

Council Members Present (online):

Carlo Colella, Vice President, Administration and Finance (Chair)
Mary Hummel, Assistant Vice President, Student Affairs (in for Patty Perillo, Vice President, Student Affairs)
David Cronrath, Associate Provost
Maureen Kotlas, Executive Director, Department of Environmental Safety, Sustainability & Risk
Scott Lupin, Assoc Dir., Environmental Safety, Sustainability & Risk, & Dir., Office of Sustainability
Susan Corry, Manager, Engineering & Energy, Facilities Management
Bryan Quinn, Director of Technical Operation, Department of Electrical & Computer Engineering
David Cooper, Assistant Director of Operations, Division of IT
Eric Wachsmann, Prof., Materials Science and Engineering and Director, MD Energy Innovation Institute
Giovanni Baiocchi, Associate Professor, Geographical Sciences
Jennifer Hadden, Associate Professor, Government & Politics
Nina Jeffries, Undergraduate Student Representative
Nicole Barbour, Graduate Student Representative

Guests Present:

Kristy Long, Executive Director, Operations & Maintenance, FM

Meeting start time: 12:00pm

Meeting Highlights

UMD Energy Goals – Status Report

Susan Corry provided an update on UMD's progress toward achieving the President's Energy Initiatives. A brief summary is included in these minutes. See the appendix for greater detail.

- Energy Conservation
 - Target: Reduce electricity use 20% by 2020 based on a 2015 baseline year consumption using building submeter data.
 - Progress: Below target. Overall 3.3% reduction in electricity consumption.
- Carbon Neutral New Development
 - Target: Mitigate any new greenhouse gas emissions from new construction and major renovations through energy efficient design, renewable power and carbon credits.
 - Progress: On target. First building to comply is Brendan Iribe Center for Computer Science and Engineering.

- Purchased Power
 - Target: Eliminate carbon emissions from purchased electricity by 2020 through the purchase of electricity from renewable energy sources.
 - Progress: On target. For 2019, 95% of purchased electricity was generated by renewable sources. For 2020, it will be 100%.
- Purchase of Verified Carbon Offsets
 - Target: Purchase verified carbon offsets to meet the Climate Action Plan 2015 and 2020 reduction goals after seeking to maximize carbon reductions through other means.
 - Progress: On target. UMD is offsetting emissions from air travel, new buildings, and undergraduate student commuting, which significantly contributes to its achievement of CAP goals to reduce net carbon emissions.

In addition to the President's Energy Initiatives, UMD successfully reduced thermal energy consumption:

- Steam consumption decreased 18% between 2015 and 2019
- Chilled water consumption decreased 51% between 2015 and 2019 (however, chilled water data is incomplete, so this figure might not be accurate for campus-wide consumption)

UMD also launched a Terp Footprints dashboard to improve energy and water data management and plans to reduce total energy consumption in existing buildings at least 1% per year to meet Governor Hogan's Executive Order requiring State facilities to reduce energy consumption 10% between 2018 and 2029.

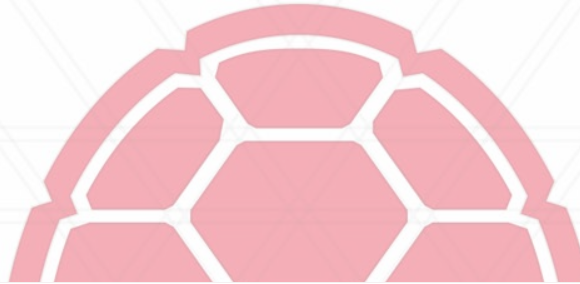
Sustainability Progress Report – Follow-up Discussion

Mark Stewart from the Office of Sustainability briefly presented six "areas for improvement" based on categories in the Sustainability Tracking, Assessment, and Rating System (STARS) in which UMD earns a below-average score compared with all colleges and universities that participate in STARS:

- Energy (STARS score: 2.45 out of 10)
- Learning Outcomes (STARS score: 1.17 out of 8)
- Investment (STARS score: 0.4 out of 7)
- Transportation (STARS score: 2.37 out of 7)
- Water Use (STARS score: 1.31 out of 5)
- Building O&M (STARS score: 1.49 out of 5)

See the slides in the appendix for more detail. The Council did not have time for discussion, so the areas for improvement will be included on the agenda for future meetings.

