The Ins & Outs of Energy Performance Contracting

with
Virginia Energy &
Loudoun County Public Schools

June 22, 2022

Who is the VAEEC?

The voice of energy efficiency in Virginia, the VAEEC is a broad coalition of over 100 members whose goal is to facilitate discussions and share resources to advance energy efficiency.

Our vision is for energy efficiency to be an integral part of Virginia's economy and clean energy future.

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VIRGINIA ENERGY EFFICIENCY COUNCIL

Audience Participation

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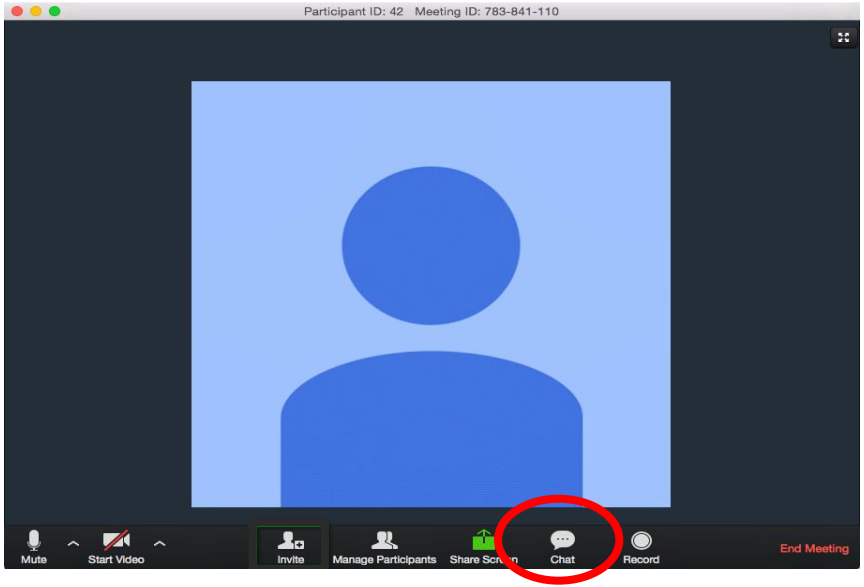

The Ins & Outs of Energy Performance Contracting

Speakers

- **Nam Nguyen**, Virginia Energy
- **Nick Polier**, Virginia Energy
- **Michael Barancewicz**, Loudoun County Public Schools
- **Susan Gerson**, Loudoun County Public Schools

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VIRGINIA Energy

Energy Savings Performance Contracting

Nick Polier & Charlie Barksdale
Office of Renewable Energy & Energy Efficiency (REEE)

Agenda

- Terminology
- Energy Savings Performance Contracting
- Virginia's Statewide Procurement Program
- Virginia's ESPC Process
- Measurement & Verification
- Program Benefits
- Questions

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Terminology

- **BOE** = Back of the Envelope
- **ECM** = Energy Conservation Measure
- **EE** = Energy Efficiency
- **ESCO** = Energy Service Company/Contractor
- **ESPC** = Energy Savings Performance Contracting
- **IGA** = Investment Grade Audit (aka TEA)
- **M&V** = Measurement & Verification
- **MOU** = Memorandum of Understanding
- **TELP** = Tax Exempt Lease Purchase / Municipal Lease

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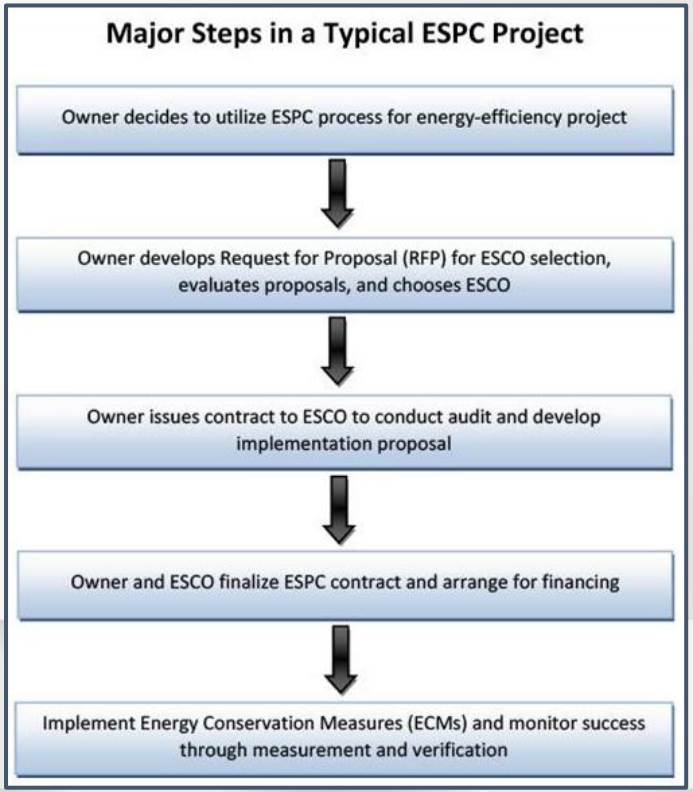
Energy Savings Performance Contracts

ESPC is designed to be a vehicle for financing energy upgrades in facilities.

- Facility Needs identified
- Proposed ECMs selected
- Term of Contract defined
- “Avoided Cost” pays for the project
- Guaranteed kWh and $ Savings
- Project Performance is verified



SOURCE: energy.gov/eere/

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Financing ESPC Projects

- Capital Budget/Funds
- Grants/Rebates
- Loans
- Bonds
- Treasury (**State Agencies**)
- Leases
  - **Tax-Exempt Lease Purchase**

An Energy Services Company (ESCO) develops and implements the ESPC project and guarantees projected results. **A third party finances the total project cost** based on the guaranteed annual savings to pay for the improvements. The finance term is within 15 years (20 for public bodies), limited by the useful life of the equipment. The ESPC process is authorized in state statutes that set requirements.

SOURCE: https://www.eergy.gov/eere

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Virginia's ESPC Program

- Virginia Energy is Technical Manager
- DGS is the Contract Manager
- Expedited Procurement
- Customer Involvement/Input
- Partner & Project Selection
- Annual Savings vs Annual Payments
- Virginia Energy Support

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Virginia's ESPC Program

Commonwealth of Virginia Contract Number: **E194-82899**
Pre-Qualified ESCOS for Energy Performance Contracts
Period: Nov.2019 - Nov. 2029

ABM Building Services	CEG Solutions	DE Kirby Inc.
Honeywell	Mckinstry Essention	Noresco
Schneider Electric	Southland Energy	Trane
AMERESCO	CMTA Inc.	Energy Systems Group
Johnson Controls	McClure Company	Wendel Energy Services
Siemens	TEN	

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ESPC Process

1. Project Assessment
    i. VA Energy Consultations, Customer Needs, Process Requirements
2. Partner Procurement
    i. RFQ, BOE, Interviews, MOU
3. Project Development
    i. IGA, Project Selection, Contract
4. Project Delivery
    i. Design, Construction, Training, Closeout
5. Project Verification
    i. Guarantee/Realized, M&V

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ESPC Common ECMs

- HVAC/IAQ
- Water/Plumbing
- VFDs
- Building Automation/Controls
- Boilers
- Transformers
- Chillers
- Windows
- Lighting/Occupancy Sensors
- Overall Improvement Of The Working Environment
- Renewables
- EV Charging Stations

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Measurement & Verification

- Mandatory
- Verifies Project Performance
- Explains the How
- Review
- Life
- Non-Performance

