



# AIAS

## SUSTAINABILITY AND RESILIENCY TASK FORCE 2019-2020

# BEST PRACTICES GUIDE

## OUR VISION

We as a committee have created this guide as a resource for students, schools, and communities at large to address sustainable practices. We cover many different topics such as recycling, building practices, and sustainability-focused organizations. Additionally, these topics are analyzed through three different lenses: school/chapter, community, and individual. Our hope is that AIAS members will use this manual to enhance their projects and everyday lives with sustainable practices that are fun and easy to implement.

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# RECYCLING

## STUDIO / CHAPTER

### HAVE A STUDIO GARAGE SALE

- Collect unwanted modeling materials and equipment from students and graduates at the end of each semester
- Make sure to designate collection locations and times in studio, and ADVERTISE!!!
- Sort the collected items and price them
- Host the garage sale at the beginning of the year or semester and make sure to advertise to incoming students!

### CREATE SEPARATE RECYCLING STREAMS

- Schools should have separate recycling streams in studio to separate between:
  - Plastics
  - Paper
  - Cardboard / Chipboard
  - Organic Waste
  - Metals
  - Wood
- Chapters can design / decorate these separate disposal containers during a GA of FBD charrette for chapter bonding!

### DESIGNATE A MATERIALS ROOM

- Many schools have a designated space where all unwanted materials can be donated for communal use
- This is especially important for younger students as they are not as experienced with buying the RIGHT amount of materials

## COMMUNITY

### FIND OR START A REUSE PROGRAM

- Find supply stores that sell recycled supplies from student donations in the area
- This can benefit students with lower incomes as well as community recycling efforts
- If you can't find a program like this, speak with your store about starting one, or create one at your school!

### DONATE TO LOCAL SCHOOLS

- Donate supplies to schools in your local area
- These donations can support underfunded arts programs and can foster childrens' interest in design
- Chapters can also use this as an opportunity for community outreach and foster connections with high school chapters

## INDIVIDUAL

### LAYOUT YOUR LASERCUTTING SHEETS WITH CARE

- Make sure your lasercutting sheets are laid out to minimize edge waste

### CHECK YOUR MACHINES

- Check lasercutters for a clean lense that is properly focused
- Make sure the laser cut through your material all the way before removing it from the bed
- Check 3D printer settings to make sure the temperature and flow are calibrated to avoid mistakes and wasted plastics

# MATERIALS

## BUYING SMART

### **CALCULATE WHAT YOU NEED**

- Try to avoid overbuying materials
- Plan out the type and amount of materials you will need in advance, don't wait until you are in the store!
- Know the dimensions of your model and of the materials you plan to buy
- Find material dimensions, colors, and shapes online or through a quick phone call
- Offer to help younger students with less experience to plan out their modeling needs

### **RESOURCE POOLING**

- Buying materials with friends can help create a resource pool
- This means using up the materials in the pool before replenishing supplies
- Resource pools help diversify material options and to split costs between friends
- You can also carpool to buy materials, or take turns

### **FIND A LOCAL SUPPLIER**

- Check if any of the materials you need can be sources from a local supplier, especially when woodworking
- This can help support small businesses and reinforces sustainable practices

## NON-RECYCLABLES

### **COMMON MATERIALS THAT CANNOT BE RECYCLED**

- REMEMBER: There is a difference between recycling and reuse! Most of these can be reused!
- MDF
- Foam
- Finished, painted, or stained wood
- Acrylic plastic sheets
- Coated trace papers
- Textiles
- Any material with large quantities of adhesives, including hot glue, tacky glue, industrial glue and tape
- Any material with large quantities of paint applied to it (pen and marker are usually OK)

## ADHESIVES

### **USING LESS**

- Glue and common adhesives cannot be recycled
- Consuming less adhesive is the best way to conserve this material
- Make sure to always recap your glue, as most glues contain water which will evaporate and render your glue useless
- Try to buy the smallest size available for super glues, as they dry out faster than other adhesives

