Eco-City Academy

CLASS 2

Class 2: Government and Residential Energy Efficiency & Renewables

- Government Energy
  - Overall goals and progress toward reductions
  - Overall approach – how does it work
  - City Building Performance Program
  - Government Energy Efficiency
  - Government Electrification
  - Government Renewables

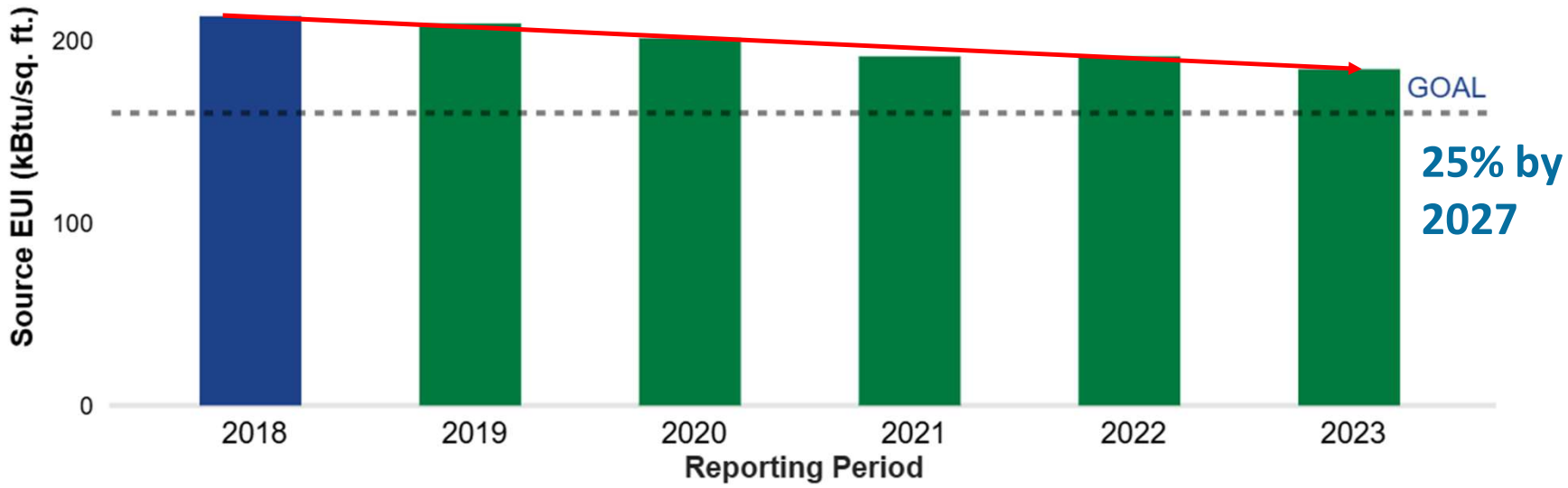
- Residential Energy

Leading by Example
EAP Goals for City Facilities
Goals and Progress towards reductions

- Reduce City Energy use 25% by 2027, 50% by 2035
- 100% electrification of City facilities by 2030
- 80% Renewable Energy by 2028, 100% by 2035

Government Energy Efficiency Performance

City of Alexandria Facility Energy Usage Over Time
DOE Better Buildings Challenge
Achieved 14% reduction as of 2023