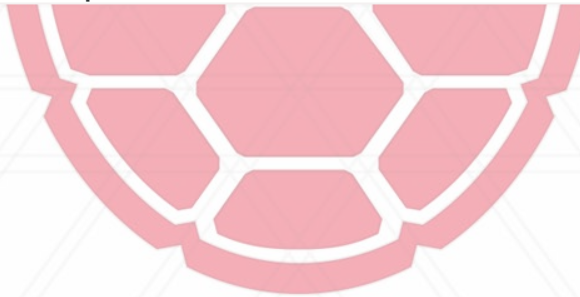
Adjourn 1:30 pm



Progress Report on Energy Initiatives & Energy Management Programs

Facilities Management

Updated November 12, 2020



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Earth Day April 22, 2014



President's Energy Initiatives –

Goals for Reducing GHG Emissions 50% by 2020

1. Energy Conservation - reduce electricity use 20% by 2020 based on a 2015 baseline year consumption using building submeter data
2. Carbon Neutral New Development – mitigate any new greenhouse gas emissions from new construction and major renovations through energy efficient design, renewable power and carbon credits
3. Purchased Power - eliminate carbon emissions from purchased electricity by 2020 through the purchase of electricity from renewable energy sources
4. Purchase of Verified Carbon Offsets - approves the purchase of verified carbon offsets to meet the Climate Action Plan 2015 and 2020 reduction goals after seeking to maximize carbon reductions through other means

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President's Energy Initiatives - Progress

1. Energy Conservation - reduce electricity use 20% by 2020 based on a 2015 baseline year consumption – **BELOW TARGET**
 - ✓ Using square footage footprint from 2015 greenhouse gas inventory as baseline
 - ✓ Overall 3.3% reduction in electricity consumption
 -  5.0% reduction in campus facilities behind master meter
 -  19.5% increase in campus facilities with individual utility meters






Successful Electricity Use Reduction

Master Meter CY 2015 vs CY 2019











Chemistry All Wings	Tawes Hall	Main Admin	McKeldin Library	Marie Mount Hall
				
KWH Use 2,945,843	KWH Use 2,134,407	KWH Use 1,598,116	KWH Use 1,400,935	KWH Use 875,189
28% Lower	36% Lower	51% Lower	27% Lower	21% Lower
Factors Leading to Lower Electricity Usage				
<ul style="list-style-type: none"> - ESCO Project - Lab Ventilation Controls - Central Lab Exhaust System 	<ul style="list-style-type: none"> - Conversion of Theatre to Classroom Space w/Advanced BAS Controls & Schedules 	<ul style="list-style-type: none"> -New Efficient Chillers -New BAS Controls 	<ul style="list-style-type: none"> -LED Lighting Conversion and Advanced Lighting Control System 	<ul style="list-style-type: none"> -New BAS Controls, Retro Commissioning and TAB

Electricity Use Increase ↑ Master Meter CY 2015 vs CY 2019

SCUB 4 Electric Chiller	Physical Science Complex	Atlantic Building Wing 4 SCUB	BioResearch Building	Xfinity Center
				
KWH Use ↑ 1,945,888	KWH Use ↑ 1,609,853	KWH Use ↑ 1,081,439	KWH Use ↑ 1,010,418	KWH Use ↑ 929,879
69% Higher	54% Higher	48% Higher	12% Higher	24% Higher
Factors Leading to Higher Electricity Usage				
- Increased Cooling Demand	- Lab Buildout	-Increased Cooling Demand From PSC & Cambridge	- Cause TBD	- Increased Events

Electricity Use Increase

Individual Utility Meter CY 2015 vs CY 2019

RiverTech Data Center	Seneca Building	Severn Building	Vet Science Building
			
KWH Use  1,882,232	KWH Use  826,251	KWH Use  499,582	KWH Use  525,327
91% Higher	54% Higher	8.4% Higher	13% Higher
Factors Leading to Higher Electricity Usage			
- Increased Cooling Demand due to DeepThought 2 Hi-Perf Computer	- Increased Occupancy	- Increased occupancy with MTS, Archives, Shops & Mail Services	- Both chillers operating to achieve required space conditions

