Energy Efficiency on Campus:

Innovation Across Virginia

Colleges

VAEEC
2025 Energy Efficiency Forum

VAEEC
VIRGINIA ENERGY EFFICIENCY COUNCIL

Connecting Leaders
Amplifying Voices

Speakers

Jesse Warren, PE, CEM
Associate Director of Sustainability,
Office for Sustainability
University of Virginia

Greg Farley
Director of University Sustainability
George Mason University

Nam Nguyen
Assistant Vice President *of Energy and Utilities,*
Virginia Tech

McKenna Dunbar
Principle,
The Grid Foundry
(Moderator)

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Jesse Warren, PE, CEM
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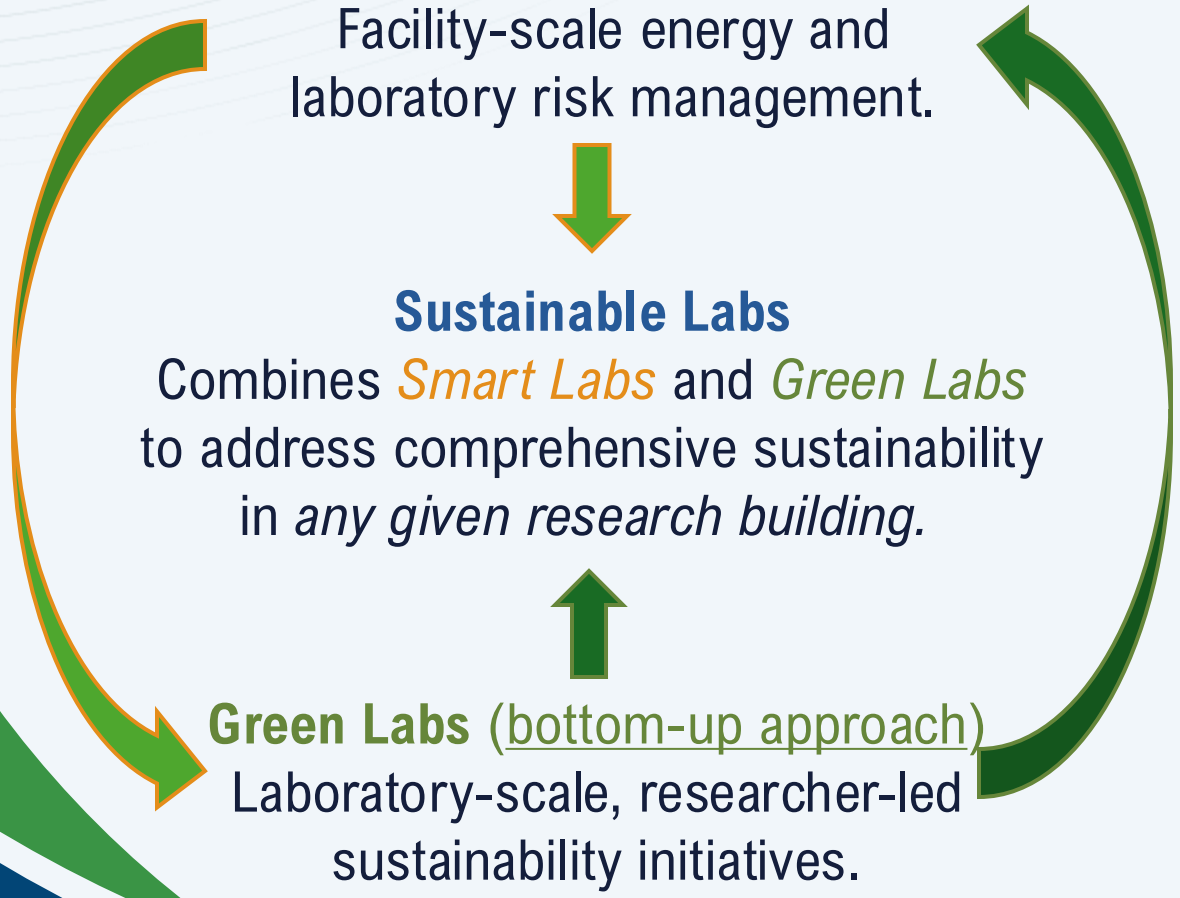
Energy Efficiency at UVA

Building Efficiency Program (Existing Academic Buildings)

Projects completed over the last 10 years saved $2.7 million in utility costs in FY25 alone.

- LED light fixtures
- Lighting dimmer switches
- Testing & troubleshooting HVAC systems
- Repairing/upgrading/replacing HVAC & lighting controls components
- Wiring & HVAC programming upgrades
- Adjusting setpoints for temperature, humidity and airflow
- Scheduling & setting back systems at night
- Occupancy sensors & lighting controls

Sustainable Labs (Existing Lab Buildings)



These projects have saved UVA $1.7 million in FY25 while increasing safety in labs.