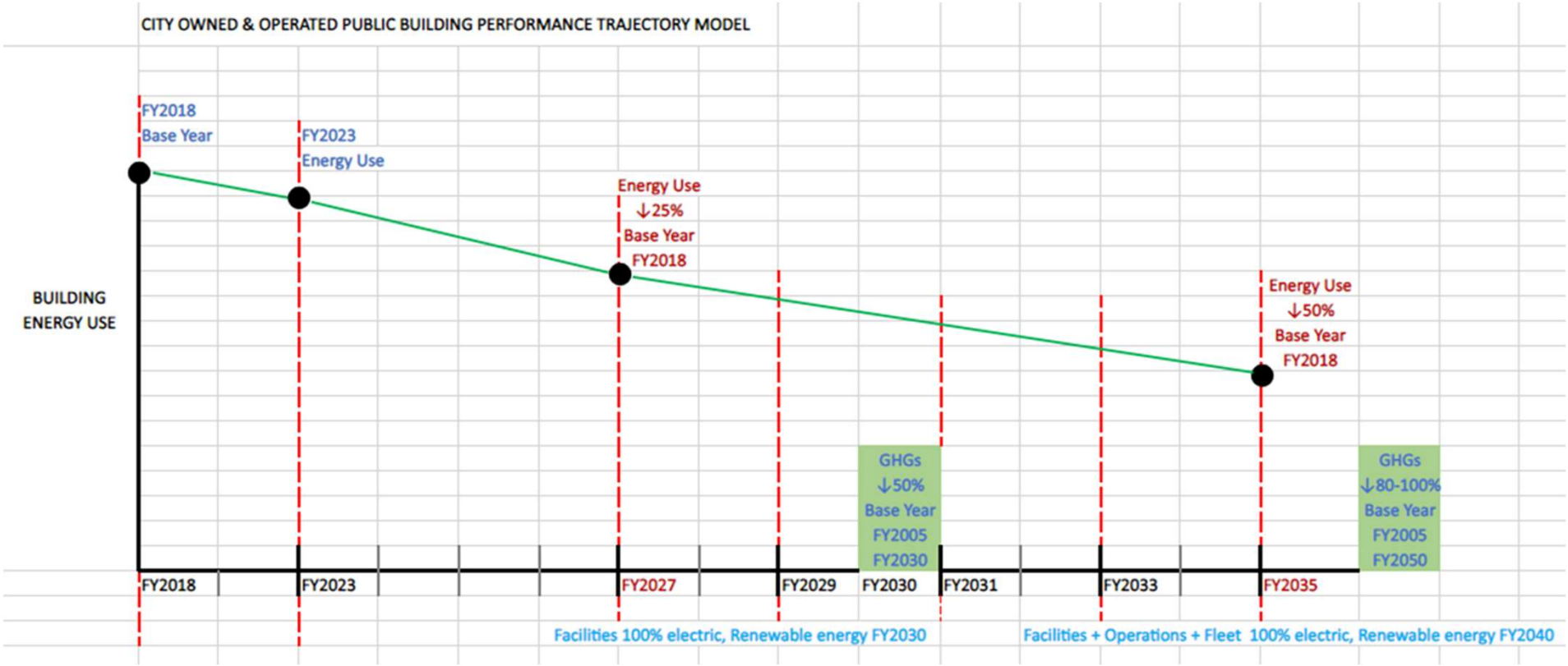


City Building Performance Program

Seal, Size, Renewables

- Identify projects for sealing and insulating facilities
- Prioritize energy-efficient and electrification improvements
- Add renewable energy to facilities

City Building Performance Program



Prioritizing Energy Efficiency

Energy reductions have been achieved through many actions, including:

- Lighting upgrades - LED
- Optimizing HVAC equipment – higher efficiency ratings, heat pumps
- Maintenance – replacing and cleaning mechanical equipment
- Improved controls – Building Automation Systems
- Air-sealing – high efficiency windows, increase insulation, seal cracks

