

# Water Action Plan

**CSU DOMINGUEZ HILLS**

*Five-year strategic water action plan (2018-2022)*

## **Office of Sustainability**

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## Campus Information

### Background

Cal State Dominguez Hills (CSUDH) is located in Carson, California and occupies a footprint of 346 acres, of which 170 acres are actively landscaped and maintained by Facilities Services. As a campus in a drought-prone region, CSUDH needs to carefully monitor and manage its water resources. CSUDH is also one of the fastest growing campuses in the CSU system, and has a projected increase in campus population to 20,000 FTE (from less than 12,000 FTE in 2017) by 2040. Cal State Dominguez Hills takes water conservation seriously, and encourages staff, faculty, and students to do their part to use water responsibly. To continue to carefully steward campus water consumption in the face of a growing campus population, CSUDH is committed to conducting thorough assessments of its current water usage in all areas of its operations and aggressively pursuing opportunities to reduce water usage over the course of the next five years.

### Overall Usage

While approximately 90% of the campus uses reclaimed water for its irrigation needs, with this percentage slated to increase with the possible conversion to reclaimed water by CAMS and in Parking Lot 7, CSUDH's progress towards Chancellor's Office water efficiency goals and net zero water is determined by water consumption volume regardless of source. Therefore, water efficiency initiatives related to outdoor irrigation still represent a key element in ensuring CSUDH's success in achieving campus water efficiency goals.

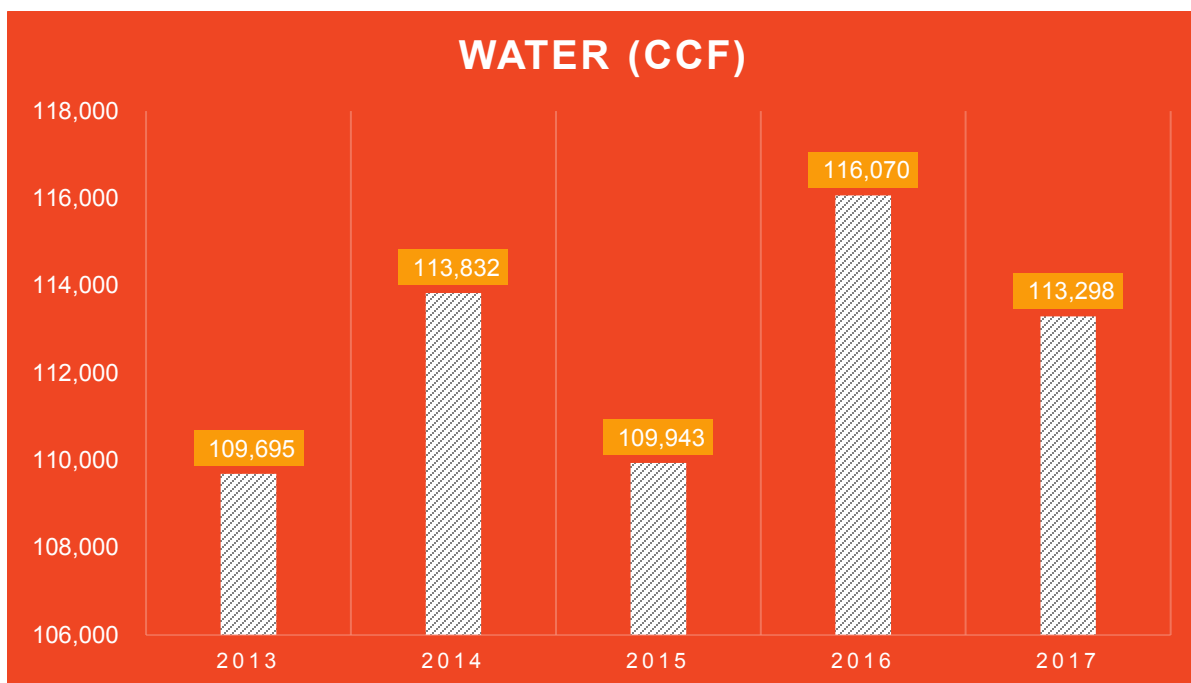


Figure 1- Total campus water consumption by calendar year for CSUDH.

