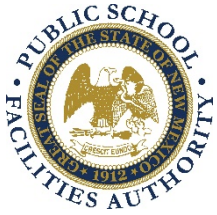


Statewide HVAC Conditions



SEPTEMBER 25, 2023

Current Funding Mechanisms for Heating Ventilation and Air Conditioning Systems (HVAC)

The PSCOC provides a Systems-based awards program, as the mechanism to fund the replacement and or upgrade of various systems projects. HVAC systems applications are validated for long-term system sustainability in respect to the overall condition of the building. Replacing HVAC systems on facilities with a high Facility Condition Index (FCI) is not a sustainable practice. Buildings with a high FCI are typically nearing the end of their functional lifespans. An FCI is a commonly used metric with the construction industry to compare the relative ages of buildings. Specifically, it is the cost of repairs/renewal divided by the cost of replacement. Since FY2020 to present, the PSCOC has awarded 49 Systems-based awards (not all included HVAC) in the amount of \$45,328,287.

Other Funding Opportunities

Other funding opportunities to address HVAC issues statewide have become available from the Federal Government through the Elementary and Secondary School Emergency Relief (ESSER) funds, which included multiple rounds of funding, including - Coronavirus Aid, Relief, and Economic Security Act (CARES), the Coronavirus Response and Relief Supplemental Appropriations (CRRSA), and the American Rescue Plan (ARP)(Abbey et al. 2021). These funds “...provided to states to support the nation’s schools in safely reopening and sustaining safe operations of schools while meeting the academic, social, emotional, and mental health needs of students resulting from the COVID-19 pandemic.”

The uses for the CRRSA and ARP rounds of funding have included:

- School facility repairs and improvements to enable operation of schools to reduce risk of virus transmission and exposure to environmental health hazards
- Inspection, testing, maintenance, repair, replacement, and upgrade projects to improve the indoor air quality in school facilities

Round three of the ARP funding appropriated \$979.1 million for operational costs, Covid-19 emergencies, facility improvements, and addressing learning loss, with a deadline for expenditure by September 30, 2024.

Statewide HVAC Conditions and GSF's

Synopsis:

- A HVAC system can be composed of up to 6 different sub-components
 - Cool generating systems, heat generating systems, dual use combo units, air distribution, exhaust and ventilation and HVAC Controls
- 53 million square feet (sf) of permanent educational public facilities statewide
- Currently FAD recognizes 4.7 million sf of HVAC systems that have a Category 1, 2 or 3 override applied with an estimated starting replacement cost of \$88.2M.
 - Category 1- Immediate Code/Life health
 - Category 2 - Degraded with Reduced Functionality
 - Category 3 - Mitigating Additional Damage
- The \$88.2M does not include the cost associated with additional infrastructure required to support the new HVAC.
- Freon is no longer being used as a cooling agent and has been phased out since 2010. Districts have trouble procuring the cooling agent required for these older systems. Nearly 15.7 million sf of public school facilities are currently cooled by refrigerated air units or dual purpose combo units that had been installed prior to 2010. Replacement cost estimated at \$546M, not including supporting infrastructure.
- HJM007 calls for “certified mechanical technicians.” PSFA assessors are not certified mechanical technicians.
- PSFA’s data on school buildings systems is limited to age, condition, gross square footage.
 - Does not capture physical measurements about yield or quality.

Current Statewide HVAC Outlook

Total statewide educational permanent structure square footage expands across 53,292,819 sf. The composition of components that make up a HVAC system are unique for many of the school facilities statewide. One building within a school may have evaporative coolers and a boiler where as other buildings might have combo units that provide both a heating and cooling capacity, it is important to consider that some buildings might be a blend of all three heating/cooling systems.