Phase 3: Project Development	Determine baselines and estimated savings: *Defined in the investment-grade audit and proposal*
Phase 3: Project Development	Develop M&V plan: *Created as part of the technical proposal*
Phase 4: Implementation and Construction	Develop post-installation M&V report: *ECM performance verified*
Phase 5: Post-Acceptance Performance	Perform annual M&V: *Activities outlined in M&V plan* *Findings documented in M&V reports*

SOURCE: energy.gov/eere/femp/

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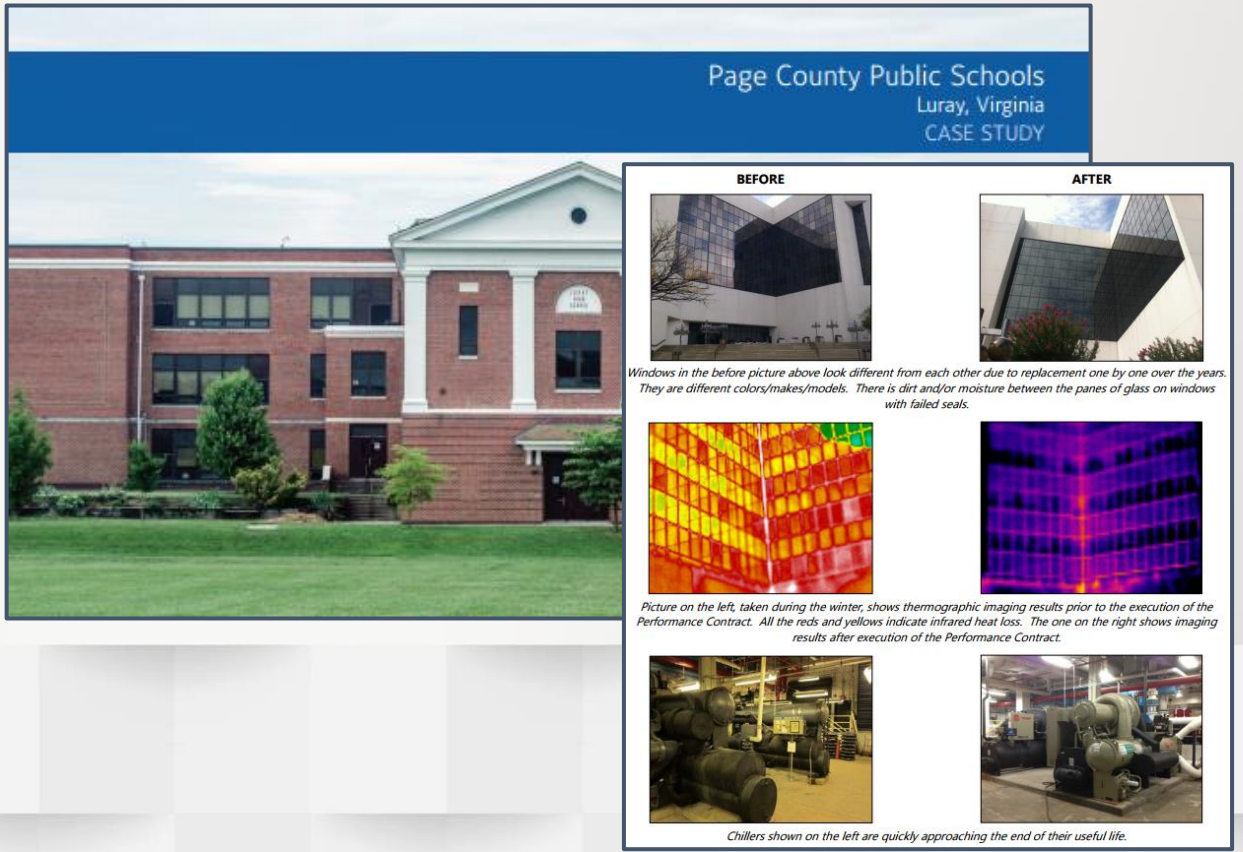
Virginia's ESPC Program

Projects/Customers

- Universities/Higher Ed.
- State Agencies
- Public Schools
- Counties
- Cities/Towns
- Correctional Facilities
- Military/National Guard
- Museums
- Regional Jails
- Labs/Medical/Scientific
- Recreational



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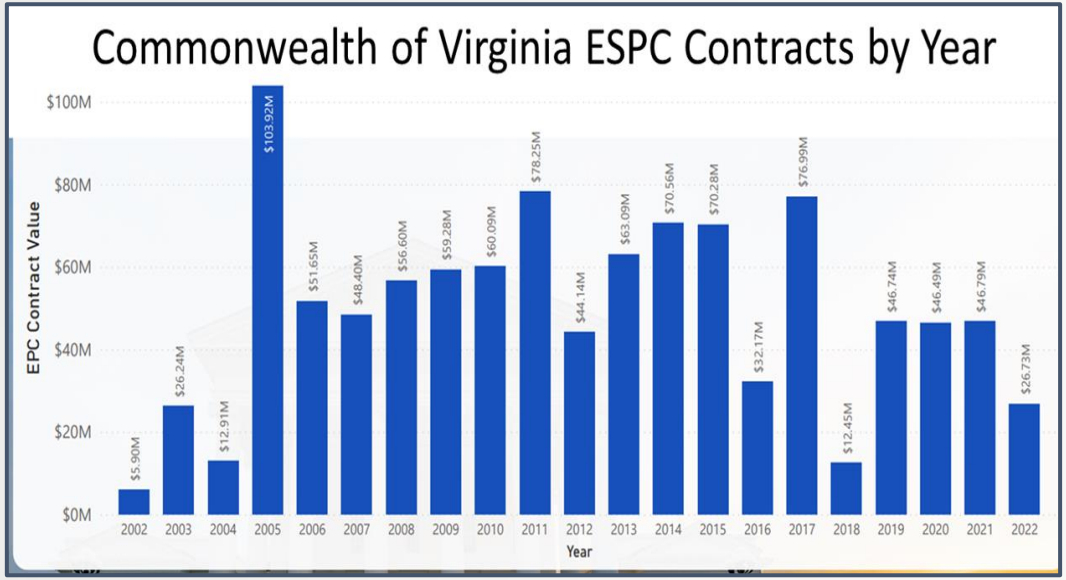
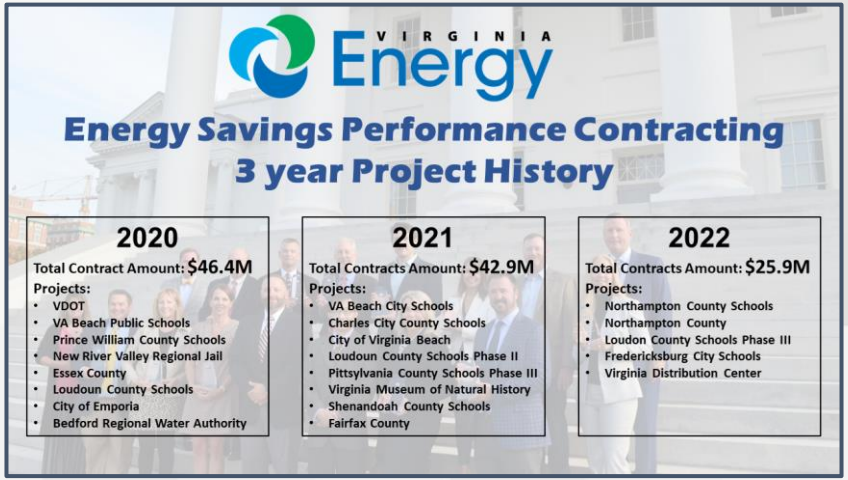
Virginia's ESPC Program

