FCPS Reponses to Questions for Staff from December 5th JET Energy Subcommittee

How much will the solar RFP reduce county emissions?

The amount of county emission reductions is directly proportional to the amount of solar generation capacity installed by the county. According to the U.S. Energy Information Administration at: https://www.eia.gov/electricity/state/virginia/ Carbon Dioxide emissions in Virginia for electricity production are 772 pounds per megawatt hour (mWh). According to the National Renewable Energy Laboratory, system output may range from 1,292,384 to 1,429,357 kilowatt hours (kWh) for a one megawatt PV system installed in Virginia. If a hypothetical production of 1,300,000 kWh is used, this is able to be converted to 13,000 mWh, which when multiplied by 772 pounds of Carbon Dioxide emissions per megawatt hour would result in: 10,036,000 pounds (4552 metric tons) of Carbon Dioxide emissions reduction per megawatt of installed solar PV. Based on the current statutory limit of 50 megawatts, if the county were able to secure all of the remaining 6.5 megawatts the maximum estimated impact would be 29,588 metric tons of CO2 emission reductions annually.

Also, what is the timeline for the solar RFP? i.e. when will awards be given, solar installed, schedule for implementation, etc.

As far as a timeline for solar RFP is concerned, FCPS has already proceeded with contacting Sun Tribe solar and is pursuing solar canopy initial installations under the terms of contract # 4400009516. https://www.fairfaxcounty.gov/cregister/ContractResultList.aspx?vendorName=&filterType=Contains&contractNumber=4400009516&contractType=&contractFY=&commodity=&NIGPCode=&orderBy=2&buyerCode= at the following seven sites: Edison High, Falls Church High, Justice High, Mount Vernon High, South County High, Westfield High, James W. Robinson Secondary with Lake Braddock Secondary selected as a "back up" site in case of any difficulties with installations at the initial seven sites.

The vendor was advised to pick the best 6.5MW to secure capacity in the Virginia State Corporation Commission's 50 megawatt (MW) Pilot Program queue. The decisions regarding sites were made by the vendor based on parking lot size, parking lot orientation, near shading obstacles, access, and conduit routing pathways. There are additional steps remaining to implement PPAs at these sites, but FCPS is proceeding as quickly as feasibly possible.

Once the statutory limit of 50 MW is met, legislation will have to change before any additional PPA installations may be made.

Ask county to benchmark all utilities (electricity, gas, water, fossil fuels)

All FCPS facilities are benchmarked in the EPA ENERGY STAR® Portfolio Manager tool. The best way to review this data is to login directly to the tool: https://portfoliomanager.energystar.gov/pm/login.html User name: FCPSguest Password: VIEWonly!

How many facilities have been benchmarked for energy?

All FCPS facilities, no exceptions.

When will all buildings be benchmarked/when will this information be available for the public?

Done, 100% available today and has been available for several years.

How many schools/government buildings are in the RFP?

The Solar RFP included 87 sites for review, but all sites are available for installation. The RFP was just a way for county entities to select a solar PPA partner, and sites included for review were just intended to be a representative sampling. All sites (owned by the county) are eligible for PPA installation.

We understand that we have to get to net-zero carbon; we have to --> there is no other option
What is the county's plan/timeframe for net-zero carbon?

FCPS implements conservation best practices, installs efficiency upgrades, focuses on demand control, and in pursuing renewable energy. All of the efforts have been moving the needle in the right direction for several years. I am not aware of a specific plan to reach net-zero carbon within FCPS at this time.

Where is the county right now in carbon emissions?

Data is posted on the FCPS website through calendar year 2018. The 2018 GHG Inventory Report is also attached.

Must know where we are before we can set goals/means to achieve goals.

Prioritize benchmarking.

The county is using a state-of-the-art financing mechanism for the solar RFP (Power Purchase Agreement). Has the county considered similar unique financing systems for other aspects of energy efficiency?

FCPS is currently reviewing and intends to implement an Energy Performance Contract under the terms of the Commonwealth of Virginia – Department of Mines, Minerals and Energy contract, details of which may be found at the following
URL: https://www.dmme.virginia.gov/DE/PerformanceContractingSupport.shtml. It is possible to supplement the savings which are used to finance energy conservation measures with additional funding sources (i.e. a bond, operating funds, grants, etc.) and that concept is being considered by FCPS. If a supplemental financing source were to be used to compliment Energy Savings in order to allow for deeper and more comprehensive retrofits and upgrades within the context of an Energy Performance Contract, it could be considered a state-of-the-art financing mechanism.

