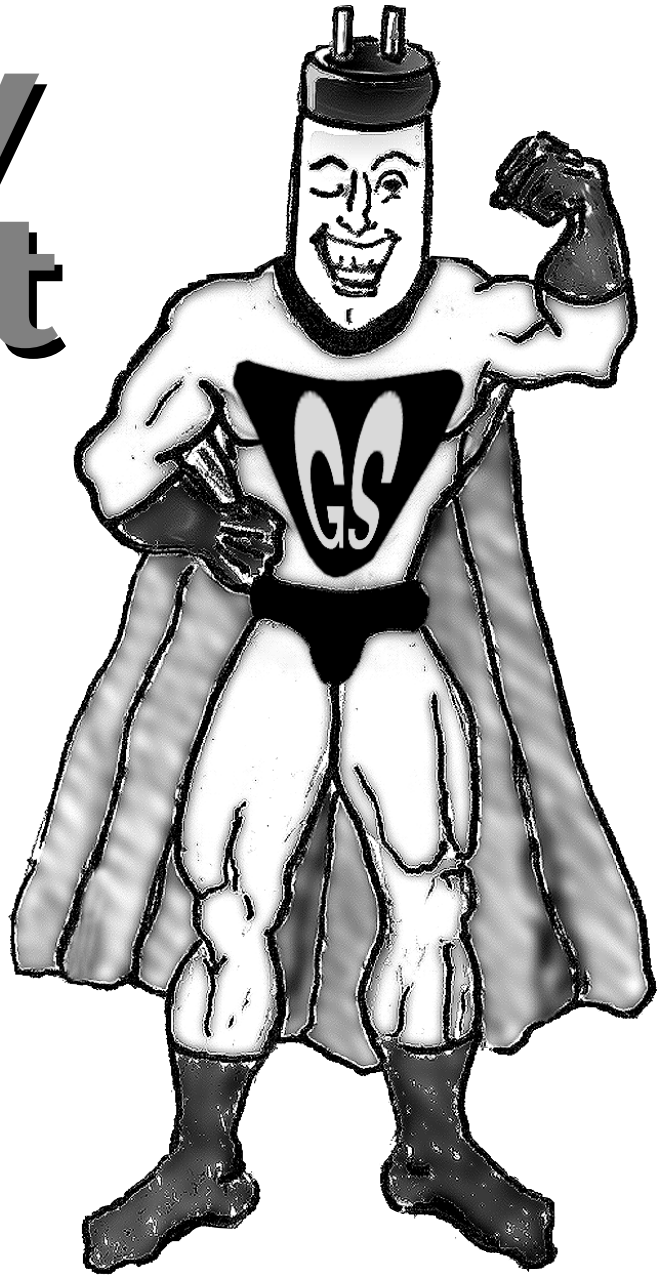
A Step-by-Step Manual

Green Schools Energy Project



Created by:
Youth for Environmental Sanity (YES!)
420 Bronco Road, Soquel, CA 95073
(877) 293-7226
E-mail: camps@yesworld.org
Fax: (831) 462-6970
www.yesworld.org

The Authors

This manual was written by Gwen Quigley and the staff of YES!, with the help of irreplaceable editing and technical assistance from Ian Thiermann and Mike Arenson of the Santa Cruz Environmental Council.

Youth for Environmental Sanity

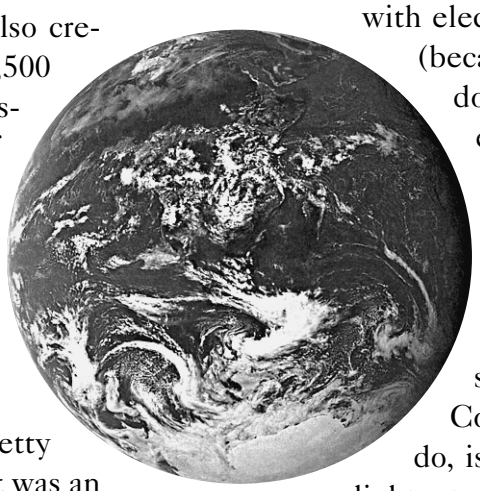
Youth for Environmental Sanity was founded in 1990 by 16-year-old Ocean Robbins and 19-year-old Ryan Eliason. Since then, YES! has become one of the most successful youth-run environmental organizations in the world. YES!'s national speaking and workshop tour has given inspirational presentations for 590,000 students in thousands of high school assemblies and college venues. By 1999, YES! had held 43 one, two, and three-week-long summer camps in seven countries for participants from 27 countries. YES! Action Camps inform, inspire and empower youth ages 15-25+ to take positive action for healthy people and a healthy planet. Widely heralded as among the world's premier youth environmental leadership events, YES! Action Camps are filled with a blend of experiential exercises, games, discussion groups, heart to heart sharing, video tapes, music, guest presenters, enjoying nature, and free time to soak it all in.

YES! has distributed tens of thousands of books and action guides, and co-produced the award-winning video, *Connect,* which was shown in 70 countries when MTV aired it on prime time for its 1997 Earth Day Special. YES!'s founder Ocean Robbins is co-author of *Choices For Our Future: A Generation Rising For Life on Earth.*

For more information on YES! Action Camps, or on YES!'s books, manuals, videos and other resources, contact YES! today! Or visit our web site, at www.yesworld.org.

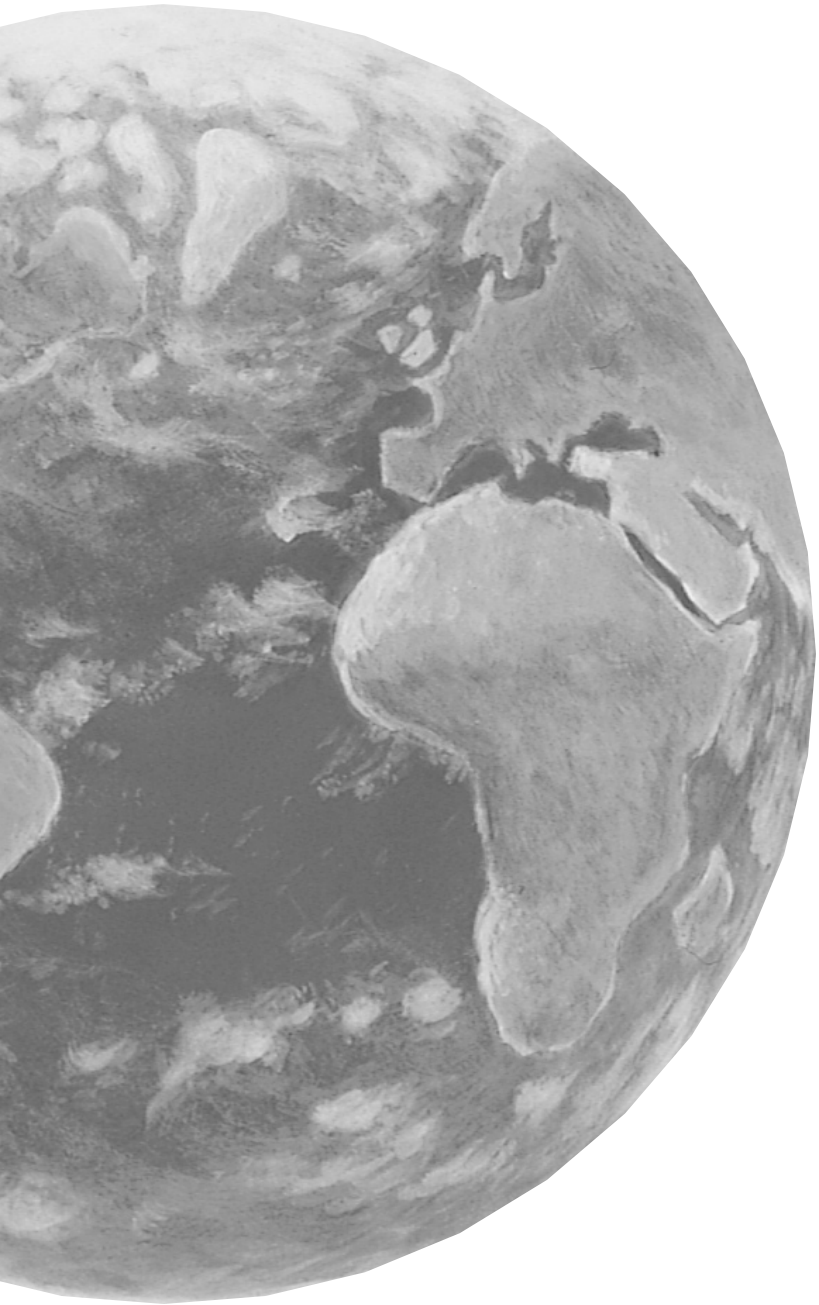
Students Are Environmental Heroes!

