



ADVANCING RESEARCH CAPACITY AT HIGH RESEARCH ACTIVITY HISTORICALLY BLACK COLLEGES AND UNIVERSITIES

REPORT by the
INTERAGENCY WORKING GROUP FOR
HBCU, TCU, and MSI STEM ACHIEVEMENT
FEDERAL COORDINATION IN STEM SUBCOMMITTEE
COMMITTEE ON STEM
of the
NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

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About This Document

The National Science and Technology Council (NSTC) was asked, via the *CHIPS and Science Act*, Section 10524, to submit to Congress a report that (1) identifies challenges and barriers to federal research and development awards for high research activity status (R2) HBCUs, and (2) identifies recommendations for federal research agencies to sustainably boost the research capacity of high research activity status HBCUs through awards-making authorities.

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Abbreviations and Acronyms

AY	Academic year
DOE	U.S. Department of Energy
DOS	U.S. Department of State
FTE	Full-time equivalent
FY	Fiscal year
GSA	General Services Administration
HBCU	Historically Black Colleges and Universities
HHS	U.S. Department of Health and Human Services
IHE	Institution of Higher Education
IPA	Intergovernmental Personnel Act
IPEDS	Integrated Postsecondary Education Survey
IRD	Independent Research and Development Program
MSI	Minority-serving institution
NASA	National Aeronautics and Space Administration
NCES	National Center for Education Statistics
NIH	National Institutes of Health
NIST	National Institute of Standards and Technology
NSF	U.S. National Science Foundation
NSTC	National Science and Technology Council
PI	Principal investigator
R&D	Research and development
R1	Very high research activity status university
R2	High research activity status university
S&E	Science and engineering
STEM	Science, technology, engineering, and mathematics
TCU	Tribal colleges and universities
UNCF	United Negro College Fund
USDA	U.S. Department of Agriculture
USPTO	U.S. Patent and Trademark Office
WHI-HBCU	White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities

Introduction

In 2022, President Biden signed the *CHIPS and Science Act*¹ into law in an effort to drive opportunity and equity for all of America in science, technology, engineering, and mathematics (STEM) and innovation. The legislation authorized federal investments to expand the geographic and institutional diversity of research institutions and the students and researchers they serve. The *Act* also aimed to broaden the geographic diversity of research and innovation funding to leverage the talent and ideas found all across America, including supporting learners, educators, and researchers at minority serving and emerging research institutions and in rural communities. The *Act*, specifically Section 10524, also tasked the National Science and Technology Council (NSTC) with submitting to Congress a report identifying (1) challenges and barriers to federal research and development awards for high research activity status (R2) Historically Black Colleges and Universities (HBCUs), and (2) recommendations for federal research agencies to sustainably boost the research capacity of high research activity status HBCUs through awards-making authorities.

This report therefore reviews the challenges R2 HBCUs face when applying for and securing federal research funding. It also provides recommendations to advance the research capacity of R2 HBCUs. The report also highlights some practices implemented by some agencies to increase the participation of HBCUs in federal funding opportunities.

Over 180 years ago, HBCUs emerged to provide Black communities a key human right—access to a full education, and as such, have played a vital role in America’s prosperity.^{2,3,4} HBCUs represent a diverse group of degree-granting institutions that include private universities, public land-grant universities, community colleges, and schools with law, medical, and/or theological focuses. HBCUs serve students in urban, rural, and suburban settings, with 99 accredited HBCUs located across 19 states, the District of Columbia, and the U.S. Virgin Islands.^{5,6} In 2022, HBCUs collectively enrolled a total of 289,000 students, with non-Black individuals comprising 24% of their enrollment.⁷ Applications to some HBCUs are on the rise, signaling increased student interest in attending these renowned institutions of academic excellence and opportunity.^{8,9}

While HBCUs make up less than 3% of the country’s colleges and universities, HBCUs make an outsized contribution to the American science, technology, engineering, and mathematics (STEM) education ecosystem. In the past, HBCUs have conferred up to 35% of our country’s bachelor’s degrees to Black

¹ <https://www.congress.gov/117/plaws/publ167/PLAW-117publ167.pdf>

² <http://nces.ed.gov/pubs84/84308.pdf>

³ http://nces.ed.gov/pubs2010/2010015/indicator6_24.asp#snapshot

⁴ Edwards, et. al. HBCU Enrollment and Longer-Term Outcomes. Washington Center for Equitable Growth. <https://equitablegrowth.org/working-papers/hbcu-enrollment-and-longer-term-outcomes/>

⁵ U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. https://nces.ed.gov/programs/digest/d23/tables/dt23_313.10.asp

⁶ U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. https://nces.ed.gov/programs/digest/d23/tables/dt23_313.20.asp

⁷ U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. https://nces.ed.gov/programs/digest/d23/tables/dt23_313.20.asp

⁸ Applications to HBCUs rise dramatically as nationwide college enrollment falls. Public Broadcasting Service. <https://www.pbs.org/newshour/show/applications-to-hbcus-rise-dramatically-as-nationwide-college-enrollment-falls>

⁹ U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. <https://nces.ed.gov/ipeds/TrendGenerator/app/answer/10/101?f=59%3D1>

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students. The most recent data shows HBCUs confer 14% of all bachelor's degrees and 15% of all STEM-related bachelor's degrees to our nation's Black students.^{10,11,12,13,14} Of all Black graduates who earned a science and engineering doctorate between 2015 and 2019, 23% of them had earned their bachelor's degree from an HBCU.¹⁵ From 2010-2020, of the top ten institutions where Black doctorate recipients earned their bachelor's degree, eight were HBCUs.¹⁶ Over time, HBCUs have produced 40% of our nation's Black engineers, 50% of our nation's Black teachers, and 70% of our nation's Black doctors and dentists.¹⁷

In addition to training the next generations of Black scientists, engineers, and doctors, HBCUs and their faculty are committed to advancing research and development (R&D). HBCUs conduct research along a continuum of disciplinary areas, with over 80% of HBCU research conducted in STEM disciplines.¹⁸ In fiscal year (FY) 2022, R&D expenditures at HBCUs totaled \$633.1 million, with over half of these expenditures (\$365.7 million) spent on life sciences R&D. Other prominent FY 2022 R&D expenditures at HBCUs were in engineering (\$75.4 million), physical sciences (\$62.6 million), geosciences, atmospheric sciences, and ocean sciences (\$30.3 million), social sciences (\$15.3 million), and computer and information sciences (\$15.1 million).¹⁹

While HBCUs contribute at varying levels to the U.S. research enterprise, there are a subset of HBCUs that, based on the Carnegie Classification of Institutions of Higher Education²⁰, are considered *high research activity status* (R2) universities. At the time of the last Carnegie ranking, which occurred in 2021, 11 HBCUs were designated as R2s, based on their research activity index, a measure which considers R&D expenditures, science and engineering (S&E) research staff, and doctoral degree conferrals.

¹⁰ U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2004062>

¹¹ U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. https://nces.ed.gov/programs/digest/d23/tables/dt23_313.30.asp

¹² U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. https://nces.ed.gov/programs/digest/d23/tables/dt23_322.20.asp

¹³ U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. https://nces.ed.gov/programs/digest/d23/tables/dt23_323.20.asp

¹⁴ U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. https://nces.ed.gov/programs/digest/d23/tables/dt23_313.30.asp

¹⁵ U.S. National Science Foundation, National Center for Science and Engineering Statistics. <https://ncses.nsf.gov/pubs/nsf21321/report/field-of-degree-minorities>

¹⁶ U.S. National Science Foundation, National Center for Science and Engineering Statistics. <https://ncses.nsf.gov/pubs/nsf22335/table/2>

¹⁷ FACT SHEET: Biden-Harris Administration Highlights A Record of Championing Historically Black Colleges and Universities (HBCUs). U.S. Department of Education. <https://www.ed.gov/news/press-releases/fact-sheet-biden-harris-administration-highlights-record-championing-historically-black-colleges-and-universities-hbcus>

¹⁸ HBCU Research Overview 2012-2021. University-Industry Demonstration Partnership. https://uidp.org/wp-content/uploads/2023/03/FINAL-HBCU-research-stats-and-facts_Page_1.png

¹⁹ U.S. National Science Foundation, National Center for Science and Engineering Statistics. <https://ncses.nsf.gov/surveys/higher-education-research-development/2022#tableCtr10124>

²⁰ American Council on Education. Carnegie Classification of Institutions of Higher Education. <https://carnegieclassifications.acenet.edu/carnegie-classification/classification-methodology/basic-classification/>

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According to the American Council on Education, which jointly oversees the classification system with the Carnegie Foundation, the R2 HBCUs are:

- o Clark Atlanta University
- o Florida A&M University
- o Howard University
- o Jackson State University
- o Morgan State University
- o North Carolina A&T State University
- o Prairie View A&M University
- o Southern University and A&M College
- o Tennessee State University
- o Texas Southern University
- o University of Maryland Eastern Shore

There are no HBCUs designated as *very high research activity status universities* (R1s) on the Carnegie Classification of Institutions of Higher Education as of the writing of this report.

While 11 institutions have achieved R2 status, three HBCUs are designated as Doctoral/Professional Universities, 23 are designated as Master's Colleges & Universities, and 17 are designated as Baccalaureate Colleges with an arts and sciences focus.²¹ These non-R2 HBCUs, and many others, are also a part of the U.S. research enterprise. Therefore, the barriers to federal research funding in this report are not limited to R2 HBCUs and most, if not all, of the recommendations in this report have the potential to benefit more than R2 HBCUs. Many of the recommendations could benefit non-R2 HBCUs as well as other types of institutions (i.e., minority serving institutions and/or emerging research institutions) looking to increase their research capacity, which collectively, is critically important to our country's national security, economic development, and global competitiveness.

The barriers and recommendations included in this report were informed by numerous engagements with HBCUs and federal research agencies. These engagements included but were not limited to events hosted by the White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities (WHI-HBCU); a Federal Funding Forum on Research and Development, co-hosted by the White House Office of Science and Technology Policy, WHI-HBCU, and the General Services Administration (GSA); and listening sessions and discussions with HBCU presidents and chancellors, senior leaders, research administrators, faculty, and students.

²¹ American Council on Education. Carnegie Classification of Institutions of Higher Education.
<https://carnegieclassifications.acenet.edu/carnegie-classification/classification-methodology/basic-classification/>

Historic Underfunding of HBCUs

Even though HBCUs have produced STEM scholars for decades, historically, they have been underfunded by federal and state investments. Between 2003 and 2015, federal funds per student have declined across all public and private four-year colleges and universities, with private HBCUs experiencing the largest reduction (42%).²²

In FY 2019, when adjusted for inflation, federal agency obligations to institutions of higher education (IHEs) for science and engineering (S&E)²³ activities increased 6% from FY 2018, but were down 10% from levels reached in FY 2009. In comparison, obligations for S&E support to HBCUs increased at a slower rate. In FY2019, when adjusted for inflation, obligations to HBCUs increased 5% from FY 2018 and were down 37% from levels reached in FY 2009. Overall, HBCUs had seen long-term declines since the early 2000s.²⁴

While obligations for S&E support to HBCUs did increase at a faster rate in FY 2021, there still remains a significant disparity between the funds received at HBCUs and non-HBCU institutions in terms of S&E funding. In FY 2021, while federal agency funding went to over 1,100 IHEs for science and engineering (S&E) activities (totaling \$43.2 billion), the top 100 institutions combined received \$34.8 billion or 81.0% of all federal S&E funding. The top 25 institutions combined received \$18 billion or 41.7% of all federal S&E funding,²⁵ with each receiving anywhere from \$443 million to over a billion for research and experimental development (R&D). HBCUs²⁶ combined received \$552 million in federal S&E funding, with \$356 million of that obligated for R&D. Among HBCUs, North Carolina A&T State University, a R2, was the leading recipient of federal S&E funding (\$42 million), with \$25.7 million of that obligated for R&D.

