Arlington County's Decarb Tool

- Project goal was to develop an internal energy efficiency and decarbonization prioritization decision-support tool for Arlington's existing facilities
- County worked with a consultant to create a custom tool based on energy models of County facilities that could inform facility upgrades
- Decarb Tool was embedding in the County's facility planning process to inform upgrades to County facilities
- The Tool was designed to be able to be updated as technology, costs, and data inputs are updated

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Overview ▶

Introduction ▶

All Facilities ▶

Electric and Gas Use ▶

Electric AMI: Load Shapes ▶

Electric AMI: Monthly kW and kWh ▶

Gas Use: Monthly ▶

Gas Use: Load Shapes ▶

Priority Building Results ▶

Energy Modeling ▶

Glossary ▶

Equipment Bureau

Facility ⓘ

| Equipment Bureau ⌄ |

Gas Cost Scenario ⓘ

| High ⌄ |

Electricity Cost Scenario

| High ⌄ |

Equipment Cost Scenario

| Standard ⌄ |

| Multiple selections ⌄ | ⓘ

Feasibility Considerations ⓘ

Electrical Panel Upgrades Needed	High ⌄
Equipment Recovery Time Concerns	Blank ⌄
Existing R-22 Use	Blank ⌄
Facility Service Delivery Impacts	Blank ⌄
Measure Implementation Order	High ⌄
Measure O&M Impacts	Blank ⌄
Planned EVSE Installations	Blank ⌄
Space Constraints	High ⌄
Utility-Side Capacity Constraints	Low ⌄

Measure & Facility	Annual Electricity Consumption (kWh)	Annual Gas Consumption (therms)	Annual Energy Costs ($)	Annual Building Emissions (lb CO2e)	Measure Cost Type ▾	Measure Cost ($)	Payback Period (years)	Annual Electricity Impact (kWh)	Annual Gas Impact (therms)
⊟ Electric Bay Heaters	620,821	22,216	41,475	648,954	Replace on Burnout	$10,472	N/A Cost Increase	134,900	-5,412
⊟ Heat Pump Hot Water Heater	493,455	27,059	37,591	625,903	Replace on Burnout	$23,126	N/A Cost Increase	7,534	-568
⊟ Exterior Lighting	480,899	27,628	37,253	624,695	Replace on Burnout	$2,548	10	-5,021	0
⊟ DMSHP	484,253	27,628	37,418	626,795	Replace on Burnout	$662	8	-1,668	0
⊟ Baseline	485,921	27,628	37,500	627,840				0	0

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Tool Outputs for Developing Capital Projects

Madison – Window AC Units

Quincy III

Key Decarb Tool Metrics

Greenhouse Gas Impacts

Payback Periods

Energy and Cost Impacts
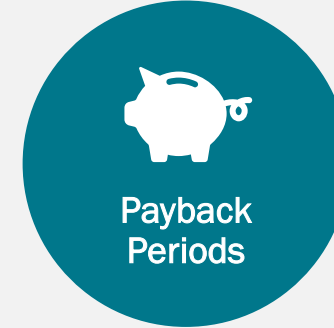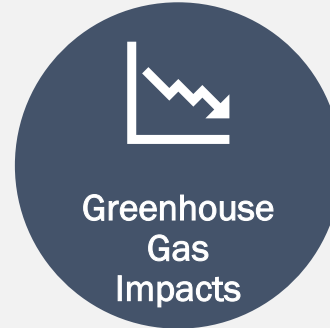
Quincy III Air Source Heat Pump Example Results:

27% GHG savings from baseline

16 Year payback

30% Increase in electricity use
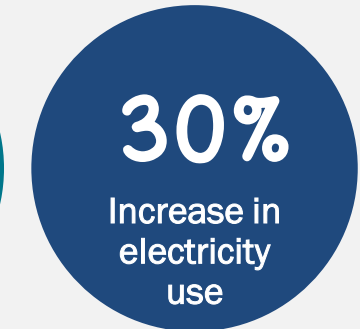
Questions

