

SUSTAINABLE DESIGN

Sustainability module Spring 2011

What is Sustainable Design in the Building Industry?

Sustainable design attempts to minimize the impact on the environment from the buildings and spaces we design and have built, in addition to the way those buildings affect the humans that inhabit them.

Sustainable architecture is the design of [sustainable buildings](#).

Sustainable architecture attempts to reduce the collective environmental impacts

- 1) during the production of building components,
- 2) during the construction process, as well as
- 3) during the [lifecycle](#) of the building (heating, electricity use, carpet cleaning etc.)

SUSTAINABLE DESIGN

Establishing a Baseline of Student Knowledge:

First, we establish what the students know about the idea of sustainability and what their personal perspective is.

I ask the following questions and ask for written answers:

- 1) What is sustainability?
- 2) What is sustainable design?
- 3) How do you think we currently practice sustainable design?

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WHY DESIGN WITH SUSTAINABLE PRACTICES?

Tell them the scary facts:

1. Every year, US buildings are responsible for 39% of US CO2 emissions (greenhouse gases.)
2. Every year, US buildings are responsible for 70% of US electricity consumption.
3. Each year, US buildings use over 15 trillion gallons of water, which is 12% of our potable water usage.
4. Buildings in the US consume 30% of the raw materials we use (and buildings worldwide consume 40% of the raw materials used worldwide.)

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WHY DESIGN WITH SUSTAINABLE PRACTICES?

Then tell them the good we are doing with sustainable design:

1. Green buildings use an average of 30% less energy than conventional buildings, with corresponding reductions in CO2 emissions. Gold and Platinum LEED buildings achieve 50% or higher.
2. Studies indicate people in green buildings have a 40-60% lower incidence of colds, flu and asthma. Patients in green hospitals are discharged as much as two and a half days early.
3. Kids in green schools have test scores that are up to 18% higher. Schools designed and constructed according to LEED standards save an average \$70 per square foot in operation costs, use 33% less energy, have a 40% lower occurrence of asthma, have 5-15% higher daily attendance, and have in general better student and teacher performance.
4. Corporations like GE Real Estate are using LEED to evaluate new purchases and benchmark and retrofit existing buildings in their entire portfolio.
5. LEED-certified buildings are achieving an increase in rental rates of \$11.24 per square foot and 3.8% higher occupancy rates, and they are achieving greater sale values: \$171 per square foot.

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The I explain HOW to design sustainably:

Design Process:

1. Sustainable issues are addressed the first day of a project, with the entire team present, including the Owner. This is sometimes referred to as an ECO-CHARENTE.
2. Sustainable intentions are defined by the group, based on costs, long term benefits, short terms benefits, etc.
3. The Owner will ultimately decide whether the project will seek LEED certification (Leadership in Energy and Environmental Design, a US Green Building Council program.)
4. Every team member maintains the design decisions that affect his/her area of expertise that established in the Eco-Charente. i.e. if native plants are intended to be used, the Landscape Architect maintains that information in their specifications throughout the project, through the permitting, bidding and construction phases.
5. At each milestone in the process, all team members report back to the team as to the evolution of the details around those sustainable decisions.

SUSTAINABLE DESIGN

The first thing to do is locate the building as well as possible on the site.

