Saving Energy with Good Landscape Design

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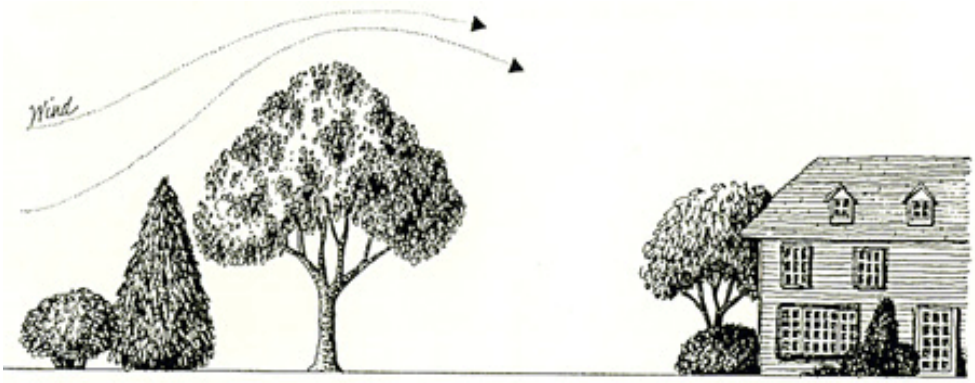

Courtesy: Virginia Cooperative Extension, Conserving Energy with Landscaping

These days, it seems energy conservation is at the forefront of homeowners' minds (and wallets), and if you've read the feature article, you have some idea how to get started inside your home. But what about going beyond the walls of your house? Can you make changes to the surroundings of your home to increase energy efficiency? Absolutely! Believe it or not, the vegetation, structures, and hardscaping around your home can drastically influence your home's interior and exterior climates. When these elements are arranged strategically around your home, their presence and location can help to improve the comfort of your home and save on heating and cooling costs. Let's explore each of these elements and how they interact with the sun, winds, and the exposure of your house at the times of year we expend energy to alter seasonal conditions: summer and winter.

SUMMER

During the summer months, the sun moves at a high angle across the sky. Heat from the sun penetrates through the roof, walls, and unshaded windows exposed to the east, south, and west. As a result, rooms facing these directions are noticeably warmer. Paved surfaces around the home such as driveways, sidewalks, and patios absorb heat from the sun and re-radiate it into their surroundings, raising the temperature. Hot, humid air can make conditions even more unbearable. Relief may come from summer breezes which typically blow from the southwest. How can you modify these conditions to create a more comfortable indoor and outdoor space?

Shading with Vegetation

Did you know that trees casting shade on the roof and windows can reduce your home's indoor temperature by 10-20^{o} F? Large canopy trees planted on the southern side of your house provide shade just where you need it: at a high angle to protect against the sun's rays in the heat of the day. Using trees with dense foliage, such as oak and maple provide dense shade, while trees with finer texture, such as birch and honeylocust give more filtered shade.

An added benefit of using vegetation to moderate the environment is their cooling and filtering effect on the air. As leaves lose water through transpiration, they release cooling moisture into the air. Also, leaves act as a filter for dust particles as the air circulates through them.

Besides using canopy trees to provide high shade, smaller trees, shrubs, and vines can be used to cast shade on lower walls and windows. These types of vegetation are especially useful on the east and west side of the house, where the early morning and late afternoon sun reaches the house at a much lower angle. Don't forget your outdoor air conditioning unit; providing shade will help it to run more efficiently.

Shading with Structure
For south facing outdoor areas and windows, mid-day sun is coming from almost directly above. Shading structures, therefore, should be positioned horizontally over the area or window. Pergolas with vines like honeysuckle or trumpet creeper would work well for this purpose. Vertical structures, like trellises, are appropriate for east and west facing walls and windows.

Use of Groundcovers
On a hot summer day, paved surfaces can be 10 degrees hotter than areas covered with lawn or groundcover! An asphalt driveway can be twice as hot as grass! Reducing solidly paved areas close to your home will not only improve stormwater management on your property, but also cool the air as well. In addition, using the design ideas listed above to cast shade on paved surfaces will also keep ground temperatures at a minimum.

Encouraging Summer Breezes
Planting the right types of vegetation is just as important as selecting the best location for them. It is essential to design your planting to allow summer breezes to travel through your yard. Planting in straight rows or dense patterns along the southwest portion of your yard may hinder the flow of these breezes. Instead, choose plants with open habit and position with adequate spacing between them. Create a buffer planting, one that integrates a mix of plants with empty space to encourage the flow of air and minimize stagnant humid conditions.

WINTER
During the winter months, the sun travels across the sky at a much lower angle. Heat from the sun warms the southern side of the house and penetrates windows, given that it is unobstructed by large trees or other structures. Cold winter winds come out of the northwest, adding a wind chill factor to the temperature. Bare walls exposed to the north are especially prone to colder microclimates. How can you best take advantage of solar gain while blocking winter winds?

Capturing Solar Heat
We've already discussed using deciduous trees on the southern exposure of your home to create shade during the hot summer months. An added benefit of the deciduous nature of these trees is that they allow the sun to penetrate through their limbs in the winter time, when solar heating is much desired. For this very reason, the use of evergreens on the south side of the house should be avoided. Large, deciduous canopy trees are usually high

branching in habit, thus allowing the sun's rays to come in under the limbs to warm the house. Still, the bare limbs will filter the sun's rays in the winter time, so proper placement is very important to achieve maximum benefits year round. Deciduous vines over pergolas and trellises also serve a double purpose. The bare stems will allow sunlight to penetrate and warm south facing windows and outdoor sitting areas.

Using Windbreaks

Prevailing winds coming out of the northwest bring cool Canadian air to our already chilly winter climate. Slowing the velocity of these winds with the help of vegetation can help to minimize the wind chill factor closer to the house. The most successful windbreaks are positioned perpendicular to the direction of the winds. Using a buffer planting, mixing deciduous and evergreen species, with 50-60% permeability can slow the wind by 50%. This could translate to 20-40% savings in heating fuel. Keep in mind that the windbreaking ability of a buffer planting is most effective for a distance of three to seven times the height of the plants. For example, if the plants average 15' in height, they will provide a windbreak for a distance of 45-105' on the leeward side.

Plants as Insulators

What about protecting north facing walls of your home? This is the shadiest part of your home and the coldest. Planting dense vegetation, such as evergreens, close to the walls provides an insulating layer of still air between the two. Additionally, the plants will buffer against cold winds that reach the house.

YEAR ROUND EFFICIENCY

Using plants sited properly around your home will ensure that you spend less time with gas or electric powered trimmers in your hands. Choosing the appropriate native plants means fewer inputs from you in the long run: less irrigation and little or no synthetic fertilization. What about keeping resources on site? Recycle your grass clippings right on your lawn or compost them for organic matter. Keep your fallen leaves on site as well; shred them and use them as a natural mulch in your garden beds or compost them. Each of these simple ideas will not only save you time, energy, and money, but also will conserve resources needed to produce the conventional alternatives.

Contact The Schuylkill Center for a Sustainable Landscape Consultation. Services include recommendations on ways to create a healthy, functional outdoor space using native species.

Source of Information:

Sustainable Energy Authority. Victoria, Australia. *Landscape Design.*
http://www.sustainability.vic.gov.au/resources/documents/Landscape_design.pdf
Virginia Cooperative Extension. *Conserving Energy with Landscaping*
http://www.ext.vt.edu/pubs/envirohort/426-712/426-712.html

The Schuylkill Center for Environmental Education