Disparities in state funding can also have a negative impact on HBCUs, particularly on land grant HBCUs. Land-grant universities were founded by the *Morrill Act* of 1862. In 1890, Congress required, through the *Second Morrill Act*, that states that opened land-grant institutions under the *Morrill Act* of 1862 with restrictive admissions policies also open comparable land-grant institutions to educate Black students. States were to then equitably fund both 1862 and 1890 land-grant universities.²⁷ However, most states with land-grant HBCUs have not fulfilled the funding obligation. In 2023, the U.S. Departments of Education and Agriculture used data from the National Center for Education Statistics

²² Public and Private Investments and Divestments in Historically Black Colleges and Universities. American Council on Education. <https://www.acenet.edu/Documents/public-and-private-investments-and-divestments-in-hbcus.pdf>

²³ The six categories of federal S&E support are: Research and experimental development (R&D); R&D plant; Facilities and equipment for S&E instruction; Fellowships, traineeships, and training grants (FTTGs); and Other S&E activities.

²⁴ Growth in Federal S&E Support to HBCUs Continues to Lag Behind Increases to All Institutions in FY 2019. NCSES report. <https://nces.nsf.gov/pubs/nsf21332/figure/2>

²⁵ Data was obtained from 33 federal agencies (14 federal departments and 19 independent agencies) that had obligations for R&D during FY 2021 or FY 2022. Obligations represent the amount for orders placed, contracts awarded, services received, and similar transactions during a given period, regardless of when the funds were appropriated or when future payment of money is required, as defined within footnote 1. NCSES report. <https://nces.nsf.gov/pubs/nsf24316>.

²⁶ IHE as defined within footnote 2. HBCU as defined within footnote 11. Sixty-nine of the nation's HBCUs received federal obligations for S&E activities in FY 2021. NCSES report. <https://nces.nsf.gov/pubs/nsf24316>.

²⁷ Secretaries of Education, Agriculture Call on Governors to Equitably Fund Land-Grant HBCUs. U.S. Department of Education. <https://www.ed.gov/news/press-releases/secretaries-education-agriculture-call-governors-equitably-fund-land-grant-hbcus>

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(NCES) Integrated Postsecondary Education Survey (IPEDS) to calculate how much funding land-grant HBCUs would have received between 1987 and 2020 if their state funding were equal to that of 1862 institutions. The Departments found that land-grant HBCUs in 16 states have missed out on over \$12 billion in state funds. This staggering disparity is at least partially due to states' decisions not to meet cost-sharing or matching requirements for federal funding sources.^{28,29} Failure to meet cost-sharing requirements means that land-grant HBCUs often lose out on critical resources for advancing research and education capacity.

With respect to research spending, in FY 2022, the eleven (non-HBCU) R2 universities with the greatest FY 2022 R&D expenditures spent a combined \$2.1 billion, with \$88.4 million coming from state and local sources, and \$1.3 billion coming from federal sources, a 1:14 ratio.³⁰ In comparison, in FY 2022, R&D expenditures at the eleven R2 HBCUs totaled \$288.8 million, with about \$18.1 million spent from state and local sources, and \$197.4 million spent from federal sources, a 1:10 ratio.³¹ Based on these state to federal spending ratios, on average, R2 HBCUs spent more of their state and local funds towards R&D in comparison to the 11 R2s with the greatest R&D expenditures, who spent more of their federal funds towards R&D. Of the 11 R2 HBCUs, six are land-grant HBCUs.

At institutions of higher education, endowment funds often help to create financial stability. They allow institutions to support students and faculty, advance programs and research activities, improve facilities infrastructure, and provide a cushion during emergencies.³² Significant endowments are one of the ways universities are less susceptible to fluctuations in federal and state funding. Both public and private HBCUs have significantly smaller endowments than their non-HBCU counterparts.³³ Overall, the endowments at public HBCUs are a third of the size of those at non-HBCU public institutions. At private HBCUs, endowments are a seventh of the size of those at non-HBCU private institutions. With smaller endowments, HBCUs do not have the same levels of financial security and flexibility enjoyed by other colleges and universities.³⁴

²⁸ The 2023 Farm Bill Must Address Inequities in the Land-Grant University System. Center for American Progress. <https://www.americanprogress.org/article/the-2023-farm-bill-must-address-inequities-in-the-land-grant-university-system/>

²⁹ AP News. Maryland finalizes \$477M settlement for HBCU federal lawsuit. <https://apnews.com/article/larry-hogan-maryland-lawsuits-legislation-education-d9a76565b03653234200033bed7a5862>

³⁰ U.S. National Science Foundation, National Center for Science and Engineering Statistics. Higher Education Research and Development (HERD) Survey 2022. <https://nces.nsf.gov/surveys/higher-education-research-development/2022>

³¹ U.S. National Science Foundation, National Center for Science and Engineering Statistics. <https://nces.nsf.gov/surveys/higher-education-research-development/2022#tableCtr10124>

³² Achieving Financial Equity and Justice for HBCUs. The Century Foundation. <https://tcf.org/content/report/achieving-financial-equity-justice-hbcus/>;

³³ Escobar, Qazi, Majewski, and Jellani. Barriers and Facilitators to Obtaining External Funding at Historically Black Colleges and Universities (HBCUs). Journal of STEM Education. <https://jstem.org/jstem/index.php/JSTEM/article/view/2606/2310>

³⁴ Achieving Financial Equity and Justice for HBCUs. The Century Foundation. <https://tcf.org/content/report/achieving-financial-equity-justice-hbcus/>

Barriers to Navigating Federal Funding, from Applying to Awarding, which Hinder the Advancement of STEM Research and Development at HBCUs

Barrier: Difficulty Identifying Funding Across a Diffuse and Complex Federal Funding Terrain

Though federal research agencies have employed various mechanisms to disseminate information to universities, researchers at HBCUs do not always know about the funding opportunities available to them.^{35,36,37} There are ongoing efforts to consolidate federal funding opportunities into centralized locations, but few currently capture the full breath of federal funding opportunities available across all of government.

Furthermore, agency outreach may not provide sufficient time for HBCUs to prepare competitive proposals. By the time a notice of a opportunity reaches an applicant, the person might not have sufficient time to develop a proposal, and/or the necessary collaborations, given competing responsibilities, teaching workloads, student advisement and mentoring, service expectations, and limited institutional support for the pre-award process.^{38,39} To receive funding, faculty have to consider the time it takes to write and submit a grant/contract; the unique application process of the respective funding agency; the available infrastructure at the university to support the pre- and post-award process; whether the program and/or its funds are available to HBCUs, MSIs, or all IHEs; the size of the award and the impact of indirect costs; and past funding rates of HBCUs for that program or at the agency, for example. Given the variety of funding opportunities and application processes across agencies, faculty, especially new faculty, may find applying for federal funding a daunting process.

Barrier: Insufficient Technical Assistance

Across the federal government, notices of funding opportunities and solicitations are lengthy and hard to understand, particularly for new researchers. The required legal language included in these documents assumes a level of experience that simply may not exist in students and faculty who are new to the grant-making process. This opaque language creates a significant barrier to access and rewards individuals and institutions who are familiar with agency funding processes (or have large and experienced sponsored research offices and administrative staff).

Technical assistance for funding opportunities at federal agencies varies significantly. The support that HBCU faculty receive from their sponsored research officers can also vary. Faculty may lack

³⁵ Toldson. Research, Action, and Practice for Historically Black Colleges and Universities. <https://149865941.v2.pressablecdn.com/wp-content/uploads/HBCU-RAP-REPORT2.pdf>

³⁶ Defense Research Capacity at Historically Black Colleges and Universities and Other Minority Institutions: Transitioning from Good Intentions to Measurable Outcomes. National Academies of Sciences, Engineering, and Medicine. <https://doi.org/10.17226/26399>

³⁷ Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce. National Academies of Sciences, Engineering, and Medicine. <https://doi.org/10.17226/25257>

³⁸ Toldson. Drivers and Barriers of Success for HBCU Researchers Submitting STEM Proposals to the U.S. National Science Foundation (Editor's Commentary). *Journal of Negro Education*. <https://www.jstor.org/stable/10.7709/jnegroeducation.86.4.0415>

³⁹ Escobar, Bell, Qazi, Kotoye, and Arcediano. Faculty Time Allocation at Historically Black Universities and Its Relationship to Institutional Expectations. *Frontiers in Psychology*. <https://doi.org/10.3389%2Ffpsyg.2021.734426>

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administrative support, particularly related to the pre-award process. Support to search for funding opportunities; write and submit grants, contracts, cooperative agreements, or other types of funding; pre-award and post-award management; and subaward or subcontract management are services or support that could vary on a HBCU campus. Smaller sponsored research offices may have little to no capacity to help faculty until an award is secured by a faculty member. HBCUs typically have limited staff to support faculty research interest, and sponsored research office staff are often spread thin across numerous university projects.^{40,41,42} In addition, staff at HBCUs are often in need of on-going training and professional development to support faculty members and navigate the federal funding process.^{43,44,45} Furthermore, they often must navigate complex bureaucratic internal and agency processes while meeting strict deadlines, which may impact an HBCU's ability to secure and build their research portfolio.⁴⁶

While HBCUs may have administrative processes suited to pursue and administer grant awards, some HBCUs have reported having less experience securing research funding via federal contracts.⁴⁷ While federal agencies may have established goals to award a percentage of contracts to HBCUs and minority serving institutions similar to the way agencies may support small businesses, women-owned businesses, etc., procurement offices at HBCUs may not have the staff to support contracting opportunities from federal agencies, and faculty may also be less familiar with how to connect with federal agencies on R&D contracting opportunities.^{48,49,50}

Barrier: Limited Opportunities to Build Institutional Capacity

⁴⁰ Defense Research Capacity at Historically Black Colleges and Universities and Other Minority Institutions: Transitioning from Good Intentions to Measurable Outcomes. National Academies of Sciences, Engineering, and Medicine. <https://doi.org/10.17226/26399>

⁴¹ Toldson. Research, Action, and Practice for Historically Black Colleges and Universities. <https://149865941.v2.pressablecdn.com/wp-content/uploads/HBCU-RAP-REPORT2.pdf>

⁴² Escobar, Qazi, Majewski, and Jellani. Barriers and Facilitators to Obtaining External Funding at Historically Black Colleges and Universities (HBCUs). Journal of STEM Education. <https://jstem.org/jstem/index.php/JSTEM/article/view/2606/2310>

⁴³ 40

⁴⁴ Toldson. Research, Action, and Practice for Historically Black Colleges and Universities. <https://149865941.v2.pressablecdn.com/wp-content/uploads/HBCU-RAP-REPORT2.pdf>

⁴⁵ Escobar, Qazi, Majewski, and Jellani. Barriers and Facilitators to Obtaining External Funding at Historically Black Colleges and Universities (HBCUs). Journal of STEM Education. <https://jstem.org/jstem/index.php/JSTEM/article/view/2606/2310>

⁴⁶ Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce. National Academies of Sciences, Engineering, and Medicine. <https://doi.org/10.17226/25257>

⁴⁷ National Institutes of Health. Paving the Path to Excellence and Innovation for Historically Black Colleges and Universities. <https://oamp.od.nih.gov/sites/default/files/SBODOCs/PEI%20White%20Paper-Jan2021.pdf>.

⁴⁸ National Aeronautics and Space Administration. Procurement Notice: Add NFS Section 1826.302 to Implement Agency One Percent HBCU/MI Goal. <https://www.hq.nasa.gov/office/procurement/regs/pn/pn17-14.pdf>

⁴⁹ National Aeronautics and Space Administration. Follow the Money: HBCU/MSI Goal and Subcontracting. <https://www.hq.nasa.gov/office/procurement/regs/pn/pn17-14.pdf>

⁵⁰ National Institutes of Health. Paving the Path to Excellence and Innovation for Historically Black Colleges and Universities. <https://oamp.od.nih.gov/sites/default/files/SBODOCs/PEI%20White%20Paper-Jan2021.pdf>.

