

ESSER Funded School Improvements

HVAC and Indoor Air Quality



Agenda



INTRODUCTIONS



ESSER & INDOOR AIR
QUALITY IMPROVEMENTS



FUNDING SOLUTIONS &
OPERATIONAL IMPACTS

Introductions



Brian Solan, PE, LEED-AP
Ameresco – Montana Business Leader



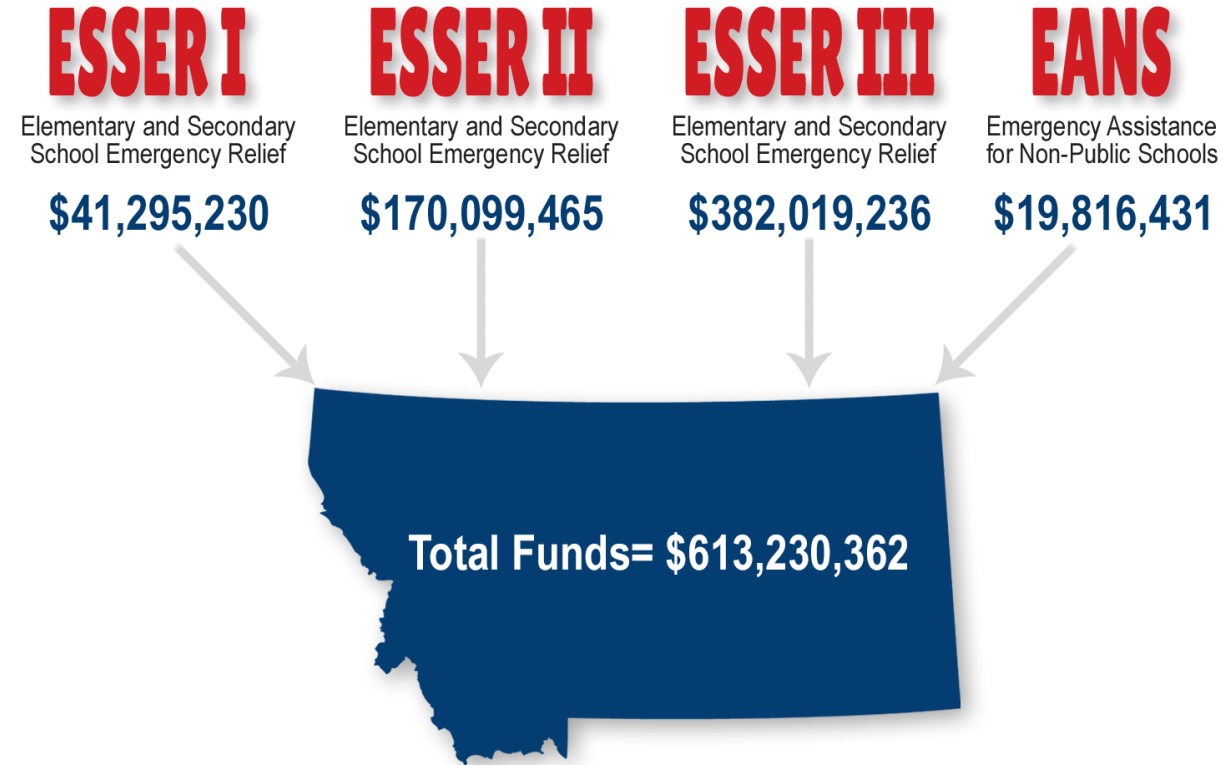
Matt Thompson, CEM, CEA
Ameresco – Montana Account Executive

ESSER and Montana OPI Guidance

- CARES Act established ESSER Fund “to prevent, prepare for, and respond to coronavirus”
- Subsequent funding from CRRSA and ARPA bring total relief funds for MT Schools to over \$600M
- ESSER II Guidance from Montana OPI clarified allowable uses of relief funds, including provisions for facility improvements:

M. School facility repairs and improvements to enable operation of schools to reduce risk of virus transmission and exposure to environmental health hazards, and to support student health needs.

