

MTSU Sustainable Campus Fee Funding Request Form

The Sustainable Campus Fee (SCF) supports projects that advance sustainability at MTSU. This form allows students, faculty, and staff to propose initiatives that contribute to a greener campus through energy efficiency upgrades, infrastructure improvements, education, research, and efforts to enhance campus biodiversity.

There are 5 sections to the application: Section I: Contact Information, Section II: Project Category, Section III: Project Description, Section IV: Project Cost, and Section V: Project Performance Information (For applicable projects).

The Sustainable Campus Fee is administered through a partnership with the Office of Student Affairs, the Center for Student Involvement & Leadership, and the Center for Energy and Sustainability (CES).

Date Wednesday, September 30, 2026

Request Number **SCFR27000092**

1. Name Kimberly Hand

Email kbhand@mtsu.edu

Phone Number (256) 665-4910

SECTION II: Project Category

Please note that all proposed projects will have to comply with MTSU campus guidelines and recommendations.

1. Select the category that best describes the project. (Select One - See Descriptions Below)

Energy Conservation/Efficiency

CATEGORY DESCRIPTIONS

Energy Conservation/Efficiency - (e.g. installing LED light bulbs, adding insulation to walls, replacing old appliances with energy-efficient models, installing programmable lighting, etc.)

Renewable Energy - (e.g. implementing projects to harness naturally replenishing sources like wind, water, and sunlight to generate electricity - like solar-powered picnic tables, etc.)

Sustainable Transportation - (e.g. installing covered bike racks, replacing fuel vehicles with electric vehicles, etc.)

Alternative Fuels - (e.g. setting up electric vehicle charging stations, implementing hybrid or electric vehicles, purchasing electric or propane power equipment, etc.)

Recycling - (e.g. purchasing recycling bins, improving signage, recycling difficult materials, etc.)

Waste Reduction - (e.g. establishing a reuseable to-go container program, reducing food waste, installing waterbottle filling stations, etc.)

Water Conservation - (e.g. purchasing rain barrels, creating a rain garden, switching to low-flow water fixtures, installing low-flow water valves, etc.)

Biodiversity - (e.g. planting pollinator garden, tree planting, installing bird boxes, etc.)

Education - (e.g. hosting a sustainability fair to raise awareness about green practices, hosting bike repair and/or safety workshops)

Research and Innovation - (e.g. researching the effects of microplastics, solar feasibility study, etc.)

SECTION III: Project Description

Please include as much detail as possible in this section. The more information you provide, the better equipped the adjudication committee will be to fully understand your request and make an informed decision.

To expand a text box, click and drag the two diagonal lines in the bottom-right corner. This allows you to adjust the size and view of your content as you type.

1. Project Title

Cope Administration Building - AHU-3 - UV Light

2. Scope: Work to be accomplished

Install an electrical outlet in close proximity to AHU-3. Install an ultraviolet light inside Air Handler Unit #3 in the basement mechanical room at Cope Administration Building.

3. Scope: Benefit Statement

Ultraviolet light prevents the growth of mold, bacteria, and mildew on the evaporator coil and drain pan inside an air handler unit which allows the air to flow through the coil using less energy. This unit supports one of the main data centers on campus which requires high air quality and cool air. Another benefit is the elimination of chemicals and water required to clean the coils on a regular basis.

4. Location of Project

Cope Administration Building - Basement Mechanical Room

5. Participants and Roles

Safe Air UV - Adam Skelton - *MTSU Graduate
Facilities Shop 90 - Charles Long – Electrician

6. Student Participation in the project and/or Student Benefit from the project

Students will benefit by providing high-quality, cool air to the area surrounding one of our major data centers. Students have been offered the opportunity to tour the ultraviolet (UV) plant in Memphis, TN, by the President of Safe Air UV, to see first-hand how these are made and the benefits of UV light.

7. Future Operating and/or Maintenance Requirements

\$100 every two years - The bulbs will need to be changed approximately every two years. There are two bulbs that cost \$50 each.

8. Additional Comments or Information Pertinent to the Proposed Project

We currently have UV lights in two air-handlers on campus, and they truly keep the coils clean. The humidity levels in our local area are conducive to the growth of mold, mildew, and bacteria. The UV lights are made in Tennessee, and the President of Safe Air UV is an MTSU graduate and would like to involve our students in future projects.

Any supporting documents or attachments will be on the pages following the SCF Request.

Note, all projects are expected to be completed by December 31, 2026.

SECTION IV: Project Costs

1. Project Cost Estimate 1645.04

2. Source of Estimate

Quote from Safe Air UV

3. Has previous funding from this source been awarded?

No

If Yes, please explain how this request differs from previous funding request.

SECTION V: Project Performance Information

If your project is expected to reduce energy consumption (e.g. through lighting upgrades or HVAC improvements etc.), please provide an estimate of potential savings. Feel free to contact the Center for Energy and Sustainability for help making these calculations at ces@mtsu.edu.

1. Estimated Annual Energy Savings (Estimated in kW, kWh, Btu, etc.)

17,494 kWh

2. Annual Energy COST Savings (\$)

\$1,662

3. Annual Operating Cost Savings or Other Cost Savings. Specify in dollar amount, if applicable. (\$)

N/A

4. Matching or Supplementary Funding (Identify and explain, if applicable)

N/A

Acknowledgment

I acknowledge that a project summary and photo must be submitted, if I am awarded funding and upon completion of the project.

Supporting Documentation or Attachments if provided.

Capital Planning Summary – UV-C Coil Protection



Prepared September 29, 2026 for: MTSU - Cope Administration Basement
Basis of analysis: 5,500 sf Hospital / 24x7 Healthcare facility in Murfreesboro, TN, USA at \$0.095 per kWh
Portfolio: Single-facility analysis
Climate input: CDD65: 1,873. Source: NOAA NCEI Climate Normals (1991–2020, airport stations only).
Prepared by: Safe Air UV LLC • Murfreesboro, TN • (615) 933-1UVC • www.safeairuv.com

This screening-level assessment quantifies the impact of cooling coil biofouling—a 'silent tax' on facility budgets caused by increased static pressure and diminished heat transfer.