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Studies show that as an institution's research and administrative capacity levels increase, both their sponsored research funding and foundation funding levels increase. Likewise, as an institution's Carnegie Classification ranking increases, so does their level of sponsored research and foundation funding.⁵¹

Most agency funds do not allow physical infrastructure as an allowable research cost. Yet, the historic underfunding of HBCUs has impacted the physical research infrastructure of these institutions, whereby many universities have deferred maintenance to laboratories, classrooms, and other buildings.^{52,53} The COVID-19 pandemic has further reduced the amount of funding available to improve campus infrastructure. For example, the United Negro College Fund (UNCF) reported that at least 20 HBCUs each had over \$5 million in deferred maintenance costs in 2022.⁵⁴ A lack of adequate research facilities and equipment is one of the biggest barriers HBCUs face in growing their research and innovation capacities.^{55, 56} Without sufficient infrastructure, HBCUs are unable to be as competitive as their non-HBCU counterparts for federal opportunities, which often take into account existing institutional capabilities to assess an applicant's ability to successfully conduct research.⁵⁷ Updated infrastructure—including laboratory spaces, research equipment, and reliable broadband—are necessary to ensure that HBCUs can compete for federally funded research opportunities and across the research enterprise.⁵⁸

A crucial element distinguishing R2 institutions from R1s is the number of research and scholarship doctorates conferred.⁵⁹ Many HBCUs have focused on undergraduate education, so if and when HBCUs want to increase their research capacity (and their Carnegie Classification status), resources must be used to build a robust graduate program. HBCU personnel shared that their ability to develop doctoral

⁵¹ Emily Devereux. Perceived Reputational and Administrative Capacity Biases & the Role of Carnegie Classifications in Funding Review Processes. *Research Management Review*, Vol. 26, No. 1 (2023)
<https://files.eric.ed.gov/fulltext/EJ1397281.pdf>

⁵² The CHIPS and Science Act Passed—What's That Mean for HBCUs? The Century Foundation.
<https://tcf.org/content/commentary/the-chips-and-science-act-passed-whats-that-mean-for-hbcus/>

⁵³ Historically Black Colleges and Universities: Action Needed to Improve Participation in Education's HBCU Capital Financing Program. US Government Accountability Office. <https://www.gao.gov/assets/gao-18-455.pdf>

⁵⁴ Greater Funding, Greater Needs: A Report on Funding for HBCUs. United Negro College Fund. https://uncf.org/wp-content/uploads/UNCF-Patterson-HBCUs-funding-report_V6.pdf?_ga=2.230805279.1803457662.1704836592-1191756712.1698342283

⁵⁵ Toldson. Research, Action, and Practice for Historically Black Colleges and Universities.
<https://149865941.v2.pressablecdn.com/wp-content/uploads/HBCU-RAP-REPORT2.pdf>

⁵⁶ Defense Research Capacity at Historically Black Colleges and Universities and Other Minority Institutions: Transitioning from Good Intentions to Measurable Outcomes. National Academies of Sciences, Engineering, and Medicine.
<https://doi.org/10.17226/26399>

⁵⁷ National Institutes of Health. UNITE External Listening Sessions: Summary Report.
https://www.nih.gov/sites/default/files/research-training/initiatives/ending-structural-racism/RFI_UNITE_external-listening-session-summary-report-508%5B42%5D.pdf

⁵⁸ The research enterprise is broadly defined as including administrative support and service infrastructure such as, but not limited to, human capital, research development and administration, research analytics, technology transfer and commercialization, corporate relations/public-private partnerships, research integrity, compliance and security, research policy, administration of student research training, and research leadership. [Growing Research Access for Nationally Transformative Equity and Diversity \(GRANTED\) | NSF - U.S. National Science Foundation](#)

⁵⁹ American Council on Education. Carnegie Classification of Institutions of Higher Education.
<https://carnegieclassifications.acenet.edu/carnegie-classification/classification-methodology/basic-classification/>

programs or expand graduate-level offerings can be problematic when their limited funding also has to be used to support student stipends or reduced teaching loads. Reduced teaching time is considered a critical factor that helps give faculty at R2 HBCUs the bandwidth to manage and develop their research programs. As such, research progress at HBCUs may be impeded by relatively low numbers of graduate student researchers, postdoctoral fellows, laboratory technicians, and other research support staff that would strengthen a university's research enterprise.

Though HBCUs can apply to a range of federal funding and contracting opportunities, HBCU-focused opportunities—which are typically intended to build research capacity as a default—can be limited in number, can have short award durations, and offer relatively small funding amounts. Awards focused on individual faculty development often do not address larger and more complex barriers to research success (e.g., funds may not address administrative or infrastructure capacity building needs).

Programs that aim to support research capacity are not always easy to find across agencies, have different criteria for who is eligible for capacity assistance, and have different mechanisms for how they build capacity. Programs can offer faculty career development; support for undergraduate students, graduate students, and postdocs; research experiences; and shared use of facilities. Offered but less common are programs and funds that support faculty release time, sector partnership and network development, programs of study/graduate program development, physical infrastructure, research administration and human capital development, inter- and intra-institutional research centers and collaborations, institutional support structures, or computing, digital, and data infrastructures. Few programs currently have mechanisms in place that support HBCUs with all of the above.

Barrier: Limited Clarity on How Institutions Build Capacity

In FY 2021, of the total federal science and engineering (S&E) support⁶⁰ received by IHEs, 91.4% of their funding was obligated for research and experimental development (R&D) in comparison to 4.1% (\$1.75 billion) of their funding being obligated for fellowships, traineeships, and training grants.⁶¹ Of the total S&E support received by HBCUs, 64.6% of their funding was obligated for R&D, while 18.4% (\$102 million) of their funds were obligated for fellowships, traineeships, and training grants.⁶² Yet a program or agency may not always 'credit' or recognize capacity building funds towards a R&D proposal (e.g., funds received to support STEM education activities). This is a small example of where a capacity building award may not strengthen a researcher's funding history in support of more a competitive or more research-intensive award.

⁶⁰ The categories are: research and experimental development (R&D); funding of fellowships, traineeships, training grants; R&D plant; facilities and equipment for instruction in S&E, and other general support for S&E

⁶¹ Fellowships, traineeships, and training grants (FTTGs) include all fellowship, traineeship, and training grant programs that are directed primarily toward the development and maintenance of the scientific workforce.

⁶² Fellowships, traineeships, and training grants (FTTGs) include all fellowship, traineeship, and training grant programs that are directed primarily toward the development and maintenance of the scientific workforce.

HBCU researchers may also be vulnerable to review processes that evaluate institutional research facilities or resources.⁶³ While there are ways for faculty from HBCUs to know if their institution meets the minimum qualifications to receive federal funds, faculty may have less information available to them to determine if the agency or funding program considers the institution to have the capacity and capabilities to carry out the requested research. Federal staff who may assist HBCUs in assessing federal viability and meeting federal rules and regulations may not be able to inform faculty as well if the institution is ill-prepared to carry out the research requested within a funding notice. Without clear definitions of what capacity is needed and clear measures to understand how agencies or reviewers determine an institution's capacity needs, it makes it hard for an institution to ensure they are fully prepared to demonstrate their capability and capacity to carry out the research.

Conversations with HBCU personnel have revealed that even when HBCUs have adequate capacity to conduct proposed research, at times, proposers receive feedback suggesting reviewers did not believe the applicant could carry out the proposed research. While it is unclear how reviewers come to these conclusions, this kind of feedback can also discourage resubmission or pursuit of other funding opportunities.⁶⁴ This lack of clarity and consistency on how capacity is assessed by reviewers, program officers, and agencies makes it difficult for faculty from HBCUs to assess their capacity needs and to meet or exceed the expectations that reviewers, program officers, and agencies have for R&D funding opportunities.

Even when programs or agencies suggest that research awards may be given to applicants who may need some assistance in carrying out their research, this tends to be met with skepticism from HBCU faculty who often have seen the need for capacity building support as a negative in the review and award process. Data shows that in competition-based funding, high-capacity institutions (which means those with fewer capacity building needs) receive more funding. Institutions that are well-resourced are more proficient at securing more resources. Likewise, institutions that are successful in securing competitive funding tend to be viewed as less risky, and when funding becomes more competitive and funding success rates decrease, reviewers and funding providers may favor institutions that carry less risk.⁶⁵ Therefore, without a clear understanding of how capacity is assessed, in most competition-based funding situations, having capacity needs or needing capacity building funds when requesting R&D funding could be seen as a liability.

Barrier: Partnerships That Are Non-Mutually Beneficial

Collaborations are considered a critical component of developing a competitive research program or portfolio. These partnerships must identify HBCUs as valued research partners. HBCU-focused

⁶³ National Institutes of Health. UNITE External Listening Sessions: Summary Report. https://www.nih.gov/sites/default/files/research-training/initiatives/ending-structural-racism/RFI_UNITE_external-listening-session-summary-report-508%5B42%5D.pdf

⁶⁴ National Institutes of Health. UNITE External Listening Sessions: Summary Report. https://www.nih.gov/sites/default/files/research-training/initiatives/ending-structural-racism/RFI_UNITE_external-listening-session-summary-report-508%5B42%5D.pdf

⁶⁵ Li and Agha. Big names or big ideas: Do peer-review panels select the best science proposals? *Science*. <https://doi.org/10.1126/science.aaa0185>

opportunities often encourage partnerships with R1 universities and other non-HBCU institutions. However, some R1 and non-HBCU researchers seek to collaborate, yet fail to engage HBCUs as true contributors.⁶⁶ The inherent power imbalance often created by these short-term collaborations prevents HBCUs from participating as full and equal partners in the research, resulting in a superficial and inequitable partnership. This is often the case when HBCUs are involved as subcontractors on awards given to R1s and predominantly white institutions (PWIs).⁶⁷

Barrier: Bias in The Review Process

When the Carnegie Classification was first developed, it was designed to be a system for describing the diversity of colleges and universities in the United States. Yet, early on, it had what some have called a ‘homogenizing’ effect in that institutions sought to “move up” the classification system for inclusion among the “research activity” universities,⁶⁸ with R1 being considered the highest and most coveted ranking. Studies show that often when it comes to making funding recommendations, reviewers tend to bias in favor of research or researchers who might often be found at a R1 institution.^{69,70,71} The existence of well-resourced and staffed laboratories, extensive shared institutional knowledge, dedicated time to navigate grant writing, management of research laboratories, and requirement for a strong track record of publication, or the belief of the availability of these resources,⁷² may factor into funding decisions. Since HBCUs were established in response to the systemic exclusion of Black students from other colleges and universities, they may not evoke perceptions of educational rigor and research excellence among members of the academic community.⁷³ This leads to biases against HBCUs and Black scholars that may negatively affect funding proposal review and award decisions.^{74,75}

The National Science Foundation (NSF) Merit Review Process FY 2021 Digest reveals that between 2012 and 2021, proposals from Black principal investigators (PIs) were consistently funded at lower rates

⁶⁶ Toldson. Drivers and Barriers of Success for HBCU Researchers Submitting STEM Proposals to the U.S. National Science Foundation (Editor’s Commentary). *Journal of Negro Education*.
<https://www.jstor.org/stable/10.7709/jnegroeducation.86.4.0415>

⁶⁷ National Institutes of Health. UNITE External Listening Sessions: Summary Report.
https://www.nih.gov/sites/default/files/research-training/initiatives/ending-structural-racism/RFI_UNITE_external-listening-session-summary-report-508%5B42%5D.pdf

