

Landscaping for Energy Conservation



The strategic placement of trees, shrubs and vines can significantly modify the climate surrounding a house. According to Colorado State University, these climate modifications and associated energy savings can reduce heating bills by as much as 25 per cent and cooling bills by 50 per cent or more.

But energy savings are not just good for the wallet; they also reduce a household's contributions to smog and climate change. These separate but related problems share a common source – the burning of fossil fuels. Residential heating and cooling typically require the burning of fossil fuels. The strategic placement of trees, shrubs and vines around houses can significantly reduce a household's reliance on fossil fuels, as well as its contribution to smog and climate change.

Summer Shading

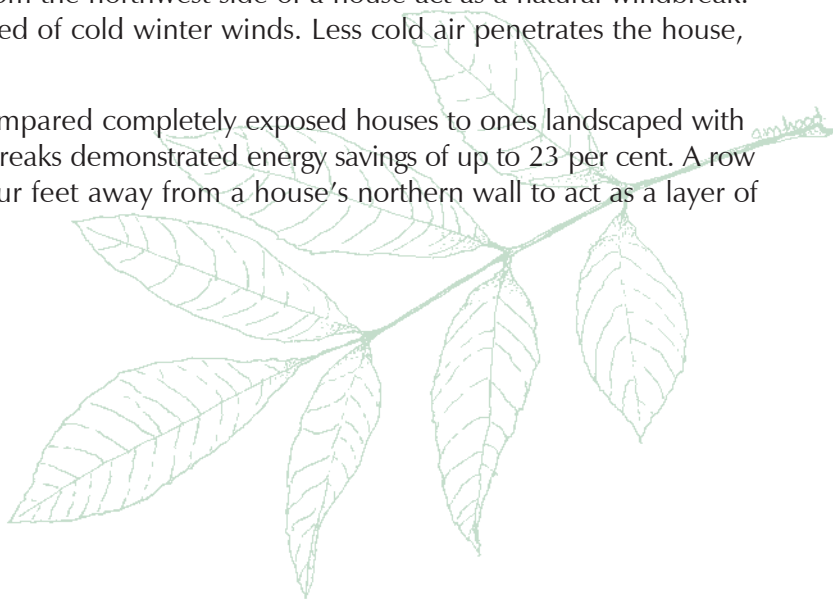
Deciduous trees planted on the south and west sides of a house shade the roof and windows throughout the summer. Tree canopies intercept the hot sun, reducing or eliminating the need for air conditioning. Large trees that shade the roof of a house from the afternoon sun can reduce indoor temperatures by as much as four to five degrees Celsius. A Friends of the Earth study concluded that three well placed and cared-for trees can reduce cooling costs by up to 40 per cent.

Small trees and shrubs can be placed near air conditioners for additional energy savings. However, these plants should be placed in such a way that they do not obstruct air flow or access for needed service. Shading is especially important for units on south or west sides of houses. Units in shaded areas use less energy to reach the desired temperature indoors because they are taking in cooler air.

Winter Windbreaks

Tall evergreen trees planted 15 to 50 metres away from the northwest side of a house act as a natural windbreak. These trees redirect and significantly reduce the speed of cold winter winds. Less cold air penetrates the house, resulting in energy savings and lower heating bills.

A Texas Agricultural Extension Service study that compared completely exposed houses to ones landscaped with properly positioned and maintained evergreen windbreaks demonstrated energy savings of up to 23 per cent. A row of smaller evergreens can also be planted three to four feet away from a house's northern wall to act as a layer of insulation.



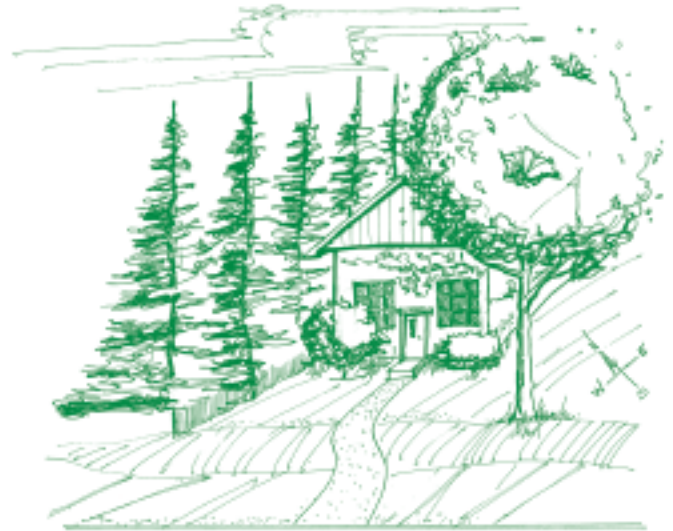
Insulating Vines

Vines also help to insulate exterior walls from summer's heat and winter's cold. However, they should only be trained up undamaged walls, away from wooden sills, shutters and doors to prevent moisture damage. If there is any sign of mortar disintegration or if there is wood detail on the exterior walls of a house, vines should be trained to grow on trellises.

Plant Selection and Placement

There is no single formula for energy conservation landscaping. Every property is unique. Property size, soil type, sun and wind exposure, and location of above- and below-ground utilities are factors which determine appropriate plant selection and placement.

Many shade trees grow to great heights and their canopies to great widths. The larger the tree, the more shade and/or windbreak value and associated energy savings. However, it is important to choose species that fit the space available. Attempts to limit the size of large trees by pruning will only result in poor structure and health.



