Energy and Cost Saving Strategies

WINTER PREPARATION
Produced by the Carnegie Mellon University Chapter of the American Institute of Architecture Students, a student organization of Carnegie Mellon University.

This booklet and related weatherproofing materials are made available to community residents without charge as a project of Carnegie Mellon Chapter of the American Institute of Architecture Students Freedom By Design and through the generosity of its sponsors and are not for sale / resale.
WHY WEATHERIZE?

Pittsburgh’s long winters can cause high heating costs, this kit provides you with the means to help you insulate your home. The fabricated box provides materials and instructions for Pittsburgh residents. Door sweeps, window plastic, weatherstripping, and electrical socket insulation are included in the kit and are labeled to match the descriptions and instructions within this booklet. Making the small improvements shown in this booklet should help you reduce your energy consumption.

WHO WE ARE

THE AMERICAN INSTITUTE OF ARCHITECTURE STUDENTS

The Carnegie Mellon Chapter of the AIAS is focused on promoting interest and intrigue in the field of architecture within the academic setting. The organization hopes to promote excellence in architectural education, training and practice via involvement and interaction between architecture students and the greater campus and community of Pittsburgh. We would like to foster an interdisciplinary connection between architecture students, the culture of the major and the university as a whole. Each semester, the AIAS CMU Chapter will offer a diverse set of events and experiences for members including firm visits, local and national social and networking opportunities, community service initiatives, and exposure to cutting edge developments within the professional field of architecture.

FREEDOM BY DESIGN

Freedom by Design™, the AIAS community service program in partnership with the National Council of Architectural Registration Boards (NCARB), uses the talents of architecture students to radically impact the lives of people in their community through modest design and construction solutions. The program embraces efforts to provide both design-build and engagement solutions to address 5 barriers:

Physical • Educational • Environmental • Socio-Economic • Cultural

We hope to develop projects in which students can engage with Pittsburgh communities and work with residents and community leaders to enact positive change and improve the lives of our neighbors.
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What’s in the box:

**Electric Socket Insulators**

*QTY:* 2 PACKS (28 OUTLETS / SWITCHES)

**Tools Required:**
- Screwdriver

**Door Sweeps**

*QTY:* 2 (2 DOORS)

**Tools Required:**
- Screwdriver
- Hacksaw (to cut if door is under 36” wide)

**Weatherstripping**

*QTY:* 5 PACKS (5 WINDOWS)

**Tools Required:**
- Paper Towels / Rags
- Scissors

**Window Plastic**

*QTY:* 1 PACK (5 WINDOWS)

**Tools Required:**
- Glass Cleaner
- Paper Towels / Rags
- Scissors
- Hair Dryer
Electric Socket Insulator

Required Tools:
Screwdriver (Included)

WHY?

The spaces behind electrical outlets and light switches are often the least insulated places in a wall. In older houses it is common to feel cold drafts coming from electrical outlets, especially on exterior walls. This may not seem significant, but any air leakage can increase heating bills during the winter. On average, an estimated 2-4% of heat loss occurs through electrical outlets and light switches.¹

The following should be considered before installing electric outlet and switch sealers as there is a risk for electric shock:
- Do not push insulators too far into socket.
- Do not touch the relay terminal (live parts) or socket terminal (live parts) while the power is on.
- Do not insert screws or screwdriver into wall socket ports.
- Do not cut or tamper with any wires on the duplex receptacle.

Turn power off before installation by:
- Tripping circuit switches to off position
- OR
- Temporarily removing fuses during installation

¹ Estimated values based on studies and research.
3. Remove plastic socket cover.

4. Poke a hole in center for screw with a sharp pencil or scissor.

5. Place socket insulator in the wall cut-out.

6. Re-install the socket cover.

You are done! Seemingly small improvements such as this can reduce your heating bills greatly! Do this for all of your electrical sockets, and switch plates.
Door Sweep

Required Tools:
Screwdriver (Included)
Masking Tape (Included)

WHY?

A door sweep is a small piece of plastic or rubber attached to an aluminum carrier strip and fitted across the bottom of a door. It provides a weatherproof seal and prevents drafts from coming in under the door. Door sweeps have the ability to protect against drafts, moisture, and outside insects. The draft protection against colder outdoor temperatures can save energy and reduce energy bills up to 10%.²

Make sure door is secure and will not be in motion during installation.

If you already have a door sweep installed it might look like this:

If your door already has a sweep installed, there is no need to install a new one, unless the current one needs to be replaced.