### **WOODWORKING ALTERNATIVES**

- See if you can use mechanical fasteners like screws and nails when working with wood
- Screws can be reused, while nails can be melted down and repurposed when recycled

# YOU AND YOUR SCHOOL

## YOUR STUDIO PROJECT

### INTEGRATING SUSTAINABLE BUILDING PRACTICES INTO YOUR DESIGN

- Look for ways to respect the site you are building on
- Choose your materials based on sustainability ratings
- Look at the types of labor that would be required for material sourcing and building the actual design
- Actively incorporate passive strategies for heating, cooling, ventilation, and daylighting
- In advanced studios, assess different types of HVAC systems that can be used

### REFERENCES / WEBSITES

- AIA 2030 Challenge
- <http://www.2030palette.org/>
- <https://core-studio.gitbook.io/beacon/>
- OKALA Ratings
- MIT Sustainable Design Lab
- <https://new.siemens.com/global/en/products/buildings/digitalization/digital-building-lifecycle/building-twin.html>

### HELPFUL TOOLS / PLUG-INS

- Climate Consultant
- LadyBug - Rhino
- DIVA - Rhino
- HoneyBee - Rhino
- Insight - Revit
- Sefaira - plugin for Revit and Rhino

## WHAT CAN YOUR SCHOOL DO?

### HIGHLIGHTING HEALTHY PRACTICES

- Schools can encourage biking or the use of public transport through discounts for students and professors
- Schools can use social media to highlight sustainable practices and student projects that incorporate them
- Studio lights can be placed on a timer or manual switch to encourage students to use individual LED desk lamps
- Computer labs should be checked for all monitors and computers to be turned off after use
- Architecture schools can advocate for renewable energy sources to run the campus
- Schools can add plants and greenery to studio spaces to increase oxygen supply and brighten the students' environment
- Sponsoring visits to firms that champion sustainable design can show visible value to students

### INTERDISCIPLINARY LEARNING

- Schools can create interdisciplinary challenges between departments, clubs, and students
- Collaboration between different majors on projects can expand common knowledge on sustainability between students
- Teaching sustainability can be shared between all professors
- Regularly updating projects and teaching methods can ensure sustainability practices are being taught

# BUILDING METHODS

## DEFINING

### WHAT ARE SUSTAINABLE BUILDING METHODS?

Sustainable building methods are methods for design that are incorporated into buildings in an effort to make them more sustainable. Some common Sustainable Building Methods include: incorporation of the natural environment into design, orientation of the building, materials used in construction, and technology incorporated into designs. The following are a small selection of ways to incorporate sustainable building methods into your designs and, as always, research should be conducted to ensure that any building method is used appropriately.

## NATURAL ENVIRONMENT

### BIOMIMETIC PRACTICES

- Biomimicry is the analysis of natural processes, especially in regards to materials, structure, and systems
- This knowledge can then be applied to the design of buildings to “mimic” nature

### GREEN ROOFS

- Green Roofs are roofs that host vegetative life
- They can be Extensive, Semi-Intensive, Intensive, Bespoke, and Sloped
- These different roof types range on a few scales:
  - Growing medium thickness
  - Accessibility
  - Maintenance
  - Types of greenery able to grow

### GREEN WALLS

- Green Walls are similar to Green Roofs in growing medium thickness and structure
- They are different as they can be used inside and are more adaptable in nature as they can be smaller in scale

## ORIENTATION AND DESIGN

### PASSIVE VENTILATION

- This is technique allows a building to heat and cool with limited use of mechanical means

### SHADING METHODS

- Providing shade to the openings of a structure (louvres, overhangs, etc.) can prohibit some light from entering a building

### TROMBE WALLS

- They consist of an outer glass skin and an inner skin made of a thermal mass material.
- Light enters through the outer skin and heats up inner skin so that heat is released gradually into the building