In November, 1993, a group of high school students in Santa Cruz, California did some research and discovered that their school could reduce its energy use by close to 40% by switching to more energy efficient technologies.[1] These changes saved the entire school district approximately $160,600 a year, including $24,000 a year for the students' high school. They also created an annual decrease of 1,500 tons of carbon dioxide emissions, 11,600 kilograms of sulfur dioxide emissions, and 5,000 kilograms of nitrogen oxide emissions![2] That's equivalent to taking approximately 200 cars off the road permanently![3]



Sounds pretty hard and pretty incredible, right? Actually, it was an easy thing do to. These students simply got their school district to change to more energy-efficient technologies and to decrease the "energy sloppiness" of their schools. The biggest step was changing the lighting used in the school district. Currently, lighting accounts for 20-25% of all electricity used in the United States.[4] Most public schools do not use the new, more energy-efficient electronically ballasted "T-8" fluorescent tube lights. If you look in your school, you will probably find that most classrooms, school gyms, bathrooms, cafeterias, and hallways are lit by fluorescent tube lights. In most schools these lights are "T-12" lights. These tube lights are ignited by a special transformer called a ballast. Most ballasts used today are magnetic, but there are new more energy efficient electronic ballasts. The combined use of these new electronic ballasts and "T-8" lights can cut a school's electricity use by 30 to 40 %![5] On top of that, the new "T-8" fluorescent lights with electronic ballasts are healthier (because they flicker faster and don't cause headaches), quieter (they don't buzz), have nicer light (not the usual greenish light) and can lower air conditioning costs (the electronic ballasts are cooler). What the students here in Santa Cruz County did, and what you can do, is get schools to switch their lights to the new energy-efficient electronic ballasts and "T-8" lights. You don't even have to be an electrician or a mechanic to do this! You just have to care about the environment, want to save your school a lot of money, and be willing to talk to people and make some phone calls.

Your school district can also save energy in many other ways, including changing to low-flow shower heads, fixing up their heating and ventilation systems, and **turning off the lights** when they aren't being used. Seems like common sense, right?!



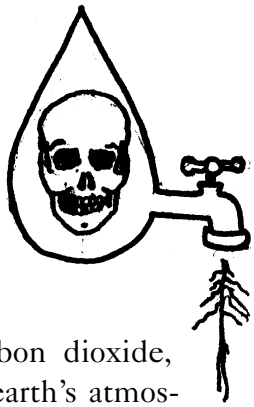
Most schools have not yet switched to these energy saving technologies because of the high costs of making the change. But what the students in Santa Cruz found was that there are companies who will do the job with no money down and later take the payments out of the money saved on the energy bill. In other words, their district didn't have to come up with any money at all to pay for these changes. The school district now gets $70,000 a year from the savings made on the electric bill after the new lights were installed.[6] The rest of the money that they save is used to pay back the company that installed the new lights. Once this company is paid off, the school district gets all of the savings. Not only did the schools decrease their use of energy and help create a healthier environment, but it now has an extra $70,000 a year to spend on other things, like sports, arts, and environmental classes!

This book contains a step-by-step guide for implementing this energy saving project in your school district. We (at YES!) have also included a fact sheet that briefly explains acid rain, global warming, and air pollution. It is a good idea to read over the whole packet before you start the project. That way you'll have a better understanding of the overview and what needs to be done. We will also be available by phone at any time to help you, and we can put you in touch with a lot of experts that can save you a great deal of work once you get ready for the more technical stuff. So get going, and let us know how it goes!

Yours for Healthy People and a Healthy Planet,

— Youth for Environmental Sanity

The Facts on Electricity

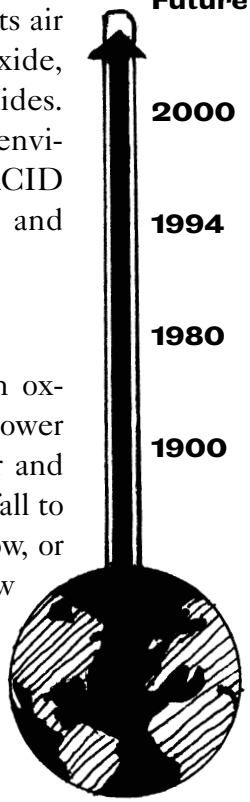


Today most of our energy comes from non-renewable energy sources, which are sources that can only be used once. These include oil, coal, hydro-electric and nuclear power. We need to begin switching to safe renewable energy sources. These sources include solar power, wind power, and hydrogen power. **We also need to reduce our current consumption of energy.**

Most electricity is generated by the burning of fossil fuels. Oil and coal are the main fuels used. This process is hazardous to the environment at many different stages. First the mining and transportation of these fuels can cause problems such as oil spills, and destruction of the land and water where the mining occurs. Sometimes, people living on the land are even forcibly removed so petroleum companies can drill for oil. Next, the burning of the fossil fuels emits air pollutants including carbon dioxide, sulfur dioxide, and nitrogen oxides. These air pollutants cause many environmental problems such as ACID RAIN, GLOBAL WARMING, and SMOG.

Acid Rain:

When sulfur dioxide and nitrogen oxides are emitted from cars and power plants, they mix with water vapor and turn into acids. These acids then fall to the ground in the form of rain, snow, or fog. These acids, commonly know as "Acid Rain," corrode buildings, damage trees, harm vegetation, and can harm or destroy aquatic life in rivers, oceans, and lakes.



Global Warming:

Certain gases, especially carbon dioxide, block heat from leaving the earth's atmosphere. This traps heat much like a greenhouse would. Usually this process is good because the trapped heat keeps the earth at a warm and constant temperature. In the past century or so, however, human activities, such as burning coal and oil, have significantly increased the concentrations of carbon dioxide and other "greenhouse" gases. This increase has led to an increase in the world's temperature, also known as global warming.

As the earth's temperature increases, there is a possibility that parts of the polar ice caps will melt, which would cause the oceans to rise. This temperature increase also causes changing weather patterns which has already led to an increase in natural disasters, such as hurricanes, droughts, and floods.

Air Pollution

Smog is caused by a mixture of various pollutants. Nitrogen oxides are one of the main ingredients in this mixture of pollutants that cause smog. Smog irritates people's (and other creature's) eyes and lungs, can intensify respiratory ailments such as asthma and bronchitis, and can increase risk of lung diseases like lung cancer.

Did You Know?

Lights account for 20-25% of all electricity used in the U.S.

Or Did You Know?