A draft stopper could prevent heat from further escaping your home. Recommendations can be found on page 33.
Installation complete! Installing door sweeps blocks warm air from escaping your house, reducing infiltration rates. This helps to reduce heating costs in the winter.

**Required Tools:**
Screwdriver (Included)

**In Box Supplies:**
Door sweep
Screws

1. If the sweep is longer than the door is wide, cut with a saw.

2. Position sweep against door with bottom brushing against floor and tape in place.

3. Screw sweep into place. (May need to pre-drill holes for metal doors)
   Remove tape

If you need help drilling your door, please contact us for assistance.
Weatherstripping

**WHY?**

Poorly sealed doors and windows can leak the heat outdoors in the winter. Heating bills can be reduced by 20% if windows and doors are weatherstripped.\(^1\)

Do not use this product to adhere to anything other than the items listed above. Do not consume or wrap around any body parts with this product, as it is a choking or injury hazard.

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**Required Tools:**
- Paper Towels / Rags
- Scissors
- Tape Measure (Included)

**In Box Supplies:**
- V-Seal Weatherstrip

1. Open window, wipe clean inside of window frame and bottom and top of window. Dry before applying weatherstripping.

2. Measure window and trim weatherstripping (for sides, give yourself an extra inch or so).

Weatherstripping will be applied to all sides of the windows, the top of the upper window, and the bottom of the lower window.
Bend V-Strip

Peel off wax paper to expose adhesion*

Apply to top of upper window and bottom of lower window

Place adhesive inside window frame with the point of the “v” facing inside.

If the surface on the moving window is not flat, apply to outer frame.

*It may be easier to peel off the wax paper in parts, and continue to peel off the paper as you apply the weatherstripping to the frame so that only parts of the adhesion is exposed at a time.
6. Apply to sides of windows, giving yourself an extra inch or so to slide past window. Keep wax paper on extra piece.

7. Loop weatherstripping under frame and retrieve on other side.

8. Remove wax paper from extra piece and press to frame.

If the window does not close all the way, find the weatherstripping that is stopping it from closing. Make sure all weatherstripping is applied flat to surfaces, if this is not possible, remove that section of weatherstripping.

Installation complete! Your windows are almost ready for winter! Now time to install the window plastic...
Window Plastic

Required Tools:
Glass Cleaner
Paper Towels / Rags
Scissors
Hair Dryer
Tape Measure (Included)

WHY?

Roughly 30% of all heat loss in a home occurs through windows. Plastic Window Insulation sheets can reduce this heat loss, and your heating bill. Each sheet covers a standard window and saves up to 25% (for every 9 windows) in heating costs seasonally. If your home has more than 9 windows Frost King Window Insulation Kits are available at the following locations: The Home Depot, Lowe’s, True Value, Do it Best, Walmart and Menards.

Keep plastic out of reach of children.
Do not wear on body in order to prevent suffocation or lack of circulation.
Double sided tape may cause paint to peel or chip.

1.
Clean window with glass cleaner and wipe trim and surrounding wall. Dry Surfaces before applying tape in next step.

In box supplies:
Heat Shrink Plastic
Double Sided Tape

Window trim
Area to clean and later apply tape
If you have flat window trim surrounding your window, you will be applying the tape to that.
If you do not have a window trim, you will applying it directly to the wall.
1. Apply double sided tape to flat trim, or surrounding wall.

2. Overlap tape at corners.

3. If the bottom of the window is a horizontal sill that sticks out, apply the tape to that surface, but make sure that the tape overlaps at the corners.

4. Press tape firmly to the surfaces.

5. Remove the wax paper film to expose the other side of the tape.
6. Make sure the plastic sheets are the correct size for your windows by holding up to windows; it is recommended that you measure the size of the window opening and make the plastic sheet 4” bigger on each side.

7. Trim your plastic down to size if it is too large.

8. Place plastic over window. It should be a few inches larger on all sides. Lightly press the plastic into place.

9. Adjust edges of plastic so that the sheet is taught around the window. Press the plastic firmly against the tape once in its final place.
Use a blow dryer to tighten the plastic. The plastic should be wrinkle-free.

Trim the access plastic from the sides.

*Check for holes or gaps along the edge, you can seal these with packaging tape.

Installation complete! Applying window plastic over your windows doubles their efficiency in the winter, but don’t forget to remove the plastic in the spring!
Roughly 30% of all heat loss in a home occurs through the windows. Loss of heat happens through the glass itself, but also around the window frame. Windows with poorly insulated or sealed frames allow the heat and air to escape outdoors, and create drafty rooms indoors. Stopping this air and heat exchange reduces heat bills, and keeps the temperature inside more comfortable and consistent.