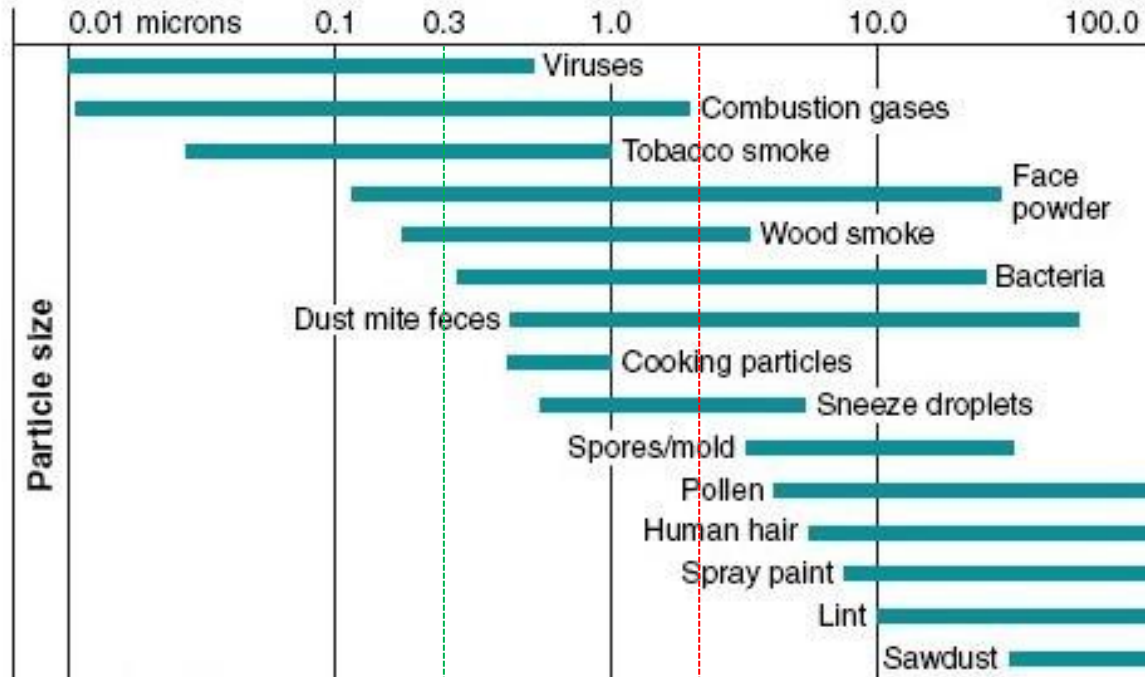
N. Inspection, testing maintenance, repair, replacement, and upgrade projects to improve the indoor air quality in school facilities, including mechanical and non-mechanical heating, ventilation and air conditioning systems, filtering, purification and other air cleaning, fans, control systems, and window and door repair/replacement.



Montana OPI ESSER Guidance

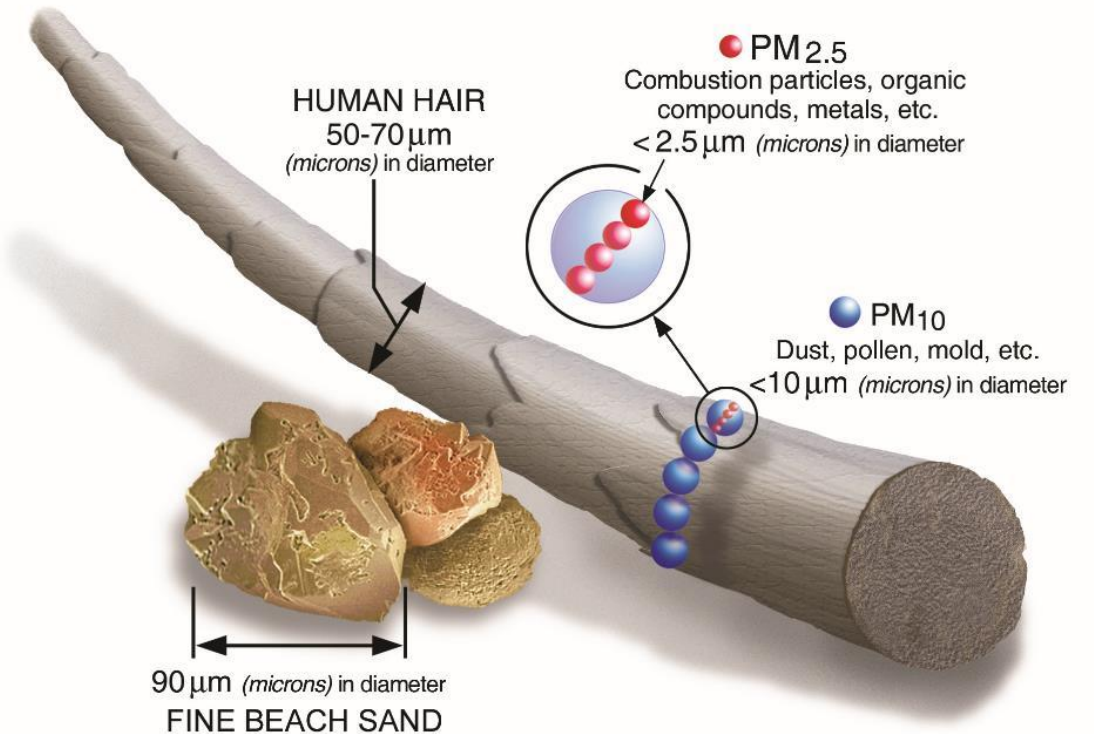
Estimated Allocations by School District