"Acid Rain"

- Thirty five percent of Europe's forests have fallen victim to acid rain.[13]
- Acid rain is leading to the deaths of so many maple trees in New England and eastern Canada that the maple syrup industry may be eliminated by the early years of the new Millennium.[14]
- Once acidified rain has reached Earth it often joins our drinking water. As it travels through our drinking water pipes it may leach out lead, cadmium, aluminum and asbestos. These materials are poisonous and can lead to kidney damage, Parkinson's disease, brain damage, respiratory problems, Alzheimer's disease, and increased risk of heart problems.[15]
- A congressional study blamed acid rain for participating in 50,000 premature deaths in the United States every year.[16]

"Global Warming"

- In the last century, carbon dioxide levels in our atmosphere have increased by more than 25 percent.[18]
- The six hottest years in recorded history have all occurred in the last decade.[19]
- The increase in global temperatures has led to the melting of portions of polar ice caps on both ends of the Earth, causing the oceans to rise by 4-8 inches in the last century.[20]
- Scientists predict that in 50 years Earth will be 3-5 degrees hotter than it is today.[21]
- A rise of 3-5 degrees in global temperatures would lead to the melting of far larger chunks of the polar ice caps, and a rise of up to 14 or even, some say, 23 feet in global sea levels. Changing weather patterns could lead to droughts in some places and torrential rain in others. It could even become more difficult to grow food on planet Earth.[22]

"Air Pollution"

- Breathing Mexico City's contaminated air is said to be as damaging as smoking two packs of cigarettes every day. [7]
- In Tokyo, the air is so polluted that clean oxygen is sold from vending machines at street corners.[8]
- In 1988, forty thousand Czechoslovakian students wore respirators to shield them from air pollution on their way to school.[9]
- In the US, some 150 million people breathe air that the Environmental Protection Agency considers unhealthy. [10]
- Air pollution leads to the deaths of 120,000 Americans every year.[11]
- Air pollution costs the United States more than $40 billion in health care annually.[12]

Outline of Steps

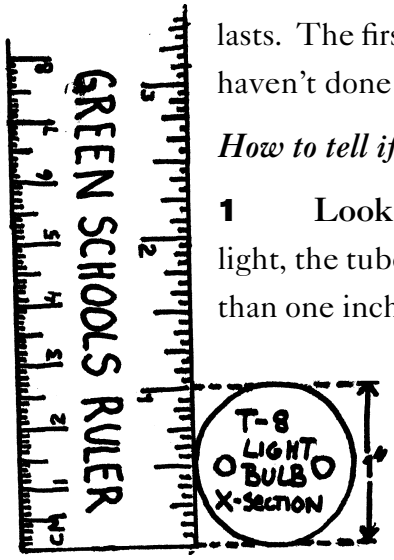
To make this project simple, we have broken the necessary work into eleven steps.

Before beginning, decide if you are going to work to get your whole school district to change their lighting (a school district usually includes all of the elementary, junior-high and high schools in your county or region), or if you just want to start off by getting your school to switch, and then work on your whole school district. Either way works, but we recommend doing it for your whole district, as it is not much more work and the results are much larger. It actually might be quite a bit easier to convince people to switch the whole district than just one school. If you are going to start with just your school, substitute the word "school" everywhere in the manual you see the words "school district."

Step 1

Find out what kind of lights your school district currently uses

The easiest and best way your school district can reduce energy and save money is to switch to the more energy-efficient "T-8" fluorescent tube lights, and to electronic ballasts. The first step is to find out if your school has already switched over. Most haven't done it yet, but some have, and it's crucial to find out right away.



How to tell if your school district uses the new T-8 lights:

1 **Look at the tube light in one of the light fixtures.** If it is the "T-8" light, the tube will be one inch in diameter; any other tube lights will be larger than one inch. *Don't touch the lights or do anything that might get you electrocuted (the world needs you, and so does your school district!).*

2 **Or ask someone in maintenance, like a custodian or the Maintenance and Operations person, whether they have installed electronic ballasts and T-8 fluorescent lights in the overhead lighting fixtures.** Ask if you can see one of the replacement lights that they use if a light burns out. Often they won't know whether they have switched to the new lights or not, or they will think they have switched even if they have not. **It is a good idea to get them to show you a replacement tube light.** If you look on the corner of the light it will have a group of numbers like "AF34 T-12GLT". If it is a "T-8" light (the good ones), it will look something like this: "AF34 T-8". If it is a T-12 light or larger, it will look something like this: "AF40 T-12". Look for the T-12 or T-8 hidden in the numbers. Or take a ruler with you and measure the diameter of the light. Again, if it's one inch in diameter, it's probably a T-8.

3 If your school district doesn't use any fluorescent tube lights, the ones that are shaped like a tube not a bulb, then they definitely don't use "T-8" lights.

You can also tell the janitor or custodian what you are working on. They could be very helpful. On the other hand they might be discouraging, especially if they think it will cost the school money. Tell them what the students in Santa Cruz did and assure them that your school has the potential to save money and energy, too. Do not let them discourage you if they don't seem interested!

4 If your school has already retrofitted its lights, that's cause for celebration! Your work's already done for you. In that case, you might want to use this manual as a resource in helping local businesses to retrofit their lighting. It can have all the same benefits, for them and for the environment!

Step 2

Get Other People Involved

If you find out that your school district has not switched to the new "T-8" lights, talk to other folks about the project. Though you might be able to do this entire project by yourself (if you're a superhero), **it is easier and more fun to work on this project with other people.** There are probably many people in your school and community that would be great to get involved.

Ideas on who to get involved:

1 Other students. Students are great people to get involved! If you are not already working with an environmental club at your school, and there is one, contact them. Also talk to other student groups that might be interested, like the student government, and student environmental coalitions in the area.

Your friends are also good people to get involved. Get everyone that is interested in the project to bring a friend or more to your next meeting. Also invite students who are not already involved in a club. They may have some extra time, and might really enjoy working on the project.

2 Teachers and other school staff. Teachers concerned about the environment, school counselors, administrators, and your principal are also important people to include. They can often provide added persuasion power and help with contacting people to build a coalition. You can also talk to teachers, especially science teachers, to see if they will make this a project in their class, or if they will give students that work on the project extra school credit.

3 Parents and other adults. Parents, parent groups, parent-teacher groups (like the PTA), community activists and local environmental groups can be very helpful. They can bring knowledge, resources and help persuade your school district to make these changes.

How to get other folks to work on the project:

Talk to your friends, your parents and your teachers about this project. Make sure you let them know that making these switches will help the environment and save your school district a tremendous amount of money. Get people excited! Organize a meeting to plan out the project. Even if you already have a group to work on the project, it is still good to invite more teachers, parents, and students who you think would be interested. Include as many people as possible. This will make your job easier and help empower lots of other people!

Step 3

Recruit to a Meeting!

Next you need to have a meeting so that everyone interested in the project can come together. This is especially important as you will want to try to include people from other schools and from community groups This meeting is to give everyone the details of the project, to form a group and to split up the work.

Recruiting for your meeting:

There are many different ways to recruit people for your first meeting, and every meeting after. Below are a few helpful hints.

1 Have flyers and posters. Create a catchy flyer or poster that tells the specifics of the meeting—like time, place, and reason for having the meeting. Then take the flyers and posters and:

- have them passed out in classrooms
- pass them out at a table during lunch or at a school event, like a football game or assembly
- hang them up in popular places around your school
- hang them up in your city, especially in places young people go to hang out

2 Announce the meeting. If possible announce the meeting over the loudspeaker during school announcements. Announce it at the beginning of your classes and write the information up on the chalkboard (of course, ask the teacher first). Also, put the information in your school newspaper if you have one, and on any bulletin boards you can—remember to include the time, place, and date.

