



Make It Green

Build a Sustainable House
Inside and Out







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We thank the leadership at the Noyce Foundation and the Gordon and Betty Moore Foundation for recognizing Techbridge's potential to impact girls beyond those in our local community. These Foundations' generous support of this project made the partnership with Girl Scout Councils possible.

We would like to acknowledge our partners who reviewed the lessons, piloted the activities, and provided feedback. We thank Cary Sneider and Lisa Regalla for their thoughtful reads of our lessons and suggestions for making the science content accurate and accessible for Girl Scouts and the adults who work with them. Our advisory team including Faith Brown, Jean Fahy, Randy Freedman, Melissa Koch, Diane Matt, and Karen Peterson offered guidance to support our training for leaders.

The Techbridge staff demonstrated tireless creativity and flexibility while developing and testing these programs. Thanks to Maria Anaya, Megan Davis, Jennifer Diaz, Jennifer Joyce, Linda Kekelis, Molly Larkin, Lulu McCourt, Martha Pena, and Jennifer Wei, with the assistance of Eli Leonardo, Jennifer Tai and Vicki Tu.

Our friends at the Girl Scout councils of Northern California (especially Brenda Gabel and troops 60021, 60656, and 60688), Central Texas, West Central Florida and Central Maryland, piloted early versions of the activities and offered suggestions that helped improve the program boxes. Our partnership with Girl Scout councils embodies the best in collaboration. We have shared resources and learned so much from teaming up on this project. Together we worked to inspire girls to change the world through engineering and science.



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About Techbridge

"Boring, nerdy, and only for boys." Some girls may think of engineering in those terms, but not the girls participating in Techbridge. They say, "I learned that this science thing is very fun and educational at the same time. I LOVE IT!" and "I learned that engineering is not just for men."

Techbridge is a leader in providing girls with firsthand experience working as engineers—from designing toys and building turbines, to meeting professional engineers who help make the world a better place.

Techbridge brings together best practices and lessons learned for partners and offers curriculum that builds on girls' interests and expands their career options. We have seen first-hand the impact that role model visits and field trips can have. We offer training and resources to youth-serving adults to create positive experiences for girls.

The Techbridge program reaches out to girls in under-served communities and offers after-school and summer programs with hands-on projects and career exploration. Techbridge has served over 3,000 girls in elementary, middle, and high schools in Oakland, California and surrounding communities since its start in 2000. The program has been shown to increase girls' confidence, build skills, and promote interest in careers in engineering, science, and technology.

In order to bring a Techbridge experience to girls across the country, we are partnering with Girl Scout councils. The Techbridge team has developed programs-in-a-box that include all the activities and materials you will need to introduce girls to the wonders of engineering and science. The Girls Go Techbridge program-in-a-box includes the leader guide you have in your hands, and the box of materials in front of you, ready for a group of ten girls to dive in and enjoy.

We invite you to partner with us to bring engineering and science to girls in your community. Together we can inspire a girl to change the world.

For more information, visit www.techbridgegirls.org.

Make It Green: Suggested Schedule

Time	Session 1	Session 2	Session 3	Session 4	Session 5
:00	Pre-Surveys (if applicable)	Icebreaker: Green Construction Mix & Match	Activity: I Spy Something Green	Icebreaker: I'm Building a Green House	Career Activity: Who Would I Hire?
:10	Icebreaker: Ecological Footprint				
:20		Activity: Green Room Planning			
:30	Activity: Green Design Overview		Activity: Green Room Building: Interior Design		
:40	Activity: What Green Material Am I?				
:50		Activity: Green Room Building: Walls, Floors and Insulation		Activity: Green Room Building: Exterior Design	Activity: TAGD Certification
1:00					
1:10	Career Activity: Green House				
1:20	Link-Up				Post-Surveys
1:30				Career Activity: Your Career Card	
1:40					

Make It Green: Alternative Schedules

	6.5 Hours	4.5 Hours
:00	Icebreaker: Ecological Footprint	Activity: What Green Material Am I?
:10		
:20	Activity: Green Design Overview	
:30	Activity: What Green Material Am I?	Activity: Green Construction Mix & Match
:40		Activity: Green Room Planning
:50		
1:00	Activity: Green Construction Mix & Match	
1:10		Activity: Green Room Building: Walls, Floors and Insulation
1:20	Career Activity: Green House Link-Up	
1:30		
1:40		Activity: Green Room Building: Interior Design
1:50	Activity: Green Room Planning	
2:00		
2:10		Activity: Green Room Building: Exterior Design
2:20	Activity: Green Room Building: Walls, Floors and Insulation	
2:30		
2:40		Activity: Labeling and TAGD Certification
2:50		
3:00		
3:10		Activity: Green Room Building: Exterior Design
3:20	Activity: Green Room Building: Interior Design	
3:30		
3:40		Activity: Labeling and TAGD Certification
3:50		
4:00		
4:10		Career Activity: Who Would I Hire?
4:20	Lunch	
4:30		
4:40		Activity: Green Room Building: Exterior Design
4:50		
5:00		
5:10	Activity: Green Room Building: Exterior Design	Activity: Labeling and TAGD Certification
5:20		
5:30		
5:40		Activity: Labeling and TAGD Certification
5:50		
6:00		
6:10	Activity: Labeling and TAGD Certification	
6:20		
6:30		

Make It Green: Introduction

5 Sessions

1 hour and 30 minutes each

Skills:

- Brainstorming
- Communication
- Teamwork
- Critical & Creative Thinking



The Make It Green program-in-a-box provides an opportunity to learn about how our choices affect the Earth and what can be done to lessen our impact on the environment.

The main activity focuses on green building design and the question, "How can we make homes more environmentally friendly?" This program introduces the concept of "green" and includes activities that emphasize energy conservation and material reuse.

Please be aware that the cause and effects of environment and pollution are complex issues and this program does not aim to provide

perfect solutions to them. The goal of this program is to make girls aware of environmental concerns and to get them thinking scientifically about possible ways to alleviate these problems. Throughout this project, emphasize ways to alleviate environmental concerns that may come up.

Designing and Building the Green House

Each girl will be responsible for designing and building one room of a house out of shoeboxes and assorted materials. The main steps of the program are as follows:

- Learn about green design techniques
- Get a room assignment and map out the layout of the whole house
- Plan out how the room will be green
- Decorate the room using recyclable materials
- Label the green design techniques in the room
- Have the room green-certified

Make It Green Overview

The Make It Green program consists of icebreakers, career activities, and hands-on activities that stress human impact on the environment and the current strategies people implement to reduce this impact.

There are three parts in this program-in-a-box:

Icebreaker Activities—activities that focus on tips for making our everyday lives green. Use them to get girls engaged and interacting with each other.

Hands-on Activities—activities that simulate advances in engineering and construction to become more green. Each of these activities must be done in sequence. Each activity builds on the concepts in the previous activities.

Career Activities—by virtually meeting the six women professionals, the girls focus on future opportunities and become exposed to new careers in the area of green design. Be sure your girls read about the women featured in their portfolio (these are the same women on the career cards).

Make It Green: Introduction

We encourage you to take the girls on field trips or have role models visit your program. Role models can enhance your girls' interest and curiosity in careers they may never have considered before. Information on how to plan a role model visit can be found on page twelve.

Project Materials

This project uses many materials. Shoeboxes are used for the rooms. These are not included in the box, so make sure you have one shoebox for every girl. Many shoe stores will save their shoeboxes if you call in advance. You can also have the girls each bring a shoebox.

Some decorating materials are provided with the boxes, but this project has the most impact when you can reuse recycled materials to decorate the green houses. Fabric and wallpaper stores sometimes have sample books they can donate. Search the internet to find a reuse store near you that might carry items for the green rooms. Again, the easiest way to obtain materials might be to have girls bring what they can from home. Clean bottles, packaging, and scraps can be creatively repurposed for the girls' green rooms.

Background Information

Being "green" means being conscious of the impact you have on the Earth while trying to leave a smaller footprint on the environment. In the field of construction and building design, the term "green" is used in the same way.

Green materials are often made of renewable rather than nonrenewable resources. They may have less of an impact on the environment because they do not require raw materials to be extracted from the Earth (which can cause habitat destruction and pollution) or they are grown in an environmentally friendly manner. Recycled or salvaged materials are also considered green because they reduce waste.

Green construction practices are used to minimize the amount of resources used, increase energy efficiency, and decrease water consumption in the building.

Criteria for Green Design:

Water Conservation

- Reduce water consumption
- Reduce pollutants that can contaminate water resources

Energy Conservation

- Use materials and/or devices that help reduce the consumption of energy

The girl portfolio is used throughout Sessions 1-5. You can ask the girls if they would like to take them home or have you collect and keep them between sessions.



Make It Green: Introduction

Green Materials

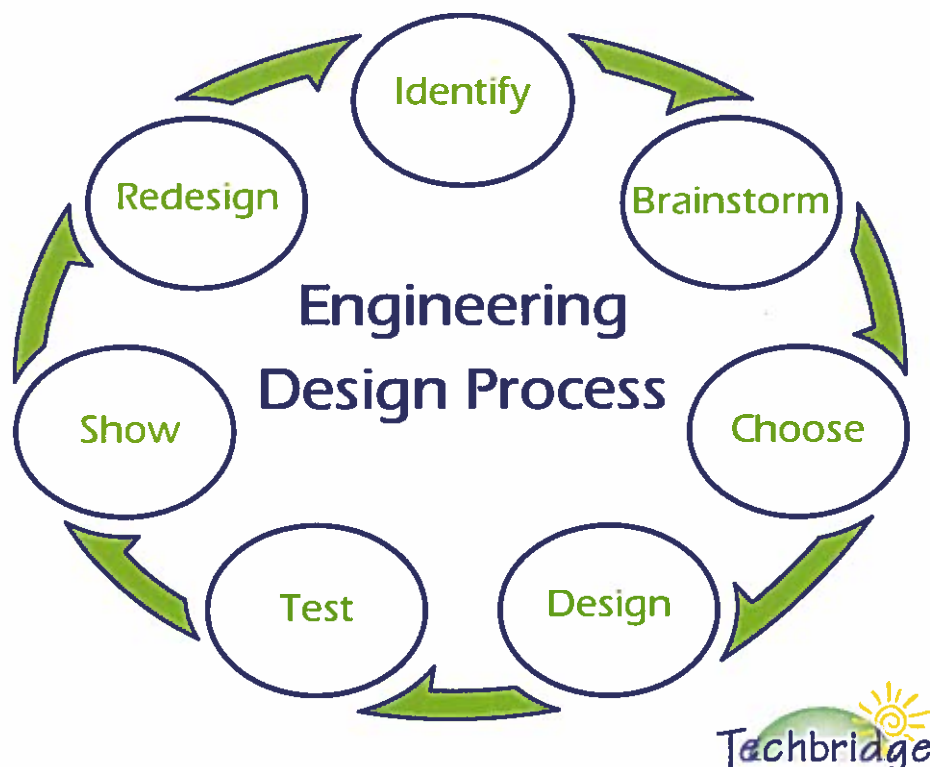
- Use recycled, salvaged, or remanufactured materials
- Use plentiful and natural materials
- Use materials that produce few pollutants
- Use locally available materials

Engineering Design Process

The Techbridge **Engineering Design Process** is a never-ending cycle of creativity. With each of the hands-on activities in this guide, we encourage you to lead girls to identify and talk about where they are in the design cycle. Growing awareness of the design process helps girls strengthen their outcomes, whether it be a hand-made product or a presentation in front of a group.

The design process encourages girls to both “try, try again” and recognize that “two heads are better than one.” Engineers, and everyone from kids to professionals, use these steps to reach their desired result. We knew this was an effective tool when one Girl Scout remarked that she used the **Engineering Design Process** when writing and revising a paper for English class, and to persuade her parents to get a later curfew!

As the leader, you’ll have to know when it’s time to stop, but the more opportunities you allow girls to reflect, redesign, and repeat the design process steps, the better the experience for all.



Girl Scout Leadership Experience

In 2008, Girl Scouts of the USA introduced fifteen Leadership Outcomes to help leaders create and recognize a successful Girl Scouting experience. You know your girls are enjoying a quality Girl Scout activity when an out-of-school experience is **girl-led, experiential, and cooperative**. You see that your girls are leaders when they:

Discover...

- Girls develop a strong sense of self
- Girls develop positive values
- Girls gain practical life skills
- Girls seek challenges in the world
- Girls develop critical thinking

Connect...

- Girls develop healthy relationships
- Girls promote cooperation and team building
- Girls can resolve conflicts
- Girls advance diversity in a multicultural world
- Girls feel connected to their communities, locally and globally

Take Action...

- Girls can identify community needs
- Girls are resourceful problem solvers
- Girls advocate for themselves and others, locally and globally
- Girls educate and inspire others to act
- Girls feel empowered to make a difference in the world

We are proud that Techbridge's hands-on activities meet many of the Girl Scout Leadership Experience (GSLE) outcomes. Girls **gain practical life skills and develop critical thinking** abilities as they work through design challenges in our programs-in-a-box. By testing and redesigning their products, working through the **Engineering Design Process**, girls thrive on **challenges**, conquer doubts, and gain confidence and new perspective.

Girls **develop healthy relationships, learn to cooperate, and resolve conflicts** as they share, brainstorm, and negotiate in teams and pairs during Girls Go Techbridge activities. To build connectedness with your community, we encourage you to invite role models in engineering to interact with your girls. Remind your guest engineers to share that they are members of the very same community as your girls, and that together we can all be problem-solvers for the issues facing our world.

We hope, through the reflection and active questioning built into the Girls Go Techbridge activities, you will lead your girls to **identify community needs, educate and inspire others, and feel empowered** to make a difference in the world. While our hands-on-activities are presented in the context of having fun in an informal learning environment, there are real-world applications. With the skills and concepts learned by working through this program-in-a-box, girls gain the tools to make the world a better place.

Our mission at Techbridge is to **inspire a girl to change the world**. Thank you for sparking the fire for change.

Leader Tips

Tips on Grouping

Throughout the Activities and Icebreakers girls are often asked to work in groups. Below are a few tips to help you get started.

- Before breaking the girls into groups, consider having the girls brainstorm rules or norms for their behavior. They can refer to the Girl Scout Promise and Laws for ideas.
- Consider the relationships between the girls. How well do they know each other? Do they get along? Are some more familiar with the material or topic? This will help you create groups that are well balanced.
- Groups or teams larger than four can present problems for participation and interaction. Suggested group sizes are noted with each activity.
- To give everyone the opportunity to participate, consider assigning roles to each girl within the group. Possible roles include: group leader, reporter, recorder, set-up, clean-up, facilitator, manager. When assigning roles, make sure each girl is aware of the role's responsibilities. If possible across the activities, change it up so that girls are able to experience more than one role.
- Avoid rushing to rescue when a group is stuck, or providing "the answer." Let them discuss and come to their own conclusions. If you are talking, the girls have less time to talk and work together.
- Get involved when the group is hopelessly off task, when the group does not seem to understand enough to get started, when the group is experiencing serious personal conflict, or if the group can't organize themselves.
- To know if your groups are working, as you observe, check to see if the girls are: asking questions, listening to each other, helping each other, and explaining by telling how and why.

Tips on Facilitating Discussions

Discussions are an opportunity for girls to process and extend the different ideas they encounter throughout the activities. Below are a few tips to consider before beginning a discussion.

- Consider the physical set-up in your room. Can the girls see each other?
- Review and enforce the behavioral "norms" or rules established by the group.
- Listen well. Validate questions by either expanding on them or challenging them, and encourage girls to challenge each other in a productive and positive way.
- Allow for wait time when you ask a question. Give girls time to respond. To formulate thorough responses, they need time to process the question.
- Offer different options for participation. Letting girls turn in written responses often helps shyer girls.
- Pause. Give the girls a few minutes to put together a response. Let girls discuss in small groups and then present their thoughts to everyone.
- Prompt girls with a variety of questions that require different levels of thinking.
 - * Some questions ask for basic knowledge and comprehension of the activity. For example, What differences exist between...? or Can you name the...?
 - * Some questions ask girls to apply or analyze the relationship between different ideas. For example, What factors would you change if...? or What are some of the problems of...?

Leader Tips

- * Some require girls to synthesize or evaluate concepts to new or different situations. For example, Can you see a possible solution to...? or How effective are...?
- To know if your discussions are working, check to see if the girls are asking for others' opinions, listening, thinking or reflecting on what has been said, giving reasons for their responses, and allowing everyone to contribute.

