



## Dekalb County Clean Energy Transportation Transition Plan

Community Engagement Session 2

### Project tasks

1. Recommendations on addressing DeKalb's Clean Energy Goals
2. Recommendations on Energy Efficient methods to meet the County's Energy Needs

#### How to transition to clean energy



Educate community  
& stakeholders



Collaborate with  
residents, businesses,  
& institutions



Set goals and track  
progress



Invest in solar energy  
& other renewable  
sources



Reduce energy use  
through efficiency  
upgrades



Reduce reliance on  
fossil fuels

## The partners

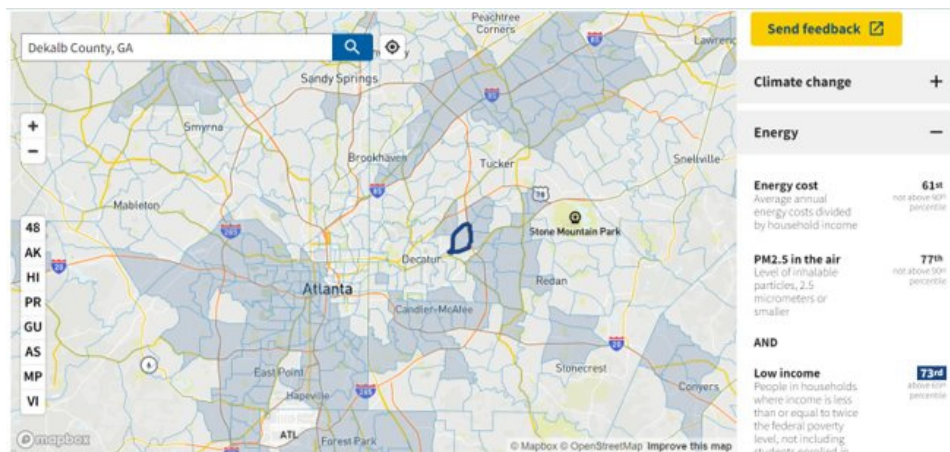


DeKalb County  
GEORGIA



## 4. Recommendations on Increasing Equity and addressing energy burden within the County

- Development of an energy equity map



#### 4. Recommendations on Increasing Equity and addressing energy burden within the County

- Community Climate Champions



#### 5. Public Stakeholder Inclusion for an Open, Inclusive, and Transparent Planning Process

- Creation of a website: [www.cleanenergydekalb.com](http://www.cleanenergydekalb.com)
- Survey



## AIR SEALING IN EXISTING HOMES

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A very brief introduction



## TYPICAL FEATURES AND ISSUES OF OLDER HOMES

- Unsealed attics and crawl spaces
- Minimal insulation
- Leaky, outdated windows and doors
- Inefficient heating & cooling systems
- Poor Water Management
- Mold & Mildew
- Outdated electrical
- Poor indoor air quality
- Asbestos & Lead



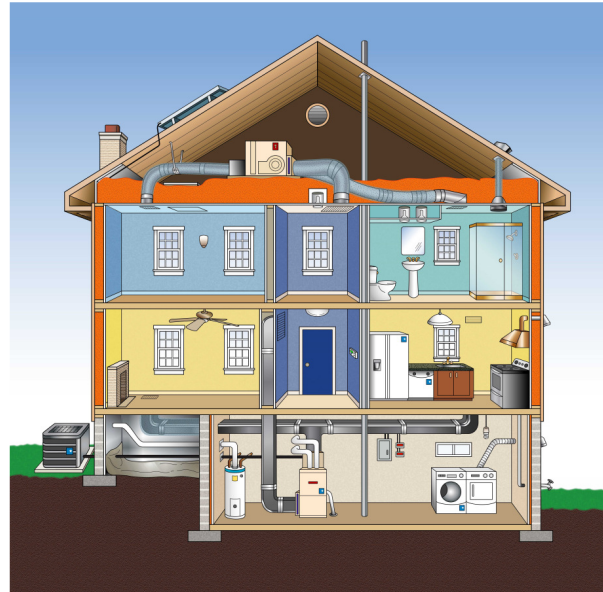


## FIRST, A LITTLE BUILDING SCIENCE

Houses are systems

What impacts how they use energy?