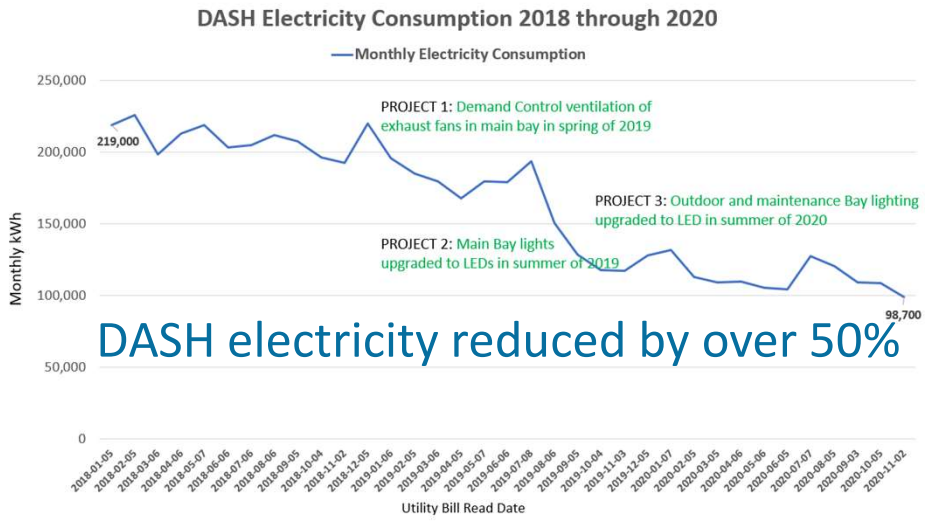
Government Energy Efficiency Examples

Del Pepper Community Center - LED lighting, lighting occupancy sensors, daylighting sensors, replacement of existing electric resistance hot water heaters with air-to-hot water heat pumps, and plug-load controls, **40% reduction in energy use**

Lloyd House - highest efficiency heat pump technology available on the market at the time of HVAC replacement, >**35% reduction in energy**

DASH between 2018-2020, electric usage **reduced by 50%** through lighting upgrades and demand-controlled ventilation of the main bus storage area exhaust fans. Natural Gas savings reduced by 30%.

- Project cost = $200,000, annual savings of $100,000



DASH electricity reduced by over 50%

Electrification

Where there is time and enough budget = fully electrifying

Example: Domestic Hot Water Replacements to Heat Pump Hot Water Heaters

4850 Mark Center Drive, A2HWHP

Ramsey Rec. Center, Before Upgrade

Ramsey Rec. Center, w/ New A2WHP

Challenges of Electrification

City of Alexandria – plan for 30 years to maximize, combine equipment replacements

Building as a whole system

Internal process - planning to achieve EAP 2040 targets for Capital Improvement Plan.

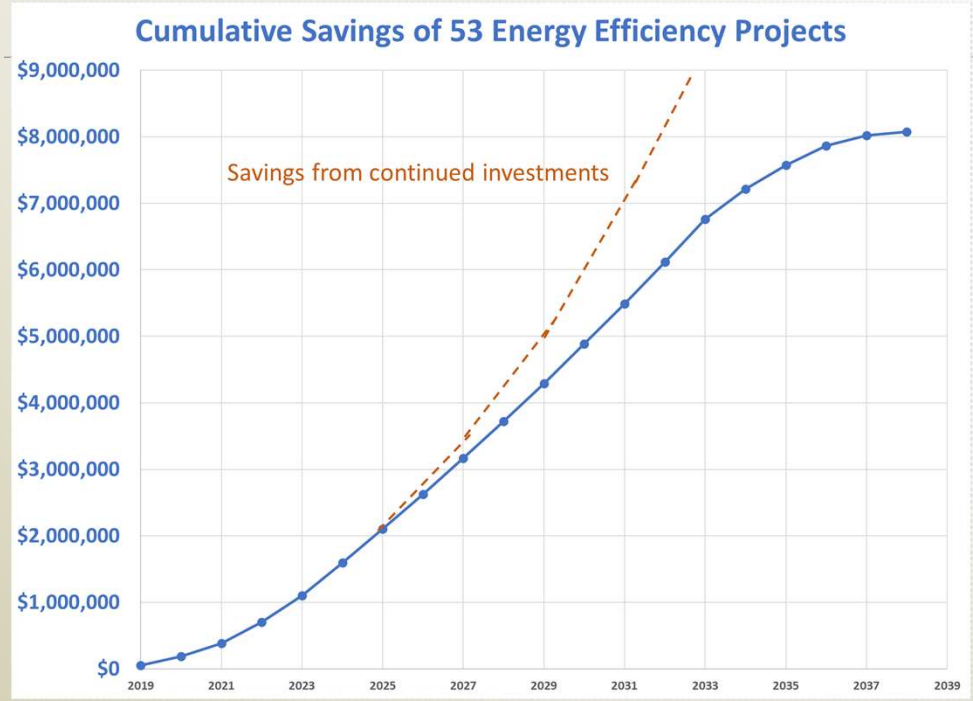
Planning for localized and district geothermal loops in certain applications.