Keeping Girls Engaged

Programs-in-a-box are designed to be girl centered. Keeping your activity on track and the girls engaged is critical to the success of the activity and will help with learning, retention, and enthusiasm for the other activities. Down time during an activity can lead to girls getting off track. To keep girls engaged, try the following techniques:

- Mental warm up. In addition to using an icebreaker in the program, take a few moments to do a yoga move, a song, or group rhythm using clapping or stomping, etc.
- Know your girls! Who works well together? Who doesn't? Who will struggle with some of the content and who will approach it enthusiastically? Thinking about these different ideas for a few minutes before you begin can help you avoid problems getting started and keeping girls motivated. One of our goals is to promote cooperation and team building.
- Quieting girls down. Have the girls do a quick write, think-pair-share, journal, or draw for a minute. You could also use the Girl Scout tradition of raising your hand and standing silently to get attention. The next person does the same, and it continues until silence spreads throughout the group. The last person not paying attention is soon the only one talking.
- Know your activities. It is vital that you closely read over the activity. When you know what you have to do, there is little confusion and less down time for the girls.
- Ask three then me. This means that the girls ask three peers before coming to you for help. The result is that the girls are more likely to work through a particular problem on their own. They are the ones doing the work—make them accountable.
- Assign girls tasks. Let the girls read the introduction while you set up. Keeping the girls busy and involved in the task allows them to maintain interest and ownership in the activity.
- Heads up! When engaging hesitant or shy girls consider your grouping and let them know a little ahead of time that they will be asked to do something. We want to encourage participation through success!

Leader Tips

Tips on Brainstorming

Many girls are familiar with the brainstorming process, but have difficulty getting started or will want to move ahead with the first idea they think of. To encourage girls to generate as many ideas as they can, consider the following tips before you begin.

Begin with the T.E.C.H. guidelines for Brainstorming.

T – Think of many ideas. Write down all ideas, no matter how wild. The more ideas, the better!

E – Everyone’s ideas are good. Work as a team and respect every idea. Everyone should participate. Keep the tone positive!

C – Creativity. Be creative and spontaneous. There are no wrong answers and lots of possible solutions.

H – Have an open mind. Consider your own ideas and the ideas of others.

To get their brainstorming going:

- Use a visual. Have the girls examine the materials they’ll be using.
- Sketch. Suggest they do rough sketches.
- Think/pair/share. When brainstorming in pairs, have the girls think individually about the topic for a minute, pair with their partner to consider all ideas, and finally share with the group.
- Free writing. Some girls are more comfortable writing their ideas down in a list.
- Clustering/mapping/webbing. This technique focuses on the relationship between different characteristics or traits of the topic.
 - * Begin by writing the topic in the middle of a page. From the concept word, write as many related concepts or terms as you can associate with the central topic. If you run out of similar concepts, write down opposites, but try to keep writing and associating. As you jot down ideas, connect them with lines to show how they relate to each other.

TECH Brainstorming



T ➡ Think of many ideas
E ➡ Everyone’s ideas are good
C ➡ Creativity
H ➡ Have an open mind

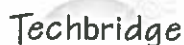
Parent Resource Handout

This handout is designed to give parents some tips on how to support and encourage their daughters outside of the program boxes. Please send copies of this *Parent Resource Handout* home.

Encouraging Girls in Science and Engineering

You can make a difference in a girl's future! If you're looking for an activity to do with your daughter, try one that encourages the skills needed in technology, science, and engineering careers. Here are some ideas that build upon the activities in Make It Green. They will give you and your daughter a chance to have fun and help care for the planet. They may also help spark your daughter's interest in becoming an engineer or environmental scientist.

1. Practice ways to be green. Invite your daughter to share what she has learned about being green. As a family, try to take on some of the practices—like turning off lights and conserving water—in your daily routines. Brainstorm other ways that your household can be greener. Investigate the insulation and flooring in your home, or options at your local hardware store.
2. Don't be intimidated by nature! Spend time with your daughter outdoors. It's not necessary to live near a national park to learn about nature. A small neighborhood creek, untended grass at the edge of an athletic field, or even your own backyard can offer opportunities to learn about the world. Encourage your daughter to explore nature, using all of her senses. Take pictures of insects, animals, and plants to identify them later at the library or on the internet.
3. Start a garden in your backyard or on your porch. Plant veggies and herbs with your daughters. Not only is this a great way to get your daughter involved with nature, but you'll be surprised how interested she will be in eating food that she's grown. Choose native plants that will attract native animals into the garden. If you don't have a space around your home, see if you can find a local community garden and work there.
4. Take a tour of a green house or community building. Check online to find houses or buildings that are certified green and are open to public tours. This could help inspire a girl to become an architect or an engineer.
5. Reuse a broken or old appliance. Do you have a hairdryer, coffee maker, or other appliance around the house that is broken or no longer used? Don't throw it away. Take it apart with your daughter and discover the inner parts and how they work. Visit www.howstuffworks.com to learn more about how the appliance works. This project may inspire your daughter and set her on a career path in engineering.
6. Give a girl a biography of a female pioneer in science or technology. Discuss how this role model found personal satisfaction in her work and used her talents to help others. Many girls express interest in careers that make the world a better place but may not realize how these fields are compatible with such an interest. We recommend *Forecast Earth. The Story of Climate Change Scientist Inez Fung*. This book is part of the Women's Adventures in Science series available from <http://www.nap.edu/catalog/was>.
7. Plan a "green" party and let your daughter invite her friends over for an exchange of books and games. If you like, invite each guest to bring recyclable materials that can be used for art projects. By giving new life to these items the group can practice the art of reuse and have fun.
8. Plan a family visit to a science museum. Look for an exhibit that focuses on renewable energy or green technology. Be mindful of giving your daughter her fair share of attention when you offer explanations of exhibits. Research finds that parents are much more likely to explain science to boys than to girls while using interactive science exhibits in a museum.
9. On your feet! Plan a day without using your car. Ride a bike, take a hike, or take public transportation and you'll save gas and help the environment. The experience will also provide family time and a chance to explore your community.
10. Looking for more ideas to play it green? Check out The Greens at PBS Zoom at <http://pbskids.org/zoom/activities/greens>. This site has lots of fun projects that you can work on together with your daughter. By playing and working together, you can give the most important gift of all—your time.

Techbridge

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Planning a Role Model Visit

Hands-on projects can spark an interest in science, technology, or engineering, but on their own they may not lead to a career interest in these fields. Role models can inspire girls and help them make informed decisions about their future. Interactions with role models require the right combination of career guidance and social engagement. The key is for role models to be personal and passionate while communicating how their work matters. A hands-on activity that offers a snapshot of their work will engage and inspire your girls.

Sample Schedule

15 minutes	Welcome and Icebreaker
10 minutes	Introduction by Role Model
45 minutes	Hands-on Activity
15 minutes	Wrap-up and Q&A



Suggested Activities:

The role model can lead the Ecological Footprint icebreaker and then the Green Room Planning activity. She can reinforce the idea of the girls being green architects who will design a model of a green house. She can help the girls get started by suggesting green features to include in their designs.

Labeling and Certification: If your role model is one of the professionals featured in this program, she can use a checklist to determine the rooms' TAGD certifications and give each room the appropriate sticker.

Finding Role Models:

- Contact your local Girl Scouts STEM coordinator for role model contacts. They may have contacts at organizations such as the Society of Women Engineers that can provide role models in your area.
- Ask your friends and contacts for leads.
- Check with science teachers who may have contacts.
- Is there an Expanding Your Horizons program in your community? You will find great role models there. Also check the directory on the National Girls Collaborative Project.
- Check with your local Chamber of Commerce.
- Recruit role models from local businesses or universities.
- Recruit a diverse group of role models (especially individuals that reflect the diversity of your girls).
- Be creative!

Tips:

1. Share our role model resource guide ***Get Involved...Make a Difference*** and toolkit with suggested activities, interview questions, and other resources. <http://www.techbridgegirls.org/rolemodels.aspx>
2. Help your role model start with an icebreaker. We recommend using ***Put Yourself on the Line*** (from the online toolkit) so the role model can get to know your girls' attitudes, likes, and dislikes.
3. Encourage role models to start with a personal story to help them connect with your girls.
4. Invite role models to share their passion for what they do. When they get excited, your girls will too.
5. Encourage role models to explain why their work is important and how it helps the world.
6. Encourage role models to talk about more than just their job. Invite them to talk about hobbies, family, and friends which will help dispel stereotypes.
7. Role models can help by offering guidance, such as the importance of taking advanced math and science classes, finding summer classes or internships, and getting good grades.
8. Make sure your girls send thank-you notes to role models.

Make It Green: Materials

Sessions	Quantity	Consumable Materials	Non-Consumable Materials
1: Ecological Footprint	10	Green Design Portfolios	
	30		Earth quarter pictures
1: Green Design Overview	10	Green Design Portfolios	
1: What Green Material Am I?	10	Green Design Portfolios	
	10		pencils
	1		Green Materials Box containing:
			bamboo piece
			cork tree piece
			old tire piece
			grocery bag and wood scrap
			recycled jeans piece
			wool/picture of sheep
			picture of rubber tree sap
			sorghum stalk
			glass and shells
			shredded paper
			bag of flaxseed and wood flour
			plastic water bottle
			kirei board
			rubber flooring piece
			jean insulation piece
			recycled rubber flooring piece
			recycled plastic bottle carpet piece
			beachstone
			bamboo flooring piece
			composite wood piece
			paperstone
			cork floor piece
			linoleum piece
			wool carpet piece
1: Green House Link-Up	1	roll of masking tape	
	1		set of Green House Link-Up cards
2: Green Construction Mix & Match	10	Green Design Portfolios	
	5		sets of Green Construction Mix & Match cards (20 cards per set)

Make It Green: Materials

Sessions	Quantity	Consumable Materials	Non-Consumable Materials
2: Green Room Planning	10	sheets of graph paper	
	3	sheets of tiny labels	
	10	Green Design Portfolios	
	10		Room Assignment cards
	10		rulers
	5		scissors
	10		pencils
	1		pencil sharpener
2: Green Room Building: Walls, Floors, and Insulation	20	foam sheets	
	20	sheets of construction paper	
	20	fabric pieces	
	3	sheets of tiny labels [remaining]	
	10	Green Design Portfolios	
	3	windows and doors stickers	
	5		scissors
	5		utility knives
	10		glue sticks
	10		rulers
3: I Spy Something Green	10	Green Design Portfolios	
	10		pencils
3: Green Room Building: Interior Design	40	glue gun sticks	
	3	sheets of tiny labels [remaining]	
	200	craft sticks	
	50	cotton balls	
	1	box of toothpicks	
	30	cups	
	1	bag of wood scraps	
	10	Green Design Portfolios	
	4		glue guns
	2		extension cords
	5		scissors
	1		set of markers

Make It Green: Materials

Sessions	Quantity	Consumable Materials	Non-Consumable Materials
4: Green Room Building: Exterior Design	40	glue gun sticks	
	10	felt pieces	
	30	straws	
	1	roll of aluminum foil	
	10	Green Design Portfolios	
		extra building materials from Session 3	
	4		glue guns
	2		extension cords
	5		scissors
	1		set of markers
4: Your Career Card	10	blank career cards	
	10		pencils
	1		set of markers
	2		sets of career cards (6 per set)
5: Who Would I Hire	2		sets of career cards (6 per set)
5: TAGD Certification	3	sheets of tiny labels (remaining)	
	2	TAGD certification sticker sheets	
	10	Green Design Portfolios	
	10		pencils

The following items are not provided in the box

Sessions	Quantity	Required Materials	Optional Materials
2: Green Room Planning	10	shoeboxes with lids	

Optional Materials:

carpet samples	plastic plants
patterned paper (scrapbook samples)	solar-powered motors
pieces of linoleum	bottle caps
pieces of rubber	dowels
used CD's	cotton swabs
bottle caps	roll of cellophane
packing peanuts	cork
magazines (especially interior design)	paint samples
stickers	

Ecological Footprint

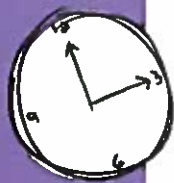
20 Minutes

+ 3 minutes preparation time

Materials:

- 1 Green Design Portfolio per girl
- 30 Earth quarter pictures

Grouping: Whole Group



Introduction: In this activity, girls will quantify their impact on the environment by calculating their ecological footprints. In this quiz the girls will measure their lifestyle in numbers of "Earths."

Objectives: As a result of this activity, the girls will be able to:

- ☀ Understand how their lifestyle choices impact the environment

Preparation:

- Arrange the thirty Earth quarter pictures in a vertical line.

Directions (10 minutes):

1. **Explain** to the girls what an ecological footprint is and how they will be calculating their own footprint. An **ecological footprint** represents the amount of land that is used to support a person's living habits. One step equals one quarter of an Earth (so four steps equal one Earth). At the end of the quiz the girls will count the total number of Earths which represents their ecological footprint. A footprint of four Earths, for example, means that if every person in the entire world lived just like that, it would take four Earths full of resources to support the population's habits.
2. **Line up** behind the first Earth quarter.
3. **Step forward or back** on the Earth quarters depending on the answers to the questions on the *Ecological Footprint* quiz. After everyone calculates their ecological footprint, tell the girls that in reality we only live on one planet so doing everything they can to cut back on resource consumption in real life is extremely important.

Reflection (10 minutes):

1. Why is it impossible for you to get one earth as an answer? *(You can discuss the fact that because we live where we do (in a developed nation), we already use up a certain amount of resources that many people across the world in less developed countries don't have access to. This is another reason we want to reduce our overall ecological footprint—to provide more opportunity to those less fortunate than ourselves.)*
2. Think about the questions again. Which questions could you answer differently in order to get a lower score? Do you think you could make changes in your daily life to help the environment?

Note:

On the quiz, #3 Water Habits, feel free to omit the last question if you think it is inappropriate. Letting the "yellow mellow" refers to leaving urine in the toilet bowl and flushing sparingly.

Ecological Footprint



Ecological Footprint Quiz



1. Food Habits

If You...	Then Take...
Eat meat at nearly every meal and eggs and dairy often	5 steps forward
Eat meat once a day and eggs and dairy often	3 steps forward
Eat no meat, but eat eggs or dairy (vegetarian)	2 steps forward
Never eat animal products (no meat, dairy, or eggs)	0 steps forward

If You...	Then Take...
Usually leave half of the food on your plate uneaten	2 steps forward
Usually leave a bit of the food on your plate uneaten	1 step forward
Usually clean your plate	0 steps forward

2. Living Habits

If You...	Then Take...
Live in a free-standing, single-family home	4 steps forward
Live in an apartment, duplex, or mobile home	2 steps forward
Have energy-conserving appliances/ home design	1 step forward
Produce less than one kitchen-size garbage bag per week	1 step forward

If You...	Then Take...
Never turn off the lights when you leave the room	4 steps forward
Sometimes turn off the lights when you leave the room	3 steps forward
Always turn off the lights when you leave the room	2 steps forward
Use two or more CFLs in your home	1 step forward

If You...	Then Take...
Never recycle	4 steps forward
Recycle only one type of product (i.e., paper, plastic, or glass)	3 steps forward
Sometimes recycle the paper, plastic, and glass	2 steps forward
Recycle or reuse all the paper, plastic, and glass you use	1 step forward

Ecological Footprint



Ecological Footprint Quiz



3. Water Habits

If You...	Then Take...
Spend more than 6 minutes in the shower	2 steps forward
Spend less than 6 minutes in the shower	1 step forward
Take baths using a full tub of water	2 steps forward
Take baths using a half tub of water	1 step forward

If You...	Then Take...
Let the water run when you brush your teeth and wash your face	1 step forward
Turn off the water when you brush your teeth and wash your face	0 steps forward

If You...	Then Take...
Flush the toilet after every use	4 steps forward
Use a low-flow toilet or put a brick in the tank to use less water	2 steps forward
Let the "yellow mellow" so you do not flush too often	1 step forward

4. Transportation Habits

If You...	Then Take...
Are driven to school	3 steps forward
Take the bus to school	1 step forward
Walk or ride your bike to school	0 steps forward

Finished? Now count how many steps forward you took and divide by four. This is the number of whole Earths it would take to support a population full of you! Think about what things you can do on this quiz to lower your ecological footprint.

Ecological Footprint



Green Design Overview

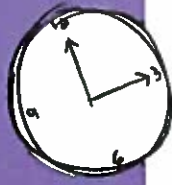
10 Minutes

+ 45 minutes preparation time

Materials:

- 10 Green Design Portfolios

Grouping: Individual



Introduction: In this activity, girls will design and build a green house. Their portfolios will guide them through the construction steps and introduce them to six careers.

Objectives: As a result of this activity, the girls will be able to:

- ☀ Explain the three things that make a house green: using water-saving strategies, minimizing energy consumption, and using materials that reduce, reuse, or recycle other materials
- ☀ Explain how buildings can be certified as green

Preparation:

- **Create** a fully labeled sample green room using a shoebox. This can be any room in the house. Make sure to include features from the *TAGD Certification* sheet. The purpose of this sample room will be to give the girls an idea of what they will be working towards.