- **Q for Arlington/DC/MDE: Describe your jurisdiction's building decarbonization goals and requirements, including specific regulations like BEPS.**

- Goals from Community Energy Plan (CEP) for County Facilities
  - Goal 1 (G1): Increase the energy and operational efficiency of all buildings
  - Goal 5 (G5): Lead by example and integrate CEP goals into all County Government activities
  - Strategies from the Carbon Roadmap (CEP Implementation-focused document)

- U.S Department of Energy's Better Climate Challenge (EUI and GHG reduction goals for County Operations)

- Sustainability Facility Policy (County New Construction)

- Decarb Tool (County Existing Buildings)

- Additional Goals for Community-wide building decarbonization in CEP and Carbon Roadmap (Green Building Incentive Program)

Q for Arlington/DC/MDE: What elements of the policy regulations are proving to be cost effective?

- The fundamental purpose of the Decarb tool is to identify and compare the most cost-effective facility upgrade scenarios that achieve the County's decarbonization goals over a variety of metrics.

Questions

Q for Arlington/DC/MDE: What modeling or data tools does your jurisdiction have in place to track building decarbonization targets and BEPS compliance?/(For Arlington County: Describe the Decarbonization Tool.)

- Decarb Tool is focused on providing scenarios for facility upgrades based on energy modeling.
- Evaluation, measurement and verification process for upgrades to County facilities.
- Public dashboard of energy use for County facilities
- Annually reports through U.S Department of Energy's Better Climate Challenge. Last year the County successfully hit it's 10-year EUI reduction target of 23% across 1.9M sq. ft. portfolio.

Q for Arlington/DC/MDE: How can local governments ensure equitable access to resources and support for building decarbonization, especially for small property owners and underserved communities?

- Arlington is using concepts from the Decarb Tool to apply to the Columbia Pike neighborhood as part of the EPA's G2G grant that was recently awarded to the County. This grant-funded project, Energy Health Equity (EHE), will create an intensive stakeholder process, decision-support tool for building owners in Columbia Pike and a project financing toolkit.

Backup Slides

Decarb Tool Goals and Overview

Develop an internal energy efficiency and decarbonization prioritization decision support tool for Arlington's existing facilities

Collect, review and assemble existing County facility data in a bottom-up approach

Engage and collaborate across departments and collect detailed facility data for up to 12 selected facilities

Develop an energy efficiency and decarbonization measure characterization energy and cost database

Model various building efficiency and decarbonization scenarios to estimate energy, GHG and cost.

Energy Efficiency and Decarbonization Tool Process Overview

① Data Collection and Research →

- Baseline Data Inputs (electric interval and monthly gas, facility summary parameters)
- Contractor phone interviews and existing literature reviews
- Energy efficiency and decarbonization measure characterization database

② Facility Selection →

- Selection of 12 representative facilities
- Detailed documentation collection (drawings, specs, controls, etc.)
- Virtual audits of priority facilities