3 Set up a table with information about the project. Include copies of the fact sheet provided in this manual. Good places for tables are at your school lunch, at sport events or other big school events. It is also good to set up a table at any community event that will draw people who might be interested in working on the project (like a county fair, or an Earth Day event). Always have a sign-up sheet at the table and get anyone who's interested to write down their name and phone number. That way you can call to remind them about the meeting and ongoing events.

4 Contact the media. Often your local newspaper, radio and T.V. stations will list the time and place of your meeting. They also will probably want to do stories about this project. Call their offices and get the names of the specific person that you should send the press information to. Then send letters, press releases (1-page articles about your work that you would like them to run) and even calendar listings. After you have sent these out, call the people you sent them to. Tell them about your meetings, the details of the project, and your progress.

5 Invite people to bring a friend or two to the meeting.

6 Call everyone. Give everyone who signed-up for the meeting a call a night or two before the meeting to remind them when and where the meeting is and to see if they are coming.

Step 4

Have the meeting

Meetings are a very important part of this project. Your group will want to meet often, but the first meeting is the most important because it sets the tone for the group. It's a way to introduce everyone to this project and get things started. This meeting should:

1 Have introductions at the beginning. Have everyone go around and say their name and answer a question. A good question is to ask everyone to say why they are there, or what interests them about the project. Introductions are good ice-breakers and usually lead to good meetings.

2 Give everyone a good understanding of the project. Have someone go through and explain the idea behind this project and the steps that are listed in this manual. Give a short explanation of what the students in Santa Cruz did and of the new electronically ballasted "T-8" lights. But make sure everybody knows this manual is just a guideline, and that any new ideas that they come up with are welcome.

3 Get everyone excited about working on the project. Not everyone will realize the relationship between their school district's energy use and the major environmental problems we face in the world. Emphasize the positive environmental impact this project can have on the world and how much money this project can save your school district.

4 Have a brainstorm, or some other activity that includes the whole group. We suggest brainstorming a list of all the tasks that need to be done before the next week. Or have the group brainstorm all of the different ways your school district can reduce its energy use.

5 Give everyone something to do before they leave. If you haven't already, come up with a list of all the tasks that need to be done before the next week. Then have everyone pick one to work on. It is important that everyone has something to do so they feel like they are part of the group and are making a difference, even if it is small task. They are also more likely to show up to the next meeting. Plus this helps to insure that one person (like you!) is not doing all of the work. Have someone be over-all coordinator to check and make sure

everyone is getting their jobs done and to reassign jobs if needed. Step 5 and Step 7 of this manual list good tasks for people to do in between meetings.

6 Have a sign-up sheet and plan your next meeting. Make sure to have a sign-up sheet at the meeting for everyone to put their name and phone number on. That way they can be called and reminded of the next meeting. Also make sure before the meeting ends that a time and place are set for the next one. It works best if meetings are held at a regular time and place.

Keys to good meetings

These keys can be very helpful! If you want more detailed information about these, please call us.

1 Make an agenda, or plan the meeting, *before* it begins

2 Keep the meeting focused on the most important topics

3 Have a facilitator to make sure everyone gets heard

4 Have a note-taker to make sure good notes are taken from the meeting

5 Have a time keeper to make sure the meeting doesn't go too late

6 Have a brainstorm or an activity that includes everyone

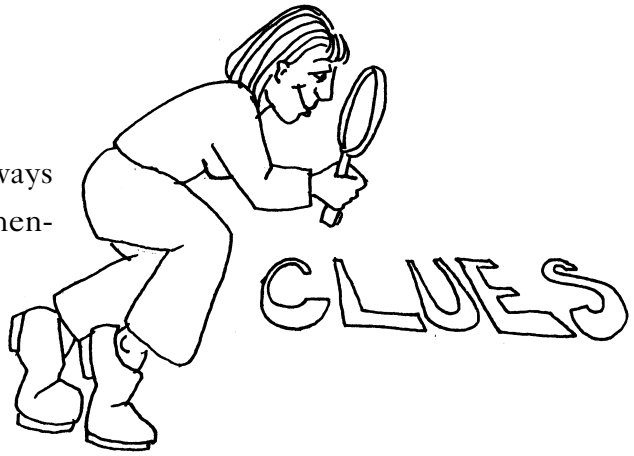
7 Delegate tasks

8 Make sure everyone who came has something to do when they leave, even if it is a small task

9 ***Have Fun!*** (you can play games, bring snacks, or do other things to make it more fun)

Step 5

Investigate!



Now is the time to start researching the ways your school district can save energy. As mentioned before, the best way is by changing over to the electronically ballasted "T-8" lights.* An energy service company can also talk to your school district about these changes. At YES!, we have researched to find the companies that best meet school's needs and once your school district has decided to make these changes, we can put your school in contact with a good company if you want. Before the lighting companies can come, your group needs to do some investigation in order to convince your school board of the importance of these changes. Below are some of the important things your group will have to find out in order to come up with an estimate of how much energy and money your school district can save.

Good Information to know:

1 Get an estimate of how many classrooms are in your school district. Ask someone in the maintenance department (like a janitor), the school office, or one of your teachers. If they don't know, they should be able to tell you who to ask. Find out how many schools are in it and what kind they are (ie. elementary, junior high, or high school), and then find out approximately how many rooms are in each school. You might have to call the main office of each school in your district and ask them.

2 Find an average size classroom in your school. It is important that this classroom is not much larger or smaller than most of the classrooms in your school, so you might need to look at a bunch of rooms first to get an idea of the average size room. Once you find an average size classroom, count the number of light fixtures in that room. A light fixture consists of a group of fluorescent tube lights (a long tube shaped light bulb), that are enclosed together. After counting how many light fixtures are in the classroom, count how many tube lights or bulbs a fixture contains. Each fixture should contain the same number of lights. Usually in schools the light fixtures contain three or four tube lights.

**There are also many other technical changes that can help your school district save energy. These changes will have to be made by an energy service company or a lighting company.*

3 Find out approximately how much of the electricity your school district uses goes towards lighting. For most schools light is responsible for using between 75-90% of total energy, depending the heating and air conditioning systems. Your school's maintenance person should be able to give you a rough estimate of your school district's lighting-related energy requirements. If they don't know then you can estimate your school district's lighting uses is approximately 75% of total electricity consumed.

4 Find out your school district's total electric or electric and gas bill for the year. This is also the kind of thing that you can ask someone in your school office about. Tell them that you are working on a project to help the school reduce energy use. It's okay if you can't get the information, but it makes things *much* easier.

5 Find out what utility company your school district uses to distribute electricity. The name is on the top of the electricity bill, and it is probably the same company that you and your family use. For example, Santa Cruz schools use Pacific Gas & Electric (PG&E) and some people in Michigan use Detroit Edison.

4 Call your utility company. Tell them what you are working on and ask to talk to the person who works with rebates. Tell this person what you are working on and ask them if they offer any rebates for schools to become more energy-efficient. Also ask them what the average cost per kilowatt-hour* is for your area, and see if you can find out specifically what the school district is paying. You should be able to get your local utility's number from an electric bill or from the phone book.

5 Figure out other ways that your school can save energy. Schools can usually save lots of energy by simply preventing "energy sloppiness." See if your school has already installed low-flow shower heads in the bathrooms. Also look for things like lights that are left on, windows that are left open when the heat or air-conditioning is on, water faucets that leak, and single-pane windows that leak out a lot of heat or air conditioning. Make sure your school turns the lights off and the heat down during holidays. Make a list of all the energy saving suggestions you find and save them to present to the school board or your principal.