- Targeted occupant engagement through the Green Labs Program and other lab-specific sustainability initiatives
- Stakeholder coordination to ensure work in research settings is safe and minimally disruptive
- Application of established methodology for right-sizing airflows in active laboratories

Green Building Standards (New Construction)

Consolidate and streamline green building best practices

Goals

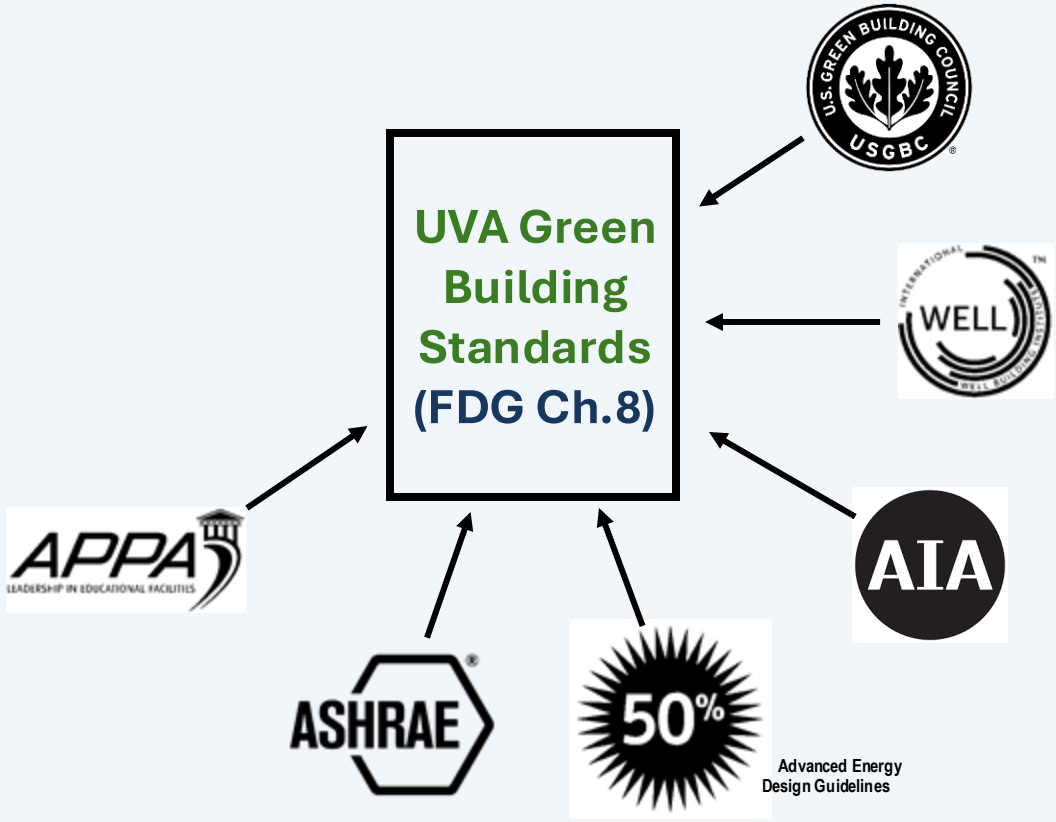
- Minimize **lifecycle cost**
- Promote **occupant health and safety**
- Support **environmental stewardship**

First Cost

+ 40/50-year Operating Cost

Life Cycle Cost

Building Type	UVA EUI Requirement
Academic	47
Residential	41
Multi-Use	51
Research	129
Inpatient	229
Outpatient	129



UVA Decarbonization Academy (Undergrad Research & Engagement)

Living lab approach - Immersive summer program that brings together students, faculty, & staff on collaborative projects that *directly support climate action at UVA*

4 Years, 67 students, 22 faculty and staff mentors, 26 projects

UVAToday

From a Tiny Forest, Big Change May One Day Come

By Bryan McKenzie, bkm4s@virginia.edu • December 15, 2023

A tiny urban forest begins to take root near Scott Stadium with the labor of dozens of volunteers, and the design of three UVA undergrads, in an effort they hope helps the University meet carbon reductions goals. (Photo by Tim Beatley)

