature that surrounds us. Turning off excess lights and heating is a small way to thank our earth for all that it provides us!

Earth Day: April 22nd

Celebrate the earth by exploring our Palouse landscape and protecting our environment. Enjoy the spring air at Kamiak Butte, Steptoe Butte, or the Palouse Falls, but make sure to follow the campsite rule: *leave it better than you found it!* Take the time to be conscious of your energy usage by dressing in layers to maintain thermal comfort. Turn off lights when they are not in use to take advantage of the natural light. Ride the bus to work. Advocate for energy efficiency to three people in the office and make sure to have a Smart Power Strip installed in your office!

EARTH DAY (April 22nd, 2023)

Explore the beautiful Palouse landscape by making a trip to Kamiak Butte or Palouse Falls! Make sure to thank our earth by cutting back on your energy consumption!

STEP OUTDOORS & DISCOVER THE MAGIC OF SUMMER!

Warm weather is finally here and we ask that you properly prepare for your departure.

As the sun shines brightly and the temperatures rise, it's time to put on your adventure hat and step outside to embrace the beauty of summer! Our latest newsletter is here to inspire you to explore the great outdoors, soak up the sun, and create unforgettable memories under the clear blue skies. Before you head out for that long weekend or highly anticipated annual leave, be sure to review our [Annual Leave Checklist](#) to ensure a safe and sustainable departure from your WSU workstation:

ANNUAL LEAVE CHECKLIST

- ☐ Be sure to remove or secure any items on your desktop that might blow off your surfaces.

These items could cause a fire if they land on heaters with exposed radiant elements.

- ☐ Completely and safely power off and unplug all electronics. This includes:

**Note: if you remote into your computer, you should unplug all monitors and other connected equipment, but leave the computer on.*

- ☐ Surge protectors (override SPS programming with 'Manual' function; see our website for more information)
- ☐ Computer monitors
- ☐ Desktop speakers
- ☐ Personal fans
- ☐ Space heaters
- ☐ All printers/scanners
- ☐ Electric kettles
- ☐ Lamps and warmers
- ☐ Adjustable desks
- ☐ Coffee machines
- ☐ Microwaves
- ☐ Other appliances within the shared kitchenette

- ☐ Turn off all overhead lights and shut the blinds.
- ☐ At your desk, empty trash and remove any food items: things that smell, or could go bad in the time you will be away.



IMPORTANT REMINDER: If you are using a space heater during the summer months due to your space being overcooled, please call ES @ (509)-335-9000!

This project is sponsored by Facilities Services and delivered by the Integrated Design + Construction Lab



March 22, 2023

ENERGY & COMFORT @ WSU

WSU Tenant Engagement Program Newsletter for French Administration, Lighty Student Services, Smith Center for Undergraduate Education, Johnson Tower, Todd Hall, and Todd Addition building occupants.

SPRING INTO THE NEW SEMESTER

Spring is here! We have officially passed the spring equinox and are ready to welcome in the new season full of regrowth and sunshine. We encourage you to open up your blinds and turn off your overhead lights to optimize the benefits you and your coworkers receive from the sun! Some of these benefits include receiving Vitamin D, a critical nutrient that prevents bone loss, weight gain, various cancers, and heart disease; **Reducing depression and anxiety**; And **improving sleep** by re-balancing your natural sleep cycles. Make sure to open up your office space to receive all these benefits! In addition to letting light into the office, this is a perfect time to get out and enjoy our beautiful Palouse landscape to get fresh air and direct sunlight! Check out these opportunities to explore:

LAWSON GARDENS

This is the only formal, public garden in Pullman! Scattered with beautiful flowers, lush greenery, and whimsical gazebos, this is a must see for the spring!

KAMIAK BUTTE

This hike, just 15 minutes out of town, provides an incredible lookout over the rolling hills of the Palouse and is the perfect spot to soak up some sun!

PULLMAN RIVERWALK

This pedestrian and cycle path winds along the South Fork of the Palouse River. The path facilitates a beautiful journey through downtown Pullman!

"HUMANS SPEND OVER 90% OF THE TIME INDOORS"

U.S. Environmental Protection Agency, Indoor Air Quality Report.

Spending the majority of our time in inside can have adverse effects on our health and well-being. This is because the majority of indoor environments have poor air quality; in some cases they contain a concentration of 2-5 times more pollutants than outdoor environments. Long-term exposure to these pollutants can increase one's risk of depression, fatigue, headaches, heart issues, and some forms of cancer. Although we cannot simply move outdoors, there are steps we can take to mitigate these risks. Avoid the use of any chemical cleaners, paints, and other products that may release pollutants into the air, regularly open your windows to allow for natural ventilation, and take time to step outside and explore nature!



EXAMPLE TENANT ENGAGEMENT MATERIALS

ENERGY & COMFORT @ WSU







ENERGY COMMUNITY WELLNESS

I AM AN ENERGY CHAMPION!

I am working with the ID+CL to address energy usage and comfort in this building. My role is to relay important information to staff and faculty about energy saving programs.

If you have any questions about Smart Power Strips or energy and comfort in your space, I am [here to help!](#)



Learn More About the Study



User Manual



Contact for more information

Shelby Ruiz
shelby.ruiz@wsu.edu

Strip #



Integrated Design + Construction Laboratory

The Integrated Design + Construction Lab



ENERGY & COMFORT @ WSU





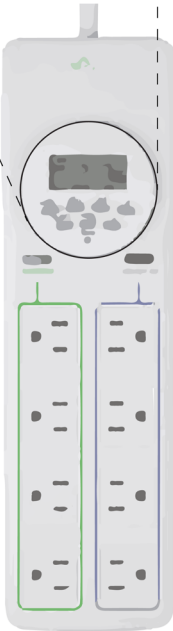


DAYLIGHT SAVING TIME

To accommodate daylight saving time, this Smart Power Strip (SPS) has a built-in function to move forward an hour without compromising the programming of the timer.

