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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Practical Electrification of Existing Buildings

LET'S TALK ABOUT...

PRACTICAL ELECTRIFICATION

in the era of County & State BEPS

April 16, 2024

Scott Dicke

Adam Landsman

Mike Cain

LEARNING OBJECTIVES

LEARN ABOUT…

- **DRIVERS FOR ELECTRIFICATION & DECARBONIZATION IN THE BEPS ERA**
- **AVAILABLE INCENTIVES** TO SUPPORT BUILDING ELECTRIFICATION
- **IMPORTANT CONSIDERATIONS** WHEN CONSIDERING ELECTRIFICATION
- **EXAMPLES OF & PRACTICAL STEPS FOR SUCCESS** IN ELECTRIFICATION & DECARBONIZATION

INTRODUCTIONS

Scott Dicke

Dir. Clean Energy Programs

Montgomery County GreenBank

Your partner for clean energy ™

Adam Landsman

President

PULSEIQ!

Your building. *Smarter.*

Mike Cain

Managing Director

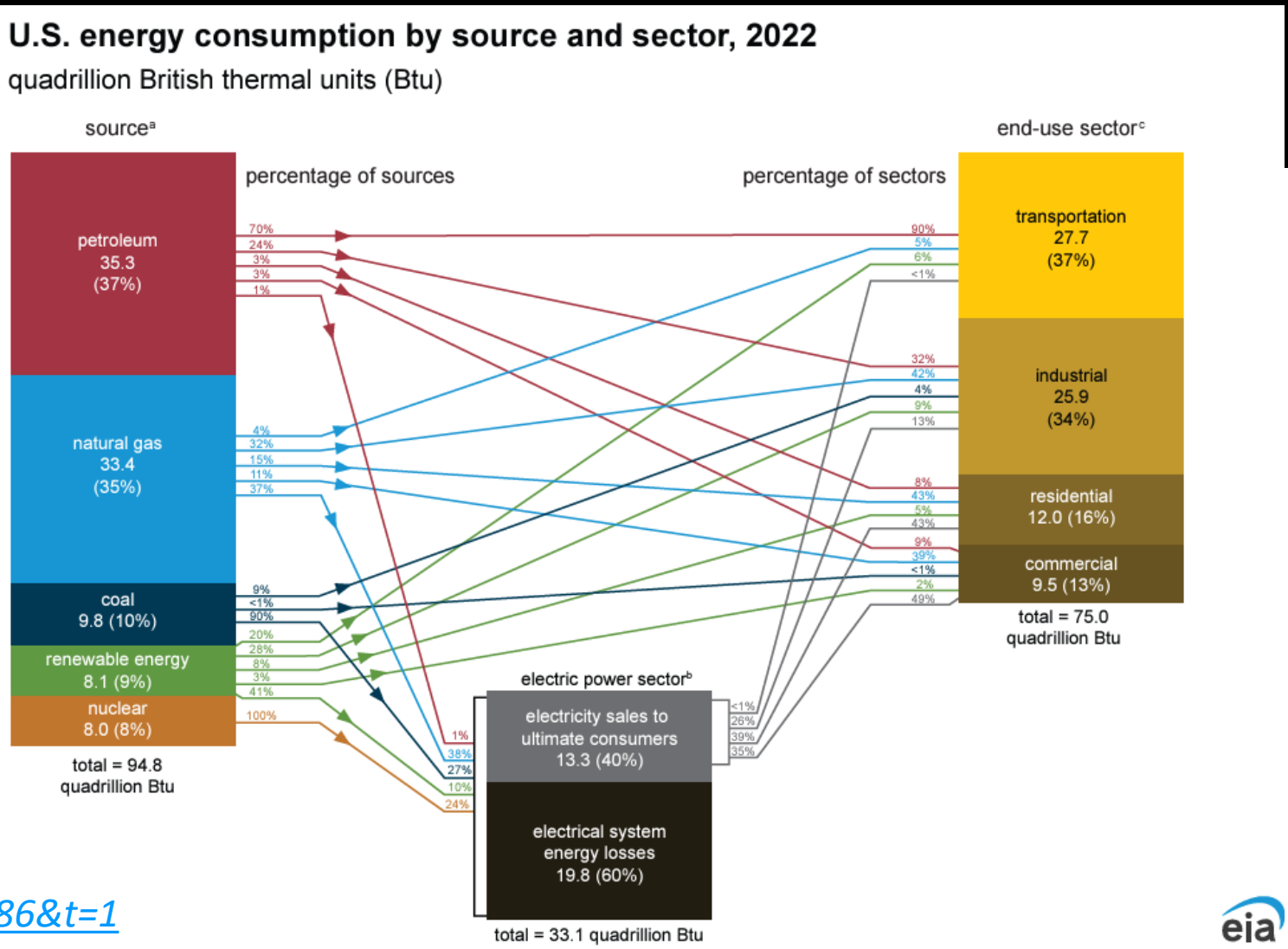
era building solutions

ELECTRIFICATION & BEPS

THE BIG PICTURE

Residential and commercial buildings consume 38% of all US energy. This equals

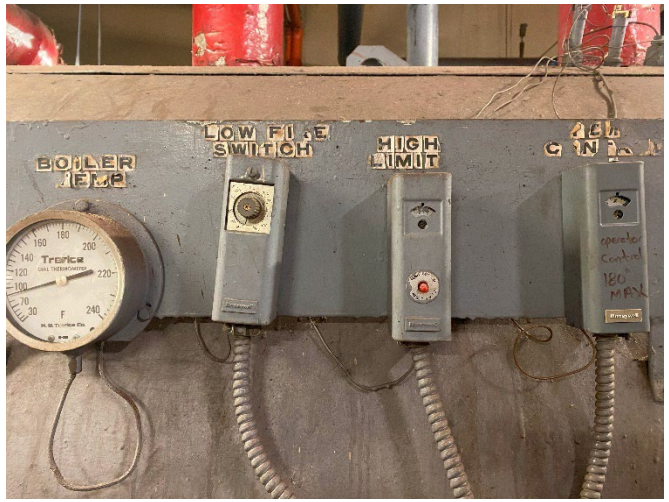
35.6 quadrillion BTUs



https://www.eia.gov/tools/faqs/faq.php?id=86&t=1

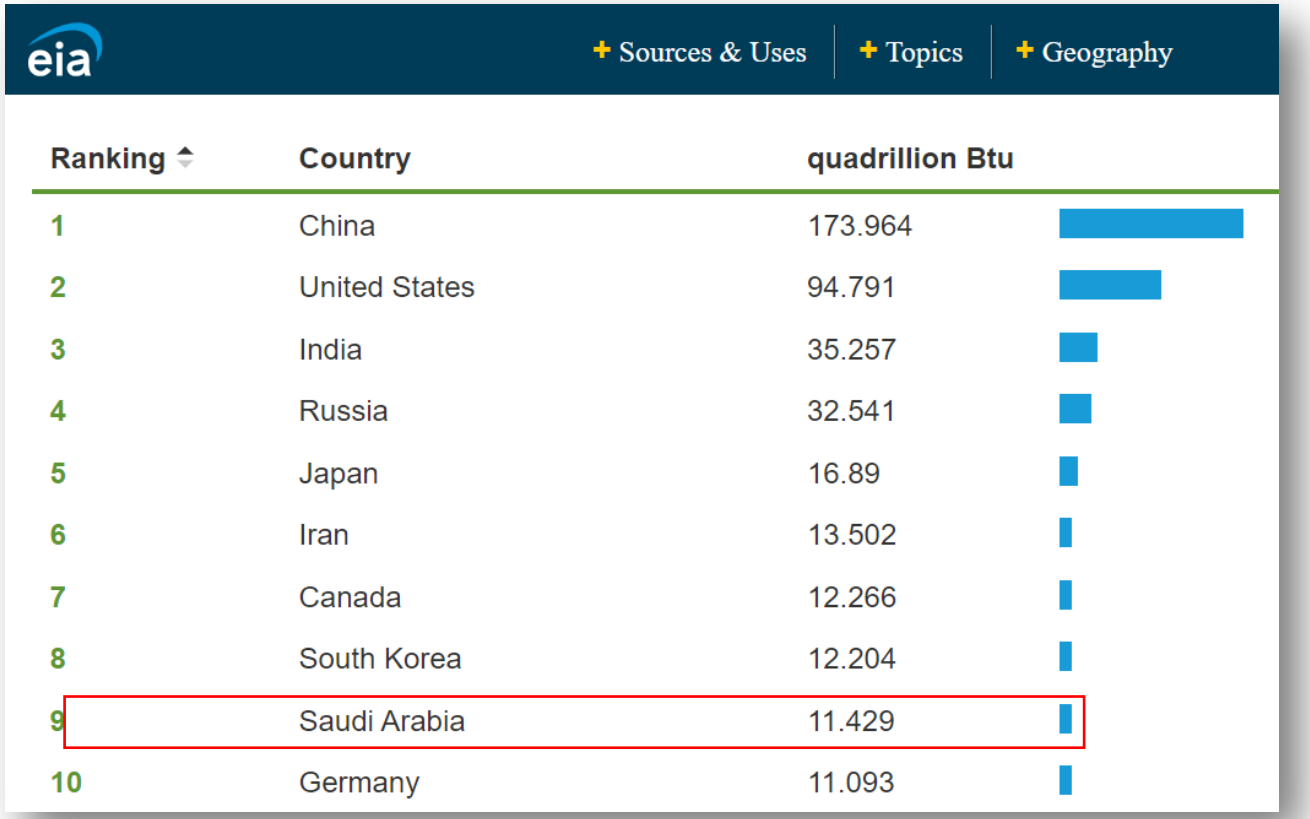
ELECTRIFICATION & BEPS
BUILDINGS WASTE A LOT OF ENERGY!

The average building wastes about 1/3 of the energy it consumes, equaling **11.4 quadrillion BTUs**



https://www.epa.gov/statelocalenergy/local-topics-energy-efficiency-non-governmental-buildings

ELECTRIFICATION & BEPS
WE CAN AND MUST DO BETTER.