Opening (2 minutes):

1. **Lead a discussion** with the girls about ways that buildings use energy and raw materials using the following questions:
 - Describe some of the materials that were used to make your house. Where did they come from? (*Girls might talk about brick, stone, or wood exteriors, and carpet or paint for interiors.*)
 - What appliances and things in your home require energy? (*Encourage girls to name something in every room of their house.*)

Brainstorm (3 minutes):

2. **Open up the Green Design Portfolios** to the *Green Design Overview* reference sheet on page four.
3. **Introduce** the program by asking girls to read the overview and green certification sections out loud. Tell the girls that over the course of the design and construction of their green room, they are going to take on the roles of different engineers. Check for understanding that your girls know the meaning of "green." In this situation, it does not refer to the color, but to being eco-friendly.
4. **Lead a group brainstorm** on the types of environmentally-friendly things that girls

Green Design Overview

already know about that they could incorporate into their homes to make them green.

Hands-On (3 minutes):

5. Turn to the *TAGD* (Techbridge Award in Green Design) *Certification* sheet on page eighteen of the Girl Portfolio. Have the girls look at the categories that will be used to rate their rooms. There is more information for you about TAGD and LEED in the *TAGD Certification* activity on page 61 of this Leader's Guide.
6. Practice certifying a room using the sample you made. Pass around the sample room and have each girl identify something in the room that is green.

Reflection (2 minutes):

7. Lead a discussion about ways that the girls could add to the sample room and about the possible engineering disciplines involved in the green house design and building process. Use the following questions:
 - What are the features on your family's wish list for the home you live in now?
 - What types of professionals do you think are involved in the design and building of a green house? (*Encourage the girls to think beyond the laborers who build and paint by asking them who plans or directs what the builder does.*)



Green Design Overview



Green Design Overview



There are currently over 6.5 billion people on this planet and all of these people need a place to live and work.

Buildings use a lot of energy and raw materials every year. Unfortunately, the amount of resources the Earth produces is limited and the environment we share is becoming more and more polluted. This is where creative green engineers such as you come in!

Your main task will be to design and build a model green house that reduces the negative impact of the building on the planet. You will use the skills and knowledge that you'll develop by completing activities in this portfolio. Each person will be responsible for one of the rooms in this green house and together you will make a complete house.

What makes a house green?

- **Water Efficiency:** Using water-saving strategies in your house to minimize wasting water.
- **Energy Efficiency:** Using energy efficiently by reducing the amount of electricity used in a house or by installing energy efficient devices. This keeps the burning of fossil fuels to a minimum.
- **Green Materials:** Using materials which reduce, recycle, or reuse materials rather than using nonrenewable materials or materials that release pollutants into the environment.



Green Certification

In order for a house to be certified green it needs to fulfill several green codes. In the real world, green builders have a rating system that determines how green a building is. This rating system is called LEED or Leadership in Energy and Environmental Design.



Your Leader will be rating your rooms to give you a TAGD (Techbridge Award in Green Design) certification. The TAGD certification levels are listed below. You will get points for each clearly labeled green strategy used in your room. Your score will determine the level at which your room is considered "green." Then your entire group's house will be given a TAGD certification award based on an average of all the rooms' award levels.



TAGD Certification Levels	
Bronze	30 - 59 points
Silver	60 - 79 points
Gold	80 - 99 points
Platinum	100+ points



My name is Joanna and I am a **Materials Science Engineer**.

I graduated from the University of Central Florida with a degree in Engineering.

Materials Engineers design new and improved materials to use when making different products. Right now I'm developing new magnetic materials that might go in computer chips. My friend is working on creating a new non-stick coating for frying pans.

In college, we studied physics to see how things moved, and designed materials to match those movements. We studied skis to help us develop a more flexible material that makes skis easier to handle on bumpy slopes. Pretty cool, huh?

What Green Material Am I?

30 Minutes

+ 5 minutes preparation time



Materials:

- 10 Green Design Portfolios
- 10 pencils
- Green Materials Box:

Source Materials:

1. bamboo piece
2. cork tree piece
3. old tire piece
4. grocery bag and wood scrap
5. recycled jeans piece
6. wool/picture of a sheep
7. picture of rubber tree sap
8. sorghum stalk
9. glass and shells
10. shredded paper
11. bag of flaxseed and wood flour
12. plastic water bottle

Green Materials:

- A. kirei board
- B. rubber flooring piece
- C. jean insulation piece
- D. recycled rubber flooring piece
- E. recycled plastic bottle carpet
- F. beachstone
- G. bamboo flooring piece
- H. composite wood piece
- I. paperstone
- J. cork flooring piece
- K. linoleum piece
- L. wool carpet piece

Grouping: Pairs

Introduction: In this activity, girls will match green building materials with their source materials. A green material used in constructing buildings has less of an environmental impact than typical building materials. A **source material** is a resource that is sustainable, abundant, or recycled, and is used to make the green materials.

Objectives: As a result of this activity, the girls will be able to:

- ☀ Explain the two different ways a material can be "green"
- ☀ Identify various green materials to use in their own model green homes

Science Behind It:

A "green" material is a product made by either recycling old products or by making a product from renewable resources. Old tires, wood scraps, grocery bags, old jeans, recycled carpets, plastic bottles, and wood flour (sawdust) are all recycled products that have been made into new, usable materials such as rubber flooring. Recycling products not only helps to reduce the amount of trash in our landfills, but also helps to conserve our natural resources.

Green materials can also be made from renewable resources. A renewable resource is a natural resource that will replenish itself quickly. Bamboo, flax seed, and wool from sheep are all

renewable resources because they will all grow back in a short time. Flax seed, for example, can constantly be planted and harvested to make linoleum. In contrast, hardwoods can take many years to grow back.

Preparation:

- Arrange the materials on a table.
- Sort into piles: Green Materials (items with letter labels) and Source Materials (items with number labels)

What Green Material Am I?

Opening (4 minutes):

1. Lead the girls in a discussion of what they know about green materials using the following guiding questions:
 - Give an example of a green material. What makes it green?
 - What is the difference between recycled materials and materials made from renewable resources? *(Recycled materials are made from preexisting materials. A renewable, also called sustainable, resource is something that can be easily replaced in nature with time. Examples include solar energy, tides, wind, and quickly growing grasses. Non-renewable resources take thousands of years to be replaced in nature. Examples include coal, gasoline, and copper.)*
2. Inform the girls that today they will be **Materials Science Engineers**.

Brainstorm (8 minutes):

3. Pair the girls and have them discuss the difference between a source material and a green material. Ask them to generate examples. A green material used in constructing buildings has less of an environmental impact than regular building materials. A source material is a resource that is sustainable, abundant, or recycled, and is used to make the green materials.
4. Lead the girls in a discussion about possible source materials for items they might use in their green rooms.
 - What are some possible source materials that you think can be used to make green materials? *(Sun, wood, and cotton)*
 - What types of people do you think are involved in the process of making green materials? How are they involved? *(Scientists, designers, engineers, and other creative professionals)*

Hands-On (12 minutes):

5. Open the Green Design Portfolio to the *What Green Material Am I?* worksheet on page five.
6. Examine the items in pairs and match the green materials with their source materials. Have girls record their answers.

Recommendations:

When reviewing the answers, go over each green material as it appears on the **Green Materials 101** reference sheet. Explain why each material is green.



What Green Material Am I?

Reflection (6 minutes):

7. **Review** each green material and talk about its source material(s). Use *Green Materials 101* on pages fourteen and fifteen as a reference. The answer key is on the next page.
8. **Lead a discussion** with the following questions:
 - Why are all of these green materials more environmentally friendly than the alternatives? *(They are made from sustainable materials, which means that the source will not be depleted and their production has a low environmental impact.)*
 - Green materials are usually more expensive than the alternatives, but why might it be worth the cost? *(Green materials usually make up for their price in energy savings and durability.)*

Fun Facts:

In the right soil and light conditions, bamboo can grow at the rate of two inches per hour! It also generates more oxygen than most trees. Flax grows to maturity within 100 days. These fast growing rates make both bamboo and flax sustainable resources.

What Green Material Am I?

Answer Key

Source Materials	Green Material Letter
1. Bamboo	<i>G - Bamboo Flooring</i>
2. Cork tree	<i>J - Cork Flooring</i>
3. Old tire	<i>D - Recycled Rubber Flooring</i>
4. Wood scraps and grocery bags	<i>H - Composite Wood</i>
5. Recycled jeans	<i>C - Jean Insulation</i>
6. Wool	<i>L - Wool Carpeting</i>
7. Rubber tree sap	<i>B - Rubber Flooring</i>
8. Shredded paper	<i>I - PaperStone</i>
9. Sorghum grasses	<i>A - Kirei board</i>
10. Glass and shells	<i>F - BeachStone</i>
11. Flaxseed and wood flour	<i>K - Linoleum</i>
12. Plastic bottles	<i>E - Carpet from Plastic Bottles</i>

What Green Material Am I?



What Green Material Am I?



Joanna



Today you are going to be a **Materials Science Engineer**, like me! You are going to discover ways to make building materials from renewable or recycled resources. Renewable materials are better for the Earth because they are made from sources which grow back quickly. Try to figure out which natural resource or recycled material is used to make the finished product.

Source Materials	Green Material Letter
1. Bamboo	
2. Cork tree	
3. Old tire	
4. Wood scraps and grocery bags	
5. Recycled jeans	
6. Wool	
7. Rubber tree sap	
8. Shredded paper	
9. Sorghum grasses	
10. Glass and shells	
11. Flaxseed and wood flour	
12. Plastic bottles	

When I was growing up, I loved playing with magnets and seeing how they worked. In college, we studied physics to see how things moved, and designed materials to match those movements. If you're curious, sensitive to how things feel, and wonder about how things work, maybe you should be a **Materials Science Engineer** like me. Keep up the good work! -- Joanna

What Green Material Am I?



Green Materials 101



Raw Materials	Green Materials	Benefits
Bamboo 	Bamboo Flooring 	Bamboo grows fast (up to 50 feet in five years). In comparison, hardwoods are harvested from trees that can take 30 to 100 years to mature. Since bamboo is a type of grass, it can be harvested again and again from the same plant.
Cork Tree 	Cork Flooring 	Cork flooring is made from the bark of the cork tree. Cork trees are peeled instead of cut down and their habitats remain undisturbed. One cork tree can be harvested every 10 to 12 years and can live about 150 to 250 years.
Old Tires 	Rubber Flooring 	Recycled rubber flooring is made from 100% tire rubber. Rubber flooring reduces the amount of scrap tires and tire dumps which are a serious environmental hazard.
Wood Scraps & Grocery Bags 	Composite Wood 	Composite wood is made from scraps of used wood and grocery bags. It is popular for decks and outdoor furniture because it will never splinter, crack, or harbor insects. This eliminates yearly maintenance with sealants and insecticides that can be hazardous to the environment.
Denim 	Jean Insulation 	Jean insulation consists almost entirely of natural denim and cotton fibers that are 100% recyclable, reducing landfill waste. Jean insulation contains no chemical irritants and requires no warning labels unlike traditional insulation products. The jean material used in insulation is typically scrap material from manufacturers, not second-hand jeans.
Wool 	Wool Carpeting 	Wool carpets are naturally stain resistant, easy to vacuum and wash, fast drying, and flame resistant. Natural fibers are recyclable and biodegradable. Also, using more wool doesn't hurt the sheep because all it takes is a shearing when the wool gets long.

What Green Material Am I?



Green Materials 101



Raw Materials	Green Materials	Benefits
Rubber Tree Sap 	Rubber 	Natural rubber is extracted from trees in the form of latex. The tree is tapped and the latex that oozes from the cut is collected in a small cup. The trees are never cut so there is less impact on the environment.
Shredded Paper 	Paperstone 	Paperstone is a countertop or shelving material made of pressed paper. It is 100% post-consumer, meaning all of the paper used has been recycled. The paper is combined with a VOC-free resin and natural pigments. The recycled paper is stacked and then pressed with heat and pressure to make a rigid, dense material strong enough to be used for furniture and paneling too.
Sorghum or Wheat 	Biocomposites like Kirei Board 	Biocomposites can be used to make cabinets, tables, and other furniture. They are made of grains, grasses, stalks, sunflower hulls, and wheat which are rapidly renewable agricultural fibers. Sorghum and wheat can be harvested yearly rather than the alternative option of cutting down trees that take longer to grow.
Shells and Glass 	Beachstone 	Beachstone is a durable countertop or tile -type material. Beachstone is made of 80% post-consumer waste that would otherwise be thrown in a landfill. It is a blend of shells and glass, with a sealant on top.
Flaxseed & Wood Flour 	Linoleum 	Linoleum's raw materials are renewable and can be produced sustainably. The manufacturing process is clean and reasonably energy efficient. Linoleum is also non-allergenic and very durable in high traffic areas.
Plastic Bottles 	Recycled Carpets 	Recycled carpets are made from fibers that are made from 100% recycled soft-drink and ketchup containers. The dyeing methods are also considered to be greener than other flooring. Be sure recycled carpets are installed with eco-friendly glue.

Make it Green - Reference Sheet

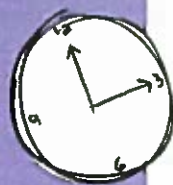
Page 15

Green House Link-Up

20 Minutes

Materials:

- masking tape
- Green House Link-Up cards



Recommendations:

If there are fewer than ten girls, you can give some girls two cards or tape the extra cards on the board for girls to see.



Introduction: In this activity, girls will each be given one card with a career and task related to building a house. They will have to link-up to one another in the order that the tasks need to happen to build a house.

Objectives: As a result of this activity, the girls will be able to:

- Relate the different elements of building a house to specific careers
- Describe how **Civil Engineers, Architects, Environmental Engineers, Product Designers, Materials Science Engineers and Landscape Architects** are involved in the building process

Directions:

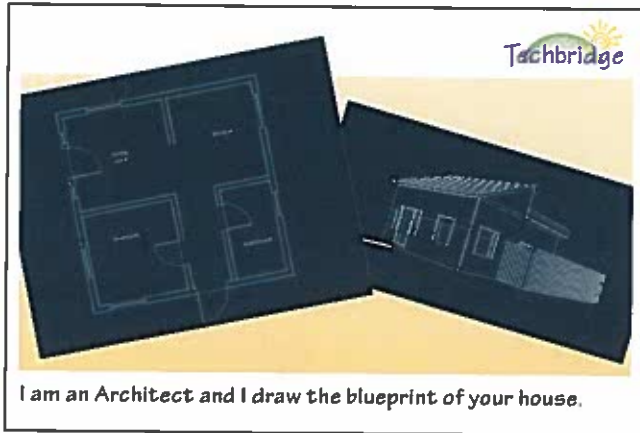
1. Give each girl one *Green House Link-Up* card. Each card has a career written on one side and a statement about which part of the house that career is responsible for developing or building.
2. Explain to the girls that they will have to link up in a specific order to build an entire house. You may want to review how to work as a team (i.e. speak one at a time, listen carefully, be open-minded and helpful) to accomplish this goal.
3. Ask the girl with the card labeled #1 to read her job description and who she is looking to link-up with. In the end all the girls should be linked together. Each card has a hint for who she should find next. Below is the correct order of the tasks.
 - A. **Architect:** I am an **Architect** and I draw the blueprint of your house.
 - B. **Civil Engineer:** I am a **Civil Engineer** and I plan and design the water and sewer lines that run to your house.
 - C. **Civil Engineer:** I am a **Civil Engineer** and I help build the walls of your house.
 - D. **Materials Science Engineer:** I am a **Materials Science Engineer** and I develop the material for the insulation and floors of your house.
 - E. **Product Designer:** I am a **Product Designer** and I develop the energy-efficient appliances for the interior of your house.
 - F. **Environmental Engineer:** I am an **Environmental Engineer** and my research helped to develop the low flush toilets and low flow showerheads in your house.
 - G. **Materials Science Engineer:** I am a **Materials Science Engineer** and I develop the composite wood that will be used to build the deck/patio of your house.
 - H. **Landscape Architect:** I am a **Landscape Architect** and I plan the rooftop garden of your

Green House Link-Up

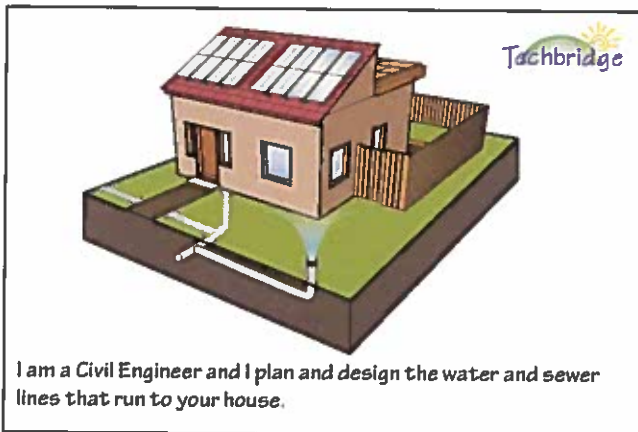
house.