Nam Nguyen
Assistant Vice President *of*
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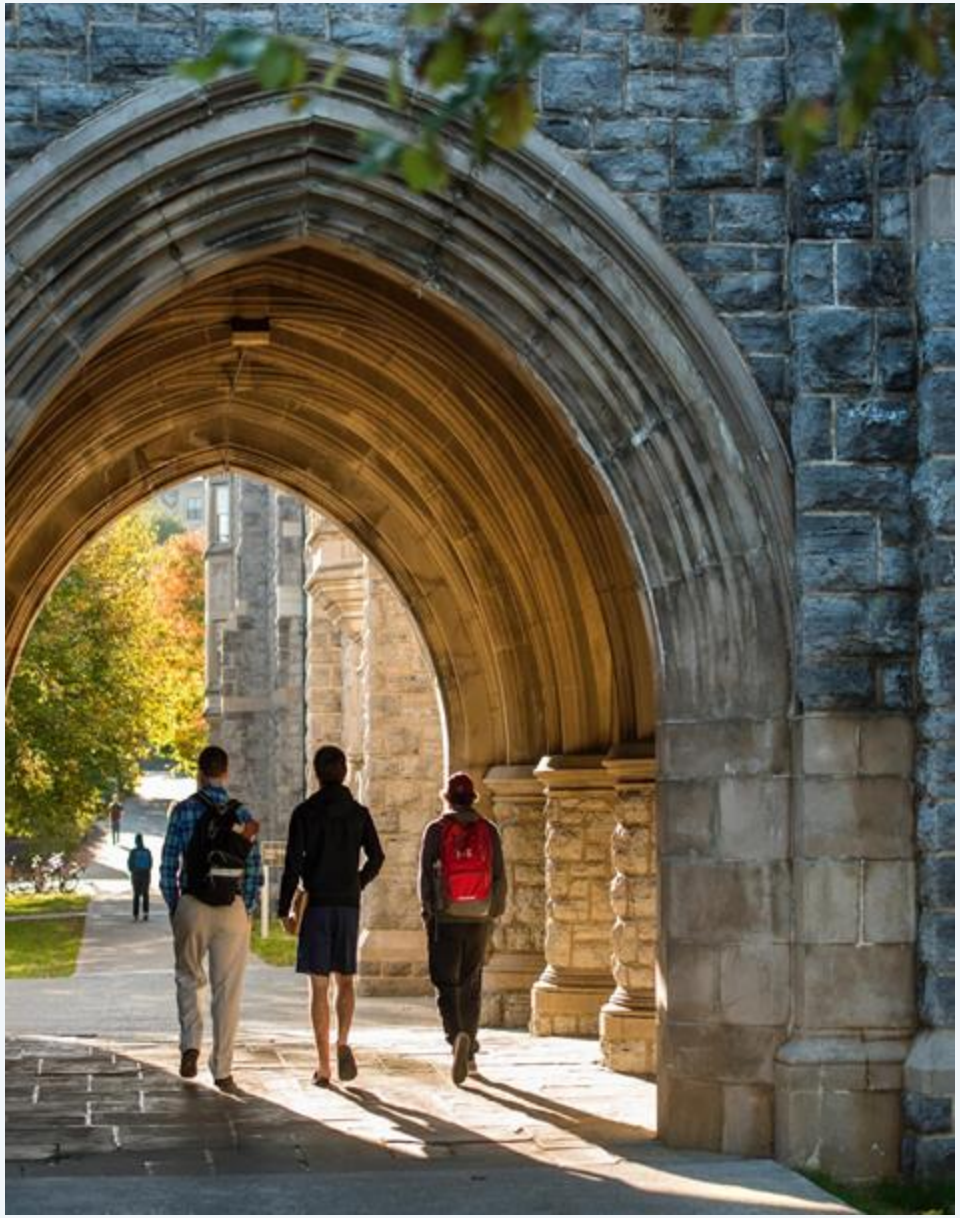

Research & Innovation

- Campus as a living lab → students and faculty test and evaluate energy solutions on active facilities.
- Building-level energy benchmarking reported to a larger stakeholder group quarterly and annually
  - Public Sustainability Annual Report
  - Public GHG Annual Report
  - Monthly performance data analyzed
  - Findings shared across campus → transparency, accountability, and innovation
- Climate Action, Sustainability, and Energy (CASE) Committee – an active collaboration between facilities, students and professors

Student Engagement

- Internship opportunities: Student Energy Analyst Program & Energy Engagement Coordinator role
- Partnerships with professors → students tackle real-world campus energy challenges
  - Sustainable Impact Academy
  - Engineering classes
  - Link operations, teaching, and research
- Careers in Energy Panel hosted in collaboration with industry partners/vendors:
  - Highlighted workforce pathways in energy
  - Special focus on women's leadership and contributions in the sector, and a discussion on how we can encourage more women/students to join the energy workforce

Green RFP

- Running for 15 years → 142 student projects approved, over $2.3M invested
- Example projects: LED retrofits, EV charging stations, solar charging tables, low-flow fixtures, bicycle parking, pollinator habitats, tree plantings, reusable to-go containers, recycling bins
  - Projects also deliver social & ecosystem benefits that are harder to quantify
- GRITS tracking (11 projects so far): $292K in cumulative savings since 2018 (financial impact will increase as more projects are logged)

Energy Efficiency Programs

- Energy Action Plan → Funding process & roadmap for major efficiency improvements
- LED lighting conversion across campus → significant electricity savings
  - 40% campus (4.4M sq ft) LED converted, by next year, it will be 50% LED
- ~816,000 kWh saved annually from all the LED conversions
- Steam trap management program launched to improve steam distribution efficiency (campus-wide steam trap survey and inventory identified failed traps that we are fixing this year).
- Fume hood optimization projects in laboratories → based on a full inventory study. Each year, we target lab buildings, retro-commission, recalibrate FH face velocities, and perform TAB work. This results in fine-tuning high-performance buildings. (can mention the award too)
- ESCO projects → guaranteed energy savings
  - Financing and implementing deep retrofits, upgrading infrastructure

Academic Building One

- LEED Silver
- Building integrated solar PV
- Solar trellis
- Horizontal solar shading PV fins
- Vegetated stormwater bioretention and infiltration
- Rainwater and condenser water harvesting
- Green roof
- High performance envelope
- Occupancy sensors
- Efficient lighting
- Flexible/hybrid space utilization