Currently, the Facilities Assessment Database (FAD) has identified up to 4,790,868 sf of school facility space that has been identified as having a Category 1 (Life/Health/Safety), Category 2 (Reduced Functionality), or Category 3 (Mitigate Additional Damage) override applied within any of its HVAC system components. These components include cool generating systems, heat generating systems, dual use combo units, air distribution, ventilation and exhaust and HVAC system controls.

Category overrides are applied to systems exhibiting defined observable conditions. The analysis does not consider square footage associated with systems that are recognized within lifecycle or beyond expected life because it is assumed that these systems are operational. Factors that affect optimal efficiency of HVAC systems.

- Maintenance
- Age
- Replacements part availability
- Qualified maintenance staff

Estimated Cost to Replace

An estimated cost to replace could potentially start at \$88,231,433. This analysis is not considering that HVAC upgrade and replacement projects on existing buildings are costly due to the complexity of the systems, high costs of individual units and components, and labor costs. The necessary scope for an HVAC replacement project must often include other associated building systems, such as fire alarm/suppression, electrical, roof, ceilings, thermal insulation, and the building envelope, to ensure the new HVAC system is functional and code compliant; these

additional, associated building system replacements can be costly and estimating a potential cost to correct will vary based upon each districts unique situations.

It is also important to consider that HVAC dual purpose combo units and cool generating refrigerated air units installed up until 2010 used Freon. Freon is now being phased out from the industry and districts looking to remediate some of their cooling issues cannot procure Freon to recharge their systems (Brown, J. n.d.). There is 15,734,460 sf of dual purpose combo units and refrigerated air units installed prior to 2010 that could all potentially be affected. The starting cost of replacement is \$546,544,335, not considering potential cost for additional systems necessary to support new HVAC infrastructure.

HVAC Assessments

The degree of detail in which HJM007 calls for in respect to the HVAC measurements and verifications is not currently captured by PSFA assessors. The memorial details the need for the HVAC systems to be assessed by certified mechanical technicians to provide specific technical information, verification of system data, and actions needed to improve the systems. PSFA assessors are not certified technicians in the context of this memorial. Costs to train PSFA staff to become certified technicians could range between \$1,200 and \$15,000 (Ko, N. J. 2022). An assessor's responsibility is to maintain the facilities assessment database in respect to current PSCOC programs. The time associated with conducting these technical HVAC system analysis would directly impact the rate in which PSFA assessors can assess New Mexico's 750+ public school facilities.

PSFA's data on school buildings systems is limited to age, condition and gross square footage. PSFA assessors follow the guidelines below when assessing HVAC systems statewide;

Proper operations & maintenance of HVAC systems and components is critical to the environmental comfort (IAQ) of the occupants & a properly balanced energy efficient reliable building. Air filters are checked that they follow manufacturer recommendations for equipment recommendations on filter types, sizes &

replacement frequencies. Systems are assessed for unusual noises / vibrations or leaks / filters & belt changes / loose or exposed wires, cleanliness of coils, rust or premature deterioration of system components. Heating & cooling systems should work as designed & operate properly. Ventilation – return air vents (combustion air) should be unobstructed & no damage is present. Pressure gauges, motors and pumps are assessed to be functional.