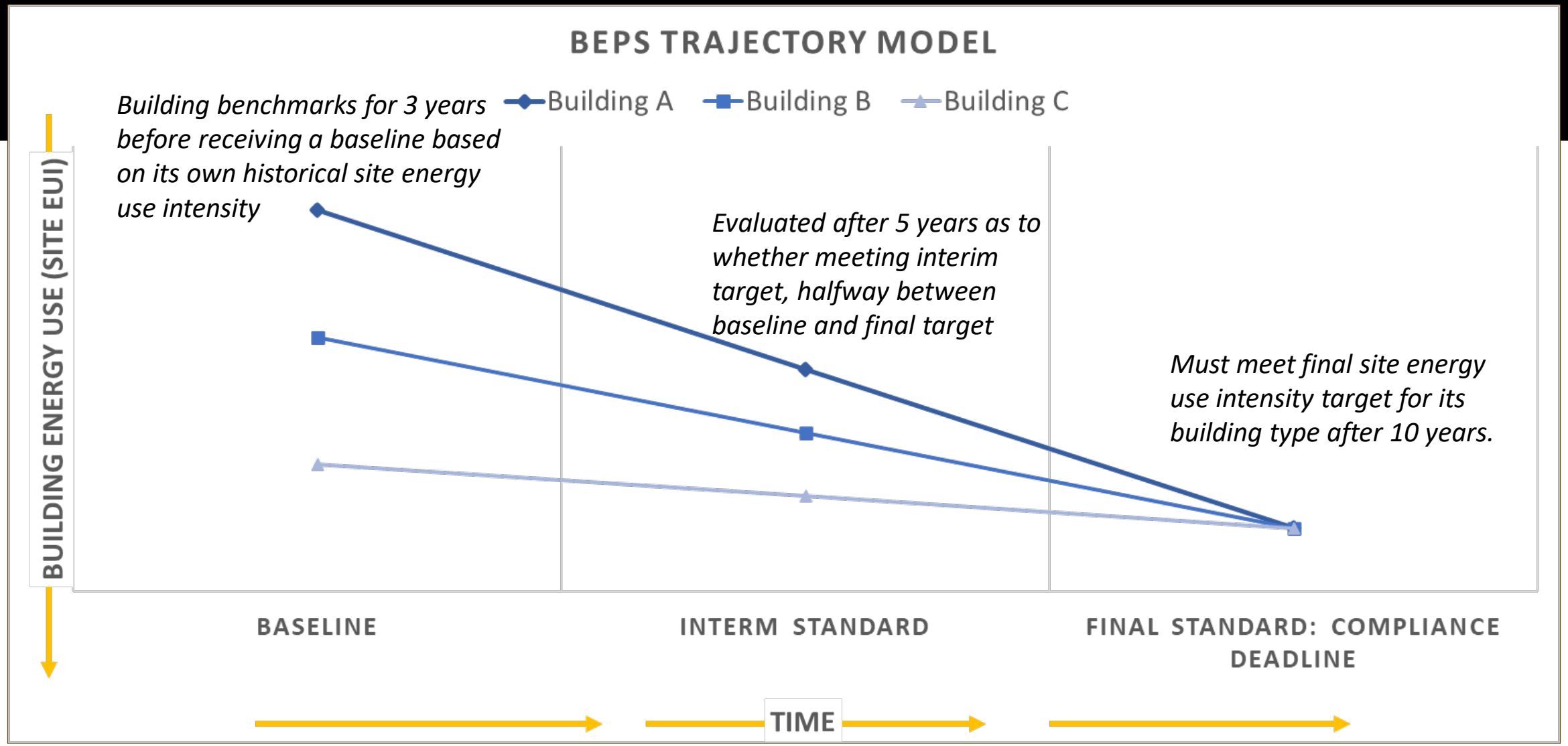

eia + Sources & Uses + Topics + Geography

Ranking	Country	quadrillion Btu
1	China	173.964
2	United States	94.791
3	India	35.257
4	Russia	32.541
5	Japan	16.89
6	Iran	13.502
7	Canada	12.266
8	South Korea	12.204
9	Saudi Arabia	11.429
10	Germany	11.093

- US buildings waste about as much energy as Saudi Arabia, the 9th highest energy consuming nation on Earth!
- Or put another way, our buildings waste as much energy as the bottom 128 (out of 212) nations on earth consume each year combined.

https://www.eia.gov/international/rankings/world?pa=44&u=2&f=A&v=none&y=01%2F01%2F2022

MONTGOMERY COUNTY BEPS



https://www.montgomerycountymd.gov/green/energy/beps.html

THE PATH TO PROGRESS

80% OF BUILDINGS THAT WILL EXIST IN 2050 <u>ALREADY EXIST TODAY</u>.

1. **Where Do We Stand? Benchmark and Report Energy Data Annually.**
   - Tracking and reporting requirement – you can't manage what you can't measure!
   - Cornerstone of understanding energy performance – data quality is essential!
   - Data is publicly disclosed and used to assess progress towards performance targets.