- I. **Materials Science Engineer:** I am a Materials Science Engineer and I develop the solar panels that go on the roof of your house.
- J. **Environmental Engineer:** I am an Environmental Engineer and I LEED certify your house.

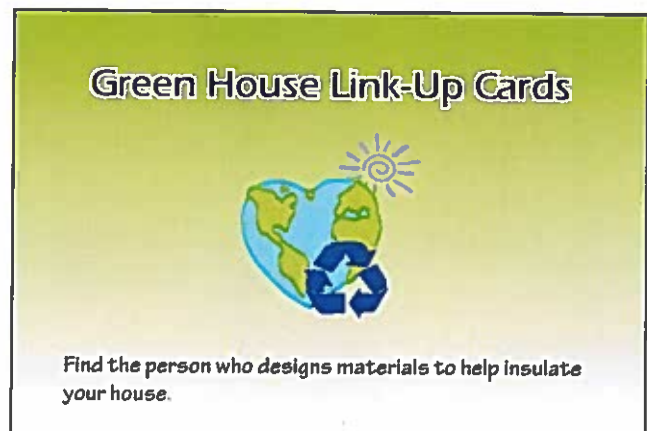
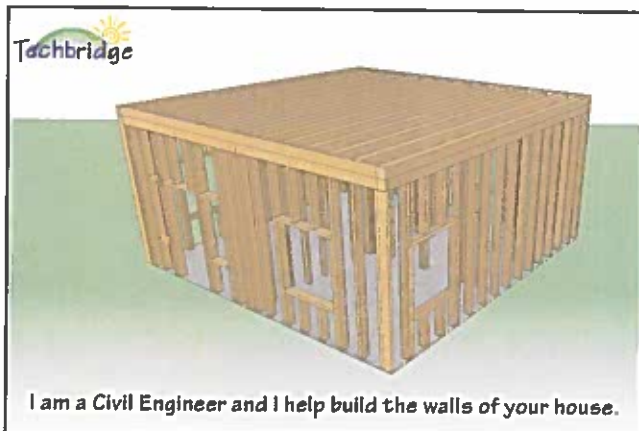
A.



B.

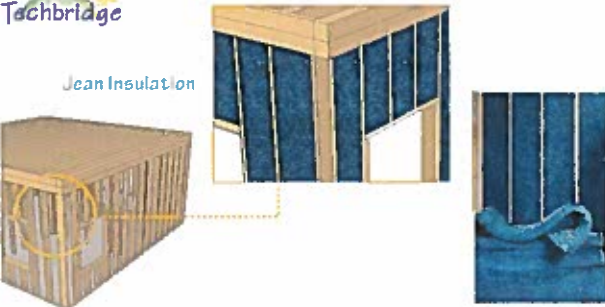


C.



Green House Link-Up

D.

Jean Insulation

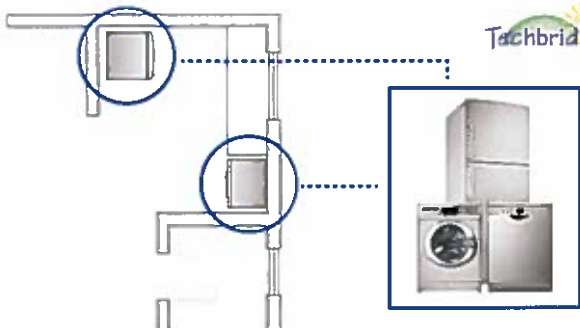
I am a Materials Science Engineer and I develop the material for the insulation and floors of your house.

Green House Link-Up Cards



Find the person who works with "Energy Star" appliances, and develops green products used inside your house.

E.

I am a Product Designer and I develop the energy-efficient appliances for the interior of your house.

Green House Link-Up Cards



Find the person who will design the water efficient systems for the bathroom and kitchen in your house.

F.

I am an Environmental Engineer and my research helped to develop the low flush toilets and low flow showerheads in your house.

Green House Link-Up Cards

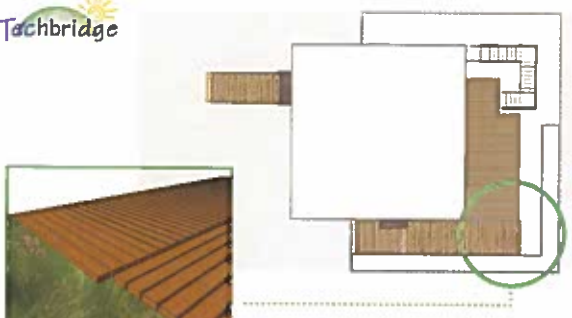


Find the person who will help create green materials for the outdoor living spaces, such as your deck or patio.

Green House Link-Up

G.

Tachbridge



I am a Materials Science Engineer and I develop the composite wood that will be used to build the deck/patio of your house.

Green House Link-Up Cards



Find the person with a "green thumb" who designs gardens or outdoor living spaces around your house.

H.

Tachbridge

ROOF GARDEN PLAN



ROOF GARDEN SECTION



I am a Landscape Architect and I plan the rooftop garden of your house.

Green House Link-Up Cards



Find the person who will help power your house using renewable resources.

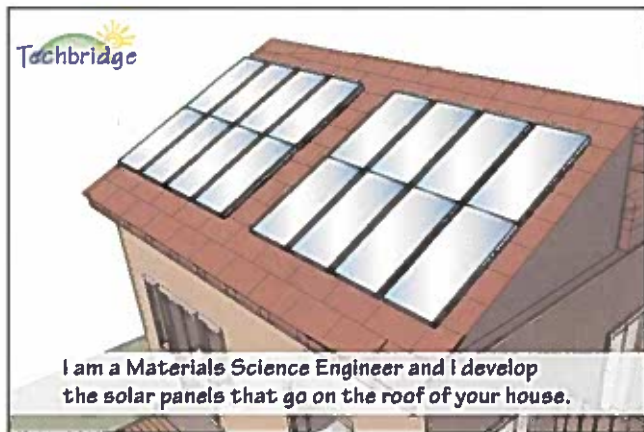
Recommendations:

There may be new vocabulary introduced on these cards, such as the "frame" of a structure and a "showerhead." Check for understanding and prior knowledge with your girls.



Green House Link-Up

I.



Green House Link-Up Cards



Find the person who will certify that your house is "green."

J.



Green House Link-Up Cards



Next step: time to move in!

Recommendations:

You may want to designate a leader for this activity, perhaps the girl who receives the last card. She can help "arrange" the order, and make sure everyone is heard.



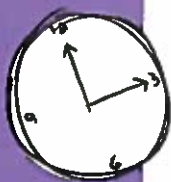
Green Construction Mix & Match

20 Minutes

Materials:

- 10 Green Design Portfolios
- 5 sets of 20 Green Construction Mix & Match cards

Grouping: Pairs



Introduction: In this activity, girls will match a green construction practice with the explanation for why it is green. There are two different types of cards. The WHAT? cards describe the green practice and the WHY? cards describe why that practice is environmentally friendly.

Objectives: As a result of this activity, the girls will be able to:

- ☀ Identify various green construction methods to use in their own model green homes

Science Behind It:

Low VOC Paint: Air indoors is often more polluted than the air outdoors because of toxins in the paint. Even many years after a room is painted, the paint gives off toxins called "volatile organic compounds" (VOC). Paint that is considered safe and environmentally friendly is no-VOC paint or low-VOC paint. As the VOCs are reduced, fewer chemicals are released into the air.

Solar Cells: Solar cells are sometimes called photovoltaic cells because they use sunlight ("photo" comes from the Greek word for light) to make electricity. Each solar cell is made primarily of silicon, which is a semiconductor. Semiconductors don't normally conduct electricity, but under certain conditions, we can make them do so. When sunlight shines on a cell, the energy knocks electrons from the silicon. These electrons can be forced to flow through an electric circuit and power anything that runs on electricity. The new energy is then transformed into a usable amount of direct current (DC).

Directions (12 minutes):

1. **Distribute** a set of *Green Construction Mix & Match* cards to each pair of girls. These cards highlight different construction practices that help a house to be green.
2. **Instruct** the girls to match the "What?" cards with the appropriate "Why?" cards.
3. **Review** the correct answers as a group and discuss why they are green. Use *Green Construction 101* found in the Green Design Portfolio, on pages sixteen and seventeen, as a reference.
4. Alternatively, to make this activity more of a scavenger hunt, you could tape the "What?" cards to appropriate objects around the room, such as the solar panel to the light switch and the energy star to a classroom refrigerator, and instruct girls to match the "Why?" cards as they find the cards' mates.

Green Construction Mix & Match

Reflection (8 minutes):

5. **Lead** a discussion using the following questions:

- What makes each of these construction tips green?
- What is the difference between a green material and a green construction practice?
- Why do you think these practices are important?



Note:

This activity is adapted from a game created by role models from Swinerton Incorporated.

Green Construction Mix & Match

What?

Insulation

Insulation is a material that prevents heat from escaping in winter and keeps the heat out in summer.



Why?

Much of a home's heat is lost through the walls and ducts. Almost half of the energy used in a house is used to heat or cool it, so add this to help control a house's temperature.

What?

Gardens and Trees

Plant a garden in the yard and/or on the roof. Plant trees around your house.



Why?

These help absorb rain water run-off, which keeps water out of our filtration plants so we use less energy. These also help keep the area cool. Make one with native plants and it will use less water and can help restore local habitats.

What?

Be A Star

Use energy-saving appliances when possible. Design your house so you can easily do things by hand (line-dry clothes and hand-wash dishes).



Why?

Putting these in a house will cut down on the amount of energy used in your home. They are more energy-efficient than regular ones.

What?

It's Hip to Recycle

Make a space for recycling and composting bins. Recycle and compost regularly to keep things tidy.



Why?

This reduces the amount of trash waste in a home. You can use one of these to help make mulch for your garden.

What?

Water, Precious Water

Use water-saving faucets, low-flush toilets, low-flow shower heads, and rainwater collection for landscaping.



Why?

The average American uses 100 - 175 gallons of water a day. Use these to help conserve water and save this important resource.

Green Construction Mix & Match

What?

Low or No VOC Paints

Use no VOC (volatile organic compounds) or low-toxic paints, finishes, and coatings on interior walls and furniture



Why?

Regular house paint usually contains volatile carbon compounds. They are hazardous to your health and to the environment. So use these instead to improve air quality and your health!

What?

Alternative Energy

Try to use solar, wind, or water power. Angle the roof south toward the sun if you are using a solar panel!



Why?

These sources of power are called "renewable sources" because they don't run out. By using these, a house will save power and reduce the energy bill each month.

What?

Ceiling Fans

Put in ceiling fans in as many rooms as possible.



Why?

These circulate the air in a room. These can save up to 40% on cooling costs and up to 10% on heating costs.

What?

See the Light

Switch to compact fluorescent light bulbs (CFLs)—the twisted spiral ones.



Why?

These can last about 10 times longer than regular light bulbs. If you switch, you will save energy and money since you won't replace them as often and your family's utility bill should decrease.

What?

Windows

Put in large, energy efficient windows and skylights to allow maximum sunlight into the house. Use double-paned windows.



Why?

These can help heat a house as well as let in more light so fewer indoor lights are used. Up to 15% of a house's energy can be lost through these, so add an extra pane to them to help reduce energy usage and costs.

Green Construction Mix & Match



Green Construction 101



Make Your Structure Green:

WARM WALLS

Make sure walls and ducts are well insulated. Select an insulation material that suits your area's needs. Choose products with the highest recycled content possible, using scrap denim or re-purposed carpet.



Why?

Up to 35% of your home's heat is lost through the walls and ducts. According to the Department of Energy, space heating and cooling consumes 44% of all energy used in the home. Adding insulation can help control heat gain and loss, which helps save the energy consumption of a heater or an air conditioner.

LOW OR NO VOC PAINTS

Use no VOC or low-toxic paints, finishes, and coatings on interior walls and furniture. Use low-VOC adhesives and sealants.



Why?

VOCs are volatile organic compounds that are hazardous to your health and the environment. So use low-VOC, no-VOC, or natural paints instead.

CEILING FANS

Put in ceiling fans in as many rooms as possible. Make sure to match the fan size to the room size. Use variable speed fans as well.



Why?

A ceiling fan can save up to 40% on your cooling costs and up to 10% of your heating costs. Ceiling fans circulate the air in a room so in the winter the warm air near the ceiling is circulated and in the summer the cold air is circulated.

SEE THE LIGHT

Switch to compact fluorescent light bulbs (CFLs)—the twisted spiral ones.



Why?

CFLs use less energy and last longer than traditional bulbs. These light bulbs also give off less heat, so the temperature of the air in your room is less likely to increase when all the lights are on.

LET THE SUNSHINE IN

Put in large, high performance, energy efficient windows and skylights to allow maximum sunlight into the house. Use double-paned windows.



Why?

Sunlight can help heat the house, as well as let you use fewer indoor lights. You can lose up to 15% of your home's energy through windows; therefore, the extra pane on the windows can help save energy usage and cost.

Green Construction Mix & Match



Green Construction 101



Include These Green Additions:

GO ALTERNATIVE!

Try to use solar, wind or water power. Angle the roof south toward the sun if you are using a solar panel.



Why?

These sources of power are called "renewable sources" because they don't run out. Benefits are lower utility costs.

SEE IT GROW

Plant a garden in the yard and/or on the roof. Plant trees and low-water and native plants. Consider replacing decorative lawns with water conserving native ground covers, turf, or shrubs.



Why?

The gardens absorb rain water run-off, and can help keep the area cool. Trees by the window will block heat in the summer with their foliage and when the trees are bare in the winter, they will allow heat to enter. Plants that are native to the area use less water and can help restore local habitats.

BE A STAR

Use energy-saving appliances when possible. Do things by hand (line-dry clothes and hand-wash dishes).



Why?

These actions will cut down on the amount of energy used in your home.

IT'S HIP TO RECYCLE

Make space for recycling and composting bins.



Why?

This reduces the amount of trash waste. The compost can be used as soil for your yard or garden. This will bring to life the soil and feed existing soil organisms.

WATER, PRECIOUS WATER

Conserve water. Use water-saving faucets, low-flush toilets, and rainwater for landscaping.



Why?

The average American uses 100-175 gallons of water a day. Conserving can help save this important resource.

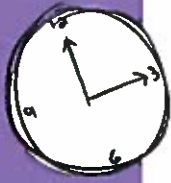
Green Room Planning

30 Minutes

Materials:

- 10 sheets graph paper
- 3 sheets return address labels
- 10 Green Design Portfolios
- 10 Room Assignment cards
- 10 rulers
- 5 scissors
- 10 pencils & pencil sharpener
- shoeboxes (not included)

Grouping: Individuals & Groups



Introduction: In this activity, girls will be assigned their rooms. They will determine how their group's various rooms fit together to form one complete house and will create their entire green house blueprint. Then, the girls will brainstorm green elements to include in their rooms. Finally, they will draw a floor plan for the layout of their room on graph paper.

Objectives: As a result of this activity, the girls will be able to:

- Explain how the room that they will design relates to the entire house
- Create a floor plan of their house and individual room

Brainstorm (4 minutes):

1. Discuss the building design process using the following questions:
 - Before you start building a house, what are some things that might have to be done first? (*Prepare the site by building connecting roads and laying pipes, electric cables, and phone lines. The house layout and materials must also be planned in advance.*)
 - Explain the importance of developing a blueprint of a building before construction. Who would draw the blueprint? (*The **Architect** would draw the blueprint, which is important for anticipating the materials needed and building more efficiently.*)



Green Room Planning

Hands-On (20 minutes):

2. **Inform** the girls that they are going to be **Architects** and their task is to design a blueprint and to make a detailed list of the green elements that will be included in their rooms.
3. **Pick.** Each girl should randomly pick one of the *Room Assignment* cards. This will be the room that she will be responsible for designing and making. Ten cards are provided. You can remove or combine rooms to adjust for the number of girls present in your group. For example, if you have eight girls, you can add more bedrooms/bathrooms to House A or you can have House A and House B only have four rooms.
4. **Choose** a shoebox (make sure it has a lid).
5. **Label.** Have each girl write her name, house letter, and room name on the bottom of her box.
6. **Gather** everyone in each house group together and figure out how the rooms will be joined. Remember to consider where the windows and doors will be located in the house.
7. **Locate** and complete the *My Green House Blueprint* worksheet, page seven, in the portfolio. As the girls are working, ask them open-ended questions about the items they are including in their rooms. This planning portion may not seem as exciting to girls as getting their hands on the materials, but it's an important part of the Engineering Design Process. Ask the girls to point out which step on the poster they are currently working on.
 - Pretend you are a **Materials Science Engineer**. How could you make this item green? (*I could design the feature to be solar-powered, or made from scraps usually considered trash.*)
 - What way would you design this item to make it green and appealing to customers?
8. **Distribute** blank labels to each girl and have her write one green alternative per label. These will be used during construction to label the room so that the girls are constantly thinking about being green. Have them keep the labels in their portfolios until they start designing.
9. **Complete** the labels, and then hand out one piece of graph paper and one ruler to each girl.
10. **Read** and follow the directions on the *My Green Floor Plan* worksheet, page eight.
 - Make sure girls do not glue their floor plans in their shoebox.
 - Make sure they pay attention to furniture spacing.
 - Remind the girls to write the name of the green aspects of their room on their floor plan. This will help keep them focused during the designing process.

