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Energy Activities for Faithful Youth

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The Interfaith Coalition on Energy

The Archdiocese of Philadelphia
The Board of Rabbis of Greater Philadelphia
The Metropolitan Christian Council of Philadelphia

7217 Oak Avenue
Melrose Park, PA 19027-3222
Telephone: (215) 635-1122
Fax: (215) 635-1903
andrewrudin@earthlink.net
www.interfaithenergy.com

Often, a congregation's interest in reducing energy costs does not extend to its young members or those in religious schools. The purpose of this ICE publication is to suggest ways to include the youth in a congregation by providing a variety of ideas for specific activities concerning energy.

Contents

Amish Beliefs

Read the following article. Discussion questions are at the end.

There are more than 16,000 Amish people in Lancaster County. Their population has doubled its number in 20 years. The Amish family includes an average of 6.6 children. The rules of the church discourage higher education, emphasizing instead on the job training. They have strong families and communities. Amish religion prohibits owning automobiles and connecting their buildings to any wires from the local electric company.

Electricity

The Amish are not against electricity. One finds electronic typewriters and cash registers in Amish stores. However, they run on electricity from 12-volt batteries because the Amish refuse to have their homes and businesses connected to an electric utility. Tanks for propane, compressed air, and fuel oil are evident everywhere, but the electric wires on utility poles bypass each Amish building.

The Amish don't like what electricity does to their lives. They don't want exposure to secular values from the outside. They prefer a slower, softer, more family-centered lifestyle over the speedy, consumption-oriented lifestyle promoted by the mass media. Were their buildings connected to the utility grid, modern appliances would be easy to install. Eliminating the use of off-site electricity eliminates the use of fax machines, compact disks, stereos, VCRs, televisions, radios, hair dryers, electric clothes dryers, toasters, air conditioners and microwave ovens -- most modern conveniences.

Amish homes and businesses contain a lot of machinery. Electric generators, however, may be used to power welding machines and to charge batteries... nothing else. Milk is cooled by compressors that are directly powered by fossil fueled engines. Motors are powered by compressed air or by hydraulics. Water is pumped by the wind or by the flow of a stream. The Amish use propane refrigerators and heating systems, along with wood, coal and some passive solar heating. There are no active solar heating systems for either space heat or domestic water. A few photovoltaic panels are used to recharge batteries.

This is not an easy lifestyle. Using electricity would be more convenient, and less expensive. Lighting, for example, is frequently supplied by gas mantles glowing with burning propane gas. A pair of mantles in one lamp produces light roughly equivalent to a 100-watt light bulb. One tank of gas, costing about $6.50, should light the mantles for about 100 hours at full brightness, giving propane light a value of about $0.65 per kilowatthour -- about six times the cost from the utility.

Automobiles

The Amish are not against automobiles, but they refuse to own them. They will ride on mass transit, rent vans, or ride with outsiders, but they will not own cars. They feel that car ownership destroys their families and communities. "You would expect the speed and convenience of cars to allow more time for home life," one Amish man said, "but just the opposite is true."

It takes about 10 minutes from start to finish to get a horse and carriage ready for the road. They travel about 10 to 12 miles per hour. Therefore, the Amish are very thoughtful about their travels. "If we had cars, we would not have to plan ahead as much," an Amish man said. "We can't afford

to forget details. We must combine errands, not travel alone or shop spontaneously. Our travel is deliberate."

Some Amish have tried bicycles, but they seemed to lead toward the justification for owning automobiles. Bicycles are now shunned. Similarly, tractors may be used around the barn, but not in the fields. One Amish settlement began using them in the fields, but found, once again, that such use seemed to justify owning cars.

We asked, "What if everyone used a horse and carriage?" An elder Amish replied that horse manure would get too deep too quick. There would have to be a massive increase in mass transit, which the Amish would like to see.

Electricity, automobiles and values

While modern society is plagued with drugs, divorce, and environmental contamination, Amish society has few of those problems. Could it be that their limitations on energy use are in part responsible? The Amish believe that not owning cars and not using off-site electricity limits consumerism and strengthens family and community vitality. Divorce and drug addiction are symptoms of broken social structures. Electricity and automobiles certainly are major contributors to environmental pollution.