Products that stop this exchange include:

**Weatherstripping (GOOD FOR RENTERS)**
Weatherstripping is the process of sealing openings such as doors, windows, and trunks from the elements. The term can also refer to the materials used to carry out such sealing processes. The goal of weatherstripping is to keep interior air in, thus saving energy on heating and air conditioning.5

**Window Plastic (GOOD FOR RENTERS)**
Window insulation film is a ubiquitous, low cost way to improve your window’s insulation and reduce drafts. It consists of a clear oversized plastic film designed to fit over the interior of a standard-sized residential window. The kits usually include double-sided tape to adhere the plastic around the edges of the window frame. Once secured on all four sides, applying heat from a hair dryer or other source will shrink the plastic, tightly sealing the window. 6*

**Caulk**
Caulk is a flexible material used to seal air leaks through cracks, gaps, or joints less than 1-quarter-inch wide between stationary building components and materials. For components that move -- doors and operable windows, for example -- weatherstripping is the appropriate material.7**

**Insulating Curtains (GOOD FOR RENTERS)**
Insulated curtains, panels and shades help stop drafts and block the sun. Thermal curtains and insulated drapes have lined backs that help create a barrier at your windows. They provide year-round insulation and can help lower your utility bills. 8

*Seasonal tape removal may result in paint chipping around windows.
**Discuss caulking with landlord before application if you rent.
Weatherstripping

Provided in Box (pg 10)

**Frost King**
E/O 7/8 in. x 17 ft. Self-Adhesive V-Seal Weatherstrip
Type: Plastic V Seal
Why: Adhesive seal for fairly even gaps around poorly sealed windows
Installation: Adhesive Strip
Buy at: Home Depot
Price: $3.97 per window

Other Products

**Frost King**
E/O 1/2 in. x 17 ft. White Tubular Vinyl Gasket
Type: Tubular Vinyl
Why: Seals out drafts around loose-fitting, warped or rattling windows
Installation: Nail / Tack / Glue / Staple
Buy at: Home Depot
Price: $3.57 per window

**Frost King**
3/8 in. x 5/16 in. x 20 ft. White Weatherseal
Type: Rubber Foam Tape
Why: Easy installation, long lasting, washable, flexible for loose fitting windows
Installation: Adhesive Strip
Buy at: Home Depot
Price: $8.87 per window

Window Plastic

Provided in Box (pg 16)

**Frost King**
E/O Indoor Window Insulation Kit (9 per Pack or 4 per Pack)
Type: Window Insulation Plastic
Why: Individual Sheets pre-cut to allow for easier install for standard size windows (62” x 42”)
Installation: Adhesive Strip + Heat Shrink
Buy at: Home Depot (Similar kits at Lowes)
Price: $1.50 per window

Other Products

**Duck**
62 in. x 420 in. Crystal Clear Window Kit Shrink Film (10-Pack)
Type: Window Insulation Plastic
Why: Large Sheets allow for variety of window sizes to be cut in case windows are not standard size
Installation: Adhesive Strip + Heat Shrink
Buy at: Home Depot (Similar kits at Lowes)
Price: $1.10 per window

**3M**
62 in. x 84 in. Clear Plastic Indoor Window Kit
Type: Window Insulation Plastic
Why: Individual Sheets pre-cut to allow for easier install for standard sliding patio door, or two 3’ x 5’ windows
Installation: Adhesive Strip + Heat Shrink
Buy at: Home Depot (Similar kits at Lowes)
Price: $2.50 per window
**Caulking**

**Products**

**GE**
Supreme Paintable Silicone 10.1 oz. White Window and Door Caulk
*Why:* Suitable for application on windows, doors, siding, trim, filling holes to prevent loss of heat, comes in multiple colors
*Buy at:* Home Depot
*Price:* $8.22

**DAP**
18109 Acrylic Latex Caulk With Silicone, 10.1-Ounce, Dark Bronze
*Why:* Suitable for application on windows, doors, siding, trim, filling holes to prevent loss of heat, comes in multiple colors
*Buy at:* Amazon
*Price:* $3.05

**Window Curtains**

**Products**

**Smart Sheer**
Insulating Voile 63-Inch Window Curtain Panel
*Type:* Insulating Curtains
*Why:* Curtains slow drafts within the home, in the winter, and block solar heat in the summer. Curtains that specify their insulation value can help keep your home warm in the winter.
*Buy at:* Bed Bath and Beyond
*Price:* $9.99

**Thermalogic**
Ultimate Window Liner
*Type:* Insulating Curtain Liner
*Why:* This product can add insulation value to curtains that you already own.
*Buy at:* Amazon
*Price:* $20.29

**Blinds.com**
Economy Blackout Cellular Shade
*Type:* Insulating Window Shade
*Why:* For problematic windows, you can order custom cellular shades that preform better than a simple curtain, this is one of the more expensive options, with a more intensive installation.
*Buy at:* blinds.com
*Price:* $57+ per window
Similar to the windows, heat loss happens around door frames and through the space underneath the door. The best way to stop this heat and air exchange is through the sealing of these spaces. This reduces heating bills, and keeps the temperature inside more comfortable and consistent.