Press the 'HOUR' and 'MIN' buttons simultaneously to activate or deactivate this function. **Note:** a small symbol "+1h" will appear on the far right of the LCD screen when this function is active.

If there are any questions or concerns with activating this function, email **Zachary Colligan** at Zach.Colligan@wsu.edu



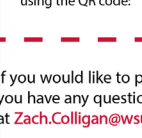


Integrated Design + Construction Laboratory

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ENERGY & COMFORT @ WSU







ARE THE KITCHEN APPLIANCES TURNED OFF?

'Plug loads' refer to energy that is drawn from the building via an outlet. This Smart Power Strip (SPS) uses a built-in timer to mitigate the load outside of the typical workday and to save energy during the evenings and weekends on campus. The Integrated Design and Construction Laboratory is conducting a study with Facilities Services to assess the impact of non-behavioral interventions, such as the SPS, on energy consumption in this building.

Your department has installed this SPS as part of our study, here's a QR code to learn more:



If you'd like an SPS for your WSU office, please fill out this form using this QR code:



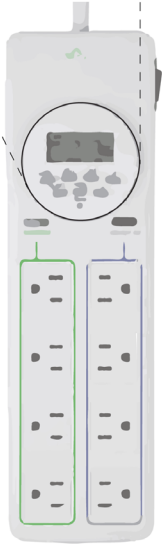
To turn the devices on temporarily:

Override the program and turn on or off the timer by pressing the MANUAL button once. This action temporarily reverts the SPS to a conventional power strip and it will return to its scheduled on/off cycle the next time around.

Please refer to the User Manual for other questions using the QR code:



If you would like to participate in our study and to have an SPS for your WSU office or if you have any questions or concerns with the Smart Power Strip, email Zachary Colligan at Zach.Colligan@wsu.edu.



This project is sponsored by Facilities Services and delivered by the Integrated Design + Construction Lab



EXAMPLE SEASONAL NEWSLETTERS

OFFER SOLUTIONS

ENERGY EFFICIENCY

COMMUNITY BUILDING

COMFORT & WELL-BEING

Tips & Tricks for a Sustainable Halloween

With Halloween around the corner, celebrations are under way. We have included some sustainable solutions to Halloween decorations and costumes so that you can celebrate the festivities while looking out for our planet!

Decorations:

- Reuse, Reuse, Reuse! Pull out the old decorations from years past and try to utilize them again. If there are stains, or you are hoping for a new look, try an easy dye project to vamp it up.
- Make your own! Using old sheets, cardboard, and other recyclable materials to create new decorations can be a fun activity and leave you with some spooky decorations.

Costumes:

Coming up with costume ideas can be difficult. We have come up with a few sustainable costume ideas to make your life a little easier:



LED LIGHT BULB
This costume will consume far less energy than your traditional light bulb and it's life span is much longer allowing you to reuse the same costume next year!



ENERGY AND SAFETY COMPLIANT SPACE HEATER
Space heaters are a huge fire safety. To make sure your costume is safe for the night, be sure to turn it off and unplug when not wearing it!



SMART POWER STRIP
Having devices plugged into the appropriate sides of your Smart Strip and programming when those devices need to be used can reduce large plug loads from the building and your costume!

STILL MORE SMART POWER STRIPS TO INSTALL IN THE COMING ACADEMIC YEAR:

As we move through this most recent milestone we look forward to doubling our quota and expanding our study! This means that **we need a Smart Power Strip in every office of every department of French Administration, Lighty Student Services, the Smith CUE, Todd Hall (and Addition) and Johnson Tower!** We are also pushing to install strips in kitchenettes and other shared workspaces with shared electronic devices. If you already have a strip installed, spread the word! Otherwise, **reach out to Zachary Colligan at zach.colligan@wsu.edu to learn more** about our study and to participate in making campus more efficient.

INFORM

HEATING SEASON!

Space Heaters; The Good, the Bad, the Ugly



THE GOOD:

These include heaters with:

- Use of 200 watts of electricity or less
- A tip over safety feature and on/off switches
- Must be UL (Underwriters Laboratory) Listed

A good heater will improve your comfort without impacting the building's climate or putting anyone in harms way. To best heat the intended target, place your heater below your desk.



THE BAD:

These include:

- Any heater without the "good" requirements
- Radiant type heaters that glow red or orange and use up to 1500W.

A bad heater will use more energy to produce a less direct source of heat that may be registered by the building before you, leaving you and the space colder than before you turned it on.



THE UGLY:

In the worst cases, space heaters can provide a serious fire danger. In Pullman, in 2018, a devastating fire was started by a space heater. No one was hurt but the damage could have been avoided. Please be cautious and aware while using your space heater.

Remember: Never leave your space heater plugged in unattended, keep paper and other combustibles away from your heater and be wary of any moving air that could blow papers that direction, and have your space heater plugged into a surge protector. (Or one of our Smart Power Strips!)

The WSU Fire Marshal and Facilities Services discourage the use of portable space heaters in university interior locations for the following reasons:

- As sources of ignition, space heaters can create fire hazards.
- Space heaters are not as energy efficient as central heating.
- The electric cord creates a tripping hazard.

To conserve energy, the Facilities Services Energy team recommends that University personnel select portable space heaters that comply with "The Good" heater.

Recommended Options for Space Heaters: [Amazon Basic](#) and [Honeywell Heatbud](#)

REMIND

PREP YOUR SMART STRIP FOR BREAK!

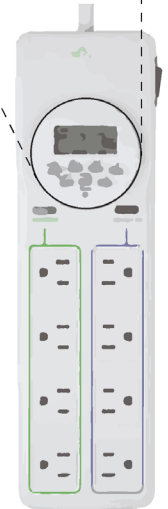
When your office is unoccupied for an extended period of time, it is best to avoid unnecessary devices turning on based on the timer. However, IT may perform updates throughout the break, requiring we leave computers on. This means that your SPS must be switched from "AUTO ON" to "MANUAL OFF". Follow these steps to do so.