Calculations are based on building type, conditioned area, local utility rates, and local climate inputs utilizing peer-reviewed ASHRAE research and local NOAA climate data for accuracy and transparency.

UV first costs, and incentive metrics are planning estimates intended to guide toward a reliable roadmap for reclaiming lost operational margins.

NET 10-YEAR VALUE

\$17,264

All-in planning value

ESTIMATED FIRST COST

\$1,500

Planning-level estimate

SIMPLE INVESTMENT RATIO

8.99

10-year @ 4% discount

Estimated upfront offsets: **Not Selected** (Available Incentives: Not Selected, Tax Benefits: Not Applicable)

ANNUAL ENERGY + O&M COST REDUCTION

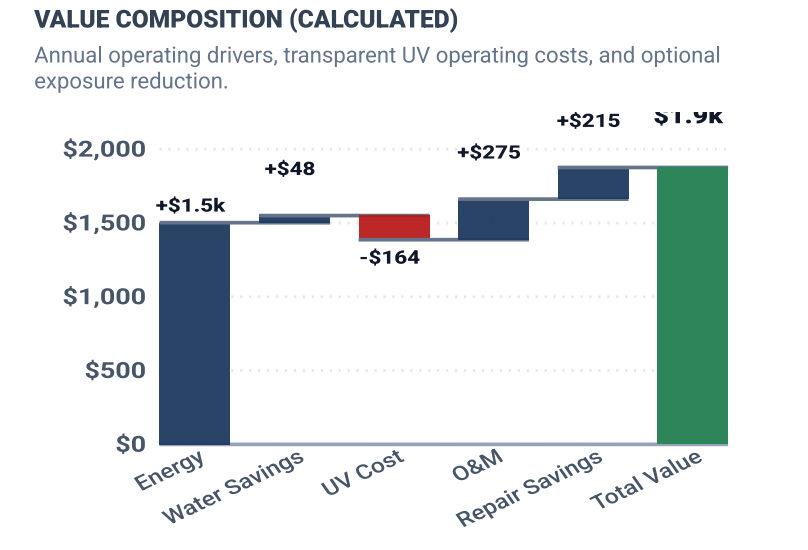
\$1,662

Modeled annual range: \$1,286 – \$2,338

NET ANNUAL VALUE (CALCULATED)

\$1,876

Includes conservative estimate for major repair avoidance



- What this UV measure delivers:**
- Energy** Calculated savings from coil performance recovery using your climate and utility rate.
 - O&M** Optional avoided coil cleaning and filter strategy impacts (if enabled).
 - UV cost** Lamp replacement + electrical use included transparently as an ongoing cost.
 - Repair exposure** Optional annual planning allowance for reduced major coil failure/remediation exposure.
 - Water** Reduced cooling tower makeup water from improved coil UA and reduced blowdown cycles (chilled water systems).

SIMPLE PAYBACK

0.9 years

Calculated annual Energy + O&M cost reduction.

EFFECTIVE PAYBACK

0.8 years

Includes upfront benefits and repair avoidance.

Operational Outlook & Implementation Roadmap.

GROSS ENERGY RECOVERY

\$15,504

Projected 10-year utility savings before maintenance offsets and UV operating costs.

MONTHLY COST OF INACTION

\$170

The modeled expense of deferred maintenance and inefficiency incurred every 30 days.

Beyond the Meter: The ROI of Well-Being

While energy savings are the primary driver, the most significant impact often occurs in areas the utility bill ignores. Well-designed UV-C solutions can deliver meaningful "Soft ROI":

- **Occupant Productivity:** Improving IAQ is linked to higher cognitive function and reduced absenteeism.
- **Asset Preservation:** Continuous UV-C disinfection extends the functional lifecycle of cooling coils and reduces mechanical stress.
- **Stakeholder Confidence:** A visible commitment to advanced hygiene provides a powerful competitive advantage in today's market.

ENVIRONMENTAL IMPACT (NET ANNUAL)

 **NET KWH SAVED** **14.6k**

 **METRIC TONS CO₂E** **10**

 **TREES (10 YR)** **171**

EPA greenhouse gas equivalencies based on net kWh saved.

Next Steps: Validating Your Savings

STEP 01

Validation Audit

Confirm mechanical specs, coil dimensions, and utility rebate eligibility.

STEP 02

Technical Proposal

Receive a firm quote to include turnkey installation and fully managed bulb service options.

STEP 03

Implementation

Professional deployment with immediate energy and air quality benefits.



Adam Skelton

President, Safe Air UV
Certified UV-C Specialist
www.safeairuv.com/why-us/#getintouch

[Click here to view or modify project details](#)

THE COMPETITIVE ADVANTAGE

Beyond the financial ROI, this project addresses the **Human Element**. By improving IAQ and system hygiene, you achieve "Safety, Savings, and Confidence"—benefits that provide a powerful competitive advantage for your facility, and an edge like no other ECM can offer.

We welcome the opportunity to review your mechanical schedule and refine this model into a site-validated implementation plan.

STANDARDS & AFFILIATIONS



Methodology & References (Screening-Level)

This calculator provides a screening-level engineering estimate of potential HVAC energy recovery associated with ultraviolet germicidal irradiation (UVGI) applied to cooling coils.

Energy impacts are modeled using physically distinct mechanisms:

- Airside fan energy recovery associated with pressure-drop (ΔP) reduction
- Cooling energy recovery associated with restored coil heat-transfer effectiveness (ΔT)

Baseline energy is derived from user-provided facility characteristics and conservative operating schedule assumptions typical of the selected building type. Climate normalization uses NOAA NCEI 1991–2020 CDD65 normals (airport stations).