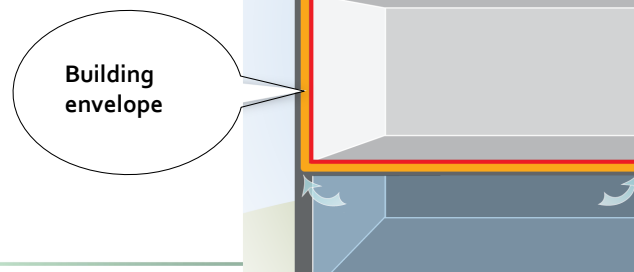
- Air sealing and insulation (called the Building Envelope)
- Heating, Air Conditioning, and Ventilation (HVAC) systems
- Water heating and piping
- Lighting and appliances



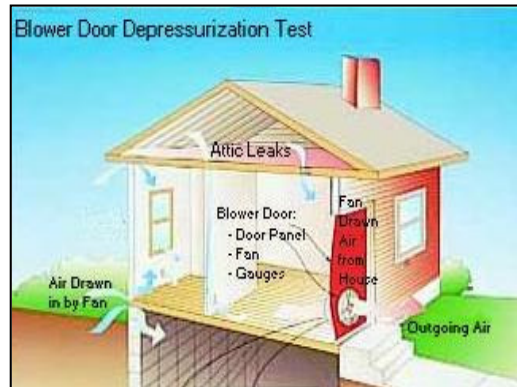
## WHAT IS A BUILDING ENVELOPE?

A two-part system:

- Air sealing (including at the ceiling, around windows/doors, and penetrations through the floors)
- Insulation in the attic, exterior walls, and the floor.



## WE CAN MEASURE AIR LEAKAGE



Air leakage in buildings can be measured using a tool called a Blower Door. Blower Doors allow us to identify where leakage areas are, and to quantify the amount of air leakage and its impact on energy efficiency.

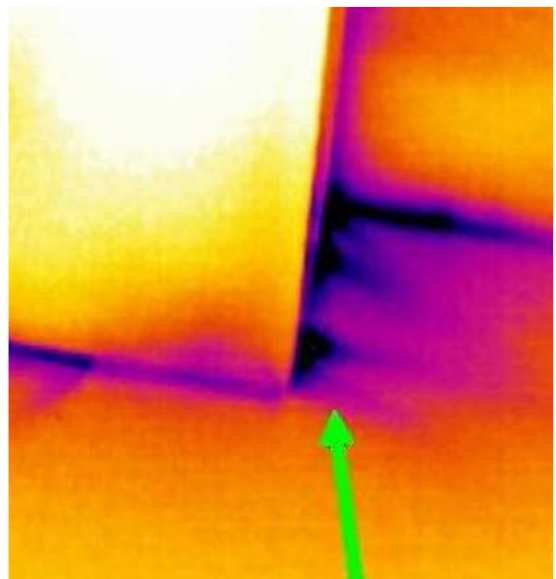
## HOW DOES AIR MOVE THROUGH BUILDINGS?

Air moves from areas of high pressure to low pressure through natural air movement or mechanical systems that are installed in homes

Differences in temperature between the indoors and outdoors results air movement via stack effect

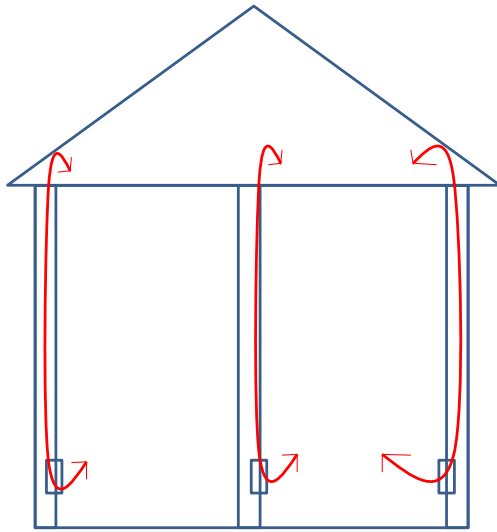
Bath fans, kitchen range hoods, and dryers intentionally remove air from homes

HVAC equipment can create positive or negative pressures based on its ductwork



## AIR SEALING: WHY?

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Penetrations larger than 1/8" add up to significant holes in a building envelope, leading to loss of conditioned air to unconditioned spaces