Increased Focus on Indoor Air Quality (IAQ)



MERV-13
≥ 75% efficiency
for particles ≥ 0.3µm

MERV-8
≥ 70% efficiency
for particles ≥ 3.0µm



CDC and ASHRAE Guidance



GUIDANCE FOR THE RE-OPENING OF SCHOOLS

ASHRAE is a global professional society of over 55,000 members committed to serve humanity by advancing the arts and sciences of heating, ventilation, air conditioning, refrigeration and their allied fields. ASHRAE has established a Task Force to help deploy technical resources to address the challenges of the COVID-19 pandemic and possible future epidemics as it relates to the effects of heating, ventilation, and air-conditioning systems on disease transmission. Guidance and building readiness information for different operational conditions has been developed for several building types, including commercial; residential; schools and universities; and healthcare facilities.

Protecting the health, safety and welfare of the world's students, faculty, and administrators from the spread of SARS-CoV-2 (the virus that causes the COVID-19 disease) is essential to protecting the entire population.

ASHRAE's [guidance for schools](#) provides practical information and checklists to help minimize the chance of spreading SARS-CoV-2. A summary of key general recommendations related to HVAC and water supply systems appears below. Many different HVAC system types are used in educational facilities, so adaptation of these guidelines to specific cases is necessary. *Please consult the full guidance for important details and consider reaching out to qualified design professionals for detailed analysis as needed.*

- **Inspection and Maintenance:** Consider assessing the condition of systems and making necessary repairs. All building owners and service professionals should follow ASHRAE Standard 180-2018 "Standard Practice for the Inspection and Maintenance of Commercial HVAC Systems."
- **Ventilation:** A good supply of outside air, in accordance with ASHRAE Standard 62.1-2019, to dilute indoor contaminants is a first line of defense against aerosol transmission of SARS-CoV-2. Pre- and post-occupancy purge cycles are recommended to flush the building with clean air.
- **Filtration:** Use of at least MERV-13 rated filters is recommended if it does not adversely impact system operation. If MERV-13 filters cannot be used, including when there is no mechanical ventilation of a space, portable HEPA air cleaners in occupied spaces may be considered.
- **Air Cleaning:** Air cleaners such as germicidal ultraviolet air disinfection devices may also be considered to supplement ventilation and filtration. Technologies and specific equipment should be evaluated to ensure they will effectively clean space air without generating additional contaminants or negatively impacting space air distribution.
- **Energy Use Considerations:** In selecting mitigation strategies, consideration should be given to energy use as there may be multiple ways to achieve performance goals that have greatly different energy use impact. Control changes and use of energy recovery to limit or offset the effect of changes in outdoor air ventilation rate and filter efficiency may reduce or offset energy and operating cost penalties.
- **Water System Precautions:** Buildings that have been unoccupied could have stagnant water, and water systems should be flushed to remove potential contaminants. Utilizing ASHRAE Standard 188 and Guideline 12 can help minimize the risk of water-borne pathogens such as legionella.

HVAC&R systems play an important role in minimizing the spread of harmful pathogens, and ASHRAE is ready to provide technical resources and answer questions.

The most up-to-date information for schools and universities can be found [here](#).

The most up to date information for Building Readiness for re-opening can be found [here](#).

For further assistance, please contact GovAffairs@ashrae.org.

The information above is provided as a service to the public. While every effort is made to provide accurate and reliable information, this is advisory, and is provided for informational purposes only. They are not intended and should not be relied upon as official statements of ASHRAE.

Official guidance includes ...

- Inspection and maintenance of HVAC systems
- Increasing ventilation to dilute indoor air contaminants with fresh outside air (OA)
- Using enhanced MERV-13 or HEPA air filters
- Implementing advanced air cleaning technologies

Potential problems ...

- Increases in energy costs - up to 4x when using 100% OA
- Not able to properly heat or cool school using 100% OA
- Reduced airflow with using more restrictive air filters
- Inundated with various air cleaning technologies
- Not sure what to do?