*=**Important Note:** *A watt is a measurement of electricity volume. A "kilowatt" is 1,000 watts. Measuring watts and kilowatts is kind-of like measuring the speed with which water flows through a hose. To figure out how much water has been used up, you also need to know how long the hose has been on. 1 kilowatt hour is the amount of energy that you would use if you were consuming 1,000 watts for an hour. Consume 1,000 watts continuously for 8 hours, and you'll have used 8 kilowatt hours.*

Criteria for picking a company to do the job

Through research, YES! has found some of the best companies to help schools change their lighting and make other energy saving changes. If you would like us to give you a current list, contact us. The information below is good for your group to know, so that you can reassure people interested in the project that the needs of your school district will be met.

There are two different kinds of companies who can change lighting in school district. One just installs the lights in each school. The other, called an Energy Service Company, will often not only install the lights and do an audit (this is an evaluation of how much money and energy your school will save, and how much it will cost), but they will also set up all the financial matters, such as loans and rebates for your school. This is the kind of company your school district will want to work with. Listed below are a few major things that we look for when we are finding good companies for schools to work with.

Major guidelines an energy company needs to meet:

1 Guaranteed savings. We look for a company that will do an audit, evaluate a school district's energy use, and guarantee the savings. Guaranteed savings is very important. With guaranteed savings a school district pays for the lighting change out of the money they will save in electric bills. If the lights don't end up saving the school district money, they don't have to pay for anything! Guaranteed savings makes this whole switch risk-free for schools.

2 No money down. We look for companies that will do the job for no money down or, if desired, we help the school district find a low-interest loan for the project. That way the school district won't have to come up with any money for the lighting switch. They just wait and use the money they save on their electric bills after the new lights are installed and the savings have begun. This is important because schools usually do not have any extra money.

3 Work after hours. We look for companies that will do the work between 3 pm and 11 pm, after school hours, on the weekends, or in the summer. That way the schools do not have to shut down or be disturbed by the changes.

4 Shared Savings. We look for companies that will use shared savings to pay for the work. This means that out of the money that is saved every year on a school district's electric bill, part of it goes to the company that did the work in the school district and the other part goes to the school district as extra new money. This will extend the number of years your school district has to pay back the company, but this way your school gets extra money right away instead of having to wait ten years.

5 Rebates and Special Programs. We look for companies that know about the rebates and special programs in your area. Utility companies will often give school districts money for changing their lighting and reducing their energy use! This is because most utility companies don't want to build any more power plants, (as it usually costs them more to build a new plant than to give people money to reduce their energy use). States may also offer to give school districts money to help fund the switch.

6 Experience. We look for companies that have worked in schools before and can provide at least three references from other jobs they have done. We also look for companies that have large amounts of money, so if they guarantee their work and the savings are way below what they estimated, they can still cover their guarantee.

Step 6

Figure out how much energy and money your school district can save and how much pollution it can prevent with a lighting retrofit!

Now is an exciting part. It is time to figure out approximately how much energy and money your school district can save. Then you can figure out the resources that could be saved and the pollution that could be prevented by that shift.

Figure out how much energy & money your school district can save:

Easy Way-Figure out approximately how much energy your school district is currently using for lighting, and how much this costs. You can start by asking the people in charge of maintenance how many kilowatt hours of electricity the school district uses each year, and how much that costs. Multiply the district's annual energy consumption (measured in both kilowatt hours and in dollars, separately) by the percentage of total energy use that is lighting related (as per step 5, number 3). You have now figured out the school district's approximate "lighting load." If your school district has four lights per fixture, a lighting retrofit will probably save it 36% of its current lighting load, while if it has 3 lights per fixture, a retrofit will probably save it 41% of its current lighting load. So then simply multiply the current lighting load by 36% or 41%, and you will have a very general estimate of how many kilowatt hours of electricity, and how much money, your district can save every year with a retrofit to the new electronically ballasted "T-8" lights.

The Harder But More Accurate Way

The following steps are directions for the harder but more accurate way to find out how much energy and money your school district can save every year.

1 Multiply the number of fixtures you counted in the average classroom by the number of classrooms in your school district. This will give you roughly the number of light fixtures in your school district. Next you need to get an estimate of the watts used by the light fixtures in your school district. The best way is if you can get someone in maintenance to help you figure it out. Each fluorescent tube may actually be a certain wattage, in which case it's relatively easy to multiply that wattage by the number of tubes in a fixture, and then to multiply that number by the number of fixtures you estimate to be in the district. If you can't figure out how many watts the light tubes use, and no one seems able to help you, you can use a general rule-of-thumb of 40 watts per tube. So if it's 40 watts per tube that would be 40 times 3 = 120 watts per fixture if you have three lights per fixture, or 40 times 4 = 160 watts per fixture if you have four lights per fixture. Then multiply 120 or 160 times the number of fixtures in your district. You have now figured out approximately how many watts your school district is using when all of its lights are turned on. ***This is also known as watts-per-hour.***

2 Next multiply the watts used for lighting in your school district (the answer in #1) by the hours per day that the lights in your school district are used (the hours from when your school opens in the morning to when it closes at night). This will give you the watt-hours per day used in your school district.

3 Now take the answer you got for watt-hours per day used at your school (answer #2) and divide it by 1,000. This equals the kilowatt-hours per day used at your school district.

4 Now take kilowatt-hours per day used (the answer in #3) and multiply it by the days per year your school is open. Take out for holidays, summer vacation, and week-ends — any time when your school will be closed with the lights off. You now have an estimate of the kilowatt-hours per year your school district uses.

5 Next take the kilowatt-hours per year used (the answer in #4) and multiply it by the cost per kilowatt-hour that your school district pays. You can get this number from someone at your school's office, or from the school electricity bill, or from your local utility. This equals the approximate lighting-related energy cost per year for your school district.

6 Now you want to figure out roughly how much energy your district would use if it installed "T-8" lights and electronic ballasts. Take the result of step number 4 and multiply it by 59% if the district's fixtures have three tubes each, and 64% if the fixtures have four tubes each.

7 Now you can figure out roughly how much ***money*** your school would spend on electricity if it installed "T-8" lights and electronic ballasts. Take the result of step number 6 and multiply it by the cost per killowat-hour that your school district pays.

8 Now take the kilowatt-hours per year that your school district uses (the final answer in step 4) and subtract the kilowatt hours per year that your school district would use if it switched to the new "T-8" lights and electronic ballasts (the final answer in step 6). This will give you the annual kilowatt-hours (kWh) that could be saved per year. In other words, this is the **amount of energy your school district can save every year by switching to the new "T-8" lights and electronic ballasts!**

9 Finally, take the amount of money spent on energy every year by your school district (the final answer for step 5) and subtract the amount of money your school district would spend on lighting with the "T-8" electronically ballasted tube fluorescent lights (the final answer in step 7). This is the **amount of money your school district could save every year by switching to the new lights!**

Now you can figure out how saving energy in your school district compares with other positive steps taken for the environment!

10 To figure out how many cars would have to be taken of the street to save as much fossil fuels as switching your school districts' lighting, take the kilowatt-hours (kWh) your school could save by switching to the new "T-8" lights (the results from #8) and divide by 7,060.

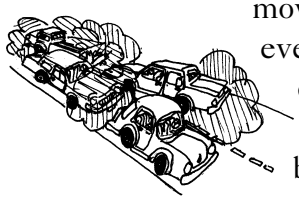
11 To figure out how many trees would have to be planted to have the same impact on global warming as switching your school districts' lighting,, take the amount of kWh's your school district could save by switching to the new "T-8" lights (the results from #8) and divide by 3,450.

12 To figure out how many gallons of gas your school districts can save with a lighting retrofit (if your power source was gasoline), take the kWh's your district could save by switching to the new "T-8" lights (the results from #8) and divide by 11.