## IMPACTS OF AIR LEAKAGE

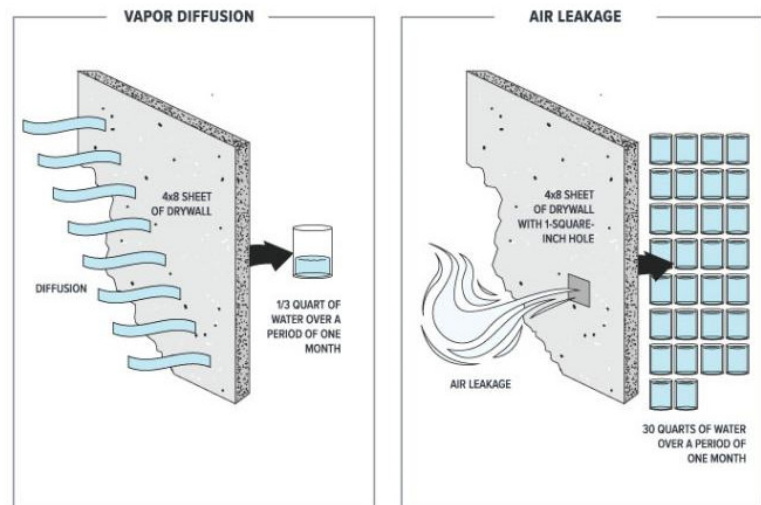
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- Outdoor air contaminants (pollen, air pollution, etc.) brought indoors that negatively impact health
- Low comfort due to impact hot/cold outdoor air brought indoors during summer/winter months
- Low comfort due to high humidity in the summer, low humidity in the winter
- Increased energy bills because systems must work harder to cool/heat outdoor air

## AIR LEAKAGE = WATER INFILTRATION

Another reason to limit air flow in a home is to reduce moisture intrusion.

Even a small hole can allow a large amount of water vapor (humidity) into the building.



**VAPOR DIFFUSION VS. AIR LEAKAGE**

INTERIOR TEMPERATURE = 70° F  
RELATIVE HUMIDITY = 40%

©CCPIA

## HOW DOES HEAT MOVE THROUGH A BUILDING?

Heat always moves from warm to cold areas through air movement, materials that are in contact with each other and from hot surfaces in close proximity to cooler surfaces

Insulation slows heat movement when exterior temperatures and surfaces are colder than the building interior, and vice versa.



## IMPACTS OF POOR INSULATION

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- Low comfort due to impact hot/cold surfaces during summer/winter
- Increased energy bills because systems must work harder to cool/heat uninsulated surfaces
- Condensation at uninsulated areas, especially in attics

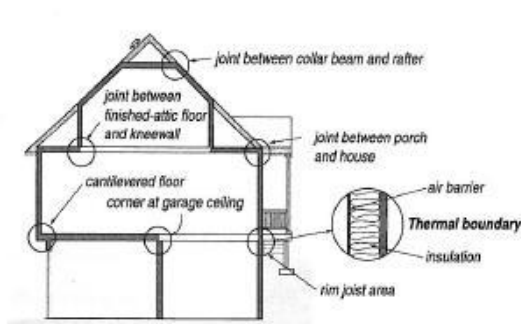
## AIR SEALING AND INSULATION

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- Air Sealing and Insulation work together to create indoor spaces that are comfortable and efficient
  - A house needs both. They are usually separate products, but some materials can be used to air seal and insulate.
- They need to be in contact with each other.
  - Where there are gaps, there are opportunities for heat transfer and/or air movement.
- They need to fill the space.
  - You don't get full credit for only partial coverage.
  - Insulation needs to be "fluffy", or not compressed



## BUILDING ENVELOPE “CRITICAL JUNCTURES”



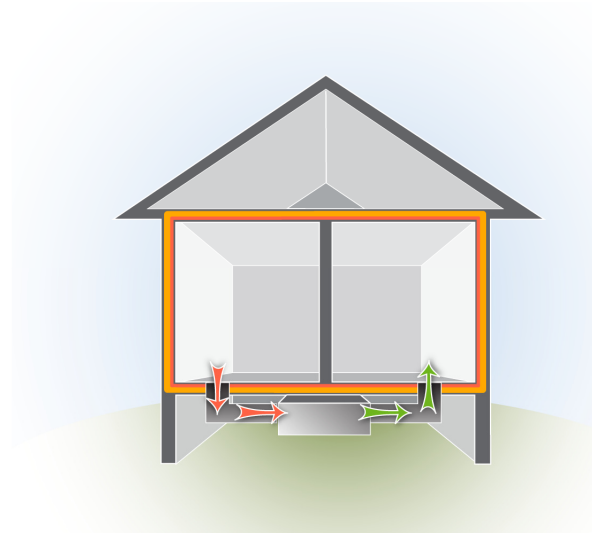
“Critical junctions” occur whenever two planes of building envelope intersect with each other:

- Exterior corners, openings
- Roofline-wall connections
- Cantilevers
- Rim joists
- Garage walls and/or ceilings
- Attic knee walls
- Dormers

## HOUSE AS A SYSTEM APPROACH

**Health, comfort and efficiency are all impacted by:**

Building envelope  
Moisture management  
Controlled ventilation  
Proper heating and cooling systems  
Efficient appliances

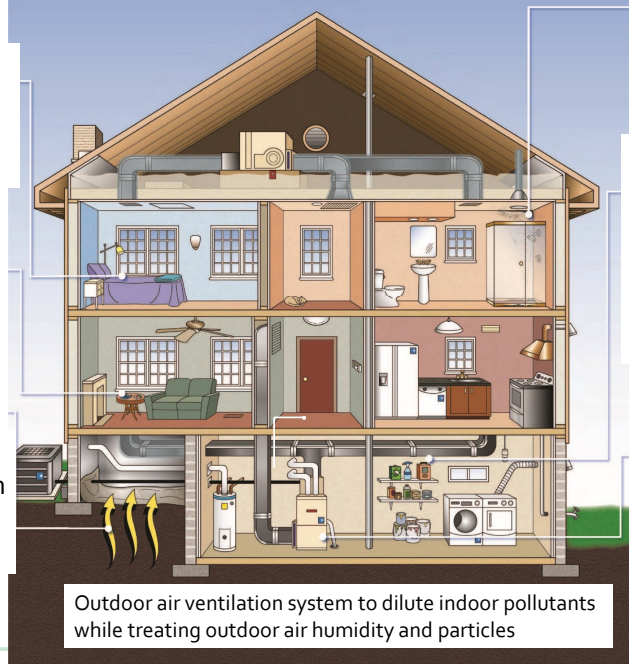


## INDOOR AIR QUALITY

Living space finishes, such as flooring, cabinets and countertops, free of VOCs and formaldehyde

Fireplaces should be sealed combustion, with proper occupant education

Homes located in EPA Radon Zone 1 are built with radon mitigation systems in place



Exhaust fans remove moisture from bathrooms, kitchens

Homeowner education to separate harmful chemicals and products from the living space air

Safe combustion appliance location and venting plus CO alarms

Outdoor air ventilation system to dilute indoor pollutants while treating outdoor air humidity and particles

## GAS APPLIANCES: SAFETY



Gas appliances have vents that remove dangerous combustion products from the home

A visual inspection for rust, disconnects, or holes helps keep the equipment safe



## TOOLS FOR ATTIC AIR SEALING

1. Urethane foam (spray foam)
  - Example: Great Stuff
2. Foam board
  - ½" thick boards work for most projects
3. Sheet metal/aluminum flashing
4. Mastic and gloves
  - Master Flow water-based mastic
5. High-temperature caulk
  - 3M Fire Barrier Sealant (red)
6. Utility flags
7. Insulation rulers
8. Tin snips (to cut aluminum flashing)
9. Stapler
10. Weatherstripping
11. Zip ties and zip tie tightening tool
12. Utility knife