③ Model Development →

- Energy Plus models for up to 12 priority facilities
- Up to 12 combinations of energy efficiency and decarbonization Measures per facility
- Apply cost scenarios for equipment, fuel, and O&M
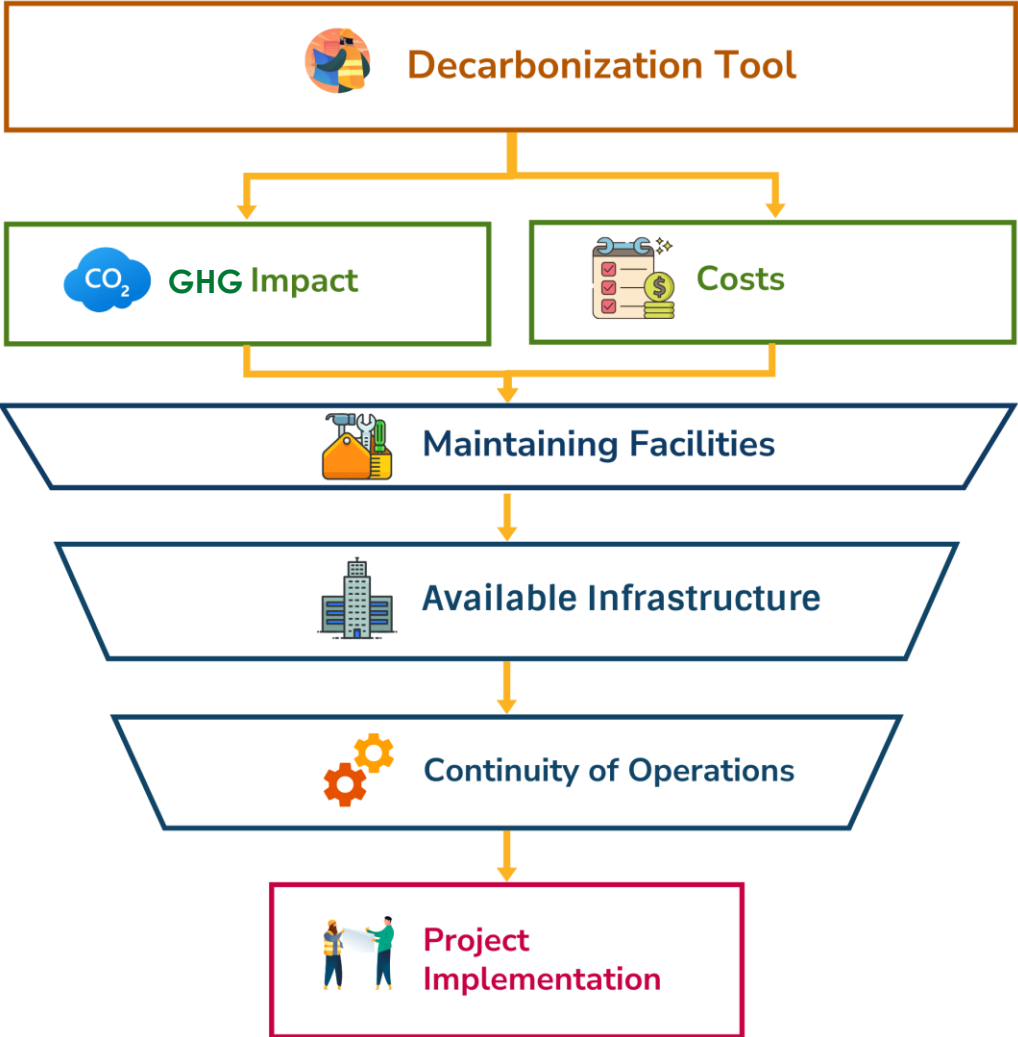- Estimate GHG impacts of each scenario