13 Sulfur dioxide (SO_2) emissions are a large contributor to acid rain. To figure out how much SO_2 your school district could reduce by switching to the new lights, take the amount of kWh's your school district could save by switching to the new lights (the results from #8) and multiply by 5.3. This equals the pounds of SO_2 emissions your school district could keep out of the air.

14 Carbon dioxide (CO_2) emissions are a large contributor to global warming. To figure out how much CO_2 your school district could reduce by switching to the new lights, take the kWh's your school district could save by switching to the new lights (the results from #8) and multiply by 5.3. This equals the pounds of CO_2 emissions your school district could keep out of the air.

- Every 3,450 kilowatt-hours of energy saved is equivalent to 1 acre of trees planted! This is because trees absorb CO_2 from the air, and saving energy also reduces the level of CO_2 in the air.[22]



- Every 7,060 kilowatt-hours of energy saved is equivalent to 1 car removed from the road forever! This is because cars and coal burning electricity plants both emit CO_2 and NO_X into the air. Reducing the amount of cars on the road and saving energy both decrease the amount of these pollutants in the air.[23]

- Every 11 kilowatt-hours of energy saved roughly equals 1 gallon of gasoline saved![24]

Tracking Chart: A Lighting Retrofit & Your District's Energy Consumption

Use this chart to help you track your answers to the questions in Step 6, pages 16-18. Fill in the answers you get for each calculation in the white boxes below.

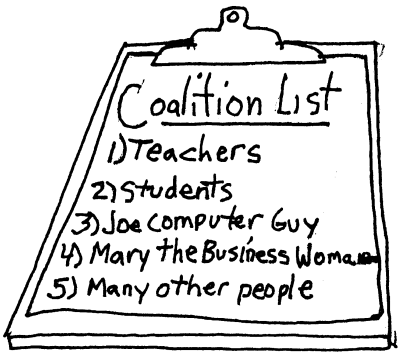
KEYS:
KwH=kilowatt hours
wph=watts per hour

	A If your School District uses T-12's	B If your School District retrofits	C Energy Saved by retrofit	Money saved by retrofit	Pollution prevented and energy saved
1 watts per hour (watts per tube times # of tubes per fixture times estimated # of fixtures in district)			Calculate the boxes in column B by multiplying the numbers from column A (titled: "If your School District uses T-12's") by .59 if your district's fixtures have 3 tubes, and by .64 if your district's fixturers have 4 tubes. For examble, if your district's fixtures have 3 tubes per fixture, 1A times .59 equals 1B.		
2 watt hours per day (wph times hours of use per day)					
3 KwH/day (watt hours per day divided by 1,000)					
4 KwH/year (KwH/day times # of days the school is open per year)					
5 Energy costs/year of lights (KwH/year times cost per kilowatt hour)					
6/ Repeat 1-5 following these instructions					
8 Amount of energy that could be saved with a retrofit (4A minus 4B)					
9 Money that could be saved per year with retrofit (5A minus 5B)					
10 Energy saved and pollution prevented compared to cars removed from the road (8C divided by 7,060)					
11 Energy saved and pollution prevented compared to acres of trees planted (8C divided by 3,450)					
12 Energy saved and pollution prevented would equal savings of how many gallons of gas? (8C divided by 11)					
13 Amount of SO2 emissions reduced by retrofit (8C times 5.3)					
14 CO2 emission reduced by retrofit (8C times 5.3)					

Step 7

Form a Coalition

A coalition is a group of organizations and/or people united for a common cause. Some of the benefits a coalition can bring to a project are additional money, knowledge, technical assistance, resources (like a computer or meeting space), and additional people to help. Another important benefit a coalition can bring is name value, especially when you get an influential person or group to join you — someone who adds credibility to your efforts. Principals, members of the school board, maintenance directors, teachers, local businesses, and even sometimes parents can add to how powerfully your efforts will recognized. The organizations or individuals that are part of the coalition can be involved to varying degrees. Some will just lend their name as supporters of the cause while others may volunteer, speak on behalf of the project, or contribute financial support.



Having more people to work on the project is great, but for this project one of the most important parts of the coalition will be the endorsements. Endorsements are a way people and organizations can support the project without doing any work. To endorse the project, they just need to say, "Yes, I think this is a good idea and you can use my name as a supporter." As you will be presenting this idea to the school board, it is especially important to get other groups, such as the PTA, and local environmental organizations, to endorse it. If a group of students brought this idea to the school board, they might just say, "We don't have time, kids." But if you show them that you have a lot of other groups and people behind you, they're much more likely to listen!

On page 24 we have a sample endorsement form which individual people and organizations can sign to show their support for this project. Make sure you keep good track and show your appreciation to everyone who supports the project.

You may want to use the "Circle of Power" graph (shown on page 22) when deciding who should be part of a coalition. Use it and the steps we have listed as a guide when forming your coalition. **Remember, this coalition will be key when you are asking the school board to make important energy saving changes.**

Steps for the "Circle of Power"

1 Think of who you are trying to influence. For this energy project, the most significant group of people for you to influence is the school board. Put them in a circle in the middle.

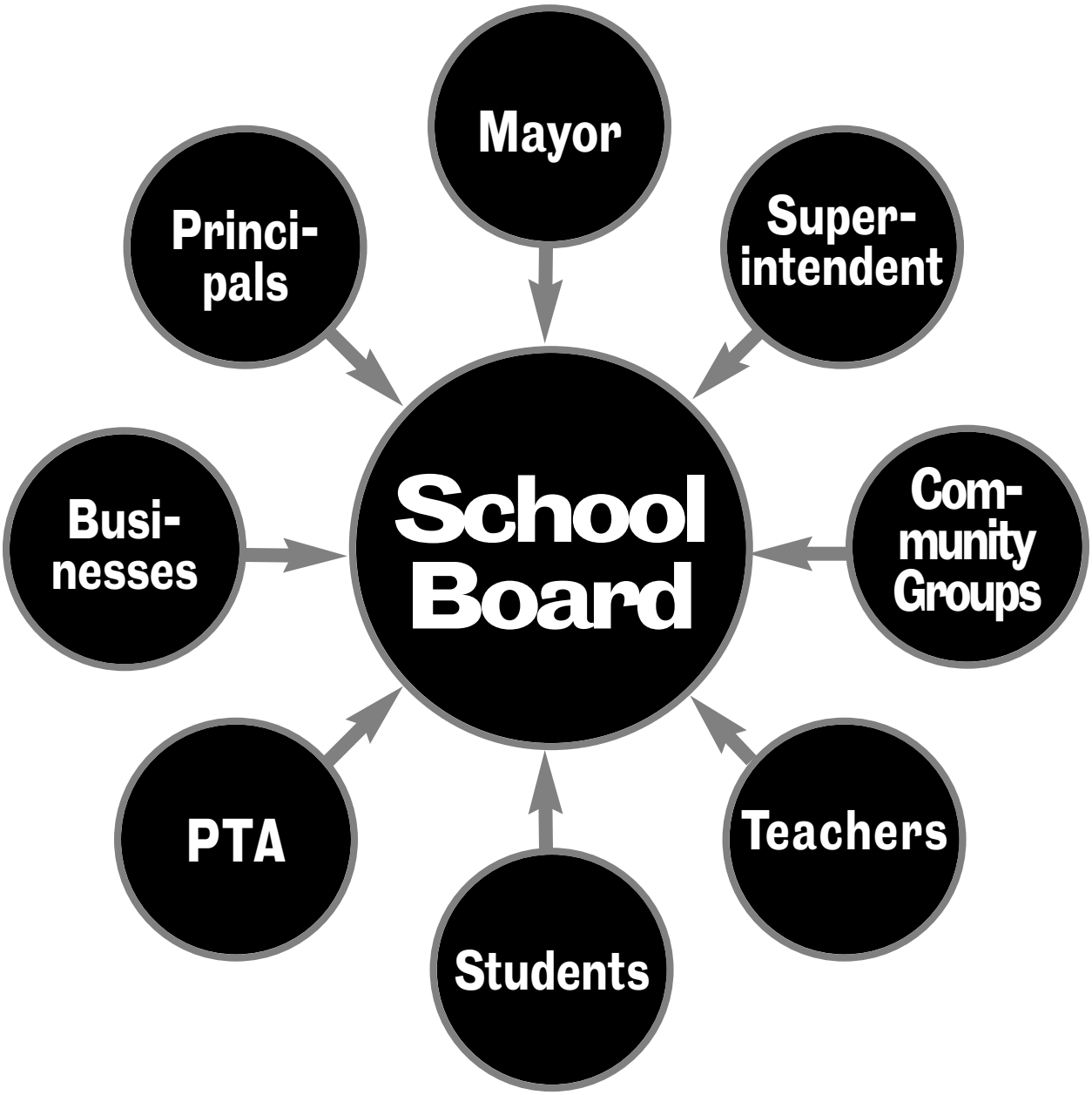
2 Figure out everyone who significantly influences the group of people in the middle. The school board is influenced by teachers, your school district's superintendent, secretaries, your school district's business manager, your school district's principals, the maintenance and operations person for your school district, students, parents, environmental groups, the PTA, other parent-teacher groups, community groups, city council members, the mayor, the school board's environmentally concerned spouses, children, or friends, and probably lots of other groups or people, too.