1. Press and hold "MANUAL" for 4-5 seconds until the label on the screen switches from "AUTO" to "MAN".
2. If your screen displays "ON" next to "MAN" you will need to briefly press the "MANUAL" button again to switch to "OFF"

Following these steps will allow devices on the "always on" side to stay on, and the "switched" side to stay off until the process is reversed.

Note: Once you have returned to the office full time, you can revert to the programmed SPS by following the exact same steps until your screen displays "AUTO ON"

If you would like to learn more about our smart strip program please visit our website: <https://idcl.wsu.edu/>



STILL MORE SMART POWER STRIPS TO INSTALL THIS ACADEMIC YEAR:

As we move through this most recent milestone we look forward to doubling our quota and expanding our study! This means that **we need a Smart Power Strip in every office of every department of French Administration, Lighty Student Services, the Smith CUE, Todd Hall (and Addition) and Johnson Tower!** We are also pushing to install strips in kitchenettes and other shared workspaces with shared electronic devices. If you already have a strip installed, spread the word! Otherwise, **reach out to Zachary Colligan at zach.colligan@wsu.edu to learn more** about our study and to participate in making campus more efficient.

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AUTUMN NEWSLETTER

EARLY-WINTER NEWSLETTER

INTRODUCTION: SPS Program

WSU Integrated Design
+ Construction
Laboratory

WSU Tenant
Engagement

Overview

Tenant Engagement
Tips & Tricks

ID+CL SMART STRIP
STUDY

LLLC Curriculum

ID + CL Research

Newsletters & Posters

Energy Champions

Energy Efficiency &
Comfort Training

About Us

Building Healthy,
Energy-efficient, and
Resilient Occupants
Podcast

ID+CL News

f

t

y

+

myWSU ACCESS POLICIES

SMART STRIP SIGNUP

PRE-INSTALLATION SURVEY

Please complete this questionnaire to help us program the Smart Power Strip (SPS) prior to the installation, which minimizes any unnecessary disruption to your workday. The additional questions related to energy use and thermal preferences are to provide us with a greater understanding of occupant behavior and perceived thermal comfort:

Would you like a free Smart Power Strip or to update the schedule for your existing strip?
(Required)

☒ I need a new Smart Power Strip

☐ I need to update my existing strip

Name *(Required)*

First

Last

EMAIL *(REQUIRED)*

DEPARTMENT *(REQUIRED)*

REASON FOR SERVICE (IF APPLICABLE)

BUILDING & OFFICE NUMBER *(REQUIRED)*

FAQs about Smart Strips answered on our website.....

Q: Are the Smart Strips free?

Q: Who can get one?

Q: What is the difference between the 'Always On' and 'Switched' portions of the Smart Power Strip?

Q: Will Daylight Saving Time be an issue?

Q: Can I use my devices outside of the scheduled time?

Q: Can I have more than one SPS in my office?

Q: Can I have one for my home office?

