



# **Human Behavior Energy Audit<sup>SM</sup>**

---

California State University, Fresno

---

SUBMITTED BY: NORESKO Green Operations

February 2022

NORESKO, LLC  
One Research Drive  
Suite 400C  
Westborough, MA 01581  
(508) 614-1000

# CONTENTS

Executive Summary.....	4
Introduction.....	5
Method .....	5
Historical Data .....	5
Focus Groups and Interviews.....	6
Web-Based Survey .....	6
Analysis.....	7
Focus Groups and Interviews.....	7
Observations from Focus Groups and Interviews.....	8
Web-Based Survey .....	8
Attitudes.....	9
Behaviors .....	10
Residential Student Behaviors .....	11
Others Wasting Energy .....	12
Recycling.....	13
Water.....	14
Vehicle Idling.....	16
Transportation.....	17
Future Priorities.....	18
Findings and recommendations.....	19
Finding 1: Energy-wasting Behaviors Exist .....	19
Recommendation: Review and Communicate University Policy on “Group-Use” Printers and Default Practices.....	19
Recommendation: Review and Communicate University Policy on Opening Doors/Windows and Space Heater Use.....	19
Finding 2: Attitudes Toward Energy Conservation Statements are Less Desirable .....	20
Recommendation: Continue Awareness Communication and Marketing Efforts.....	20
Recommendation: Develop a Guest Lecture Series Featuring Different Aspects of the CUPR P3 Project.....	21
Recommendation: Communicate that Sustainability Priorities Align with Campus Community .....	21
Finding 3: Recycling Behavior is a Concern Among Both Students and Faculty/Staff.....	22
Recommendation: Audit Campus Recycling System .....	22
Finding 4: There is a Willing Audience Ready to Help Fresno State Conserve Energy.....	22
Recommendation: Provide Feedback from HBEA Report to Campus Community.....	23

Recommendation: Continue Aligning Internships with Student Interest and Program Potential .....23

Recommendation: Consider Feasibility of Sustainability Living Learning Community for Students .....23

Finding 5: Perceptions of Sustainability and Energy Conservation May Not Represent Existing Efforts..... 23

Recommendation: Ensure Maintenance Work Order System is Understood, Utilized, and Executed.....23

Recommendation: Review and Communicate University Water Usage Policies.....24

Recommendation: Communicate Necessity of Golf Cart Usage and Sustainable Practices.....24

Wrap-Up ..... 25

# EXECUTIVE SUMMARY

## Introduction

The Green Operations (GO) team holistically approaches an energy project by including building occupants as active participants in the project. These occupants bring uniqueness to the energy efficiency initiative and create the sustainable culture of an organization. NORESOCO applauds Fresno State's decision to perform a Human Behavior Energy Audit<sup>SM</sup> (HBEA) to assess the current status of this sustainable culture. The decision by Fresno State to perform this audit speaks specifically to their progressive approach towards a more sustainable campus.

## Method

The HBEA is a comprehensive process that collects data through focus groups, interviews, and a web-based survey. Focus groups were conducted on-site from October 18<sup>th</sup> through October 22<sup>nd</sup> by the Green Operations team. A web-based survey was administered from November 17<sup>th</sup>, 2021 to December 7<sup>th</sup>, 2021. Survey incentives were offered to boost participation levels.

## Analysis

Green Operations collected both qualitative and quantitative data from 2,419 participants responding to the web-based survey and 127 participants who attended the focus groups. Detailed content and statistical analysis were then conducted. In general, Fresno State faculty/staff and students have similar positive attitudes toward energy conservation, indicating that they are willing to engage with energy conservation behaviors and sustainability practices. However, we did find that students scored lower on some attitude measures; additionally, many participants from both groups reported some unanticipated energy-wasting behaviors. All suggest that energy sustainability advocacy among students and faculty/staff could be beneficial for the overall sustainability culture at Fresno State.

## Findings

Analyzing Fresno State's faculty/staff and student responses from focus groups and the web-based survey, NORESOCO's GO team was able to identify areas open for improvement. Observations and analyses yielded five key findings across multiple areas.

- ▶ Energy-wasting behaviors exist
- ▶ Attitudes toward energy conservation statements are less desirable
- ▶ Recycling behavior is a concern among both students and faculty/staff
- ▶ There is a willing audience ready to help Fresno State conserve energy
- ▶ Perceptions of sustainability and energy conservation may not represent existing efforts

## Recommendations

Multiple avenues exist to address the key findings listed above. Energy efficient technology upgrades will help reduce some of the waste reported by HBEA participants. The GO team will seek to fill gaps, augment efforts, and enrich the energy performance project with a holistic approach toward enhancing Fresno State's culture of energy efficiency and conservation.

# INTRODUCTION

The Green Operations (GO) team is excited and honored to be working with Fresno State through the CUPR Public Private Partnership (P3) project. As our engineers were designing this project, the Green Operations team focused on conducting our Human Behavior Energy Audit<sup>SM</sup> (HBEA). This report is a comprehensive document intended to provide insight and guidance on specific areas related to the current status of sustainability at Fresno State. The HBEA report is not intended to be a final destination in the Fresno State sustainability journey, but rather serves as a springboard for dialogue, encourages the development and implementation of energy conservation initiatives, and functions as a guide to accelerate Fresno State's progress towards a sustainable campus. The development of the recommendations and findings in this report is based on best practices most used in environmental psychology and other social science fields. We look forward to reviewing this document with you and appreciate the partnership you have chosen by working with the Green Operations team.

## METHOD

A Human Behavior Energy Audit<sup>SM</sup> was conducted to understand the baseline attitudes, social norms, knowledge, and behaviors of Fresno State faculty/staff and students. This holistic and comprehensive audit process began with a review of historical data. Interviews and focus groups were conducted to begin the discovery phase and assist in the creation of a baseline measuring instrument. Historical data combined with focus group comments provided a framework for the web-based survey.

## Historical Data

The GO team began a review of relevant historical data gleaned from an online search review, reading historical and research documents, and NORESO's first contact through the Investment Grade Audit (IGA). The following is a partial review of pertinent historical data identified before, during, and after HBEA on-site activities. A more thorough compilation of relevant historical data and milestones can be found in Appendix K: Fresno State Timeline.

