VAEEC 2021 ENERGY EFFICIENCY FORUM

Opportunities & Insights for Energy Performance Contracting

November 15th, 1:05-2:20 pm



AGENDA

Opportunities & Insights for EPCs

- Program Overview
- Case Studies
- Challenges & Solutions
- Upcoming Trends & Opportunities









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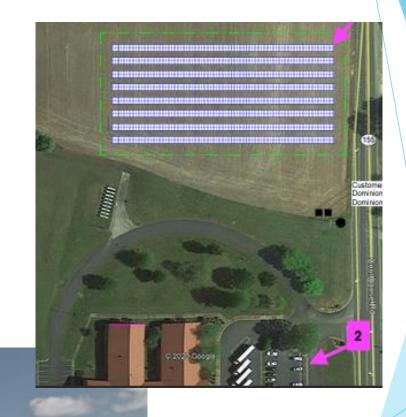
Agency Rebranding





Advantages of the Virginia ESPC Program

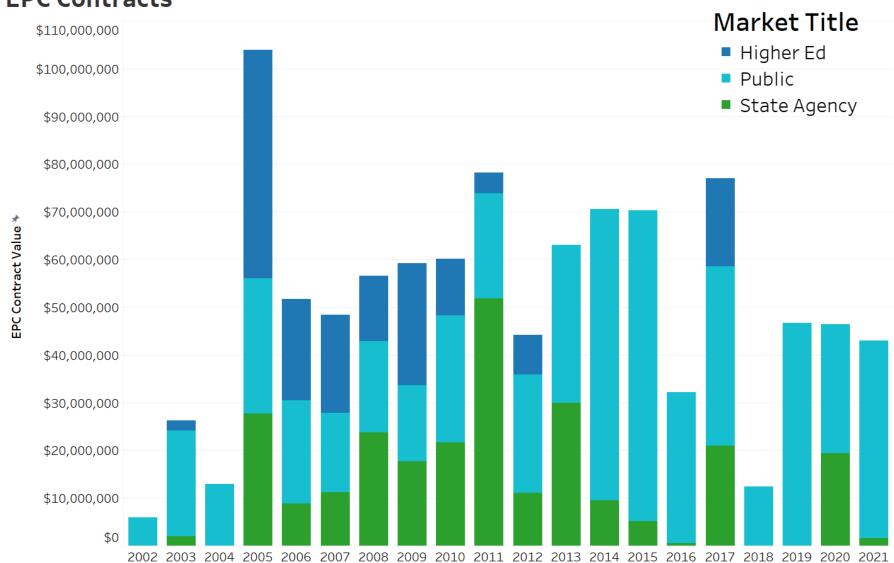
- State contract for cooperative procurement
- No-cost technical support
- Guaranteed savings
- Annual measurement & verification





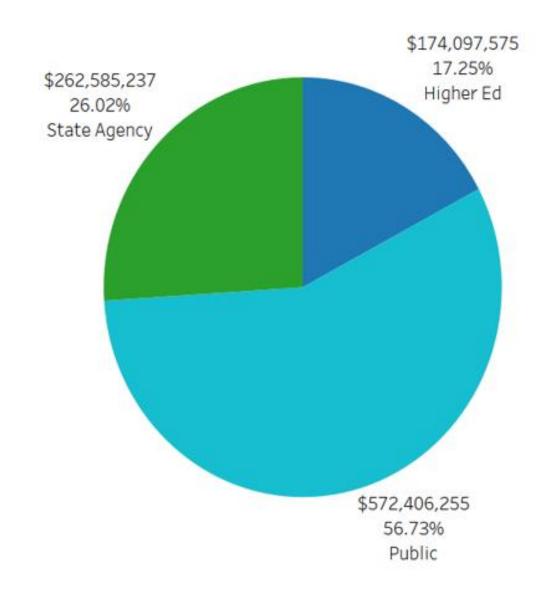
Proven Experience







Diverse Market Sectors



For The Record...