Program Established in 2002



Over 280 Projects

Over $1B in Project Investment



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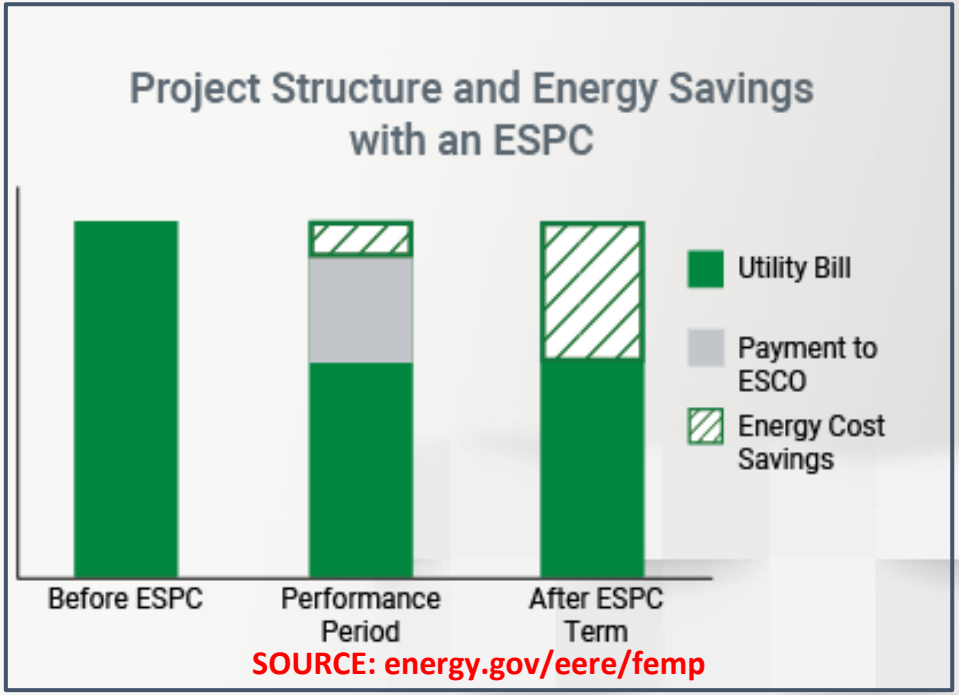
Financing ESPC Projects

- Remember: Avoided costs pay for the cost of the Project
- You may already be paying for a project
- Financing Options
  - Self Fund
  - Lease
  - Combination
- Allowed to “buy down”



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ESPC Program Benefits

- Pre-qualified Vendor Pool/Process for Procurement
- All documents and templates provided by VA Energy
- Open Book Pricing
- Negotiated Overhead & Profit ***prior to*** contract signing
- ***NO "LOW BID" Requirement***
- ***NO CHANGE ORDERS***...unless customer initiated
- Preferred Equipment & Sub-contractor input
- Single contract that covers the entire scope of work at all included facilities
- Project Performance Guarantee
- VA Energy Solar Enhanced ESPC Program

VA Energy Support - Pre, During & Post Project Completion!

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Virginia Energy &
Charles City County School Board Solar Enhanced ESPC Project

Charles City County High School

Energy Conservation Measures

- Building Controls
- HVAC
- Building Envelope
- Boilers
- Hot Water Upgrades
- Ground Mount Solar PV
- Lighting
- Wastewater Treatment
- Scoreboard Improvements
- Track Resurfacing

Total Project Cost: $4.6M

- Size: 714.4kW Ground Mount Solar Array
- Cost: $2.1M (of the $4.6M total)
- VA Energy Grant: $500,000
- Projected Total Annual Savings: $171,226 or 1,708,511kWh
- Projected Annual Solar Savings: $86,824

- VA Energy's First Solar Enhanced ESPC Project
- Public Body Customer
- 59% Reduction in energy consumption at the High School
- Historically Economically Disadvantaged Community (71% minority)

Questions

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Virginia Energy Efficiency Council
Energy Performance Contracting Webinar

Loudoun County Public Schools
Department of Support Services

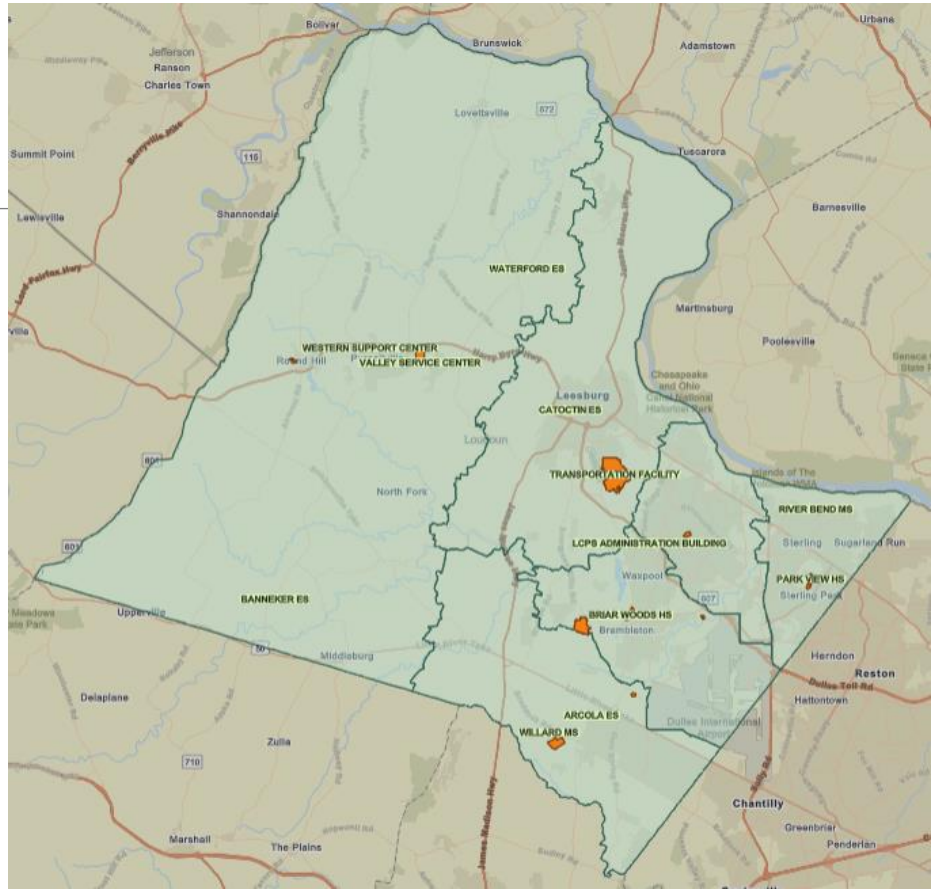
Discussion Points

- LCPS Statistics
- Challenges
- Why DMME - Why ESCO
- Approach and Benefits with EPC
- Implemented ECMs
- Accomplishments/Plans/Future
- Questions

LOUDOUN COUNTY

Roughly 250 miles of gravel roads that crisscross the western portion of Loudoun County.