Products that stop this exchange include:

**Door Sweeps (GOOD FOR RENTERS)**
A door sweep is a small piece of plastic or rubber, attached to an aluminum carrier strip and fitted across the bottom of a door. It provides a weatherproof seal and prevents drafts from coming in under the door. Door sweeps have the ability to protect against drafts, moisture, and outside insects. The draft protection against colder outdoor temperatures can save energy and reduce energy bills up to 10%.9

**Draft Stoppers (GOOD FOR RENTERS)**
Draft stoppers are long thin objects that are placed at the bottom of a door to prevent the movement of air in between spaces. They can work with a door sweep, or if a door sweep cannot be installed, they can be used in their place.10

**Weatherstripping (GOOD FOR RENTERS)**
Weatherstripping is the process of sealing openings such as doors, windows, and trunks from the elements. The term can also refer to the materials used to carry out such sealing processes. The goal of weatherstripping is to keep interior air in, thus saving energy on heating and air conditioning.11
Door Sweeps

Provided in Box (pg 6)

Frost King
E/O 1-5/8 in. x 36 in. Aluminum White and Vinyl Door Sweep
Why: Fills up to 3/4 in. gap between the door bottom and threshold
Installation: Screws
Buy at: Home Depot
Price: $6.48 per door

Other Products

Frost King
2 in. x 36 in. Heavy-Duty Aluminum/Brush White Door Sweep
Why: Brush bottom prevents scratches on floor
Installation: Screws
Buy at: Home Depot
Price: $10.72 per door

Draft Stoppers

Products

Frost King
E/O Designer Cloth Draft Seal
Why: This is simple, cheap, requires no installation, and prevents drafts from entering
the home from underneath the door.
Buy at: Home Depot (Similar kits at Lowes)
Price: $7.88 per door

Morgan Home
Solid Fleece Draft Guard
Why: This is simple, cheap, requires no installation, and prevents drafts from entering
the home from underneath the door.
Buy at: Bed Bath and Beyond
Price: $9.99 per door

Frost King
1.25-in x 36-in Brown Aluminum Door Threshold
Why: This is simple, cheap, and prevents drafts from entering the home from under-
neath the door.
Installation: Slide onto door
Buy at: Home Depot
Price: $7.97 per door
Weatherstripping

Products

**Frost King**
E/O 1/2 in. x 17 ft. White Tubular Vinyl Gasket  
Type: Tubular Vinyl  
Why: Seals out drafts around loose-fitting, warped or unevenly cut doors  
Installation: Nail / Tack / Glue / Staple  
Buy at: Home Depot  
Price: $3.57 per door

**Frost King**  
3/8 in. x 5/16 in. x 20 ft. White Weatherseal  
Type: Rubber Foam Tape  
Why: Easy installation, long lasting, washable, flexible for loose fitting doors  
Installation: Adhesive Strip  
Buy at: Home Depot  
Price: $8.87 per door

**Frost King**  
E/O 9/16 in. x 5/16 in. x 10 ft. White EPDM Cellular Rubber Weather-Strip Tape Cushioned Ribbed  
Type: Rubber Foam Tape  
Why: Easy installation, long lasting, washable, flexible for loose fitting doors with a 10 year guarantee.  
Installation: Adhesive Strip  
Buy at: Home Depot  
Price: $16 per door
The spaces behind electrical outlets and light switches are often the least insulated places in a wall. In older houses it is common to feel cold drafts coming from electrical outlets, especially on exterior walls. This may not seem significant, but any air leakage can increase heating bills during the winter. On average, an estimated 2-4% of heat loss occurs through electrical outlets and light switches.

Products that stop heat loss include:

**Socket Insulators (GOOD FOR RENTERS)**
Socket insulators are flat pieces of solid foam insulation that can be installed behind the socket plate to reduce heat transfer through the electrical sockets, it can be applied inside light switches as well.