Using energy affects our lives. It's difficult for people to explain or quantify the benefits of limiting their consumption of energy. The Amish cannot easily explain to outsiders the benefits of not having electric meters or cars, and yet they continue, generation after generation, to live happily without them.

Research has been done in at least two universities about the relationship of society to the energy it uses. Earl Cook was a Professor of Geology and Geography at Texas A&M University. He was the executive secretary of the National Academy of Sciences from 1963-66. In Chapter 7 of his book *Man, Energy, Society*, he discusses the differences among societies based on the amount of energy they use. Although Professor Cook did not mention the Amish, we see remarkable coincidences in his writing with what we found in Lancaster County:

> "In a low energy society, family and community are of great importance. Not only are many goods and services produced within the family, but also the family is a major instrument of social control. Social efficiency is given strong preference over individual choice....
>
> "Life in a high energy society is in sharp contrast to life in a low energy society. Family and community are subordinated to the state because most goods and services are produced outside the family and because the means of social control do not depend upon the family's and community's allocating status and inculcating behavior. Services are performed by specialists."

Discussion questions:

How does energy use affect our lives?

How does energy use affect everything around us?

Here are two lists of human activities. One always requires an expenditure of electricity and/or fuel, and the other list does not. What do feel about the items in each list?

Activities which don't require electricity or fuel	**Activities which require electricity and/or fuel**
Making love	Travel and transportation
Walking and swimming	Most manufacturing
Talking and singing	Cooking
Meditation and prayer	Television and movies
Teaching and understanding	Medicine
Thinking and imagining	War
Using the five senses	Constructing & operating buildings
Reading	Mass media
Art and creativity	Money and banking
Peace	

In what ways are you already like the Amish?

Are the Amish an example of how controlling energy use improves one's relationship with the environment?

Does the Amish lifestyle have a message for your congregation?

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What is zoning?

Your building is probably designed so that sections (zones) of the building can be heated without heating the other sections. Where are the these heating zones?

Step 1. Draw a plan of your building. If it has more than one floor, draw each floor. If possible, try to get all the floors on one page.

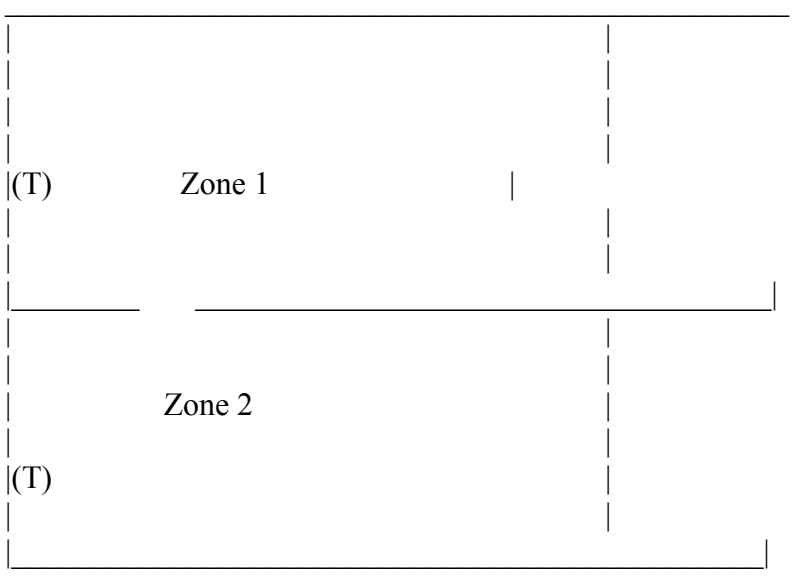
Step 2. Find each heating thermostat and mark its location on your plan by drawing a "T" with a circle around it.

Step 3. With the help of an adult, turn up one of the thermostats to find out what rooms heat up. Those rooms are one zone.

Step 4. Mark these rooms on your plan, maybe in color. Then, color the thermostat with the same color so that you know which thermostat controls the heat in that zone.

Step 5. Repeat Steps 3 and 4 until you have found and labeled all the zones.

Example:



Rating the electricity used by your congregation

What would you do if you found out that your congregation used twice as much electricity as the average for similar buildings? How can you determine whether it used that much or not?