## Campus Information

*Net Zero Water:* In terms of more ambitious goal-setting, approximately 80,228 CCF falls on the stateside-maintained grounds on campus (170 acres) based on an annual rainfall rate of 13” per year. This means that CSUDH still has 33,070 CCF in reduction measures from 2017 levels to pursue before achieving a **net zero water** balance for the campus.

*Chancellor’s Office Goals:* This aligns very closely with the Chancellor’s Office goal of 10% water conservation from 2013 CY levels which represents a 2016 goal of 82,270 CCF in consumption. This consumption would need to go down to 76,785 CCF by 2020 to reach the Chancellor’s Office goals for 20% water conservation by 2020.

Goal	Overall Water Consumption Target	CCF Reduction from 2017 Levels (113,298 CCF) Needed
<i>Net Zero Water: water consumption matches natural water balance</i>	80,228 CCF	33,070 CCF
<i>Chancellor’s Office: 20% water conservation from 2013 levels by 2020</i>	76,785 CCF	36,513 CCF

Table 1- Overall CSUDH water consumption goals

### Potable Water Usage

Potable water on campus is mostly used for indoor applications, with the exception of landscaping in Housing and parts of Parking Lot 7.

The Chancellor’s Office ascribes to an absolute 20% reduction in water consumption from 2013 levels by 2020 which would represent a total water allowance of 31,676 total CCF in potable water use for the campus based on historical potable water consumption.

However, CSUDH is a rapidly growing campus with up to a 20,000 FTES population projected by 2040. To better evaluate and commit to effective water efficiency and conservation measures, additional analysis in the context of per capita growth is necessary.

#### *Historical Potable Water Usage:*

Year	Potable Water Consumption (CCF)	Total Campus Population (FTE Employees and Students)	Gallons/Capita
2013	39,595	10,903.13	2,716.38
2014	40,360	11,514.69	2,615.67

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2015	42,933	12,094.6	2,655.22
2016	52,963	12,193.1	3,249.07
2017	51,561	12,503.4	3,084.57

Table 2- Historical potable water usage for CSUDH

While some allowances should be expected given the rise in total campus population, per capita analysis of potable water consumption over the past five years demonstrates that on the whole, water consumption per user is higher on average.

A large contributor to the sudden spike in average consumption per capita between 2015 and 2016 may be attributed to the conversion of the Central Plant cooling towers back to potable water after five years (pre-2013) of using reclaimed water. This was due to the reclaimed water quality being so poor as to render its continued use at the Central Plant infeasible given the damage it was causing to piping and mechanical systems. The amount of water lost through evaporation alone contributes to losses totaling approximately 30,000 gallons of water per day, making this a major contributor to the increase in consumption of potable water.

Additional conservation measures since then have helped to bring this average consumption per capita down, but not to previous levels. This indicates a need for additional conservation and infrastructure measures to reduce per capita water use for campus users.

### *Future Potable Water Usage Targets:*

Assuming a 4% load growth and an upward growth trajectory to support the Master Plan's goal of 20,000 FTES by 2040, applying a 10%-20% reduction target in line with Chancellor's Office goals on a per capita basis results in the following targets:

Year	Potable Water Consumption (CCF) Target	Total Projected Campus Population (FTE Employees and Students)	Gallons/Capita
2018	42,499.5	13,003.5	2,444.7 gallons/capita (10% from 2013 levels)
2019	44,199.7	13,523.7	2,444.7 gallons/capita (10% from 2013 levels)
2020	40,860.6	14,064.6	2,173.1 gallons/capita (20% from 2013 levels)

## Campus Information

2021	42,495.1	14,627.2	2,173.1 gallons/capita (20% from 2013 levels)
2022	44,195.0	15,212.3	2,173.1 gallons/capita (20% from 2013 levels)

Table 3- Projected campus population increase and per capita water consumption targets

### Reclaimed Water Usage

As the boundaries of the campus core are not projected to expand in the next five years, the water budget allocated to support campus landscaping should stay relatively stable irrespective of fluctuations in campus population. As landscaping is currently the exclusive use for reclaimed water on campus, conservation targets related to reclaimed water need to focus on measures related to Grounds.