### Energy Conservation Initiative

Fresno State launched its very first Energy Conservation Initiative in 1978, which established the zeitgeist of energy sustainability. Such initiatives led to more influential energy sustainability events at Fresno State, such as the establishment of the International Center for Water Technology in 2007.

### Awareness to Establish Sustainability

From 2013 to 2017, Fresno State received multiple grants from the federal government and energy providers to assist with its energy technologies and energy-efficient construction projects. These installed sustainability measures serve as a solid foundation leading to a more sustainable campus.

### Student Involvement

According to the most recent study by Fresno State student Acosta and colleagues (2021), youth-led sustainability organizations such as the student-led Sustainability Task Force (SLSTF) can be a driving force for forming a sustainability culture among California State University systems. Indeed, SLSTF at Fresno State strives to create a

sustainable culture. For instance, SLSTF met with a Fresno State vice president to discuss sustainability efforts across campus, and the following year, eight California Climate Action Corps interns joined SLSTF. Even with turnover and organizational changes among faculty and staff, the student-led organization was able to maintain momentum and growth while pursuing AASHE STARS and increasing sustainability outreach on campus.

## Focus Groups and Interviews

The GO team conducted 22 focus groups and interviews on-site from October 18<sup>th</sup> through October 22<sup>nd</sup>. 101 faculty and staff and 26 students were randomly chosen from their respective groups. A total of 127 individuals participated in these sessions which lasted less than an hour. The GO team facilitated open-ended discussions and provided every participant an opportunity to voluntarily complete a structured worksheet and verbally respond to three questions, and then speak to anything else they desired concerning energy use on campus. Each student, faculty, and staff response was documented. Responses were analyzed using a standard content analysis approach yielding themes found in the analysis portion of this report. Written worksheet responses (with any identifying information removed) can be found in Appendices A-G.

## Web-Based Survey

On November 17<sup>th</sup>, 2021, two web-based surveys were sent out via e-mail on the behalf of Fresno State President, Saúl Jiménez-Sandoval, to the Fresno State community. The two surveys included questions that pertained specifically to the two population groups, one for faculty/staff, and one for students. While many items were unique to each section, common questions across sections were also included. Fresno State IRB reviewed and approved the survey for distribution. A total of 2,419 respondents participated from November 17<sup>th</sup> to December 7<sup>th</sup>, 2021: 894 faculty/staff and 1,525 students. Contact information was provided only if respondents wished to be eligible and considered for survey incentives. One winner was randomly selected from each group of respondents.

### Incentives

Survey incentives are effective methods for boosting web-based survey participation rates. Incentive recipients were selected on a random basis. The incentives for the surveys were as follows:

- ▶ Two survey respondents received a second-generation Apple AirPods Pro: one respondent from the student survey and one respondent from the faculty/staff survey.

## ANALYSIS

A comprehensive and rigorous analysis of all collected quantitative and qualitative data was performed. Content analysis on open-ended comments resulted in a themed summary of statements. Summary-level statistics were performed on quantitative data yielding specific findings to serve as a baseline for future program comparisons. The numerous tables included in the report show the frequencies of response for each question. In addition, descriptive statistics were used to analyze continuous scale data including shower length and frequency. A deeper analysis on some questions was conducted, including t-tests. A t-test is used to determine if there is a statistically significant difference between the means of two groups (most often faculty/staff and students for this dataset). The mean is calculated based on the five-point Likert scale used in most questions. A large t-test score indicates that the groups are different while a small t-score indicates they are similar. The p-value is the probability that the results from the sample groups occurred by chance. If the p-value is lower than 0.01, there is only a 1% probability that the results happened by chance and we conclude that there is significant difference.

### Focus Groups and Interviews

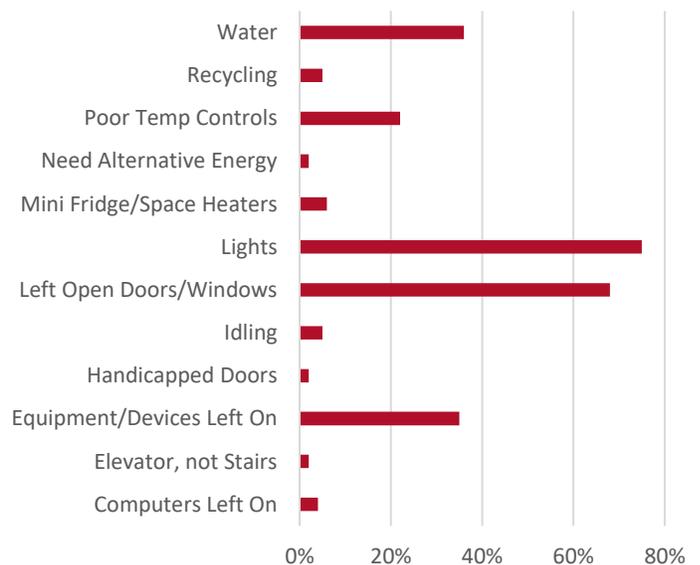
Participants from the 22 focus groups and interviews identified multiple energy-wasting behaviors. Of the three verbal questions posed, the primary question asked, “Tell us how you see others wasting energy.” This encouraged focus group participants to freely share wasteful behaviors without having to divulge their personal actions. Each response was categorized to help define and group the behaviors into themes. Additionally, numerous important topics surfaced for inclusion in the web-based survey.

#### Faculty/Staff

The graph to the right shows Fresno State faculty/staff responses when asked to describe how they see others wasting energy. The following list identifies the most frequently mentioned ways of wasting energy:

1. Lights
2. Left Open Doors/Windows
3. Water
4. Equipment/Devices Left On
5. Poor Temperature Controls

How do you see others wasting energy?