Step 1. How much of your building uses electricity? Probably the whole building uses electricity in one form or another. So, you have to measure the building and find out your square feet of floor area. Area is the length multiplied by the width. It's easiest to get the measurements from blueprints, if your congregation has them. If you can't get the blueprints, you can measure the building directly. It's easier to do this on the outside of the building with a long tape measure, as long as the weather is OK.

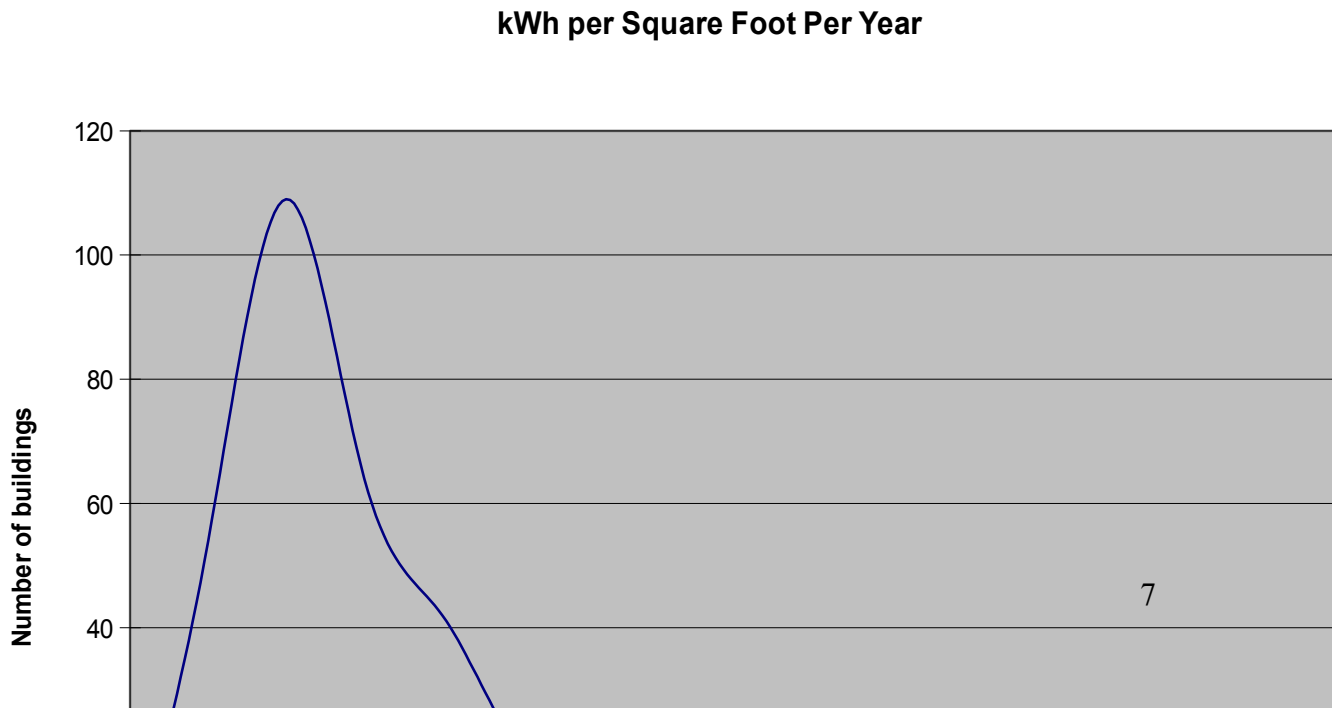
Step 2. As you look around the building, find out where the electric meter is. This is what measures the amount of electricity coming into your building. That amount is called a kilowatthour. You need to measure all the floor area served by that electric meter, even if it supplies electricity to more than one building.

Step 3. Gather all the electric bills for one year. It doesn't matter which month you start with, but you should end up with twelve months, one right after the other.

Step 4. Write down the number of kilowatthours used during each month, and then add the total for the year.

Step 5. Divide the total kilowatthours for the year by the square feet of floor area served by the meter. And BINGO, you get kilowatthours per square foot.

Step 6. Draw an arrow on the chart below to see how your congregation compares with hundreds of other congregations in and around Philadelphia.



Naming and labeling mechanical equipment

We are amazed how few items are labeled in the mechanical equipment rooms for which congregations are responsible.