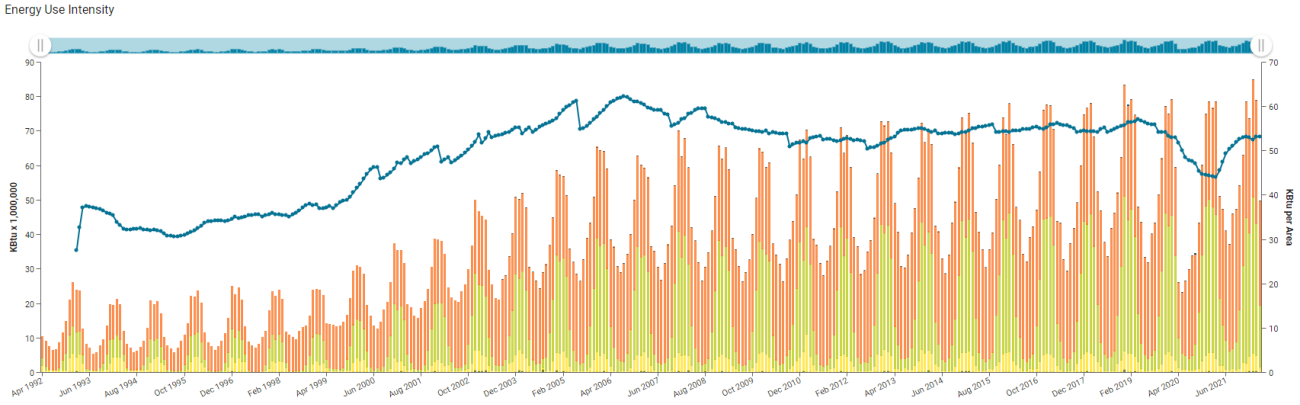
County Founded: 1757
County Seat: Leesburg
Land Area: 520 square miles

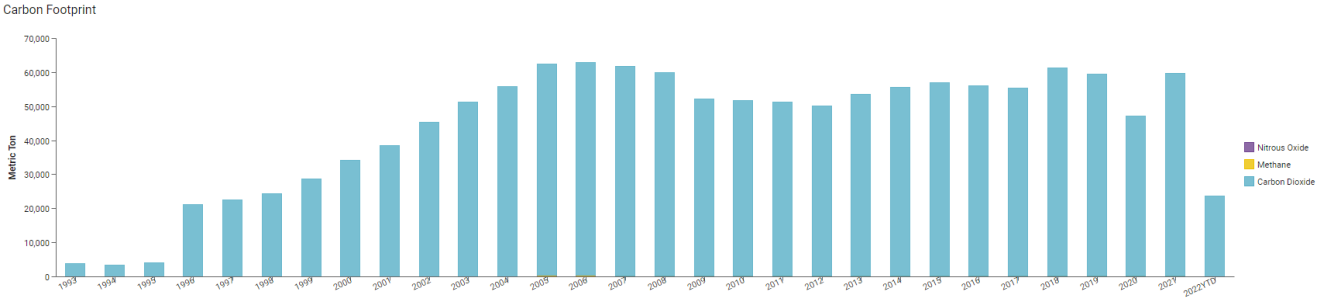


Loudoun County Public Schools

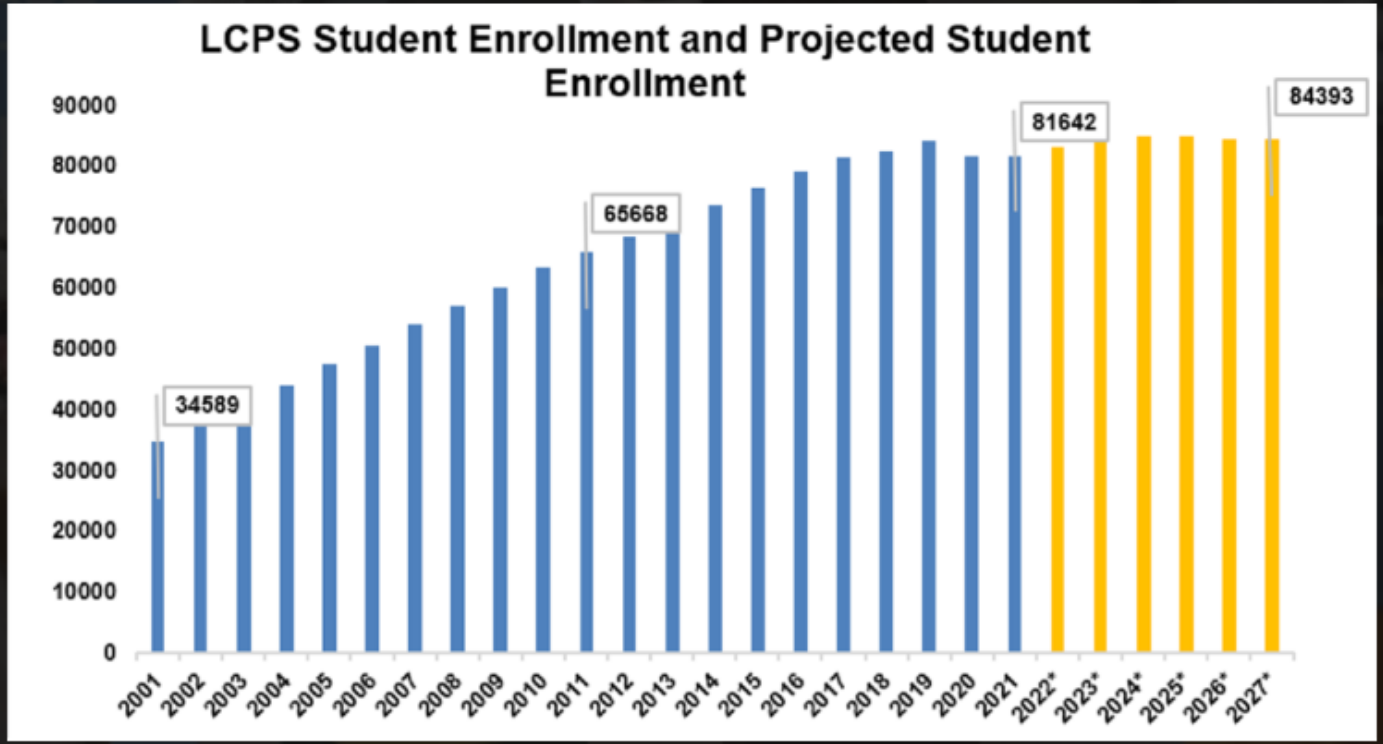
- 3rd largest school division in VA
- Fastest growing County in VA
- 81,000 Students
- $1.3B Annaul Budget
- 97 Facilities, 12.8M sq/ft - 2022
  - 18 High Schools
  - 17 Middle Schools
  - 69 Elementary Schools
  - 2 Educational Centers

27 SCHOOLS IN 1993!





Student enrollment has increased 136 percent over the last twenty years - from the 34,589 students enrolled in September 2001, to the 81,642 students reported in September 2021.



Challenges

- Existing Program Limitations
  - 1993 - to present Energy Conservation Program
- New Construction
  - DEES, Energy Star, Green Globes
  - Open 1-3 new school facilities/year
  - Capital Improvement Program
  - CIP is a 30-year capital plan that addresses need for new schools, facility renewals in stages a short term six-year plan, a medium plan and a long term outlook
- Aging Infrastructure
  - Capital Asset Preservation Program
  - Developed in conjunction with the CIP to provide funding for the regular maintenance and replacement of major system components
  - Supports replacement at least every ten years (HVAC, plumbing, resurfacing, roofing, & structure repair)
- Sustainability
- Institutional Knowledge
  - Talent Gap, Attrition

