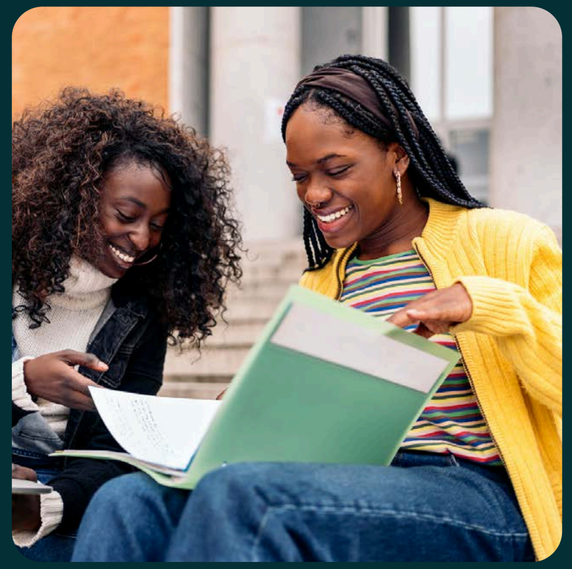
An Early Guide to Decarbonization: Historically Black Colleges and Universities



Qualifications & Background

Anthony Kinslow II, PhD, CEM

BS ‘12 in Civil & Environmental Engineering from NC A&T (HBCU)

MS ‘14 and PhD ‘19 in Sustainable Design & Construction (CEE) from Stanford

Founder and CEO of Gemini Energy Solutions

Lecturer at Stanford University:

- Racial Equity in Energy
- Quest for an Inclusive Clean Energy Economy

Consultant for Clean Energy Works

Resides in Springfield, VA with wife Maria and sons Marcus & Samuel

Why HBCUs?

107 (as of 2026) across 19 states

328,000 current students and a network of 12+ million alumni

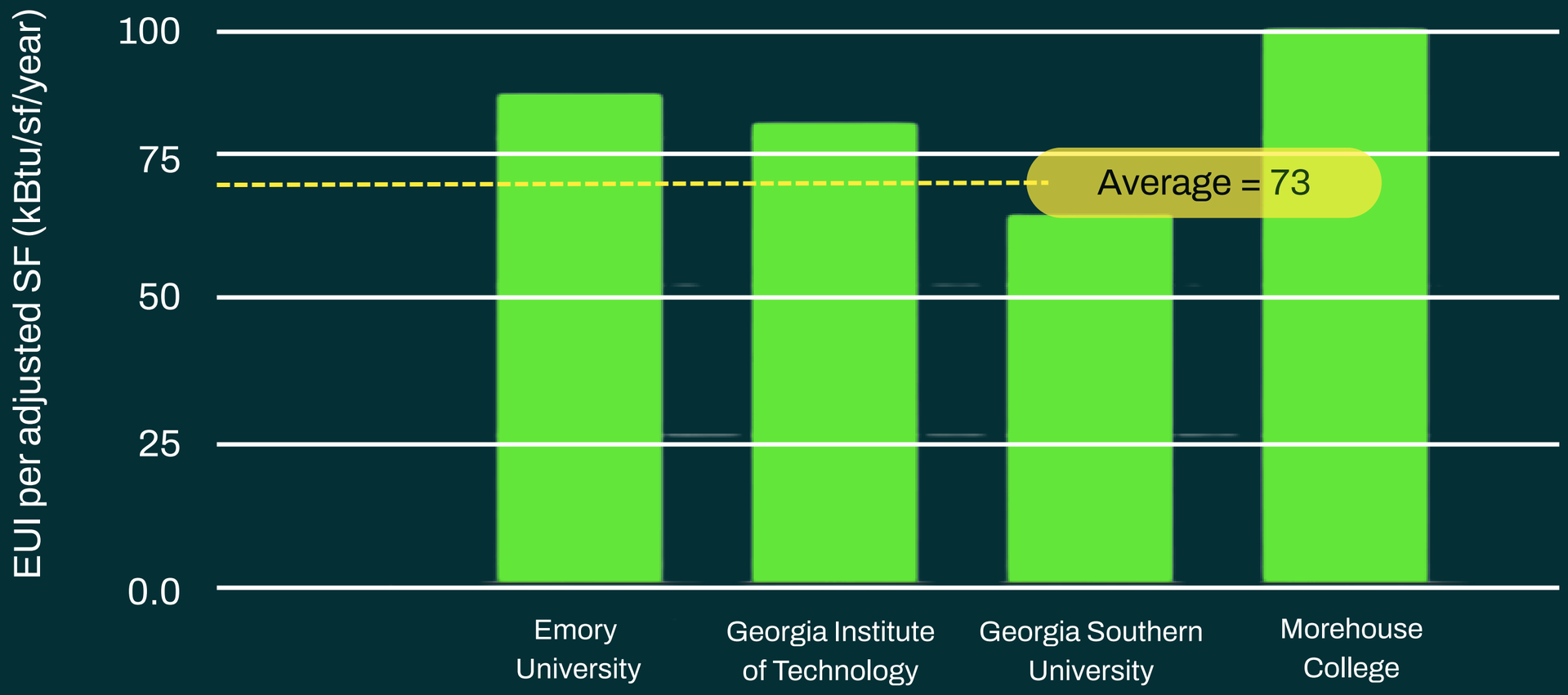
More than 4.5 million students have attended HBCUs since 2008