Adequate below-ground space for root growth is also very important. Most roots are found in the top 45 cm of soil and can spread out up to three times the height of the tree. If their growth is impaired by structures, the entire tree will suffer. See the plant list for suggested planting distances from buildings.

Plant List

This plant list features native species because of the added benefits associated with such plants. These benefits include the protection of native biodiversity, the creation of wildlife habitat and the minimization of long-term maintenance (e.g., pest control and watering).

Native plants are indigenous to a specific location, whether that location is a county, country or continent. Some species have large ranges, others small and others somewhere in between. Plants that are native to the swath of land now referred to as the Greater Toronto Area evolved over thousands of years together with countless other native species.

It is unfortunate that the vegetation that truly belongs on this land is absent from most gardens and nurseries. However, a growing number of land managers and owners are discovering the benefits of native plant gardening and adopting the principles on their land. See the Naturescaping fact sheet in this series for more information on native plants and where to find them.



~ Plant List ~

Large trees to provide wide-reaching shade

basswood (*Tilia americana*)
bur oak (*Quercus macrocarpa*)
common hackberry (*Celtis occidentalis*)
green ash (*Fraxinus pennsylvanica*)
red oak (*Quercus rubrum*)
white ash (*Fraxinus americana*)

- Ideally, plant at least seven metres from buildings and paved surfaces.

Medium-large trees to shade roofs and windows

black cherry (*Prunus serotina*)
paper birch (*Betula papyrifera*)
red maple (*Acer rubrum*)

- Ideally, plant at least four metres from buildings and paved surfaces.



Small trees and shrubs to shade air conditioners and windows

chokecherry (*Prunus virginiana*)
downy serviceberry (*Amelanchier canadensis*)
eastern redbud (*Cercis canadensis*)
gray dogwood (*Cornus racemosa*)
nannyberry (*Viburnum lentago*)
pagoda dogwood (*Cornus alternifera*)

- Ideally, plant at least two metres from buildings and paved surfaces.

Evergreen trees for windbreaks

white pine (*Pinus strobus*) - Plant at least four metres from buildings and paved surfaces.
white spruce (*Picea glauca*) - Plant at least three metres from buildings and paved surfaces.
eastern white cedar (*Thuja occidentalis*) - Plant at least one metre from buildings and paved surfaces.

Vines for shading walls

virgin's bower (*Clematis virginiana*)
Virginia creeper (*Parthenocissus vitacea*)
moonseed (*Menispermum canadense*)
climbing bittersweet (*Celastrus scandens*)

Tree Health

A healthy tree can defend itself against most of these pests, eliminating the need for expensive treatments. The first step to maximizing health and vigour is to plant the right tree in the right place. As mentioned earlier, ensure adequate above- and below- ground space is available for trees and that the species selected suits the existing soil type and light conditions.

The second most important factor in tree health is water. Trees need water for all of their biological functions, just as humans do. When dehydrated, they become vulnerable to attack by pests and disease. Most urban trees suffer drought since much of the rain that does fall runs off paved surfaces and compacted soils into storm sewers.



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Tree Health - continued

For the first two years after planting, water twice a week for 20 minutes, with the hose at the base of the tree on a trickle. This light flow will allow water to soak deep into soil rather than run off the surface. Apply a two- to three-inch layer of mulch around the base of trees and shrubs to increase the permeability of soil and prevent evaporation. A large donut-shaped circle of mulch will also prevent lawn mower and weed-wacker damage, which can be fatal to trees. A mixture of leaves, wood chips and compost makes an ideal mulch.

Keep in mind that mature trees need water too. After the first two years, watering trees once per week for about an hour will greatly improve their health and ability to resist pests and diseases. For more information on choosing the right species and location and proper planting and maintenance techniques, refer to the resources listed at the end of this fact sheet, especially LEAF's Web site.

A new threat to trees in the Greater Toronto Area is the Asian long-horned beetle (ALHB). In September 2003, the Canadian Food Inspection Agency (CFIA) confirmed a new find of this beetle in the area bordering the cities of Toronto and Vaughan. While it presents no threat to public health, ALHB poses a significant risk to local trees and forests. There are no natural controls in North America to prevent its spread.

The CFIA is implementing an aggressive campaign to control and eradicate this tree pest with the full cooperation of Toronto and Region Conservation, the City of Vaughan, the City of Toronto and other federal, provincial and municipal partners. The general public is encouraged to familiarize itself with the signs and symptoms of ALHB and report all suspected cases to the CFIA at 1-800-442-2342. Visit CFIA's Web site at <http://www.inspection.gc.ca/english/sci/surv/data/anoglae.shtml> for more information.

Another tree pest to recently arrive in southern Ontario is the Emerald Ash Borer (EAB), which attacks and kills all species of ash. First discovered here in 2002, EAB has killed large numbers of ash trees throughout Essex County. Extensive measures have been taken to prevent its spread and, fortunately, EAB has not been found in the Toronto area. Contact the CFIA for more information on this pest and to report suspected infestations.

Additional Resources

- Local Enhancement and Appreciation of Forests (LEAF)
www.leaftoronto.org (416) 413-9244



LEAF encourages community participation in urban forestry through educational materials, workshops and volunteer training. LEAF also operates a Backyard Tree Planting Program, which helps homeowners plant the right tree in the right place. Text for this fact sheet is based on LEAF literature, with kind permission.

- Ontario Urban Forest Council www.oufc.org
- Evergreen – Native Plant Database www.evergreen.ca/nativeplants/search/
- City of Toronto Urban Forestry Services www.toronto.ca/trees/index.htm (416) 338-TREE
- Tree Canada Foundation www.treecanada.ca (613) 567-5545