#### *Historical Reclaimed Water Usage:*

Year	Reclaimed Water Consumption (CCF)	CCF Over/Under 20% Reduction Goal (56,080 CCF)	% Progress Towards 20% reduction goal
2013	70,100	14,020 CCF over	Baseline
2014	73,472	17,392 CCF over	4.8% increase from 2013
2015	67,009	10,929 CCF over	5% reduction from 2013
2016	63,107	7,027 CCF over	10% reduction from 2013
2017	61,773	5,693 CCF over	12% reduction from 2013

Table 4- Historical reclaimed water usage for CSUDH

Reclaimed water usage over the past five years has mostly seen a steady decrease in consumption, but is still shy of the 20% reduction goal. This correlates to a general trend towards water-wise landscaping over time as well as improved Grounds practices to conserve water.

# Campus Information

## Future Reclaimed Water Usage Targets:

To achieve a 20% reduction in reclaimed water consumption from 2013 levels, the campus would need to reduce reclaimed water usage by 5,693 CCF.

The irrigation audit provided by the Metropolitan Water District (MWD) in spring of 2018 provided several recommendations for reducing water usage in landscaping that could contribute to reaching this goal:

Water Efficiency Measure	Units	Initial Cost	Rebates & Incentives	Water Savings (Gal/Yr)	Water Savings (HCF/Yr)	Annual Savings <sup>1</sup>	Simple Payback <sup>2</sup> (Years)
<b>Recommendations for Landscape Improvements</b>							
Replace Unused Areas of Lawn with Drought Tolerant Plant Material (sq ft)	101,400	\$377,208	\$0	10,841,512	14,494	\$41,519	9

<b>Recommendations for Irrigation System Improvements</b>							
Fix Irrigation Systems Problems	25	\$524	\$0	2,561,152	3,424	\$9,809	Immediate
Replace Spray Nozzles with Rotary Nozzles	300	\$1,500	\$600	142,868	191	\$546	2
Redesign with Drip Irrigation	101,400	\$24,336	\$0	3,351,040	4,480	\$12,833	2
<b>Totals:</b>		<b>\$ 403,568</b>	<b>\$ 600</b>	<b>16,896,572</b>	<b>22,589</b>	<b>\$ 23,188</b>	<b>17.4</b>

1. Cost savings are based on a water rate of \$2.975 per CCF (January 2017 rate)
2. The total simple payback period is based on the total implementation costs and the total savings amount (the bottom line), it is not an average of the payback periods of each recommended measure.
3. \*Rebate amounts are subject to change.

Figure 2- Campus Recommendations (p.8 of MWD Report)

Collectively, these proposed measures have the potential to exceed campus reclaimed water reduction goals by a significant amount. Adopting these measures on a rolling basis over the next five years could provide a strong base for water conservation efforts in this area.

# Five-Year Campus Water Action Plan

## Five-Year Campus Water Action Plan

### Water Recommendations & Targets:

The campus is not currently on target with any of its recommended water conservation goals or targets. For CSUDH to achieve upcoming Chancellor's Office goals related to water conservation and/or Net Zero Water principles, it will have to undertake initiatives that will significantly reduce water consumption by 25,542-33,070 CCF per year (assuming a 2017 CY level of consumption) which equates to approximately 19-24 million gallons per year.

Breaking down this general target into equivalent 20% reductions in reclaimed vs. potable water yields a target reduction of 10,700 CCF/year in potable water in comparison to 2017 CY levels, and 5,693 CCF/year in reclaimed water.

Goal	CCF Goal	Actual CCF Consumption	CCF Difference
<i>Chancellor's Office: 20% reduction from 2013 CY levels by 2020</i>	87,756	113,298 (2017 CY)	25,542 (over)
<i>Net Zero Water: Consumption equal or less than natural precipitation</i>	80,228	113,298 (2017 CY)	33,070 (over)
<i>Potable Water: Reduce per Capita Consumption by 20% from 2013 levels by 2020</i>	40,861 (by 2020)	51,561 (2017 CY)	10,700 (over)
<i>Reclaimed Water: Reduce by 20% from 2013 levels by 2020</i>	56,080	61,773 (2017 CY)	5,693 (over)

Table 5- Campus water consumption in relation to water conservation targets.