⁶⁸ Forbes. Movin’ On Up: Nine Universities Climb to Highest Carnegie Classification In 2021.
<https://www.forbes.com/sites/michaelnietzel/2021/12/21/movin-on-up-nine-universities-climb-to-highest-carnegie-classification/?sh=1cd15bac4d8b>

⁶⁹ Merton. The Matthew effect in science. *Science*. <https://doi.org/10.1126/science.159.3810.56>

⁷⁰ Okike, et. al. Single-blind vs Double-blind Peer Review in the Setting of Author Prestige. *Journal of the American Medical Association*. <https://doi.org/10.1001/jama.2016.11014>

⁷¹ Blank. The effects of double-blind versus single-blind reviewing: Experimental evidence from the American economic review. *American Economic Review*. <https://www.jstor.org/stable/2006906>

⁷² Chemical and Engineering News. Why racial disparities in NIH funding persist and what might fix the problem.
<https://cen.acs.org/careers/diversity/racial-disparities-NIH-funding-persist/100/i18>

⁷³ Rankins. An Investigation of How Black STEM Faculty at Historically Black Colleges and Universities Approach the U.S. National Science Foundation Merit Review Process.
<https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=6235&context=etd>

⁷⁴ National Institutes of Health. Review Matters: Race & Peer Review.
<https://www.csr.nih.gov/reviewmatters/2020/06/12/race-peer-review/>

⁷⁵ Chen, et.al. Meta-Research: Systemic racial disparities in funding rates at the U.S. National Science Foundation. *eLife*.
<https://doi.org/10.7554/eLife.83071>

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than proposals submitted by white principal investigators (PIs).⁷⁶ Research on funding rates at the National Institutes of Health (NIH) in 2011 and 2019 demonstrated that applications from white PIs were about 1.7 times more likely to be funded than applications from Black PIs.^{77,78,79} While these reports focus on Black scholars, not specifically HBCUs, HBCUs have higher percentages of Black/African American faculty, making this issue of bias relevant. In 2022, across 3,480 degree-granting postsecondary institutions, over 725,000 full-time instructional staff were employed.⁸⁰ A little over 6% of these instructional staff identified as Black. Across HBCUs, almost 55% of full-time instructional staff identified as Black. Given that HBCUs produce a significant number of Black STEM graduates who go on to receive STEM doctorates, graduates may also be subject to these biases upon entering a new faculty position and attempting to secure federal funding.

HBCU researchers have noted that federal program directors and/or reviewers tend to have had little to no experience teaching or conducting research at an HBCU and have limited knowledge of the institutional context of HBCUs or the strengths that they can bring to a research study.⁸¹ Studies have demonstrated that an applicant's prior grant funding, institution size, and institutional prestige are related to funding success.⁸² Funding decisions can also be influenced by a reviewer's perception of scientific merit, where an applicant went to school, and a lack of diversity among grant reviewers.⁸³ Demographic data on NIH study section members from FY 2011 through FY 2015 revealed that just 2.4% of its members were Black/African American.⁸⁴ Data on federal proposal reviewer composition is limited but without diversified representation, proposals from Black/African American researchers and HBCU faculty face an increased risk of a subjective, instead of an objective, review.^{85,86} Improvements have been made,⁸⁷ but government-wide, there is still more work to be done.

⁷⁶ U.S. National Science Foundation and National Science Board. Merit Review Process: Fiscal Year 2021 Digest. https://www.nsf.gov/nsb/publications/2022/merit_review/nsb202314.pdf

⁷⁷ Ginther, et. al. Race, Ethnicity, and NIH Research Awards. *Science*. <https://doi.org/10.1126%2Fscience.1196783>

⁷⁸ Hoppe, et. al. Topic choice contributes to the lower rate of NIH awards to African-American/black scientists. *Science Advances*. <https://doi.org/10.1126%2Fsciadv.aaw7238>

⁷⁹ Taffe and Gilpin. Racial inequity in grant funding from the US National Institutes of Health. *eLife*. <https://doi.org/10.7554%2FeLife.65697>

⁸⁰ U.S. National Science Foundation. National Center for Education Statistics. <https://nces.ed.gov/ipeds/TrendGenerator/app/build-table/5/51?rid=162&cid=59>

⁸¹ Toldson. Drivers and Barriers of Success for HBCU Researchers Submitting STEM Proposals to the U.S. National Science Foundation (Editor's Commentary). *Journal of Negro Education*. <https://www.jstor.org/stable/10.7709/jnegroeducation.86.4.0415>

⁸² A Review of Funder Instructions and Grant Reviewer Practices for Assessing the Intellectual Merit and Other Impacts of Research. U.S. National Science Foundation. <https://nsf.gov/resources/nsf.gov/files/Broader-Impacts-Literature-Review.pdf?VersionId=pEEdnFPn5alSEsH5NMaA4JqhFICKqDMG>

⁸³ Chemical and Engineering News. Noni Byrnes wants to bring transparency. <https://cen.acs.org/policy/research-funding/Noni-Byrnes-wants-bring-transparency/97/i46>

⁸⁴ Hoppe, et. al. Topic choice contributes to the lower rate of NIH awards to African-American/black scientists. *Science Advances*. <https://doi.org/10.1126%2Fsciadv.aaw7238>

⁸⁵ Chemical and Engineering News. Why racial disparities in NIH funding persist and what might fix the problem. <https://cen.acs.org/careers/diversity/racial-disparities-NIH-funding-persist/100/i18>

⁸⁶ Toldson. Drivers and Barriers of Success for HBCU Researchers Submitting STEM Proposals to the U.S. National Science Foundation (Editor's Commentary). *Journal of Negro Education*. <https://www.jstor.org/stable/10.7709/jnegroeducation.86.4.0415>

⁸⁷ National Institutes of Health. Demographics of CSR Reviewers. https://public.csr.nih.gov/AboutCSR/Evaluations#reviewer_demographics

Barrier: Limited Post-Award Information that HBCUs Can Use to Inform Funding Opportunity Selection

Developing a process for finding and securing funding and making well-informed decisions about which funding opportunities to pursue can be critically important for faculty seeking and securing long-term research funding. HBCU faculty, particularly at R2 HBCUs, are expected to balance high teaching loads, service responsibilities, and research productivity. These ongoing obligations can limit the dedicated time that faculty have to find new funding opportunities, draft grant or contract submissions, or handle any pre-award management issues before securing a research award.^{88,89} Faculty also have to factor into their process and planning if limited institutional/administrative staffing support may serve as a challenge, if limited or outdated physical infrastructure or research facilities will inhibit their research efforts, or if high turnover rates among senior faculty, staff, and other institutional leaders or loss of institutional knowledge will negatively impact a faculty member's research plans.

To support faculty in developing strong research processes and plans, it is critically important that HBCU faculty know the opportunities that are available to them through federal funding. To make those decisions, it helps when researchers, sponsored research officers, and administrators know: who the recipients of prior awards are, the funding rates/success rates for investigators at the institution, how many prior awards were to new faculty/new investigators, the research findings and publications of previously funded researchers, and the outcomes and impacts of previous awardees. This data can be incredibly helpful to researchers considering where to invest significant time and energy in the grant writing and research development process, and to federal agencies when looking to see if equitable funding decisions are being made. When seeking multi-institution funding opportunities, faculty should be able to see all institutions that are a part of a previously/current funded collaborative.

To attract and retain faculty, HBCUs have to compete with well-resourced institutions that may offer more competitive salaries, better-equipped laboratories, and substantial start-up packages.⁹⁰ Large funding opportunities, if secured, can help an institution attract and retain new faculty or improve existing faculty members' ability to hire necessary research support staff. Having budget information on such large funding opportunities could help a faculty member when looking to budget and hire a multi-institution team. Seeking and securing research funding that includes professional development and mentoring may be particularly important for early career faculty who often do not have regular access to effective faculty development programs or guidance from more senior faculty. Knowing how other early faculty utilized their funding can help new awardees foster grant-writing and research management success.⁹¹

⁸⁸ Escobar, Qazi, Majewski, and Jellani. Barriers and Facilitators to Obtaining External Funding at Historically Black Colleges and Universities (HBCUs). *Journal of STEM Education*. <https://jstem.org/jstem/index.php/JSTEM/article/view/2606/2310>

⁸⁹ Qazi and Escobar. Fostering the Professional Advancement of Minority STEM Faculty at HBCUs. *American Associations of Colleges and Universities: Peer Review*. <https://par.nsf.gov/servlets/purl/10162053>

⁹⁰ National Institutes of Health. UNITE External Listening Sessions: Summary Report. https://www.nih.gov/sites/default/files/research-training/initiatives/ending-structural-racism/RFI_UNITE_external-listening-session-summary-report-508%5B42%5D.pdf

⁹¹ Escobar, Qazi, Majewski, and Jellani. Barriers and Facilitators to Obtaining External Funding at Historically Black Colleges and Universities (HBCUs). *Journal of STEM Education*. <https://jstem.org/jstem/index.php/JSTEM/article/view/2606/2310>

Recommendations for Federal Research Agencies to Boost Research Capacity at HBCUs

To sustainably boost the capacity of high research activity status HBCUs, the recommendations in this section provide clear suggestions regarding ways federal agencies can grow the participation of HBCUs across their funding opportunities.

Recommendation: Strengthen Outreach and Engagement Activities

Each federal agency must take responsibility for its communication strategies and assess whether they are effective in reaching key populations. Posting opportunities to a centralized site is a start, but given such sites are rarely complete or comprehensive, it cannot be used as an agency's only means of outreach. Through deliberate and active approaches with measures to assess impact, agencies can provide more opportunities to HBCUs looking to move from R2 status to R1 status.

Provide structured, government-initiated outreach

- Ensure in-person engagement balances in-person events at agencies and events on-campus at HBCUs.
- Make sure institutions know if a PI, researcher, educator, or administrator can request an outreach visit from federal staff
- Utilize virtual engagement tools to regularly reach rural and remote populations.
- Before conducting outreach, have awareness of the institutions' areas of existing research strengths, ask for capabilities/capacity statements in advance of visits, capture their current federal funding profile (i.e., which other agencies fund them), and build connections between the institutions' existing funding and other funding opportunities (within the agency) where researchers have also found success.

Update agency communication practices

- Designate positions/identify liaisons at agencies to support genuine, culturally competent engagement with faculty, staff, and students at HBCUs.
- Ensure that information about new funding opportunities is shared with HBCUs far in advance of application deadlines, to ensure ample time for prospective grantees to prepare an application; also consider increasing the length of the submission window and use of recurring deadlines to allow for partnering and proposal development.
- Ensure past info sessions and webinars are centrally posted for access at any time.
- Consider more proactive outreach that is shared directly with HBCUs (e.g., emails, newsletters) in addition to outreach that individuals have to seek (e.g., websites, online portals).
- Ensure materials posted on agency websites are updated and, where possible, centralized to provide information on agency and cross-agency resources that support research activities at HBCUs.

Strengthen interagency coordination

- Agencies should work together to streamline event coordination, email communications, resources, and requests made of HBCUs.
- Collaborate with other agencies to host convenings, workshops, and other events.
- Fund a federally coordinated website that compiles information about STEM education and R&D funding opportunities that HBCUs are eligible to apply to.

Recommendation: Provide Comprehensive Technical Assistance and Training

Technical assistance can be defined as assisting with “navigating the federal grant process and to strengthen the capacity of grant applications and recipients to apply for, and manage, federal grant funding.”⁹² Federal agencies can provide technical assistance to prospective awardees on how to navigate the federal funding process. This is especially true for federal contracting as the procurement process is radically different from the grantmaking process and is governed by different regulations, agency offices, and other requirements. Additionally, intellectual property education and training can be a strong tool to help advance research and innovation to impact in the marketplace.