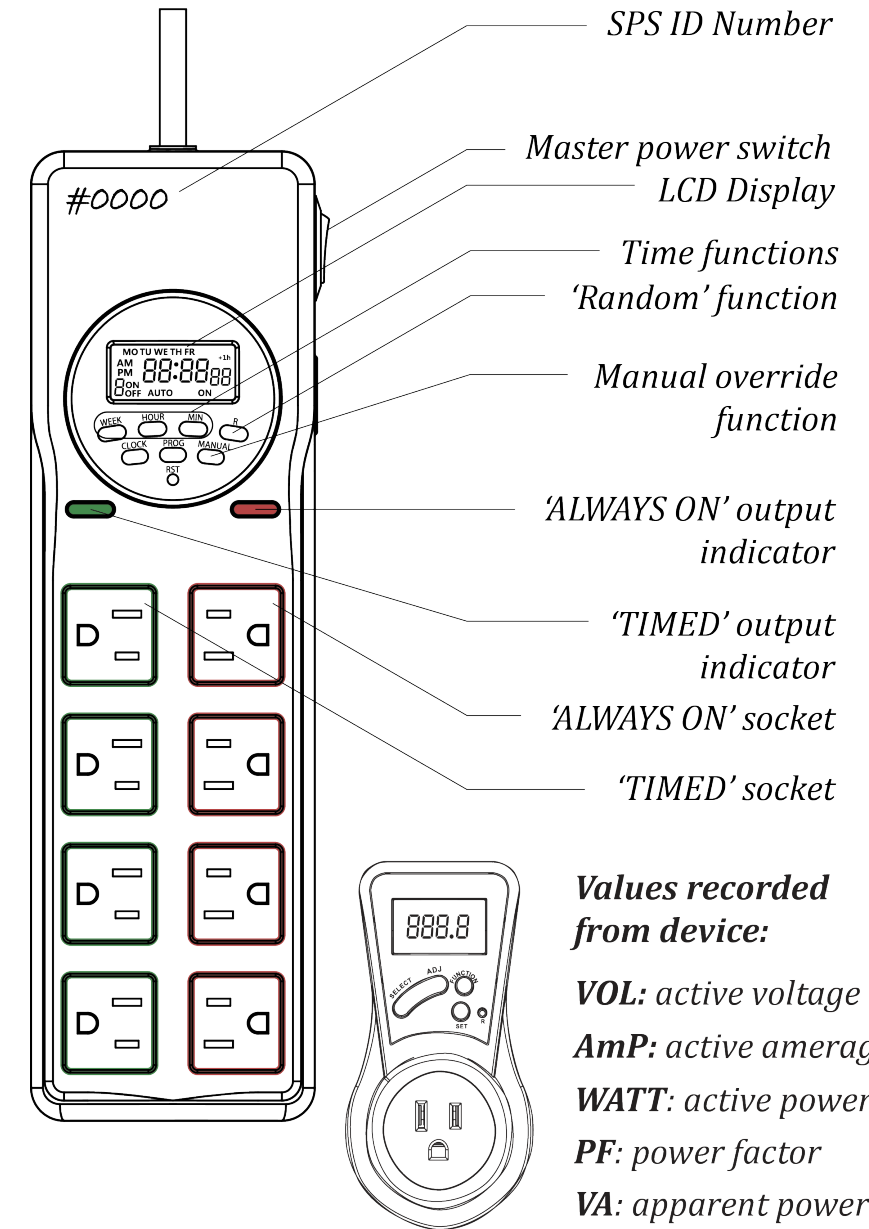


See more on our website!! idcl.wsu.edu

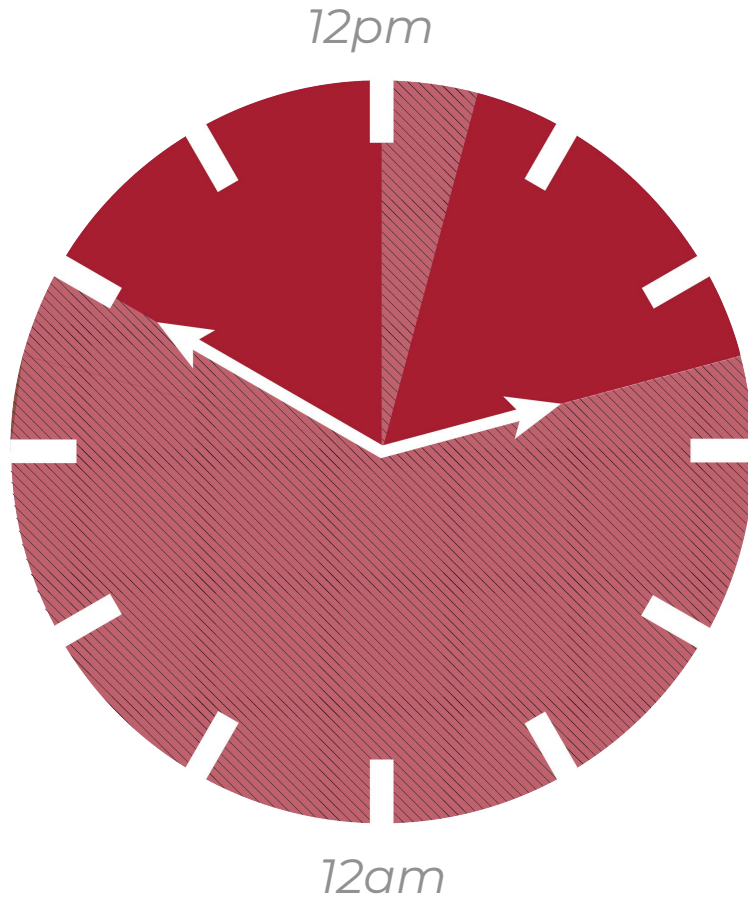
'Smart' Power Strip

IN RESPONSE TO CHALLENGES

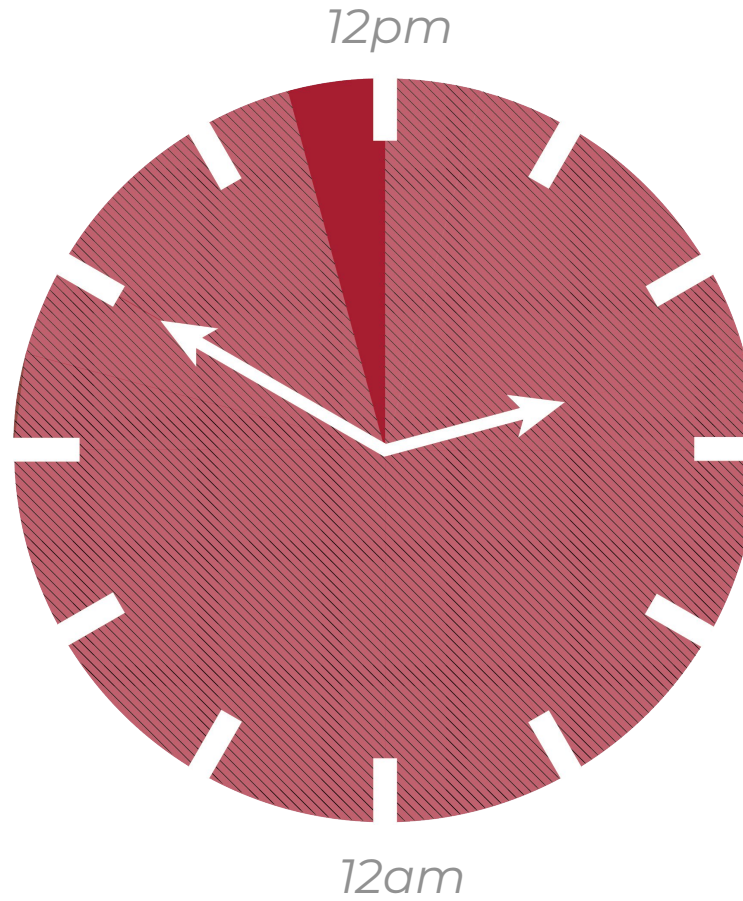
- The strip's schedule encompasses the user's schedule by an hour on each end, **ensuring no disruption to the typical workday.**
- **The device has no Bluetooth or Wi-Fi capabilities,** it is strictly a surge protector with an integrated timer.
 - **Our initial measurements help us to estimate** the existing consumption of a space and then make predictions as to the annual energy saved.
- The timer is fixed but must be adjusted for Daylight Saving Time and in case the workday runs long. The **manual override** and the '**Daylight-Saving Function**' are both described on our website.