Example: Mount Vernon Recreation Center Roof Top Units and Fire Station 207 replacement = heat pump + gas back-up.

Government Renewables

- Renewable energy
  - Onsite + regional:
  - 80% by 2028, 100% by 2035
- Durant Recreation Center roof - installing ~95kW 2025/26
- Exploring rooftop solar City in partnership with Energy Service Companies (ESCOs)
- City Hall renovation considering solar on the facility and in Market Square

Beatley Central Library – 2012 installed 180 panels 42.3kW



Government Energy Efficiency

Questions?

Answers…

Activity:
Laying it on the Line

Laying it on the Line

Let’s all stand up!

How much do you agree or disagree with each statement?

Stand on either side of the room to let us know.

Laying it on the Line

- I could confidently define ‘home weatherization’

Laying it on the Line

- I could confidently define ‘home weatherization’
- I have a good idea of what my home needs to be weatherized

Laying it on the Line

- I could confidently define ‘home weatherization’
- I have a good idea of what my home needs to be weatherized
- I feel confident about how to address those needs

Residential Energy

Residential Energy: Background

- Throwback to Class 1
  - Lower emissions → less climate change
  - City's climate goals: reduce emissions, reduce energy use
  - What it takes to get there: home energy efficiency
- Why residential?

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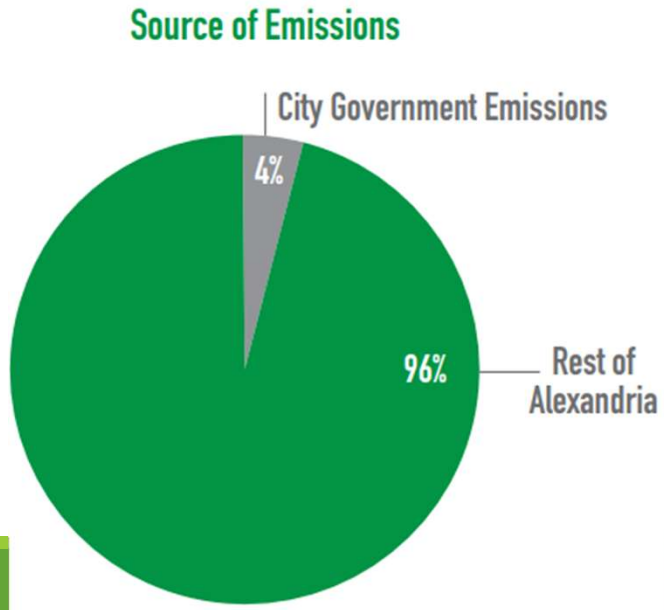