Enhanced Filtration and Air Cleaning

- Increased Outdoor Air (OA)
- MERV-13 or HEPA Media Filters
- Activated Carbon Adsorption Filters

HVAC System
Sizing Issues &
Significant
Operational Cost
Increase

- Electrostatic Media Filters (Dynamic AQS)
- Ultraviolet Germicidal Irradiation (UVGI)
- Electrostatic Precipitators
- Needlepoint Bi-Polar Ionization
- Photocatalytic Oxidation

Each Technology has a
specific application.

Evaluation of existing
systems required for correct
application and long-term
operational costs.

Ameresco Solutions for K-12 School Indoor Air Quality



Assess Indoor Air Quality

- Test, Adjust, & Balance (TAB) Ventilation
- Retro-Commission (RCx) Temperature Controls
- Indoor Air Quality (IAQ) Testing

Repair or Replace Deficient HVAC Equipment

- Control Dampers
- Air Handling Units
- Boiler Systems

Install Enhanced Filtration and Air Cleaning Systems

- MERV-13 Air Filtration
- Dynamic Air Cleaning Systems
- Germicidal Ultraviolet (UV) Light Systems
- Needlepoint Bi-polar Ionization Systems
- Other Solutions Depending on Application

Electrostatic Media Filters

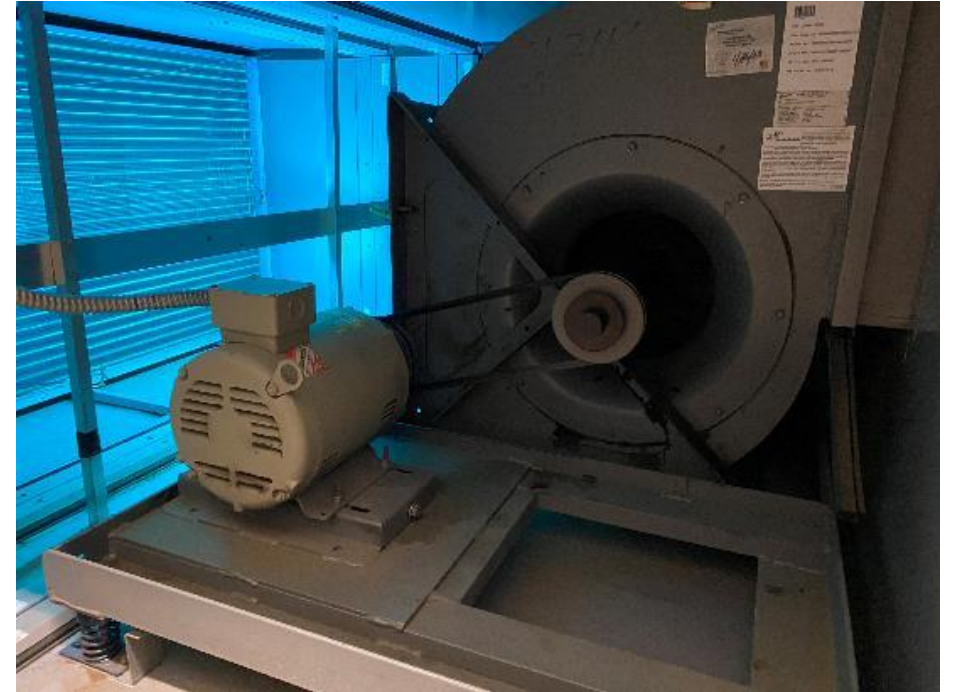
- An electrostatic charge is applied to enhance filter's ability to capture particles
- Achieves higher MERV-13+ levels at lower static pressure drops
- Provides extended maintenance intervals
- Recently installed in Livingston School District