Mechanical equipment rooms usually have locked doors and signs telling you not to come in. Inside they are usually dark and mysterious. Inside these rooms, you can find fans, boilers, electric panels, pipes, ducts and lots of other stuff. Unless you know the names of what you see, you actually cannot see them. They are invisible. The whole room looks like a dark gray mess.

The cost of energy flowing through an average Philadelphia church was about $22,000 per year in 2011, if it was heated by natural gas. How much is that for one day?

For gas-heated synagogues, it's $46,000 per year. How much is that per day?

So, mechanical equipment rooms are the most expensive rooms in the building, and yet they are dark and mysterious and usually not well cared for.

This project is going to take some of the mystery out of these spaces.

Step 1. Borrow a flashlight from someone.

Step 2. Ask the custodian for a tour of a mechanical equipment room. Using the flashlight to pick out specific objects, ask the custodian what each one's name is. Let each student pick something.

Step 3. Draw a picture of that specific object, and label it in the picture. Each student can draw a different object.

Step 4. When you get back to your classroom, try to put all the pictures together to make a "collage." A collage is a big picture made up of small ones pasted together.

Step 5. Discuss how each student has a different opinion about the mechanical equipment room.

Step 6. Give the collage to the custodian, and ask him or her to label the items clearly, so that everybody understands what each one is called and what it does.

The view from your roof

This exercise applies only to flat roofs. Roofs that are sloped are too dangerous to be on. Flat roofs are fun, but you have to be careful not to fall off, and you must walk where you are told to walk because you can damage the roof by walking in the wrong place.

1. Borrow a digital camera.

2. Ask the custodian to guide you.

3. Pick a pleasant day -- not too hot, not to cold, not to windy and not raining. With one or more adults supervising the project, go out onto the flat roof. Sometimes this means climbing up stairs, and sometimes ladders. Sometimes you have to climb out a window to get out onto a flat roof. Whatever way you get there, be careful.

4. Once you are on the flat roof, ask yourself these questions:

> Does it seem like people care about the flat roof? For example, is there a lot of rubbish on it? Does it seem pretty?
>
> What are the things that are poking up through the roof? Are there any skylights, vents, ventpipes, chimneys? Ask the custodian to explain what these things are called and what they do.
>
> What is mounted on the top of the roof? Are there any air conditioning units, fans, or antennas? What does each do?
> What are the names of their parts?
>
> Often, you can get a good view of the neighborhood from a roof.
> What do you see?

5. Take pictures of the roof and the neighborhood.

6. Carefully go back into the building to your classroom. By then, the Polaroid pictures should be fully developed.

7. Look at the pictures. What are the names of the things you see?

8. You can make a collage out of these photos.

Organizing an energy patrol

Young people can save lots of money and energy. For example, a school in Arizona saves $2,000 each year by having their students remind everyone to turn things off when they are not being used. Here's how to do it in your church or synagogue:

1. Start by listing the electricity your building uses for at least one year. You do this by copying the kilowatthours of electricity from the electric bill which comes each month. Your list could look like this...

Month	2009	2010	2011	Savings
January	3,822	4,104	_____	_____
February	3,940	4,200	_____	_____
March	3,777	4,104	_____	_____

2. Once you have made a list of the past kilowatthours used, you begin your Energy Patrol. What does the Patrol look for?

Lights on in empty rooms
Air conditioners running when no one is around
Computers left on
Empty but cold refrigerators, freezers and walk-in coolers
Basically, any use of energy when no one benefits.

3. When you find that something is left on, don't just turn it off yourself. For example, turning off a computer may ruin computer files. Or turning off a light in a bath room may cause someone to panic if they are in the dark. Instead, make a list of what is left on, when you found it on, and present it to the custodian. If you want to get even quicker results, present your list to the property committee or the finance committee. The finance committee is responsible for money.

4. When you think that your Patrol is making some progress, fill in the last two blanks in your list with the changes in the kilowatthours billed by the electric company. Your list might look something like this:

Month	2009	2010	2011	Savings
January	3,822	4,104	3,500	604
February	3,940	4,200	3,443	757
March	3,777	4,104		_____

5. How much is the savings worth? You could estimate each kilowatthour is worth about ten cents. How much did you save each month?