## COMMON AIR LEAKAGE LOCATIONS

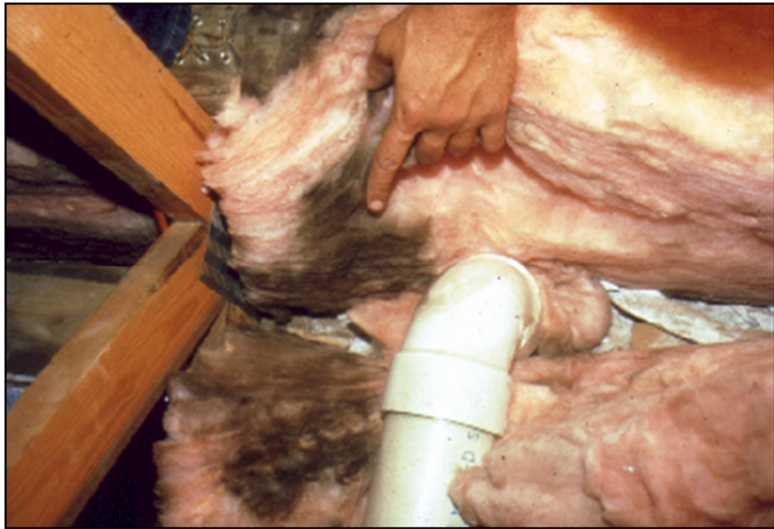
- Chases – framing around fireplaces, ductwork, flues, etc.
- Top plates – top of framing for walls that are accessible in attics
- Electrical & wiring penetrations that are accessible in attics and basement/crawlspace
- Plumbing penetrations that are accessible in attics and basement/crawlspace
- Knee walls (walls in some finished attic spaces)
- Attic stairs and scuttle holes
- Recessed can lights
- Exhaust fans
- Dropped soffits – often found in closets and above kitchen cabinets



## LOOKING FOR AIR LEAKAGE IN ATTICS

Dirty insulation shows air leakage!

Spider webs are useful for finding air leakage too



## LOOKING FOR LEAKS IN AN ATTIC

Plumbing pipe and dirty insulation are clues . . .



. . . that an attic bypass is allowing air flow through the insulation.

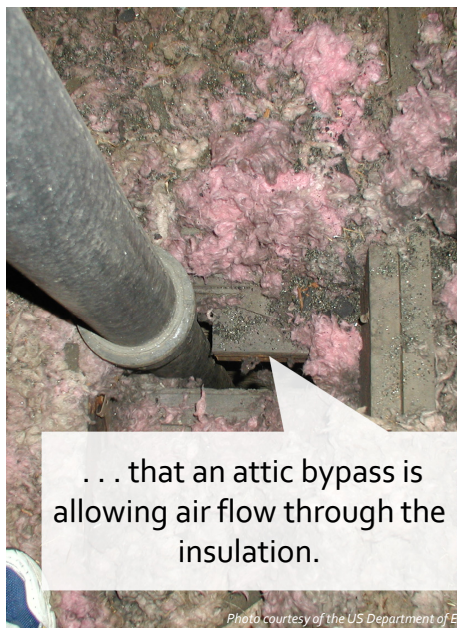


Photo courtesy of the US Department of Energy

## EXAMPLES OF AIR MOVEMENT - CHASES

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Insulation has been stuffed into the gap in framing between HVAC ductwork and the ceiling framing



Gaps are left between fireplaces and ceiling framing

## EXAMPLES OF AIR MOVEMENT - CHASES

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Chases are intentional wall cavities for utilities such as plumbing, ductwork, and/or combustion vents





## SEALING CHASES & PENETRATIONS

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Non-heat sources (plumbing, HVAC ducts) can be sealed with spray foam, caulk, and/or foam board



## SEALING CHASES: GAS APPLIANCES/HEAT SOURCES

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Chases around flues and other heat sources must be capped and sealed with fire-safe materials such as aluminum or galvanized sheet metal flashing, cement board and fire caulk



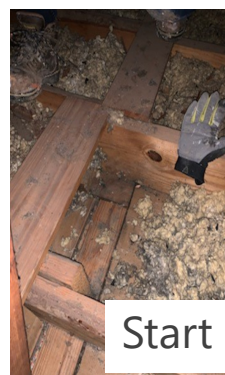
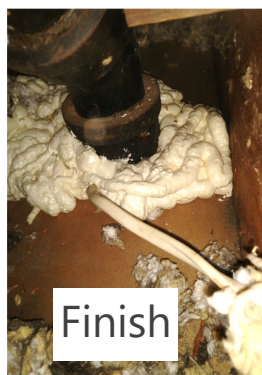
## AIR SEALING HEAT SOURCES



Heat sources include fireplaces, gas water heater vents and gas furnace vents



## SEALING ATTIC PENETRATIONS



Brush back insulation to clean the surface and fully expose the air leakage location before sealing with spray foam or caulk.