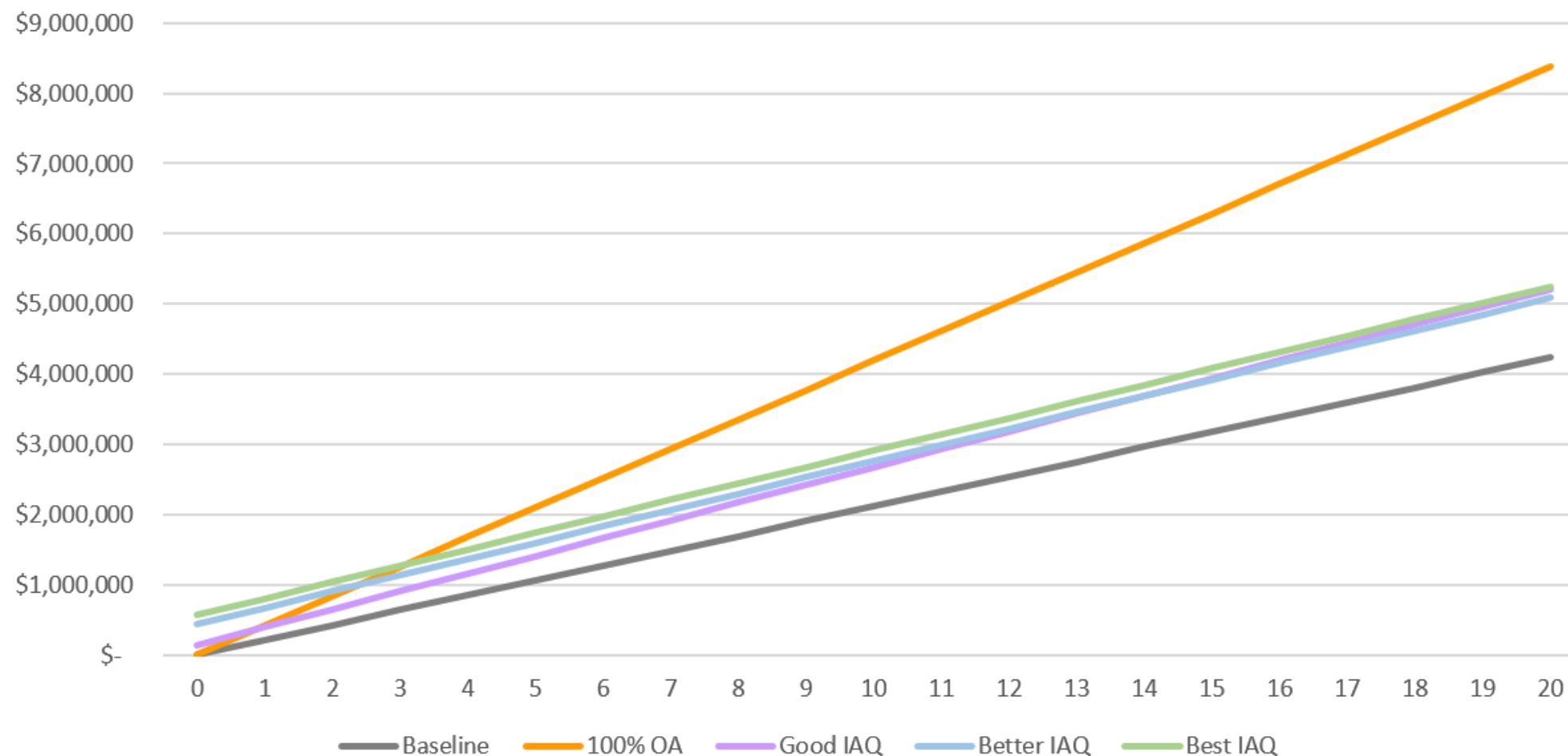
Air Quality Solutions Dynamic V8 System

Ultraviolet Germicidal Irradiation (UVGI)

- UV-C lamps proven to inactivate aerosolized viruses, bacteria, and fungi
- Used extensively in hospitals and water treatment applications
- Effectiveness is dependent on light intensity and exposure time
- Need to incorporate safety features as UV light can be a health hazard for people



Indoor Air Quality – Life-Cycle Cost Comparison



Energy Performance Contracting: Typical Scope



Lighting Retrofits

- Install energy efficient LED lighting
- Occupancy sensors and scheduling

HVAC and Indoor Air Quality

- High efficiency boilers, air handlers, and other equipment
- Install enhanced filtration/air cleaning systems
- Modernize building automation with new digital temperature controls
- Test and balance ventilation rates and commission controls
- Operational modifications to enhance IAQ and reduce costs

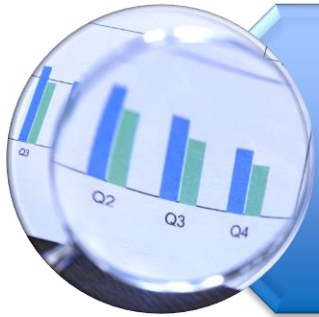
Onsite Energy and Utility Rates

- Install solar panels & develop learning opportunity for students
- Review and optimize utility rate schedules

Weatherization and Water Conservation

- Seal and insulate building envelope
- Install water conserving faucets, toilets, and urinals

Energy Performance Contracting: Project Impact



Budget Neutral

Cost savings, grants, and incentives pay loan payments

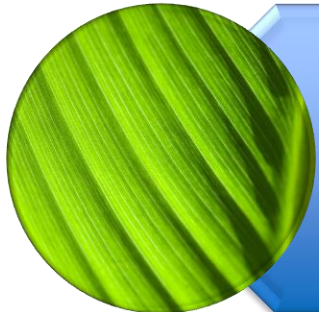
- No impact to taxpayers
- No need to wait