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President's Energy Initiatives

2. Carbon Neutral New Development – mitigate any new greenhouse gas emissions from new construction and major renovations through energy efficient design, renewable power and carbon credits – **ON TARGET**
- ✓ First building to comply is Brendan Iribe Center for Computer Science and Engineering
 - ✓ Reached substantial completion in January 2019 following design guidelines of the International Green Construction Code
 - ✓ Actual 2019 energy consumption is higher than energy model
 - Electric consumption approximately 300% higher than energy model
 - Steam consumption approximately 42% higher than energy model
 - ✓ Emissions associated with electricity consumption is mitigated through initiative #3 on purchased electricity derived from renewable sources (1,598 MT-CO₂e)
 - ✓ Emissions associated with steam consumption is mitigated through purchase of verified carbon offsets (445 MT-CO₂e)

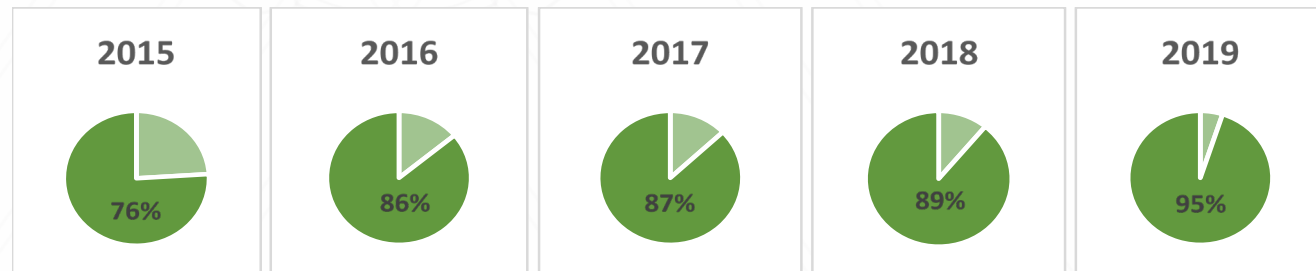
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President's Energy Initiatives

3. Purchased Power - eliminate carbon emissions from purchased electricity by 2020 through the purchase of electricity from renewable energy sources - **ON TARGET**

- ✓ Three off-site renewable power purchase agreements – 2 wind, 1 solar
- ✓ 3 MW of on-site solar (garage canopies, Severn rooftop, IBBR rooftop & canopy) and solar dashboard
- ✓ Renewable Energy Credits (RECs) management program for regulatory compliance and voluntary emissions reduction associated with purchased electricity

Progress toward 100% purchased power from renewable sources:



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President's Energy Initiatives

4. Purchase of Verified Carbon Offsets - approves the purchase of verified carbon offsets to meet the Climate Action Plan 2015 and 2020 reduction goals after seeking to maximize carbon reductions through other means – **ON TARGET**
 - ✓ Achieved 50% GHG reduction in 2019, more than a year ahead of schedule (CAP milestone was 50% reduction by 2020)
 - ✓ January 2019 - issued RFP for qualified vendors to provide a portfolio of carbon offsets that met UMD needs and budget
 - ✓ June 2019 – two vendors were selected for award to provide a portfolio of carbon offsets to UMD
 - ✓ Purchased verified offsets to mitigate 2018 undergraduate commuting and study abroad air travel

2019 Procurement from NativeEnergy:

Offset Vintage	Project	Quoted Price per Metric Ton	Metric Tons	Full Purchase Price
2018	Maharashtra Wind for retirement in July, 2019	\$2.00	31,943	\$63,886.00
2018/2019/2020	Maharashtra Wind for future retirement	\$2.00	60,827	\$121,654.00
2018	Southern Ute Vent Well for retirement in July, 2019	\$5.50	3,445	\$18,947.50
TOTALS			96,215	\$204,487.50



2019 Procurement from WGL Energy Services:

Offset Vintage	Project	Quoted Price per Metric Ton	Metric Tons	Full Purchase Price
2018	Henrico Landfill (VA)	\$4.25	10,445	\$44,391.25
2018	Various Landfills with Green-e certification	\$3.90	7,301	\$28,473.90
TOTALS			17,746	\$72,865.15