Reflection (6 minutes):

11. **Share** one or two ideas about how the girls are making their rooms green.
12. **Lead** a discussion with the following questions:

Green Room Planning

- Why is it important for an **Architect** to draw a blueprint before constructing a building? *(While brainstorming, planning, and getting feedback from others, sometimes great new ideas surface.)*
- What else would an **Architect** have to think about? *(How many people will use this structure? Do any of them have special needs to consider? What climate is the house in?)*



A group of girls are matching their individually-made rooms to create a green house together.

Green Room Planning



My Green House Blueprint



Meet Architect: Adhamina Rodriguez

My name is Adhamina and I'm an **Architect**. I studied at the University of Seville in Spain, and moved to the U.S. after graduation. **Architects** design new buildings and houses, and improve existing ones. They think about how the buildings look from the outside and design floor plans. As an **Architect**, I get to be creative and draw beautiful buildings, but I also have to know a lot about the structure of buildings and how they stay up. I love finding creative ways to make buildings environmentally friendly while keeping my designs beautiful.

Today you are going to be an **Architect**, too! You have to design a blueprint, or a detailed plan of what you are planning to build. You need to decide what green elements to include in your room, and the materials needed to build it.

Have everyone in your same house come together and figure out how the rooms will be joined. Decide as a group where the windows and doors will be in your house. **Draw a blueprint of your group's entire house in the space provided below.** Make sure to clearly label all rooms, windows, and doors. Draw on your box where the windows and doors will be in your own room.

Green Room Building: Walls, Floors, and Insulation

40 Minutes

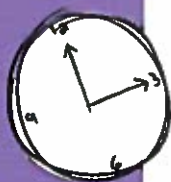
Materials:

- 20 foam sheets
- 20 sheets of construction paper
- 20 fabric pieces
- return address labels and completed labels
- 10 Green Design Portfolios
- windows and doors stickers or blank stickers for girls to create their own
- 5 scissors
- 5 utility knives
- 10 glue sticks
- 10 rulers

Optional

- carpet samples
- patterned paper
- pieces of linoleum
- pieces of rubber

Grouping: Individual



Introduction: In this activity, girls will consider, choose, and install the insulation, wallpaper, flooring, windows, and doors in their rooms.

Objectives: As a result of this activity, the girls will be able to:

- ☀ Describe how insulation works and why it's important in the design of a home
- ☀ Explain the green features they chose for flooring, windows, and walls

Science Behind It:

Insulation is installed between the walls and ceilings of a home or building. It works to slow the movement of heat into or out of a room. This helps prevent heat from escaping a house during the winter and helps keep the house cooler in the summer. There are three main types of heat transfer: **conduction, convection, and radiation**. Conduction is the flow of heat through a substance of a higher to a lower temperature, such as ice cooling off your hand. Convection is the transfer of thermal energy by forced physical movement, such as

a fan. Radiation is a process of energized particles or waves travelling through a medium or space. Heat radiation is energy emitted from the surface of an object due to the object's temperature, such as the sun. Insulation helps stop the different types of heat transfer by absorbing the heat and slowing its movement. Heat always moves from hotter to cooler areas in an attempt to reach equilibrium, but insulation interferes with this flux.

Opening (6 minutes):

1. **Introduce** this activity by asking girls to share what they know about insulation.
 - What types of things require insulation? (*Homes, refrigerators, coolers, thermoses, recording studios, and humans.*)
 - How are temperature and insulation related? (*Insulation slows the transfer of heat, which affects temperature.*)
 - Why is insulation important? (*Insulation keeps us comfortable in extreme weather, reduces noise, and makes buildings more energy efficient by keeping warm or cool air from escaping.*)

Green Room Building: Walls, Floors, and Insulation

2. **Tell** the girls that they are going to be **Civil Engineers** and they must construct the walls, floors, and insulation in their homes.

Brainstorm (6 minutes):

3. **Open** up the portfolio to the *Walls, Floors, and Insulation* reference sheet, page nine. Have the girls read through it.
4. **Consider**, in pairs, the different types of walls, floors, and insulation that they will use in their rooms. Use the reference sheet from the *What Green Material Am I?* activity, *Green Materials 101*, for guidance.

Hands-On (20 minutes):

5. **Build** the walls, floors, and insulation of the rooms. The girls should begin with the insulation, and then wallpaper. They will do the flooring last. Have them use the various materials to represent the type of insulation, wallpaper, and flooring they would like. For example, foam sheets can represent the type of insulation they have chosen for their rooms. If they did not include this on their *My Green Room* worksheet, help them choose which type of insulation they would like using the *Green Materials 101* reference sheet. Another example is if they want "bamboo flooring" then they should try to choose a color that would mimic bamboo, although most materials can be stained to be any color girls want.
6. **Measure** and cut all needed materials, then use glue sticks to secure all insulation, wallpaper, and flooring inside of the shoeboxes.
7. **Refer** to the pre-made labels when the girls label the green materials. If they choose to make a green material that they don't already have a label for, have them create a new label for it.
8. **Tell** the girls that the next session they will be decorating the inside of their box and that they can bring any materials from home that they may want to use. Remind them to stay "green" by bringing in materials they might have otherwise thrown away.
9. **Apply** window and door stickers, or use utility knives to carefully cut openings.

Reflection (8 minutes):

10. **Facilitate** a discussion on how insulation works and why it's important in the design of a home. Use the following questions:
 - In real life, how do you think you would pick your home's insulation?
 - Can you explain how insulation works?
 - Why is it important?

I Spy Something Green

20 Minutes

Materials:

- 10 Green Design Portfolios
- 10 pencils

Grouping: Pairs



Introduction: In this activity, girls will match parts of a house with the green materials and construction practices that are applied.

Objectives: As a result of this activity, the girls will be able to:

- ☀ Identify green design elements in home and building design
- ☀ Use their knowledge of green design elements to build their own model green rooms

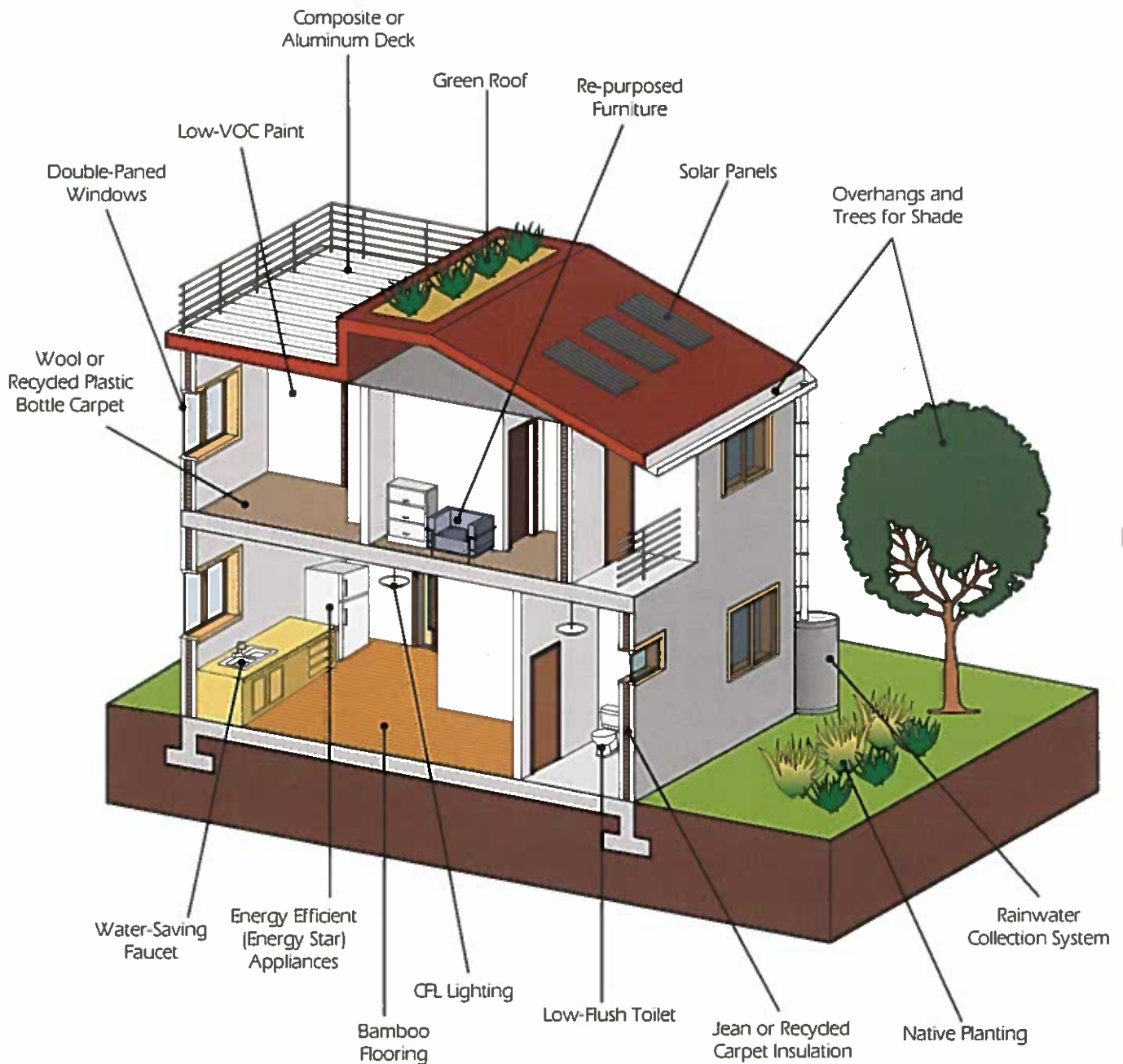
Directions (10 minutes):

1. **Pair** the girls and explain to them that they will each be matching green elements listed on the right side of the handout to the corresponding letter on the pictures on the left.
2. **Explain** that each building highlights a variety of different green elements.
3. **Open** the **Green Design Portfolios** to the *I Spy Something Green* activity on page twelve. Explain that the girls should each mark her own worksheet, but they can still work with their partners to discuss answers.
4. **Circulate** and use the answer key on the next page to make sure each pair has the correct answers.
5. **Share** one or two green elements from one of the building pictures.
6. **Alternative.** To make this an active group game, reproduce the house on two larger posters and hang them on the wall. Divide the girls into two teams and invite them to do a relay race to match the green features with the correct part of the house where the feature can be found. To add an extra challenge, invite each competitor to "race" to the poster in a different way. You could have them draw a card instructing them to hop on one foot, do a crab walk, crawl, walk backwards, squat, skip, sing, balance a book, pat their head, or twirl their arms.

Reflection (10 minutes):

7. **Lead** a discussion using the following questions:
 - Can you spot anything else in these pictures that might be considered green?
 - Why are these houses green? Recall what you learned from the past activities to describe the green elements of the houses.
 - What building practices do you find most interesting or helpful? Why?

I Spy Something Green Answer Key



Green Room Building: Interior Design

80 Minutes

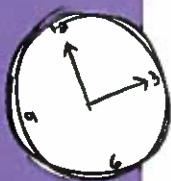
Materials:

- 40 glue gun sticks
- 3 sheets of labels
- building supplies from the box:
 - a. 200 craft sticks
 - b. 50 cotton balls
 - c. 1 box toothpicks
 - d. 30 cups
 - e. 1 bag wood scraps
- 10 Green Design Portfolios
- 5 glue guns
- 2 extension cords
- 5 scissors
- 1 set markers

Optional Building Supplies (not included)

- | | |
|-------------------|----------------|
| ▪ used CDs | ▪ stickers |
| ▪ bottle caps | ▪ cork |
| ▪ packing peanuts | ▪ cellophane |
| ▪ paint samples | ▪ cotton swabs |
| ▪ magazines | ▪ dowels |

Grouping: Individual



Introduction: In this activity, girls will design and build the inside of their model rooms using re-purposed supplies.

Objectives: As a result of this activity, the girls will be able to:

- ☀ Justify why they selected the materials and methods that they used for the interior of their rooms

Opening (6 minutes):

1. **Lead** a discussion with the girls about the types of things one might find in one of the rooms of a house and how you could make that item environmentally friendly. For example, you could make a television green by getting it from the thrift store or you could have LED lighting.
2. **Inform** the girls that they are going to be **Product Designers** and they must think about making the products in their rooms environmentally friendly.

Brainstorm (8 minutes):

3. **Open** the portfolio to the *Interior Design* reference sheet, page ten, and read through each step.
4. **Reference** the green room floor plan as the girls design and build the interior of their rooms. Suggest that they add other ideas to their list. If they choose to make something green that they don't already have a label for, have them create a new label.

Green Room Building: Interior Design

Hands-On (54 minutes):

5. **Plug in** the extension cords and glue guns. Remind the girls that glue guns can get very hot and burn them if they are not careful. You might want to put scratch paper underneath the glue guns in case they drip.
6. **Build.** As you circulate the room, ask the girls what they are creating and how it is green. If they are straying from the concept of "green," help them brainstorm ways to modify their idea. For example, if a girl says she is making a TV, ask her how it can be green (some answers to this have been "solar panel powered," "bicycle powered," and "it's a thrift store TV.")



Note:

The girls will be using glue guns. Stress that they get VERY hot and the glue can burn. Use craft sticks or other objects to press down the glue rather than your fingers to help prevent burns.

Reflection (12 minutes):

7. **Lead** a discussion on some of the things the group chose to include in their rooms.
 - What are some of the green materials that you used in your room? Why did you choose these?
 - What are some other green aspects of your room, such as energy efficient appliances, water-saving practices, or recycled materials?
 - Do you think it's possible to use all these ideas in a real home? Why or why not?

Green Room Building: Interior Design



Interior Design



Heather



Meet Product Designer: Heather Fleming

My name is Heather. I went to Stanford University and I am a **Product Designer**.

Product Designers combine art, science, and technology to make the products we use every day.

I run my own company that makes products for villages in developing countries. My company has made things like wind turbines that a family can use to power small lamps or a radio that works in places where electricity is unreliable. I love that I can use engineering to create products that are efficient, affordable, and environmentally friendly!

Today you are going to be a **Product Designer**, too! You need to think about what you need in your house and how that product can be environmentally friendly! Think about alternative sources of energy, recycled materials and energy-efficient appliances.

Now it's time to design the interior of your room. This means that you choose the furniture, the appliances, the art, etc. Get creative and stay green! Use the different materials that your leader has available to you to build everything that goes inside your room.

- Always refer to your Floor Plan and list to make sure you are including the green things you wanted. The **Green Materials 101** and **Green Construction 101** pages can also help you figure out what green materials to include in your room.
- Label your room as you are designing. You can create more labels if you think of new green things to put into your room that you didn't already have.

Glue gun safety instructions:

- Always put the glue gun down when you are not using it. Make sure it is not put on anything that can get burned.
- Always look at what you are gluing. Do not turn your attention away for a second!
- Do not try to get someone's attention while they are gluing.
- Unplug glue guns when no one will be using them.



Heather

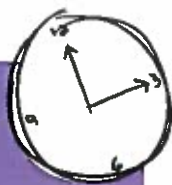


I grew up with a big family and always liked helping people. I wanted to find a way to continue helping others for a career. I love that as a **Product Designer**, I can use engineering to create products that are efficient, affordable, and environmentally friendly! If you like creating new things that solve problems or make daily life easier, keep **Product Design** in mind for your future.

I'm Building a Green House

10 Minutes

Grouping: Whole Group



Introduction: This activity reinforces different "green" features of a house.

Objectives: After this activity, girls will be able to:

- ☀ Describe different parts of a green house
- ☀ Work as a team
- ☀ Review green elements already learned

Directions:

1. **Arrange** the whole group in a circle.
2. **Begin.** The first girl says the sentence "I'm building a green house and I'm going to have..." She must finish the sentence with one green feature she will put in her house. For example, she might say **jean insulation**, **CFL lights**, **double-paned windows**, or a **patio made of composite wood**.
3. **Repeat.** The girl on her right will repeat what the first girl said, and then tag on her own green addition.
4. **Continue.** The game continues until the last girl repeats the entire group's green feature list before she adds her own green feature.