Improved Learning Environment

Facility upgrades improve Indoor Environmental Quality (IEQ)

- Lighting levels and color
- Thermal comfort and indoor air quality

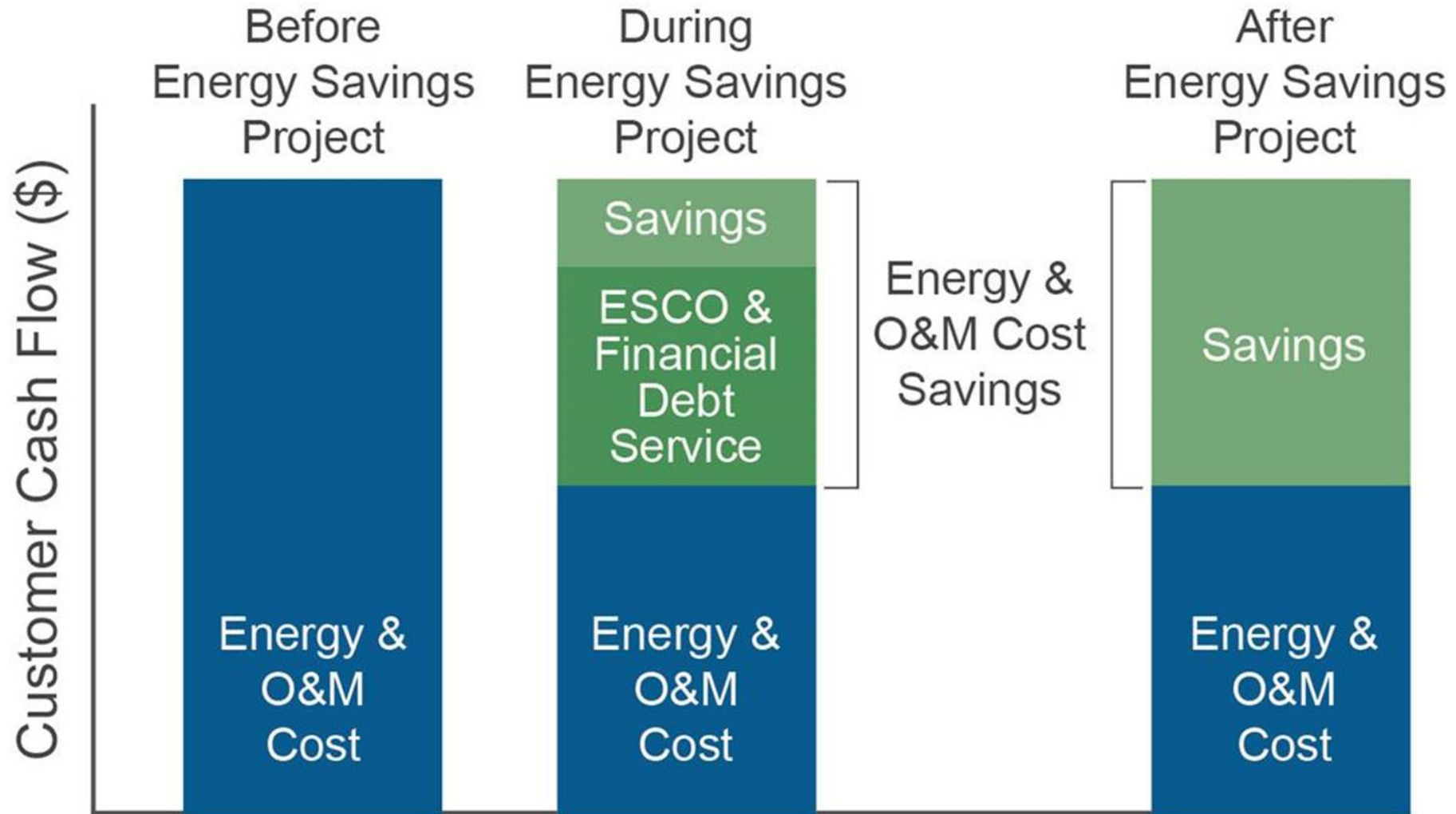