Other Energy Initiatives:

Reduce Steam & Chilled Water Usage






Energy Conservation – reduce steam and chilled water consumption based on a 2015 baseline year consumption

- ✓ Using square footage footprint from 2015 greenhouse gas inventory as baseline
- ✓ Overall 18.0% reduction in steam consumption
 -  18.0% reduction in master meter campus facilities
- ✓ Overall 51% reduction in chilled water consumption
 -  51% reduction in master meter campus facilities
 - Note - only 30 Chilled Water locations have data for this assessment

Successful Steam Use Reduction











Master Meter CY 2015 vs CY 2019



Chemistry Wings 3 & 5	Marie Mount Hall	Kim Engineering	Physical Science Complex	P. Mitchell Art-Soc
				
Lbs. Use 16,505,276	Lbs. Use 10,228,510	Lbs. Use 9,664,249	Lbs. Use 6,757,489	Lbs. Use 6,662,760
54% Lower	41% Lower	42% Lower	35% Lower	39% Lower
Factors Leading to Lower Steam Usage				
<ul style="list-style-type: none"> - ESCO Project - Lab Ventilation Controls - Heat Recovery System 	<ul style="list-style-type: none"> - New BAS, Retro Commissioning, TAB and Scheduling 	<ul style="list-style-type: none"> -New Lab Control System Developed by CCMS 	<ul style="list-style-type: none"> -Lab AHU Dewpoint Control Sequence and Lab Buildout reducing reheat 	<ul style="list-style-type: none"> -New BAS Controls and Air Handler Replacements






Steam Use Increase

Master Meter CY 2015 vs CY 2019

Plant Science	Eppley Campus Rec	SCUB 2	Ellicott Dining Hall	Engineering Labs Bldg.
				
Lbs. Use  9,572,449	Lbs. Use  9,674,689	Lbs. Use  4,843,923	Lbs. Use  3,279,708	Lbs. Use  1,153,726
43% Higher	63% Higher	12% Higher	62% Higher	35% Higher
Factors Leading to Higher Steam Usage				
- Aging Controls (major downward trend since Sept. 2019 new controls commissioning by ESCO)	- Additional Building Reheating - Use of Steam to Generate Heating Water vs. NG	- Increased Heating Demand From 10 Connected Buildings	-Aging Mechanical Systems -Pneumatic Controls System -Increase Steam Use in Kitchen	-Additional Lab Space in UMERC -New Concrete Material Testing Lab and Classroom Space






Successful Chilled Water Use Reduction Master Meter CY 2015 vs CY 2019



Kim Engineering	Chemistry W3 & W5	AV Williams Building	John Toll Physics	Marie Mount Hall
				
TonHrs Use 1,508,093 ↓	TonHrs Use 1,303,634 ↓	TonHrs Use 967,423 ↓	TonHrs Use 827,312 ↓	TonHrs Use 652,152 ↓
55% Lower	40% Lower	47% Lower	60% Lower	60% Lower
Factors Leading to Lower Chilled Water Usage				
-New Lab Control System Developed by CCMS	-ESCO Project - Lab Ventilation Controls - Heat Recovery System	-New AC Units Primary Data Center -New BAS Controls	-New AHUs and BAS Controls -Renovation of 4 th	-New BAS Controls, Retro Commissioning and TAB