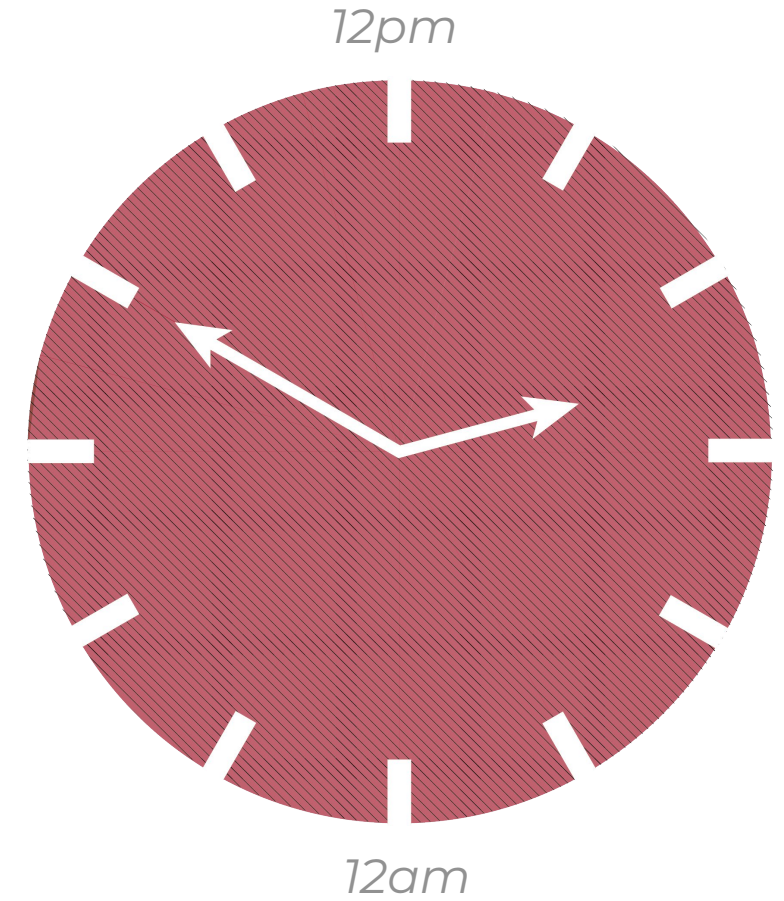
Fulltime Schedule



Hybrid Schedule



Weekend/off-day



Fulltime Schedule

- **'Always ON'** = 5 days (8hr ($W_{avg.}$) + 16hr (W_{low}))