## PENETRATIONS CAN ALSO BE FOUND IN THE FLOORS

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Before



After



## AIR SEALING TOP PLATES

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- Top plate to drywall (interior wall cavities often connect to attic)
- Wherever there are interior walls, there are top plates in the attic that can be air sealed!



## KNEE WALLS

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 Southface

## ATTIC KNEE WALLS

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Knee walls are walls that separate conditioned space from attic spaces

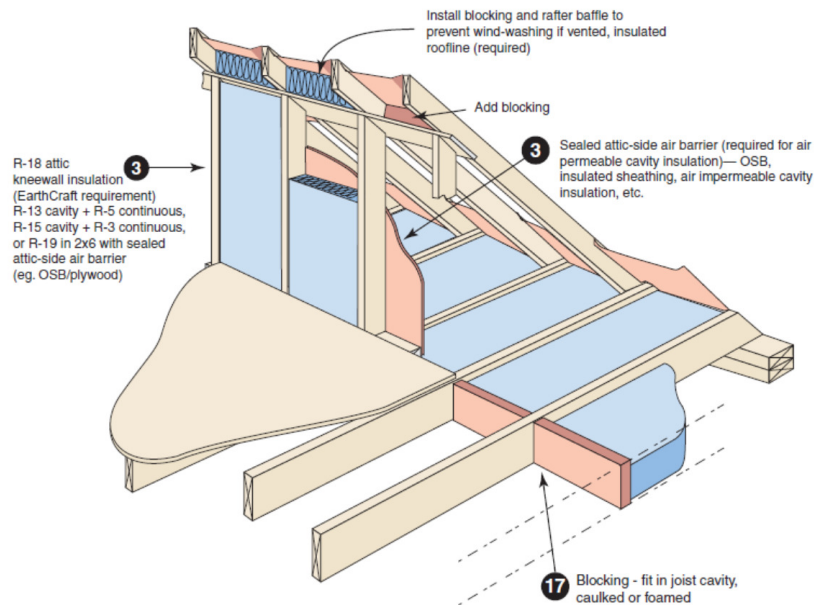
They can often look like this:



But they should be sealed and insulated from the attic side of the wall

 Southface

## ATTIC KNEE WALL DETAILS



## AIR SEALING ATTIC ACCESS

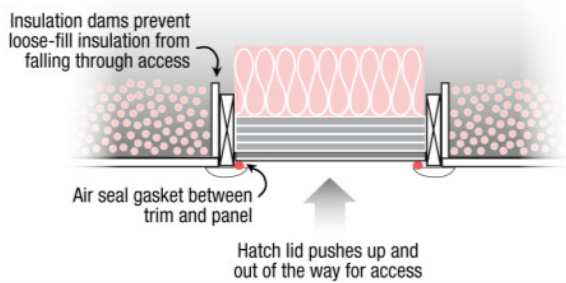
Use weather-stripping & caulk and add insulation



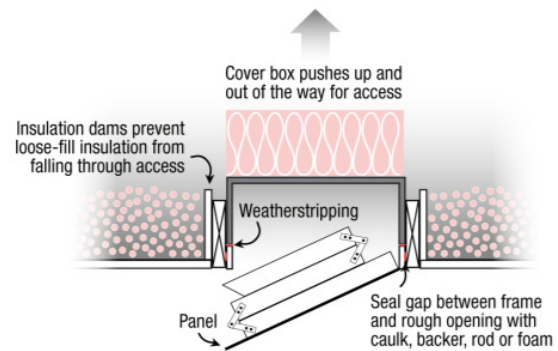


## DIFFERENT WAYS TO AIR SEAL AND INSULATE ATTIC ACCESS

### Scuttle Hole Cover

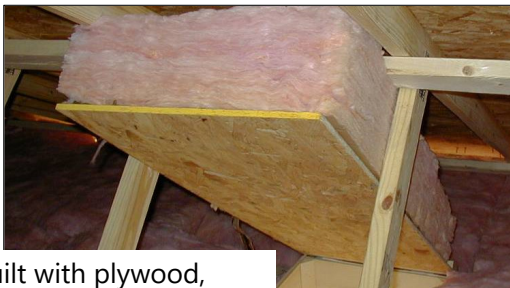


### Pull-Down Attic Stairs



Graphics courtesy of [http://www.energysavers.gov/your\\_home/insulation/airsealing/index.cfm?mytopic=11400](http://www.energysavers.gov/your_home/insulation/airsealing/index.cfm?mytopic=11400)