6. What do you think the congregation should do with the money saved?

Mapping solar time on the floor

You already know that the sun seems to move across the sky. You probably also know that your shadow is longer in the winter than in the summer.

But have you ever tried to watch shadows move? For example, you could lay a pencil on the shadow cast on the floor by part of a chair. Now, watch the shadow move. Pretty slow, right?

So, this project can let you follow these slow movements of sunlight.

Step 1. Pick a room which is exposed to sunlight. Pick a sunny day.

Step 2. Using masking tape, or some other tape that can easily be removed from painted walls, stick a strip on the floor or wall right where the edge of a window is creating a shadow of the sunlight.

Step 3. Label the strip of tape with the date and the time of day.

Step 4. Wait an hour or so, and then label the shadow again with another piece of tape with the same date but a different time.

Step 5. One week later, if the day is also sunny, label the same shadow at the exact same time of day, but with a different date, of course.

Step 6. Now, analyze the pattern between the two weeks and predict where the next strip of tape should be placed for the shadow at that same time, but one week into the future.

Step 7. Did your prediction turn out to be right?

You now have a sun clock on the floor or wall of the classroom.

Your custodian as your teacher

Custodians are not hired to be teachers. Sometimes, however, they can talk about their practical experience in operating buildings in ways that other teachers can't.

Ask you custodian if he or she would be willing to talk to your class.

If he or she agrees to do so, here are some of the things they can teach you:

- How the energy systems in the building work
  - Heating
  - Air conditioning
  - Lighting
  - Ventilation
  - Cooking
  - Heating sink water
- How to reduce the amount of energy used by occupants
- Where to get more information about energy

Here are some particularly interesting items:

- How thermostats work
- How the custodian adjusts the building's systems to make people more comfortable
- How people communicate with the custodian
- How you read a meter
- How the building occupants can make life easier for the custodian
- How important it is to keep up with repairs
- How the custodian adjusts the systems when the weather changes

Zero energy worship

You know what worship services usually are. They occur in the middle or late morning. You ride there in a car. Sit in an air conditioned room. Listen to voices amplified by electricity, and so on.

What would a worship service be if it involved using absolutely no electricity or fuel?

Could it be inside?

If it were outside, could it be on a very cold day? On a very hot day?µ

Could you get there in a car without using any fuel or electricity?
If not, how would you get there?

Would the service be held after dark?

Worship itself does not require electricity and fuel, but getting to worship and being housed comfortably do.

Here is the project:

Step 1. Design a worship service that uses no electricity or fuel at all.

Where would it be?

What time would it occur?

What would the weather have to be like?

What do you expect to happen as a result of zero-energy worship?
What songs? Any dance?
What reading? What prayer?

Step 2. Do it.

Follow through on your plan by holing your own service? You can ask a minister, priest or rabbi to officiate, if you want.

Note what happens before, during and after the service.

Step 3. Discuss your feelings about the result.

Discuss what happened.

How would you do things differently?

Did anyone use any electricity or fuel?
If so, how can you not use it in the next zero-energy worship?

Energy use when no one is using the building

Why should your building use electricity, water or fuel when no one is in the building?

This project allows you to find out how much energy and water is being used so that you can make suggestions on how to use less.

Step 1. Fill in the following information from your electric, gas and water meters. If you can't do the readings yourself, ask the custodian to do it for you.

Day one:

Electric meter reading at the start of the day _____
Electric meter reading at the end of the day _____

Gas meter reading at the start of the day _____
Gas meter reading at the end of the day _____

Water meter reading at the start of the day _____
Water meter reading at the end of the day _____

Day two:

Electric meter reading at the start of the day _____
Electric meter reading at the end of the day _____

Gas meter reading at the start of the day _____
Gas meter reading at the end of the day _____

Water meter reading at the start of the day _____
Water meter reading at the end of the day _____

Day three:

Electric meter reading at the start of the day _____
Electric meter reading at the end of the day _____

Gas meter reading at the start of the day _____
Gas meter reading at the end of the day _____

Water meter reading at the start of the day _____
Water meter reading at the end of the day _____

Step 2. Subtract the readings at the beginning of the day from those at the end of the day to get the consumption when people are using the building. Each dash below is a minus sign:

Electricity: (End of day) - (beginning of day) = daytime use
Day 1: _____ - _____ = _____