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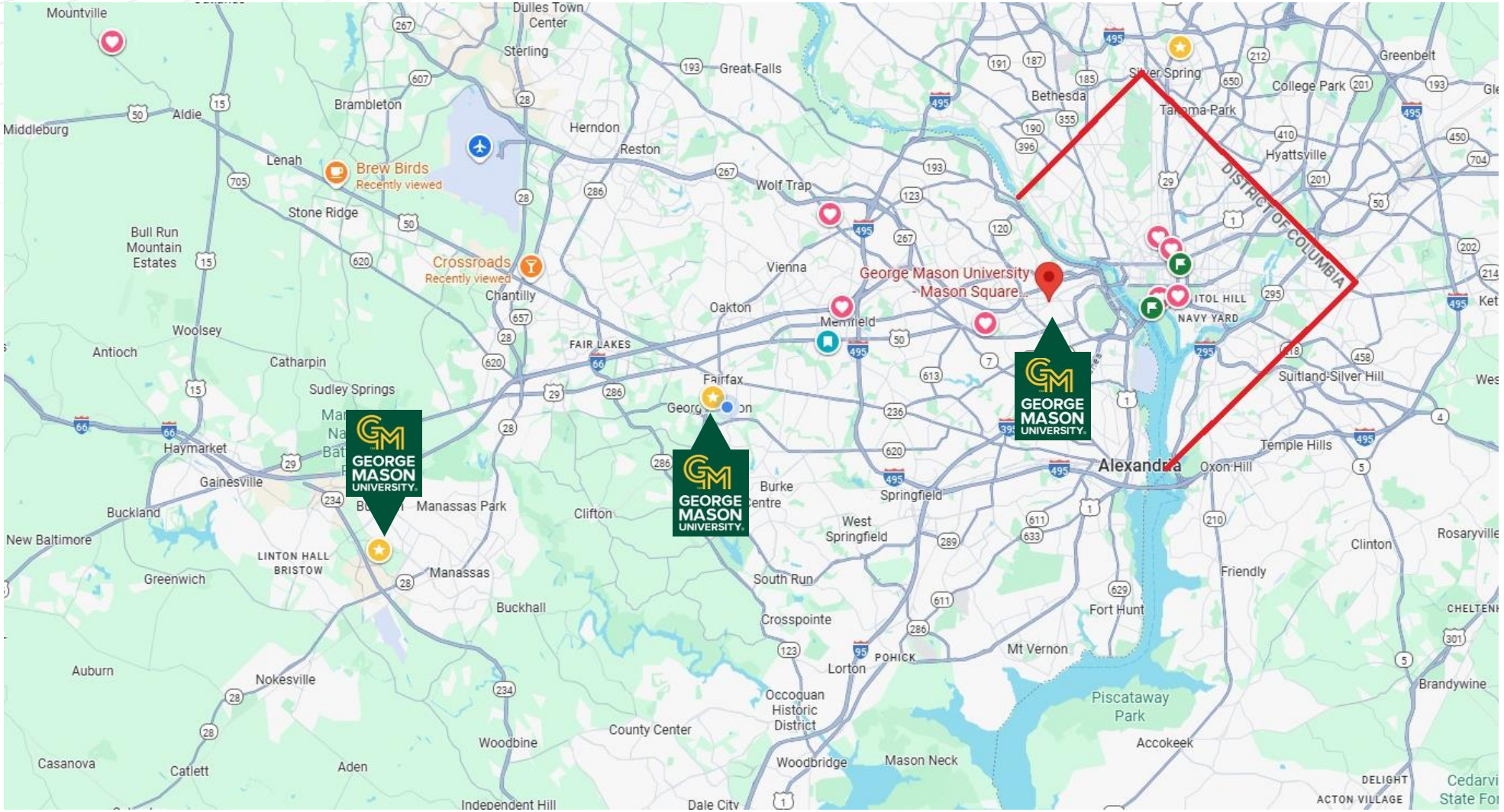
GEORGE MASON UNIVERSITY