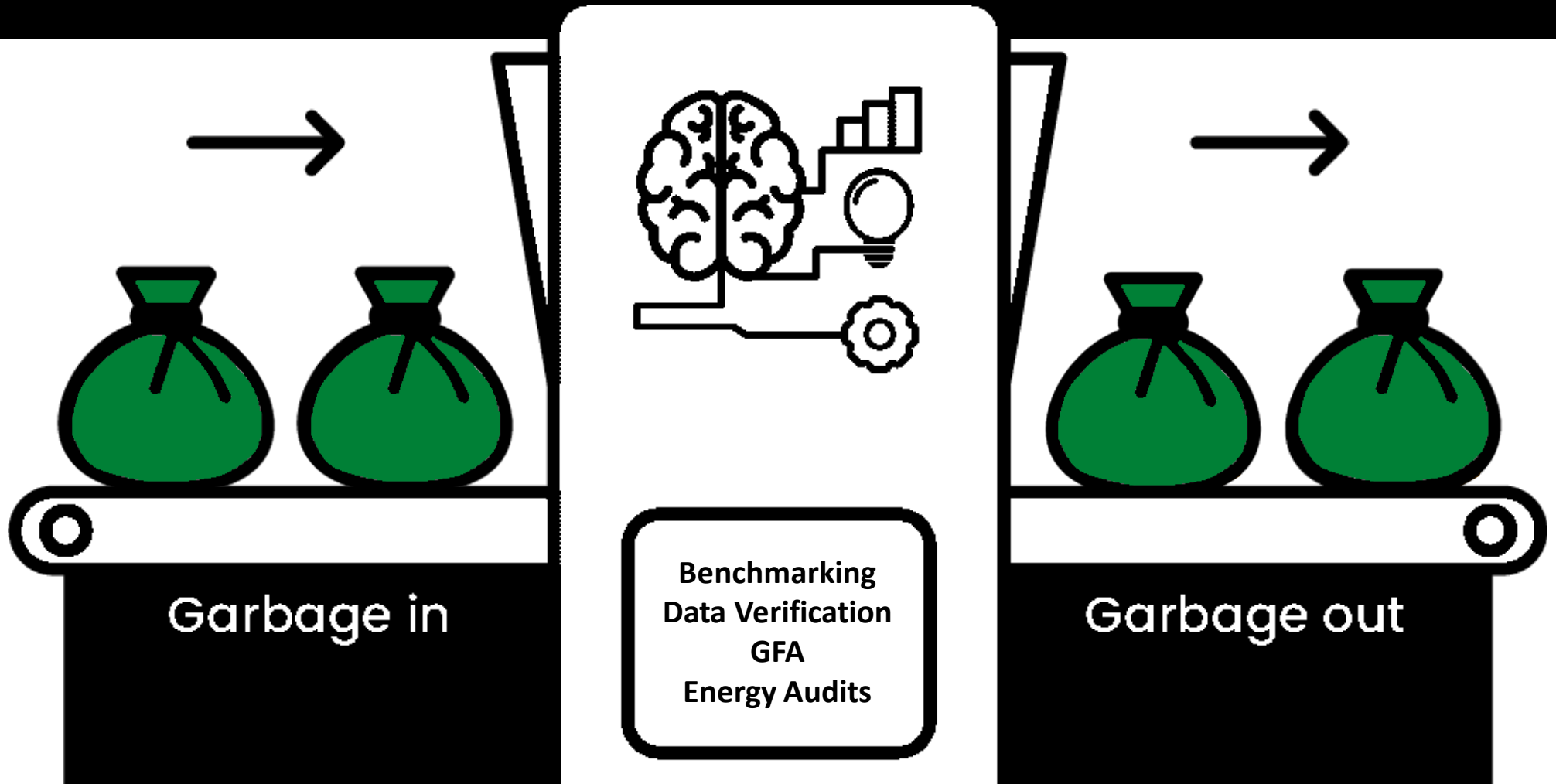
2. **Where Are We Going? Meeting Building Energy Performance Standards**
   - Requirements for building to improve performance across one or more quantitative objective measurements (e.g. to reduce site energy use intensity, greenhouse gas emissions, or improve ENERGY STAR Score).
   - Many buildings need to take action to meet performance targets.
   - Energy conservation, efficiency, and efficient electrification may be strategies to meet standards.
3. **How Do We Get There? Plan, Do, Act, Check and REPEAT!**
   - Don't guess. Start with an Energy Audit.
   - Implement your ECMs and use your annual benchmarking results to assess performance.
   - Reassess and repeat. Efficiency good for business (and the environment). Compliance is a floor, not a ceiling.