Recovery bands reflect ranges reported in published field studies and ASHRAE technical guidance.

While this tool is not a measurement and verification study, its structure aligns conceptually with industry M&V frameworks (ASHRAE Guideline 14 and IPMVP) through transparent baseline definition, explicit assumption disclosure, and separation of measure effects.

For chilled water systems (v2.6.0+), UV-C coil irradiation improves overall enthalpy-based thermal conductance (UA), which raises chilled water return temperature, reduces required flow rate, and decreases chiller and pump energy. Recovery bands use a parallel table (RECOVERY_TABLE_CW) anchored to a 15.62% UA improvement yielding approximately 16% integrated chiller+pump savings in the Calculated mid-case, with the high band approaching 28.2% chiller savings reported in a 7-week severe-fouling scenario (Rebecca et al., 2024). Baseline chiller efficiency (kW/ton) is derived from equipment age band per ASHRAE 90.1 minimum efficiency tiers, ranging from 0.52 kW/ton (new equipment) to 0.85 kW/ton (20+ year equipment). For Mixed systems, DX and CW baselines and recovery percentages are blended by the chilled water fraction. Tower makeup water savings are estimated at 0.10 gal/ton-hr — a conservative blowdown-reduction proxy — applied at the user-provided combined water+sewer rate in \$/CCF (1 CCF = 748 gallons; AWWA 2022 non-residential median default: \$7.00/CCF). Centrifugal chiller efficiency is nonlinear with load, peaking at 40–70% load per ASHRAE 90.1 IPLV methodology. UV-C coil irradiation restores fouled chillers toward their design operating point, so the linear screening assumption is considered conservative. IPLV-based analysis using measured BAS trend data is recommended for IGA-grade assessment.

UVGI & Coil Performance Basis

- ASHRAE Handbook (2019). Chapter 62 – Ultraviolet Air and Surface Treatment.
- Bahnfleth, W. et al. (2015). Field Study of Energy Use Related Effects of Ultraviolet Germicidal Irradiation of a Cooling Coil. Pennsylvania State University.
- Bahnfleth, W. (2017). Cooling Coil Ultraviolet Germicidal Irradiation. ASHRAE Journal 59(10): 72–74.
- Martin, Bahnfleth et al. (2008). Ultraviolet Germicidal Irradiation: Current Best Practices. ASHRAE Journal.
- Brais, N. (2015). Coil Cleaning: UV Fundamental Sizing and Energy Savings. September 2015.
- Kowalski, W. (2009). Ultraviolet Germicidal Irradiation Handbook. Springer.
- Levetin, E. et al. (2001). Effectiveness of germicidal UV radiation for reducing fungal contamination within air-handling units. Applied and Environmental Microbiology.
- Rebecca, A., Woo, D., Guha, A. (2024). An energy efficiency and cost analysis of utilizing high-intensity profile UVC systems on an AHU under a cool-humid climate. *Building and Environment*, 265, 111989. DOI: 10.1016/j.buildenv.2024.111989

Measurement & Verification Alignment

- ASHRAE Guideline 14 – Measurement of Energy, Demand, and Water Savings.
- International Performance Measurement and Verification Protocol (IPMVP).
- DOE Uniform Methods Project (UMP).
- IUVA M&V Guidelines for Performance-Based Contracts (2021).

Climate & Environmental Factors

- NOAA National Centers for Environmental Information (NCEI), Climate Normals 1991–2020.
- U.S. Environmental Protection Agency (EPA) Greenhouse Gas Equivalencies Calculator.

This reference list represents foundational sources informing screening-level modeling assumptions. Detailed methodology, assumptions, and version governance are maintained in the calculator's Technical Reference Manual (TRM), which tracks modeling revisions and supporting research.



UV Proposal Cover

Dear MTSU Sustainable Campus Fee Project Selection Committee:

We are genuinely grateful to be considered for this exciting project. UV is well documented to help achieve your Safety, Savings, and Confidence goals to improve Campus life, Education, and your Carbon footprint.

Your team and future generations will enjoy

- ✓ Reliable energy savings
- ✓ Improved odors and temp complaints.
- ✓ Reduced HVAC failures.
- ✓ Better air quality for attendance and achievement goals.

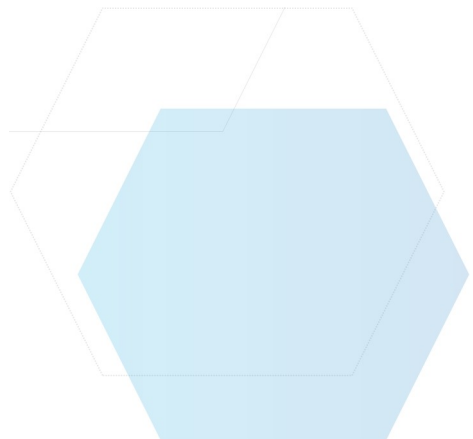
We are proud to deliver this proposal and to potentially partner with you as you subject matter experts and friends.

Thank you for the opportunity to serve!

- Adam Skelton and *your* Safe air UV team.



I AM *true*
BLUE
MIDDLE TENNESSEE STATE UNIVERSITY



UVGI Proposal



SHIP TO:		BILL TO:	
ATTENTION NAME	Kimberly Hand	ATTENTION NAME	TBD
*COMPANY NAME	MTSU	COMPANY NAME	MTSU
STREET ADDRESS	315 Visitor's Cir,	STREET ADDRESS	
CITY, STATE, ZIP	Murfreesboro, TN 37132	CITY, STATE, ZIP	
PHONE	615-604-8356	PHONE	
EMAIL	Kimberly.Hand@mtsu.edu	EMAIL	

Safe Air UV Rep: Adam Skelton. 615-554-4061. adam.skelton@safeairUV.com	Proposal ID: SUV260930Mt Date: 9/30/2026
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SAM UEI: XNY1RA1RFBX5. CAGE: 9JJT6 Prices valid for 30 days from Date of Proposal.