Active Hours

Idle Hours

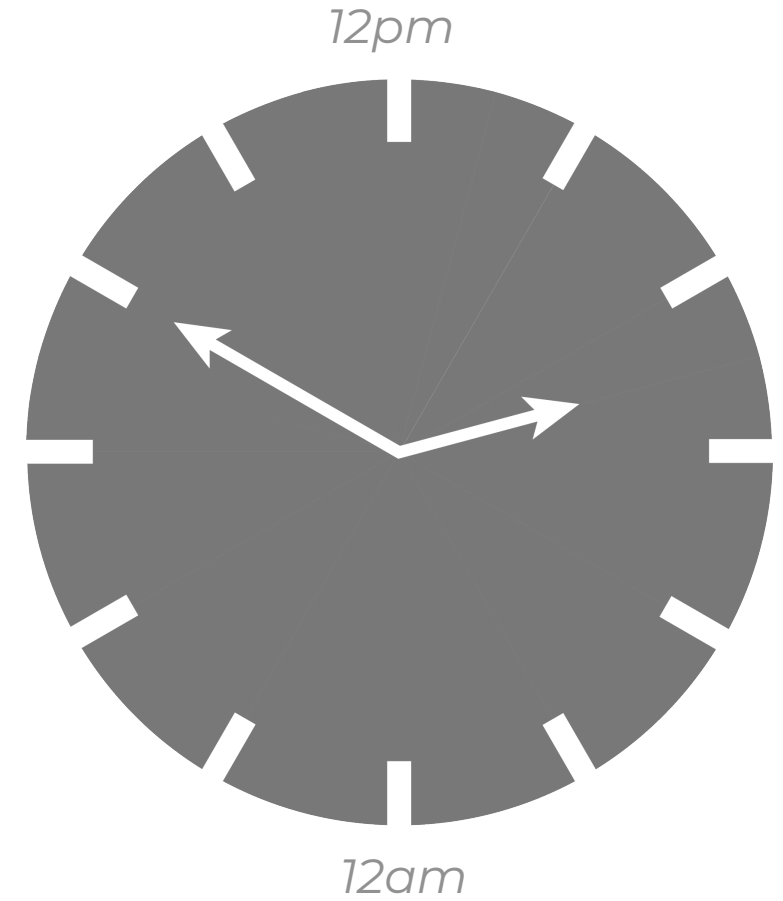
Fulltime Schedule



Hybrid Schedule



Weekend/off-day



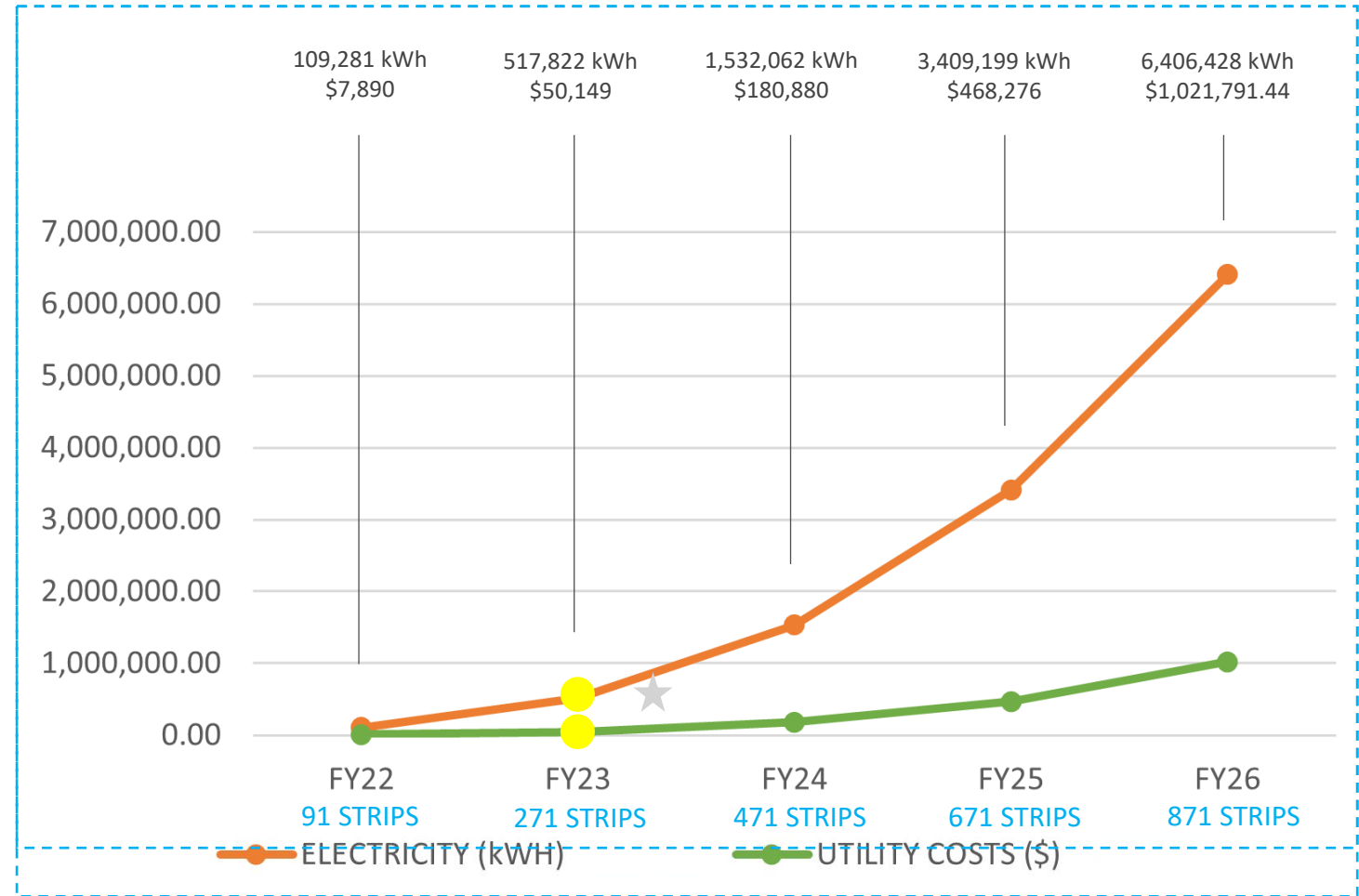
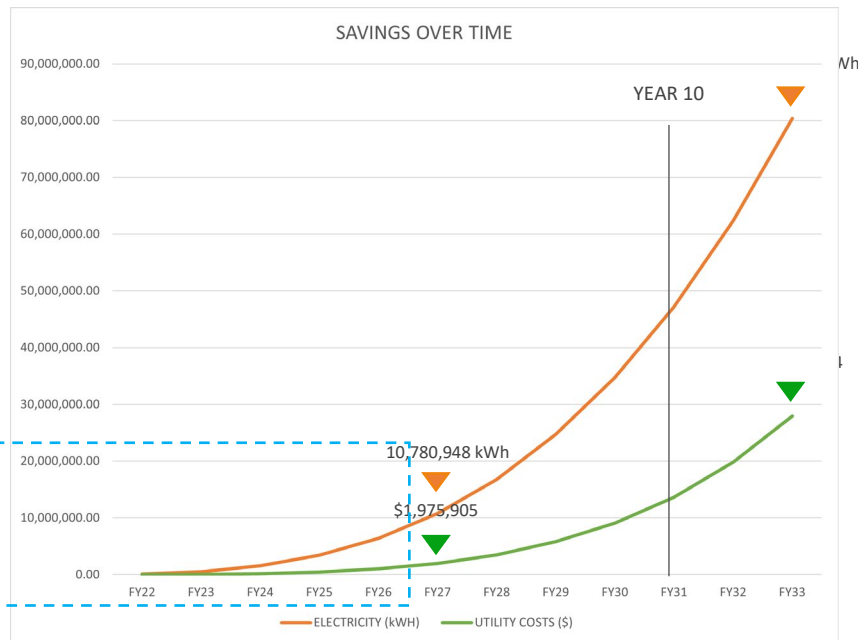
Fulltime Schedule

- **'Timed'** = 5 days (8hr ($W_{avg.}$) + 3hr (W_{low}) + 13hr (W_{OFF}))

Results

FY23 REF ESTIMATED SAVINGS -

Estimated annual dollar savings - \$87 per Smart Strip
 Cumulative utility cost savings – \$50,149
 Cumulative electricity savings – 517,822 kWh