D3030- COOL GENERATING SYSTEMS STATEWIDE CONDITIONS AND ESTIMATED COST TO REPLACE

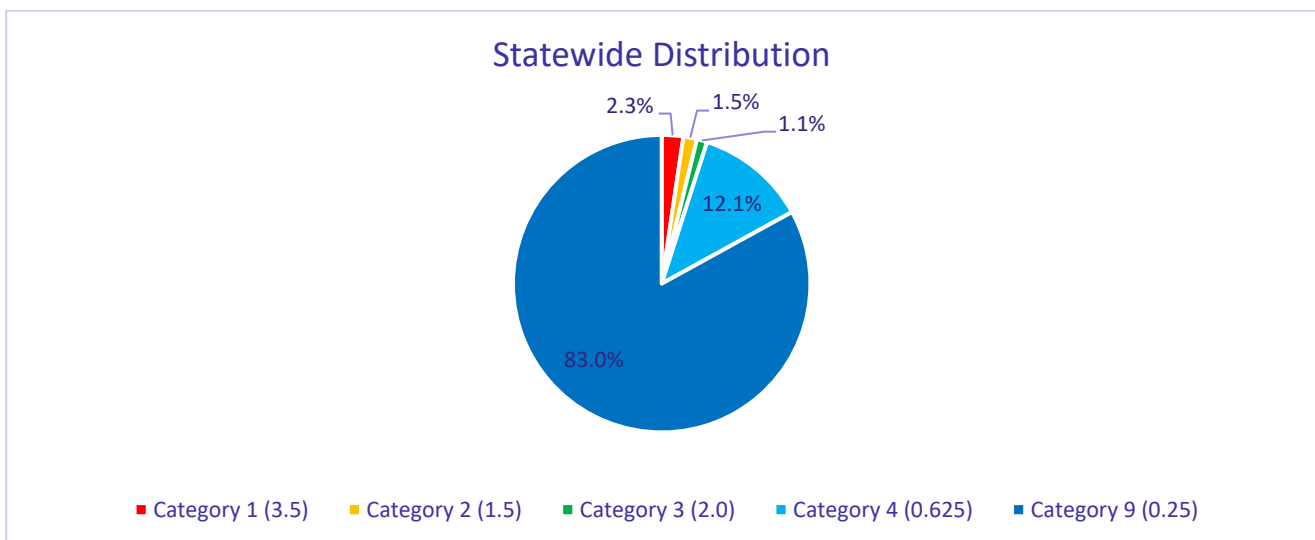
Includes:

Chillers, cooling towers & evaporative coolers, condensing units, piping & fittings, primary pumps, direct expansion systems, equipment & piping insulation, window or through-the-wall air conditioners, with or without heating of any type, reverse-cycle, water- or air-cooled, terminal heat pumps, wall sleeves where required

Total GSF and Estimated Cost To Replace Systems in Category 1,2, and 3:

Currently 1,520,533 sf of facility square footage has been recognized as having an override of Category 1 (Life/Health/Safety), Category 2 (Degraded with Reduced Functionality) or Category 3 (Mitigate Additional Damage). The cost to replace these systems within the state could cost \$33,869,872.58.

<u>D3030-Cool Generation Systems</u> 30 Year Lifecycle		fad -Cost/SQFT + 35% Inflation	
Condition	GSF	\$	22.28
		<u>Cost To Replace</u>	
Category 1 (3.5)	719,840	\$	16,034,436.00
Category 2 (1.5)	454,586	\$	10,125,903.15
Category 3 (2.0)	346,107	\$	7,709,533.43
Category 4 (0.625)	3,713,821	\$	82,725,362.78
Category 9 (0.25)	25,554,702	\$	569,230,987.05
Total	30,789,056	\$	685,826,22.40