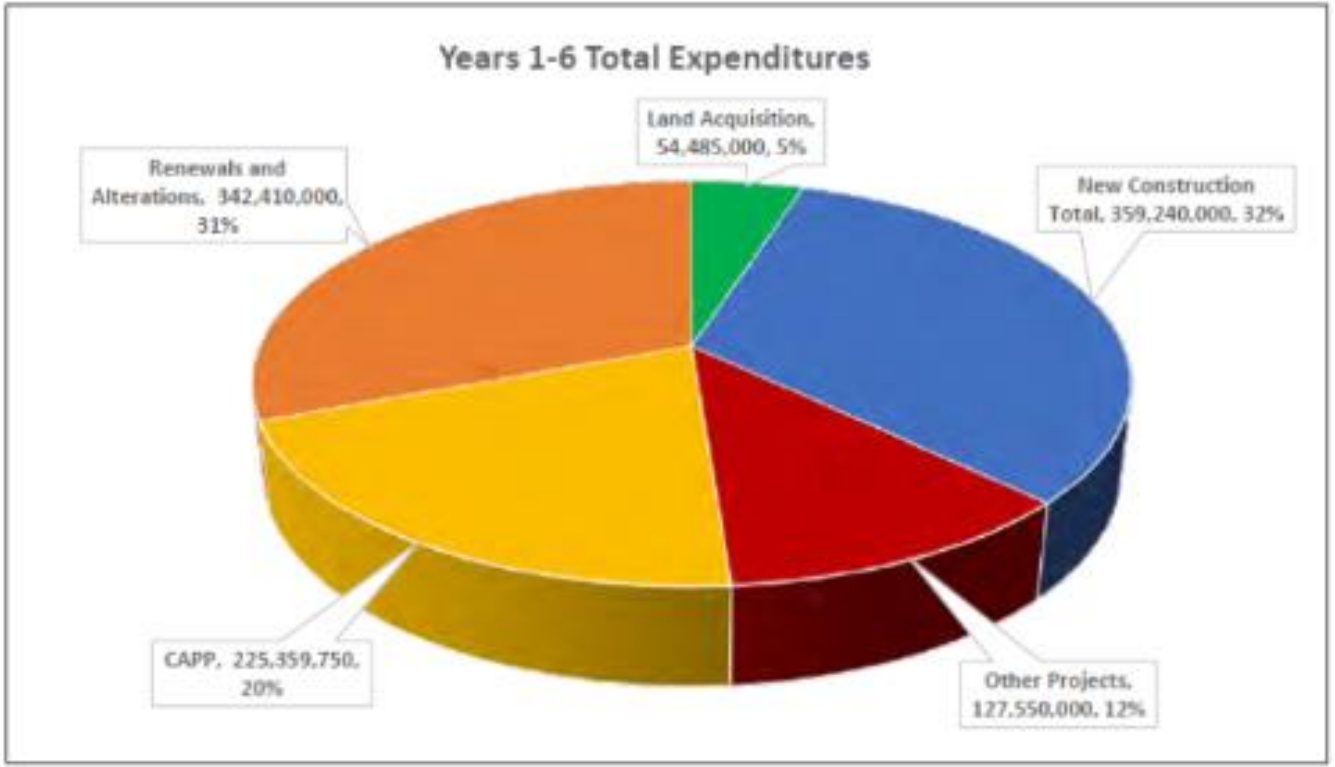
Banneker ES opened March 1948

Lincoln ES opened in 1909 and remodeled in In 1916

Elaine Thompson ES Opening Fall 2022

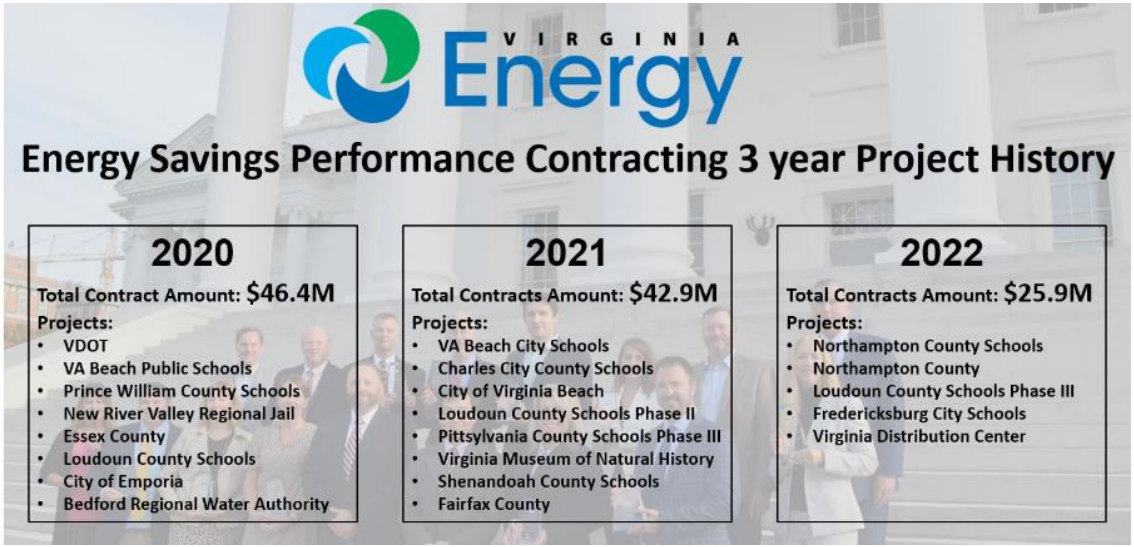
SHORT-TERM CIP (FY 2023 - FY 2028)

The proportion of total expenditures in the short-term, six-year CIP by program category is provided in the chart below:



Why Virginia Energy?

- State contract process and plan
- Prequalified Vendors
- Fully Supported (beginning and ongoing)
- Boiler plate Contract Documents
- History of Success
- Competitive Process with Equal Access
- Guaranteed Savings
- M&V
- Maintenance Contract (not required)



Process

- LCPS Initiated a Back of Envelope Audit for ESPC at J L Simpson Middle School
- Invited all 15 prequalified Energy Services Companies on State Contract
- Items to be included in BOE Audit:
  - Building Automation Systems, Lighting, HVAC, Air distribution, Outdoor ventilation, Exhaust, Hot Water, Electric Motors, Building Envelope, Water consuming systems, Roof mounted Solar Array
  - Preparation Key – Drawings, 3 years utility data, chosen site, preliminary meeting, designated walk -through audit day, all candidate companies together-questions shared with group
- 5 ESCOS returned & CMTA Energy Solutions selected
- February 2020 CMTA presented IGA
- ESPC Contract initiated at cost $1,953,243
- Total guaranteed savings is $2,617,587 in energy and maintenance over next 20 years
- Presented and Accepted by School Board

Option 2 – LED Retrofit Kits & Dimming Controls without Occupancy Sensors

ECM	ECM Description	Total Energy/ Water Savings	O&M Savings	Budget Cost	SPB
C.2	BAS System Retro-Commissioning	$1,547	$0	$45,338	29
C.4	Demand Limiting	$2,170	$0	$23,828	11
E.1	Solar Photovoltaic Array	$64,313	$0	$1,073,976	17
E.3	LED Lighting – Retrofit Kits	$25,399	$2,455	$427,220	15
	Dimming Controls	$0	$0	$76,880	-
E.6	Transformer Replacement	$5,486	$0	$131,022	24
E.7	Utility Meter Elimination	$1,151	$0	$3,100	3
G.1	Building Envelope Improvements	$1,100	$0	$43,129	39
H.3	Refurbish Energy Recovery Ventilators	-$2,233	$1,146	$64,937	-60
P.1	Plumbing Fixture Replacements	$3,668	$185	$43,160	11
P.2	Domestic Water Heating Improvements	$1,657	$0	$18,716	11
P.3	Extend Natural Gas Line and Remove Propane	$163	$0	$1,938	12
Total		**$104,421**	**$3,786**	**$1,953,243**	**18.1**

Glossary of Terms:
ECM - Energy Conservation Measure
LED - Light-Emitting Diodes
O&M - Operations and Maintenance
SPB - Simple Payback Years

Upon Securing Partnership

1. Determine the list of schools to include in this analysis; this could include all buildings initially, but several buildings could be eliminated quickly due to equipment age and low energy use indices (EUI) - LCPS & CMTA