Facility GOALS:	- Implement beneficial campus upgrades as wise stewards of the Sustainable Campus Fee (SCF) Program. - Meet Clean Energy Committee standards for long term improvements to the environment, as well as current and future students and faculty. - Consider Green Power applicability for TVA recognized Energy Conservation Measures (ECMs). - Investigate projects with potential for collaborative research.
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Executive Summary	Safe Air UV is grateful for the opportunity to participate in the Sustainable Campus Fee (SCF) Program. Students are and should be the primary focus of MTSU efforts and this is an outstanding program to help students identify real goals, and take implementation beyond the classroom. We are committed to fully honoring the intent of the program by providing a quality, sustainable, and educational upgrade to the Cope Administration building. UV-C destroys pathogens at the DNA level. Pathogens grow in HVAC units making them not only less efficient, but making the space less comfortable or conducive to the learning/teaching environment. UV-C on the HVAC coils in the Cope Basement is a small but powerful example of how a small, reliable solution can address multiple concerns by improving efficiency, and the air we breathe. Safe Air UV LLC is a locally owned small business, run by a MTSU alumni. Our team is WELL Building certified, ASHRAE conference speaker, NALMCO GUV specialist. Our factory is in Memphis, TN so this program will further support TN business. As a TVA Preferred Partner, we will enthusiastically support any TVA custom rebate opportunities (up to \$0.18 per kWh saved) as well as PR opportunities like their Story Spark initiative within their Energy Right Program. Above it all, we are passionate about working with MTSU and the SCF Program. If students in engineering, sustainability, project management, or even marketing (for PR efforts) could benefit or collaborate with this project, we will enthusiastically support the partnership. The proposed measure will add UV-C disinfection to Cope Admin basement AHU-03 which serves some University offices and IT computer and storage rooms - but is representative of similar units directly impacting students actively learning and living on campus property. Recurring needs are a simple bulb change every two years. We proudly use Philips brand bulbs that are readily available so that you're never handcuffed to a vendor for future maintenance. Warranties are 5 years non-prorated meaning if the units fail, we'll cover it without costing the campus a dime (see documentation for details). Thanks again for the opportunity to support my Alma Mater in this outstanding program.
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WHAT OUR CLIENTS ARE SAYING		
School Nurse:	I've never had a healthier season personally in my career.	D. Hatfield. GCS et al.
Facility Director:	The air just feels clean. We finally tackled those musty smells.	D. Crumley JCS
Facility Director:	I've had zero closings this season, unlike the districts all around us.	P Underwood. ECS

Facility Director:	My filters are lasting twice as long.	P Underwood. ECS
Coordinated Health Director	An asthmatic teacher and one special needs student have never done better.	S. Sutherland. ECS

Scope of Work:	Install UV-C for coil cleaning and air quality in University AHU according to ASHRAE, NALMCO standards per MTSU guidance.
Furnish and install:	UV in all Split or Package AHUs for 99.4% average single pass Covid disinfection, or 100% hourly with 4 air cycles. UV will protect
Quality Assurance:	Safe Air UV Products are proudly made in America, lead by a team supervisor with 48+ years of outstanding commitment to her craft.
Warranty:	Lifetime material warranty, Non-prorated 5 years electronics, Non-prorated 2 years bulbs for manufacturer defect and UV output at or above industry standards. 5 year no-touch, full service option listed in Installation section.
Commissioning:	We will measure UV output against manufacturer and design expectations to ensure proper function across each or representative samples of all units. We will provide an installation report of all installed assets and model numbers.
Complimentary Communication Tools:	Signage is provided for UV zones to assist with risk mitigation, reputation, and peace-of-mind benefits. We will inspect and clean all units at one year anniversary at no charge. If bulbs need replacement, this is within warranty and will also be accomplished at no charge. Digital PR language is also provided complimentary.
COST OF OWNERSHIP:	We proudly offer non-proprietary Philips UV bulbs. Known for their outstanding performance, it also ensures maintenance is accessible, reliable, and affordable. We are fully committed to never lock you into a proprietary "house brand" bulb with unforecast and unreasonable price fluctuations. Consider our 5 year no-touch guarantee.
Extended Commitment:	MTSU students are the real heroes of this story and we are fully committed to supporting their technology upgrade communications, training, and even research potential with this project. We are grateful for the opportunity to collaborate with such a respected institution (and yes, we're biased! Go Blue Raiders!).

Target Dates:	Objective / Milestone:	Notes:
10/30/2026	Final proposal review zoom call. Time TBD.	30 minute Zoom meeting. Will send amended proposal if adjustments are needed.
11/13/2026	Receive client PO. Will order material. Expect 1-3 week lead time.	Coordinate with Brittaney Hammond, bhammond@safeairuv.com to provide W9, COI, get tax forms, and related docs.
12/13/2026	Begin Turn-key installation	Adam Skelton or other factory rep to assist and coordinate.
12/20/2026	Complete installation, Commissioning, Stakeholder Training and celebration.	Celebrate the win of a timely project for improved safety, savings, and confidence!

Products are made in Memphis, TN. All Fixtures ship with bulbs and safety features. All voltage range 120V-277V.

TIPS Members, please include on PO:
"TIPS 230603 Pathogen Removal and Remediation Supplies and Services"

PO / Proposal Number	SHIP VIA	FOB	Payment Terms
SUV260930Mt	Best	Memphis, TN	50% Due upon PO receipt. Balance due upon Completion.