*graph depicts projections of 200 SS installations per FY

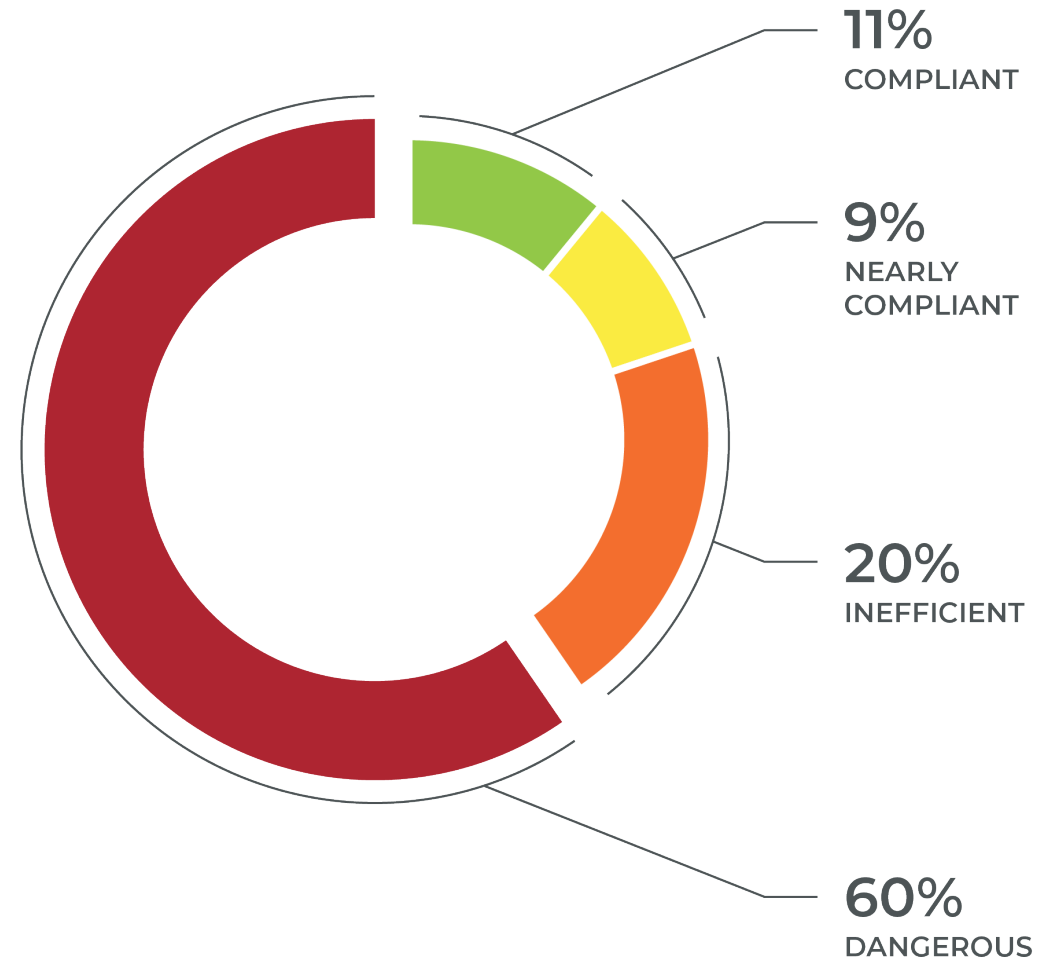
★ Savings Goal

● Current Savings

Space Heaters

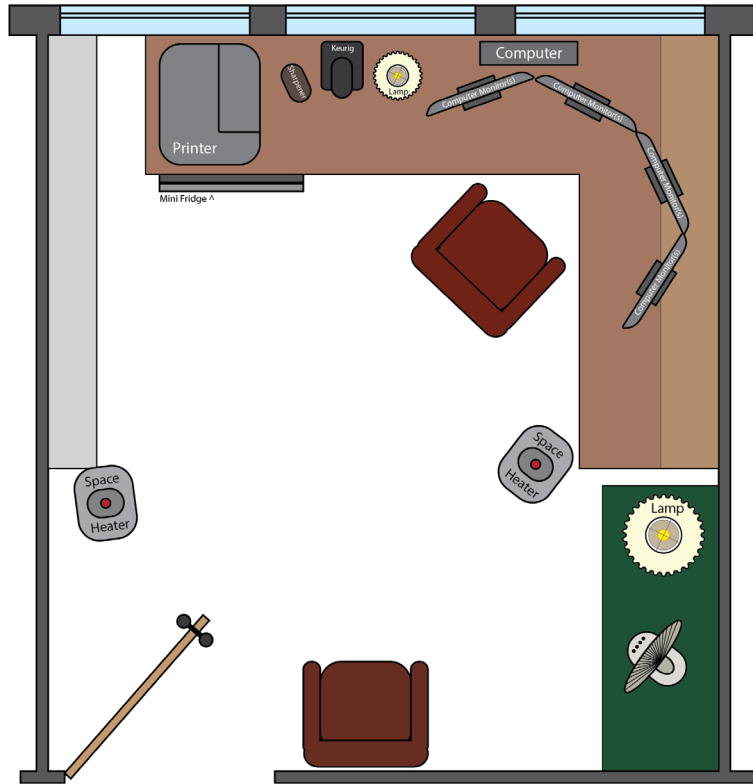
	\$\$/4hr use	\$\$/8hr use
DANGEROUS >1,200 W (avg. 1,413 W)	\$0.44 \$114/yr	\$0.88 \$228/yr
INEFFICIENT 600 to <1,200 W (avg. 961 W)	\$0.30 \$78/yr	\$0.60 \$156/yr
NEARLY COMPLIANT 200 to <600 W (avg. 348 W)	\$0.11 \$29/yr	\$0.22 \$58/yr
COMPLIANT <200 W (avg. 165 W)	\$0.05 \$13/yr	\$0.10 \$26/yr

146 space heaters were identified across our six target buildings



For this one office...