3 Rate each of the organizations or people you came up with on whether you think they would support making these changes in your schools and on the amount of influence they have on the members of the school board. Use "1," "2," and "3," to rate their importance: "1" being the highest and "3" being the lowest. For example, a daughter of a school board member who is very environmentally conscious would probably be a "1" (unless of course she gets along horribly with her parents!)

4 Plan your approach for each person or group that you came up with, starting with the "1's." Decide what you are going to ask each person or organization to do. Different people need to be approached and asked to do things in different ways. Some people have more time than others, while some people's name on an endorsement letter would hold more weight than others. For example, you would probably approach a city council member differently than a student. Also, have different ways people can be part of the coalition. That way, if they can't give much time, maybe they can still meet with a school board member or someone who you really want as part of the coalition. Be creative and resourceful!

5 Always follow-up with people after they commit to help. Remind them to do what they said they would and find out the results of their task.

** Two common pitfalls of coalitions are: 1) A person or group that joins has a reputation that is not credible or that is inflammatory (for instance, regardless of your thoughts on Earth-First!, their name will probably not be helpful in this case), and; 2) A person or group might commit to do something and then not follow through. You'll want to think carefully about everyone you invite to join the coalition. Ask other members of the coalition how they feel about including these other groups or people. They might know something about them that you don't.*



Circle of Power

Sample Endorsement Form Collection Speech

An example of what you might want to say when you are asking someone to endorse your project:

"Hi my name is Gwen and I am with the Rose High School Environmental Club. We are working on a project that can reduce the amount of energy our school district uses by up to 40%. Not only will this reduction greatly help our environment by preventing major air pollutants and acid rain causing chemicals from entering our atmosphere, but it can also save our school district thousands of dollars — or maybe even more — every year. This can all be done by installing more energy-efficient lights in our schools. We are working on this project with Youth for Environmental Sanity, a non-profit group working with schools across the country. They have given us a list of companies that can do the work for no money down, and guarantee the savings. That way our schools will not have to risk losing any money. We will be presenting this idea for approval at the next school board meeting. We would like your group (or you) to endorse this project. By endorsing this project we would like to add your name to the following list of people that already support this project (then read them the list). How does this sound to you? (Then answer their questions. If they agree to endorse the changes, then ask them if they would be willing to also help out with the work for the project… and go from there).

Before you call people, practice what your are going to say a few times with a friend, family member, your dog, or even the mirror! That way you won't sound like your reading something and you'll feel more confident when you are talking to people.

Note: ***Some people will want a more detailed explanation of what you have in mind, in which case the following may be helpful:***

The Santa Cruz school district in California retrofitted their lighting to use the new T-8 electronically ballasted tube fluorescent lights and they're saving $160,000 every year in electricity bills. The cost of the retrofit was about $800,000, but they didn't have to put any money down, so every year $90,000 is taken out of their savings to pay back a low-interest loan, and the other $70,000 they're saving is available right now for the school to use as needed. After 10 years the loan will be paid off, and they'll get the full $160,000 annually. The new lights are less flickery and more pleasant, and of course they're saving the school district a lot of money and helping the environment. We want to see something like that happen here, too. It's a win-win situation for the school, the students and the environment.

Endorsement of the Green Schools Energy Project

Whereas, most of the Earth's most severe environmental problems — including global warming, oil spills, nuclear wastes, air pollution, and acid rain, — are all linked to excessive energy consumption; and

Whereas, solving these problems will require a substantial reduction in the amount of electricity we use; and

Whereas, lighting accounts for 20-25% of all electricity sold in the US; and

Whereas, one half of the electricity produced in the US could be conserved through cost-effective efforts; and

Whereas, energy efficiency efforts since 1970 have helped reduce America's energy bills by over $100 billion every year; and

Whereas, retrofitting a school district's lighting with electronically ballasted high-efficiency lights can save tens of thousands of dollars every year, as well as thousands of tons of air pollution; and

Whereas, students, teachers, and local citizens can participate in helping a district make the switch to efficient lighting, with no financial risk to the schools,

I hereby endorse the efforts of the Green Schools Energy Project. I support the students, faculty, and staff in the_____

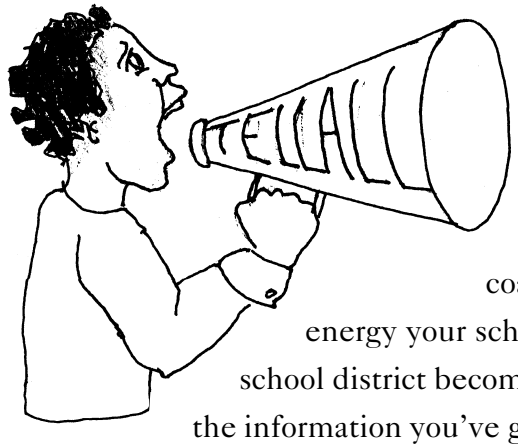
School District who are working on this project.

_____ _____

Name Title/Position

_____ _____

Organization/Affiliation Date



Step 8

Tell everyone!

Now you are ready to go. Once you have a strong coalition formed and an idea of how much money and energy your school can save, you can start the process of letting your school district become a part of saving our planet. The next step is to take the information you've gathered and present it to someone, such as the school board, the superintendent, or the principal, who can approve making contact with an Energy Service Company (ESCO) who can then perform an "energy audit" and see about a more detailed analysis of the costs and benefits of bringing these lighting changes to your school district.

We strongly suggest that you do a presentation for your school board. In this presentation, tell them about everything you have learned and strongly encourage them to approve switching to the electronically ballasted "T-8" lights and to making the other energy saving changes. We have found that it is important to present this information to your school board, so even if you talk to the other school officials and they say they will look into your project, we recommend that you still tell your school board.

Another option is to just take the information to your school supervisor, or to the administration, and have them take it to the right people. If you do this, put together an information packet of written materials like the one described below. Your best bet is to also take the information to the school board, unless you are sure your supervisor, or principal, is very supportive of this project **and** willing to work hard on it. These folks are often too busy to work on a new project, or in some cases are not knowledgeable about environmental issues.