Source(s): The Hundred-Seven.org, and National Center for Education Statistics (NCES).

Critical Attributes of HBCUs

- Over extended (professors & administrators)
- See students as family
- Facilities care
- Honoring matters
- Higher percentage of buildings and equipment are older

Energy Use Intensity vs University



Morehouse is 25% higher than its peers

Note: Data from the The Sustainability Tracking, Assessment & Rating System (STARS) of AASHE (https://stars.aashe.org/)

Qualifications & Background

Peter Rumsey, PE, FASHRAE

BS ‘83 in Mechanical Engineering from the University of California, Berkeley

ASHRAE Fellow and Senior Fellow at Rocky Mountain Institute

Renewable Energy Innovator of the Year (2012) – Association of Energy Engineers

Designed over 3 million sq ft of radiant-cooled buildings

Registered Professional Engineer in 10 states + Certified Energy Manager

Designed 50+ LEED Platinum projects—first in the nation to do so

Driven by innovation, impact, and a passion for sustainable solutions for all communities

Morehouse as a Client

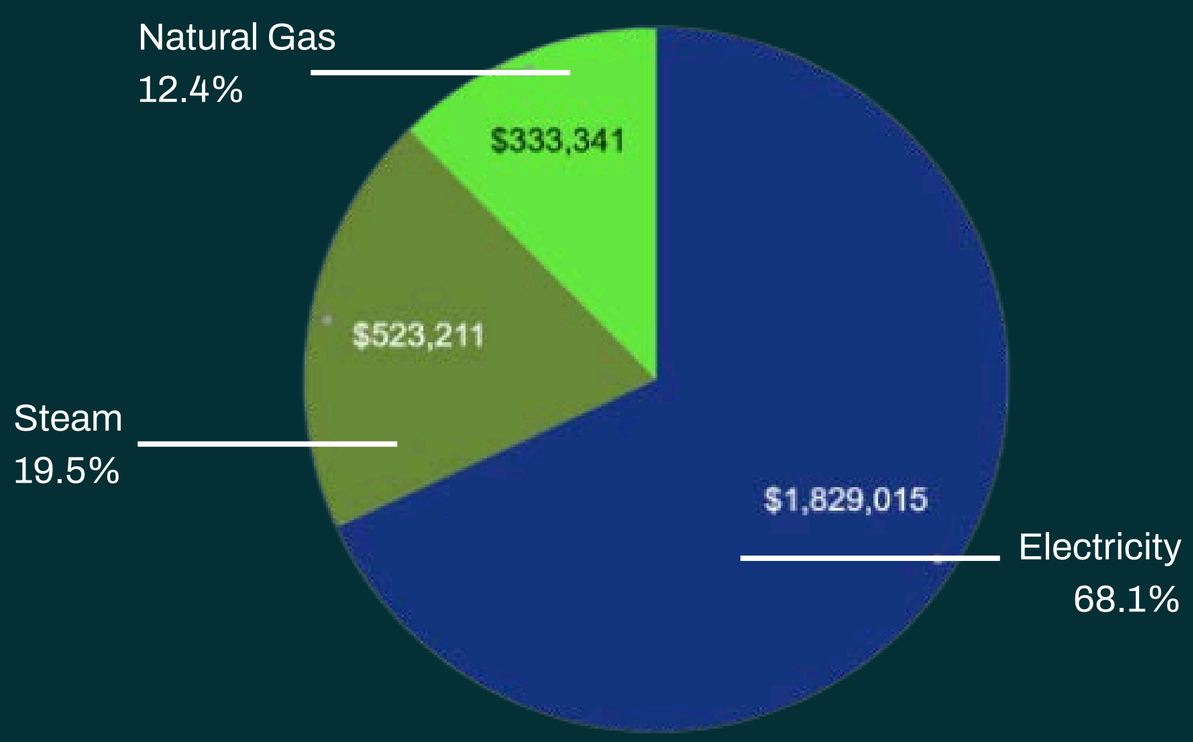
- Founded: 1867
- Over **150 years** of history
- 2,200+ students
- 20,000+ alumni worldwide
- #1 producer of Black men earning doctorates
- 5 Rhodes Scholars