Day 2: _____ - _____ = _____
Day 3: _____ - _____ = _____

Natural gas: (End of day) - (beginning of day) = daytime use
Day 1: _____ - _____ = _____
Day 2: _____ - _____ = _____
Day 3: _____ - _____ = _____

Water: (End of day) - (beginning of day) = daytime use
Day 1: _____ - _____ = _____
Day 2: _____ - _____ = _____
Day 3: _____ - _____ = _____

Step 3. Now here is the interesting part. Subtract the readings at the beginning of the day from those at the end of the day before to get the consumption when the building is empty:

Electricity: (Beginning of day)- (End of Previous day) = Overnight use
Day 2: _____ - _____ = _____
Day 3: _____ - _____ = _____

Natural gas:(Beginning of day) - (End of Previous day) = Overnight use
Day 2: _____ - _____ = _____
Day 3: _____ - _____ = _____

Water: (Beginning of day) - (End of Previous day) = Overnight use
Day 2: _____ - _____ = _____
Day 3: _____ - _____ = _____

Step 4. What equipment is using energy or water overnight?

What equipment is using electricity overnight? How can less be used?

What equipment is using gas overnight? How can less be used?

What equipment is using water overnight? How can less be used?

Polling the adults

This project is a way to figure out what adults are thinking. The idea is to prepare a list of questions, ask randomly-selected adults to answer the questions in a way that protects their privacy, and then to summarize the results so you can understand them.

Step 1. What do you want to find out about the way adults are thinking about energy? What questions would give you the answers you seek? Possible categories:

What do they think will happen when fuel prices go up?
What do they think about car pooling, efficient lighting?
Would they be willing to be uncomfortable if it saves the congregation money?

Step 2. Be careful about how you ask your questions. Here are some general hints about questions:

To be able to count the answers, you could ask opinions with answers scored from 1 to 5. It is best to pick an odd number.

Avoid open-ended questions. Instead of asking "How do you feel about...?" try "Rate your feelings to this statement from 1 if you agree strongly to 5 if you disagree strongly...."

Step 3. Pick adults at random. One way to do this is to pick names out of a list of the members of the congregation... every tenth name, or every twentieth.

Step 4. Try to be consistent in getting the answers. Use the same questionnaire and answer sheet for each person you interview. Try to avoid saying anything which would bias their answers one way or another.

Step 5. If you find out that a question just does not work, remove it and try your poll again.

Step 6. Score the answers and share them with the entire congregation.

Ideal design of a future worship center

What kind of worship center would you and your class like to have? Here are some questions that can stimulate class discussion:

Can the congregation rehabilitate an existing structure instead of building a new one?

What about sharing space with other congregations?

Should the building be easily converted to other uses if necessary?

How would you design the the inside and outside to take advantage of the path of the sun, prevailing winds, and other environmental factors?

How would you make it eaier to worship outside?

Does the design of the building allow for natural light while minimizing heat loss through glass?

Do you want a garden outside? Also, would you want a garden inside?

How about shade from trees during the summer and windbreaks of trees in the winter?

How does your class feel about lawns? Can you think of other natural habitats which require less maintenance?

Do you want a plan for easily and conveniently composting kitchen and yard waste?

What happens to the storm water run-off from the roofs and paved surfaces?

How can the location and orientation of the building design lend itself to ease of use of bicycles, walking, carpooling and mass transit?

Can your parking lots have more than one function?

Where will you put lots of snow in the winter?

Where should the building's water come from and where should waste water go?

Where is the air going?

Each person interested in doing this needs to get a pencil, some tissue paper, and some adhesive tape. Cut a piece of tissue as wide as the pencil and twice as long. Tape the tissue to the pencil so that it looks like a flag. Blow on it. See the tissue move? When the tissue moves, it means the air around it is moving. You have built an "Air Motion Detector."

Step 1. Go to the doorway of your classroom and open the door. Stand next to the doorway with your Air Motion Detector in the door opening. You will have to wait a minute or two to get a orrect reading. Is the air moving? Which way? Where is it going?

Step 2. Often, someone in the office has a drawing of the plan of the building. If they don't have one, draw one. It does not have to be exact, but it should show all the rooms and all the doorways.