Green Room Building: Exterior Design

70 Minutes

Materials:

- 40 glue gun sticks
- 10 felt pieces, green
- 30 straws
- 1 roll aluminum foil
- 10 Green Design Portfolios
- completed labels from previous sessions
- any building supplies from previous Green Room Building sessions
- 5 glue guns
- 2 extension cords
- 5 scissors
- 1 set markers

Optional (not included)

- solar-powered motors
- plastic plants

Grouping: Individual



Introduction: In this activity, girls will design and build the exterior of their model rooms, including alternative energy sources, roof design, and possible landscape elements.

Objectives: As a result of this activity, the girls will be able to:

- ☀ Justify the use of materials and structures for the exterior of the house, including the roof
- ☀ Identify other renewable energy sources and possible landscape elements

Science Behind It:

A living roof, or green roof, is a vegetated roof cover. Green roofs have many benefits for a home, including heat loss reduction in the winter, which leads to less energy consumption. Green roofs also help absorb rainwater, which reduces storm water runoff. During a torrential downpour, the ground can't absorb so much water in such a short amount of time. Storm water runoff can be harmful because

the water picks up chemicals and other pollutants before flowing into a storm sewer system, where it may be used for swimming, fishing, and providing drinking water. Living roofs can play an important role in improving our air quality by removing pollutants from the air. A vegetable and herb garden on the roof can also supplement your groceries! This can save an extra trip to the store, which will help conserve gasoline.

Planting native plants in and around your home can benefit both the environment and the homeowner. Native plants will use less water and be more resistant to local plant diseases. Native plants also help reduce the amount of air pollution by removing carbon from the air.

Opening (15 minutes):

1. Lead a discussion with the girls about how the exterior design of a home can be green.
 - Describe a living roof. What are some of the benefits of having one? (*A living roof has plants growing on its surface, which take advantage of the exposure to sunlight and rain. Benefits include extra recreational space if you don't have a yard, and more opportunities for growing flowers and vegetables. Living roofs also reduce heat loss from your home and absorb rainwater.*)

Green Room Building: Exterior Design

- What are some alternative forms of energy that can be used? (*Solar, wind, and water power.*)
 - What are some ways to conserve water? (*Rainwater collection barrels, native landscaping, water-saving faucets, and low-flow shower heads.*)
2. **Tell the girls that they are going to be Landscape Architects** and they must design the exterior of their houses and incorporate green elements.

Hands-On (40 minutes):

3. **Open up the portfolio to the *Exterior Design* reference sheet, page eleven, and read through the entire sheet.**
4. **Explain** that the girls should each have a roof and exterior features for their individual rooms even though they have a group house. This is because each girl will get an individual certification and take home her own individual room.
- Remind the girls to think about the alternative forms of energy they saw in the reference sheets and the green house pictures. Help them brainstorm ways to represent those with recycled materials. Some examples are solar panels, wind turbines, and solar water heating.
 - The girls may also want to include rainwater collection and native plants.
5. **Refer** to the pre-made labels to label the rooms. If the girls choose to make something green that they don't already have a label for, have them create a new label for it.
6. **Build.**
7. **Re-visit** the rest of the room if time allows. See if there is anything else the girls can add to make their rooms greener. If not, they can help others with their rooms.

Reflection (15 minutes):

8. **Lead a discussion** about the types of things the girls chose to incorporate in their exteriors.
- What are the benefits of using native plants in your garden? (*Native plants are better adapted to the local climate, so they don't need watering, fertilizer, or pesticides to survive.*)
 - What additional things could you include in the exterior design of your house to make it even more green? (*Planted walls provide extra insulation and decoration, and properly placed shady overhangs can prevent solar heat gain.*)
 - What inspired you in other designs that you saw?
 - Has anyone ever visited or seen a "green" building or home?

Green Room Building: Exterior Design



Exterior Design



Meet Landscape Architect: Annie Abbot



My name is Annie and I am a **Landscape Architect**. I went to Michigan State University. **Landscape Architects** design, plan, and manage land. They help plan the outdoor spaces of a building complex or city, and concentrate on making these areas functional, beautiful and in harmony with the natural environment.

In my job, I help make new construction projects environmentally friendly. One way I do this is by using native plants, or plants that grow naturally in an area, because they don't need as much water or fertilizer to grow!

Today you are going to be a **Landscape Architect**. You will design the exterior of your house. What "green" things can you include? Think about what is outside your house (air, water, and sunlight) and how to incorporate that into your design!

Look at the outside of your room, especially the "roof," and think about how you can make it green.

I grew up camping and hiking and I love that I get to work outside a lot for my job. In school my favorite subjects were art and biology. With this career, I found a way to combine my love of designing things with my love of nature. If you enjoy these things too, check if your dream college offers a major in **Landscape Architecture**!



Your Career Card

20 Minutes

Materials:

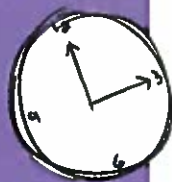
Per Girl

- 1 blank career card
- 1 pencil

Per Group of 10

- 1 box of permanent markers
- 2 sets of 5 role model career cards

Grouping: Individual



Introduction: In this activity, girls will think about their futures and create a role model career card about themselves.

Objectives: As a result of this activity, the girls will be able to:

- ☀ Illustrate future career plans
- ☀ Consider career options

Preparation:

- **Optional.** Take and print headshot photos of your girls ahead of time and attach them to the cards.

Directions:

1. **Pass** around the role model career cards from this box and give the girls a chance to become familiar with them. Discuss some of the projects they have done so far and some of the careers they have learned about during those activities.
 - What kind of designer makes green appliances and furnishings?
 - What kind of designer writes and draws the plans for a home?
 - What does a **Civil Engineer** do?
2. **Explain** that they will be making their own career cards today. Girls will need to choose a career from the career cards.
3. **Ask** them to think about what college they might attend for this career and what degree they might have. Would they like to have a family? Where do they see themselves living?
4. **Give** the girls ten minutes to make cards for themselves modeled after the role model cards in your box. If any girl is having trouble choosing a career, ask her to think back on what activity she liked the best or what career she thought was most interesting.
5. **Present** these career cards to the group. Discuss why girls chose a specific career.
 - Why did you choose this career for yourself?
 - What other things do you hope to accomplish in your future?
 - Explain why science and engineering are good careers for women.

Your Career Card

Your Career Card

Techbridge



Picture

Name

Occupation

Degree in:

Biography:

Interesting Facts:

At my job, I work on...

Your Career Card

Techbridge



Picture

Name

Occupation

Degree in:

Biography:

Interesting Facts:

At my job, I work on...

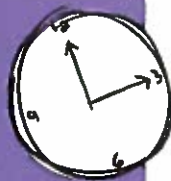
Who Would I Hire?

15 Minutes

Materials:

- 2 sets of career cards

Grouping: 2 Teams



Introduction: This activity reinforces which green careers are associated with different aspects of construction.

Objectives: As a result of this activity, the girls will be able to:

- ☀ Describe different careers
- ☀ Identify which careers work on different parts of building a home
- ☀ Work as a team

Directions:

1. **Divide** the girls into two teams.
2. **Give** each team one set of career cards. Each girl should have a card or two depending on the numbers on each team. Encourage them to read and share the cards to prepare for a quiz.
3. **Read** the career cards, then collect all the cards when the teams are done.
4. **Ask** the first team one of the *Who Would I Hire?* questions.
5. **Allow** the girls thirty seconds to confer with their team and answer the question. The answers to the question will always be one or more of the six careers: **Environmental Engineer, Product Designer, Architect, Landscape Architect, Materials Science Engineer, and Civil Engineer**. If the team does not produce the correct answer, allow the other team to guess.
6. **Play.** Correct answers earn one point. Continue the game until all of the questions are exhausted.
7. **Conclude.** The team with the most points at the end wins the game.

Note:

If a team gives a different answer than the one provided, but can explain or justify their reasoning, you may award them a point. More than one answer may be correct. Creative thinking should be encouraged and rewarded!

Who Would I Hire Questions:

Q: I want my new puppy to only eat and drink from a bowl made from recycled plastic bags. Who would I hire?

A: Materials Science Engineer (Materials Scientists work to convert old products into new recycled products like a dog bowl.)

Q: I want to create a sound system for my TV only powered by bicycles. Who would I hire?

A: Product Designer (Product Designers are responsible for creating new products that use our resources efficiently and wisely.)

Who Would I Hire?

Q: I'm designing a new public library for our town. Who would I hire?

A: Architect (Architects design new buildings and make plans for renovating old ones too.)

Q: I'm building a new home on new land and want to make sure my house won't flood. Who would I hire?

A: Civil Engineer (Civil Engineers work to prepare the land before a house is built.)

Q: I'm building a housing development in a brand new neighborhood and need a sewer system. Who would I hire?

A: Civil Engineer (Civil Engineers work to prepare the land before a house is built.)

Q: I'm designing a new urban park downtown. I want to be sure to include a lot of native plants! Who would I hire?

A: Landscape Architect (Landscape Architects work to design, plan and manage outdoor and public spaces, making them more beautiful and useful.)

Q: I want to build a modern school with lots of new technology and open spaces. Who would I hire?

A: Architect, Civil Engineer (Architects and Civil Engineers work together to design new buildings.)

Q: I need to design the layout of an amusement park. Who would I hire?

A: Landscape Architect, Architect, Civil Engineer (Landscape Architects work to design outdoor, public spaces. Architects and Civil Engineers work together to design the buildings.)

Q: The building I work in needs more shade and I think we need to add more trees. Who would I hire?

A: Landscape Architect (Landscape Architects work to bring more natural shade to buildings, houses, and public spaces.)

Q: I would like to turn the town's toxic dump into a park. Who would I hire?

A: Civil Engineer, Environmental Engineer and Landscape Architect (A Civil Engineer might plan the drainage and roads, an Environmental Engineer might work on the water and soil quality, and a Landscape Architect might decide which plants should be used in the park.)

Q: I want to create an exhibit for kids at the local museum that will use all green materials. I want to be sure they are non-toxic and the kids won't break them. Who would I hire?

A: Materials Science Engineer (Materials Scientists design new and improved materials to use in all kinds of products, like cabinets made from sunflower seeds.)

Q: I'm designing a new recreational center for the park in our town. Who would I hire?

A: Architect (Landscape Architects may also be consulted about how the outdoors can best work with a new structure.)

Note:

Salary information is from the National Bureau of Labor Statistics Occupational Employment and Wage Estimates as of May 2009.

Career Cards



Adhamina Rodriguez



Architects design new buildings and houses, and improve existing ones. They must be creative and think about how people will use a building, and make sure their design reflects that. Buildings also must be functional, safe, and built according to a budget. Most importantly, buildings must be designed with the health, safety and welfare of the general public in mind.

Because the work is so varied, the architecture field can accommodate many different types of talents and personalities. The average salary is around \$79,000 a year, or \$38 an hour!



University of Seville, Spain
Architecture, Civil Engineering

My name is Adhamina and I'm an Architect.

When I was in school I liked history and art. I wanted to do something creative when I grew up. In college, I decided to become an architect. I get to create and draw beautiful buildings, but I also have to know a lot about the structure of buildings and how they stay up.

I love finding creative ways to make buildings environmentally friendly while keeping my designs attractive.



Melanie Lapointe



Civil Engineers design and create structures that people use every day. They build structures like large buildings, bridges, dams, roads, and airports. **Civil Engineers** specialize in making the structure safe and strong, rather than drawing the design. They also might be involved in things like the water supply and sewer system for a building.

Civil Engineers are also responsible for making sure a building is earthquake or hurricane-proof, or that a bridge will be safe after years of use. The average salary is about \$81,000 a year, or \$39 an hour!



University of Texas, Austin
Civil Engineering

My name is Melanie and I am a Civil Engineer.

I always liked science and thought I wanted to be a doctor. But when I went to college, I realized I didn't like being in a lab all day. I decided to study engineering instead. I picked **Civil Engineering** because I can work on environmental issues.

I work for a company that specializes in "green" construction. Our company has recently designed a brand new office building that generates all of its own energy. I love that my job lets me be creative, inventive, help people and help the earth, all at the same time.

Career Cards



Cari Ishida



Environmental Engineers work to keep our planet clean and preserve our natural resources. They keep people's health and safety in mind, while working on environmental protection projects, such as air and water pollution control, recycling, and waste disposal. **Environmental Engineers** might develop new ways to recycle things we already use, or work with companies to make sure their factories or products don't release pollutants.

The average salary is about \$80,000 a year, or \$39 an hour!



University of Maryland
Civil and Environmental
Engineering

My name is Cari and I am an **Environmental Engineer**!

As a Girl Scout I loved solving puzzles and problems, and also loved our nature hikes, so a teacher suggested I try **Environmental Engineering**. At some schools, like mine, this degree is combined with **Civil Engineering**.

My company certifies "green" buildings based on LEED criteria (Leadership in Environmental and Energy Design). I also help new companies make sure their development doesn't harm the environment.

I help to solve some of the biggest problems we face today, like helping to reduce global warming!



Heather Fleming



Product Designers combine art, science, and technology to make the products we use every day. They have to be good with people to figure out who is going to use a product. Then they create something that works well, is easy to use, and is affordable. **Product Designers** are good communicators and great problem solvers!

Product Designers might design anything from a car seat for a pet, to a toothbrush that a disabled person can use, to a wind-up radio that doesn't require electricity. The average salary is about \$66,000 a year, or \$30 an hour!



Stanford University
Product Design

My name is Heather and I am a **Product Designer**.

I grew up in New Mexico with a big family and always liked helping people. I wanted to find a way to do that for a career. As a product designer, I work with people to create things they need.

I run my own company that makes products for villages in developing countries. My company has made things like wind turbines that a family can use to power small lamps or a radio that works in places where electricity is unreliable. I love that I can use engineering to create products that are efficient, affordable, and environmentally friendly!

Career Cards



Joanna Alvarado



Materials Science Engineers design new and improved materials to use when making different products. Sometimes they need to create a lighter, stronger material to use in buildings, or have to create a material that doesn't hurt the environment when you throw it away.

Materials Science Engineers might also work on various projects from the heat-resistant handles on frying pans to developing a microscopic material that acts like bone to help people with broken bones heal faster. The average salary is about \$85,000 a year, or \$41 an hour!



University of Central Florida
Materials Engineering

My name is Joanna and I am a **Materials Science Engineer**.

When I was growing up, I loved playing with magnets and seeing how they worked. I didn't learn about **Materials Science** until I went to college, but once I learned what it was all about, I was hooked!

In college, we studied physics to see how things moved, and designed materials to match those movements. For example, we studied skis to help us develop a more flexible material that makes skis easier to handle on bumpy slopes. Now, I'm working on a magnetic material that may be in computers some day!



Annie Abbot



Landscape Architects design, plan, and manage land. They help plan the outdoor spaces of a building complex or city. Their job concentrates on making sure these areas are functional but also beautiful and work well with the environment.

Landscape Architects might design a city park or playground. They would decide where roads, walkways, and sidewalks are most helpful, and also where to put plants, trees, and benches. Airports, hospitals, and college campuses can also be designed by landscape architects. The average salary is about \$66,000 a year, or \$31 an hour!



Michigan State University
Landscape Architecture

My name is Annie and I am a **Landscape Architect**.

I grew up in Maine and love to go camping and hiking. In school my favorite subject was art. With this career, I found a way to combine my love of designing things with my love of nature. I like getting to combine elements of nature like trees and flowers with the materials in cities like concrete and steel.

In my job, I help make new construction projects environmentally friendly. One way I do this is by using native plants, or plants that grow naturally in an area, because they don't need as much water or fertilizer to grow! I love that I get to work outside a lot for my job.

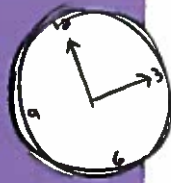
TAGD Certification

50 Minutes

Materials:

- blank and completed labels
- TAGD certification stickers
- 10 Green Design Portfolios
- 10 pencils

Grouping: Individual & Groups



Introduction: In this activity, girls will TAGD certify their rooms. Each room will be rated by the leader according to the TAGD certification guidelines. Then girls will put together their entire houses and receive a house TAGD certification award.

Objective: As a result of this activity, the girls will be able to:

- ☀ Explain LEED certification
- ☀ Review the key concepts in *Make It Green*

Science Behind It:

Leadership in Energy and Environmental Design (LEED) is a green building certification program. LEED focuses on environmental and human health issues, including energy efficiency, indoor environmental quality, materials selection, sustainable site development, water efficiency, and innovation in the design process. The certification is carried out by a third-party company, but overseen by the U.S. Green Building Council. Individuals can also become LEED certified after passing a series of three exams. This professional certification shows that the recipient has knowledge of green building practices and knows how to inspect and certify a building as LEED. This certificate is most desirable for anyone working in the construction industry, including architects, engineers, and contractors. This can also be a useful certification for anyone involved in the real estate or marketing business who wants to show clients their green expertise.