- Started in 2001
- Over \$1B in savings
- ▶ 270+ Projects
- Average annual project total \$50M
- Average project value \$3.7M
- Annual kWh saved 20.2M kWh (292.3M kWh cumulative lifetime)
- Enough to power over 1,500 homes annually
- ... or over 5,500 EV's annually







Keys to Success

- Experienced and dedicated resource to the program
- State contract to ease procurement burden
 - ▶ 10-year contract for stability
 - Streamlined re-enrollment period every 2 years
 - Established process and guidelines
- Strong partnership with pre-qualified energy services companies (ESCO)
- Build relationships with state and localities energy managers
- Draws on experience of prior projects (K-12, universities, hospitals, laboratories, correctional facilities, military bases, highway LED Stl, etc)
- Engagement with energy associations/organizations like VAEEC, USGBC, NASEO, SEEA, DOE, other state energy offices



Strong Partnership







- **Deferred Maintenance**
- Solar (renewable energy) array systems
- Energy storage
- EV charging make-ready
- Electrification





VDOT'S LED ROADWAY LIGHTING ENERGY PERFORMANCE CONTRACT

VA Energy Efficiency Council | 2021 Energy Efficiency Forum (virtual)

Marc Lipschultz, P.E., PTOE | VDOT Traffic Engineering Division

Agenda

- About VDOT
- Why Use Energy Performance Contracts (EPCs)?
- VDOT's EPC
- VDOT's Contract Development Experience
- Construction Status
- Q&A



About VDOT | Fast Facts

- 7,500 Employees
- 58,000 miles of statemaintained roads
 - Does not include roads maintained by Cities, large Towns some Arlington/Henrico Roads, or independent toll road agencies
- Third-largest state DOT in the country
- Divided into nine Districts



About VDOT | VDOT road lighting inventory

Location Type	Inventory
Conventional Poles	20,100 poles
High Mast Light Poles	700 poles
VDOT-maintained parking lots	 69 VDOT-owned P&Rs with lighting (20,900 spaces) 41 Rest Areas 21 Weigh Stations
Overhead Sign Lighting	2500~3000 structures
Tunnels	 6 VDOT-maintained long tunnels (24/7 lighting) Estimated 50~100 underpasses
Combo signal/light poles	Estimated 100~200
Aerial/marine navigation lights	Estimated 100~200



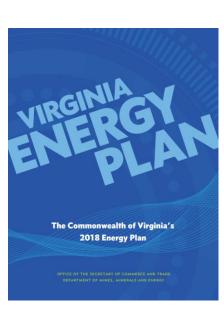
Why Use EPCs?

How EPC Works:

- Energy improvements financed with line of credit from VA Treasury
- Loan is secured by future projected energy savings
- Developed by Energy Services Contractor (ESCO)

Why use EPC?

- Cash flow benefits from year one; no capital budget impacts
- ESCO guarantees future energy savings
- Consistent with 2018 Virginia Energy Plan and Governor Northam's 2019 Executive Order #43
- Successful track record from other agencies



VDOT's EPC | Scope of Work

- Replacement of ≈ 9,600 High-Pressure Sodium (HPS) luminaires with LEDs
 - All of VDOT's Fredericksburg, Richmond, and Hampton Roads Districts, plus portion of NOVA District
 - Includes conventional and high-mast poles on VDOT highways and in some rest areas/weigh stations/park & rides
- Installation of a Lighting Controls System
 - Provides utility-grade metering capability that is essential for securing an EPC loan
 - Additional energy savings above and beyond those achieved by LED conversion alone
 - Allows for smarter management and monitoring of VDOT lights



VDOT's EPC | Expected Benefits

Fiscal benefits

- No impacts to VDOT's Capital Budget
- Positive cash flow begins immediately

Safety benefits

- LEDs last 2-3 times longer than HPS → fewer shoulder/lane closures → reduced risk of work zone crashes for both workers and road users
- LEDs improve driver's ability to see dark objects (e.g. pedestrians, deer, debris) at night

Environmental benefits

- 11.3 million kWh annual reduction (≈16,000 refrigerators per year)
- Reduced light trespass and skyglow



VDOT's EPC | Expected Benefits (Pro Forma Analysis)

Project Costs (2020-2036)	Cost
CONSTRUCTION COSTS **	\$17.40M
Operation Costs (2018-2034): M&V and Controls Interest Payment	\$1.46M \$4.50M
TOTAL PROJECT COSTS (over 15 years)	\$23.36M

Project Savings (2020-2036)	Savings
Total Energy Savings: LED savings LCS savings	\$15.86M \$2.46M
O&M Savings	\$9.11M
TOTAL PROJECT SAVINGS (over 15 years)	\$27.43M