## DIY ATTIC ACCESS OPTIONS



Site-built with plywood, hinges and R-38 batt



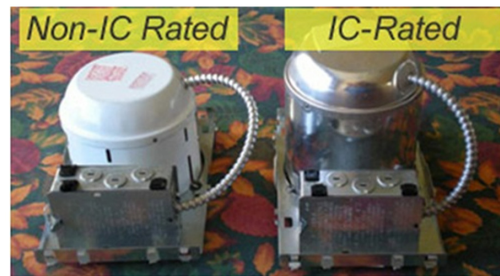
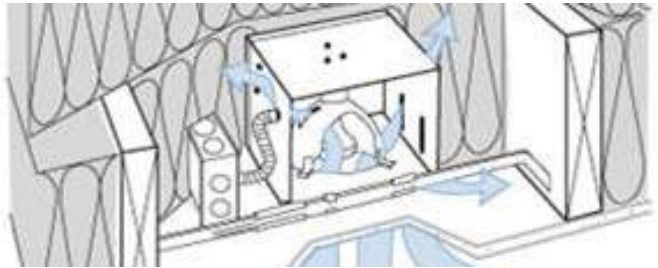
Site-built with foam board



Attic Tent



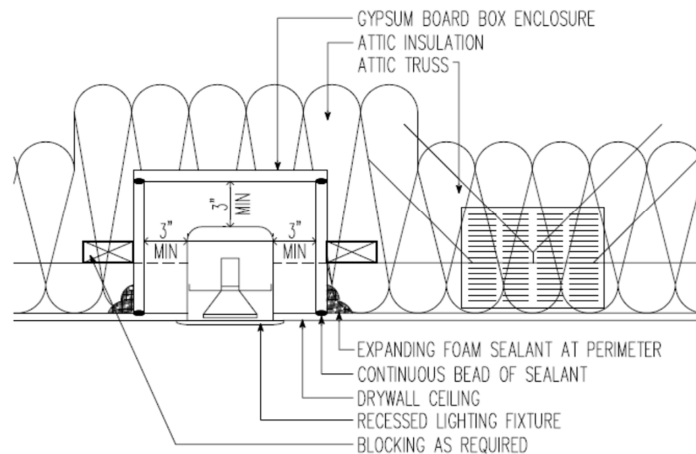
## CAN LIGHTS CAN BE BIG LEAKS



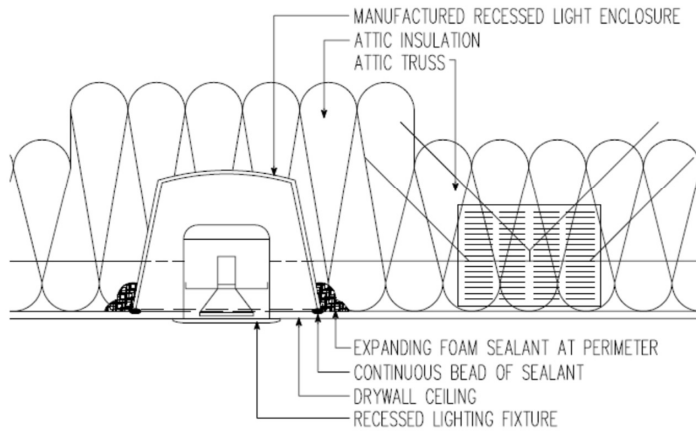
Even when covered with insulation recessed lights pump conditioned air out of the house.



## CAN LIGHT SOLUTIONS



## CAN LIGHT SOLUTIONS



## AIR SEALING ELECTRICAL PENETRATIONS

HVAC, plumbing and electrical penetrations can be found in the attic – wherever there is a ceiling light or fan, there is a penetration