Brainstorm (8 minutes):

1. **Lead** a discussion with the girls about certification. Use the following questions:
 - What does it mean to be certified? (*Certification means that an authorized body has confirmed that you are skilled in a particular area, and that you are an expert or leader.*)
 - What are some things or people that can be certified? (*Safe toys for young children, healthy food, teachers, and doctors.*)
 - How are those things or people certified? (*They pass tests or meet with experts.*)
2. **Tell** the girls that they are going to be **Environmental Engineers** and they must TAGD certify their houses to find out how green they are. Explain that in real life, buildings are LEED (Leadership in Energy and Environmental Design) certified. Today the girls will TAGD (Techbridge Award in Green Design) certify their houses.

TAGD Certification

Hands-On (28 minutes):

3. **Review** the rooms one last time and label anything else that is green and not already labeled.
4. **Turn** to the *TAGD Certification* worksheet, page eighteen, and have the girls complete it for their individual room.
5. **Award** each girl the appropriate level TAGD sticker (which are provided in the box) based on the result from her sheet. Here is the breakdown:
 - Bronze = 30 – 59 points
 - Silver = 60 – 79 points
 - Gold = 80 – 99 points
 - Platinum = 100 + points
6. **Call** the girls up one by one in front of the group to award their stickers. You can also suggest what to do with the sticker. For example, they can stick it on their certification sheet, put it on their room, or keep it for later.
7. **Allow** girls to join their house groups and put together their entire house as shown on the *My Green House Blueprint* worksheet.
8. **Give** the whole house the **average** of the certification levels of the individual rooms. For instance, if there are four TAGD Platinum rooms and two TAGD Gold rooms in House A, then House A gets a Platinum rating. Encourage the team to do the math and come up with their average score.
9. **Look** at the other houses and have the girls present their rooms to the rest of the group.
10. **Allow** the girls to modify their rooms and get recertified to get a higher rating if time permits.

Reflection (15 minutes):

11. **Lead** a discussion with the following questions:
 - What two things would you want to put in your future house? Why?
 - If you had more time, what are some things that you would add or modify in your room?
 - What are some of the careers that would be involved in building your room in real life?
 - Which career introduced during this project is most appealing to you and why?
 - What did you find challenging about this activity?
12. **Tell** the girls that they can take home their rooms with pride. Remind the girls that any level of TAGD certification is an amazing step toward being more environmentally friendly. Also remind them that the careers they have been learning about can all lead to this kind of work in the future. They could all be green designers one day!

TAGD Certification



TAGD Certification



Techbridge Achievement of Green Design (TAGD)

Check off each that applies:

Green Designer: _____

Room of the house: _____

Water Efficiency

- ☐ Water efficient appliances
- ☐ Native plants
- ☐ Recycled water collection/use
- ☐ Roof-top garden
- ☐ Other _____

10 Points each _____ points
 10 Points _____ points
 10 Points _____ points
 10 Points _____ points
 10 Points each _____ points

Energy Efficiency

- ☐ Energy efficient appliances
- ☐ CFL or LED light
- ☐ Use of alternative forms of electricity
- ☐ Large and/or double pane windows
- ☐ Home insulation
- ☐ Other _____

10 Points each _____ points
 5 Points each _____ points
 10 Points _____ points
 10 Points each _____ points
 10 Points _____ points
 10 Points each _____ points

Green Materials

- ☐ Recycled/Reused materials
- ☐ Green materials
- ☐ Recycling station
- ☐ Other _____

10 Points each _____ points
 10 Points each _____ points
 10 Points _____ points
 10 Points each _____ points
 TOTAL _____ points

Total points for your house / number of rooms = TAGD average for your house

_____ / _____ = _____

TAGD Certification Level: Platinum
 [for your room] 100+ points

Gold
 80-99 points

Silver
 60-79 points

Bronze
 30-59 points

TAGD Certification Level: Platinum
 [for your house] 100+ points

Gold
 80-99 points

Silver
 60-79 points

Bronze
 30-59 points

Signature of certifier: _____



Congratulations! Way to think like a future green engineer.

TAGD Certification





Cari



Meet Environmental Engineer: Cari Ishida

Hi, girl! My name is Cari and I am an **Environmental Engineer** from the University of Maryland! As a Girl Scout I loved solving puzzles and problems, and also loved our nature hikes, so a teacher suggested I try environmental engineering. I help to solve some of the biggest problems we face today, like preserving our natural resources and keeping our planet clean!

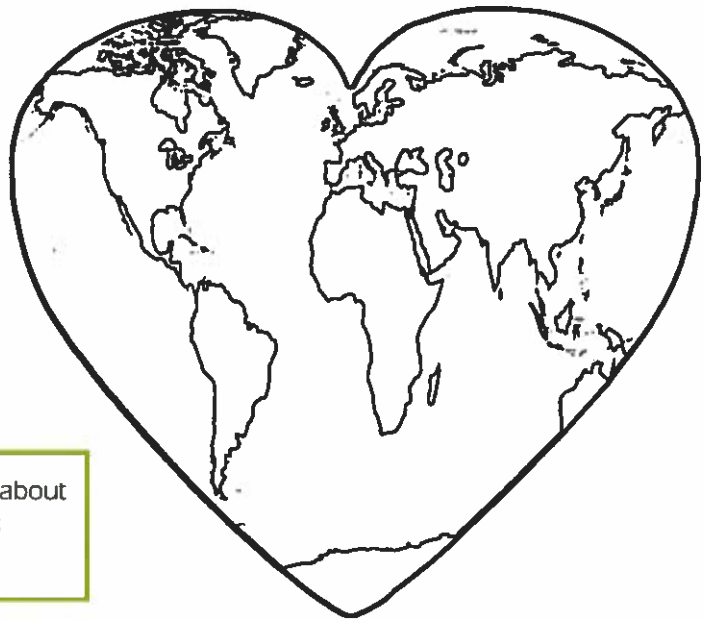
Do you like to make things and experiment? Engineers are problem solvers, we're always thinking of ways to improve the world around us.

In these activities you're going to learn all about engineering, the environment, and how they can work together to make the world a better place. You'll learn more about **Environmental Engineering** later.

There are lots of different types of engineers, and in this portfolio you will meet five of my friends. We're all colleagues, meaning we work together on projects, such as the green model house you're going to make.

Each of us has a role in designing and constructing an environmentally-friendly building, and you'll get to try out each of our jobs along the way.

Just like you, we care about the earth, and we want to "Make It Green!"



I want you to meet my friends. You'll learn about more about them and their work throughout these activities. There's Adhamina, Melanie, Heather, Annie and Joanna.

Adhamina



Melanie



Heather



Annie



Joanna





1. Food Habits

If You...	Then Take...
Eat meat at nearly every meal and eggs and dairy often	5 steps forward
Eat meat once a day and eggs and dairy often	3 steps forward
Eat no meat, but eat eggs or dairy (vegetarian)	2 steps forward
Never eat animal products (no meat, dairy, or eggs)	0 steps forward

If You...	Then Take...
Usually leave half of the food on your plate uneaten	2 steps forward
Usually leave a bit of the food on your plate uneaten	1 step forward
Usually clean your plate	0 steps forward

2. Living Habits

If You...	Then Take...
Live in a free-standing, single-family home	4 steps forward
Live in an apartment, duplex, or mobile home	2 steps forward
Have energy-conserving appliances/ home design	1 step forward
Produce less than one kitchen-size garbage bag per week	1 step forward

If You...	Then Take...
Never turn off the lights when you leave the room	4 steps forward
Sometimes turn off the lights when you leave the room	3 steps forward
Always turn off the lights when you leave the room	2 steps forward
Use two or more CFLs in your home	1 step forward

If You...	Then Take...
Never recycle	4 steps forward
Recycle only one type of product (i.e., paper, plastic, or glass)	3 steps forward
Sometimes recycle the paper, plastic, and glass	2 steps forward
Recycle or reuse all the paper, plastic, and glass you use	1 step forward



3. Water Habits

If You...	Then Take...
Spend more than 6 minutes in the shower	2 steps forward
Spend less than 6 minutes in the shower	1 step forward
Take baths using a full tub of water	2 steps forward
Take baths using a half tub of water	1 step forward

If You...	Then Take...
Let the water run when you brush your teeth and wash your face	1 step forward
Turn off the water when you brush your teeth and wash your face	0 steps forward

If You...	Then Take...
Flush the toilet after every use	4 steps forward
Use a low-flow toilet or put a brick in the tank to use less water	2 steps forward
Let the "yellow mellow" so you do not flush too often	1 step forward

4. Transportation Habits

If You...	Then Take...
Are driven to school	3 steps forward
Take the bus to school	1 step forward
Walk or ride your bike to school	0 steps forward

Finished? Now count how many steps forward you took and divide by four. This is the number of whole Earths it would take to support a population full of you! Think about what things you can do on this quiz to lower your ecological footprint.



Green Design Overview



There are currently over 6.5 billion people on this planet and all of these people need a place to live and work.

Buildings use a lot of energy and raw materials every year. Unfortunately, the amount of resources the Earth produces is limited and the environment we share is becoming more and more polluted. This is where creative green engineers such as you come in!

Your main task will be to design and build a model green house that reduces the negative impact of the building on the planet. You will use the skills and knowledge that you'll develop by completing activities in this portfolio. Each person will be responsible for one of the rooms in this green house and together you will make a complete house.

What makes a house green?

- **Water Efficiency:** Using water-saving strategies in your house to minimize wasting water.
- **Energy Efficiency:** Using energy efficiently by reducing the amount of electricity used in a house or by installing energy efficient devices. This keeps the burning of fossil fuels to a minimum.
- **Green Materials:** Using materials which reduce, recycle, or reuse materials rather than using nonrenewable materials or materials that release pollutants into the environment.

Green Certification



In order for a house to be certified green it needs to fulfill several green codes. In the real world, green builders have a rating system that determines how green a building is. This rating system is called LEED or Leadership in Energy and Environmental Design.

Your Leader will be rating your rooms to give you a TAGD (Techbridge Award in Green Design) certification. The TAGD certification levels are listed below. You will get points for each clearly labeled green strategy used in your room. Your score will determine the level at which your room is considered "green." Then your entire group's house will be given a TAGD certification award based on an average of all the rooms' award levels.

TAGD Certification Levels	
Bronze	30 - 59 points
Silver	60 - 79 points
Gold	80 - 99 points
Platinum	100+ points



My name is Joanna and I am a **Materials Science Engineer**.

I graduated from the University of Central Florida with a degree in Engineering.

Materials Engineers design new and improved materials to use when making different products. Right now I'm developing new magnetic materials that might go in computer chips. My friend is working on creating a new non-stick coating for frying pans.

In college, we studied physics to see how things moved, and designed materials to match those movements. We studied skis to help us develop a more flexible material that makes skis easier to handle on bumpy slopes. Pretty cool, huh?



What Green Material Am I?



Joanna



Today you are going to be a **Materials Science Engineer**, like me! You are going to discover ways to make building materials from renewable or recycled resources. Renewable materials are better for the Earth because they are made from sources which grow back quickly. Try to figure out which natural resource or recycled material is used to make the finished product.

Source Materials	Green Material Letter
1. Bamboo	
2. Cork tree	
3. Old tire	
4. Wood scraps and grocery bags	
5. Recycled jeans	
6. Wool	
7. Rubber tree sap	
8. Shredded paper	
9. Sorghum grasses	
10. Glass and shells	
11. Flaxseed and wood flour	
12. Plastic bottles	

When I was growing up, I loved playing with magnets and seeing how they worked. In college, we studied physics to see how things moved, and designed materials to match those movements. If you're curious, sensitive to how things feel, and wonder about how things work, maybe you should be a **Materials Science Engineer** like me. Keep up the good work! – Joanna



My Green Room

Joanna



To make our rooms green, let's first look at the things our rooms usually contain. In the first column, list all of the appliances, devices, and furniture that your type of room usually contains. This can also include windows, mirrors, wall paint, flooring, and more. In the second column, think of a way to make each of these items greener. Use the Green Materials 101 and Green Construction 101 pages in this portfolio for ideas. And most importantly, get creative! Here's an example:

This is what is normally in this room:	My room will be more green because...
Hardwood floors	The floors will be made out of bamboo
Big screen TV	There will be a smaller TV powered by bicycle.

This is what is normally in this room:	My room will be more green because...

Now write each green alternative on a label. You will be putting these in your rooms as you design and they will be used to certify your room green!



Adhamina



Meet Architect: Adhamina Rodriguez

My name is Adhamina and I'm an **Architect**. I studied at the University of Seville in Spain, and moved to the U.S. after graduation. **Architects** design new buildings and houses, and improve existing ones. They think about how the buildings look from the outside and design floor plans. As an **Architect**, I get to be creative and draw beautiful buildings, but I also have to know a lot about the structure of buildings and how they stay up. I love finding creative ways to make buildings environmentally friendly while keeping my designs beautiful.

Today you are going to be an **Architect**, too! You have to design a blueprint, or a detailed plan of what you are planning to build. You need to decide what green elements to include in your room, and the materials needed to build it.

Have everyone in your same house come together and figure out how the rooms will be joined. Decide as a group where the windows and doors will be in your house. **Draw a blueprint of your group's entire house in the space provided below.** Make sure to clearly label all rooms, windows, and doors. Draw on your box where the windows and doors will be in your own room.



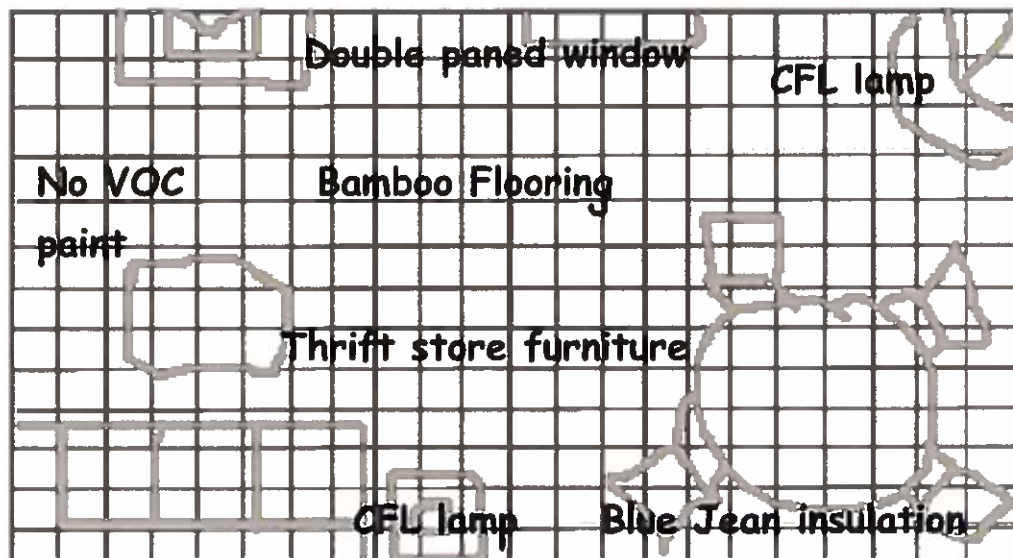
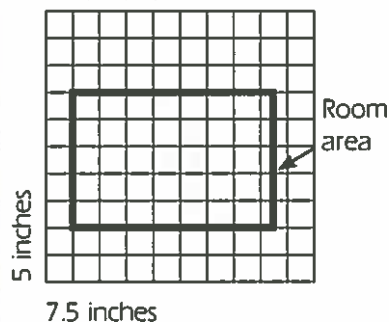
My Green Room Floor Plan



Measure your shoebox and draw lines on graph paper to make an area that is the same size as your shoebox. Example →

Now draw all of the items you want in your room on the graph paper. Label these items with its green name (for example, say "Bamboo Flooring" instead of just "floor"). Also, write any green things that go on the walls of your box (such as insulation or the type of paint you will use). Here is an example ↓

Graph paper



Now cut out your floor plan and put it inside of your box to see how it looks. Do not glue it! You will need to remove the floor plan when you start building.



When I was in school I liked history and art. I am also into fashion, travel, and interested in cultures and style. If you are artistically creative, but also precise and detail-oriented with a sharp sense of observation, you would make a great **Architect**! Cheers! – Adhamina



Melanie



Meet Civil Engineer: Melanie LaPointe

My name is Melanie and I am a **Civil Engineer** from the University of Texas at Austin. **Civil Engineers** design structures and complexes that people use every day. Things like large buildings, bridges, sewer systems, roads, and airports. **Civil Engineers** specialize in making the structure safe and strong, rather than drawing the design (like an **Architect**).