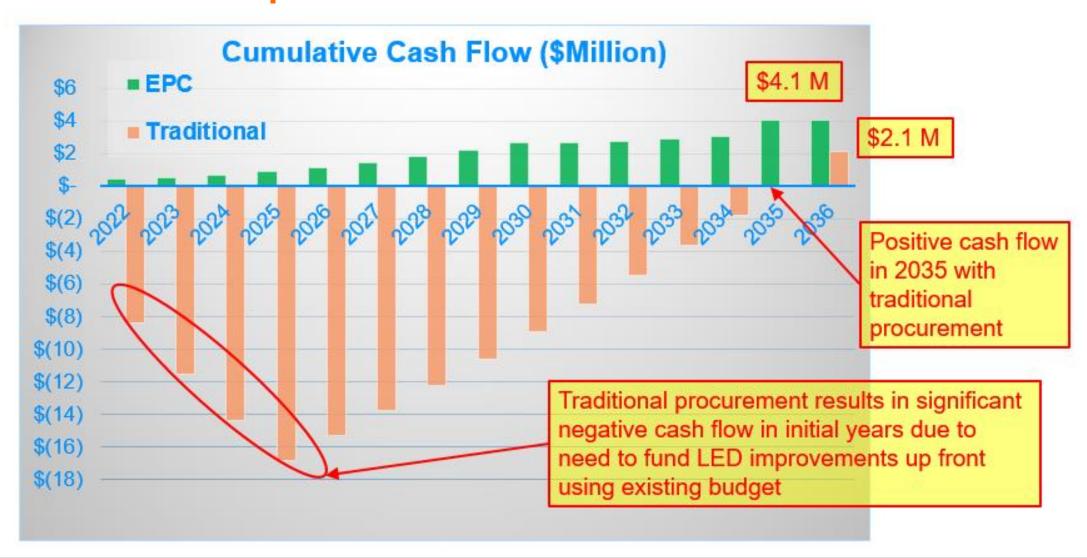
NET PROJECT SAVINGS

= \$27.43M - \$23.36M = **\$4.1M**

**Includes \$500K owner contingency and Trane's \$514k previously-incurred energy audit costs



VDOT's EPC | EPC vs. Traditional Procurement





Contract Development | Timeline

- 2015: VDOT selects Trane as its ESCO for "back of envelope" audit using established DMME procurement procedures
- 2015-2017: Contract development
 - VDOT decides to focus exclusively on roadway lighting for its first ESCO; does not include buildings improvements
- 2017-2019: Implementation paused pending evaluation of appropriate Correlated Color Temperature (CCT) policy
- Spring 2020: revised audit of VDOT lights using work order tracking platform
- Summer 2020 March 2022: Construction
 - Substantial completion expected by Dec. 2021



Contract Status

- LED replacement over 90% complete
- On track for substantial completion by the obligated March 2022 completion date
- Lighting Controls System (LightGrid) generally working; focus now is on completing system setup and configuration
- Zero safety incidents to date