Increase In Chilled Water Use

Master Meter CY 2015 vs CY 2019

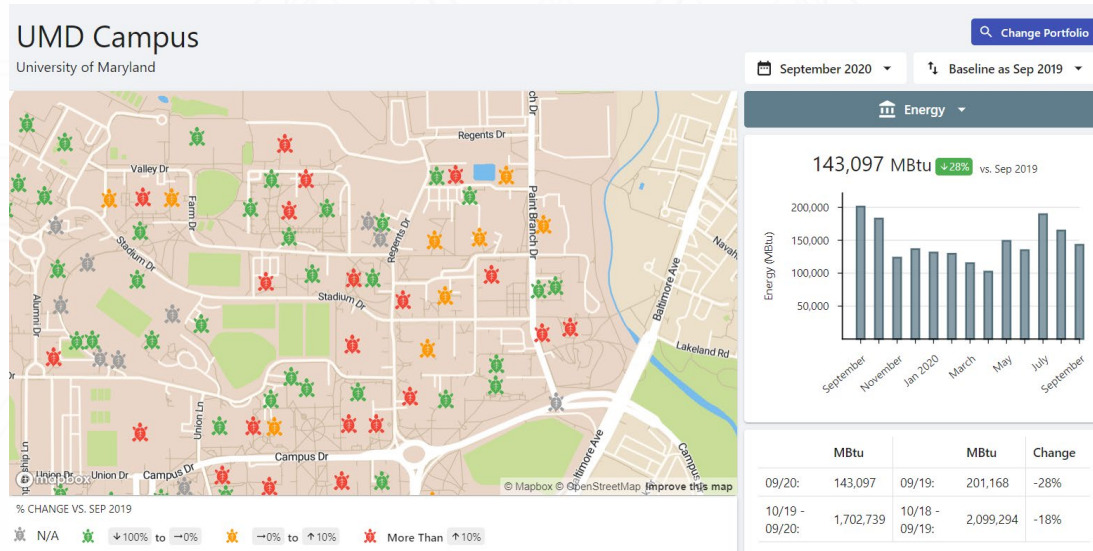
Animal Science W1	Animal Science W5	Engineering Lab Building	Centreville Hall	Bel Air Hall
				
TonHrs Use ↑ 232,006	TonHrs Use ↑ 254,013	TonHrs Use ↑ 150,271	TonHrs Use ↑ 130,600	TonHrs Use ↑ 31,179
55% Higher	36% Higher	73% Higher	107% Higher	92% Higher
Factors Leading to Higher Chilled Water Usage				
- Cause TBD	- Restoration of AHUs to proper operation by ESCO Project	- Additional Lab Space in UMERCL -New Concrete Material Testing Lab and Classroom Space	- Dehumidifiers added to each room. Additional Heat Rejection by Chilled Water System	- Dehumidifiers added to each room. Additional Heat Rejection by Chilled Water System

Other Energy Initiatives

TerpFootprints Dashboard Expansion

Collaboration with Dr. Jelena Srebric and her team to expand the TerpFootprints energy dashboard as a tool for O&M

- ✓ Track energy performance of individual buildings
- ✓ Identify data anomalies and trends to facilitate investigation or action
- ✓ Track changes made by technicians via online log
- ✓ Develop building portfolios to facilitate reporting, e.g. executive order on energy, campus units, energy efficiency projects, performance contracts, etc.



Other Energy Initiatives

TerpFootprints Dashboard Expansion

Change Portfolio

Portfolio Name

Buildings

Bookmarked

Active

UMD Campus

211

Make Active

HVAC Zone 8

14

Make Active

HVAC Zone 2

22

Make Active

HVAC Zone 3

13

Make Active

HVAC Zone 4

27

Make Active

HVAC Zone 5

17

Make Active

HVAC Zone 6

22

Make Active

Executive Reporting

258

Make Active

HVAC Zone 1

11

HVAC Zone 1

University of Maryland

May 2020

Baseline as May 2019

Download

Energy

HVAC Zone 1 Buildings





















May 2020

	ID	Name	Type	Area (ft ²)	May 2020 (kBtu)	↑ Change from May 2019 (kBtu)	% Change
▼	91	Chemistry Building	Lab	398,392	6,007,165	-2,435,943	-29
▼	82	John S. Toll Physics Building	Lab	230,558	1,769,077	-1,527,862	-46
▼	76	Symons Hall	Office	78,248	455,010	-552,019	-55
▼	83	J.m. Patterson Building	Lab	79,248	808,221	-395,700	-33
▼	73	H.j. Patterson Hall	Lab	118,111	1,335,253	-320,079	-19
▼	140	Health Center	Office	55,852	157,826	-147,876	-48
▼	34	Jimenez Hall	Office	65,321	321,496	-143,439	-31
▼	90	Chemical & Nuclear Engineering Building	Lab	84,877	1,696,931	-55,473	-3
▼	84	William E. Kirwan Hall	Office	138,852	1,014,488	-21,925	-2