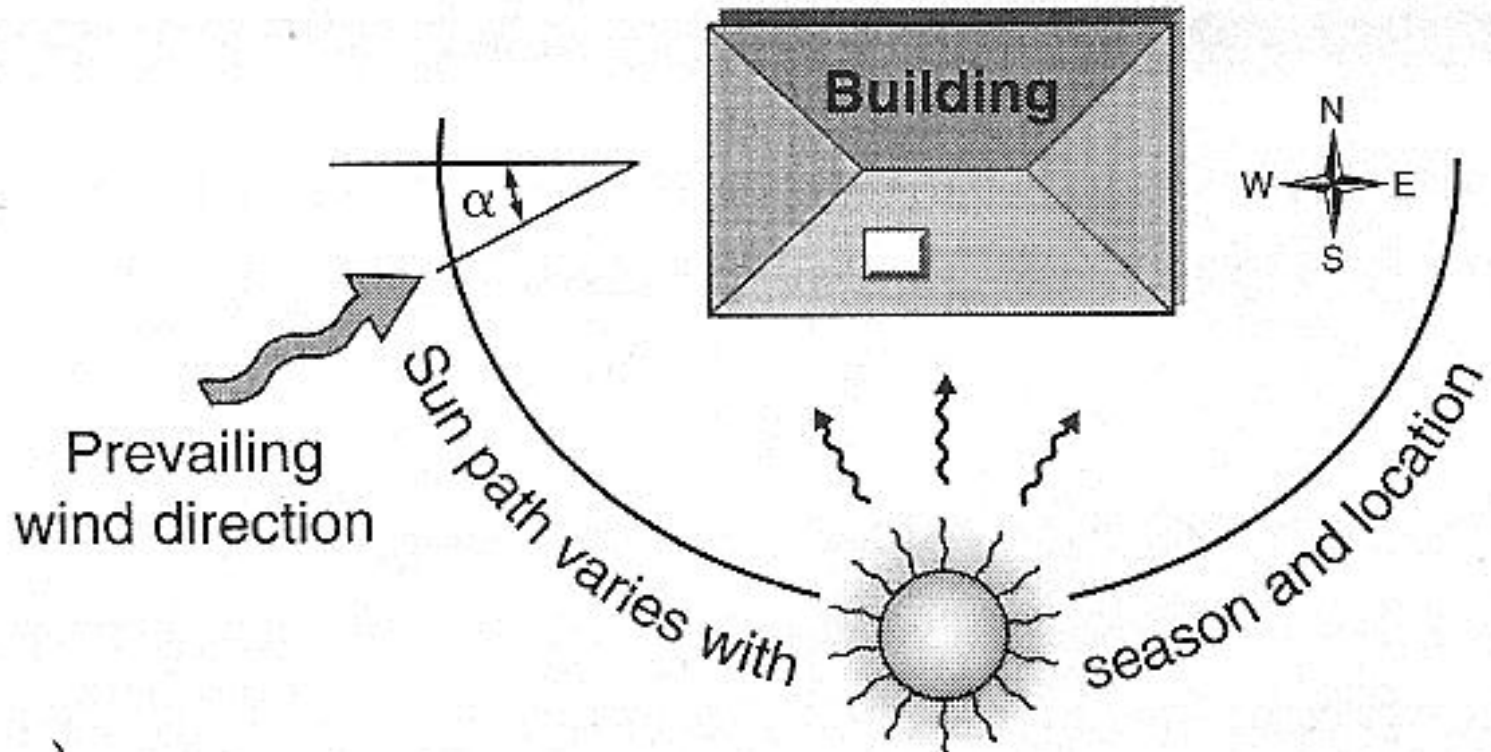


FIGURE 5.6 Orient buildings to take advantage of natural site features such as sun and wind.

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HOW will they learn to make the right decisions in the design process?

Systems Analysis = study of elements and the interaction between them.

Examining all factors.

Interdependence in a system.

We must take a **HOLISTIC APPROACH**.