- Daily Costs: \$7.55
- Daily Energy Use: 96.5 kWh



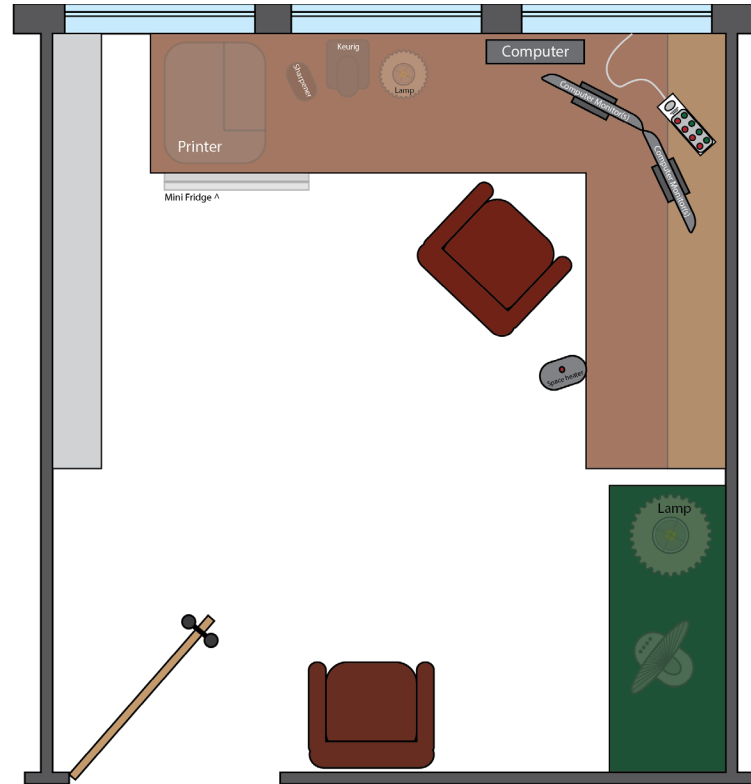
Existing Condition

"WORST CASE SCENARIO"

Before any tenant engagement
and smart strip install

For this one office...

- Daily Costs: \$0.49
- Daily Energy Use: 6.03 kWh



Intervention C

"BEST CASE SCENARIO"

Interventions A + B + Removal of
printer, 2 monitors, and replacement (or removal)
of high wattage space heater.

Examples

Mr. 4 Monitors

- Office was cold – left his space heaters running 24/7/365, trapped in cooling loop
- Simple conversations and removal/replacement of equipment resulted in higher comfort and lower energy use outcomes
- (despite going back to having 4)

Engagement Communications



“Does [broadening temperature setpoints] really save energy if everyone is cranking up space heaters?”

*“My office was freezing cold for several weeks **this summer**. I came into my office on a Monday and the temperature was 65 degrees. It remained this temperature for two weeks.”*

*“There are several using a space heater **this summer**. It’s an issue in other suites on the 4th floor as well.”*

**PEOPLE REACH OUT TO US WHEN
THEY ARE NOT COMFORTABLE
AND THEY HAVE QUESTIONS**

COMMENTS FROM WSU STAFF REGARDING NEW MANDATORY CHANGES

*“There are people that are definitely layering on the clothes. **This discomfort then turns into disgruntle**, which leads to less working hours and/or poor attitudes, which turns into an entirely different issue.”*

“I’m sure there are plenty of wonderful comments heading towards facilities 😁 I feel bad for them this time of year!”

Limitations

- Only hear about problems when they reach critical mass, from the most vocal
- Not very 'Smart' Smart strips due to IT limitations:
 - Security concerns
 - Estimates based on initial collection
- Balance of convenience vs. efficiency
 - Accommodating people's schedules, different backgrounds, level of interest, tolerance for disruption
- Negotiated utility rates and cumulative cost savings
- Getting meaningful feedback from participants, surveys, interviews, we are all busy!



Surveys and Interviews: 2024



CONSERVATION



COMMUNITY



COMFORT

Primary Hypothesis

OCCUPANTS DO CARE

- Do building occupants **care** about their energy consumption on WSU's campus?
- Do building occupants **understand** their role in a building's energy consumption?
- Do building occupants **implement** low-energy, low-cost **strategies** for managing their comfort?
- Are building occupants **interested** in completing an energy positive behavior training?

Building occupants understand and care about energy conservation in WSU buildings.

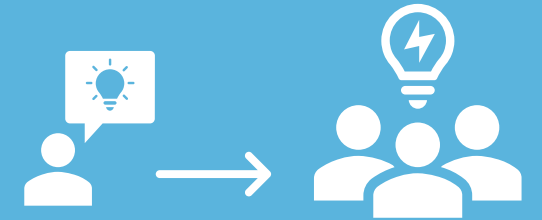


Secondary Hypothesis

THE CAMPAIGN IS EFFECTIVE

- How well do people **recognize** our staff, our language, our goals, and our marketing material?
- How broad is the **reach** of the campaign's recognition?
- Does the campaign save energy as a result of **behavioral** intervention?

The Energy and Comfort @ WSU campaign is impacting the adoption of energy-positive behavior on WSU's Pullman campus



Goal and Intention

WHY DO MORE SURVEYS?

- Are building occupants interested in additional training/guidance for energy-positive behavior?
- Are occupants taking the previous training and has it been an effective resource?
- Is there opportunity to create student training?
- Does the previous training need to be updated?
- Data analysis in progress ... interesting so far!

The survey feedback will serve as an opportunity to update WSU's Energy and Comfort training module.



Successes and Areas of Growth + Lessons Learned

Goals/Strategies

- High rate of in-person engagement
- High rate of **attempted** installs
- High number of **completed** installs
- Engagement with multiple buildings
- Website utilization
- Specialized occupant type engagement
- Maintain privacy and security
- Consistent feedback on program

PAST

PRESENT

FUTURE

✓	✗	✓
✓	✗	✓
✗	✓	✓
✗	✓	✓
✗	✓	✓
✗	✓	✓
✓	✓	✓
✗	✗	✓



Next steps

Moving into the next phase of engagement:

- Complete few remaining installs in **Johnson Tower**
- Build recognition among staff and faculty in **College of Veterinary Medicine** and **Voiland College**, complete more installs, and conduct in-person engagement activities.
- Implement **surveys and interviews**.
- Collect and **curate feedback** from surveys to inform **development of campaign and future training** modules
- Build our **visibility and retention** among all target buildings



Facilities Services

WASHINGTON STATE UNIVERSITY

Thank you to WSU Facilities Services!
Any questions?

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Scan to learn more about
Energy and Comfort at WSU