D3020- HEAT GENERATING SYSTEMS STATEWIDE CONDITIONS AND ESTIMATED COST TO REPLACE

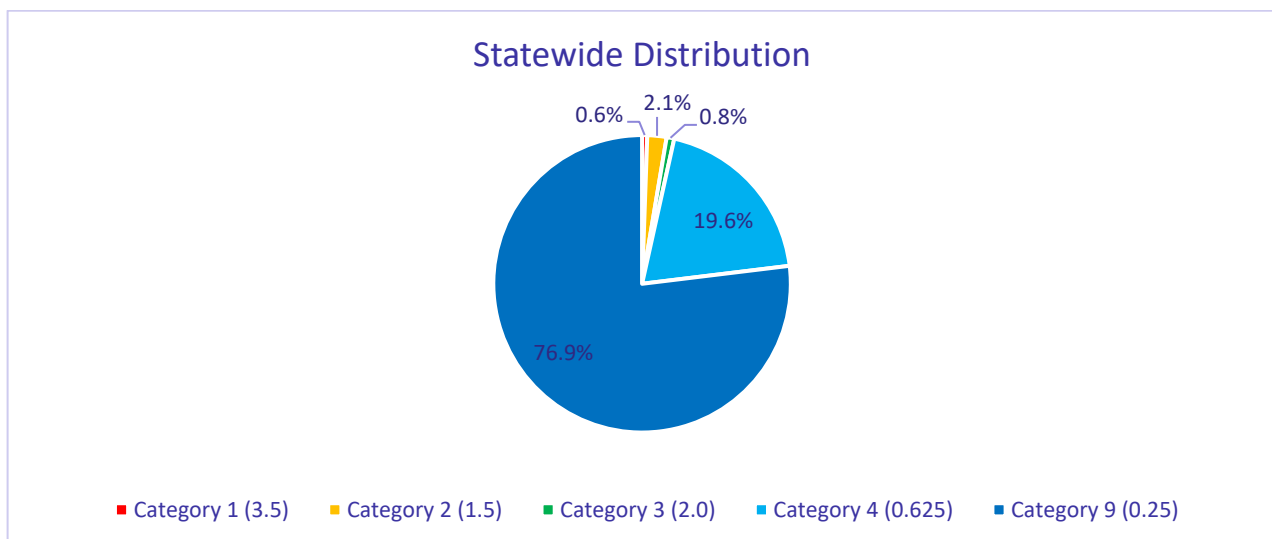
Includes:

Boilers, including electric, piping and fittings adjacent to boilers, primary pumps, auxiliary equipment, equipment & piping insulation, electric baseboard, electric or fossil fuel fired unit heaters, unit ventilators, & radiant heaters, electric or fossil fuel fired air-handling units or furnaces, wall sleeves where required

Total GSF and Estimated Cost To Replace Systems in Category 1,2, and 3:

Currently 1,138,214 sf of facility square footage has been recognized as having an override of Category 1 (Life/Health/Safety), Category 2 (Degraded with Reduced Functionality) or Category 3 (Mitigate Additional Damage). The cost to replace these systems within the state could cost \$25,353,716.85.

<u>D3020-Heat Generation Systems</u> 30 Year Lifecycle		fad -Cost/SQFT + 35% Inflation	
Condition	GSF	\$	22.28
		<u>Cost To Replace</u>	
Category 1 (3.5)	183,437	\$	4,086,059.18
Category 2 (1.5)	684,281	\$	15,242,359.28
Category 3 (2.0)	270,496	\$	6,025,298.40
Category 4 (0.625)	6,406,907	\$	142,713,853.43
Category 9 (0.25)	25,163,088	\$	560,507,785.20
Total	32,708,209	\$	728,575,355.48