EQUIPMENT CALCULATIONS						
Line #	QUANTITY	EQUIP ID	FOR:	MSRP EA.	CLIENT PRICE	EXTENDED
1						
2						
3	1	ADPL-295-MC	Cope 13 ton East Stairwell AHU Unit/s	\$ 1,195.04	\$ 1,195.04	\$ 1,195.04
4						
Material Subtotal:					\$	1,195.04

INSTALLATION CALCULATIONS					
ITEM #	QUANTITY	DESCRIPTION	MSRP EA.	CLIENT PRICE	EXTENDED
UV Installation	1	Includes Contract Electrical and all parts. Min \$85.	\$ 1,050.00	\$ 450.00	\$ 450.00
No-Touch Policy	0	5-year full PM provided for bulbs and service.	\$ 516.00	\$ 516.00	\$ -
M&V	0	Optional air sampling - before & after lab cultures	\$ 450.00	\$ 399.00	\$ -
M&V	0	Optional surface sampling - before & after lab cultures	\$ 350.00	\$ 299.00	\$ -
TIPS Discount	0	TIPS cooperative purchasing discount available.	\$ (143.40)	\$ (143.40)	\$ -
Supervisory/ Admin	0	Sourcing technicians, training & supervision.	\$ 1,050.00	Waived	\$ -

Permits / Other	0	Contingency planning.	5%	NA - local	\$ -
Mobilization*	0	Positioning and on-site technical support.	\$ 850.00	NA - local	\$ -
*Estimated. Will be confirmed with receipts on final invoice if acceptable.				Installation Subtotal:	\$ 450.00

I have the authority to act on the Company's behalf, I have read and agree to the Terms and Conditions available at www.safeairuv.com/terms, and I approve this Proposal. **Please Consider this a binding Purchase Order for Material and Services reflected on this document.**

TOTAL MATERIALS \$ 1,195.04

Installation: \$ 450.00

Site Condition Allowance:** included

Mobilization, M&V, Training, Admin: \$ -

Other: Shipping waived. \$ (59.75)

S&H: \$ 59.75

Tax: \$ -

SUBTOTAL to Safe Air UV*: \$ 1,645.04

Discounts Applied: \$ 600.00

*add 3% if paying by credit card

Printed Name _____ Date _____

Signature _____

Co-Signer's Printed Name if required _____ Date _____

Co-Signature if required _____

WHAT DO I DO NEXT?

1	Send a Purchase Order to your rep. Or, if you like, just sign this document and return to your rep. We'll consider it a PO and start your order. If purchasing with TIPS, include the contract info on in the PO as indicated above and we'll handle reporting and TIPS paperwork.
2	Your material should arrive in 1-3 weeks. We'll be making any installation preparations if necessary.
3	We coordinate the installation and commission the project. Then we provide free communication material to help inform those who matter most! Enjoy safer and more satisfying air in your facility. If the bulb and filter services are

Make Checks Payable to:
OR for ACH info, email bhammond@SafeAirUV.com

Safe Air UV LLC
2211 Joseph Ct.
Murfreesboro, TN 37128

*ORDER SUBJECT TO ACCEPTANCE BY MANAGEMENT. SBE Certification is through Home office in Tennessee.

**Any unused portion of the Site Condition Allowance is credited back to Buyer within 30 days of final invoice, based on documented site conditions encountered during installation.

Due to continuing research, Safe Air UV and Lumalier Products reserves the right to change specifications without notice.

Upon acceptance, this proposal ID and date should be referenced in any resulting agreement between with Safe Air UV, LLC.

READ ME. MANDATORY DISCLOSURE: By accepting this proposal, you understand that it was obtained through diligence, financial commitment, and a significant sacrifice of time from both your staff and the staff of Safe Air UV LLC; and you agree to keep all information and communication from Safe Air UV LLC confidential. In no circumstance can any of the enclosed information, or other forms of communication with Safe Air UV LLC or its reps, be sent or discussed with other vendors for any reason whatsoever, and especially for the sake of competitive bids. Vendors need specific information for their specific products so you would likely get a very unreliable quote from other vendors using our information. You deserve the best fit for your facility, never shortcuts.

If you have any questions about this quote, please contact Adam Skelton at: m - 615-554-4061, e - Adam.Skelton@SafeAirUV.com



SAFE AIR UV
SAFETY SAVINGS CONFIDENCE

APPENDIX 1

SUPPLEMENTAL

This section includes a UV savings estimate calculated using the referenced publicly available resources and methodologies.

It also contains problems and benefits specific to the University field that UV-C implementation can address.

☐ (615) 933-1882

✉ info@safairuv.com

👤 IN YOUR SERVICE...

Capital Planning Summary — UV-C Coil Protection

Prepared **September 30, 2026** for: **Cope Admin Basement AHU-03**

Basis of analysis: **5,500 sf Hospital / 24x7 Healthcare facility in Nashville, TN, USA** at **\$0.095 per kWh**

Portfolio: **Single-facility analysis**

Climate input: **CDD65: 1,873. Source: NOAA NCEI Climate Normals (1991–2020, airport stations only).**

Prepared by: Safe Air UV LLC • Murfreesboro, TN • (615) 933-1UVC • www.safeairuv.com



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UV first costs, and incentive metrics are planning estimates intended to guide toward a reliable roadmap for reclaiming lost operational margins.

NET 10-YEAR VALUE

\$17,773

All-in planning value

ESTIMATED FIRST COST

\$1,645

Planning-level estimate

SIMPLE INVESTMENT RATIO

8.52

10-year @ 4% discount

Estimated upfront offsets: **Not Selected** (Available Incentives: Not Selected, Tax Benefits: Not Applicable)

ANNUAL ENERGY + O&M COST REDUCTION

\$1,727

Modeled annual range: **\$1,352 – \$2,403**

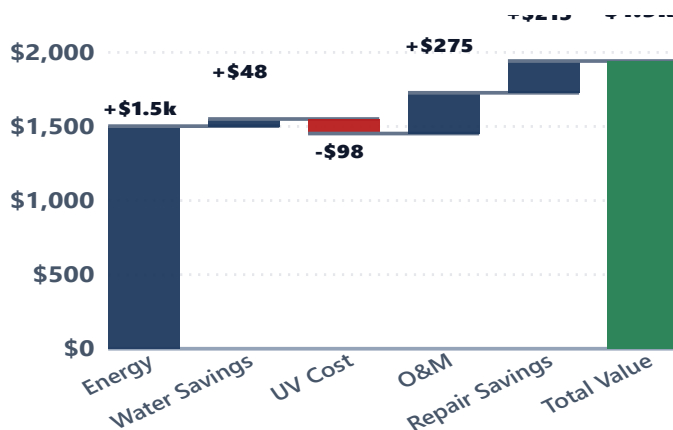
NET ANNUAL VALUE (CALCULATED)

\$1,942

Includes conservative estimate for major repair avoidance

VALUE COMPOSITION (CALCULATED)

Annual operating drivers, transparent UV operating costs, and optional exposure reduction.