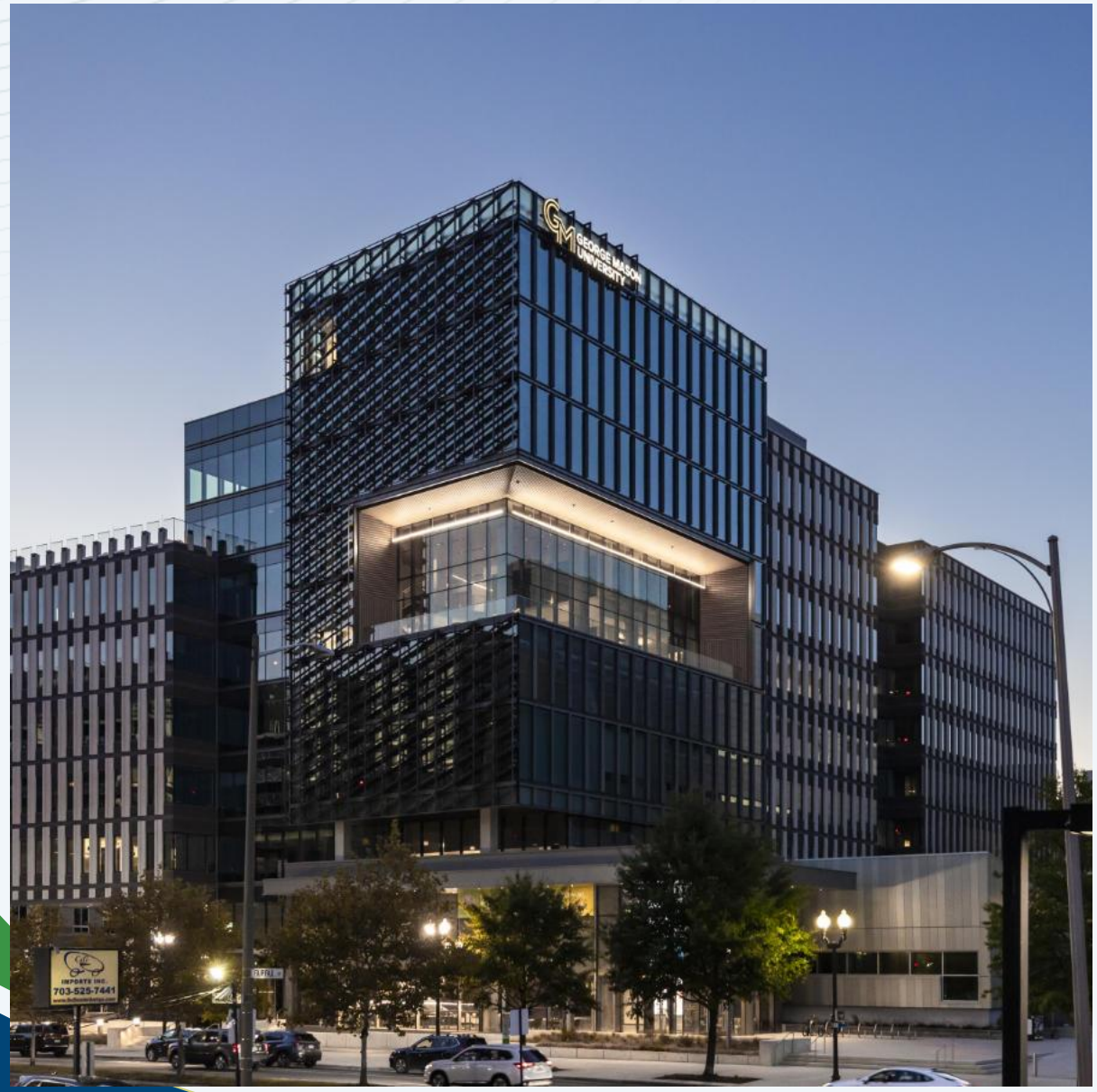
- Large public research university
- 40,000 students
- 6,000 FTE staff
- 1,500 faculty
- ~9.3M GSF
- 3 campuses in Northern VA:

GEORGE MASON UNIVERSITY

3 campuses in Northern Virginia



Fuse at Mason Square



- 345,000 GSF
- LEED Platinum
- All electric*
- Advanced metering
- Our first solar PV array
- Net-zero energy (RECs)

- Public-Private Partnership

Office of Research, Innovation, and Economic Impact
INSTITUTE FOR DIGITAL INNOVATION
George Mason University®