I work for a company that specializes in "green" construction. Our company has recently designed a brand new office building that generates all of its own energy. I love that my job lets me be creative, inventive, help people and help the Earth, all at the same time.

Today you are going to be a **Civil Engineer**, like me! You need to think about the plumbing and sewage, as well as the walls, floors, and insulation of your house. Make sure to include things like windows and maybe a skylight. Your leader has door and window stickers you can apply to your room, or feel free to get creative and draw your own.

Now that you have applied your windows and doors, you can design the walls, floors and insulation of your box. Refer to your floor plan and list to see what green materials you planned to use.

You can use construction paper, fabric, or foam sheets, or any other material you can think of to represent your green walls and floors.

Tips:

- Use the Green Materials and Green Construction 101 handouts for help choosing green materials.
- It's easiest to put the insulation in first, then the wallpaper, and then the flooring.
- Put sticky labels on the green features in your room as you make them.



Melanie



I always liked science and thought I wanted to be a doctor. But when I went to college, I realized I didn't like being in a lab all day. I decided to study engineering instead. I love that my job lets me be creative, inventive, help people and help the earth, all at the same time. If you're interested in designing large structures that lots of people use every day, that could be around longer than your own lifetime, **Civil Engineering** might be a good pick for you!



Meet Product Designer: Heather Fleming

My name is Heather. I went to Stanford University and I am a **Product Designer**.

Product Designers combine art, science, and technology to make the products we use every day.

I run my own company that makes products for villages in developing countries. My company has made things like wind turbines that a family can use to power small lamps or a radio that works in places where electricity is unreliable. I love that I can use engineering to create products that are efficient, affordable, and environmentally friendly!

Today you are going to be a **Product Designer**, too! You need to think about what you need in your house and how that product can be environmentally friendly! Think about alternative sources of energy, recycled materials and energy-efficient appliances.

Now it's time to design the interior of your room. This means that you choose the furniture, the appliances, the art, etc. Get creative and stay green! Use the different materials that your leader has available to you to build everything that goes inside your room.

- Always refer to your Floor Plan and list to make sure you are including the green things you wanted. The **Green Materials 101** and **Green Construction 101** pages can also help you figure out what green materials to include in your room.
- Label your room as you are designing. You can create more labels if you think of new green things to put into your room that you didn't already have.

Glue gun safety instructions:

- Always put the glue gun down when you are not using it. Make sure it is not put on anything that can get burned.
- Always look at what you are gluing. Do not turn your attention away for a second!
- Do not try to get someone's attention while they are gluing.
- Unplug glue guns when no one will be using them.



I grew up with a big family and always liked helping people. I wanted to find a way to continue helping others for a career. I love that as a **Product Designer**, I can use engineering to create products that are efficient, affordable, and environmentally friendly! If you like creating new things that solve problems or make daily life easier, keep **Product Design** in mind for your future.



Meet Landscape Architect: Annie Abbot



My name is Annie and I am a **Landscape Architect**. I went to Michigan State University. **Landscape Architects** design, plan, and manage land. They help plan the outdoor spaces of a building complex or city, and concentrate on making these areas functional, beautiful and in harmony with the natural environment.

In my job, I help make new construction projects environmentally friendly. One way I do this is by using native plants, or plants that grow naturally in an area, because they don't need as much water or fertilizer to grow!

Today you are going to be a **Landscape Architect**, too! You will design the exterior of your house. What "green" things can you include? Think about what is outside your house (air, water, and sunlight) and how to incorporate that into your designs!

Look at the outside of your room, especially the "roof," and think about how you can make it green.

I grew up camping and hiking and I love that I get to work outside a lot for my job. In school my favorite subjects were art and biology. With this career, I found a way to combine my love of designing things with my love of nature. If you enjoy these things too, check if your dream college offers a major in **Landscape Architecture**!





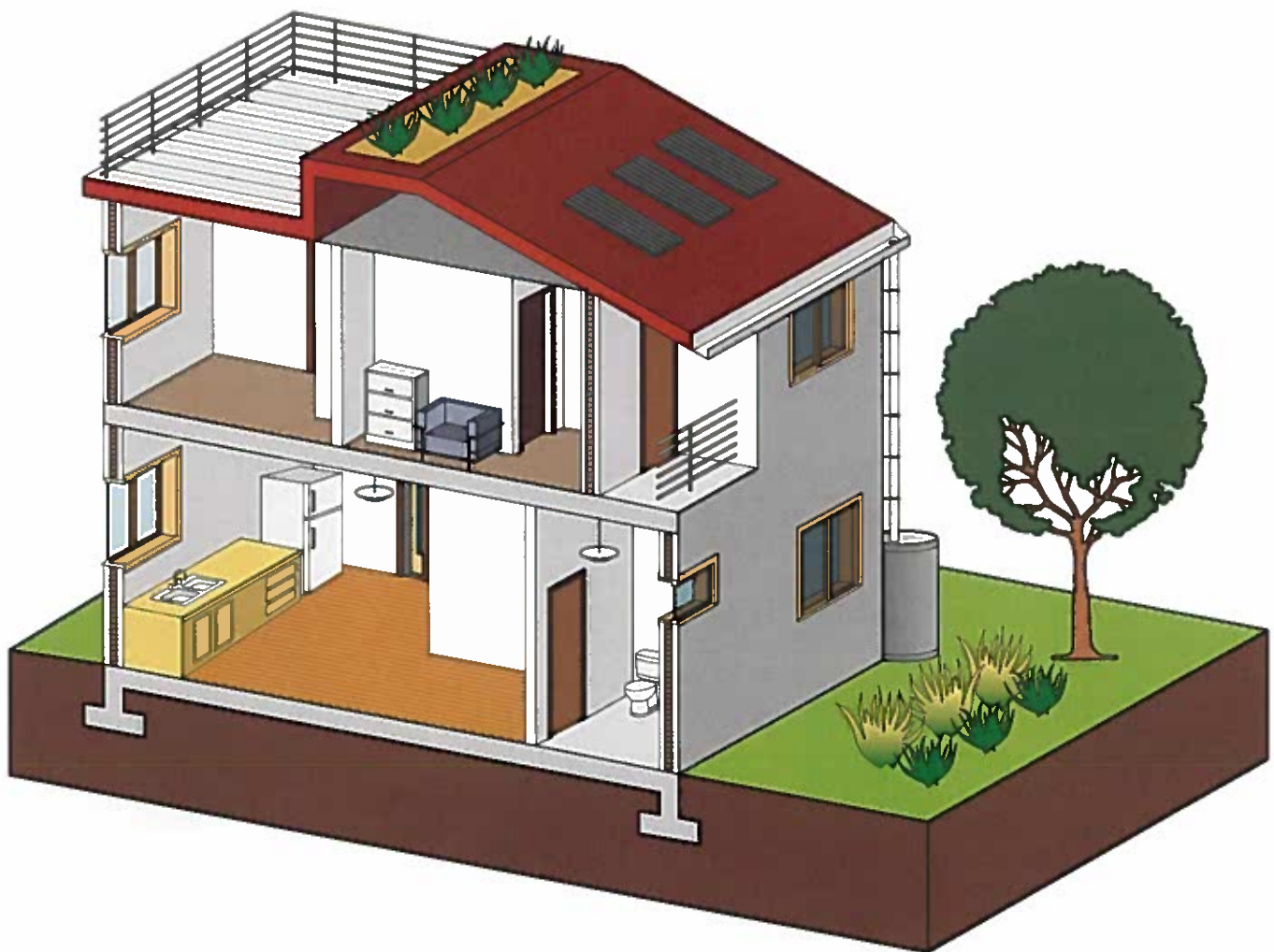
I Spy Something Green

Draw a line to connect these green elements to their place in the house:

1. Compact fluorescent lighting (CFLs)
2. Solar photovoltaic system (solar panels)
3. Low VOC paint
4. Energy efficient appliances
5. Insulation from recycled or re-purposed materials
6. Double paned windows
7. Bamboo flooring
8. Native plants
9. Low-flush toilet
10. Composite or Aluminum deck

Bonus:

See if you can identify four more green elements in the house!





TAGD Certification



Cari



Hey, it's me, Cari, again! You've done some great work building your green room, and meeting all of my friends, Joanna, Adhamina, Annie and Heather. Do you remember what I do?

Environmental Engineers like me work with lots of different industries to help protect the environment and keep it green.

My company certifies "green" buildings based on LEED criteria (Leadership in Environmental and Energy Design). I also help new companies make sure their development doesn't harm the environment.

Today you are going to be an **Environmental Engineer**, too! You are going to be a TAGD (Techbridge Award in Green Design) representative evaluating how green your house is. Each of the choices you made about materials, style and construction factor into the LEED score your green house will receive. There are four levels of "green-ness" ranging from Bronze to Platinum.

What does LEED mean? Leadership in Energy and Environmental Design (LEED) Certification is a big deal to many companies. It's like a special award or recognition for environmentally friendly choices the **Engineers, Architects** and owners of the building made along the way. The owners of a LEED certified building may receive tax discounts for choosing green products. That rewards them for helping planet earth.



Are you finished with everything? Check to make sure you included and labeled everything that you wanted to from your My Green Room Worksheet and My Green Room Floor Plan Worksheet. You are now ready to be certified! Good luck!



Green Materials 101

Raw Materials	Green Materials	Benefits
Bamboo 	Bamboo Flooring 	Bamboo grows fast (up to 50 feet in five years). In comparison, hardwoods are harvested from trees that can take 30 to 100 years to mature. Since bamboo is a type of grass, it can be harvested again and again from the same plant.
Cork Tree 	Cork Flooring 	Cork flooring is made from the bark of the cork tree. Cork trees are peeled instead of cut down and their habitats remain undisturbed. One cork tree can be harvested every 10 to 12 years and can live about 150 to 250 years.
Old Tires 	Rubber Flooring 	Recycled rubber flooring is made from 100% tire rubber. Rubber flooring reduces the amount of scrap tires and tire dumps which are a serious environmental hazard.
Wood Scraps & Grocery Bags 	Composite Wood 	Composite wood is made from scraps of used wood and grocery bags. It is popular for decks and outdoor furniture because it will never splinter, crack, or harbor insects. This eliminates yearly maintenance with sealants and insecticides that can be hazardous to the environment.
Denim 	Jean Insulation 	Jean insulation consists almost entirely of natural denim and cotton fibers that are 100% recyclable, reducing landfill waste. Jean insulation contains no chemical irritants and requires no warning labels unlike traditional insulation products. The jean material used in insulation is typically scrap material from manufacturers, not second-hand jeans.
Wool 	Wool Carpeting 	Wool carpets are naturally stain resistant, easy to vacuum and wash, fast drying, and flame resistant. Natural fibers are recyclable and biodegradable. Also, using more wool doesn't hurt the sheep because all it takes is a shearing when the wool gets long.



Green Materials 101



Raw Materials	Green Materials	Benefits
Rubber Tree Sap 	Rubber 	Natural rubber is extracted from trees in the form of latex. The tree is tapped and the latex that oozes from the cut is collected in a small cup. The trees are never cut so there is less impact on the environment.
Shredded Paper 	Paperstone 	Paperstone is a countertop or shelving material made of pressed paper. It is 100% post-consumer, meaning all of the paper used has been recycled. The paper is combined with a VOC-free resin and natural pigments. The recycled paper is stacked and then pressed with heat and pressure to make a rigid, dense material strong enough to be used for furniture and paneling too.
Sorghum or Wheat 	Biocomposites like Kirei Board 	Biocomposites can be used to make cabinets, tables, and other furniture. They are made of grains, grasses, stalks, sunflower hulls, and wheat which are rapidly renewable agricultural fibers. Sorghum and wheat can be harvested yearly rather than the alternative option of cutting down trees that take longer to grow.
Shells and Glass 	Beachstone 	Beachstone is a durable countertop or tile -type material. Beachstone is made of 80% post-consumer waste that would otherwise be thrown in a landfill. It is a blend of shells and glass, with a sealant on top.
Flaxseed & Wood Flour 	Linoleum 	Linoleum's raw materials are renewable and can be produced sustainably. The manufacturing process is clean and reasonably energy efficient. Linoleum is also non-allergenic and very durable in high traffic areas.
Plastic Bottles 	Recycled Carpets 	Recycled carpets are made from fibers that are made from 100% recycled soft-drink and ketchup containers. The dyeing methods are also considered to be greener than other flooring. Be sure recycled carpets are installed with eco-friendly glue.



Make Your Structure Green:

WARM WALLS

Make sure walls and ducts are well insulated. Select an insulation material that suits your area's needs. Choose products with the highest recycled content possible, using scrap denim or re-purposed carpet.



Why?

Up to 35% of your home's heat is lost through the walls and ducts. According to the Department of Energy, space heating and cooling consumes 44% of all energy used in the home. Adding insulation can help control heat gain and loss, which helps save the energy consumption of a heater or an air conditioner.

LOW OR NO VOC PAINTS

Use no VOC or low-toxic paints, finishes, and coatings on interior walls and furniture. Use low-VOC adhesives and sealants.



Why?

VOCs are volatile organic compounds that are hazardous to your health and the environment. So use low-VOC, no-VOC, or natural paints instead.

CEILING FANS

Put in ceiling fans in as many rooms as possible. Make sure to match the fan size to the room size. Use variable speed fans as well.



Why?

A ceiling fan can save up to 40% on your cooling costs and up to 10% of your heating costs. Ceiling fans circulate the air in a room so in the winter the warm air near the ceiling is circulated and in the summer the cold air is circulated.

SEE THE LIGHT

Switch to compact fluorescent light bulbs (CFLs)--the twisted spiral ones.



Why?

CFLs use less energy and last longer than traditional bulbs. These light bulbs also give off less heat, so the temperature of the air in your room is less likely to increase when all the lights are on.

LET THE SUNSHINE IN

Put in large, high performance, energy efficient windows and skylights to allow maximum sunlight into the house. Use double-paned windows.



Why?

Sunlight can help heat the house, as well as let you use fewer indoor lights. You can lose up to 15% of your home's energy through windows; therefore, the extra pane on the windows can help save energy usage and cost.



Include These Green Additions:

GO ALTERNATIVE!

Try to use solar, wind or water power. Angle the roof south toward the sun if you are using a solar panel.



Why?

These sources of power are called "renewable sources" because they don't run out. Benefits are lower utility costs.

SEE IT GROW

Plant a garden in the yard and/or on the roof. Plant trees and low-water and native plants. Consider replacing decorative lawns with water conserving native ground covers, turf, or shrubs.



Why?

The gardens absorb rain water run-off, and can help keep the area cool. Trees by the window will block heat in the summer with their foliage and when the trees are bare in the winter, they will allow heat to enter. Plants that are native to the area use less water and can help restore local habitats.

BE A STAR

Use energy-saving appliances when possible. Do things by hand (line-dry clothes and hand-wash dishes).



Why?

These actions will cut down on the amount of energy used in your home.

IT'S HIP TO RECYCLE

Make space for recycling and composting bins.



Why?

This reduces the amount of trash waste. The compost can be used as soil for your yard or garden. This will bring to life the soil and feed existing soil organisms.

WATER, PRECIOUS WATER

Conserve water. Use water-saving faucets, low-flush toilets, and rainwater for landscaping.



Why?

The average American uses 100-175 gallons of water a day. Conserving can help save this important resource.



TAGD Certification



Techbridge Achievement of Green Design (TAGD)

Check off each that applies:

Green Designer: _____

Room of the house: _____

Water Efficiency

- ☐ Water efficient appliances
- ☐ Native plants
- ☐ Recycled water collection/use
- ☐ Roof-top garden
- ☐ Other _____

10 Points each	_____ points
10 Points	_____ points
10 Points	_____ points
10 Points	_____ points
10 Points each	_____ points

Energy Efficiency

- ☐ Energy efficient appliances
- ☐ CFL or LED light
- ☐ Use of alternative forms of electricity
- ☐ Large and/or double pane windows
- ☐ Home insulation
- ☐ Other _____

10 Points each	_____ points
5 Points each	_____ points
10 Points	_____ points
10 Points each	_____ points
10 Points	_____ points
10 Points each	_____ points

Green Materials

- ☐ Recycled/Reused materials
- ☐ Green materials
- ☐ Recycling station
- ☐ Other _____

10 Points each	_____ points
10 Points each	_____ points
10 Points	_____ points
10 Points each	_____ points
TOTAL	_____ points

Total points for your house / number of rooms = TAGD average for your house

_____ / _____ = _____

TAGD Certification Level: Platinum
(for your room) 100+ points

Gold
80-99 points

Silver
60-79 points

Bronze
30-59 points

TAGD Certification Level: Platinum
(for your house) 100+ points

Gold
80-99 points

Silver
60-79 points

Bronze
30-59 points

Signature of certifier: _____



Congratulations! Way to think like a future green engineer.