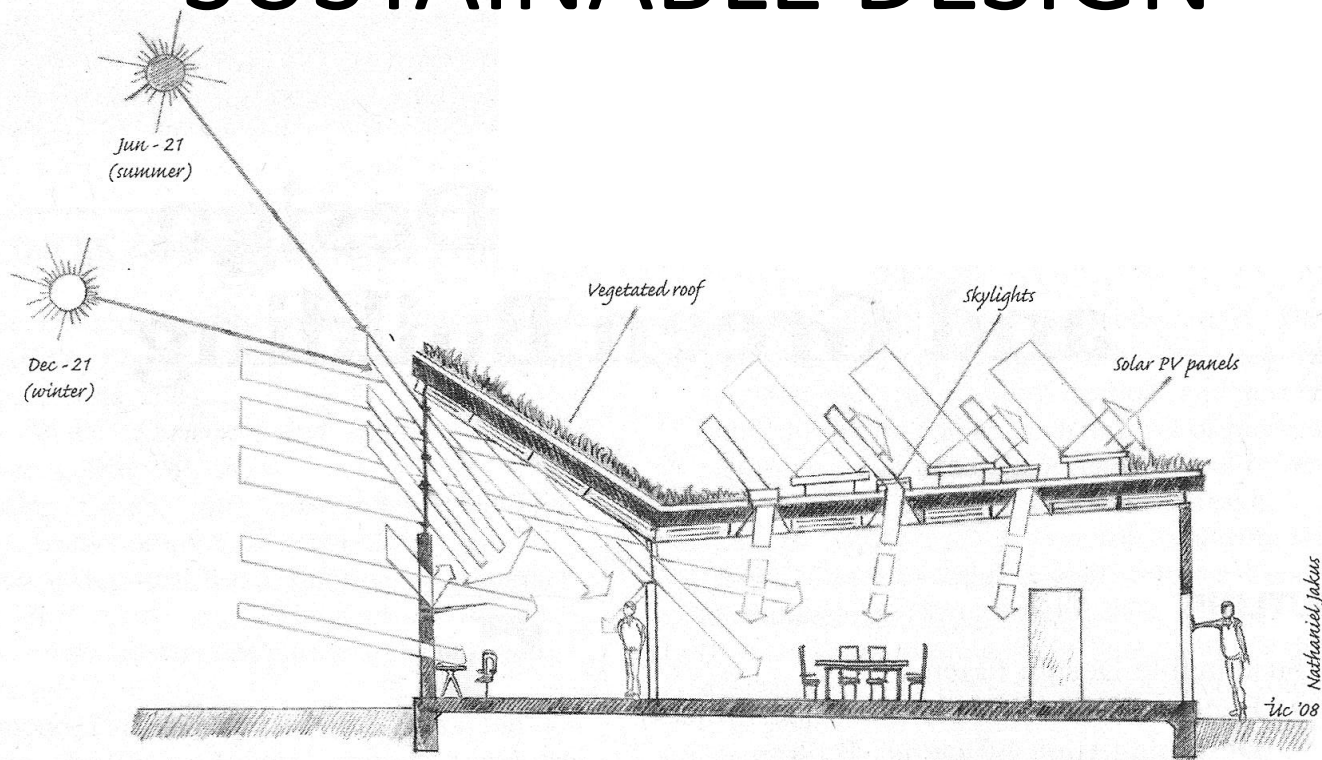
We must have a balance between:

Society - Environment - Economics

People - Planet - Profit

Humanity - Humility - Honesty

SUSTAINABLE DESIGN



- Southern glazing for passive solar heating
- Vegetated roof for thermal mass
- Solar PV panels to reflect undesired solar heat gain at roof and collect energy

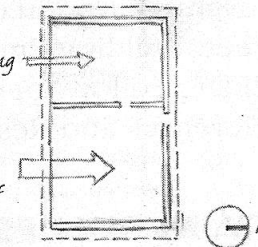


FIGURE 3.1 Sustainable building design considers natural features that are more efficient than traditional features and that improve the quality of the interior space.

SUSTAINABLE DESIGN

CASE STUDY - PASSIVE HOUSE

We will be discussing sustainability in many facets of the built environment, and this project will serve as a case study in which we will trace all of the implications of sustainable design, in a project that claims it has “done it all right.”

Students will research this building and discuss how this project has impacted the environment (systems and materials):

- How a building generates or uses power.

- How it's ventilated, heated and cooled.

- How it uses materials and resources, how they were installed.

- What are the project's Life cycle costs?

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CASE STUDY - PASSIVE HOUSE



SUSTAINABLE DESIGN

ASSESS OUTCOMES

1. Learn
2. Retain
3. Assess
4. Put into real life practice

At the end of the quarter, I will again ask the students what they think sustainable design is, etc. and measure the change against the answers they gave me at the beginning of the quarter. The reports on the Case Study Passive House will also show how much the students have retained and are able to assess a completed project.

Ideally I have converted at least some of the them to commit to thinking this way, and hopefully they will also act more sustainably conscience in their personal lives.

Assess where this class can become stronger in the future.