What this UV measure delivers:

Energy Calculated savings from coil performance recovery using your climate and utility rate.

O&M Optional avoided coil cleaning and filter strategy impacts (if enabled).

UV cost Lamp replacement + electrical use included transparently as an ongoing cost.

Repair exposure Optional annual planning allowance for reduced major coil failure/remediation exposure.

Water Reduced cooling tower makeup water from improved coil UA and reduced blowdown cycles (chilled water systems).

SIMPLE PAYBACK

1.0 years

Calculated annual Energy + O&M cost reduction.

EFFECTIVE PAYBACK

0.8 years

Includes upfront benefits and repair avoidance.

Operational Outlook & Implementation Roadmap.

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- **Asset Preservation:** Continuous UV-C disinfection extends the functional lifecycle of cooling coils and reduces mechanical stress.
- **Stakeholder Confidence:** A visible commitment to advanced hygiene provides a powerful competitive advantage in today's market.

ENVIRONMENTAL IMPACT (NET ANNUAL)

 **NET KWH SAVED** **15.1k**

 **METRIC TONS CO₂E** **11**

 **TREES (10 YR)** **177**

EPA greenhouse gas equivalencies based on net kWh saved.

Next Steps: Validating Your Savings

STEP 01

Validation Audit

Confirm mechanical specs, coil dimensions, and utility rebate eligibility.

STEP 02

Technical Proposal

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Implementation

Professional deployment with immediate energy and air quality benefits.



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President, Safe Air UV
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[Click here to view or modify project details](#)

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STANDARDS & AFFILIATIONS



Methodology & References (Screening-Level)

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Baseline energy is derived from user-provided facility characteristics and conservative operating schedule assumptions typical of the selected building type. Climate normalization uses NOAA NCEI 1991–2020 CDD65 normals (airport stations).

Recovery bands reflect ranges reported in published field studies and ASHRAE technical guidance.

While this tool is not a measurement and verification study, its structure aligns conceptually with industry M&V frameworks (ASHRAE Guideline 14 and IPMVP) through transparent baseline definition, explicit assumption disclosure, and separation of measure effects.

For chilled water systems (v2.6.0+), UV-C coil irradiation improves overall enthalpy-based thermal conductance (UA), which raises chilled water return temperature, reduces required flow rate, and decreases chiller and pump energy. Recovery bands use a parallel table (RECOVERY_TABLE_CW) anchored to a 15.62% UA improvement yielding approximately 16% integrated chiller+pump savings in the Calculated mid-case, with the high band approaching 28.2% chiller savings reported in a 7-week severe-fouling scenario (Rebecca et al., 2024). Baseline chiller efficiency (kW/ton) is derived from equipment age band per ASHRAE 90.1 minimum efficiency tiers, ranging from 0.52 kW/ton (new equipment) to 0.85 kW/ton (20+ year equipment). For Mixed systems, DX and CW baselines and recovery percentages are blended by the chilled water fraction. Tower makeup water savings are estimated at 0.10 gal/ton-hr — a conservative blowdown-reduction proxy — applied at the user-provided combined water+sewer rate in \$/CCF (1 CCF = 748 gallons; AWWA 2022 non-residential median default: \$7.00/CCF). Centrifugal chiller efficiency is nonlinear with load, peaking at 40–70% load per ASHRAE 90.1 IPLV methodology. UV-C coil irradiation restores fouled chillers toward their design operating point, so the linear screening assumption is considered conservative. IPLV-based analysis using measured BAS trend data is recommended for IGA-grade assessment.

UVGI & Coil Performance Basis

- ASHRAE Handbook (2019). Chapter 62 – Ultraviolet Air and Surface Treatment.
- Bahnfleth, W. et al. (2015). Field Study of Energy Use Related Effects of Ultraviolet Germicidal Irradiation of a Cooling Coil. Pennsylvania State University.
- Bahnfleth, W. (2017). Cooling Coil Ultraviolet Germicidal Irradiation. ASHRAE Journal 59(10): 72–74.
- Martin, Bahnfleth et al. (2008). Ultraviolet Germicidal Irradiation: Current Best Practices. ASHRAE Journal.
- Brais, N. (2015). Coil Cleaning: UV Fundamental Sizing and Energy Savings. September 2015.
- Kowalski, W. (2009). Ultraviolet Germicidal Irradiation Handbook. Springer.
- Levetin, E. et al. (2001). Effectiveness of germicidal UV radiation for reducing fungal contamination within air-handling units. Applied and Environmental Microbiology.
- Rebecca, A., Woo, D., Guha, A. (2024). An energy efficiency and cost analysis of utilizing high-intensity profile UVC systems on an AHU under a cool-humid climate. *Building and Environment*, 265, 111989. DOI: 10.1016/j.buildenv.2024.111989

Measurement & Verification Alignment

- ASHRAE Guideline 14 – Measurement of Energy, Demand, and Water Savings.
- International Performance Measurement and Verification Protocol (IPMVP).
- DOE Uniform Methods Project (UMP).
- IUVA M&V Guidelines for Performance-Based Contracts (2021).