④ Interactive Decision-Making Tool

- Optimization of modeled scenarios (GHG impacts, energy savings, payback periods)
- Replicable process for future use
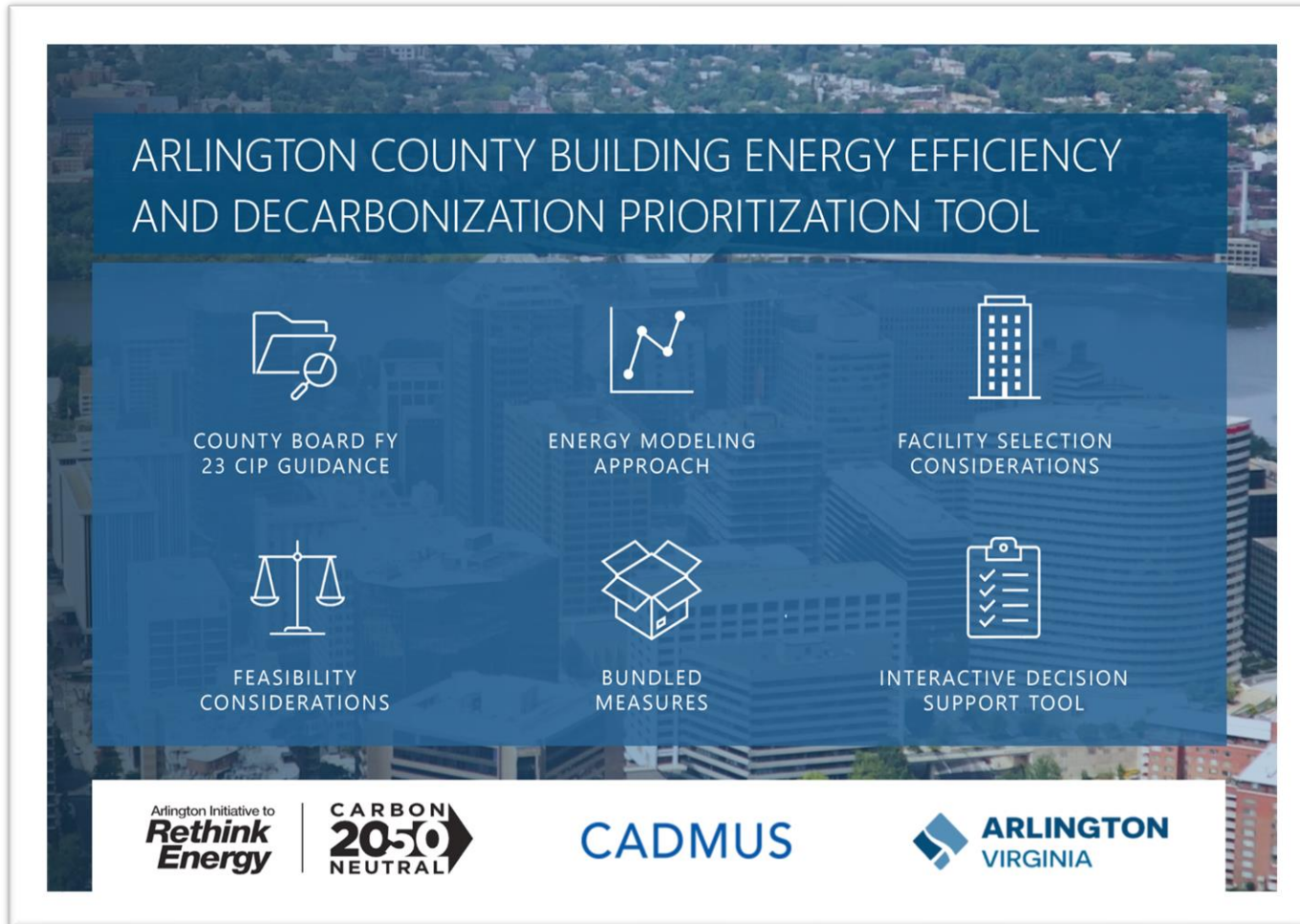
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Integrated Approach to Energy Management and Facilities Maintenance

- Throughout the facility upgrade process, we are committed to achieving the County's sustainability goals and seeking overall reductions in GHG emissions where possible

- Energy metrics inform a coordinated approach to County facility updates by:
  - Leveraging Decarbonization Tool scenarios
  - Incorporating facility-specific data
  - Focusing on GHG savings and facility operations

- Integrating facility maintenance program with decarbonization efforts

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Decarb Tool- Ongoing Use and Updates

ARLINGTON COUNTY BUILDING ENERGY EFFICIENCY
AND DECARBONIZATION PRIORITIZATION TOOL

COUNTY BOARD FY 23 CIP GUIDANCE

ENERGY MODELING APPROACH

FACILITY SELECTION CONSIDERATIONS

FEASIBILITY CONSIDERATIONS

BUNDLED MEASURES

INTERACTIVE DECISION SUPPORT TOOL

- Modeling four new facilities
- Include additional measures into modeling
- Refine and update data- cost utility rates, eGrid factors
- EM&V for implemented measures
- Feasibility Considerations enhancement
- Enhancing pathways towards deep energy retrofits (cost and energy)
- Continue to use for CIP project planning