### MATERIALS AND TECHNOLOGY

- Masonry and concrete can be useful for thermal mass, fire resistance, and reuse for new designs
- Glass must be properly insulated and shaded with attention to new technologies like gas filled windows
- Steel can be continuously recycled for structural supports like rebar
- Wood is a renewable material, however safe forestry practices must be a factor when choosing the type

# RENEWABLE ENERGIES

## DETAILING DIFFERENT TYPES

### **GEOHERMAL ENERGY**

- This is a closed loop system that includes coils underground that transfer or absorb heat from the earth's crust for energy
- Seasonally, heat can be dispersed through the ground to make a building cooler, or heat can be absorbed to heat a building

### **SOLAR ENERGY**

- Takes two forms: Photovoltaic Cells (PV) and Concentrated Solar Thermal Power (CSP)
- PV works better in climates with steady light but lower heat
- CSP works better in climates with severe heat and could prove more viable in the future with climate change
- Solar energy use has doubled seven times globally since 2000
- An incentive for consumers to invest in solar energy is Net Metering
- Net Metering allows for electricity produced by consumers' rooftop panels to be fed back into the grid
- Websites like Google Sunroof and PVWatts calculator can help consumers and designers see energy savings by using solar
- Hopefully PV can be incorporated into design more frequently in coming years

### **WIND ENERGY**

- Wind is a plentiful, clean resource around the world
- Onshore wind and offshore wind energy are both used however, offshore wind energy is stronger and more consistent
- Wind turbines work by converting wind energy into electricity
- Storage for electricity is a rapidly growing research area
- China is the current world leader in wind power
- For every doubling of windspeed, the amount of energy produced is cubed
- Wind power is a largely bipartisan issue as the wind corridor in the United States resides in majority Republican States

### **HYDROPOWER**

- Hydropower currently produces more electricity than nuclear energy
- It contributes 16% of electricity globally

Romm, Joseph J. Climate Change: What Everyone Needs to Know. New York, NY: Oxford University Press, 2018.

## OTHERS TO RESEARCH

### **OTHER CLEAN ENERGY / POWER OPTIONS**

- Wave Energy
- Tidal Energy
- River Energy
- Kinetic Energy
- Battery Power
- Biomass Energy
- Biofuel
- Agriculture production with aquaponic system

# ADVOCACY AND LEADERS

## ADVOCACY

### GROUPS AND CHALLENGES

- USGBC
- Living Building Challenge
- International WELL Building
- Green Building Initiative

### HOW TO PROMOTE GROUPS LIKE THIS

- Host classes and workshops
- These can be at community centers or school based for credit
- Invite representatives from different organizations to present at your school
- Invite groups for panel discussions

## LEED / INDIVIDUAL INITIATIVE

### GETTING CERTIFIED / SUSTAINABLE CREDENTIALS

- People can gain certifications from certain organizations like LEED
- To become LEED certified you must take the LEED Green Associate Exam
- This is a one hundred question exam on energy efficiency and sustainability
- If you pass you are granted LEED certification which you can then put on your resume

### STUDY TIPS

- Recommended study time for this exam is 20 hours minimum to fully understand the rating system
- There are many study guides available online

### LEED BASICS

- The LEED rating system is split into 5 main categories:
  - Building Design and Construction
  - Operations and maintenance
  - Neighborhood development
  - Interior design and construction
  - Homes
- LEED certified buildings must meet prerequisites and choose from 110 credits points to reach a desired certification level
- There are four levels of LEED building:
  - Certified (40-49)
  - Gold (60-79)
  - Silver (50-59)
  - Platinum (80+)

## LEADERS

### LEADING DESIGNERS IN SUSTAINABLE DESIGN

- HOK
- Foster + Partners
- Bjarke Ingels Group
- Gensler
- The Living
- ZGF
- Jones Studio
- Stantec
- Studio Gang
- Doris Sung of DO | SU Studio Architecture
- EYP Architecture & Engineering
- Tom Jacobs of Krueck+Sexton Architects