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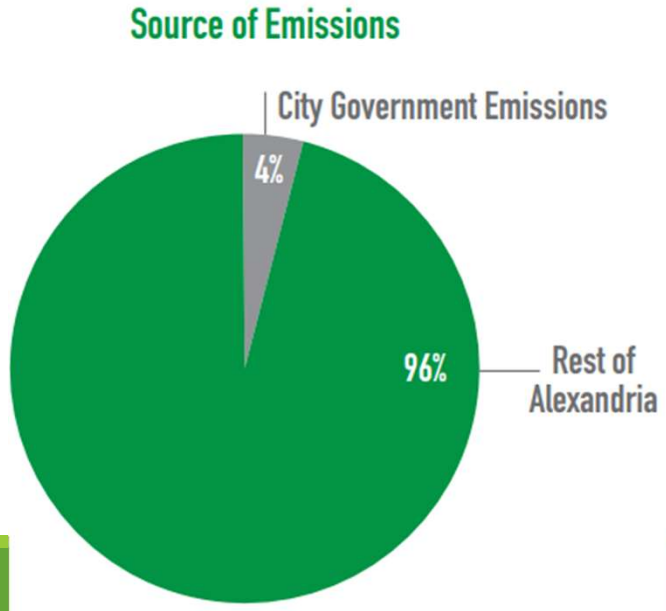
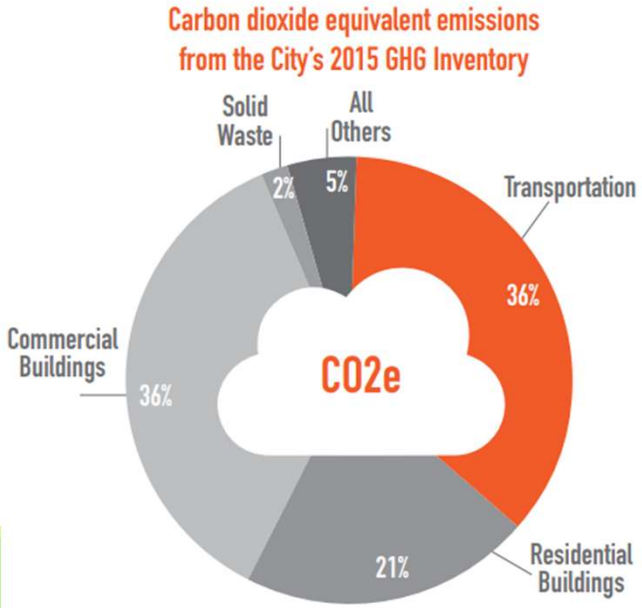




Agenda

- Understanding energy at home
- Seal and save
- Electrification
- Solar
- Programs
- Tax credits

Goals:

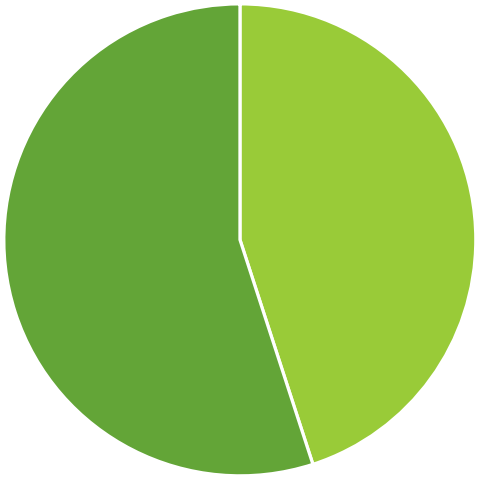
- Improve comfort and health while being sustainable
- Save money with energy-efficiency and incentives + tax credits

Understanding Energy at Home

Question: What uses energy in your home?

