

Proactive Planning & Budgeting with a Sustainable Approach

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Monday Morning . . .



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Proactive Planning - Budgeting for Library Maintenance Through a Sustainability Lens



- Building Envelope Maintenance – Preventive maintenance and capital planning to protect what's behind the walls.
- HVAC System Maintenance – Ensuring heating, cooling, and ventilation systems remain a priority, even when out of sight.
- Energy Efficiency Strategies – Identifying opportunities for savings through building envelope enhancements and HVAC modifications.
- Future-Proofing – Planning improvements for the next 3, 5, and 10 years through capital planning.
- Preserving Collections & Health – Enhancing indoor air quality (IAQ) to safeguard building assets and occupant well-being.



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Proactive Maintenance - Avoiding Costly Surprises



- "Out of sight" should never mean "out of mind" (or planning)
 - Ignoring early warning signs can turn small issues into major crises.
 - Proactive planning, preventive maintenance, and incremental savings help prevent emergencies like flooded floors or failed heating.
- Capital Improvement Plans (CIP) are the foundation of a well-maintained facility
 - A variety of tools and resources are available to support long-term facility planning - let's explore them next.



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Building Envelope Maintenance - Protecting What's Behind the Walls

- Preventive maintenance and capital planning help protect the building's structure.
- Poor bulk water management can lead to moisture intrusion, mold, and structural damage.
- If water gets in, swift action is critical to prevent further issues.
- A well-maintained building envelope ensures longevity, energy efficiency, and occupant health.



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Tools



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Building System Lifespans - Planning for the Future

Building Element	System/Component	Life Expectancy
Roof	EPDM Membrane	20 to 25 years
	Metal	50 years
	Shingle	15 to 25 years
Exterior Walls	Vinyl Siding	20 to 30 years
	Brick – Veneer	70 years
	Aluminum	30 to 50 years
	EIFS / Stucco	30 to 50 years
Exterior Doors	Wood	30 to 40 years
	Steel	35 to 40 years
	Glass	20 to 30 years
Parking Lot	Concrete	30 to 35 years
	Asphalt	25 to 30 years
	Granite Curbing	50+ years

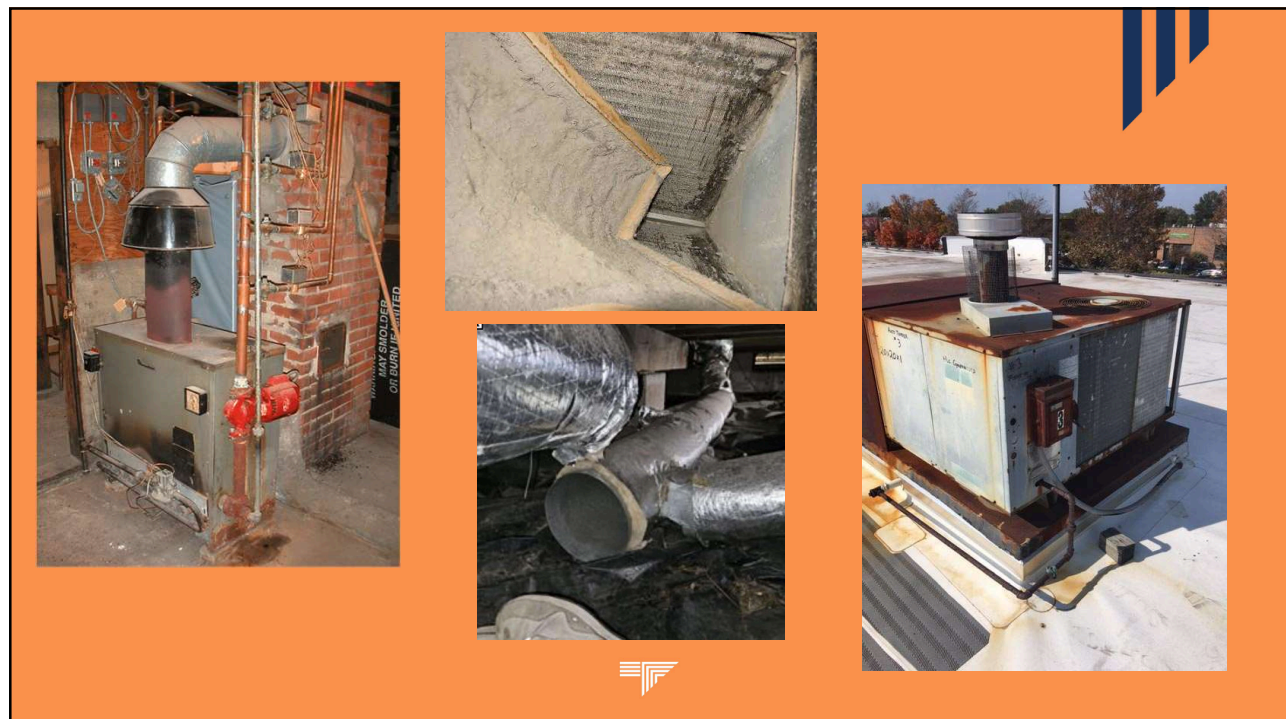
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HVAC Maintenance - Capital Planning: Keeping Systems Running