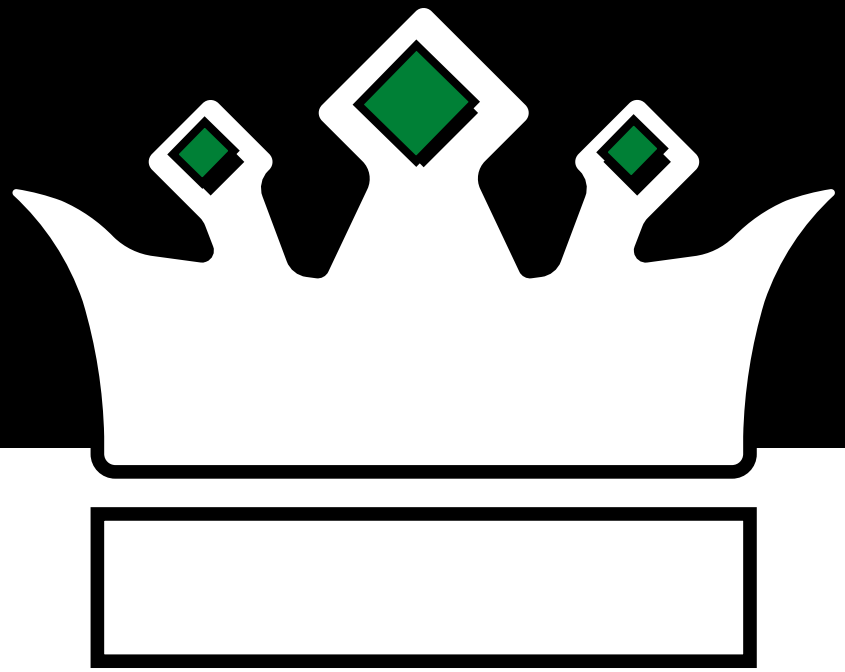
ELECTRIFICATION
3 KEY CONSIDERATIONS

1. **Gas Costs Will Increase Faster Than Electricity**
   - US is the world's leader in natural gas supply, but policy is cutting into demand
   - With fewer customer, the costs to maintain the distribution infrastructure are more concentrated
   - As a result, gas prices for end users will likely rise much faster than electricity

2. **The MD BEPS Law Will Put An Extra Penalty Cost on Gas**
   - Alternative Compliance Payment = no less than the social cost of carbon, $230 per metric ton of excess CO2e in 2030 going up to $270 per metric ton of excess CO2e in 2020 dollars, adjusted for inflation, in 2040
   - 0.0053 metric tons CO2 per therm → $1.41 additional dollars per therm in penalties
3. **Gas Is Explosive**
   - 2016 – Flower Branch Apartments – 7 Dead, 65+ Injured, 100+ Displaced.
   - 2022 – Friendly Gardens Apartments – 14 Injured, 200+ Displaced.
   - 2022 – Potomac Oaks Condo – 1 Dead, 14 Injured, 34 Displaced.
   - Each of these cases spawned massive lawsuits and settlement.
   - Electric equipment can also cause fires and must be regularly inspected and maintained.

GIGO
DATA QUALITY MATTERS





KEEP CALM

RESOURCES ARE AVAILABLE

...AND OTHERS HAVE DONE IT BEFORE.

Building Tune-Up

THE RESOURCES

Commercial Clean Energy Rebate (Solar)