Understanding Energy at Home

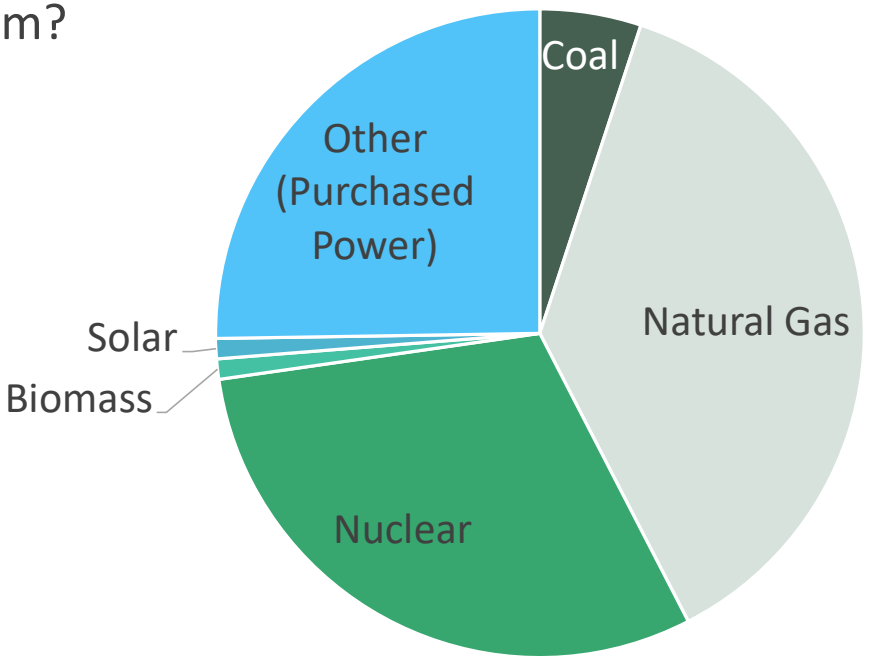
- What uses energy in your home?
  - About half to heating, ventilation, and air conditioning (HVAC)
  - Other half to water heating, appliances, electronics, and lighting



Understanding Energy at Home

Where does our energy come from?

- Electricity: Dominion Energy
- Gas: Washington Gas



Saving Energy at Home

- HVAC uses the most energy → greatest potential for savings
- Priority actions
  - Understand usage and identify issues
  - Seal and insulate
  - Efficiency (thermostat, appliances, lighting)
  - Electrification
  - Renewables

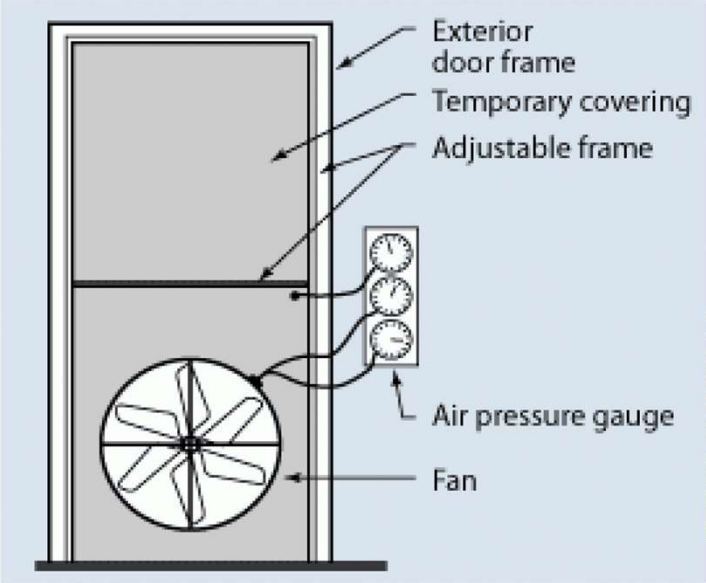
Understand Usage and ID Issues

- Energy audit
- DIY or professional: go around your home to find issues and understand what's using power
- Professional: more thorough + tax credit!
- Save 5-30% on monthly energy bill after improvements

Professional Energy Audits

- Discussion – energy bills, daily usage, any concerns
- Room-by-room inspection
- Final report on how to reduce energy use while improving comfort and health