What has the county done for energy efficiency so far? (specifics on air tightness, insulation, energy audits, LED lights, etc.)

FCPS has an Energy Management Section within the Office of Facilities Management which consists of two teams. The Building Automation Team is responsible for the operations, maintenance, and (upon reaching obsolescence) replacement of Building Automation Systems which allow for energy management through remote control of the scheduling and operations of Heating, Ventilation, and Air Conditioning (HVAC) systems at FCPS facilities. This is a highly technical team that includes certified technicians and engineering expertise. The second team, the Energy Education Team's goal is to ensure efficient and effective stewardship of public resources (both economic and environmental) through

continually striving to reduce division energy use and cost without negatively impacting health and safety, the educational environment, or productivity. The FCPS Energy Education Team includes all students, staff, parents and other community members who make up the totality of individuals who utilize FCPS sites. Energy Education Specialists are the FCPS employees tasked with involving all members of the FCPS Energy Education Team and focusing team member's efforts towards accomplishing the goal. The job description of an FCPS Energy Education Specialist is attached for reference.

Improvements in energy efficiency are made during school renovation and new construction and with the replacement of less efficient equipment and systems at schools not undergoing renovation. Typically, there are about eight major school renovation/new construction projects completed annually. Energy improvements during renovation and construction include upgrading structural components (roofs, walls, windows, and doors) plus heating, cooling, ventilation, refrigeration, and lighting equipment. The installation of more energy efficient heating, cooling, ventilation, and refrigeration equipment in schools not undergoing renovations are made when existing equipment is beyond useful life or has failed. In total, these energy improvements and Energy Management are helping FCPS meet School Board Policy 8542 which establishes environmental stewardship priorities including reduction of FCPS' carbon footprint, improvement of air quality, and reduction of facility operating costs. Specific examples listed are below:

- Automatic Temperature Control (ATC): Heating, cooling, and air conditioning equipment is controlled by a computerized system that stops and starts equipment, sets temperatures back during unoccupied times, and controls the intake of fresh air. The systems are managed remotely.
- Daylighting: Introducing natural light into classroom and large spaces such as libraries, lobbies, and gyms improves quality of lighting and reduces electricity use. Window sizes, Low E coatings, placement, shades, light shelves, skylights, and solar light tubes are used for this.
- De-Lamping: Numbers of lighting fixtures and/or numbers of lamps in fixtures are eliminated to reduce energy use while maintaining the same or improved quality of lighting.
- ECM motors (Electronically Commutated Motors): These motors for pumps and fans adjust the power of the motor in response to changing load conditions in order to maintain work output.
- Efficient Boilers: Condensing boilers are 90%+ efficient using natural gas.
- Efficient Chillers: Magnetic bearing, water cooled, screw chillers that provide enhanced efficiency of chiller operation.
- Electrical Plug Load: Power management controls of computers and the installation of ENERGY STAR rated walk-in coolers, ovens, ice makers, refrigerators, and holding/proofing cabinets in school kitchens.
- Energy Recovery Units (ERU): Energy Recovery Units (ERU): Energy Recovery Units exchange heat energy between incoming unconditioned ventilation air and outgoing conditioned exhaust air. This exchange effectively pre-conditions the incoming air for cooling or heating, saving a corresponding amount of energy.
- LED Lighting: Highly efficient LED lamp fixtures are installed in interior spaces and are also used for exterior lighting.

- Lighting Based on Occupancy: Occupancy sensors help ensure lights do not remain on when rooms are empty. Multi-level switches in classrooms allow occupants to control levels of lighting in combination with natural light to save electricity.
- Roofs, Walls, and Windows: Upgraded wall insulation and an air barrier product is used to make the wall even more efficient by reducing air infiltration. Double glazed, low-E windows with thermal insulated frames are installed and reflective R-30 white gravel cool roof assemblies reduce the amount of solar heat, reducing the cooling loads for HVAC equipment.
- Variable Frequency Drive (VFD): VFDs are installed on large HVAC equipment to control speed of the motors in response to system demand.
- Variable Refrigerant Flow (VRF) systems: VRF units work at the rate needed allowing for energy savings at load conditions. In addition, interior temperatures in individual rooms can be controlled.