2. Collect and analyze energy use, utility cost and maintenance cost data for all the agreed to facilities - LCPS & CMTA

3. Identify the facilities with relatively new roofs as candidates for roof-mounted solar PV – LCPS

4. Review existing capital improvement plan for each of the facilities, and obtain input from facilities maintenance personnel about their needs and wishes - CMTA

5. Review control sequences, schedules and available trends at the front ends of the energy management systems – CMTA

6. Collect and review available drawings for each facility- LCPS & CMTA

7. Conduct a walk-through energy audit of each facility necessary to assess equipment conditions and identify energy savings opportunities - CMTA

8. Tabulate findings from the walk-through, review with LCPS personnel, and update accordingly - LCPS & CMTA

9. Prepare budget costs and savings estimates of identified capital improvement and energy conservation measures – CMTA

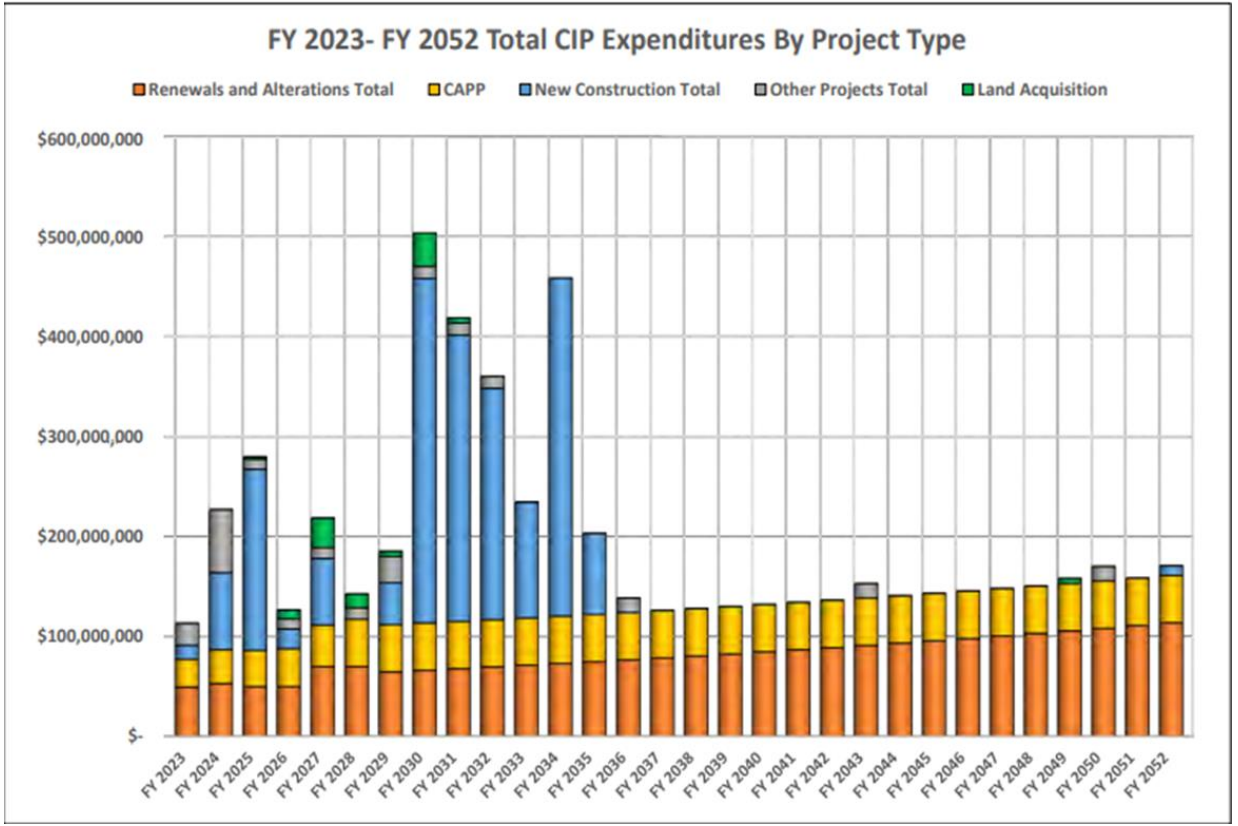
10. Develop a multi-year phased approach for developing and implementing the identified capital improvement and energy conservation measures - CMTA

11. Review phased approach recommendation with LCPS and adjust accordingly - LCPS & CMTA

12. Develop Investment Grade Audit for each project phase and select final list of ECMs to be implemented

Funding

- LCPS secures funding up front
  - Phases coincide with CIP, CAPP
  - Phases are tied to major equipment replacement and infrastructure repairs
  - LCPS Does not Finance the ESCO Projects



ESPC Benefits

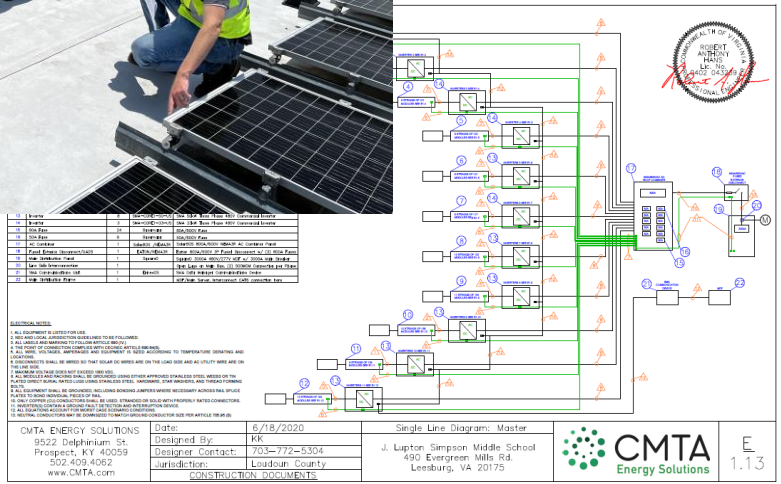
- Expertise in design, planning, implementation, and communication
- Resource that guarantees long term success
- Full integration across multiple projects
- Energy Audits and M&V of multi year savings
- ESCO work among all locations under same contract
- Fiscal Advantage of financing energy efficiency retrofits from realized future energy savings
- Commitment to multi year project creates trusted partnership for staff
- Can include non-ECM projects

CMTA Staff Training

AGENDA

- ✓ Site Plan / Key System Details
- ✓ Master Single Line Diagram
- ✓ System Components
  - Utility Accessible Disconnect Switch
  - AC Combiner Panel
  - Racking & Solar Module
  - Inverter
- ✓ System Shutdown Procedures

CMTA Energy Solutions



CMTA ENERGY SOLUTIONS
9522 Delphinium St.
Prospect, KY 40059
502.409.4062
www.CMTA.com

Date:	6/18/2020
Designed By:	KK
Designer Contact:	703-772-5304
Jurisdiction:	Loudoun County
CONSTRUCTION DOCUMENTS	