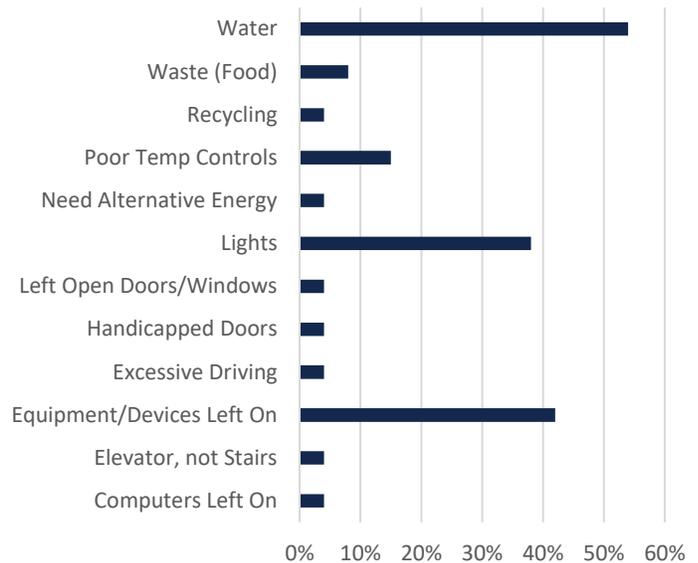


## Students

The graph to the right shows Fresno State student responses when asked to describe how they see others wasting energy. The following list identifies the most frequently mentioned ways of wasting energy:

1. Water
2. Equipment/Devices Left on
3. Lights
4. Poor Temperature Controls
5. Waste (Food)

How do you see others wasting energy?



## Observations from Focus Groups and Interviews

Fresno State students and faculty/staff mentioned similar types of energy waste, but faculty/staff saw lights left on most frequently, and students reported water waste as the number one energy waste of others. Faculty/staff mentioned left open door/windows more frequently and students listed food waste. Other topics that came up in the focus groups for both groups involved the waste of water through irrigation and excessive usage of golf carts. Both of these topics were included in the survey and were unique to Fresno State.

## Web-Based Survey

On November 17<sup>th</sup> 2021, students and faculty/staff were sent an invitation to participate in a survey via email. The survey was closed for participation on December 7<sup>th</sup>, 2021. A total of 2,419 respondents participated resulting in the following margins of error for each group:

	Population	Valid Sample	Margin of Error
Students	25,497	1,525	1.6%
Faculty/Staff	2,068	894	2.6%
Totals	27,565	2,419	1.9%

# Attitudes

**Attitudes generally indicate positive or negative perceptions/feelings toward a construct.**

In general, energy conservation attitudes were positive among faculty/staff and student populations, but left room for improvement. For example, when asked if Fresno State should conserve energy, 84% of faculty/staff and 69% of students agreed with this statement. It is noteworthy that when respondents were asked if they should help Fresno State conserve energy, faculty/staff showed stronger levels of agreement than the student group by 13%. Students agreed that recycling was important at Fresno State 14-percentage points more than faculty/staff. In contrast, 40% of students disagreed with the statement “It is my right to use as much energy as I want” compared to 76% of faculty/staff who disagreed, a 36-percentage point difference. Both faculty/staff and students generally agree that their personal actions, in combination with others, have a significant impact on the environment.

Overall, students have lower desirable attitudes toward energy conservation than faculty/staff. An independent t-test was conducted to assess the average score for attitudes toward energy conservation between student and faculty/staff groups. For this test, responses from all seven attitude statements were combined to determine a mean level of agreement with the attitude statements. The t-test identified that students reported a significantly lower desirable attitude toward energy conservation topics than faculty/staff. We also used a t-test to assess the average score on “It is my right to use as much energy as I want”; students reported a stronger agreement than the faculty/staff group. Both p values are less than .001, indicating statistical significance. These tests indicate that there is a statistically significant difference between faculty/staff and student responses to these grouped attitude questions.

**Table 1.1**  
**Faculty/Staff - Attitudes**

Please indicate your level of agreement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	% Desirable
Energy conservation is important here at Fresno State.	3%	11%	23%	33%	29%	63%
Fresno State should conserve energy.	1%	2%	13%	39%	45%	84%
I should help Fresno conserve energy.	1%	1%	9%	44%	44%	88%
It is my right to use as much energy as I want.*	37%	39%	18%	4%	2%	76%*
My personal actions...have...impact on the environment.	2%	2%	10%	38%	48%	87%
Recycling is important here at Fresno.	5%	11%	16%	34%	34%	68%
Fresno State considers the water impact...landscape design decisions.	7%	15%	43%	27%	9%	36%

N =883\*\*

\*Reverse Scored. \*\*The mean of responses for each question.

**Table 1.2**  
**Students - Attitudes**

Please indicate your level of agreement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	% Desirable
Energy conservation is important here at Fresno State.	3%	6%	31%	33%	27%	59%
Fresno State should conserve energy.	2%	3%	26%	36%	33%	69%
I should help Fresno State conserve energy.	3%	2%	19%	45%	30%	76%
It is my right to use as much energy as I want.*	11%	29%	38%	15%	7%	40%*
My personal actions...have...impact on the environment.	3%	4%	13%	35%	47%	81%
Recycling is important here at Fresno State.	2%	5%	12%	33%	48%	81%
Fresno State considers the water impact...landscape design decisions.	4%	8%	46%	26%	15%	43%

N =1715\*\*

\*Reverse Scored. \*\*The mean of responses for each question.

## Behaviors

*The primary focus of this portion of the survey is to identify energy-wasting behaviors on campus.*

Faculty/staff survey respondents were asked to self-report their frequency of engaging in nine energy conservation behaviors, while students were asked about four behaviors. Turning off both the faucet and the fan had the highest levels of desirable behavior among the faculty/staff group. Similarly, the student group demonstrated energy-conserving behavior by reporting high percentages of turning off both lights and water faucets. Data analysis also revealed some energy-wasting behaviors. For example, at least 20% of the respondents in the faculty/staff group have used a space heater and neglect to turn off their printers when finished. Analogously, 42% of respondents in the faculty/staff group reported opening doors and windows to compensate for excessively hot/cold rooms.

Although students demonstrated less desirable energy conservation attitudes relative to faculty/staff, students generally reported more desirable behaviors. For purposes of the t-tests, we combined the behavior questions to determine a mean frequency for all behavior questions. We conducted an independent t-test to compare the means for energy behavior between students and faculty/staff. The test identified that there was a statistically significant difference between the groups, with students behaving more favorably with respect to energy consuming behaviors. The p-value was again below 0.001, indicating the probability of the differences happening by chance was incredibly low.