- Preventive maintenance is key – HVAC systems may be out of sight, but they shouldn't be out of mind.
- Plan for system replacements based on expected lifespan and insert into your capital Improvement plan.
- Utilize available resources and tools to support proactive HVAC maintenance.
 - EPA: Tools for Schools Check Lists
 - Town maintenance/facilities managers



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HVAC and Plumbing System Lifespans - Planning for Long-Term Reliability

Building Element	System/Component	Life Expectancy
Heating/Cooling Units (air)	Indoor Air Handling Unit	20 to 30 years
	Outdoor Roof Top Unit	15 to 25 years
	Split System (Heat Pump)	10 to 20 years
	Chiller	20 to 25 years
	Boiler (Condensing)	15 to 20 years
Ventilation Units	Energy Recovery Ventilator (ERV)	20 to 30 years
	Exhaust Fan	20 to 30 years
Distribution (air/water)	Ductwork	20 to 30 years
	Variable Air Volume Box (VAV)	15 to 20 years
	Diffuser/Register	20 to 30 years
	Steel pipe	30 to 40 years
Domestic Water Distribution	Copper piping	50 years
	PEX piping	30 to 35 years
	Valves	20 to 30 years
Water Heater	Electric	15 to 20 years
	Gas	10 to 15 years
	Heat Pump	10 to 15 years

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Energy Savings - Future-Proofing Strategies

Building Envelope Enhancements:

- Roof replacement with increased insulation
- Air sealing improvements (thermal imaging for detection)
- Siding/façade upgrades with added exterior insulation
- Long-lasting, resilient building elements/design choices
- Window replacements for better efficiency

HVAC System Upgrades:

- Energy-efficient technologies and new refrigerants
- Evaluating proven solutions (chilled water & hydronic systems)
- Transitioning to heat pumps vs. fossil fuel systems



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Capital Planning: Preparing for the Future

- Develop a 3-, 5-, and 10-year plan for system upgrades and major maintenance.
- Understanding useful life cycles helps anticipate replacement needs.
- Strategic planning and savings ensure you're prepared for necessary investments.
- Avoid costly surprises by proactively managing building components and systems.



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Capital Planning: Tool

Building Element	Category	Subcategory	Description	Year Installed	Life Expectancy/Warranty	Installation Cost	Current Condition (1 poor to 5 excellent)	Date of Assessed Condition	Anticipated Replacement Date	Replacement Cost	Notes
Exterior	Envelope	Walls									
		Roof									
		Insulation									
		Exterior Finish									
		Foundation/Structure									
		Windows									
		Doors									
	Other	Roof Drainage/Gutters									
Interior	Walls/spaces	Wall Finishes									
		Floor Finishes									
		Ceiling Finishes									
		Doors									
		Other									
HVAC	Heating	Boilers									
		Piping									
		Pumps									
		Other									
		Louvers									
	Ventilation	Energy Recovery									
		Ductwork									
		Registers									
		Other									
		Roof Top units									
	Air conditioning(cooling)	Split systems									
		Air Handling Units (indoors)									
		Ductwork									
		Registers									
		Other									



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Capital Planning: Tool

Building	MOB								
Building Element	Category	Subcategory	Description	Year Installed	Install Cost	Condition	Project Yr.	Replacement Cost	Notes
Exterior	Envelope								
		Walls	Wood Frame	1901	Unknown	Good			Original Wood Frame
		Roof	Asphalt/Rubber	2016	Unknown	Good			
		Insulation	Wall	Unknown	Unknown	Poor		TBD	Survey indicates insulation is poor, vermiculite
		Insulation	Attic 18"	2018	\$10,400	Good			Loose Cellulose R-49
		Exterior Finish	Vinyl Siding	2016?		Good		TBD	
		Foundation/Structure	Brick	1901	Unknown	Good			
		Windows	Vinyl Clad	2006?		Fair			Several windows are difficult to open, close and seal
		Doors	Aluminum Commercial	Unknown	Unknown	Fair			Hardware repaired as needed
		Exterior Paint	Entry's						Continuing Maintenance
	Site work								
	This conversation	Roof Drainage/Gutters				Poor, non-existent	2027-2028	\$ 289,900.00	
	warrants a workshop	Parking Lot, Drainage				Poor		TBD	Following items included in this figure
	session with the SB	Parking Lot, Pavement		Unknown		Fair		TBD	Drainage is ineffective during the winter, heavy rain
		Front Stairs		Unknown		Fair		TBD	Showing signs of rebar corrosion, cracking
		Stairs to upper lot		Unknown		Poor		TBD	Concrete was covered "temporarily"
		Ramp				Fair		TBD	Ramp and Stairs are poorly designed
		Addition ADA, Rear	Lift for interior rear stairs					TBD	Proposed in new layout
								\$ 7,700.00	
		Test Boring						\$ 5,400.00	Aries Engineering
		Lot Line Survey							Bartlett and Associates