# Five-Year Campus Water Action Plan

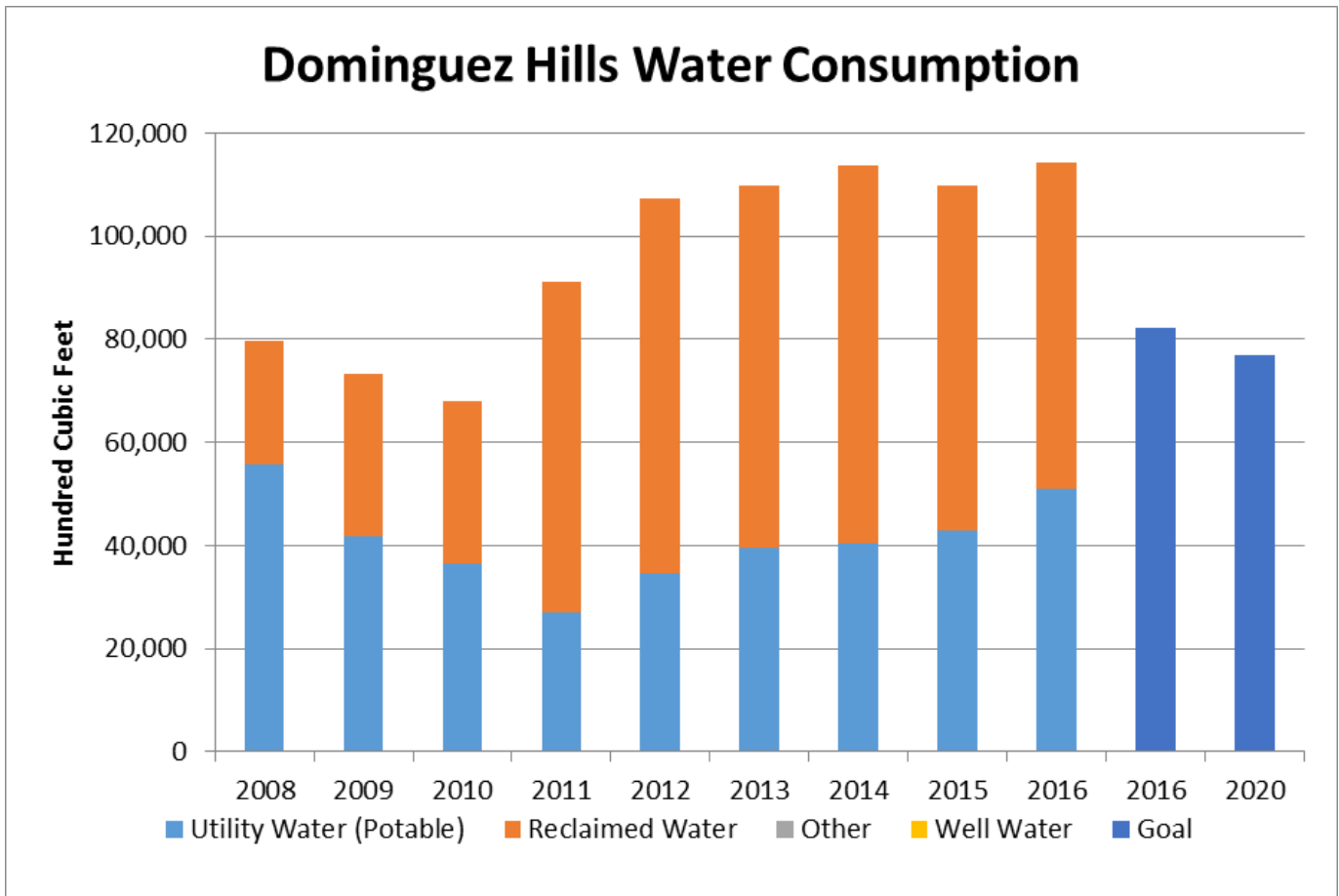


Figure 3- Comparison of campus water consumption by source to Chancellor's Office goals.