**Table 2.1****Faculty/Staff - Behaviors**

Tell us about these behaviors while at school.	Never	Seldom	Half the time	Often	Always	% Desirable
When I leave my unoccupied workspace, I turn off my fan.	4%	2%	4%	15%	75%	90%
When I leave unoccupied areas, I turn off the light(s).	3%	4%	5%	27%	62%	88%
I turn off the water faucet when I am finished.	<1%	<1%	<1%	1%	98%	>99%
When I am finished using a printer, I turn it off.	47%	20%	7%	9%	17%	24%
When I am finished using my computer, I turn it off.	15%	15%	12%	18%	39%	57%
When I am finished using my computer, I turn my monitor/display off.	18%	13%	7%	16%	46%	62%
I close the window blinds/shades when the sun coming in feels too hot.	13%	7%	9%	19%	53%	71%
I open exterior doors/windows to compensate for excessively hot/cold rooms.*	34%	13%	12%	22%	20%	47%*
I use a personal space heater to help control the temperature in my workspace.*	60%	11%	8%	13%	7%	72%*

N = 796\*\*

\*Reverse Scored. \*\*The mean of responses for each question.

**Table 2.2****Students - Behaviors**

Tell us about these behaviors while at school.	Never	Seldom	Half the time	Often	Always	% Desirable
When I leave unoccupied areas, I turn off the light(s).	6%	5%	8%	27%	54%	81%
When I am finished using my computer, I turn it off.	5%	9%	14%	19%	54%	73%
When I am finished using my computer, I turn my monitor/display off.	8%	8%	11%	19%	55%	74%
I turn off the water faucet when I am finished.	<1%	<1%	1%	4%	95%	99%

N = 1419\*\*

\*\*The mean of responses for each question.

## Residential Student Behaviors

*This section asked specific questions to residential campus students, as they consume campus energy differently than commuter students.*

Students were asked to identify if they were a residential student and then asked several additional behavior questions related to their energy consumption while on campus. 260 students reported that they were part of the residential community at Fresno State. With approximately 1,000 students living on campus, the margin of error for these questions is 5.2%. 74% of residential students indicated that they “often/always” open exterior doors and windows to compensate for excessively hot/cold rooms and 25% of residential students “often/always” use a personal space heater to control the temperature of their rooms. These behaviors directly impact the energy load required by the HVAC system to maintain a consistent building environment.

Residential students were also asked about their shower lengths and frequency. Students reported an average shower length of 16.2 minutes, with an average frequency of 6.2 showers per week. When students responded “yes” they listen to music in the shower, the average number of songs was 4.5. The average American shower last 7.8 minutes, according to the 2016 Residential End Uses of Water Study performed by the Water Research Foundation. The reported average of 16.2 minutes is also higher than the average reported shower time from the GO team proprietary database.

**Table 3.1**  
**Residential Students - Behaviors**

Tell us about these behaviors while at school.	Never	Seldom	Half the time	Often	Always	% Desirable
When I leave my unoccupied room, I turn off my fan.	5%	7%	12%	24%	52%	76%
I close my window blinds/shades when the sun coming in feels too hot.	4%	4%	11%	25%	57%	82%
I open exterior doors/windows to compensate for excessively hot/cold rooms.*	6%	4%	16%	30%	44%	10%*
I use a personal space heater to help control the temperature in my room.	53%	11%	12%	11%	14%	64%*
N = 218**						

\*Reverse Scored. \*\*The mean of responses for each question.

**Table 3.2**  
**Students - Showers**

While showering...	Yes
Do you time your showers?	52%
Do you have your phone with you in the bathroom?	66%
Do you listen to music in the shower?	51%
N = 228**	

\*\*The mean of responses for each question.

## Others Wasting Energy

*The focus on how others waste energy can provide enlightening information as respondents are generally more candid about the undesirable behaviors of others compared to themselves.*

Using an open-ended response format, survey respondents were asked to describe how they see others wasting energy. Over 3,500 written responses were collected, and each comment was reviewed, analyzed, then categorized into themes. Each time an energy wasting behavior was mentioned, a frequency was recorded. **Table 4.1 and 4.2** display the most frequently reported energy-wasting behaviors with rank-orders. While there was much overlap among the most frequently reported behaviors, priorities differed slightly. Lights left on is the most frequently mentioned energy wasting behavior by students and faculty/staff. However, it is worth noting lights are usually any organization’s most reported energy-wasting behavior as a single light left on can be seen by multiple people. There are also safety concerns regarding lights left on overnight that take priority over energy conservation. Technology

solutions (occupancy sensors, timers, energy efficient lights, etc.) can often address this specific energy-wasting behavior.

**Table 4.1**  
**Faculty/Staff - Observations**

Please list three ways you see others wasting energy.	Percent
Lights left on	39%
Devices and equipment	22%
Recycling	17%
Water waste	13%
Heating and cooling	5%
Doors and windows	2%
Landscaping	2%

**Table 4.2**  
**Students - Observations**

Please list three ways you see others wasting energy.	Percent
Lights left on	52%
Devices and equipment	16%
Water waste	12%
Recycling	13%
Heating and cooling	4%
Doors and windows	1%
Landscaping	1%

## Recycling

*Proper recycling behaviors are highly correlated with many desirable energy-saving behaviors.*

Survey participants reported the frequency with which they perform recycling behaviors and the degree to which bin placement and capacity provide them an opportunity to do so (as well as perceptions of custodial staff properly processing bins). Overall, students reported performing desirable recycling behaviors to a substantially higher degree than faculty/staff. Both groups indicated that when they do engage in recycling behavior, they are mindful to place it in the correct bin, and the majority of faculty/staff and students report that they understand what items can and can't be recycled on campus. Both groups noted that recycling bin placement and capacity were not sufficient and the more direct infrastructure statement of "every waste station has both a trash and recycling bin" received similarly undesirable responses. These perceptions and behaviors are seemingly at odds with the high personal desirable behavior, which could indicate a lack of faith in the current recycling system and an opportunity to streamline the process and availability of bins.

**Table 5.1**  
**Faculty/staff - Recycling Behaviors and Observations**

Tell us more about recycling.	Never	Seldom	Half the time	Often	Always	% Desirable
I recycle at Fresno State.	3%	6%	10%	36%	45%	81%
I am mindful to place recyclable material in the appropriate bin.	2%	3%	6%	32%	57%	89%
Recycling bin placement and capacity is sufficient.	10%	19%	23%	28%	20%	48%
I see custodial staff properly process the recycling bins.	22%	20%	9%	29%	20%	49%
I reuse paper when appropriate (scrap/scratch).	1%	7%	16%	37%	39%	76%
I print on both sides of the paper (duplex).	5%	10%	17%	40%	28%	68%

N = 782\*\*

\*\*The mean of responses for each question.