Single Line Diagram: Master

J. Lupton Simpson Middle School
490 Evergreen Mills Rd.
Leesburg, VA 20175

CMTA Energy Solutions

E
1.13

Phased Approach Status- Completed

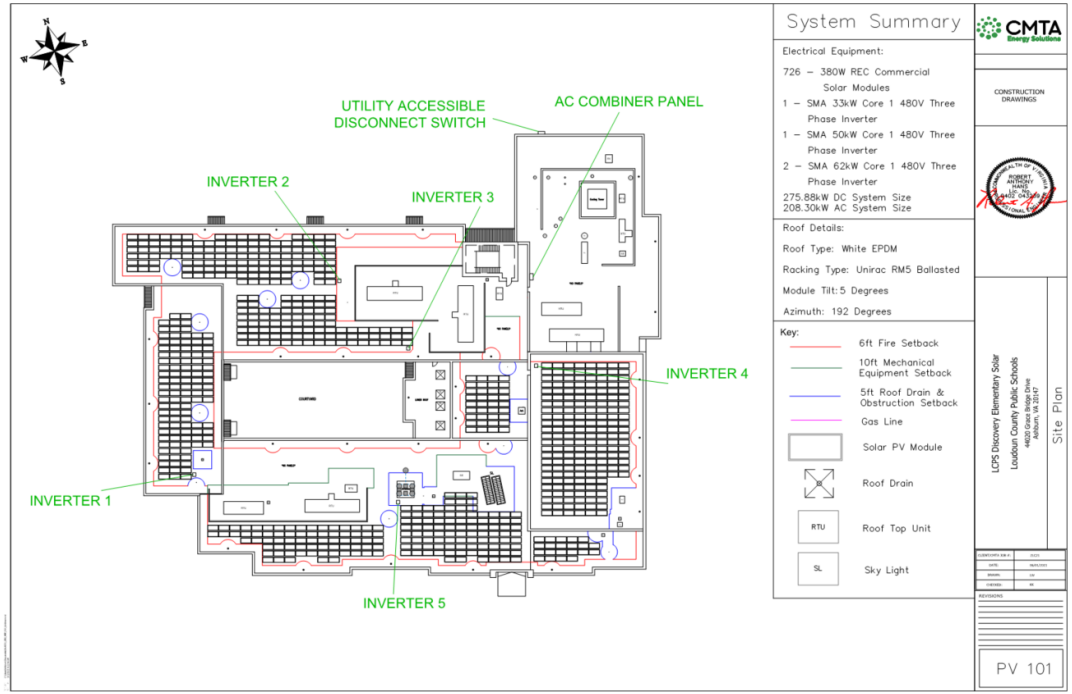
- **Phase 1 - $1,953,243 contract – 100% Complete**
  - 1 facility w/ $108,207 in annual savings – completed 2020
  - 1,076 MWh, 2,277 therms, 775 metric tons C02, 256 kGal annual savings
  - $2,615,739 in savings over project term
- **Phase 2 - $20,965,490 contract – 95% Complete**
  - 6 facilities w/ major HVAC renovations – 2021 construction
  - 396 MWh, 23,487 therms, 405 metric tons C02 annual savings
  - $1,836,643 in savings over project term
- **Phase 3 - $9,143,493 contract – 95% Complete**
  - 8 facilities w/ $372,469 in annual savings – 2021/22 constr.
  - 3,467 MWh, 2,333 therms, 2,469 metric tons C02, 1,106 kGal annual savings
  - $8,486,692 in savings over project term

Phased Approach Status – In Progress

- **Phase 4 - $746,655 project – 60% complete**
  - 1 facility w/ $60k in annual savings (solar only project for new ES)
  - 690 MWh, 489 metric tons C02
  - $1,406,522 in savings over project term
- **Phase 5 - ~$25,000,000 project – In Design**
  - 24 facilities w/ an estimated $525,000 in annual savings – 2022/23 constr.
  - Multiple HVAC equipment replacement projects to address CAPP items from the last 5 years
- **Phase 6 - ~$17,000,000 project – In Design**
  - 2 facilities to receive major HVAC renovation (including all new LED, fire suppression system, ceilings, backup generator, and domestic water heater)
  - 50% funded from CSLFRF HVAC Grant
  - $60k in anticipated annual savings - Summer 2023 constr.

Phased Approach Status-Planning

- **Phase 7 - ~$13,200,000 project – Concept Development**
  - 5 facilities w/ an estimated $420,000 in annual savings – 2023/24 constr.
- **Phase 8 - ~$20,300,000 project – Concept Development**
  - 2 facilities to receive major HVAC renovation
  - 50% funded from CSLFRF HVAC Grant
  - $180k in anticipated annual savings - Summer 2024 constr.
- **Phase 9-13 - ~$200,000,000 – In planning stages**