Other Energy Initiatives

TerpFootprints Dashboard Expansion

Operations and Maintenance Reports

Date ↓ ≡	Category ≡	System ≡	User ≡	Notes	Go To Report	Edit Report
10/05/2020	Other	Other	donhill@umd.edu	New Steam Meter Installed		
09/24/2020	Schedule Increased	Air Handling Unit (AHU)	aschaub@umd.edu	Two new unit were started in the 3100 area in September. Heat pumps with local stats		
09/23/2020	Other		pearson0@umd.edu	Test for workshop		
09/23/2020	Other	Other	pearson0@umd.edu	This is a test		
09/23/2020	Occupant Request		jvucci@umd.edu	increased OA for dilution on AHUs to 30% 9-23-1-20 Vucci training test		
09/23/2020	Other	Chiller	dickman@umd.edu	Chiller reset OA temps and chilled water temps adjusted, released enable point for cooling back to auto based on OA temps.		
09/21/2020	Other	Other	donhill@umd.edu	Test Notes for Workshop		
09/21/2020	Weather Colder	Air Handling Unit (AHU)	donhill@umd.edu	Test Report for Workshop		
09/15/2020	Other	Chiller	dickman@umd.edu	New Trane chiller brought online 8/11/20		
09/08/2020	Economizer Issue	Variable Air Volume Unit (VAV)	aschaub@umd.edu	2-New damper motors were installed and Econ. checkout was complete 9-8-20		

Proven Successful Strategies & Remaining Challenges

What Worked

- New BAS Controls
- Lab Ventilation Reduction
- ESCO Projects
- Retro Commissioning
- Energy Recovery Units
- Advanced Sequences in BAS
- Equipment Schedules
- LED Lighting Upgrade
- Lighting Control Systems

Challenges

- Funding
- Metering Un-Available (can't improve what you don't measure)
- Scheduling (Customer awareness of impact)
- Temperature and Humidity Setpoints
- Maintaining new sequences and automation to realize savings
- DCFS difficult to keep up-to-date with fast paced technology changes

Governor's 2019 Executive Order

10% energy reduction by 2029

In late 2019, Governor Hogan issued an executive order mandating all state agencies to reduce energy consumption 10% by 2029 against an FY18 baseline using utility invoices

- ✓ All agencies are required to provide energy data to Department of General Services (DGS) to update the state energy database EnergyCap
- ✓ EnergyCap will be used to report on all agencies' progress toward the executive order reduction goal
- ✓ DGS will use database to identify the worst performing buildings and facilitate energy auditing and energy performance contracts
- ✓ University of Maryland College Park is the biggest energy user in the state of Maryland
- ✓ Because of complexity of CHP, UMD's report is based on site building submeter energy data instead of utility invoices
- ✓ First annual report was submitted to the Governor's office in Sept 2020
- ✓ UMD achieved a 2.6% energy reduction in FY19 over FY18 baseline

Energy Management Plan Development

- ✓ Identify fund sources for energy efficiency projects
- ✓ Analyze data to determine projects with best ROI, procurement methods, source financing, and execution timeline
- ✓ Achieve 1% reduction annually of building site energy consumption using FY18 baseline (aligns with Governor's Executive Order)
- ✓ Develop NextGen Energy Program strategies for Climate Action Plan 3.0 (CAP 3.0 currently under development by Office of Sustainability)
- ✓ Develop and/or identify contract options
- ✓ Perform continuous monitoring of buildings
- ✓ Work with legislators to retain energy savings in the utility budget for additional energy efficiency projects
- ✓ Expand preventive maintenance program
- ✓ Automated scheduling of common spaces

Strategies to Include in Energy Management Plan

- ✓ Review possibility of self performing energy performance contracts
- ✓ Maximize Automated Scheduling of Building Systems reducing O&M and Energy Costs
- ✓ Expansion of lab ventilation automation
- ✓ Expand Fault Detection Software provide alerts for conditions that impact wear & tear & energy use.
- ✓ Convert O&M to a data-driven organization taking proactive steps to improve operations
- ✓ Coordinate energy conservation projects with Facilities Renewal and major renovation projects to avoid conflicts and scope overlap
- ✓ Assure new construction and renovation aligns with future goals (e.g. space for larger hot water coils to allow migration to lower temperature systems)
- ✓ Work with NextGen Energy Program to investigate options to improve plant efficiencies and optimize performance
- ✓ Work with O&M teams to perform continuous monitoring of facilities using TerpFootprints & PI Vision
- ✓ Provide training to O&M teams to identify non-conforming operations and take corrective action