**Table 5.2**  
**Students – Recycling Behaviors and Observations**

Tell us more about recycling.	Never	Seldom	Half the time	Often	Always	% Desirable
I recycle at Fresno State.	3%	4%	9%	30%	54%	84%
I am mindful to place recyclable material in the appropriate bin.	<1%	2%	5%	27%	65%	92%
Recycling bin placement and capacity is sufficient.	4%	11%	22%	32%	31%	63%
I see custodial staff properly process the recycling bins.	11%	14%	16%	30%	30%	60%
I reuse paper when appropriate (scrap/scratch).	3%	6%	17%	34%	40%	74%
I print on both sides of the paper (duplex).	9%	13%	19%	27%	32%	59%

N = 1282\*\*

\*\*The mean of responses for each question.

**Table 5.3**  
**Faculty/staff – Recycling System**

Tell us more about recycling.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	% Desirable
Every waste station has both a trash and recycling bin.	13%	23%	22%	31%	11%	42%
I understand which items can and can't be recycled at school.	4%	12%	19%	44%	21%	65%

N = 782\*\*

\*\*The mean of responses for each question.

**Table 5.4**  
**Students – Recycling System**

Tell us more about recycling.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	% Desirable
Every waste station has both a trash and recycling bin.	4%	16%	25%	34%	21%	55%
I understand which items can and can't be recycled at school.	2%	7%	17%	39%	34%	74%

N = 1282\*\*

\*\*The mean of responses for each question.

## Water

**Water is one of California’s scarcest resources; this section of the survey can reveal some water-wasting behaviors on campus.**

Water-wasting concerns were raised throughout the focus group sessions, which required further investigation in the survey. New questions were created specifically to capture observations of lawn sprinklers, broken sprinklers, and puddles caused by the sprinkler system. In this section, a “never/seldom” response is considered desirable as it indicates that water is not observed being wasted. None of the statements reported a desirable percentage over 80%. Students reported problematic sprinklers more frequently than faculty/staff in both focus groups and surveys. It is noteworthy that generally, students reported a lower desirable percentage for the observation statements than faculty/staff.

**Table 6.1****Faculty/Staff - Water Observations**

Please tell us about your water observations while at Fresno State.	Never	Seldom	Half the time	Often	Always	% Desirable
I observe faucets left on.*	29%	39%	9%	10%	13%	68%*
I observe broken fixtures with water running, leaking, or dripping (faucet/shower/toilet).*	21%	45%	10%	13%	11%	66%*
I observe sprinklers operating at inefficient times (when it's raining/hottest part of the day).*	24%	41%	11%	15%	9%	65%*
I observe broken sprinklers.*	27%	47%	9%	11%	7%	74%*
I observe water puddles or wet sidewalks/roadways from the sprinkler system.*	15%	40%	15%	20%	10%	55%*

N = 821\*\*

\*Reverse Scored. \*\*The mean of responses for each question.

**Table 6.2****Students - Water Observations**

Please tell us about your water observations while at Fresno State.	Never	Seldom	Half the time	Often	Always	% Desirable
I observe faucets left on.*	31%	26%	14%	15%	14%	57%*
I observe broken fixtures with water running, leaking, or dripping (faucet/shower/toilet).*	26%	30%	16%	16%	11%	57%*
I observe sprinklers operating at inefficient times (when it's raining/hottest part of the day).*	35%	29%	15%	12%	10%	63%*
I observe broken sprinklers.*	39%	30%	11%	11%	8%	69%*
I observe water puddles or wet sidewalks/roadways from the sprinkler system.*	20%	28%	19%	18%	15%	48%*

N = 1364\*\*

\*Reverse Scored. \*\*The mean of responses for each question.

**Table 6.3****Water Knowledge**

	Faculty/Staff "Yes"	Students "Yes"
Did you know that water is required to clean and keep equipment and machinery functioning properly?	85%	80%
	N = 858	N = 1412

# Vehicle Idling

Vehicle idling reduces vehicle fuel economy, increases financial input, and creates pollution.

Overall, reported observations for idling and unnecessary golf cart usage were low. Faculty/staff and students reported observing vehicles idling 22% and 14% often/always respectively. This finding aligns with our focus groups' results. Additionally, we assessed knowledge related to golf cart overcharging based on topics discussed during the focus group sessions. Knowledge in this area was low for both faculty/staff and students and provides an opportunity to educate the community on the sustainable practices in place for when a golf cart is fully charged and remains connected.

**Table 7.1**  
**Faculty/Staff - Vehicle Idling Observations**

Please tell us about vehicles at Fresno State.	Never	Seldom	Half the time	Often	Always	% Desirable
I observe Fresno State vehicles idling.*	30%	46%	10%	10%	4%	76%*
I observe personal vehicles idling.*	18%	44%	14%	18%	6%	62%*
I observe unnecessary golf cart usage around campus.*	27%	46%	10%	11%	5%	74%*
N = 765**						

\*Reverse Scored. \*\*The mean of responses for each question.

**Table 7.2**  
**Students - Vehicle Idling Observations**

Please tell us about vehicles at Fresno State.	Never	Seldom	Half the time	Often	Always	% Desirable
I observe Fresno State vehicles idling.*	27%	33%	18%	14%	8%	60%*
I observe personal vehicles idling.*	17%	26%	20%	24%	13%	43%*
I observe unnecessary golf cart usage around campus.*	28%	33%	15%	14%	10%	62%*
N = 848**						

\*Reverse Scored. \*\*The mean of responses for each question.

**Table 7.3**  
**Combined - Golf Cart Knowledge**

	Faculty/Staff "Yes"	Students "Yes"
Did you know that golf cart chargers stop charging (or shut down) when the battery is fully charged, even though it is still plugged in?	45%	26%
	N = 848	N = 1362

# Transportation

Transportation can be a significant contributor to organizational CO<sub>2</sub> emissions and a focal area for fuel-maintenance savings.

The overwhelming majority of both faculty/staff and students “often/always” drive gas-powered vehicles to campus. However, 16% of faculty/staff and 10% of students reported “often/always” driving an alternative-fueled/hybrid vehicle to campus. Students were also a little more diverse than faculty/staff in their mode of transport to campus and reported “often/always” walking to campus (18%) and carpooling (17%). When asked what their ideal way would be to commute to campus, both groups selected “alternative-fueled/hybrid vehicle” as their first choice.