Adopt consistent and clear models of communication and prioritize accessibility in funding opportunities

- Limit jargon, extensive use of acronyms, or language that might otherwise be ambiguous to new investigators and/or institutions.
- Have clear and consistent communication protocols that include location of goals and objectives, criteria and process for selection, and additional information that could ease new investigators and institutions in navigating the funding pathway.
- Create graphics and other multimedia products hosted on agency websites that guide applicants through the process of grant and/or contract solicitations when possible. The goal of such efforts should be to increase the clarity and decrease the ambiguity of the application process, thus empowering institutions to submit competitive proposals.
- Work with communities of practice and/or with grantees to better understand the barriers facing institutions and researchers, and create technical assistance materials accordingly. (e.g., timelines, milestones, check-in points, etc.)

Allow for more opportunities for funding supportive cohort structures and communities of practice of grantees and potential grantees

- Provide access to funding that allows researchers to have support from experienced program managers or program liaisons.
- Increase awareness of the proposal process and increase opportunities for prospective grantees to engage with current awardees to demystify the proposal process.
- Incorporate opportunities for researchers or prospective researchers to connect with other researchers funded by similar programs/agencies/research communities

⁹² Federal Grant Technical Assistance: Definition, Use, and Considerations for Congress. Congressional Research Service. <https://crsreports.congress.gov/product/pdf/R/R47607/1#:~:text=Technical%20assistance%20is%20a%20category,and%20manage%2C%20federal%20grant%20funding>

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- Support currently funded researchers in the identification of new funding opportunities before their current award ends.

Fund or allow for funding of innovative training and resource exchange models

Some HBCUs may have small and overburdened sponsored research offices, contract administrators, and procurement staff. Funding should be allocated to:

- Attract and retain skilled staff and administrators at HBCUs.
- Facilitate peer training, mentoring, or staff exchange programs between HBCUs, R1s, and federal extramural offices.

Foster exchanges within government that would also help to foster institutional exchanges, where research development professionals, contract specialists, and foundation/partnership specialists might work together sharing and using effective strategies for applying for and securing external funding.

Recommendation: Increase the Flexibilities and Expand the Funding Available to Support Institutional Capacity

Federal agencies should expand the mechanisms available to support HBCUs.

Incorporate multi-targeted comprehensive funding approaches that allow for ecosystem development

Provide a broad set of funding opportunities to support students and researchers at HBCUs as well as the institutions' administrative, research, and physical infrastructure. Examples include but are not limited to:

- Scholarships, paid internships, and registered apprenticeships for students,
- Fellowships for graduate students, postdoctoral researchers, and early career faculty,
- Basic, translational, and convergent research grants,
- Exploratory, pilot, and planning research grants,
- Faculty startup grants, seed funding, and bridge funding,
- Workshop and conference grants,
- Faculty training and professional development grants,
- Cooperative agreements for research centers, such as centers of excellence,
- Physical research infrastructure grants,
- Access to federal or federally funded state-of-the-art research instrumentation,
- Broadband infrastructure investments,
- Business and human infrastructure grants, including support for information technology and ancillary business support staff, and
- Intellectual property, technology transfer, and commercialization support.

Invest in shared/collaborative sponsored research offices (SRO) or resource centers

Establish resource centers that provide:

- Grant development seminars for proposers.

- Proposal submission assistance to HBCU PIs and grant administration staff.
- Deliver targeted trainings for staff on the administrative logistics of submitting proposals and managing funded awards.
- Training for administrators and staff on how to better understand the federal procurement process (e.g., getting on a GSA schedule⁹³).
- Training for administrators and researchers on how best to support sponsored office staff and federal budget officers while a grant or contract is being administered.
- Funding that supports third-party grant/contracting consortiums to manage pre-award and post-award processes.
- Support alignment of HBCU's strategic research goals and the needs of local communities and trends in the research and innovation ecosystem.
- Support funding for technology transfer office capacity, or state commercialization consortiums to provide support for emerging programs.
- Integrate intellectual property education for students and faculty early in the R&D cycle to expand opportunities for licensing and tech transfer of research endeavors to commercial products.

Support research infrastructure needs through a variety of mechanisms

As R&D funding opportunities have increased in number, HBCU research infrastructure has not grown proportionally to keep up. This is especially evident in physical facilities since, generally, grants and contracts do not allow for funds to be expended on brick-and-mortar building renovation and/or construction. Funding renovations to research facilities and supporting research development and grants management can help HBCUs meet their current needs and expand into critical and emerging STEM research areas. Potential areas for agency implementation include:

- Embed funds/line items for capacity-building support into non-competitive and competitive research, education, and training awards to include improvements to physical facilities.
- Allow award personnel budgets to include support for research management or award administration staff.
- Allow for the use of award funds to purchase business management system software to manage grants/procurement/research expenditures.
- Use mechanisms to sustain support for and access to federally funded centers and labs after the primary funding period ends.

Recommendation: Demystify the Funding Process and Support Clearly Defined Pathways for Building Research Capacity

To enable HBCUs to more easily apply for funding, agencies can make notices of funding opportunity solicitations, and other funding announcements more accessible to faculty, staff, and students.

⁹³ <https://www.gsa.gov/small-business/small-business-resources/training-resources/getting-on-the-gsa-schedule>

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Delineate clear ways for institutions and researchers to build capacity, capability, and competitiveness over time

- Identify and offer discussion forums, listening sessions, and idea labs that allow innovative approaches for increasing research development, infrastructure, and capacity to be developed, and exercise federal authority and flexibilities to fund such innovative proposals.
- Ensure there are clear ways for researchers to assess their readiness to carry out a research project in advance of proposal submission.
- Ensure regular engagement with HBCUs and assessment of researcher access and utilization to understand which programs across government are most effective in meeting institutional capacity needs vs. individual capacity needs.
- Increase awareness of co-funding opportunities and increase the number of programs that allow co-funding within and across agencies. Agencies should ensure faculty know about co-funding opportunities so that proposals are eligible for co-funding upon submission and can be considered for co-funding in the event co-funding becomes available. Co-funding could provide capacity building not available in R&D-only funding opportunities alone. For example, such funds could allow the use of program funds as start-up dollars to recruit new faculty or to retain faculty by increasing compensation to competitive levels.
- Support cluster hires to reduce some of the challenges of recruiting people from historically underrepresented groups into academic faculty positions. Support institutions in using the cluster hiring model to foster collaborative work towards proposal milestones, to navigate administrative processes, etc.
- Identify graduated steps or tracks across the agency in which researchers can anticipate funding as a next step in building their capacity (i.e., starting with a small training award, moving to a larger R&D award, then securing a contract with subcontractors) Consider capabilities and capacities that would be needed (and that would be funded) along the R&D trajectory.

Amend agency award policies and procedures

Agencies should explore, where allowable, modifications that address resource challenges faced by HBCUs:

- Increase the ceilings for direct costs based on established capacity needs.
- Permit allowable costs to include teaching and service buy-outs for faculty.
- Permit allowable costs to include travel funds to attend prospective or related federal agency convenings related to research and development.
- Ensure grant policies provide support to investigators, researchers, students and other trainees who may have caregiving responsibilities.
- Supplement expenses usually covered by overheads.
- Remove or reduce cost-sharing requirements.
- Ensure funds can be used to hire project staff who can help coordinate cross-disciplinary/multi-sector teamwork, project communication, and performance and dissemination efforts.

Revisit and revise programs as well as create/pilot new funding to increase the opportunities for HBCUs to build research capacity and secure competitive R&D awards

- Allow for longer award periods/periods of performance.
- Increase funding ceilings.
- Limit eligibility for funding to only lower-capacity institutions to prevent competition with well-resourced institutions.
- Embed capacity building funds or co-funding support into competitive research awards. Consider allocating a percentage or a budget amount of program funds to supplement competitive research awards (grants and contracts) to HBCUs to provide extra funding, time, resources, and/or staffing support to carry out capacity building activities before formally starting the research portion of the project. A set number of awards or funds should be made across programs, disciplinary areas, research foci, etc. to ensure capacity is constantly being developed across the research enterprise.

Recommendation: Facilitate effective and equitable partnerships

Federal agencies can leverage their positions as funders to facilitate effective, meaningful, and equitable partnerships between HBCUs and other entities. Importantly, federally funded partnerships should be based on trust, build institutional knowledge of grant and contract funding, and establish networks for future collaborations that result in increased federal R&D investment at R2 HBCUs.

Support collaborations among HBCUs, and between HBCUs and non-HBCU partners

To grow research and development at HBCUs and within the communities that HBCUs serve, federal agencies can fund collaborations, including but not limited to:

- Planning grants to support the development of emerging partnerships or networks.
- Regional research collaborations and national consortia to facilitate resource- and knowledge-sharing among HBCUs.
- Partnerships between HBCUs and K-12 school systems.
- Partnerships between HBCUs and non-HBCU community colleges.
- Partnerships between HBCUs and industry.
- Partnerships between HBCUs and non-profit organizations.
- Research and teaching collaborations between HBCUs and national laboratories.

Having strong multi-sector partnerships is critical and sometimes required to secure federal funding, especially grants and contracts for large-scale research centers and hubs. HBCUs need opportunities to lead these partnerships, drawing on their many strengths.

Include funding requirements for genuine partnership-building

While funding opportunities can be effective in fostering relationships, incorporating language that encourages genuine partnerships can help to ensure that federally funded collaborations do not perpetuate inequities. Examples of potential actions include:

- Releasing notices of intent in advance of releasing funding opportunities such that HBCUs have adequate time to secure partners.

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- Requiring that proposals for research collaborations include sections that describe envisioned investigator and institutional roles and the nature of the proposed partnership.
- Requiring that HBCU partners on proposals must receive a specific minimum portion (e.g., at least half) of the requested project budget.
- Requiring applicants to describe how students and other trainees will be able to utilize the resources made available by the partnership.
- Weighing relevant grant and contract solicitation evaluation criteria to reward applicants with authentic HBCU partnerships.
- Incorporate “no-go clauses” within contract and grant terms to prevent funding from being allocated to awardees that do not provide performance reports that demonstrate HBCU engagement in alignment with the activities and metrics stipulated within the proposal.
- Allow for HBCUs/sub-awardees to provide/include performance reports directly to federal reporting systems.
- Fund resources and events that facilitate partnership development.

Federal agencies can make links between HBCUs and potential partners. Such connection-making activities can include:

- Online repositories of HBCU R&D capacity and/or capability statements.
- Convenings to enable HBCUs to network and share capabilities with prospective partners.
- “Matchmaking” sessions with other institutions and federal agencies.
- Developing interagency funding opportunity announcements to enable HBCUs to acquire a broader, more sustainable, access to federal funding opportunities.
- Sub-competitions through non-profit partners, which could help to circumvent complex funding requirements, reduce constraints on allowable research costs, and provide training on writing competitive federal grant proposals.

Recommendation: Combat Biases During Proposal Review

Incorporate the merits of funding HBCUs into agency-wide training

Merit review trainings for new program officers, panelists, and reviewers should improve understanding of the research enterprise at HBCUs by highlighting that:

- An individual’s experience with attributes of what constitutes high quality research may limit their thinking, as the principle of equifinality (there is more than one way to get to the same end) advances STEM innovation.
- HBCUs can and do conduct rigorous research.
- HBCUs are not monolithic.
- PIs and grant administrators at HBCUs work in unique institutional contexts.
- HBCUs train and prepare high quality STEM scholars.