UNIVERSITY OF
MARYLAND

Facilities Management

Service Building, 7757 Baltimore Ave., College Park, MD 20742



Areas for Improvement

SUSTAINABILITY COUNCIL

NOVEMBER 16, 2020

Sustainability Tracking, Assessment, and Rating System (STARS)



- ▶ 342 Colleges and Universities currently participate in STARS
- ▶ UMD is among 133 institutions that earn a Gold rating
- ▶ 9 institutions are currently rated Platinum
 - ▶ Arizona State U.
 - ▶ Colorado State U.
 - ▶ Cornell U.
 - ▶ Stanford U.
 - ▶ Thompson Rivers U.
 - ▶ U. of California – Irvine
 - ▶ U. of Connecticut
 - ▶ U. of New Hampshire
 - ▶ U. de Sherbrooke

UMD's Below-Average Scores in STARS



- ▶ **Energy** (STARS score: 2.45 out of 10)
- ▶ **Learning Outcomes** (STARS score: 1.17 out of 8)
- ▶ **Investment** (STARS score: 0.4 out of 7)
- ▶ **Transportation** (STARS score: 2.37 out of 7)
- ▶ **Water Use** (STARS score: 1.31 out of 5)
- ▶ **Building O&M** (STARS score: 1.49 out of 5)

Energy (STARS score: 2.45 out of 10)



How to Improve

- ▶ Decrease total energy consumption per square foot of building space
- ▶ Increase percentage of total energy produced from renewable sources

Current Work

- ▶ Recent/current energy efficiency projects could improve UMD's score
- ▶ NextGen:
 - ▶ Should decrease source energy consumption through overall system efficiency
 - ▶ Might improve building-level (site) energy consumption
 - ▶ Could increase (or decrease) percentage of energy produced from renewables

Learning Outcomes (STARS score: 1.17 out of 8)



How to Improve

- ▶ Increase percentage of students who graduate from degree programs that include at least one sustainability learning outcome

Current Work

- ▶ Approximately 15% of students graduate from programs that have adopted at least one sustainability learning outcome (Sustainability Studies Minor, a few select majors, and all programs in the School of Architecture, Planning & Preservation)
- ▶ The Sustainability Curriculum Project could improve the score if the faculty director (to be selected) successfully works with deans and program chairs to encourage the development of sustainability learning outcomes

Investment (STARS score: 0.4 out of 7)



How to Improve

- ▶ Increase percentage of endowment funds that meet sustainability investment criteria
- ▶ Maintain a committee for investor responsibility
- ▶ Disclose investments

Current Work

- ▶ USM Foundation invests approximately 1% of UMD's share of its investment pool in sustainable investments

Transportation (STARS score: 2.37 out of 7)



How to Improve

- ▶ Increase percentage of UMD fleet comprised of zero-emissions vehicles
- ▶ Increase percentage of students, faculty, and staff who do *not* use conventional single-occupancy vehicles (SOV) for commuting

Current Work

- ▶ Council recently approved a fleet electrification plan
- ▶ ZEV and hybrid vehicles are fairly popular choices at UMD
- ▶ Teleworking and remote learning count toward non-SOV commuting

Water Use (STARS score: 1.31 out of 5)



How to Improve

- ▶ Reduce potable water use

Current Work

- ▶ The NextGen program should lead to significant potable water savings with the renovation of the district energy steam system
- ▶ FM approved a position to oversee water conservation and stormwater management issues

Building O&M (STARS score: 1.49 out of 5)



How to Improve

- ▶ Use LEED O&M or another Green Building Council rating system (e.g. BREEAM-In Use, CASBEE for Existing Buildings, DGNB, Green Star Performance) for the maintenance of UMD's facilities

Current Work

- ▶ Residential Facilities achieved Green Building certification under the Cleaning Industry Management Standard (CIMS-GB)
- ▶ FM Housekeeping Services achieved Green Seal certification under GS-42
- ▶ Terp Footprints tracks and reports building level energy and water data