Blower door test



Thermographic inspection

Seal and Insulate

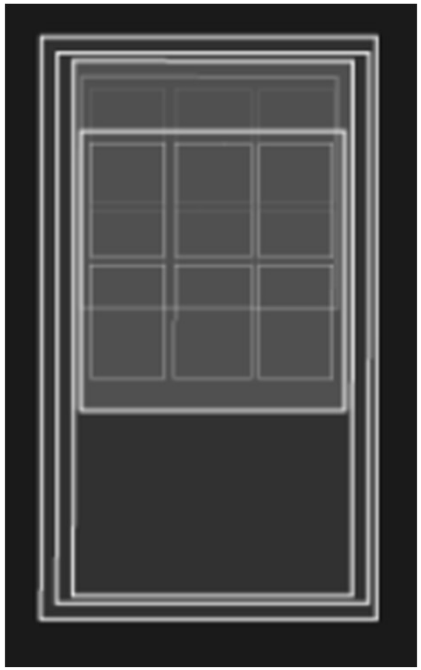
What: AKA “weatherization” or “weatherizing”

Why:

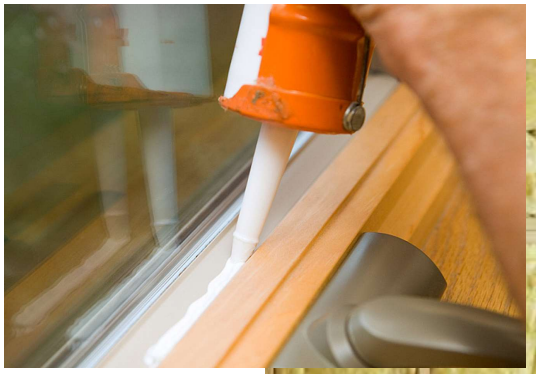
- Average home has ~window’s worth of air leakage

Benefits:

- Save 17% on heating and cooling
- Comfort (avoid drafts)
- Health (prevent bugs, pollution, etc. from getting in)



Seal and Insulate



How:

- Insulation
- Caulk, window cling, weather stripping
- High-performing doors, windows

Programs and Incentives:

- Programs for free audit usually also include weatherizing
- City programs for low- and moderate-income residents
- Tax credits for windows and skylights, exterior doors, insulation materials

Energy Efficiency: Thermostats

Purpose: Heating, AC, and ventilation are about half of home energy use

How: Temperature settings can help save energy and money

- Programmable
- Smart

Financials

- Inexpensive options
- Utility rebates

Energy Efficiency: Plug loads and lighting

Purpose: Energy efficiency in everyday use

How:

- ENERGY STAR certified appliances
- Finding and addressing energy vampires
- LED lighting

Financials

- Some income- and age-qualified programs

Electrification

Replacing gas appliances with electric versions:

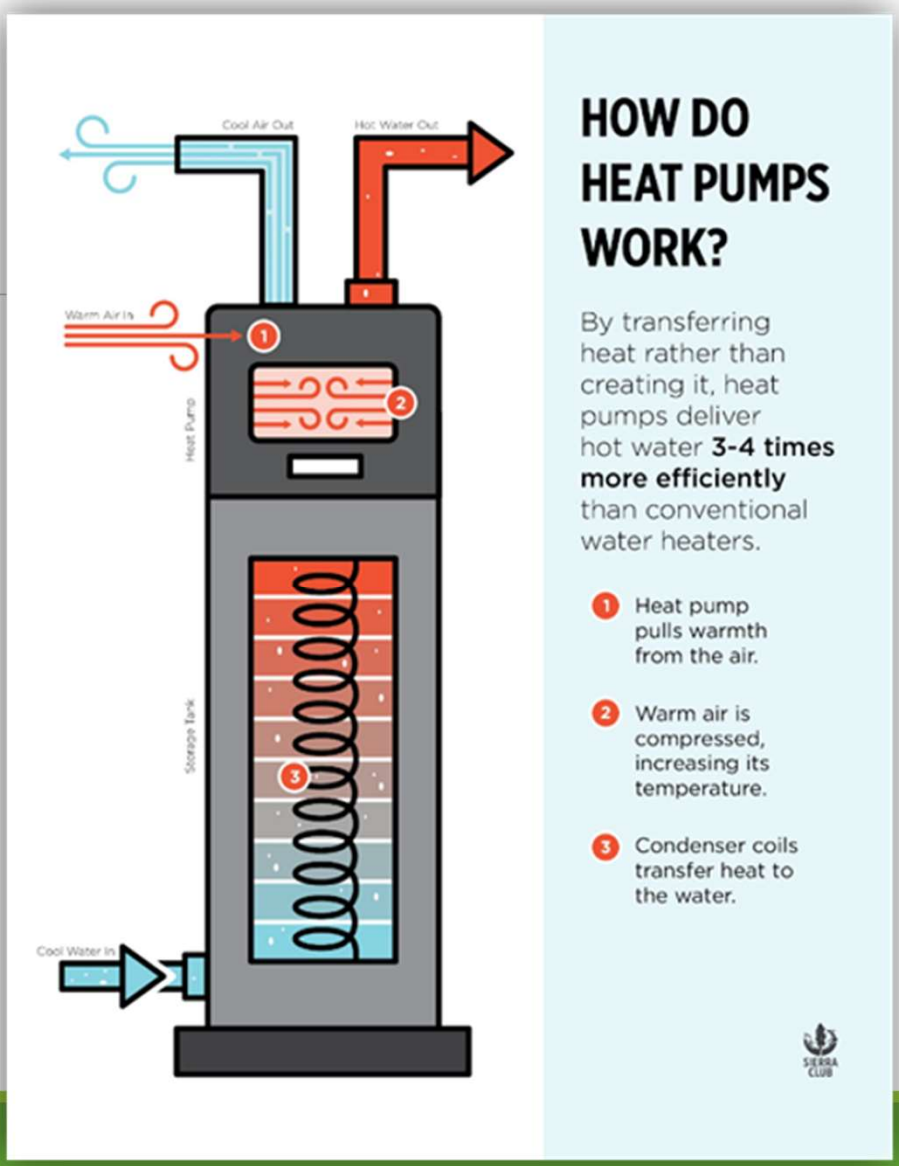
- Furnace → heat pump
- Water heater → heat pump water heater
- Oven / stovetop
- Clothes dryer

Why?

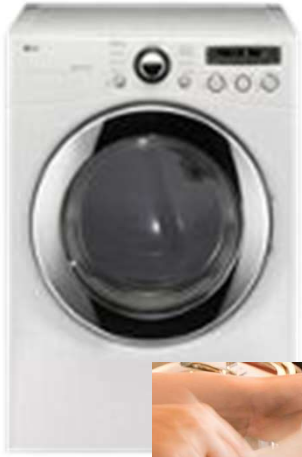
- Improves indoor air quality and health
- More efficient (save $$)
- Lower emissions

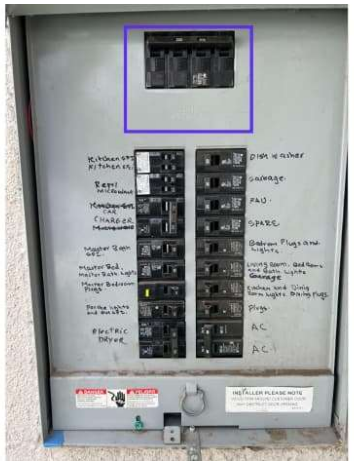
Heat Pumps

Heat Pump Water Heaters



Other Considerations





Solar

- Create your own energy!
- Save $$ -- payoff 9-12 years
- Reduce emissions

Incentives

- 30% federal tax credit
- City property tax exemption (up to cost of installation + equipment) for 5 years
- Net metering

Federal Tax Credits

Energy.gov/save

Up to $3,600 annually

Eco-City Homes

ECO-CITY
HOME
ALEXANDRIA

Challenge

Apply for Eco-City Homes recognition and get a neighbor to apply!

Applications for condo owners, homeowners, and renters

Q & A Session

Weatherization Programs

- Home Rehabilitation Energy Efficiency Loan Program
- Community Housing Partners income- and age-qualifying programs
- Home Performance Program with Energy Star