Notable Alumni

- Dr. Martin Luther King, Jr. (Nobel Peace Prize recipient; civil rights leader)
- Rev. Raphael Warnock (US Senator, Georgia)
- Howard Thurman (theologian, author, mentor to Dr. MLK, Jr.)
- Dr. Benjamin Elijah Mays (influential educator and mentor to Dr. MLK Jr.)
- Spike Lee (Academy Award-winning filmmaker)
- Samuel L. Jackson (Award-winning actor)
- Maynard Jackson (First Black mayor of Atlanta)
- Sanford Bishop, Jr (US Congressman)

Source: Morehouse College: Our History

Morehouse Energy Cost



$103 million over 25 years, including 3% electricity and 5% gas cost escalation per year.

Building Summary

By Number of Buildings

Buildings 01-14 years old	Buildings 15-29 years old	Buildings 30-49 years old	Buildings over 50 years old	Buildings Unknown
2	8	9	20	3

By Square Feet of Building Space

Buildings 01-14 years old	Buildings 15-29 years old	Buildings 30-49 years old	Buildings over 50 years old	Buildings Unknown
80,000	390,000	294,678	391,000	6,900
7%	33.5%	25%	34%	0.5%

Strategy

- Low cost review of campus
- Ten (10) projects to implement now
- Create building standards to be approved by the Board

Summary of Buildings by Building Recommendations

Number of buildings reviewed: 35 | Time Frame: 2025-2050

	2025-2030	2031-2039	2040-2050
Heat pumps for Space Heating - 250 kBtu -500 kBtu	8	4	8
Package Terminal Heat Pumps (PTHPs) - approx ¾ tons	-	-	270
Efficient Water Cooled Chillers - 50 - 250 tons	2	6	11
Large Heat Pumps for Domestic Hot Water (DHW) - 50 - 250 kBtu	-	17	9
Tank Heat Pump Water Heaters for DHW - 40 to 80 gallons	6	10	8
Split System (AC and Heat Pump Heating) - 1 to 3 tons	13	24	2
Heat Pump Package Units (heating and cooling)	-	4	-
Variable Refrigerant Flow (VRF) Systems	2	2	2

Note: the recommendations are preliminary only and need further engineering analysis for verification.