Step 3. Stand in each doorway marked on the plan. Use only inside doors. You can try this with an outside door, but you will probably find that the air is always coming into the building. Your goal is to find out how it travels once the air is inside. Mark the direction the air flows through each doorway on your plan.

Step 4. After you have done this with each inside doorway, figure out where the air is going. How is it getting out of the building?

Keep the ice from melting

This project can be a bit messy, so it might be good to do it outside when the weather is pleasant.

Step 1. Talk about the project first. Each student is going to get an ice cube. The object is to keep the ice cube from melting as long as possible. Discuss ways to do this and what materials would be needed.

> Remember, you have to be able to prove that the ice cube has not melted. So, pick materials that will allow you to check it easily either by touching it or being able to see it. You can feel it before it turns into water, for example.

Examples of insulating materials include tissue paper, hot drink cups, pieces of styrofoam, plastic with bubbles in it, or fiberglass. Can you think of others

Step 2. Gather any materials needed to prevent the ice from melting.

Step 3. Each student constructs a container to hold an ice cube so that the ice melts as slowly as possible.

Step 4. Once every student or group of students has gathered their materials, distribute an ice cube to each and start a stopwatch or note the time on a wrist watch.

Step 5. Note the time that each ice cube has completely melted.

Step 6. Whose ice cube lasted the longest? Why?

Step 7. How can you apply what you learned to keeping your house warm in the winter?

An Energy Walk

We often take energy for granted, which means we don't even notice it. In this project, you are going to become much more aware of energy.

Energy walks can be inside the building or outside. You put a blindfold on and have someone carefully lead you around, visiting places where you can experience different forms of energy.

Step 1. Decide who goes first, second, third and so on.

Step 2. Put a blindfold on whoever goes first.

> Remember, you have to be very careful about this. Some people get scared when they can't see. Don't force anyone to do this if they don't want to.

Step 3. Have someone lead the blindfolded person around.

> Remember, the blindfolded person can't see. Be very careful about stairs, doors, sharp objects and so on. BE GENTLE, AND GO SLOW.

Step 4. When leading the blindfolded person, here are some questions to ask and places to visit:

> Can you tell what temperature the air is?
> What sounds can the blindfolded person hear? What use of energy is producing the sound?
> Which sounds are natural, and which are made by humans?
> What smells can the blindfolded person smell? What use of energy is causing the smell?
> Which smells are natural, and which are made by humans?
> Have the blindfolded person touch several objects. Which feel colder?
> Can he or she feel the movement of air? Which direction is it moving?
> Can he or she tell where the sun is by feeling it?

Step 5. After some or all of the students have been on their Energy Walk, discuss what feelings came up. Can one or more students imitate a type of energy so the others can guess what type it is?

Four additional activities:

Posting the Accounts

Each month, tack the electric, gas, oil and water bills to a bulletin board where everyone can see. Members of congregations usually have no idea the cost of energy to operate a house of worship. Posting the accounts is simply tacking to a bulletin board a copy of the invoices conspicuously showing the amount of money paid in the past month for water, electricity and fuel. When members of a congregation see how much is being spent, they may be more motivated to help lower costs.

Mime of the turn off

In this ritual, students are encouraged to imitate turning things off. Silently, they re-create scenes in which not using electricity or fuel brings a greater appreciation of how we use energy unnecessarily, following the principle that waste does not lead to a better lifestyle or environment.

Witness the dumpster

Some congregations continue to discard material whose street value has increased, particularly paper and aluminum. A congregation can bear witness to what they have discarded by emptying the contents of the dumpster for all to see. Hopefully, items which can be recycled will be sorted into appropriate containers. The recycled contents of a dumpster can add to congregation income. (Contributed by Pastor Richard Purchase of the Upper Merion Baptist Church in King of Prussia.)

Our best fans

Moving air cools our bodies by increasing the rate that moisture evaporates from our skin. For this reason, ceiling fans make us feel cooler, even when the temperature of the moving air remains the same. Some congregations have placed individual hand-held fans in the pews. Often, these fans have advertising from funeral parlors or other local businesses. The fans can be ordered, however, with no printing on them and can be decorated by children from religious education programs. The project involves the decoration of the fans, the admiration of the art work and the use of the fans to improve comfort without the use of air conditioning. (Contributed by Matthew White of Philadelphia's Tenth Presbyterian Church.)