**Spray Foam**
Spray foam comes in a can, and is a spray-able foam insulation that can be applied behind the socket plate to reduce heat transfer through the electrical sockets, it can be applied inside light switches as well.\(^1\)

*Discuss spray foam with landlord before application if you rent.*
Socket Insulator

Frost King
1 Gang Socket Switch and Deco Wall Plate (14-Pack)
Why: Stops heat from escaping through poorly insulated socket spaces in wall
Installation: Screws
Buy at: Home Depot
Price: $2.28

Spray Foam

Products

Touch 'N Foam Max
Fill Expanding Foam Sealant- 12 Oz
Why: This super-expanding foam creates an airtight, weather-resistant bond that seals out drafts while blocking insects and other pests. MaxFill Foam Sealant is ideal for filling larger gaps and cracks. It can be used indoors or outdoors.
Buy at: Dollar General
Price: $4.95 for 12 Oz

GREAT STUFF
16 oz. Big Gap Filler Insulating Foam Sealant Quick Stop Straw
Why: This product can fill gaps larger than 1 in. It’s airtight, paintable, stainable and sandable. It’s polyurethane-based and perfect for all sorts of materials like wood, drywall, metal, masonry, glass and most plastics.
Buy at: Home Depot
Price: $5.25 for 16 Oz

Loctite
12 fl. oz. Tite Foam Insulating Foam
Why: This product is the best insulator. It can be used for multiple applications including sealing out drafts, moisture and pests. It can be used on both interior and exterior projects and is paintable, sandable and stainable, and cures white.
Buy at: Home Depot
Price: $5.78 for 12 Oz
Uninsulated hot water pipes allow for the water's heat to radiate out of the pipes and add unnecessary heating costs to your energy bills. A relatively inexpensive way to lower heating costs and conserve energy is to insulate your hot water pipes, which can lead to savings of 3 to 4% per year. Insulating pipes can raise the water's temperature 2 to 4 degrees Fahrenheit, allowing you to lower the hot water temperature setting. This also means you will not need to wait as long for your water to heat up when you go to use your shower, or another faucet helping to conserve water. While it is possible to get an outside party to insulate your pipes for you, this is not necessary. It is also recommended to insulate all your pipes during new construction as they are installed.

Products that stop this exchange include:

**Pipe Insulation (GOOD FOR RENTERS)**

Pipe insulation is usually a tube made of foam insulation that surrounds a pipe. Interior pipe insulation is usually used to keep heat in hot water pipes, reducing energy costs, while exterior pipe insulation is used in order to prevent the pipes from freezing and bursting outside the home, or in unheated parts of the home. When buying tube insulation, first measure the diameter of your pipes so that you know what size to get at the store. The thicker the foam, typically the better the insulation.

**Spray Foam**

Spray foam comes in a can, and is a sprayable foam insulation that can be applied inside the holes in the wall created for the passage of pipes, reducing the transfer of heat from inside to outside.13*

*Discuss spray foam with landlord before application if you rent.
Pipe Insulation

Products

M-D Building Products
3/8 in. x 3/4 in. x 6 ft. Tube Pipe Insulation Kit (Other sizes available)
Why: The insulating tape blocks heat loss or gain to help save energy, as well as halting condensation on cold pipes to help prevent water damage. It is easy to install.
Installation: Self Adhesion
Buy at: Home Depot
Price: $1.92 per 6 ft

Everbilt
3/4 in. x 6 ft. Foam Self Seal Pipe Insulation
(Other sizes available)
Why: For an economical and energy efficient way to help prevent your pipes from freezing use the Everbilt Self Sealing Foam Pipe Insulation.
Installation: Self Adhesion
Buy at: Home Depot
Price: $2.63 per 6 ft

Everbilt
3/4 in. Rubber Pipe Insulation Pre-Slit Elbow
(Other sizes available)
Why: This 3/4 in. Rubber Prefabricated Elbow helps save energy by protecting copper and iron pipes from freezing and condensation.
Buy at: Home Depot
Price: $5.53

Spray Foam

Products

Touch 'N Foam Max
Fill Expanding Foam Sealant- 12 Oz
Why: This super-expanding foam creates an airtight, weather-resistant bond that seals out drafts while blocking insects and other pests. MaxFill Foam Sealant is ideal for filling larger gaps and cracks. It can be used indoors or outdoors.
Buy at: Dollar General
Price: $4.95 for 12 Oz

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Buy at: Home Depot
Price: $5.78 for 12 Oz
SOURCES


7. https://energy.gov/energysaver/weatherize/air-sealing-your-home/caulking


SPECIAL THANKS TO OUR SPONSORS:

NCARB

Frost King

PROJECT RE

So/L Carnegie Mellon University