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Capital Planning: Tool

	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034	FY2035	FY2036
Capital Reserve Fund Starting Balance	\$28,891	\$23,036	\$24,996	\$68,916	\$6,916	\$7,916	\$30,916	\$50,916	\$32,916	\$52,916	\$63,416	\$83,416
Total to be spent in Year	\$40,855	\$66,040	\$24,080	\$130,000	\$67,000	\$45,000	\$10,000	\$48,000	\$10,000	\$19,500	\$10,000	\$18,500
Addition to Capital Reserve Fund	\$35,000	\$68,000	\$68,000	\$68,000	\$68,000	\$68,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000
Year End Balance	\$23,036	\$24,996	\$68,916	\$6,916	\$7,916	\$30,916	\$50,916	\$32,916	\$52,916	\$63,416	\$83,416	\$94,916
Itemized spending												
LED Lighting install (2023)												
Roof replacement (2006) (20-30 years)				\$125,000								
Roof repairs	\$2,842									\$2,500		
Well pump new building (20 years)	\$4,000											
Well pump old building (2024) (20 years)	\$3,013											
Water Filtration		\$7,500										
Pressure tank old building (2024) (5 years)	TBD											
Pressure tank new building boiler room (2024) (5 years)	\$1,500											
Pressure tank new building basement stacks (2024) (5 years)	\$1,500											
Hot Water Heater new building (2024)	\$3,000											
Carpet replacement												
Program room floor replacement												
Flooring (other) replacement												
Entrance doors and openers replacement (30 years)												\$8,500
Technology upgrades (5 years)		\$35,000						\$38,000				
Multipurpose copier, printer, scanner (every 5 years)					\$7,000					\$7,000		
HVAC Systems												
Boiler old basement (2006) (20 years)												
Boiler new building (2006) (20 years)					\$50,000		\$35,000					
AC unit and condenser old building 1 (2023) (15 years)												
AC unit and condenser old building 2 (15 years)												
AHU and condenser 1 new building (20 years)	\$18,000											
AHU and condenser 2 new building (20 years)		\$18,540										
AHU and condenser 3 new building (2024) (20 years)												
AHU and condenser 4 new building (20 years)			\$19,080									
Unanticipated expenses	\$7,000	\$5,000	\$5,000	\$5,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000

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Protecting Collections, Health - Indoor Air Quality (IAQ)

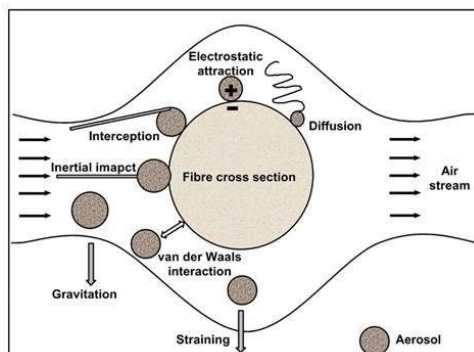
- Buildings play a crucial role in the well-being of staff and patrons.
- People spend 90%+ of their time indoors – air quality matters.
- Poor IAQ impacts health and can reduce life expectancy.
- Simple ways to improve IAQ:
 - Proper ventilation and air filtration
 - Managing humidity levels to protect books and media
 - Avoiding hidden IAQ hazards (e.g., air fresheners and chemical cleaners)
- A well-maintained environment preserves assets and enhances comfort.



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Air Filtration - IAQ

Captures small particles on a surface, removing them from the air.