D3020- COMBO UNIT SYSTEMS STATEWIDE CONDITIONS AND ESTIMATED COST TO REPLACE

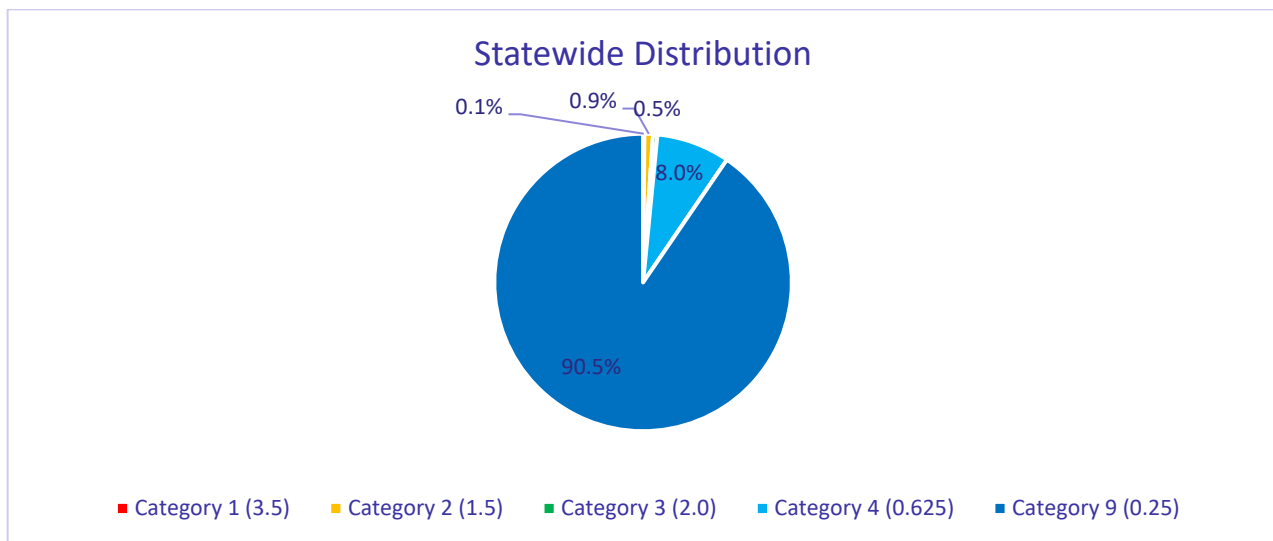
Includes:

Self-contained, air- or water-cooled, floor, ceiling, & rooftop air conditioners, & heat pumps, ductwork and accessories, including flue stacks

Total GSF and Estimated Cost To Replace Systems in Category 1,2, and 3:

Currently 445,748 sf of facility square footage has been recognized as having an override of Category 1 (Life/Health/Safety), Category 2 (Degraded with Reduced Functionality) or Category 3 (Mitigate Additional Damage). The cost to replace these systems within the state could cost \$15,483,279.65.

D3050-Combo Unit Generation Systems		fad -Cost/SQFT + 35% Inflation	
25 Year Lifecycle		\$	34.74
Condition	GSF	Cost To Replace	
Category 1 (3.5)	42,309	\$	1,469,624.27
Category 2 (1.5)	267,734	\$	9,299,874.36
Category 3 (2.0)	135,705	\$	4,713,781.03
Category 4 (0.625)	2,305,213	\$	80,072,726.16
Category 9 (0.25)	26,098,392	\$	906,540,695.32
Total	28,849,353	\$	1,002,096,701.13



D3041- AIR DISTRIBUTION SYSTEMS STATEWIDE CONDITIONS AND ESTIMATED COST TO REPLACE

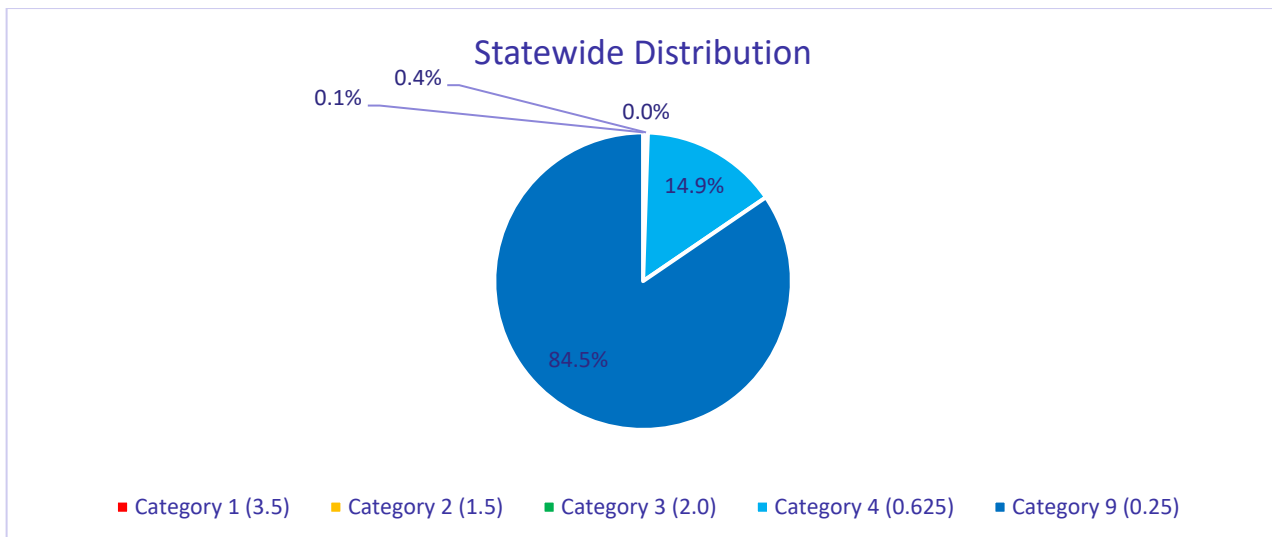
Includes:

Supply & return air systems, including air handling units with coils (electric included), filters, ductwork, & associated devices such as VAV boxes, duct heaters, induction units & grilles, auxiliary equipment such as secondary pumps, heat exchangers, sound attenuation, & vibration isolation

Total GSF and Estimated Cost To Replace Systems in Category 1,2, and 3:

Currently 228,441 sf of facility square footage has been recognized as having an override of Category 1 (Life/Health/Safety) and Category 2 (Degraded with Reduced Functionality). The cost to replace these systems within the state could cost \$5,088,523.28.

D3041- Air Distribution Systems		fad -Cost/SQFT + 35% Inflation	
30 Year Lifecycle		\$	22.28
Condition	GSF	Cost To Replace	
Category 1 (3.5)	51,901	\$	1,156,094.78
Category 2 (1.5)	176,540	\$	3,932,428.50
Category 3 (2.0)	0	\$	0.00
Category 4 (0.625)	6,566,514	\$	146,269,099.35
Category 9 (0.25)	37,130,844	\$	827,089,550.10
Total	43,925,799	\$	978,447,172.73



D3042- EXHAUST & VENTILATION STATEWIDE CONDITIONS AND ESTIMATED COST TO REPLACE

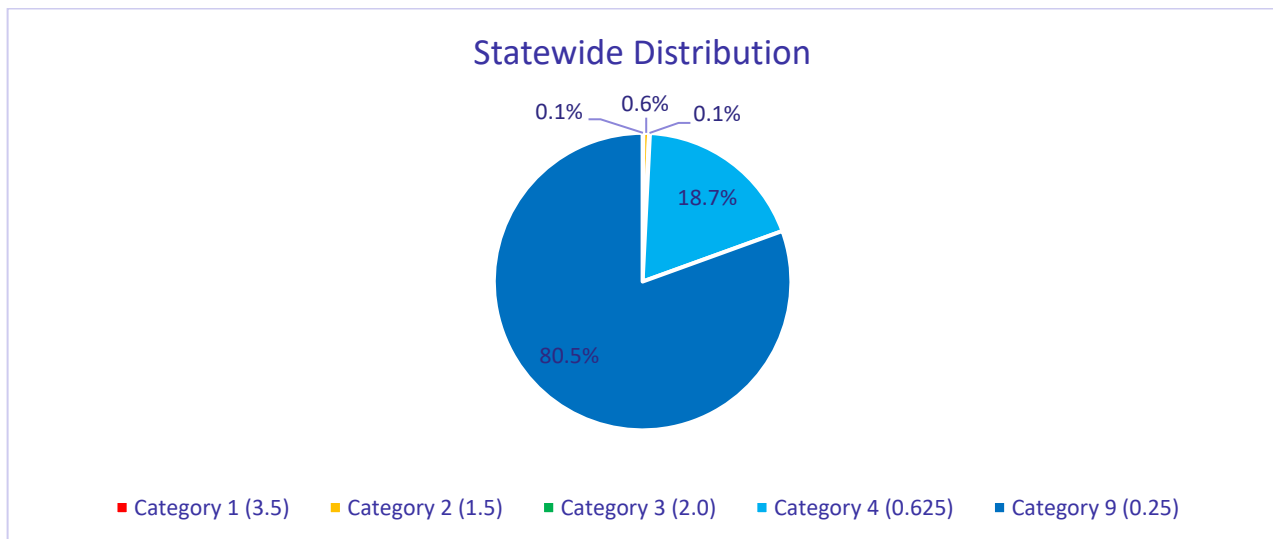
Includes:

Ventilation & exhaust systems

Total GSF and Estimated Cost To Replace Systems in Category 1,2, and 3:

Currently 414,052 sf of facility square footage has been recognized as having an override of Category 1 (Life/Health/Safety), Category 2 (Degraded with Reduced Functionality) or Category 3 (Mitigate Additional Damage). The cost to replace these systems within the state could cost \$1,827,832.55.

D3042- Exhaust and Ventilation Systems		fad -Cost/SQFT + 35% Inflation	
30 Year Lifecycle		\$	4.41
Condition	GSF	Cost To Replace	
Category 1 (3.5)	39,599	\$	174,809.79
Category 2 (1.5)	327,474	\$	1,445,633.97
Category 3 (2.0)	46,979	\$	207,388.80
Category 4 (0.625)	9,818,679	\$	43,344,588.45
Category 9 (0.25)	42,316,353	\$	186,805,540.32
Total	52,549,084	\$	231,977,931.32



D3060- HVAC CONTROLS STATEWIDE CONDITIONS AND ESTIMATED COST TO REPLACE

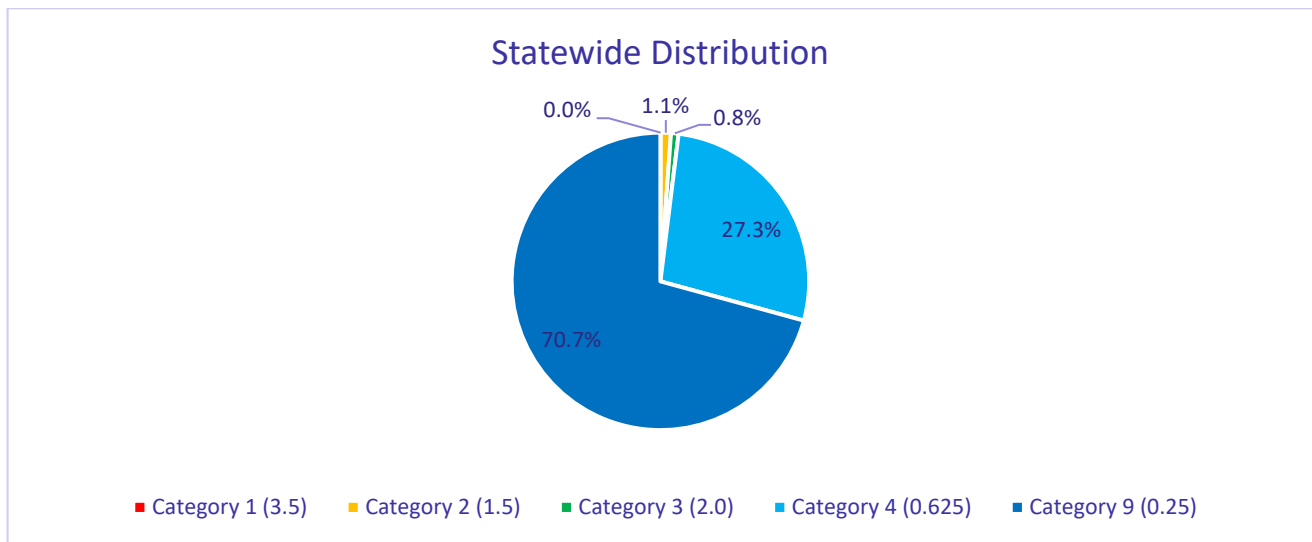
Includes:

Heating generating systems, cooling generating systems, heating/cooling air handling units, exhaust & ventilating systems, terminal devices, energy monitoring & control, building automation systems

Total GSF and Estimated Cost To Replace Systems in Category 1,2, and 3:

Currently 1,043,880 sf of facility square footage has been recognized as having an override of Category 1 (Life/Health/Safety), Category 2 (Degraded with Reduced Functionality) or Category 3 (Mitigate Additional Damage). The cost to replace these systems within the state could cost \$4,608,208.26.

D3060-HVAC Controls		fad -Cost/SQFT + 35% Inflation	
20 Year Lifecycle		\$	4.41
Condition	GSF	Cost To Replace	
Category 1 (3.5)	15,405	\$	68,005.37
Category 2 (1.5)	589,577	\$	2,602,687.67
Category 3 (2.0)	438,898	\$	1,937,515.22
Category 4 (0.625)	14,546,363	\$	64,214,919.46
Category 9 (0.25)	37,702,576	\$	166,438,021.75
Total	53,292,819	\$	235,261,149.48



Deficiency Categories and Associated Weight Factors

System - Category Override

Category Type #	Description	Applied Weight Factor
1	Immediate Code/Life/Health Applied to a system exhibiting critical issues that pose immediate threats to life, health or safety of persons within the facility. Examples include: <ul style="list-style-type: none"> • Obvious friable asbestos; potential release into the air • Serious code violations such as blocked egress, improper fire detection/warning, electrical hazards, structural failures, emergency lighting • Inadequate cooling/heating/ventilation in educational spaces • No site security fencing 	3.5
2	Degraded with Reduced Functionality Applied to a system exhibiting degradation due to age or use. Examples include: <ul style="list-style-type: none"> • Severely damaged walls, floor finishes and ceiling finishes 	1.5
3	Mitigate Additional Damage Applied to a system exhibiting damage and/or degradation that is beyond repair and failure is imminent. The system requires significant repairs or replacement to prevent additional damage to the building or facility. Examples include: <ul style="list-style-type: none"> • Chronically leaking roofs 	2.0
5	Grandfathered or State/District Recommended Applied to a system that contains code issues that are "grandfathered" or standards specific to the local agency or jurisdiction. Examples include: <ul style="list-style-type: none"> • Fire sprinkler systems • Finishes, flooring type, architectural standards, etc. 	0.50

System - Age Based

4	Beyond Expected Life Automatically applied to a system that is over 100% beyond expected BOMA life cycle, but exhibit no sign of immediate repair or replacement.	0.625
9	Normal/Within Life Cycle Automatically applied to a system that is within the projected lifecycle and does not exhibit degradation or need for replacement or repair.	0.25

Educational Adequacy

Category Type #	Description	Applied Weight Factor
6	Facility Related Deficiencies Automatically applied when site related deficiencies are determined in respect to the statewide adequacy standards and are an inherent part of the facility. Examples include: <ul style="list-style-type: none"> • Insufficient parking • Insufficient bus drop offs 	1.0
7	Space Related Deficiencies Automatically applied when interior space related deficiencies are determined in respect to the statewide adequacy standards and are an inherent part of the facility. Examples include: <ul style="list-style-type: none"> • Insufficient art, music, computer, career education, general classroom square footage, etc. • Insufficient core support areas needed to support mission critical space. 	3.0
8	Equipment Related Deficiencies Automatically applied when the equipment within a facility does not meet statewide standards. Examples include: <ul style="list-style-type: none"> • Lack of playground equipment • Lack of chemical storage units 	0.50

References

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