Transform who participates in the merit review system

Part of the “hidden curriculum” of securing research funding is truly understanding how proposals will be evaluated. Few of those who participate in the review of federal research funding programs come from HBCUs. The merit review process can be improved by:

- Offering “mock panel review” sessions for HBCU faculty.
- Creating and expanding opportunities for HBCU faculty to sit on agency grant proposal review boards or agency advisory boards.
- Continuing to offer the option for virtual participation in panel reviews, which became widespread during the COVID-19 pandemic.
- Standardizing processes for recruiting and selecting reviewers across and between agencies.
- Changing incentive structure for reviewer participation to ensure that scholars from all backgrounds are better represented in the merit review process.
- Ensuring that feedback on unfunded proposals is constructive and does not include biased judgments on institutional capabilities.

Increase opportunities for HBCU faculty members to serve within the federal government

A generally underused mechanism is the *Intergovernmental Personnel Act (IPA)* authority which allows for temporary assignment of personnel between the federal government and state and local governments, colleges, and universities, Indian tribal governments, federally funded research and development centers, and other eligible organizations, such as institutions of higher education.

Use of IPA authority (e.g., temporary assignment) can increase opportunities for HBCU faculty members to work alongside career federal employees, which will increase information and research exchange and allow for new perspectives to inform agency activities. To avoid depleting the already strained human capital resources of HBCUs, federal agencies could recruit IPA assignees from faculty who are tracked for upcoming sabbatical or who have already been released from teaching duties. NSF allows for IPA assignees to maintain their involvement with their professional research using the Independent Research/Development (IRD) program and structuring the workload and other requirements (e.g., telework) to facilitate participation in the IRD program.⁹⁴ With this flexibility, IPAs can continue to contribute to their research at their home institution while contributing to agency activities.

An increase in the number of HBCU faculty who gain understanding of internal federal research agency processes will promote information and bidirectional resource exchanges between agencies and HBCUs. It will also allow for perspectives of HBCU researchers to inform federal activities. Agencies can:

- Raise awareness about the value and use of the IPA mechanism.
- Ensure IPA guidelines are accessible to non-governmental readers and are of consistent detail and quality across federal agencies.
- Actively recruit HBCU research faculty for sabbaticals at federal agencies through IPA temporary assignments.

⁹⁴ U.S. National Science Foundation. Intergovernmental Personnel Act Assignments. <https://new.nsf.gov/careers/rotator-programs/intergovernmental-personnel-act-ipa-assignments>

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- Increase training opportunities that HBCU administrators and leadership can access to process and manage IPA appointment requests.
- Amplify and celebrate research that takes place at HBCUs and highlight the accomplishments of PIs at HBCUs in articles, convenings, and achievement awards.

Recommendation: Prioritize transparency

Setting public agency-wide goals and monitoring

Setting agency-wide funding goals, along with measurable and trackable commitments to build research capacity across our nation leveraging currently underutilized institutions, can only be done with concrete strategies.

- Establish approaches to engage more HBCUs and emerging research institutions (ERIs) in the research enterprise.
- Track HBCU engagement and involvement along the way to identify and address challenges in agency approaches.
- Set explicit agency-wide targets for number of proposal submissions, awards, gross obligation dollar amounts, funding rates, and other relevant metrics.
- Regularly measure progress on achieving targets.⁹⁵
- Publicize the agency's involvement with HBCUs as well as communicate shared accomplishments and success stories with HBCUs.
- Connect HBCUs with non-profit organizations and industry to help cultivate a pipeline of potential HBCU board members, administrators, and/or faculty members.

Prioritize performance assessment of HBCU inclusivity across agency opportunities with data

In order to understand which new interventions and changes to existing programs are actually effective in advancing HBCU research capacity, agencies need to effectively assess outcomes. Agencies can:

- Routinely analyze program data related to proposal submission rates, merit review processes and outcomes, funding rates, and program features that may be correlated with HBCU success.
 - Disaggregate data to reveal funding rates for HBCUs.
 - Assure that individuals leading evaluation efforts have direct experience with and understanding of HBCUs.
- Make performance outcomes public through accessible reports on agency websites.
- Share effective policies and adapt/adopt promising practices from other agencies via interagency collaboration.
- Regularly confer with university stakeholders during program evaluations and program improvement phases.

⁹⁵ U.S. National Science Foundation. Agency Priority Goal: Improve representation in the scientific enterprise. <https://tableau.external.nsf.gov/views/AgencyPriorityGoal/APGInstitutionGoal?%3Aembed=y&%3B%3AisGuestRedirectFromVizportal=y>

Conclusions

This report reviews important barriers and challenges faced by R2 HBCUs in participating in the federal funding ecosystem, summarizes promising and emerging practices currently implemented by agencies to support HBCUs, and offers suggestions for federal research agencies to support R2 HBCUs and other HBCUs who seek to boost their research capacity. As of the writing of this report, all R2 HBCUs have included goals in their strategic plans to advance HBCUs' research capacities. The recommendations offered here reveal practices to best support HBCUs in their research and development goals for years to come.

In 2025, the American Council on Education plans to revise the Carnegie Classification framework, which will include updates to college and university research designations.⁹⁶ With these changes, HBCU research designations are going to change; some R2 HBCUs may receive an R1 designation and others will be acknowledged for their commitment to training students and supporting undergraduate research. In the face of these changes, federal agencies will need to grow opportunities for sustained investment in all HBCUs to ensure they continue to advance STEM research and innovation.

Though this report is focused on reducing barriers to participation in the federal research ecosystem for R2 HBCUs, its findings can be adapted to support other emerging research institutions aiming to boost research capacity, including HBCUs that are not R2s, Predominantly Black Institutions, Tribal Colleges and Universities, Hispanic-serving institutions, and other minority serving institutions that have been historically underrepresented as awardees in federal research funding programs. These institutions can face similar financial, infrastructure, and administrative resource barriers as R2 HBCUs, and agency best practices for improving engagement with R2 HBCU faculty and staff would also positively impact these institutions. The recommendations outlined in this report to increase the number and accessibility of funding opportunities, promote genuine partnerships, mitigate biases, and provide training and technical assistance can facilitate the success of all historically underserved institutions.

⁹⁶ American Council on Education. 2025 Basic Classification. <https://carnegieclassifications.acenet.edu/carnegie-classification/basic-classification/>

Appendix 1: Select Agency Practices for Advancing Research Capacity at HBCUs

By highlighting some promising and/or emerging practices⁹⁷ pioneered by some agencies, practices can be replicated by other federal agencies to address the challenges faced by HBCU applicants and advance HBCU R&D capacity. These practices are intended to: improve the ability to access and utilize information from federal sources; increase funding success and the ability to produce impactful research; reduce institutional and organizational impediments to the research process; improve opportunities for faculty development and growth as researchers through collaboration, mentorship, and grants management; and increase the university's organizational development by facilitating conditions and resources to support research and innovation.

Promising/Emerging Practice: Initiated and Sustained Outreach and Engagement

HBCUs have expressed difficulty identifying funding opportunities. While traditional communication methods such as email distribution lists allow agencies to reach many recipients, agencies have found that more proactive forms of outreach and engagement yield better results. These methods include:

- Convening in-person and virtual sessions with HBCU representatives to foster relationship-building and bidirectional knowledge-sharing on specific challenges HBCUs may face when responding to agency funding opportunities.
- Developing matchmaking services through which HBCUs connect with agency point-of-contacts who can facilitate matching faculty research interests to appropriate funding opportunities.
- Hosting HBCU researchers at agency intramural research programs under institution-government exchange programs.
- Being intentional in sharing information about the various opportunities that HBCU faculty/staff/ administrators have to convene around shared areas of research interest or new areas of research and innovation.
- Providing opportunities for intellectual property awareness/understanding, and commercialization training for faculty and students at HBCUs to help researchers make the vital link between R&D and innovation.
- Providing opportunities for HBCU faculty to carry out hands-on projects working alongside federal researchers.
- Including HBCU researchers on agency peer review or advisory boards.
- Sharing opportunities with HBCU researchers about program officer positions and IPA employee positions.

⁹⁷ Promising Practices: Promising practices are those that are consistent with principles established by research but have not been verified by evaluation. "Promising practices" can also be used to refer to practices that are known to be "evidence-based" under a specific context, but are being applied in a different context. Emerging Practices: Emerging practices are considered to be interventions that are new, innovative, or exploratory in nature, and while they may be based on some level of evidence, that evidence is not sufficient for it to be considered a promising practice. <https://www.whitehouse.gov/wp-content/uploads/2021/09/091621-Best-Practices-for-Diversity-Inclusion-in-STEM.pdf>

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One of the examples above is practiced and/or was provided by:

- DOC National Institute of Standards and Technology (NIST) Professional Research Experience Program⁹⁸
- DOC United States Patent and Trademark Office (USPTO) Outreach to Minority Serving Institutions⁹⁹
- U.S. Department of Energy (DOE) Educational Engagement and Training Series: Technical Assistance for HBCUs, TCUs, and other MSIs¹⁰⁰
- DOE Visiting Faculty Program¹⁰¹
- U.S. Department of Health and Human Services (HHS), National Institutes of Health (NIH) Path to Excellence and Innovation Initiative¹⁰²
- U.S. Department of Health and Human Services (HHS), National Institutes of Health (NIH) Engagement and Access for Research-Active Institutions (EARA)¹⁰³
- U.S. Department of State (DOS) Bureau of Educational and Cultural Affairs Fulbright HBCU Institutional Leaders Initiative¹⁰⁴
- National Aeronautics and Space Administration (NASA) HBCU/MSI Technology Infusion Road Tour¹⁰⁵
- NASA MSI Exchange Database and MSI Exchange Newsletter¹⁰⁶
- USPTO intellectual property education programs and conferences focused on increasing HBCU participation in the innovation ecosystem
- USPTO collaborating with NASA on the Minority Innovation and Tech Transfer Competition (MITTC)¹⁰⁷

Promising/Emerging Practice: Robust Pre-Award Technical Assistance

To craft competitive grant proposals, institutions and researchers must have a comprehensive understanding of the requirements and review criteria of federal funding programs and, in the case of contracts, how the federal government agency implements procurement practices. Given the time and resource challenges that can limit HBCU applicants' ability to prepare and submit successful proposals, agencies have developed HBCU- and MSI-focused programming that supports:

- Providing technical assistance on proposals during events, such as National HBCU Week.¹⁰⁸
- Agency-hosted office hours, workshops, webinars that provide technical assistance on grant and contract proposals and encourage timely submission.

⁹⁸ <https://www.nist.gov/iaao/academic-affairs-office/professional-research-experience-program>

⁹⁹ <https://www.uspto.gov/learning-and-resources/kids-educators/outreach-minority-serving-institutions>

¹⁰⁰ <https://www.energy.gov/justice/educational-engagement-and-training-series-technical-assistance-msis-tcus-hbcus>.

¹⁰¹ <https://science.osti.gov/wdts/vfp>

¹⁰² <https://oamp.od.nih.gov/nih-small-business-program-office/nih-path-to-excellence-innovation-initiative>

¹⁰³ <https://diversity.nih.gov/build/engagement-and-access-research-active-institutions-eara>

¹⁰⁴ <https://www.fulbrightprogram.org/fulbright-hbcu-institutional-leaders-initiative/>

¹⁰⁵ <https://stemgateway.nasa.gov/public/s/course/a0Ct0000007KImNEAW/murep-hbcumsi-technology-infusion-road-tour>

¹⁰⁶ <https://msiexchange.nasa.gov/>

¹⁰⁷ <https://www.uspto.gov/learning-and-resources/kids-educators/outreach-minority-serving-institutions>

¹⁰⁸ <https://www.ed.gov/news/press-releases/white-house-initiative-advancing-educational-equity-excellence-and-economic-opportunity-through-historically-black-colleges-and-universities-host-2022-national-hbcu-conference>

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- Funding for dedicated faculty development programs that provide training on how to prepare competitive proposals.
- Pre-proposal conference calls, which allows proposers opportunities to ask questions before they submit their proposals.
- Constructive feedback, free from bias, on rejected proposals and guidance on how to resubmit.
- Pre-recorded webinars for each funding mechanism, followed by office hours.¹⁰⁹
- Instead of submitting one long grant proposal, applicants first submit a brief description, concept paper, or letter of intent; attend a series of virtual trainings on how to write strong grant applications; and receive feedback from reviewers on their initial applications before submitting full grant proposals.