Make sure electrical wiring is safely installed before working around it



## AIR SEALING TO DRYWALL

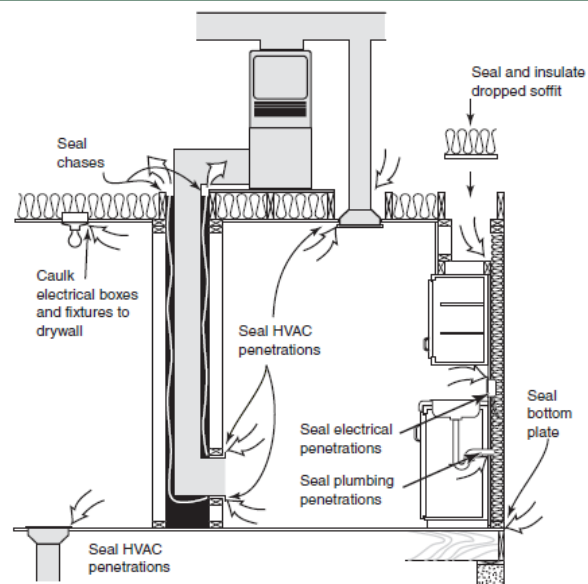


Sometimes penetrations are not easily accessible; remove covers and air seal to the drywall in these cases.



## AIR SEAL HVAC SYSTEMS

- Use mastic to air seal seams at the HVAC unit
- Remove register covers and caulk boots to ceiling and/or floor
- Cap chases in ceilings





## DUCTWORK AIR SEALING GUIDE

1. Apply mastic on collar to plenum connection
2. Apply mastic on sheet metal seam/connection
3. Slide liner over connection and install compression strap (zip tie)
4. Mastic over liner & zip tie (about 1" on either side of liner edge)
5. Pull insulation over connection and zip tie



## DROPPED SOFFIT FROM THE LIVING SPACE

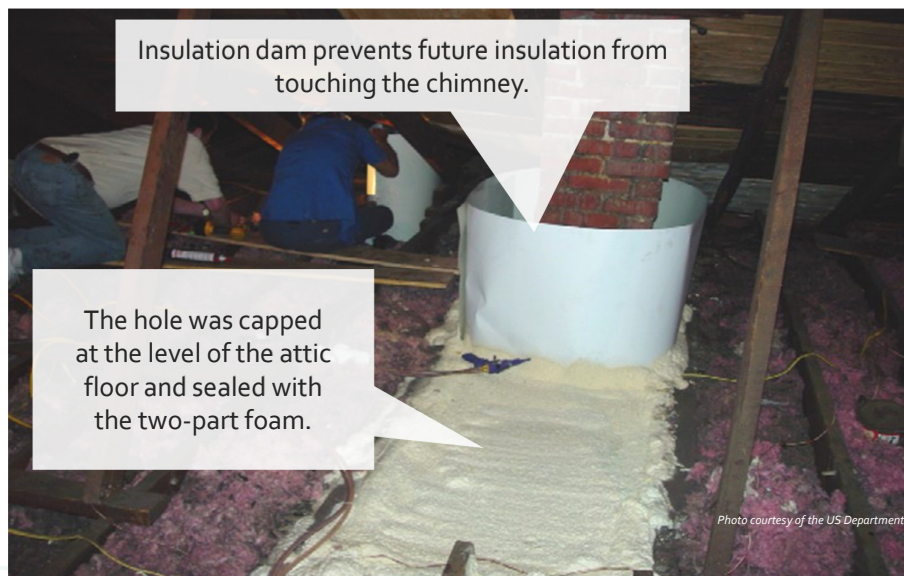




## DROPPED SOFFIT FROM THE ATTIC



## SEAL, DAM, AND INSULATE



## FIRST AIR SEAL, THEN INSULATE

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Photo courtesy of the US Department of Energy



## SUMMARY

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- Air sealing a home provides benefits to energy efficiency, indoor comfort, and air quality
- Plumbing, electrical and HVAC penetrations may be identified in the living space before going into the attic
- Where there are interior walls there are top plates
- Use appropriate materials for air sealing (heat sources require heat-safe materials)



## RESOURCES

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- [www.Southface.org](http://www.Southface.org)
  - <https://www.southface.org/insights/building-science-webinars/>
  - <http://www.earthcraft.org/>
- [www.energystar.gov](http://www.energystar.gov)
- [www.epa.gov/watersense](http://www.epa.gov/watersense)
- [www.epa.gov/indoorairplus](http://www.epa.gov/indoorairplus)
- [www.GREENGUARD.org](http://www.GREENGUARD.org)
- [www.georgiapower.com/rebates](http://www.georgiapower.com/rebates)
- <https://www.georgiapowermarketplace.com/>