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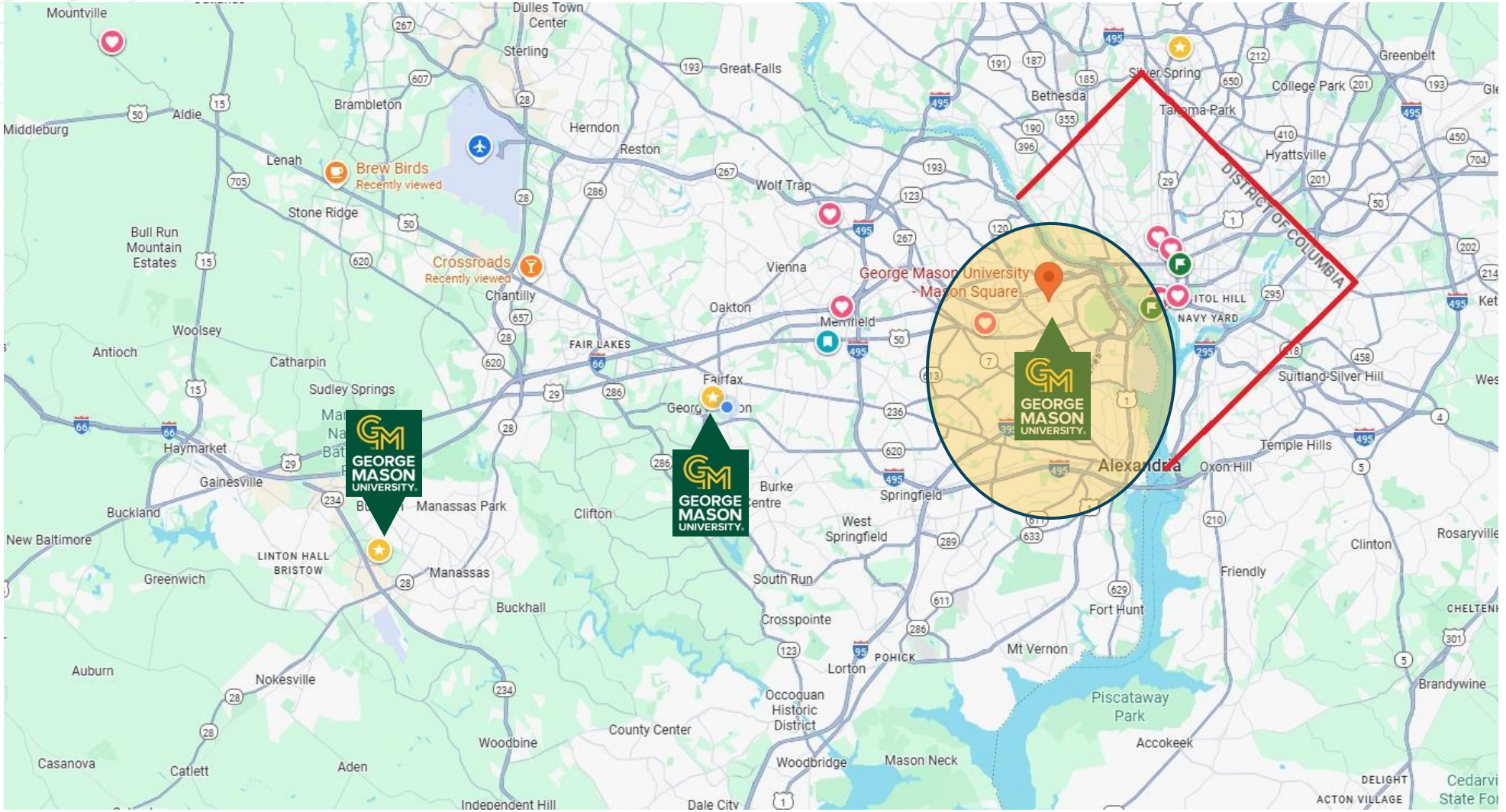
3 campuses in Northern Virginia



GADGET: Green Assessment and Design GuidancE Tool

- Mason as a Living Lab project, funded by:
  - Facilities and Campus Operations
  - Institute for a Sustainable Earth
- Pareto-optimal model of ALL campus infrastructure
  - Buidings
  - Standing equipment
  - Utility supply and contract structures
  - POTENTIAL:
    - PV
    - Energy Storage
    - Efficiency measures
- Carried out in conjunction with energy and resilience planning
- Early model runs indicated that energy storage would be advantageous

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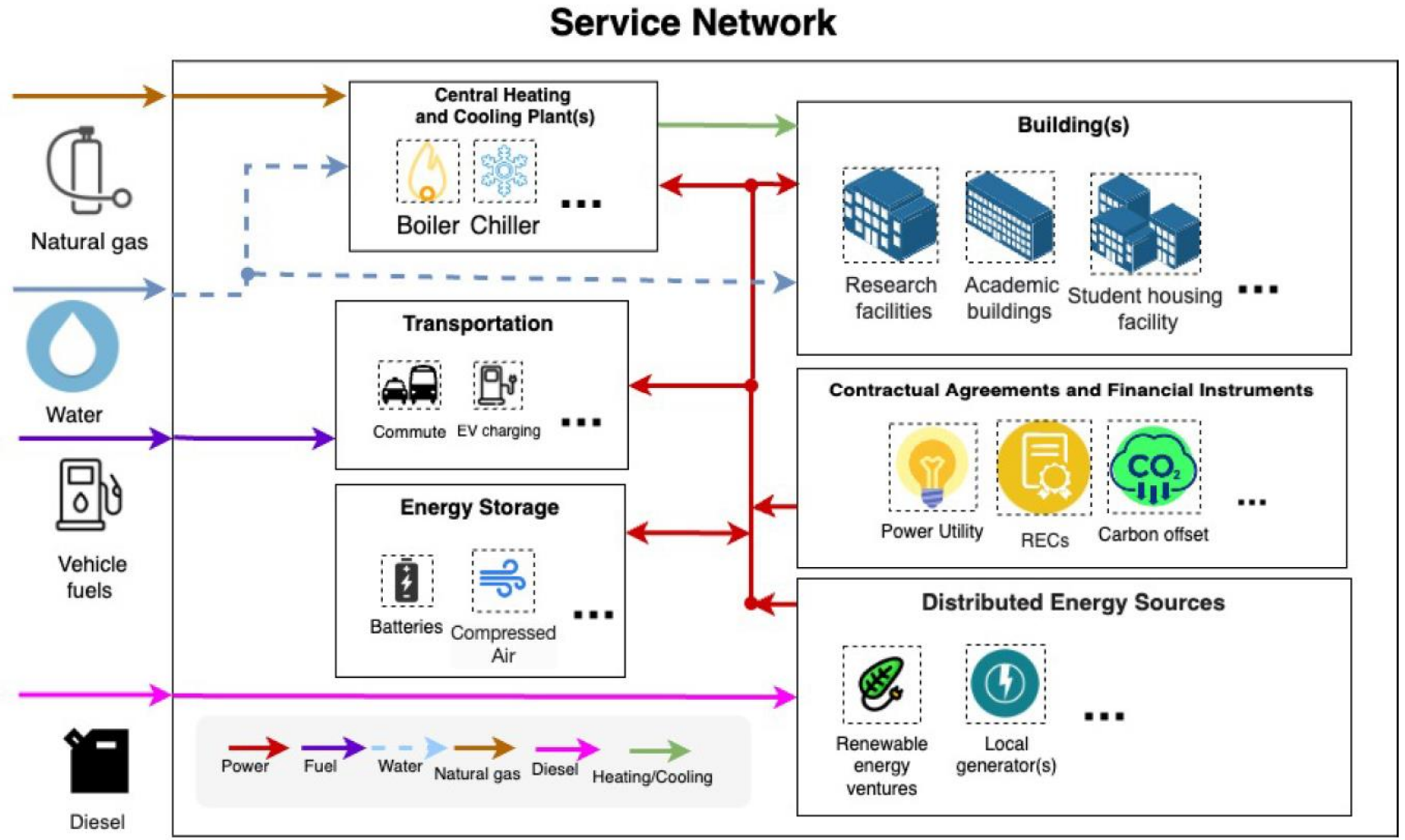