Typical Lighting ECMs

Retrofit LED Kits

New LED fixtures

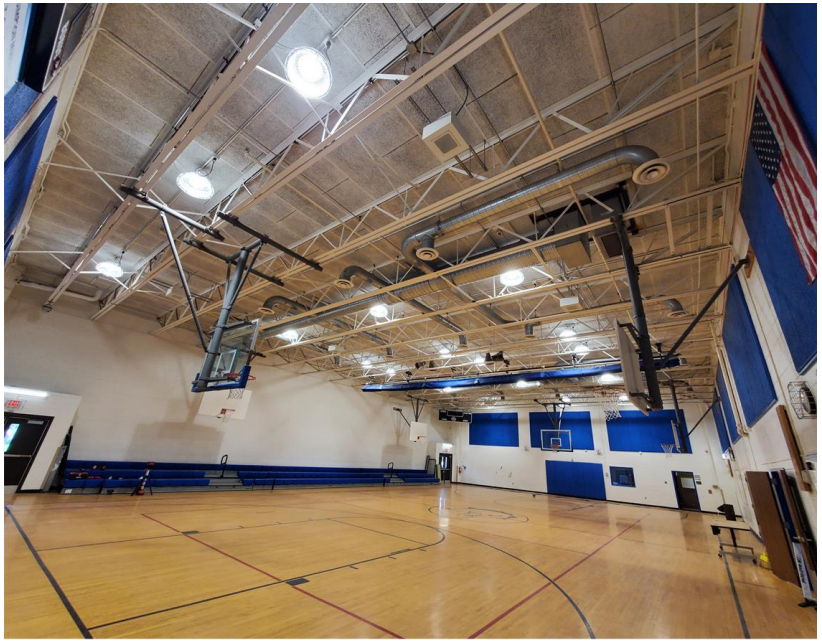
New Exterior LED Fixtures

Dimming Controls

Select Occupancy Sensors

Expansion of Emergency Lighting

Theatrical Lighting



Roof Coating Prior to Solar Array Installation

Typical Equipment Replacements

Roof Top Equipment

DX Equipment

Boilers

Chillers

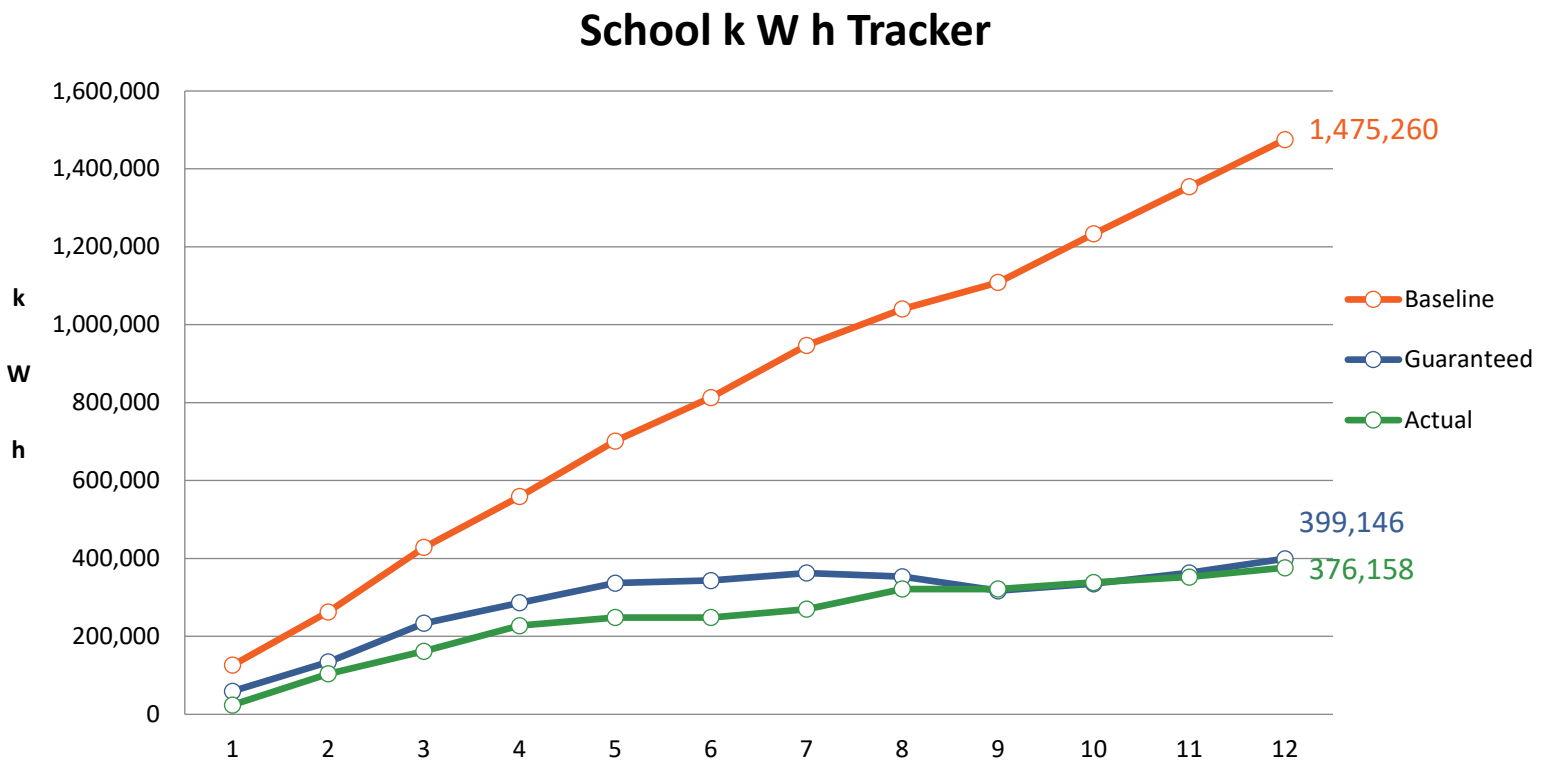
Main Electrical Switchgear

Electrical Transformers

Standby Generators

HVAC Controls

LCPS EPC Ph 1 Pilot Project Results

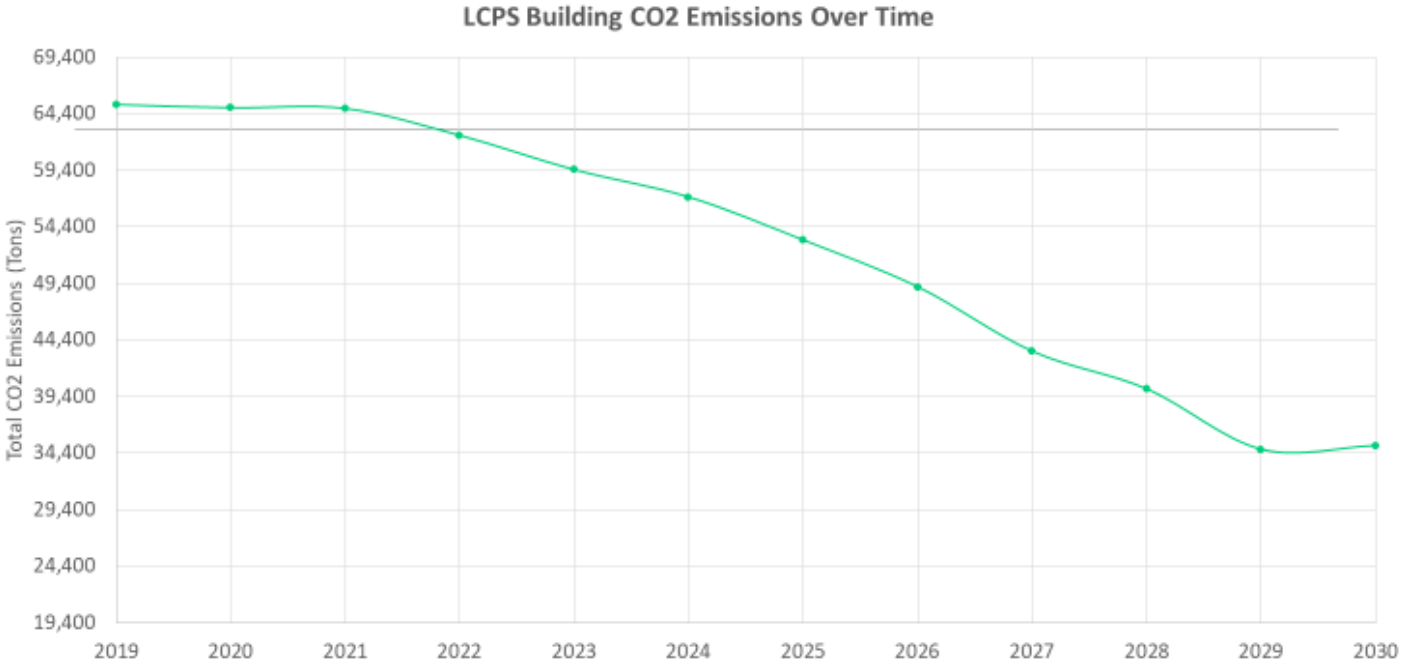


75% kWh Reduction

Future

- 25.2 MW –DC of Solar Photovoltaic arrays spanning 53 Facilities
- LED interior and exterior lighting district wide
- Currently 12 buildings to receive major HVAC renovation or critical system replacements
- Decrease district wide EUI to 38.0 (33% reduction)
- Eliminate 39,386 metric tons from being emitted into the atmosphere each year.
- Solar Website Accessible to Staff and Students

Future



47% Reduction in Emissions

Questions

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571 252 2960

Energy & Environment Team

https://www.lcps.org/domain/27217

Q+A

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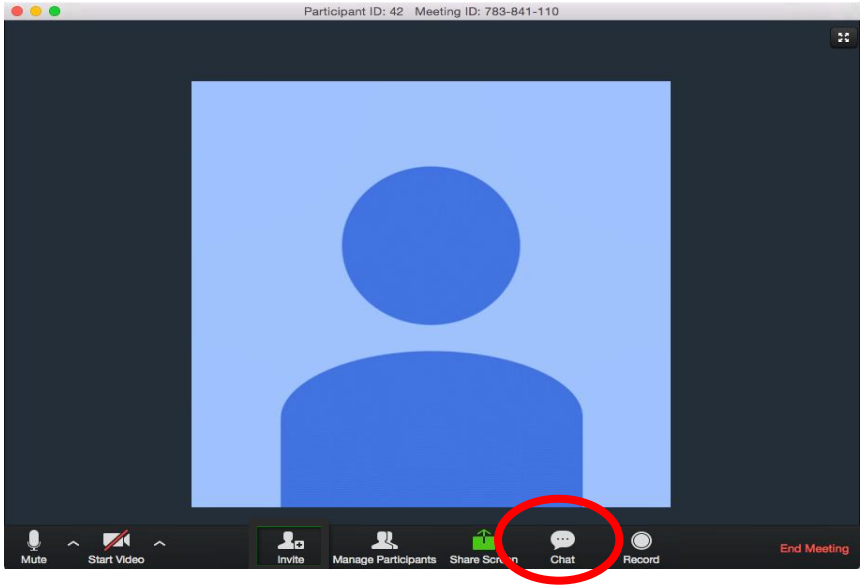

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