Sustainable Savings

Financial Assurance

- Guaranteed price and no change orders
- Savings are measured and guaranteed

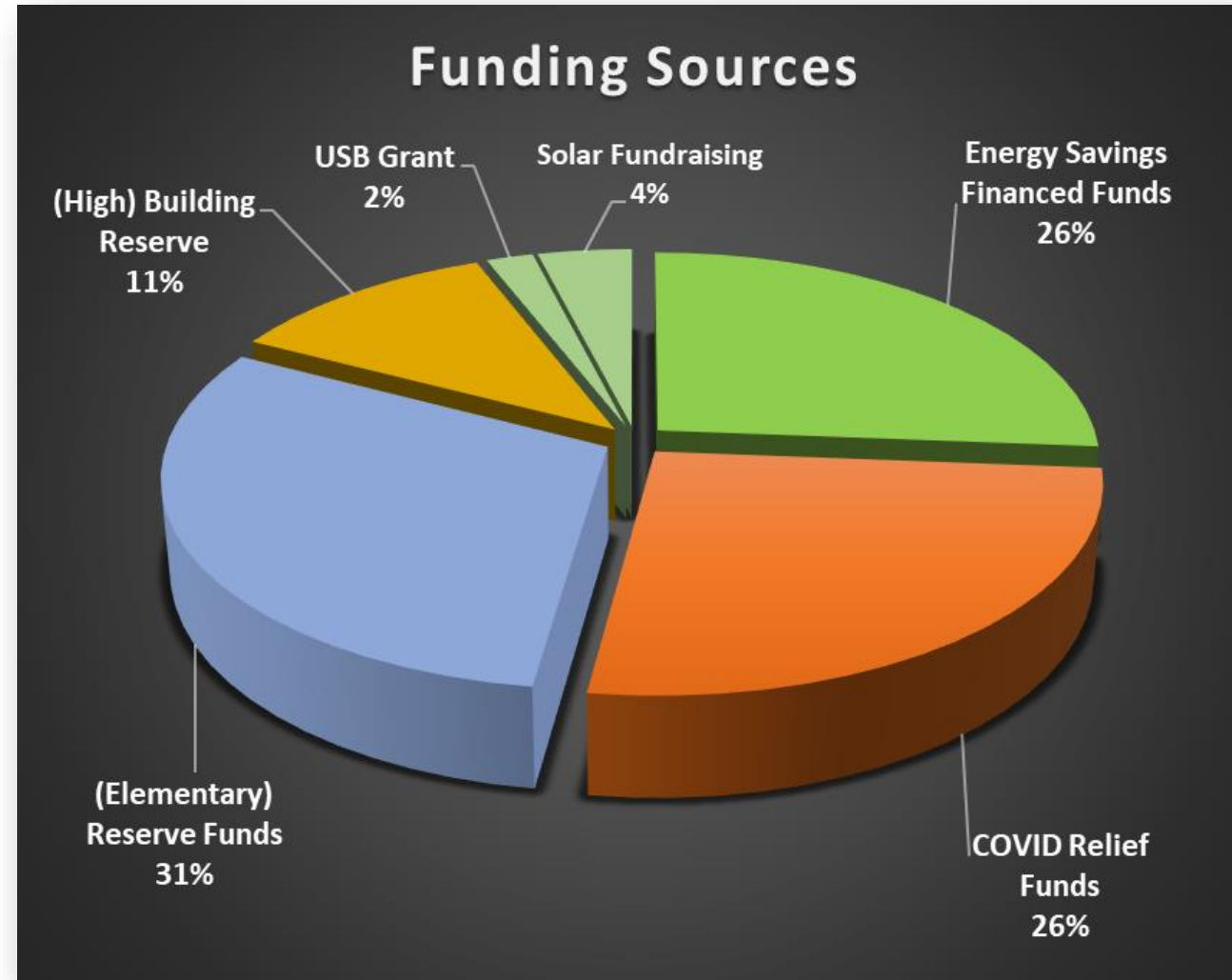
Energy Performance Contracting: Budget Neutral