Climate & Environmental Factors

- NOAA National Centers for Environmental Information (NCEI), Climate Normals 1991–2020.
- U.S. Environmental Protection Agency (EPA) Greenhouse Gas Equivalencies Calculator.

This reference list represents foundational sources informing screening-level modeling assumptions. Detailed methodology, assumptions, and version governance are maintained in the calculator's Technical Reference Manual (TRM), which tracks modeling revisions and supporting research.

The Trusted Authority for Universities & Colleges

University Benefits:

- Improved health & human wellness
- Reduced absenteeism and increased performance of students and faculty
- Reduced pathogens to mitigate risk of outbreaks
- Delivered performance-based solutions
- Increased energy efficiency
- Reduced maintenance costs

Safe Air UV is dedicated to providing UVC products that contribute to improving environmental conditions in universities and other educational facilities for the students, faculty, and administrators. The use of UVC improves indoor environments and contributes to enhanced student and faculty productivity and reduced absenteeism. It also promotes efficient performance of HVAC equipment with less maintenance and extends equipment lifecycles.

Achieving the best results in pathogen reduction starts with identifying the specific challenges in the different university environments:

- Dorms
- Cafeterias
- Athletic facilities
- Classrooms & lecture halls
- Administrative buildings

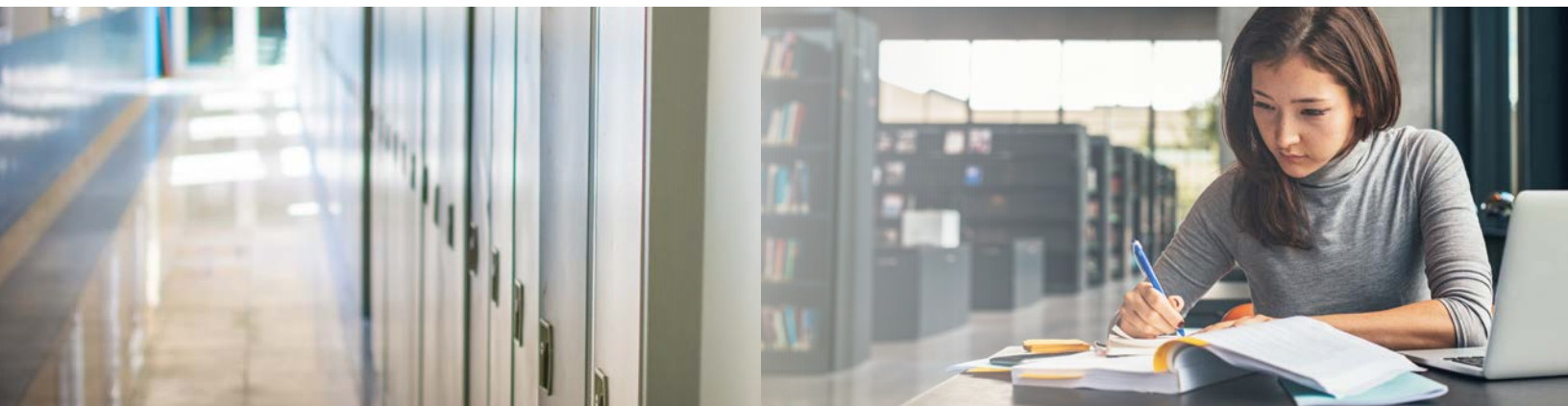
UVC Solutions

Types of disinfection incorporating UVC energy include:

- In-AHU and In-Duct disinfection
- Upper-room/upper-air UVGI
- Surface/room decontamination

Challenges: Universities

- Poor indoor air quality (IAQ), which impacts student and faculty performance and attendance.
 - Spread of infectious agents.
 - High energy and maintenance costs.
-





UVC Disinfection Products for Universities

UVC for IAQ and Energy Efficiency In AHU and In Duct UV Fixtures

In-AHU and In-duct UV fixtures, such as the Lumalier AR Series UVC Fixtures, are installed inside ventilation systems to provide high-level, facility-wide disinfection of the airborne infectious pathogens that can cause respiratory sickness, disease, and infection. In-AHU and In-Duct fixtures are scalable to fit any size air handler unit (AHU).

- Achieves the greatest square foot coverage at the lowest cost.
- Uses the existing ventilation system to disinfect and distribute air.
- Eliminates biological growth on coils and in the drain pan that can cause coil fouling, odors, and premature failure of air conditioning equipment.
- Provides facilities with an ROI benefit with reduced energy consumption and maintenance.

UVC for IAQ Upper-Air UV Fixtures

Upper-air UV fixtures are engineered to provide very targeted airborne pathogen reduction in high-risk areas.

- Installation applications include lobbies in administrative buildings, classrooms and lecture halls, hallways, cafeterias, libraries, etc.
- Units are available for high or low ceilings and for any square footage.
- Units can be permanently or temporarily installed for flexible space uses.
- Natural convection-currents create repeated air disinfection within defined spaces. Fan assisted models are available.

UVC for Risk Management Surface Disinfection

Surface disinfection UV fixtures are engineered for high-level disinfection of contaminated surfaces that can spread infection.

- Appropriate for temporary disinfection of floors, desks, and table surfaces that have been contaminated.
- Ideal for treatment of difficult-to-disinfect surfaces, such as keyboards, monitors, lab and cafeteria equipment.
- Surface disinfection units are available in both fixed and portable options.



Quality Products Made in TN By:

LUMALIER
Trusted Experts in UV and Indoor Air Quality



SAFE AIR UV
SAFETY SAVINGS CONFIDENCE

APPENDIX 2

DATA SHEETS

This section includes data sheets for proposed UV fixtures. Additional documents such as full Operational Manuals and warranty details are available upon request.

(615) 933-1882



info@safairuv.com



IN YOUR SERVICE...



ADPL Series

IN AHU AND IN DUCT UVC FIXTURES

Polluted indoor air contaminants (pollution) can include airborne particulates, germs (virus, bacteria, and fungus), chemicals, and gasses.