### Reclaimed Water Goals:

While the campus has made an important first step by using reclaimed water for the majority of its irrigation needs, it will still need to ramp up its water efficiency measures to achieve these goals. This includes serious consideration of the irrigation recommendations suggested by the Metropolitan Water District report and measures such as converting turf areas to drought-tolerant landscaping, fixing the CalSense irrigation system for the campus, and addressing leaks and broken heads. The report estimates irrigation maintenance and converting to drip irrigation alone could create 22,589 CCF in savings. If correct, this would more than address the reclaimed water savings target and help contribute progress towards a reduction in overall consumption for the campus.

### Planned Activities

To achieve a 5,693 CCF reduction in reclaimed water use from 2017 CY levels, CSUDH will commit to the following initiatives over the next five years:

# Five-Year Campus Water Action Plan

Measure	Projected CCF Savings
<ul style="list-style-type: none"> <li>• <b>24-hour response policy to all leak reports for irrigation.</b></li> <li>• <b>Install flow meters/sub-metering for main irrigation piping and all campus buildings to help identify leaks.</b></li> <li>• <b>Complete student research project to create a campus landscape survey map to identify hydrozones with high water usage/candidates for replacement with low-water usage plants.</b></li> </ul>	n/a- preventative
<ul style="list-style-type: none"> <li>• <b>Fill the Irrigation Specialist Grounds position to ensure ongoing inspection and maintenance of all campus irrigation to address and fix irrigation issues related to spray blockage, overspray, and broken sprinkler heads.</b></li> </ul>	3,424/year
<ul style="list-style-type: none"> <li>• <b>Eliminate unused turfgrass areas and convert to low-water using plants and/or re-design with drip irrigation for 12,639 sq ft. of existing landscaping by 2022.</b></li> </ul>	2,275/year by 2022* <small>*Based on MWD report estimate of 18,974/year for 101,400 sf converted (0.18 ccf/yr/sq ft converted)</small>
<b>TOTAL</b>	<b>5,699 CCF per year in reductions by 2022</b>

### Potable Water Goals:

Reducing water from irrigation will also need to be supplemented by more aggressive standards for indoor potable water use. The first step to accomplishing this is completing an updated campus-wide inventory of all indoor water fixtures on campus. Based on the results, Facilities Services can create a roll-out plan to upgrade older fixtures to water-saving models and pursue opportunities to add additional control technologies such as automatic sensors and dual-flush toilet handles to campus restrooms. Enforcement of current CalGreen standards for efficiency of indoor water fixtures on campus, and ensuring ongoing retrofits of existing fixtures to water-saving models will help ensure an ongoing campus commitment to water conservation.

Central Plant is also attempting to address its cooling tower water consumption through a pilot of water-capture technology which would recycle waste condensate water from the campus air handlers, and pump the water back to the cooling tower. As the cooling tower consumes 30,000 gallons of potable water a day, this 1 million gallon+ a year water-saving project could help the campus in achieving its water saving goals in conjunction with an aggressive portfolio of water efficiency upgrades.

# Five-Year Campus Water Action Plan

The Office of Sustainability will also be piloting a green restroom program in the summer of 2019 which could provide a learning pilot for implementing these technologies on a wider scale as well as create water conservation signage and educational campaigns that could roll-out to the campus as a whole.

## Planned Activities

To achieve a 10,700 CCF reduction in potable water use from 2017 CY levels, CSUDH will commit to the following initiatives:

Measure	Projected CCF Savings
<ul style="list-style-type: none"> <li>Complete sub-metering of water in all campus buildings and for Housing.</li> <li>24-hour response to all leak reports for fixtures</li> <li>Promote Work Control telephone number for reporting leaks to the campus via educational efforts.</li> </ul>	n/a- preventative
<ul style="list-style-type: none"> <li>Complete condensate recovery system at Central Plant</li> </ul>	1,363.78/year
<p>Enforce 2016 (or most up-to-date) CalGreen standards for interior water fixtures on all new installations and retrofits.</p> <p>2016 CalGreen Standards:</p> <ul style="list-style-type: none"> <li>Water closets shall not exceed 1.28 gallons per flush (Sec 5.303.3.1)</li> <li>Wall-mounted urinals shall not exceed 0.125 gpf (Sec 5.303.3.2.1)</li> <li>Floor-mounted urinals shall not exceed 0.5 gpf (5.303.3.2.2)</li> <li>Single showerheads shall have maximum flow rate of 2.0 gpm (5.303.3.3.1)</li> </ul>	Ongoing based on new construction and retrofit projects.
<ul style="list-style-type: none"> <li>Conduct a campus-wide inventory of restroom facilities and gpf/gpm ratings of all bathroom fixtures. Create a retrofit schedule to address high water-using fixtures and/or leaking fixtures based on inventory results.</li> </ul>	To be determined based on results of inventory.
<ul style="list-style-type: none"> <li>Conduct a water assessment and conservation program for specialty use areas and auxiliaries including:               <ul style="list-style-type: none"> <li>Housing</li> <li>LSU/Campus Dining</li> <li>Laboratories (Green Lab Program)</li> <li>Athletics</li> </ul> </li> </ul>	Ongoing based on opportunities identified through the assessments.
<ul style="list-style-type: none"> <li>Conduct water conservation education campaigns as part of Race to Reduce Month</li> </ul>	Variable, based on user behavior.

# Five-Year Campus Water Action Plan

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| <ul style="list-style-type: none"><li>• Apply water conservation signage to bathrooms in all major multi-story campus buildings over the next five years.</li></ul> |  |
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## Other Current and Planned Initiatives

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### Other Current and Planned Initiatives

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#### *Potable Water/Indoor Applications:*

- The Office of Sustainability and Facilities Services have identified the second floor restrooms of Welch Hall as a candidate for a green restroom retrofit over the summer and fall of 2019. These restrooms will be outfitted with EPA WaterSense-rated automatic sensor faucets, toilets, and urinals to demonstrate the latest in water efficiency technology. This will also be complemented with water conservation signage and feedback surveys to gain campus support for water conservation efforts as well as valuable feedback on these new fixture models.
- The Central Plant converted to a zero blowdown procedure that conserves 35,000 gallons of water per day for the campus compared to traditional methods of cooling.

#### *Reclaimed Water/Outdoor Irrigation:*

- The Office of Sustainability in partnership with Facilities Services has held planning meetings with Cal Water, West Basin, and Metropolitan Water District (MWD) to proactively pursue rebate opportunities and take advantage of conservation resources in the 2018 calendar year.
- Via the Sustainable Landscape Plan, the Sustainable Landscape Committee has set aggressive campus standards for irrigation, exceeding state Model Water Efficient Landscape Ordinance (MWELO) requirements for landscaping by not allowing special exemptions for reclaimed water usage. Outdoor irrigation is now held to the same standard of efficiency regardless of water source.
- Per request from the campus, MWD conducted a professional irrigation audit of campus landscaping on April 10, 2018 to identify potential water savings opportunities. Their report, delivered in June 2018, identified several opportunities for converting lawn to drought-tolerant plantings, fixing sprinkler systems, and more efficient irrigation practices that Grounds will be evaluating for integration in the next fiscal year. Full implementation of all recommended measures is estimated to reduce landscape water use by approximately 22,589 CCF (16.8 million gallons) per year, representing a cost savings of \$23K annually.
- Grounds has also been reigniting the efforts to fix the CalSense irrigation control system for the campus, and worked with IT to restore basic connectivity and functionality to allow remote irrigation control. They are also working on integrating local weather data into CalSense to allow for more accurate weather-based monitoring and irrigation for maximum efficiency.

## Contact Information



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## Information on the Office of Sustainability

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California State University, Dominguez Hills and other state institutions are major consumers of energy and natural resources. The university has a responsibility to be a wise steward of scarce resources by reducing the use of non-renewable resources, increasing energy efficiency, and as part of the larger CSU system, promoting continued economic and ecological viability in California. CSU Dominguez Hills is on the cutting edge of sustainability efforts by an urban campus, and is actively providing leadership in engaging faculty, students and staff in on-campus sustainability efforts. We are looking at ways to increase partnerships and funding to support the educational, research, and public service missions of the university as they relate to sustainability.



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