GADGET: Green Assessment and Design GuidancE Tool

	Period 1	Period 2	Period 3	Period 4	Period 5	PVC	Break Point	IRR (Baseline2040)	IRR (BAU)
BAU	Gas Boiler(18.75): 1		Gas Boiler (25): 1 Gas Boiler(18.75): 1		Gas Boiler(18.75): 1	Total: 133.31 M Investment: 2.67 M Sunk: 0 Residual: 0.67 M Saving: 0	N/A	N/A	0%
Base 2040 (RECs and Offset)	Gas Boiler(18.75): 1	REC: 11,337 Offset: 7,270	Gas Boiler (25): 1 Gas Boiler(18.75): 1 Offset: 16,760	Offset: 99,132	Gas Boiler(18.75): 1 Offset: 85,393	Total: 146.66 M Investment: 2.67 M Sunk: 13.32 M Residual: 0.67 M Saving: 0	N/A	0%	NA
Greedy	Gas Boiler(18.75): 1 Energy Storage: 1	Solar Panels: 4,720 Energy Storage: 1	Gas Boiler (25): 1 Gas Boiler(18.75): 1 Solar Panels: 883	Solar Panels: 434 Energy Storage: 1	Gas Boiler(18.75): 1 Solar Panels: 632 Energy Storage: 1	Total: 127.81 M Investment: 18.31 M Sunk: 0 Residual: 3.71 M Saving: 21.14 M	2038-10-17	14.36%	8.23%
Green 2040	Gas Boiler(18.75): 1 Energy Storage: 1	Solar Panels: 4,394	Gas Boiler (25): 1 Gas Boiler(18.75): 1 Solar Panels: 1,197 Energy Storage: 1	Solar Panels: 702 Energy Storage: 2 Offset: 90,910	Gas Boiler(18.75): 1 Solar Panels: 851 Offset: 81,998	Total: 136.21 M Investment: 18.35 M Sunk: 8.66 M Residual: 4.09 M Saving: 21.34 M	2038-12-17, 2040-04-16	11.67%	2.94%
Green 2040 enhanced	Gas Boiler(18.75): 1 Energy Storage: 1	Solar Panels: 6,004 REC: 275 Energy Storage: 2 Offset: 923	Gas Boiler (25): 1 Solar Panels: 961 Electric Boiler(1800): 3 Offset: 834 Transformer: 1	Solar Panels: 1,728 Offset: 82,731 Energy Storage: 1 Electric Boiler(1800): 1	Gas Boiler(18.75): 1 Solar Panels: 359 Offset: 74,086	Total: 137.15 M Investment: 24.11 M Sunk: 8.08 M Residual: 4.8 M Saving: 25.69 M	2042-01-16	9.44%	3.13%
Green 2035	Gas Boiler(18.75): 1 Energy Storage: 1	Solar Panels: 6,004 Energy Storage: 2 REC: 301 Offset: 938	Gas Boiler(18.75): 1 Solar Panels: 2,303 Electric Boiler(1800): 4 Offset: 90,858 Transformer: 1	Solar Panels: 386 Energy Storage: 1 Offset: 83,164	Gas Boiler(18.75): 1 Solar Panels: 485 Offset: 73,227 Electric Boiler(1800): 1	Total: 145.63 M Investment: 25 M Sunk: 16.32 M Residual: 4.76 M Saving: 26.33 M	2046-06-16	5.55%	-0.47%
Green 2030	Energy Storage: 1 Electric Boiler(1800): 2 Transformer: 1	Solar Panels: 8,577 Energy Storage: 2 Electric Boiler(1800): 3 REC: 20,731 Offset: 74,434	Gas Boiler (25): 1 Solar Panels: 130 Offset: 88,692	Solar Panels: 152 Offset: 82,119 Energy Storage: 1	Gas Boiler(18.75): 1 Solar Panels: 562 Offset: 73,215 Energy Storage: 1	Total: 160.17 M Investment: 28.65 M Sunk: 29.2 M Residual: 4.58 M Saving: 28.32 M	N/A	1.47%	-3.03%
Green 2025	Energy Storage: 1 REC: 26,269 Offset:172,757 Electric Boiler(1800): 2 Transformer: 1	Solar Panels: 8,601 Energy Storage: 2 REC:20,721 Offset: 74,252 Electric Boiler(1800): 3	Gas Boiler (25): 1 Gas Boiler(18.75): 1 Solar Panels: 98 Offset: 88,683	Solar Panels:147 Energy Storage: 1 Offset: 82,254	Gas Boiler(24.89): 1 Solar Panels: 332 Offset: 73,268	Total: 168.77 M Investment: 27.8 M Sunk: 37.67 M Residual: 4.4 M Saving: 27.33 M	N/A	0.04%	-4.11%