One of the examples above is practiced and/or was provided by:

- Department of Education (ED) Office of Postsecondary Education.
- DOE Funding for Accelerated, Inclusive Research (FAIR).¹¹⁰
- DOS Increase and Diversify Education Abroad for U.S. Students (IDEAS).
- NASA Office of STEM Engagement.
- NSF Alliances for Graduate Education and the Professoriate-funded PATHs Program.¹¹¹
- NSF Historically Black Colleges and Universities – Undergraduate Program (HBCU-UP)
- Department of Agriculture (USDA) National Institute of Food and Agriculture’s series of Grants Development and Grants Management Workshops for Minority Serving Institutions.
- USPTO engagement with interagency collaborators to ensure that federally funded research has IP protection. Educating faculty and students on IP protection for research not only prepares HBCUs to obtain funding and provide protection but also prepares them to build entrepreneurship into research efforts, which can open additional resources, such as NSF's Innovation Corps (I-Corps) training for entrepreneurs and startups.

Promising/Emerging Practice: Different Mechanisms for Funding Which Allow for and Support Capacity Building

Agencies that effectively fund HBCUs have a variety of programs that are HBCU-focused and provide multiple levers of support. HBCU-focused programs and other opportunities that prioritize applications from HBCUs provide a clear pathway for HBCUs into the federal funding ecosystem. These opportunities grow HBCU applicants’ familiarity with federal protocols and procedures and build the relationships and momentum necessary to be successful at securing the research and development funding at agencies.

¹⁰⁹ <https://www.nsf.gov/edu/Videos/2023HBCUUPWebinar.jsp>

¹¹⁰ <https://science.osti.gov/Initiatives/FAIR/Funding-Opportunities>

¹¹¹ <https://www.t-paths.net/>

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HBCUs have a long history of advancing education and research in the agricultural sciences.^{112,113} USDA, one of the largest annual sources of S&E support for HBCUs, offers the Research at 1890 Land-Grant Institutions (Evans-Allen) Program.¹¹⁴ Additional USDA funding for land-grant HBCUs include programs to support student education and training, advance STEM research, and improve campus facilities:

- 1890 Institution Teaching, Research and Extension Capacity Building Grants Program¹¹⁵
- Scholarships for Students at 1890 Institutions (1890 Scholarships)¹¹⁶
- Centers of Excellence at 1890 Institutions (1890 COEs)¹¹⁷
- Agricultural Extension Programs at 1890 Institutions¹¹⁸
- 1890 Facilities Grants Program¹¹⁹
- Agriculture Business Innovation Center (ABIC) at an HBCU Program¹²⁰

The U.S. National Science Foundation (NSF) also offers a diverse array of grants to support HBCU faculty research, undergraduate education, and efforts to build partnerships and research and innovation capacity.¹²¹

Examples of dedicated NSF funding opportunities for HBCUs include:

- Advancing Research Capacity at HBCUs through Exploration and Innovation (ARC-HBCU)¹²²
- Historically Black Colleges and Universities – Excellence in Research (HBCU - EIR)¹²³
- Historically Black Colleges and Universities – Undergraduate Program (HBCU-UP)¹²⁴

Although not directly for HBCUs, NSF’s Growing Research Access for Nationally Transformative Equity and Diversity (GRANTED) initiative is designed to support infrastructure needs.¹²⁵

¹¹² Ag Web. HBCU’s and Agriculture: History and Recent Developments. <https://www.agweb.com/opinion/hbcus-and-agriculture-history-and-recent-developments>

¹¹³ Black Enterprise. USDA Invests \$33 Million into HBCU Agricultural Programs. <https://www.agweb.com/opinion/hbcus-and-agriculture-history-and-recent-developments>

¹¹⁴ U.S. Department of Agriculture. FY 2023 Enacted National Institute of Food and Agriculture Analysis. <https://www.nifa.usda.gov/sites/default/files/2023-01/FY%202023%20Enacted%20NIFA%20Analysis%20-%20Agriculture%20Appropriation.pdf>

¹¹⁵ <https://www.nifa.usda.gov/grants/funding-opportunities/1890-institution-teaching-research-extension-capacity-building-grants>

¹¹⁶ <https://www.nifa.usda.gov/grants/funding-opportunities/scholarships-students-1890-institutions-1890-scholarships>

¹¹⁷ <https://www.nifa.usda.gov/grants/funding-opportunities/centers-excellence-1890-institutions-1890-coes>

¹¹⁸ <https://www.nifa.usda.gov/grants/programs/capacity-grants/agricultural-extension-programs-1890-institutions>

¹¹⁹ <https://www.nifa.usda.gov/grants/funding-opportunities/1890-facilities-grants-program>

¹²⁰ <https://www.nifa.usda.gov/grants/funding-opportunities/agriculture-business-innovation-center-hbcu-institution>

¹²¹ U.S. National Science Foundation. NSF By the Numbers.

<https://tableau.external.nsf.gov/views/NSFbyNumbers/Trends?%3AisGuestRedirectFromVizportal=y&%3Aembed=y&%3Alinktarget=blank&%3Atoolbar=top>

¹²² <https://new.nsf.gov/funding/opportunities/advancing-research-capacity-hbcus-through>

¹²³ <https://new.nsf.gov/funding/opportunities/historically-black-colleges-universities-0>

¹²⁴ <https://new.nsf.gov/funding/opportunities/historically-black-colleges-universities-1>

¹²⁵ <https://new.nsf.gov/funding/initiatives/broadening-participation/granted#overview-98e>

Promising/Emerging Practice: Incentivizing Fair and Equitable Partnership Development and Collaboratives

Agencies have seen the importance of ensuring and developing equitable partnerships. Partnership development, inclusion of HBCUs as co-developers, or incentives to HBCU or EMI engagement are seen as critical components of the following funding opportunities:

- NSF Enabling Partnerships to Increase Innovation Capacity (EPIIC)¹²⁶
- NSF Build and Broaden: Enhancing Social, Behavioral and Economic Science Research and Capacity at Minority Serving Institutions (B2)¹²⁷
- DOE'S Clean Energy Education Prize Partnerships Track¹²⁸
- USPTO and Kentucky Commercialization Ventures, a tech transfer/research commercialization consortium, working with HBCUs to provide intellectual property-related opportunities.
- USPTO's work with principal investigators on intellectual property and the patent application process through the NSF Centers of Research Excellence in Science and Technology (CREST), a program that provides support to enhance the research capabilities of minority serving institutions (MSIs).

Promising/Emerging Practice: Reducing Harmful Bias During the Review Process

- NIH announced, in October 2023, a new framework for the peer review of most research project grant (RPG) applications beginning with submissions for due dates on or after January 25, 2025. The simplified review framework is expected to better focus peer reviewers on the key questions needed to assess the scientific and technical merit of proposed research projects: "Should the proposed research project be conducted?" and "Can the proposed research project be conducted?"^{129,130, 131}
- NSF has implemented a robust reviewer training program to help mitigate the impact of bias in the merit review process and to demonstrate its commitment to creating a merit review system that is fair, objective, and inclusive. Key elements of the NSF's bias mitigation strategies include educating reviewers on implicit biases and providing them with strategies to recognize and overcome them during the evaluation of proposals. The training also emphasizes the importance of assessing the potential of applicants from underrepresented backgrounds, including those from HBCUs, and recognizing the value of diverse perspectives and experiences. To ensure proposals are evaluated based on their intrinsic merits, the NSF utilizes standardized review criteria helping to minimize the reliance on superficial factors or biases. Recognizing the potential for individual biases, programs across the NSF actively recruit diverse pools of reviewers to provide comprehensive and balanced assessments. Furthermore, NSF continuously analyzes data

¹²⁶ <https://new.nsf.gov/funding/opportunities/enabling-partnerships-increase-innovation-capacity>

¹²⁷ <https://new.nsf.gov/funding/opportunities/build-broaden-enhancing-social-behavioral-economic>

¹²⁸ <https://americanmadechallenges.org/challenges/hbcu>

¹²⁹ National Institutes of Health. Simplified Review Framework for NIH Research Project Grant Applications. <https://grants.nih.gov/grants/guide/notice-files/NOT-OD-24-010.htm>

¹³⁰ National Institutes of Health. Simplified Peer Review Framework. <https://grants.nih.gov/policy/peer/simplifying-review/framework.htm>

¹³¹ National Institutes of Health. Simplifying Review of Research Project Grant Applications. <https://grants.nih.gov/policy/peer/simplifying-review.htm>

to identify and address any patterns of bias or inequity, including in the review of HBCU proposals, and incorporates reviewer feedback to improve the process.^{132,133,134,135,136}

Promising/Emerging Practice: Data to Inform Decisions and Assess Program/ Funding Access

While publicly available data is limited, agencies have shown concrete improvements in their funding rates after instituting some of the above practices. These data points shed light onto how these practices are moving the needle towards the goal of increasing research capacity at HBCUs. Likewise, HBCUs can use these data to inform their strategies when deciding on various funding opportunities. Access to data also fosters trust in the overall review and funding process.

- NSF has shown that the funding rate of proposals from HBCUs have doubled between 2013 and 2023.¹³⁷ NSF also has an Agency Priority Goal to improve representation in the scientific enterprise by making changes that will lead to an increase in proposal submissions led by individuals from underrepresented groups and from underserved communities. By September 30, 2025, NSF will increase the proportion of proposals received 1) with principal investigators from groups underrepresented in STEM and 2) from emerging research institutions by 10 percent over the FY 2022 baselines.¹³⁸
- In DOS, the IDEAS program awarded 35% of institution grants (12 of 34) to MSIs in every grant category in FY 2022. Fulbright participants from or hosted by MSIs increased from 1,037 during Academic Year (AY) 2021-22 to 1,417 for AY 2022-23—an increase of 36%. The Critical Language Scholarship (CLS) Spark Program awarded scholarships to 37 students from MSIs in FY 2022, which represented 44% of the total award winners. Gilman Program participants from HBCUs increased from 17 in FY 2021 to 42 in FY 2022.
- DOE increased the number of research grants to HBCUs as the leading institution in FY 2023 by 77% (from 35 awards in FY 2022 to 62 awards in FY 2023). DOE increased the number of unique HBCUs supported in FY 2023 by 66.7% (from 15 in FY 2022 to 25 in FY 2023). Also, in FY 2023, 12 undergraduate students from 9 HBCUs participated in the DOE’s Science Undergraduate Laboratory Internships (SULI) program; 25 faculty and 2 students from 15 HBCUs participated in the Visiting Faculty Program (VFP).
- USDA National Institute of Food and Agriculture (NIFA) released a public grant funding dashboard in 2023 which reveals USDA-NIFA increased funding to HBCUs from \$222 million in FY 2021 to \$353 million in FY 2023. This increase included \$79 million to 1890 Institutions from Learning to Leading: Cultivating the next Generation of Diverse Food and Agriculture

¹³² National Science Foundation. Advisory Committee for STEM Education. <https://www.nsf.gov/edu/advisoryreports.jsp>

¹³³ U.S. National Science Foundation. Merit Review Orientation. <https://new.nsf.gov/od/oia/merit-review-orientation>.

¹³⁴ U.S. National Science Foundation. Proposal & Award Policies & Procedures Guide (PAPPG). <https://new.nsf.gov/policies/pappg/23-1>.

¹³⁵ U.S. National Science Foundation. (2024c). Implicit Bias. <https://new.nsf.gov/news/unmasking-bias>

¹³⁶ U.S. National Science Foundation. Broadening Participation Resources <https://new.nsf.gov/funding/initiatives/broadening-participation/other-resources>.