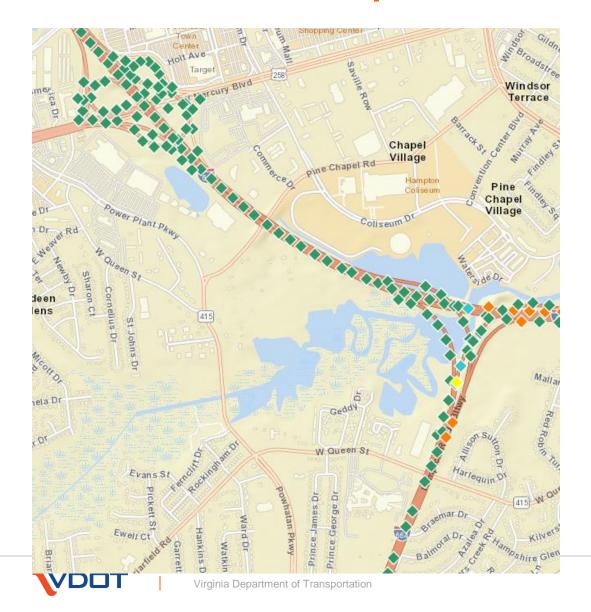


Contract Status | Construction



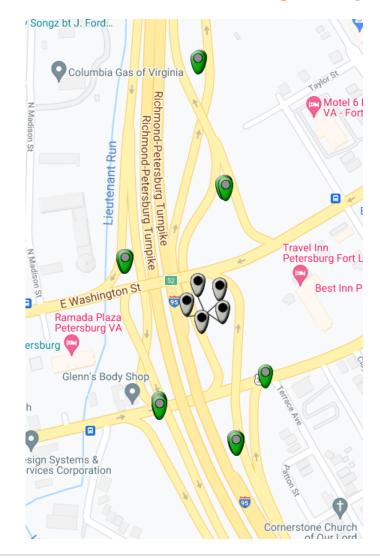


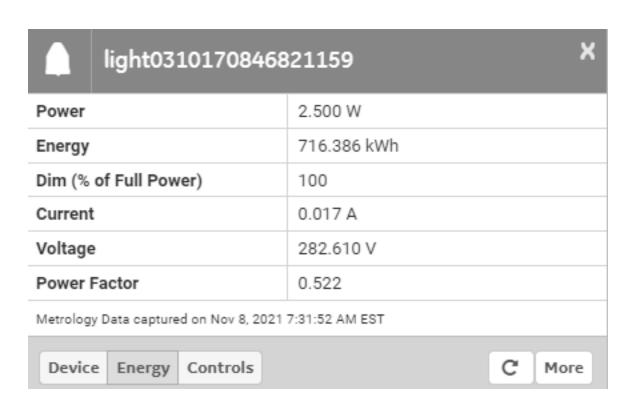
Contract Status | Work Order Tracking



WOR	K ORDER	
^	WORK ORDER DETAILS	
	WO Status★ 7 - Billed ▼	Work Order #* 3234
	Title 64 East	
^	WORK REQUESTED *	
	Work Requested	
	Fixture	

Contract Status *LightGrid*











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Current Legislative Issue Important to ESCOs

Background and Timeline of Issue

- ✓ 2015 Cooperative procurement guidelines were changed preventing new construction and DGS determined roof replacements were considered new construction. Impact meant ESCO projects could only impact 20% of roof space.
- ✓ 2017 Legislation was introduced be Del Minchew (HB 1712) exempting wholesale roof replacements from EPC contracts.
 - ✓ Roof exemption considered a compromise so entire EPC program would not be jeopardized.
 - ✓ ESCOs not allowed to install Energy Conservation Measures (ECMs) on roofs if it impacted more than 20% of the roof
 - ✓ Rooftop solar wasn't as prevalent in schools and government facilities
- ✓ 2021 Market and legislative forces changed dramatically
 - ✓ Commonwealth Clean Energy Policy passed in 2021 (SB 1284)
 - ✓ Solar costs have decreased dramatically
 - ✓ Many K-12 schools and local and state governments have adopted carbon reduction goals

Current Legislative Issue Important to ESCOs

Current Impact

Rooftop solar is becoming a very attractive ECM for schools and governmental entities but with limits in place where ESCOs are only allowed to impact 20% of roof space, projects are not moving forward using the ESCO model

Solution

ESCOs working with VAEEC and consultants to update EPC code language to allow roof repairs (beyond the current 20% limit) and for full replacements

Goal is to agree on specific language changes to current code and obtain sponsors in each legislative body to move bill(s) forward. Result of recent election will have an impact.

ESCO Offering Trends in the Marketplace

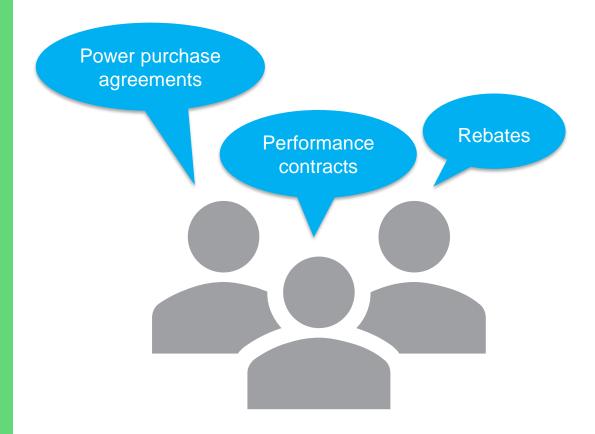
- 1. Energy as a Service EaaS
- 2. Fleet Electrification

Energy as a Service (EaaS)

As defined by Guidehouse Insights

EaaS can be defined as the **management** of one or more aspects of a **customer's energy portfolio**—including strategy, program management, energy supply, energy use, and asset management—by applying new products, services, **financing instruments**, and technology solutions.