**Table 8.1**  
**Faculty/Staff - Transportation**

Tell us about your commute to campus.	Never	Seldom	Half the time	Often	Always	% Desirable
I walk to campus.	91%	6%	1%	2%	1%	3%
I ride my bicycle to campus.	88%	7%	1%	2%	2%	4%
I ride public transit to campus.	93%	5%	1%	<1%	<1%	1%
I drive an alternative-fueled/hybrid vehicle to campus.	77%	3%	3%	3%	13%	16%
I drive my gas-powered vehicle to campus. *	13%	6%	4%	9%	69%	19%*
I carpool/ride share to campus.	77%	11%	3%	5%	4%	9%

N = 757\*\*

\*Reverse Scored. \*\*The mean of responses for each question.

**Table 8.2**  
**Students - Transportation**

Tell us about your commute to campus.	Never	Seldom	Half the time	Often	Always	% Desirable
I walk to campus.	72%	6%	4%	6%	13%	18%
I ride my bicycle to campus.	91%	4%	2%	1%	2%	3%
I ride public transit to campus.	87%	5%	3%	2%	4%	6%
I drive an alternative-fueled/hybrid vehicle to campus.	85%	2%	2%	2%	8%	10%
I drive my gas-powered vehicle to campus. *	22%	6%	4%	9%	59%	28%*
I carpool/ride share to campus.	61%	14%	8%	8%	9%	17%

N = 1218\*\*

\*Reverse Scored. \*\*The mean of responses for each question.

**Table 8.3****Combined - Transportation**

In an ideal world, how would you like to commute to campus?	Faculty/Staff	Students
Walk	14%	20%
Gas-powered vehicle	11%	14%
Alternative fuel/hybrid vehicle	38%	28%
Bike	16%	15%
Public transit	8%	8%
Carpool/ride share	5%	10%
Other	7%	5%
	N = 827**	N = 1295**

\*\*The mean of responses for each question.

**Future Priorities**

*Understanding the priorities of the campus community can help shape and align future sustainability endeavors.*

One of the final questions in the survey asked respondents to prioritize three future sustainability efforts for Fresno State. The efforts were determined in coordination with the Facilities Department and captured areas of improvement already considered for sustainable practices. More than 60% of the responses for both faculty/staff and students chose more solar power generation. This aligns with the existing CUPR P3 Project Energy Conservation Measure (ECM) installation of renewable energy and the installation of the solar photovoltaic canopies on parking lots P5 and P6. While the reclamation of water was also notable, the other priorities of the campus community were not as clear with the remaining categories all selected around 20-30% of the time.

**Table 9.1****Combined - Future Priorities**

Please check three future sustainability priorities for Fresno State.	Faculty/Staff	Students
More solar power generation	61%	65%
Reclaim water (the purple pipe) for reuse on campus	31%	39%
Low water-intensity landscaping options (no grass/native species/hardscapes)	25%	33%
More efficient irrigation system	29%	23%
Low-flow water fixtures (toilets and sinks)	26%	22%
Electric equipment for custodial, facilities, and maintenance staff (leaf blowers)	26%	22%
More electric vehicle charging stations	19%	22%
Electrify the Fresno State vehicle fleet	21%	20%

## FINDINGS AND RECOMMENDATIONS

After a review of all data collected throughout the HBEA process, the GO team identified five key findings which when implemented, could assist Fresno State with their strategy of enhancing a culture of energy efficiency. These findings represent a set of general recommendations that are open to interpretation and discussion. While Green Operations takes pride in creating a data-driven program, we also understand that Fresno State priorities must also be considered in concert and may elevate certain findings, while deferring others to be addressed at a later date.

No matter how Fresno State decides to proceed, Green Operations is extremely confident it can help. The GO team is committed to being a trusted partner to represent the University's best interests and always strives to meet agreed upon goals.

### **Finding 1: Energy-wasting Behaviors Exist**

"Lights left on" was the overall number one energy-wasting behavior reported across both groups in the survey responses. Temperature discomfort and excessive use of water were also reported. Your CUPR P3 Project ECMs will provide automatic light controls and greater consistency of temperature across campus, thereby addressing these responses, at least in part. As these improvements are being installed and become operational, the GO team will incorporate the lights and temperature responses from the HBEA into their communication messaging. Hence, we suggest focusing on a strategy to address water waste concerns. Additionally, opportunities exist to address other HBEA respondent's energy wasting concerns involving equipment/devices left on, open doors and windows, space heaters, and recycling. After a review and consultation with Fresno State, the GO team will work to incorporate specific messaging and prescriptive behaviors related to these latter concerns into future activities. Following are a few specific recommendations based on Finding 1 presented for review and discussion.

### **Recommendation: Review and Communicate University Policy on "Group-Use" Printers and Default Practices**

While individuals appear to be aware and cognizant of device and equipment vampire load, survey responses indicate that group spaces and shared devices are an area where more investigation is warranted. This is supported by the low desirable behavior related to turning off printers. Determining if "group-use" printers are set to hibernate or whether faculty/staff are using more personal printers may help shed some of the unnecessary load of the University. The University position on printing may also need to be refreshed for faculty and staff – only printing something if it is really necessary, and to also print on both sides of the paper, as well as using old printing for scratch/scrap paper. This printing policy refresher for faculty and staff on using shared devices can be done through a series of social media posts or a University website link with a "how-to" guide setting the hibernation time on a laser printer, as well as how to set duplex printing as the default option.

### **Recommendation: Review and Communicate University Policy on Opening Doors/Windows and Space Heater Use**

Faculty/staff survey responses indicate that occupant comfort in the buildings is an area that warrants attention. 47% of respondents indicated opening exterior doors/windows to compensate for excessively hot/cold rooms. While this may seem like a logical choice to improve one's level of comfort with minimal impact, it has larger implications for

University energy usage. Opening doors and windows to compensate for heating or cooling issues means that the HVAC system is going to work harder to maintain the temperature setpoints for the area. In instances when the local air quality is not ideal or could be disruptive for sensitive groups, the HVAC system is also going to have to work harder to filter the air contaminants and put unnecessary strain on the system.