¹³⁷ U.S. National Science Foundation. NSF By the Numbers.

<https://tableau.external.nsf.gov/views/NSFbyNumbers/Trends?%3AisGuestRedirectFromVizportal=y&%3Aembed=y&%3Alinktarget=blank&%3Atoolbar=top>

¹³⁸ U.S. National Science Foundation. FY 2024 - FY 2025 Priority Goals. <https://www.performance.gov/agencies/nsf/apg/fy-24-25/>

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Professionals. This dashboard also provides transparency into match funding provided by NIFA's grantees. Grant impacts are available through NIFA's Data Gateway Enterprise Search.¹³⁹

- USPTO improved access to Intellectual Property resources within local communities by expanding its recruiting and designation of local libraries across the country as Patent and Trademark Resource Centers (PTRCs), where the librarians are trained to provide visitors with USPTO resources such as search tools and educational materials. During this expansion, the USPTO has worked with four HBCUs (Howard University's Founders Library, the John B. Cade Library at Southern University and A&M College, the John B. Coleman Library at Prairie View A&M University, and the Miller F. Whittaker Library at South Carolina State University).

¹³⁹ National Institutes of Food and Agriculture. Data Gateway. <https://www.nifa.usda.gov/data/data-gateway>

Appendix 2: List of Research Capacity Building Funding Opportunities (i.e., focuses on HBCUs, TCUs, and MSIs and/or Emerging Research Institutions (ERI))

- **U.S. Department of Commerce** National Oceanic and Atmospheric Administration (NOAA)
 - Educational Partnership Program with Minority Serving Institutions (EPP/MSI): As an education and workforce training program, the NOAA EPP/MSI program provides financial assistance to MSIs through competitive cooperative agreements. The goal of the awards is to support the education, training, and graduation of post-secondary students in NOAA mission-aligned disciplines and to increase research collaborations with MSI faculty and NOAA. Most recent 5-year cooperative agreement awards were \$30 million and were awarded to Florida A&M University, Howard University, University of Maryland Eastern Shore, and City College of the City University of New York.
 - Scientist-In-Residence Program: This program provides an opportunity to advance scientific understanding of the complex processes occurring in the atmospheric boundary layer on local, regional, and global scales and fosters strong research collaborations with Minority Serving Institutions that are engaged in NOAA-mission sciences.
- **U.S. Department of Defense**
 - HBCU/MI Program¹⁴⁰
- **U.S. Department of Homeland Security** Science and Technology Directorate Office of University Program's Minority Serving Institution Programs
 - Scientific Leadership Award: Grants are competitively awarded to MSIs to help build institutional capacity through research and collaboration. Grants enable awardees to establish homeland security-related curricula and/or courses of study while supporting the development of student mentorship and recruitment activities, science and engineering research, and teaching initiatives. These awards significantly contribute to the development of and cultivation of relationships and networks across private industry, university, federal and local government, and DHS Centers of Excellence (COE).¹⁴¹
 - Summer Research Team (SRT) Program: Early career faculty and up to two students from MSIs are paired with a DHS COE to conduct full-time collaborative summer research. Over the course of 10 weeks during the summer, this opportunity increases and enhances scientific research capacity at MSIs in areas that support the mission and goals of DHS. Upon successful completion of the summer session, teams are eligible to receive up to \$100k of follow-on funding to continue their research for an additional year.¹⁴²
 - Minority Service Research and Development Consortium (MSRDC): A funding pathway in partnership with the US Army provides DHS Components access to member MSIs. The MSI serves as the prime performer for research, development, test, and/or evaluation (RDT&E)

¹⁴⁰ <https://basicresearch.defense.gov/Programs/HBCU-MI-Program/>

¹⁴¹ <https://www.dhs.gov/science-and-technology/minority-serving-institutions-program>

¹⁴² <https://www.dhs.gov/science-and-technology/minority-serving-institutions-program>

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- efforts. Through MSRDC, DHS can access more than 80 MSIs (38 HBCUs), including 15 R1 universities, and 37 partnering private industry organizations.¹⁴³
- Homeland Security Professional Opportunities for Student Workforce to Experience Research (HS-POWER): Provides substantive work-based learning opportunities to graduate and undergraduate students majoring in a broad spectrum of homeland security-related STEM disciplines as well as DHS mission-relevant research areas. Interns gain quality research and work experience with DHS Components, federal research facilities, and other STEM-focused entities nationwide. HS-POWER also provides interns with invaluable opportunities to cultivate relationships with DHS personnel, researchers, and fellow students.¹⁴⁴
 - Homeland Security Workforce opportunities to Increase Research Engagement and Diversity (HS-WIRED): An 8-12-week internship program for graduate and undergraduate MSI students interested in supporting cutting-edge research with leading scientists and engineers. Participants conduct research at Pacific Northwest National Laboratory (PNNL) and have an opportunity to establish connections with U.S. Department of Energy professionals working on homeland security-related research.¹⁴⁵
- **U.S. Department of Education**
 - Research and Development Infrastructure Grant Program¹⁴⁶
 - **U.S. Department of Energy**
 - Visiting Faculty Program¹⁴⁷
 - Faculty-Applied Clean Energy Sciences Program¹⁴⁸
 - Funding for Accelerated, Inclusive Research (FAIR)¹⁴⁹
 - Minority Serving Institutions Partnership Program (MSIPP)¹⁵⁰
 - National Nuclear Security Administration Minority Serving Institution Partnership Program¹⁵¹
 - Office of Science Funding for Accelerated, Inclusive Research¹⁵²
 - Reaching a New Energy Sciences Workforce (RENEW)¹⁵³
 - **National Aeronautics and Space Administration** Minority University Research and Education Project (MUREP)¹⁵⁴ and its connected programs, which include:

¹⁴³ <https://www.msrdconsortium.org/>

¹⁴⁴ <https://www.dhs.gov/science-and-technology/minority-serving-institutions-program>

¹⁴⁵ <https://www.dhs.gov/science-and-technology/minority-serving-institutions-program>

¹⁴⁶ <https://www2.ed.gov/programs/rdi/index.html>

¹⁴⁷ <https://science.osti.gov/wdts/vfp>

¹⁴⁸ <https://orise.orau.gov/FACES/>

¹⁴⁹ <https://science.osti.gov/Initiatives/FAIR>

¹⁵⁰ <https://www.srnl.gov/partner-with-us/academia/minority-serving-institutions-partnership-program/msipp-research-awards/>

¹⁵¹ <https://www.energy.gov/nnsa/nnsa-minority-serving-institution-partnership-program-msipp>

¹⁵² <https://science.osti.gov/Initiatives/FAIR/Funding-Opportunities>

¹⁵³ <https://science.osti.gov/Initiatives/RENEW>

¹⁵⁴ <https://www.nasa.gov/learning-resources/minority-university-research-education-project/>

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- MUREP Innovative Research Opportunity (MIRO): Established to strengthen and develop the research capacity and infrastructure of MSIs with an annual cooperative agreement of up to \$1 million for five years¹⁵⁵
- MUREP Partnership Learning Annual Notification (MPLAN): A short-term opportunity for MSIs to connect with NASA via a prize of up to \$50,000¹⁵⁶
- MUREP Space Technology Artemis Research (MSTAR): Established to promote STEM literacy of MSIs to participate in opportunities for advance technologies need for space exploration¹⁵⁷
- **U.S. Department of Agriculture**
 - Agricultural and Food Research Initiative Food and Agricultural Science Enhancement (FASE) Grants¹⁵⁸
 - Centers of Excellence at 1890 Institutions¹⁵⁹
 - Education Grants for 1890 Institutions (Capacity Building Grants)¹⁶⁰
 - Extension Services at 1890 Institutions¹⁶¹
 - Facility Improvements at 1890 Institutions¹⁶²
 - Scholarships at 1890 Institutions¹⁶³
- **U.S. National Science Foundation**
 - Advancing Research Capacity at HBCUs through Exploration and Innovation (ARC-HBCU)¹⁶⁴
 - Building Research Capacity of New Faculty in Biology (BRC-BIO)¹⁶⁵
 - Build and Broaden: Enhancing Social, Behavioral and Economic Science Research and Capacity at Minority Serving Institutions (B2)¹⁶⁶
 - Centers of Research Excellence in Science and Technology Research Infrastructure for Science and Engineering (CREST-RISE)¹⁶⁷
 - Computer and Information Science and Engineering Research Expansion Program (CISE MSI)¹⁶⁸

¹⁵⁵<https://www.nasa.gov/learning-resources/minority-university-research-education-project/murep-institutional-research-opportunity/>

¹⁵⁶<https://www.nasa.gov/learning-resources/minority-university-research-education-project/murep-partnership-learning-annual-notification-mplan/>

¹⁵⁷<https://www.nasa.gov/learning-resources/minority-university-research-education-project/murep-space-technology-artemis-research-m-star-planning-grant/>

¹⁵⁸ <https://www.nifa.usda.gov/grants/programs/agriculture-food-research-initiative-afri/afri-fase-epscor-program>

¹⁵⁹ <https://www.nifa.usda.gov/grants/funding-opportunities/centers-excellence-1890-institutions-1890-coes>

¹⁶⁰ <https://www.nifa.usda.gov/grants/funding-opportunities/1890-institution-teaching-research-extension-capacity-building-grants>

¹⁶¹ <https://www.nifa.usda.gov/grants/programs/capacity-grants/agricultural-extension-programs-1890-institutions>

¹⁶² <https://www.nifa.usda.gov/grants/funding-opportunities/1890-facilities-grants-program>

¹⁶³ <https://www.usda.gov/partnerships/1890NationalScholars>

¹⁶⁴ <https://new.nsf.gov/funding/opportunities/advancing-research-capacity-hbcus-through>

¹⁶⁵ <https://new.nsf.gov/funding/opportunities/building-research-capacity-new-faculty-biology-brc>

¹⁶⁶ <https://new.nsf.gov/funding/opportunities/build-broaden-enhancing-social-behavioral-economic>

¹⁶⁷ <https://new.nsf.gov/funding/opportunities/centers-research-excellence-science-technology-0>

¹⁶⁸ <https://new.nsf.gov/funding/opportunities/computer-information-science-engineering-research-0>

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- EMpowering BRoader Academic Capacity and Education (EMBRACE)¹⁶⁹
- Enabling Partnerships to Increase Innovation Capacity (EPIIC)¹⁷⁰
- Expanding AI Innovation through Capacity Building and Partnerships (ExpandAI)¹⁷¹
- Geoscience Opportunities for Leadership in Diversity (GOLD-EN)¹⁷²
- Historically Black Colleges and Universities – Excellence in Research (HBCU - EIR)¹⁷³
- Historically Black Colleges and Universities – Undergraduate Program (HBCU-UP)¹⁷⁴
- Launching Early-Career Academic Pathways in the Mathematical and Physical Sciences (LEAPS-MPS)¹⁷⁵

¹⁶⁹ <https://new.nsf.gov/funding/opportunities/empowering-broader-academic-capacity-education>

¹⁷⁰ <https://new.nsf.gov/funding/opportunities/enabling-partnerships-increase-innovation-capacity>

¹⁷¹ <https://new.nsf.gov/funding/opportunities/expanding-ai-innovation-through-capacity-building>

¹⁷² <https://new.nsf.gov/funding/opportunities/geoscience-opportunities-leadership-diversity-gold>

¹⁷³ <https://new.nsf.gov/funding/opportunities/historically-black-colleges-universities-0>

¹⁷⁴ <https://new.nsf.gov/funding/opportunities/historically-black-colleges-universities-1>

¹⁷⁵ <https://new.nsf.gov/funding/opportunities/launching-early-career-academic-pathways>