WE ALREADY DO THIS, RIGHT?





Here's what is different about EaaS

EaaS deals usually take the form of an **Energy Service Agreement (ESA)** with the following attributes:



Client doesn't need to provide own capital for project



Cost of project is paid for by savings generated under the ESA and guaranteed by funding provider (i.e. ESCO)



Payment is usually expressed as \$ cost/kWh or \$ cost/kWh saved



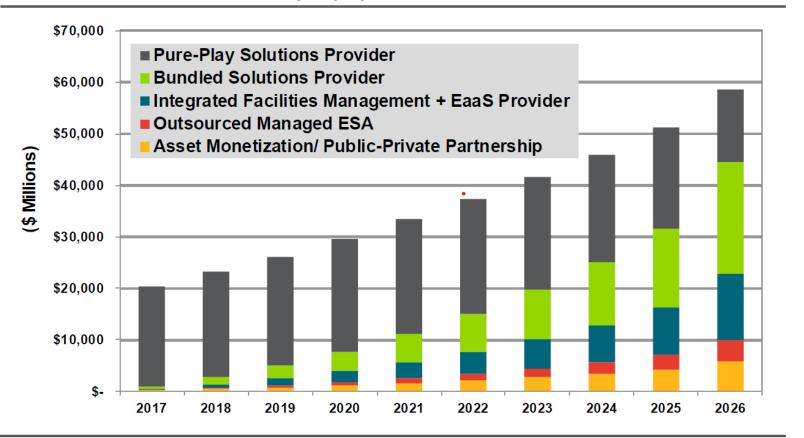
Energy assets often (but not always) owned by funding provider and often operated/maintained by the ESCO as more of an outsourced model



EaaS market projected to grow significantly

Projections by business model (Navigant Research)

Chart 3.4 Annual EaaS Revenue by Deployment Model, North America: 2017-2026



(Source: Navigant Research)

PUBLIC SECTOR

- Trillion-dollar gap for infrastructure modernization work
- 80% 90% of infrastructure controlled by state and local governments



Performance Contracts vs. Energy Savings Agreements

Quick recap

ATTRIBUTES	PC	ESA
Avoids client capital outlay	Yes	Yes
Outsourced operational model	Light	Heavy
Contractual outcome guarantees	Yes	Yes
Off-balance sheet asset ownership	No	Usually
Pricing expressed as cost/energy output	No	Yes
Traditional banking partners	Yes	Yes/No
Transaction duration	15 years	7 – 25 years **

^{**} These can be larger if structured as concession agreements (OSU)





Custom Energy as a Service fleet electrification solution

Solar photovoltaic canopy provides cost-effective and predictable clean energy to achieve sustainability goals and enable bus fleet to "drive on sunshine"



Battery energy storage optimizes energy utilization, maximizing on-site renewable energy usage



Distributed generation provides low-carbon baseload energy while ensuring resilience, reliability, and guaranteed uptime







Pantograph and multi-dispenser chargers provides comprehensive charging solution for eBus fleet



Schneider ECC combines electrical distribution equipment and industrial controls into an intelligent Power Management System (PMS) to deliver autonomous microgrid solutions managing multiple energy sources and prioritized loads



AlphaStruxure network operations center (NOC) provides digital optimization and management of the end-to-end system

Project Visualization – Brookville Bus Depot, Montgomery County, MD











Client profile: 1M-resident municipality (Metro D.C.) Work scope: Public Safety HQ/Correctional Center Microgrid (2 sites)

- 2 MW solar canopies
- 1 MW CHP
- Integration of existing gas backup generator
- New absorption chilling
- New L1 & L2 EV charging infrastructure
- Primary substation upgrades
- Sophisticated microgrid edge control
- EcoStruxure Microgrid Advisor Cloud orchestration

Amount funded via ESA: ~\$20 million Timeline to implement: ~18 months

Asset owners: Duke Energy **Client satisfaction:** Very high













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