In addition to opening windows and doors to control space temperatures, 39% of faculty and staff have used/use a space heater at least some of the time. It is recognized that space heaters can be a great source of personal comfort for areas that are not ideally suited to an individual's comfort levels. However, space heaters are also first and foremost, a fire hazard. Additionally, they are not very energy efficient and may pose a plug load hazard, and this is especially true if 1 out of 3 faculty/staff may be using one at any given time on campus.

It is recommended that the University review and/or create a policy or position regarding opening windows and doors and the use of personal space heaters. This policy should be shared online and via social media and will be best received if shared in tandem with the CUPR P3 Project construction completion of the external HVAC piping systems and control upgrades (internal). Open doors/windows and space heater policies could incorporate additional reminders about the importance of temperature setpoints (and what they are) and the impact on the University's energy use. Suggesting alternative actions individuals can take to make their working spaces more comfortable would also be advisable (e.g., open or closing blinds). Prompts near doors/windows highlighting the importance of keeping them closed to maintain the internal environment and air quality may also be effective.

## **Finding 2: Attitudes Toward Energy Conservation Statements are Less Desirable**

Overall, both students and faculty/staff reported less desirable attitudes toward energy conservation questions; with students reporting even fewer positive attitudes toward energy conservation than faculty/staff. For example, only 63% of faculty/staff and 59% of students agreed that "Energy conservation is important at Fresno State". Other universities that have previously participated in the Human Behavior Energy Audit<sup>SM</sup> reported a generally higher range of attitudes (80%-90%) toward energy conservation. Water waste was especially concerning, with a minority (36%) of faculty/staff and (43%) of students agreeing that "Fresno State considers water impact in building/landscaping design decisions."

## **Recommendation: Continue Awareness Communication and Marketing Efforts**

Building upon the existing branded marketing materials, HBEA feedback and other comprehensive awareness communication information will enhance project understanding and knowledge, creating buy-in and support for additional sustainability initiatives on campus, while mitigating some of the construction challenges to people and their environment. The GO team will further develop the sustainability brand and message to continue to convey the project to the community and design deliverables customized to the University's sustainability culture. Examples of awareness communication media that have been created already that will lend to shifting less-than-desirable conservation perceptions include:

- ▶ CUPR P3 project brochure
- ▶ Lobby banners
- ▶ Fence wraps
- ▶ Informational cards with website QR code

- ▶ Expanded website information
- ▶ Frequent social media posts
- ▶ Alumni article inclusion in the biennial newsletter

Additional materials/media that the GO team will develop to further enhance the sustainability messaging around campus includes but may not be limited to:

- ▶ Communicating positive and/or desirable HBEA responses
- ▶ Announcing University strategies to address HBEA reported concerns
- ▶ Installing building-specific lobby banners communicating building improvements
- ▶ Light switch sticker prompts
- ▶ Golf cart bumper stickers
- ▶ Vehicle idling signs in parking areas
- ▶ Recycling bin stickers
- ▶ Additional social media posts regarding various University policies

### **Recommendation: Develop a Guest Lecture Series Featuring Different Aspects of the CUPR P3 Project**

The F5 Opportunity Program components proposed inviting BIG personnel to collaborate with faculty and staff to serve as guest lecturers for the University's various sustainability-related courses. The GO team will support expanding Fresno State's general knowledge about the various technologies and benefits associated with the CUPR P3 Project. Additionally, upon analyzing survey and focus group responses, the GO team also recommends guest lectures and seminars conducted by Fresno State personnel and decision makers who work with the project and understand the resulting impacts and benefits. These lectures, town halls, and/or open forum discussions will communicate the reasoning behind the project to the broader campus body while highlighting multiple benefits of the project, including green collar jobs among the community, and promoting additional interest in future internships and scholarships.

### **Recommendation: Communicate that Sustainability Priorities Align with Campus Community**

We asked survey respondents to list three future sustainability priorities for Fresno State and the most frequent answer from both groups was to increase the solar power generation on campus, (61% of faculty/staff and 65% of students). This presents an excellent opportunity to create a trusted relationship between the Facilities Department and the campus community. With the additional 4.55 MW of solar carports being installed as part of the CUPR P3 Project, Facilities has the ability to inform the campus, "We listened!" by sharing the news about the solar before, during, and after installation. This will be a win for the Facilities Department and be a visible, positive reminder of the evolving sustainability journey and priority at Fresno State. It is recommended to share this information through a variety of media; through the Facilities website and social media, signage and other communication vehicles.

The second and third most frequent answers for a sustainability priority at Fresno State both involve water conservation: to begin making use of reclaimed water on campus, and to use low-water intensity landscaping options. Working to implement reclaimed water use on campus would be a large undertaking and a challenge, but the support from campus is present for such an initiative. The priority for low water-intensity landscaping options also indicates that changes to current landscaping design would be better received by the campus community than perhaps previously believed. Leveraging the replacement of landscape that is being impacted by the CUPR P3 Project to better

align with these HBEA responses will be an effective message. Finally, it is recommended that the University make future water conservation initiatives a priority, as they have a great deal of support from the campus community.

### **Finding 3: Recycling Behavior is a Concern Among Both Students and Faculty/Staff**

Recycling behavior concerns were reported often among faculty/staff and students with some confusion conveyed concerning the recycling process. While desirable individual recycling behaviors for all respondents were generally high, infrastructure questions were significantly lower. When asked in an open-ended question to provide any additional information about recycling, many participants commented and voiced their support for an effective recycling program and offered suggestions for improvement to the system. These comments can be found in Appendix H: Recycling Open-Ended. Many participants also expressed their concerns about the existing recycling process, specifically mentioning the co-mingling of trash and recycling and a lack of faith in the waste hauler's processes. Our experience shows that proper recycling behavior, reassurance with the recycling system, and successful reduction of waste hinges on three critical areas:

- ▶ Ease: make it easy/accessible. People most often will make the right choice when it is placed before them.
- ▶ Education: everyone must understand what can be recycled and how.
- ▶ Trust: make the process face-valid that once someone recycles, the right thing is done with it.

### **Recommendation: Audit Campus Recycling System**

We have the experience and tools to initiate a data-driven review of campus recycling. The GO team can assist one or several student groups with identifying barriers to proper recycling, such as capacity and location issues. A comprehensive bin inventory system for the Facilities Department would enable annual or semi-annual tracking of recycling bins around campus and allow for the assignment of resources where they are most needed. A thorough investigation of the University's recycling process should result in suggestions to improve current recycling throughout campus and guide decisions toward future changes in costs and processing.