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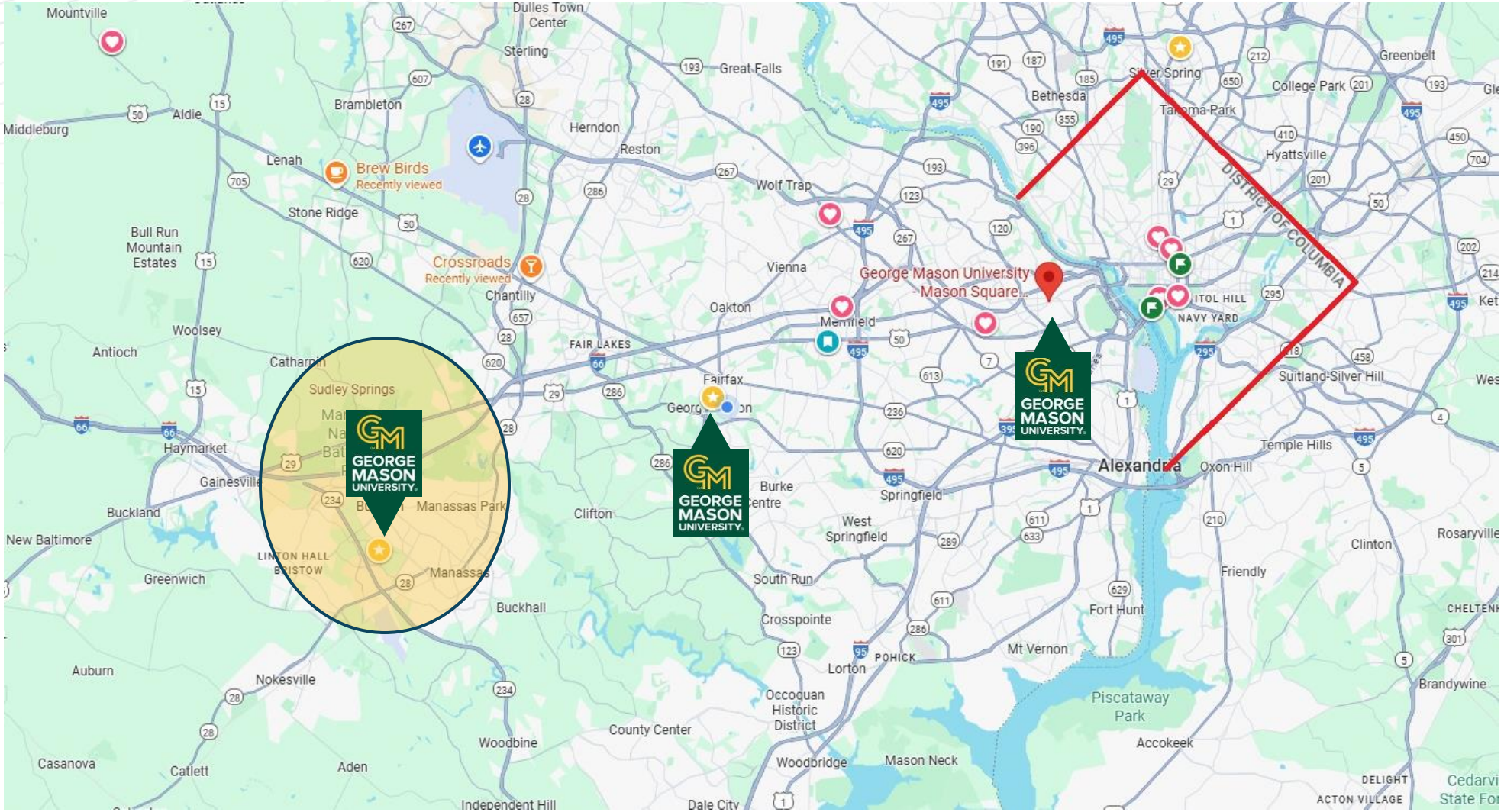
3 campuses in Northern Virginia



Data Center Heat Recapture?

Thank you!

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