Inflation Reduction Act

Custom Incentives

Grants

Instant Rebates

Financing

Technical Assistance Program

Energy Advance

Washington Gas
A WGL Company

Pepco
An Exelon Company

PACE

EV Smart

Small Business

MBCx

Medium/Large Business

Resilient Maryland

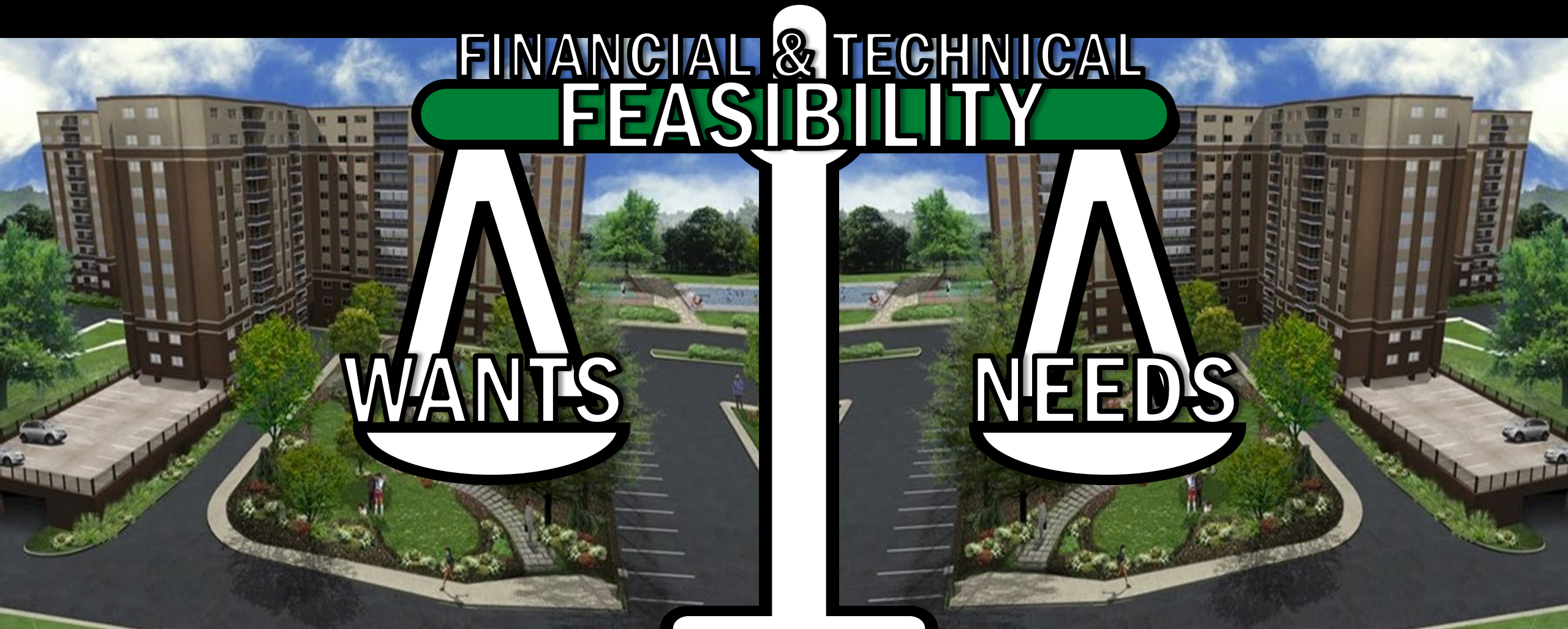
Maryland Energy Administration

Montgomery County GreenBank
Your partner for clean energy ™

Prescriptive Incentives

Resilient Maryland

CASE STUDY
THE TAKOMA PARK TWINS



CASE STUDY
THE TAKOMA PARK TWINS

CASE STUDY
BUILDING 1

THE BUILDING

- **240-UNIT CONDOMINIUM**
- **BUILT 1967**
- **CONCERNS:**
  - LIMITED AVAILABLE CAPITAL
  - UNRELIABLE HEATING SYSTEMS
  - SPIKING REPAIR, OPERATION, & MAINTENANCE COSTS
  - MAJOR UPCOMING CAPITAL INVESTMENT REQUIREMENTS

CASE STUDY
BUILDING 1

THE NEEDS

CASE STUDY
BUILDING 1

THE NEEDS

REPLACEMENT OF...

- SWITCHGEAR
- BOILERS
- WATER HEATERS

IMPROVEMENT OF...

- EXTERIOR LIGHTING (SECURITY)

CASE STUDY
BUILDING 1

BASIC REPLACEMENT

CASE STUDY
BUILDING 1

HOLISTIC REPLACEMENT

CASE STUDY
BUILDING 1

DELIVERED:

- COMBINED HEAT & POWER PLANT
- BOILER UPGRADES
- DHW UPGRADES
- ADVANCED CONTROLS
- EXTERIOR LIGHTING
- RESIDENT ENERGY IMPROVEMENTS
- SWITCHGEAR REPLACEMENT

CASE STUDY
BUILDING 1

PAID THROUGH...

- **$250,000+ IN GRANTS & INCENTIVES**
  - MD ENERGY ADMINISTRATION
  - WASHINGTON GAS
  - PEPCO
- **$1.2M IN LOW-COST GREEN FINANCING**
  - MONTGOMERY COUNTY GREEN BANK

CASE STUDY
BUILDING 2

THE BUILDING

- 240-UNIT APARTMENT BUILDING
- BUILT 1967
- CONCERNS:
  - ENVIRONMENTAL SUSTAINABILITY
  - LONG-TERM AFFORDABILITY
  - MAJOR UPCOMING CAPITAL INVESTMENT REQUIREMENTS

CASE STUDY
BUILDING 2

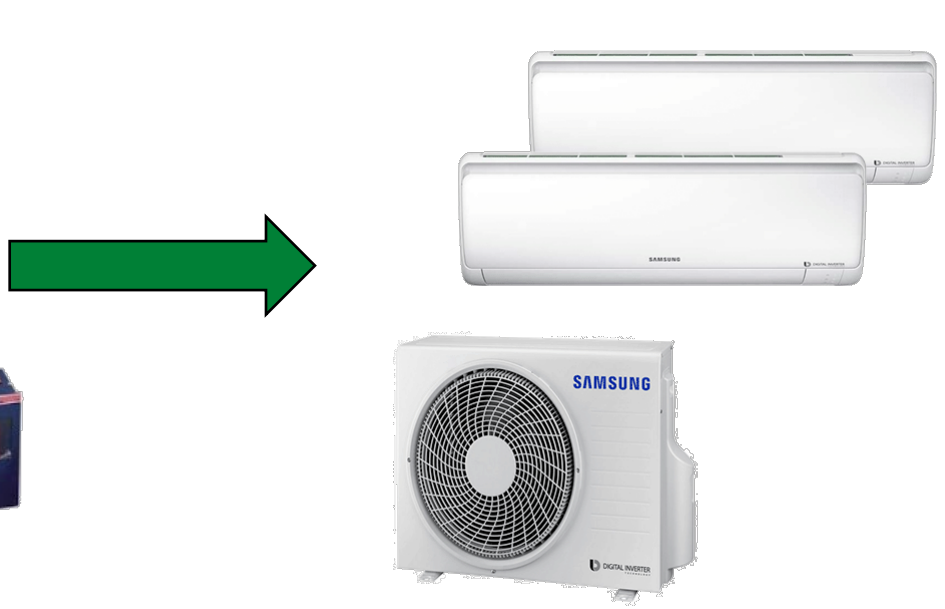
NEEDS:

- CHILLER(S)
- BOILERS
- WATER HEATERS
- RISERS
- FAN COIL UNITS
- ELECTRICAL SWITCHGEAR
- IN-UNIT HEAVY-UP
- INTERIOR UPDATES

...WHILE MAINTAINING AFFORDABILITY

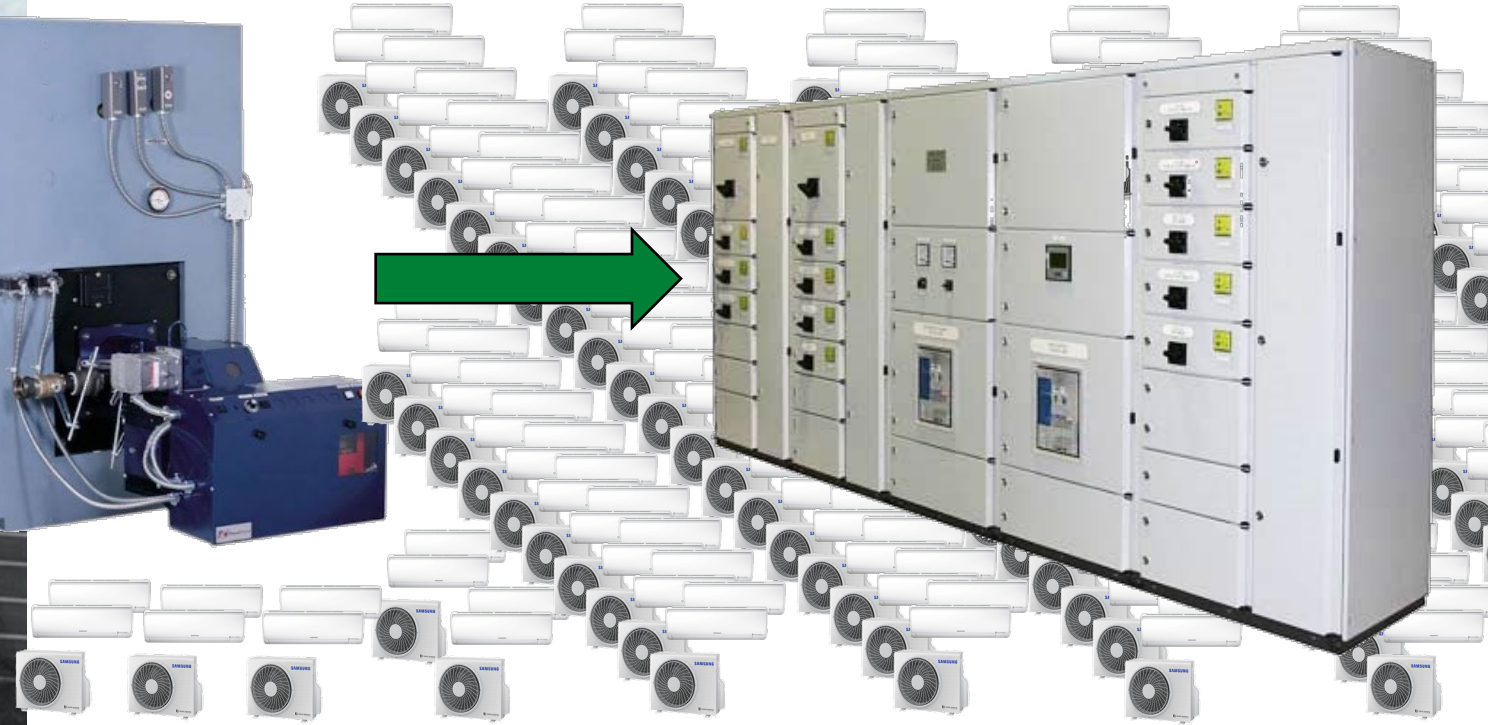
CASE STUDY
BUILDING 2

HOLISTIC APPROACH
W/ ELECTRIFICATION OBJECTIVES:



CASE STUDY
BUILDING 2

HOLISTIC APPROACH
W/ ELECTRIFICATION OBJECTIVES:



CASE STUDY
BUILDING 2

HOLISTIC APPROACH
W/ ELECTRIFICATION OBJECTIVES:

CASE STUDY
BUILDING 2

HOLISTIC APPROACH

W/ ELECTRIFICATION OBJECTIVES:

CASE STUDY
BUILDING 2

HOLISTIC APPROACH:

- AIR-SOURCE HEAT PUMP CONVERSION
- **FULL ELECTRICAL SYSTEM UPGRADE WITH TENANT METERING**
- DISTRIBUTED DOMESTIC HOT WATER
- **ADVANCED CONTROLS**
- SOLAR+BATTERY RESILIENCY HUB
- **FULL BUILDING RENOVATION**

CASE STUDY
BUILDING 2

LEVERAGING...