The GO team has connections to a variety of waste stream monitoring technology companies who:

- ▶ Install innovative sensors or cameras into waste and recycling bins
- ▶ Collect data points about the current service practices
- ▶ Analyze and compare collected data to the contractual waste hauler services
- ▶ Propose effective and efficient solutions to reduce hauler costs and waste contamination

The GO team can facilitate discussions with these companies to find which technologies and services may be the best partnership for the University, and to explore the many benefits associated with right-sizing, dynamic scheduling, and data-driven decisions.

### **Finding 4: There is a Willing Audience Ready to Help Fresno State Conserve Energy**

When presented with two survey items, "Fresno State should conserve energy" and "I should help Fresno State conserve energy", only 4% and 2% of faculty/staff survey respondents disagreed/strongly disagreed with these statements respectively, and 5% and 6% of students for the same statements. Also, when survey respondents were

asked, “Are you interested in becoming more involved with Fresno State’s sustainability and energy conservation initiatives?” almost 600 personnel and over 350 students responded “Yes, or Maybe.”

**Recommendation: Provide Feedback from HBEA Report to Campus Community**

Provide feedback from HBEA report to campus community to increase the understanding and outcome of the focus groups and campus-wide survey. This will be done in the form of the CUPR P3 Project website, various infographics, social media, PowerPoint presentations, etc. The goal is to encourage engagement and communication regarding the results with student groups.

**Recommendation: Continue Aligning Internships with Student Interest and Program Potential**

The GO team plans to leverage the established BIG internship program to support other initiatives outlined in the F5 Opportunities program scope. We recommend utilizing a student intern(s) whose focus is in education to help build hands-on STEM activities and sustainability programming for local K-12 schools. This type of outreach and engagement with the community will connect potential future students to Fresno State, build the intern student’s resume and communication skills, and provide a unique opportunity for future educators to collaborate with industry experts outside of academia.

**Recommendation: Consider Feasibility of Sustainability Living Learning Community for Students**

We will explore whether a Living Learning Community is feasible and realistic given the size of the residential student population and given the level of engagement and current initiatives from the student-led Sustainability Task Force. If the circumstances are not favorable for a Living Learning Community, then GO team efforts can be shifted to support other student sustainability-based endeavors and programs.

**Finding 5: Perceptions of Sustainability and Energy Conservation May Not Represent Existing Efforts**

This statement is supported by the disparities between personal actions and statements regarding University responsibility, such as personal mindfulness to properly recycle items (90%+ for both groups), yet low agreement with recycling being properly processed (41% for faculty/staff and 61% for students). Another example of this disparity is shown with water conservation: I turn off the water faucet when I am finished (98%+ for both groups), I observe faucets left on (68% and 57%) and I observe broken fixtures with water running, leaking, or dripping (66% and 57%). This indicates that there could be an opportunity to address perceptions of conservation through more streamlined maintenance practices, or more responsive addressing of deferred maintenance issues.

**Recommendation: Ensure Maintenance Work Order System is Understood, Utilized, and Executed**

Water waste is a focus area that underscores the perception vs. reality disparity at Fresno State. For instance, almost everyone reports turning off water faucets when they are finished, but 68% of faculty/staff and 57% of students observe faucets left on, and there are similar percentages for I observe broken fixtures with water running, leaking, or dripping. With water scarcity an omnipresent issue in California and in the Central Valley, the low desirable survey responses indicate that a higher priority needs to be placed on water conservation efforts across campus. It also

indicates that perhaps the water issues are part of a larger deferred maintenance concern and/or overworked maintenance personnel. Focus group participants reported that communication throughout campus regarding maintenance issues was good, but maintenance personnel on staff felt unable to effectively address all the voiced concerns in the normal running of a university. However, new equipment and technologies included in the CUPR P3 Project should reduce strain on maintenance personnel and allow for more available time and resources to address other issues handled by facilities staff.

Given the percentages of responses regarding leaking or broken fixtures, it would also be advisable to have prompts for water conservation at the source of such issues. This could include static clings for bathroom mirrors to remind people to conserve water, but more importantly, to include the number (or QR code to online University submission form) to submit a work order for a broken/leaking fixture. This could also be accomplished near where sprinkler systems are set up outside with the use of yard stakes.

### **Recommendation: Review and Communicate University Water Usage Policies**

It would be beneficial to conduct a review of the University policy on water conservation, low-intensity water activities, and sustainability priorities, and share that information in a fully transparent manner online and through social media. Reviewing the sprinkler policy especially and sharing that it is indeed the most efficient, and effective way to maintain the beautiful Fresno State campus would help to address some of the less desirable perceptions and attitudes that people have toward water conservation. If there are decisions that are made on an ongoing basis that require any type of water resource, it would also be advisable to share that via social media as well. For example, areas of campus will need to be replanted with grass after the construction of the utility distribution piping – sharing that a low-water intensity species of grass was selected as the replacement would also help address the less-than-desirable water use perceptions.

### **Recommendation: Communicate Necessity of Golf Cart Usage and Sustainable Practices**

During the focus group sessions, golf cart usage and charging on campus were a concern. When survey respondents were asked if they knew that the chargers stopped charging when batteries were fully charged, only 45% of faculty/staff and 26% of students indicated agreement. This showcases an opportunity to communicate to the campus and support a change in perceptions. A simple awareness communication piece – such as golf cart bumper stickers – highlighting this fact in a simple, quick way will help to support a positive perception of sustainability at Fresno State. Golf carts are necessary for certain trips and people to move around campus and are more efficient than using gas-powered vehicles. Added transparency for this choice will reinforce sustainability as a priority for the University.

## WRAP-UP

This HBEA report highlights that Fresno State has commenced the worthwhile journey of improving campus sustainability, and has already made smart fiscal, environmental, and social choices that make the campus a better place to work, learn, and live. This report also showcases areas of opportunity where further positive impacts can be made. The GO team is an additional resource to assist where needed and where most beneficial as Fresno State moves towards a more sustainable campus and culture. We look forward to a discussion on how best to assist and where to first implement which recommendations based on Fresno State priorities.