Meeting with the school board:

There are two ways to meet with the school board. Either you can try to get on the school board's agenda, or ask to speak during the time set aside at every board meeting for public comments. Ask someone in your school's office or one of the teachers who has been helping you when the next board meeting is and how to either get on the agenda or speak during the public comment time. When asking to present your idea to the school board, it is helpful to mention all of the teachers, parents and others that support the project. If you have any problems getting on the next school board meeting agenda, have a teacher or parent who supports the project call the school, school board members, or the superintendent, and tell them they think your group should be able to present. You may even want them to present with you.

Once you have a meeting set up with your school board, it is good to plan out what you want to say and who is going to speak. Key things to talk about are:

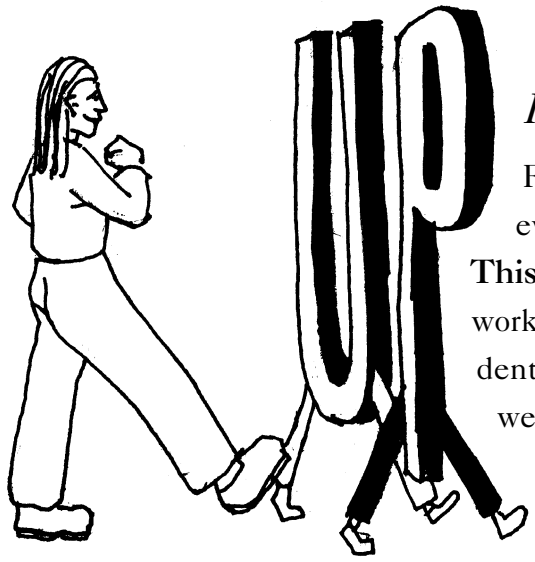
- **the great environmental impact this project will have**
- **the large amounts of money the school can save**
- **the fact that these companies will do the work with no money down and guarantee the savings**
- **how many teachers, parents, school clubs, local environmental groups, and others support this change (if you've gathered many of them).**

It would also be good to have at least one teacher or parent representative with you at the school board meeting. Using some sort of visual prop is also helpful, like fake money to give them that represents how much money they could save. Practice what you are going to say with friends, family, and teachers many times before the meeting. That way you're less likely to get nervous!

YES! also has materials for you to give the school board members. These will include references from other schools that have made these important changes, and names and information from a few good energy companies that we recommend.

Your group should also create a list of everyone who supports the project, and a chart showing how much money your school could save. If you can, make a copy of these for every member of the school board. Try to send this information to them before the meeting to give them time to think about the project. If you want to, get a teacher or parent to help you put all of this together.

Another good idea would be to send information to the **media** before and after the school board meeting. This will let everyone in your community know what's going on and allow you to get more local support (plus it's always fun to have your name in the paper). The first step in media outreach is to create a press release. This is basically a 1-page write up on your coalition and what it's trying to accomplish. Think of the press release as if it were the ideal article you'd want to see written about it. It can even quote you, or others involved. Then it's time to make contact with the local media. Start by looking in the phone book for the numbers of the local newspapers and radio and television stations. Then call and ask for a reporter that covers schools or environmental issues (either one may be interested). Then you can tell them about what you're doing, and the upcoming school board meeting. If they ask for a press release, you can send, fax, or e-mail it to them (whichever's easier for you and them).



Step 9

Follow-Up!

From here you just have to keep following up with everyone to make sure everything is moving right. **This is a very important step**. You don't want all your work to go to waste. We suggest you call the superintendent and key members of the school board at least once a week. Keep reminding them how important it is to make these energy saving changes. You may just get their secretaries or voice-mail, and if that's the case, leave a message and, always being friendly and polite, let them know that you want to make sure this doesn't get dropped. School Board members and the superintendent usually have tons of work to do and might have a tendency to put this project off. Just keep contacting them! This follow-up step can take anywhere from a month to a couple of years. If you are graduating make sure you get other people to continue with the follow-up after you leave.

A key stage will come when you make contact with Energy Service Companies and get them in on this project. They can sometimes speak a technical language that will be helpful, and give your project increased credibility. As soon as you, or representatives of your school district, start to make contact with them, the project's chances for success go up substantially.

We wish you the best of luck, and ask you to please tell us how it goes! Call YES! at (877) 2-YES-CAMP, or e-mail camps@yesworld.org

Step 10

With each new step towards success, don't forget to celebrate!!!!

Step 11

The next great project!!

There are lots of similar projects you can work on in the future, including getting people to cut down on the amount of energy they use in their homes and getting businesses in your area to cut down their energy use. Your school or club can also start a great fundraising project that involves bringing these lighting changes into peoples' homes.

End Notes

1 U.S. Environmental Protection Agency, *Green Lights, An Enlightened Approach to Energy Efficiency and Pollution Prevention*, July 1993.

2 Santa Cruz Environmental Council, *Santa Cruz City Schools Energy Conservation Retrofitting*, 1993.

3 U.S. Environmental Protection Agency, *Green Lights, An Enlightened Approach to Energy Efficiency and Pollution Prevention*, July 1993.

4 U.S. Environmental Protection Agency, *Green Lights, An Enlightened Approach to Energy Efficiency and Pollution Prevention*, July 1993.

5 U.S. Environmental Protection Agency, *Green Lights, An Enlightened Approach to Energy Efficiency and Pollution Prevention*, July 1993.

6 Santa Cruz Environmental Council, *Santa Cruz City Schools Energy Conservation Retrofitting*, 1993.

7 Geoffry Lean, Don Hinrichsen, and Adam Markham, *The World Wildlife Fund Atlas of The Environment*, Prentice Hall Press — publisher, 1990, pg. 89

8 Geoffry Lean, Don Hinrichsen, and Adam Markham, *The World Wildlife Fund Atlas of The Environment*, Prentice Hall Press — publisher, 1990, pg. 92

9 Paulette Bauer Middleton, *1992 Earth Journal*, "Air Pollution," Buzzworm Books — publisher, 1992, pg. 81

10 Hillary French et al, The WorldWatch Institute, *State of The World 1990*, W.W. Norton & Co., — publisher, 1990, pg. 98

11 Hillary French, *WorldWatch Magazine*, May/June, 1990, pg 27

12 Hillary French et al, The WorldWatch Institute, *State of The World 1990*, W.W. Norton & Co., — publisher, 1990, pg. 104

13 Hillary French et al, WorldWatch Institute, *State of the World 1990*, W.W. Norton — publisher, 1990, pg. 107

14 John Elkington, Julia Hailes, and Joel Makower, *The Green Consumer*, Penguin Books — publisher, 1990, pg. 13

15 John Elkington, Julia Hailes, and Joel Makower, *The Green Consumer*, Penguin Books — publisher, 1990, pg. 14

16 John Elkington, Julia Hailes, and Joel Makower, *The Green Consumer*, Penguin Books — publisher, 1990, pg. 14

17 William F. Allman, *U.S. News & World Report*, Oct. 31, 1988, pg 60

18 World Wildlife Fund, *Atlas of the Environment*, Prentice Hall Press—publisher, 1990, pg. 93

19 Albert K. Bates, *Climate in Crisis*, Book Publishing Company — publisher, 1990, pg. 46

20 Albert K. Bates, *Climate in Crisis*, Book Publishing Company — publisher, 1990, pg. 46

21 Albert K. Bates, *Climate in Crisis*, Book Publishing Company — publisher, 1990, pg. 46

22 U.S. Environmental Protection Agency, Green Lights HotLine, October 15, 1994.

23 U.S. Environmental Protection Agency, Green Lights HotLine, October 15, 1994.

24 U.S. Environmental Protection Agency, Green Lights HotLine, October 15, 1994.