- **$30,000+** IN STRATEGIC PLANNING SUPPORT
- **$500,000+** IN GRANTS & INCENTIVES
  - MD ENERGY ADMINISTRATION
  - WASHINGTON GAS
  - PEPCO
- **$6,000,000** IN TAX SUBSIDIES AND PUBLIC FUNDING
- **$4,000,000+M** IN GREEN LENDING
- **6-FIGURE TAX BENEFITS** (ITC+179D)

CASE STUDY
THE TAKOMA PARK TWINS

BUILDING 2
~$9M OWNER INVESTMENT
$7M IN TAX, GRANT, & INCENTIVES
ENABLED LOW-COST FINANCING

SITE EUI: -49%*
SOURCE EUI:-40%*
TOTAL EMISSIONS: TBD*

NEW SITE EUI: 30.7* (NET OF SOLAR)
BEPS-COMPLIANT BY 2027*

BUILDING 1
$0 UP-FRONT INVESTMENT
ENERGY SAVINGS > LOAN PAYMENTS

SITE EUI: -37%
SOURCE EUI: -46%
TOTAL EMISSIONS: -43%

NEW SITE EUI: 40.2
BEPS WITHIN REACH

CASE STUDY
WHAT NEXT FOR BUILDING 1

“BEPS WITHIN REACH”

POSSIBILITIES…

- CONVERT AT LEAST 1 CHILLER TO (OR ADD 1) **AIR-TO-WATER HEAT PUMP**
- ADD **SOLAR**
- UPGRADE DOMESTIC WATER **PUMPING**
- DIGITALLY **TUNE PLANT OPERATION FOR REDUCED SITE EUI**
- OTHER **FUTURE TECHNOLOGIES**

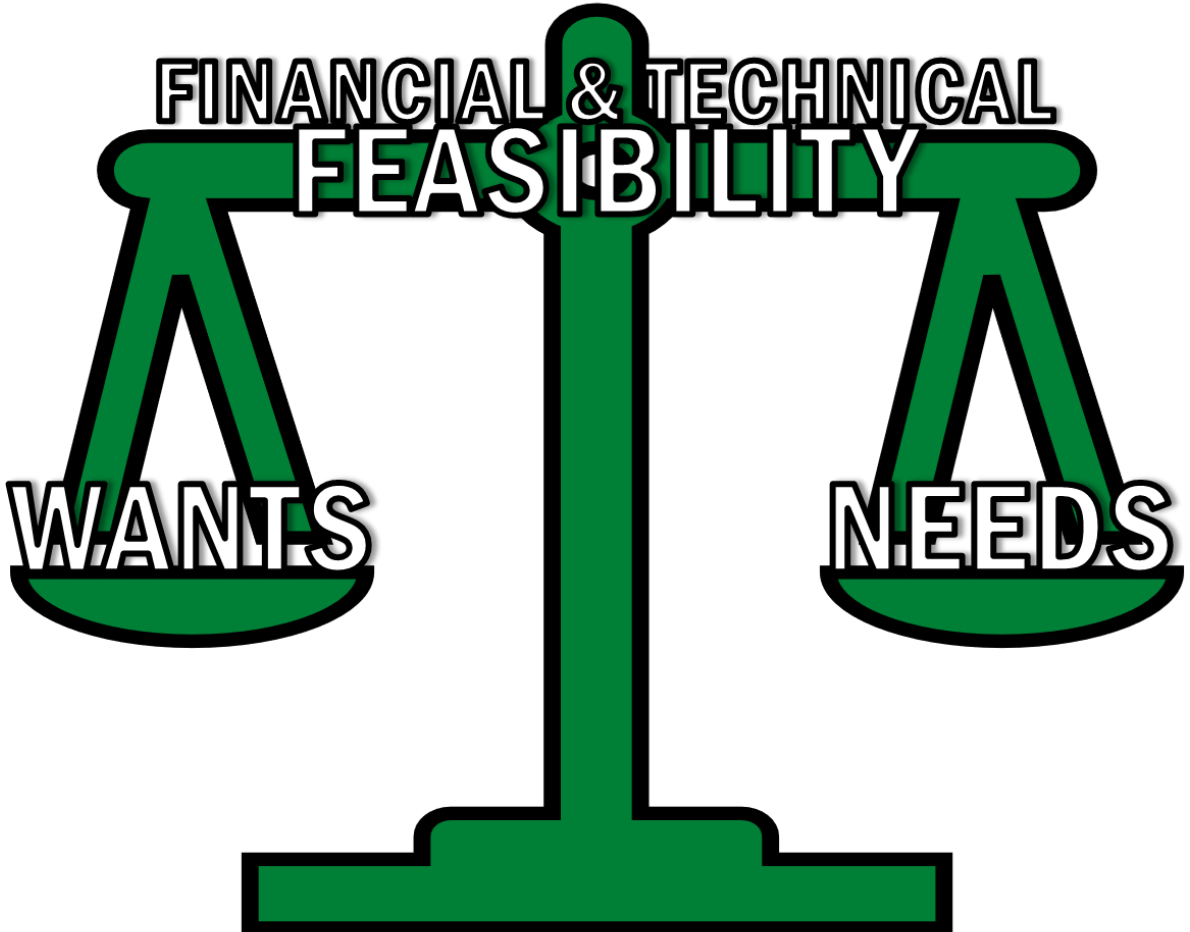
WHAT'S PRACTICAL?

NEAR-TERM ELECTRIFICATION & DECARBONIZATION

Partial is Practical

WHAT'S PRACTICAL?

NEAR-TERM ELECTRIFICATION & DECARBONIZATION



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