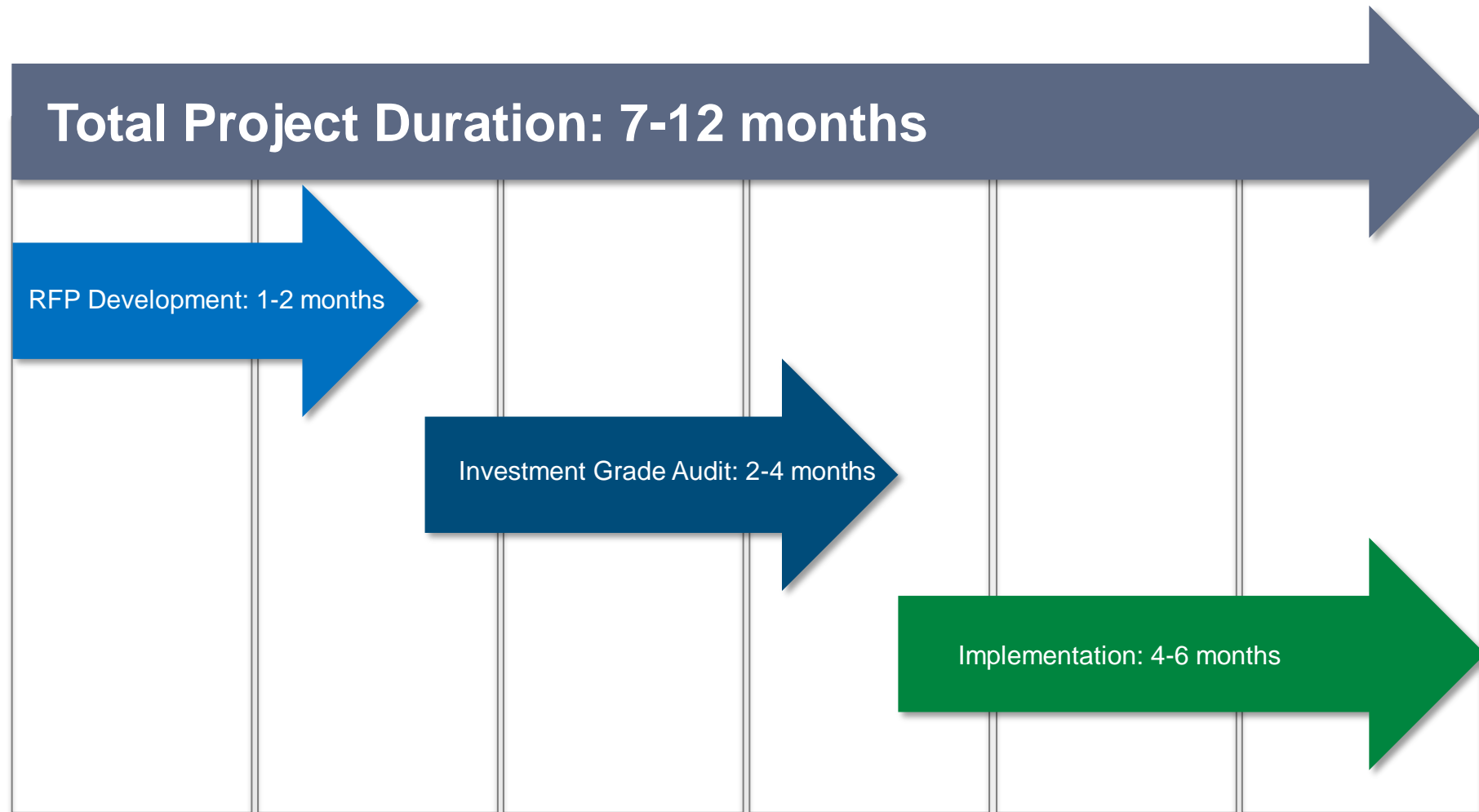
Energy Performance Contract: Example Project

ECM	Annual Energy Savings	Annual O&M Savings	Cost
Solar PV System	\$6,175		\$114,328
Retro-Commissioning	\$8,543		\$ 160,183
Indoor Air Quality	\$0	\$3,173	\$ 98,612
Envelope Sealing	\$605		\$ 18,944
Temperature Controls Upgrade	\$12,228		\$ 780,625
Boiler Plant and DHWS Upgrade	\$1,770		\$ 305,479
Indoor Air Quality	\$0	\$4,319	\$ 241,998
Envelope Sealing	\$519		\$ 11,453
Retro-Commissioning	\$669		\$ 17,258
Indoor Air Quality	\$0	\$899	\$ 81,546
Envelope Sealing	\$1,035		\$ 9,296
Indoor Air Quality		\$68	\$ 50,794
Envelope Sealing	\$566		\$ 5,687
Envelope Sealing	\$74		\$ 706
LED EXIT Signs	\$2,676		\$ 9,507
1% MT Gross Receipt Tax			\$ 19,064
Totals	\$34,860	\$8,459	\$1,925,480

Funding Source	Amount
Energy Savings Financed Funds	\$505,047
COVID Relief Funds	\$500,000
(Elementary) Reserve Funds	\$586,105
(High) Building Reserve	\$220,000
USB Grant	\$ 38,000
Solar Fundraising	\$ 76,328



Energy Performance Contracting: Project Process



Thank You!

Brian Solan

(406) 461-7432

bsolan@ameresco.com

Matt Thompson

(406) 581-1595

mthompson@ameresco.com