Near term (5 year), High Impact Efficiency

Decarbonization Projects for Consideration

#01 - Solar PV w/ right-sized Battery Energy Storage System (BESS) at Parking Facility

#02 - Electrification and Solar PV for Student Center including the Food Service Facility

#03 - DHW Electrification and Solar PV for the New Residence Hall

#04 - Demonstration - Decarbonization of the President’s House (efficiency, electrification and renewables)

#05 - Bulk Purchase of Heat Pumps for Boiler and Steam Hybrid Replacement

#06 - Lab Building (Merrill/Tech Tower/Hope) Efficiency Upgrades

#07 - New Pathway Lighting (Will Reduce the Use of BT Harvey Stadium Lighting)

#08 - Deep Energy Retrofits with ESCO for two to four buildings on campus

#09 - PV System for Forbes Arena + Archer Hall

#10 - Off-site Renewable Energy Procurement

Summary Building Standards

New Construction

25% more energy efficient than ASHRAE standard

All-electric heat pump heating and cooking

Solar on the roof (where possible)

No steam, natural gas, or electric resistance

At a minimum: Make buildings heat pump ready - adequate electrical service and no space heating systems that require more than 140 F hot water.

Existing Buildings

Transition to efficient heat pump systems at end of life of existing systems.

After 50 years, single pane windows replaced with double glazed.

Complete transition to LED lighting with occupancy controls

Where appropriate add DDC Systems

Favor water cooled chillers

Add PV systems where possible

Buildings retro commissioned every 20 years

Results thus Far

- Changed their design for their new student center and it will be all electric, including the kitchen
- Made electrification adjustments to the dorms that are nearing construction
- Board approved the building standards

Lessons Learned

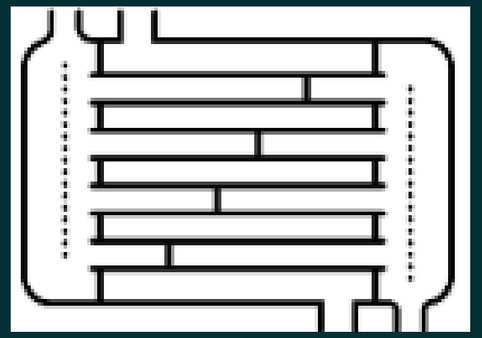
Communication matters

Heat Pumps are a Foundation of Efficiency & Electrification

Gas

$12

Steam

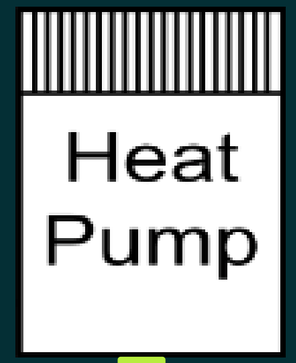


$26

Electricity

$27

Electricity



$9

Based on Morehouse costs of electricity, gas, and steam.

Lessons Learned

Communication matters

Need to provide alternatives that aren’t ideal

Strategies for Improving Affordability

Hybrid Heat Pump Strategy - When replacing existing gas or steam boiler systems with more efficient heat pump systems, a combination of heat pumps with the legacy gas or steam system can lower up front costs and provide for high reliability. If the heat pump(s) is sized for 50% to 75% of the peak load, often times that system will be able to meet over 90% of the annual heating needs. The gas back up system the provides heat on the peak day or when the heat pump has problems and needs service.

Replace at End of Life - Gas using or inefficient equipment should be replaced when it is towards the end of its useful life. In that way, the cost purchasing the more efficient equipment is only the added cost above what would have been spent regardless.

Equipment Standardization - Standardization can help reduce costs because of bulk purchasing, familiarity by contractors, lower maintenance costs.

Combining Envelope Upgrades with Heating Upgrades - Envelope improvements such as insulation, new windows envelope sealing reduce heating and cooling loads allowing for smaller equipment to be used when replacing that equipment.

Sizing Equipment to Meet Measured Loads vs. Calculated Loads - Heating and cooling equipment including fans and pumps are significantly oversized. For existing buildings, messing the peak heating and cooling loads in summer and winter can lead to downsizing or more accurately right sizing when replacing the equipment with more efficient new systems.

Lessons Learned

Communication matters

Need to provide alternatives that aren’t ideal

Need a champion who can navigate internal politics

Thank You

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