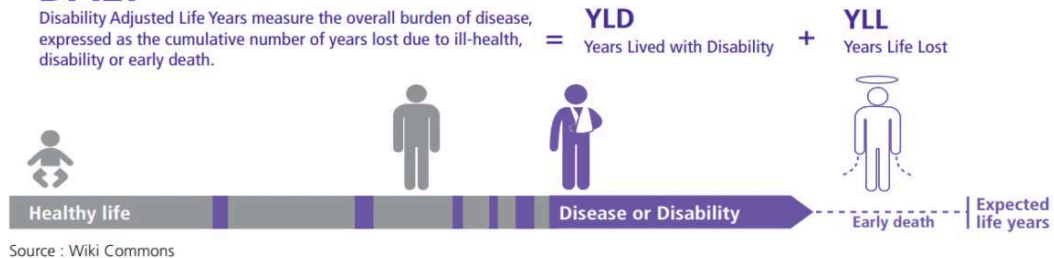


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DALY – Disability Adjusted Life Year

DALY

Disability Adjusted Life Years measure the overall burden of disease, expressed as the cumulative number of years lost due to ill-health, disability or early death.



Source : Wiki Commons

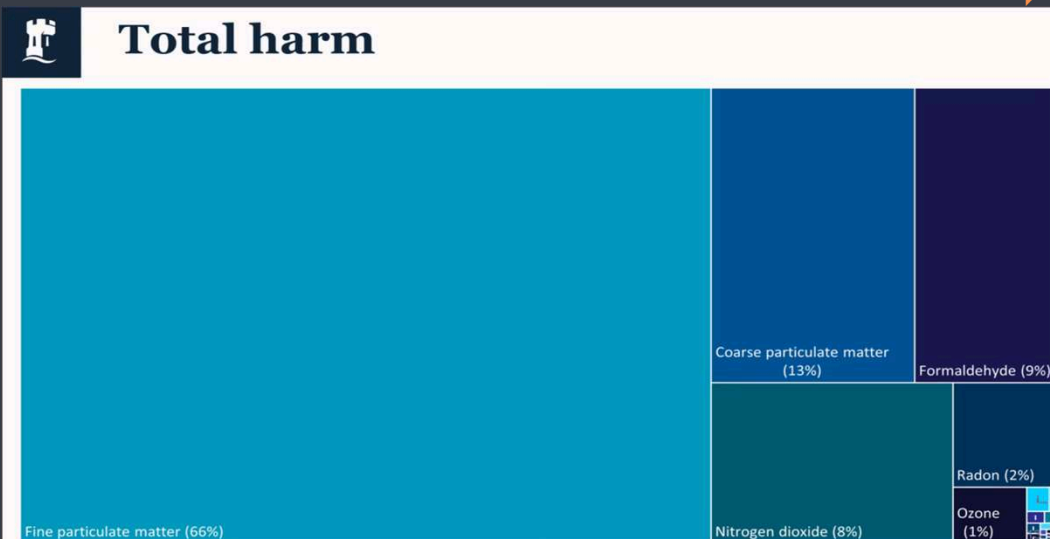
$$\text{DALYs} = \text{Years of life lost due to premature mortality (YLL)} + \text{Years lived with disability (YLD)}$$

The respiratory system has no immune system leaving it highly susceptible to contagions such as Covid, Influenza, Staph, and PM 2.5. PM 2.5 size is the most dangerous to the respiratory system.

Source: Wikipedia: http://en.wikipedia.org/wiki/Disability-adjusted_life_year

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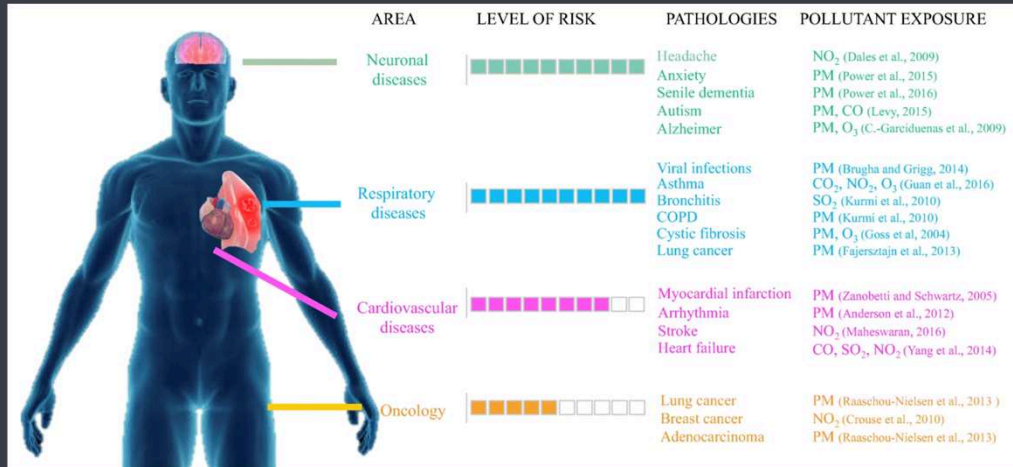
DALY and Contaminants of Concern



Courtesy of the University of Nottingham: Harm from Indoor Air Contaminants

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Numerous Research on Indoor Contaminants That Influence Health



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Thank You

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