Our ADPL Series UVC Fixtures are engineered for residential and light commercial applications in split system air handlers (AHUs). These In-AHU and In-Duct UVC fixtures provide solutions for disinfection throughout homes and can also be used in some light commercial applications. Benefits include:

- Reduces odors
- Reduces HVAC maintenance
- Reduces pathogens that cause sickness and disease
- Improves occupant performance
- Increases energy savings

Models

The ADPL is available in three lamp sizes (35W, 60W, 95W), and single and double lamp configurations, to provide options for various duct sizes. All lamps are non-proprietary Philips lamps that are chill corrected down to 40 degrees Fahrenheit.



Works invisibly within existing HVAC systems to create a safe, comfortable, germ-free indoor environment.



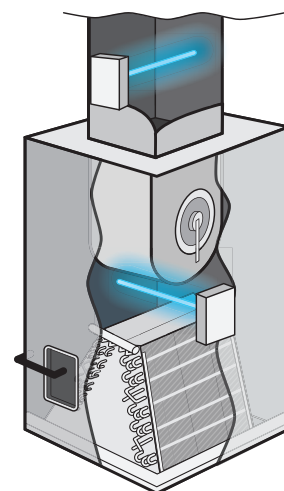
Installed at the coil plenum and designed to achieve disinfection of the cooling coil surfaces.



Works 24/7 to keep air free and clear of airborne contaminants.



Neutralizes and eliminates the infectious airborne pathogens that cause respiratory illness and disease.



Quality Products By:
LUMALIER
Trusted Experts in UV and Indoor Air Quality



ADPL Series

IN AHU AND IN DUCT UVC FIXTURES

ADPL UV Air Fixture Product Specifications

(Single and Dual Lamp Models)

Standard Specifications

Lamp Specs	PL-L 35W, 60W, 95W TUV (non-proprietary)
Wavelength	254 Nanometers*
Expected Lamp/ Bulb Rated Life ¹	18 months
Lamp Socket	Single Ended, 4 Pin, 2G11
Input Voltage	Self Regulated Electronic UV Ballast 120V to 277V
Electrical Requirement	1.3A @ 120V to 0.56A @ 240V, 50-60Hz
Housing Finish	Aluminum
Weight	ADPL 1 Light - 8 lbs. ADPL 2 Light - 12 lbs.

Certifications:



ASHRAE	meets ASHRAE TC 2.09
EPA ²	EST. NO. 91347-TN-001
ETL	CDR100230620ATL-001A

Warranty

Lamps/2 years; Parts/5 years

*Lumalier ADPL Fixtures don't produce ozone. UVC technology is endorsed by the EPA, ASHRAE, FEMA, the CDC, and many other health organizations.

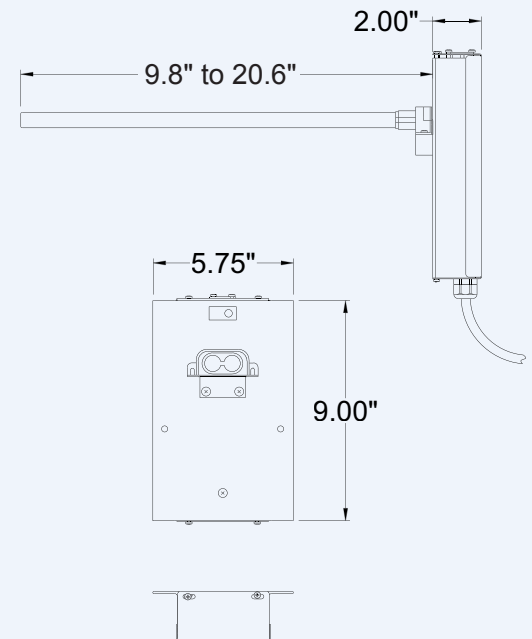
¹With 80% utilization

²The manufacturer is registered with the US EPA. Clinical lab testing has been performed in independent labs.

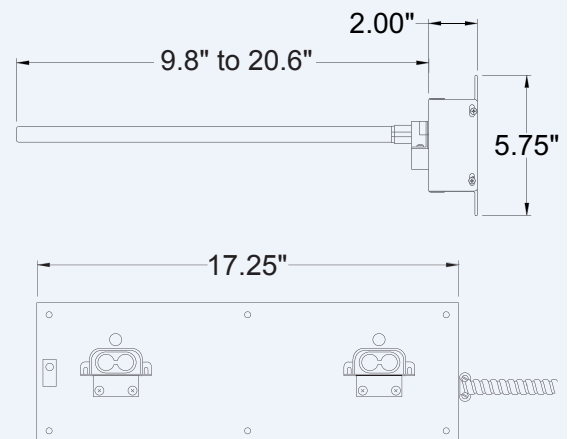
Ordering Guide

Model#	Description
ADPL-135	Fixture Series with one 35W lamp
ADPL-235	Fixture Series with two 35W lamps
ADPL-160	Fixture Series with one 60W lamp
ADPL-260	Fixture Series with two 60W lamps
ADPL-195	Fixture Series with one 95W lamp
ADPL-295	Fixture Series with two 95W lamps
Daisy Chain Option	
ADPL-135-DC	Fixture Series with one 35W lamp
ADPL-235-DC	Fixture Series with two 35W lamps
ADPL-160-DC	Fixture Series with one 60W lamp
ADPL-260-DC	Fixture Series with two 60W lamps
ADPL-195-DC	Fixture Series with one 95W lamp
ADPL-295-DC	Fixture Series with two 95W lamps
Accessories	
PCO-35	Photocatalytic Oxidation Grid 35 Watt Lamp
PCO-60	Photocatalytic Oxidation Grid 60 Watt Lamp
PCO-95	Photocatalytic Oxidation Grid 95 Watt Lamp

ADPL-135/160/195



ADPL-235/260/295



Due to continuing research, Lumalier reserves the right to change specifications without notice.