CHAPTER 8

Green Businesses; Green Buildings

The bottom line of green is black.
—Tedd Saunders, Co-owner, Boston Park Plaza Hotell

Introduction

It is often thought that business and industry are enemies of the environment. Many businesses and corporations, however, are leading the way toward sustainable development. Countless businesses have changed particular practices to sustainable ones in some part of their operations or products, and the number of businesses that have systematically overhauled their entire operations to move in a sustainable direction is growing steadily. Why? Because it makes good economic sense.

Elsewhere in this book, the stories of Sângâ-Sâby and Scandic Hotels tell how two businesses moved from near bankruptcy to leading market positions through major systematic overhauls of company operations to sustainable practices. These businesses used the Natural Step framework as their sustainability compass. The well-known example of the Interface Corporation, led by its CEO Ray Anderson, has set a zero-waste goal for its entire multinational operations and is making progress toward that goal. The stories of these and other companies, such as IKEA and the Collins Pine Company, that have altered business practices using the Natural Step framework as a guide, are documented in The Natural Step for Business by Brian Nattrass and Mary Altomare.

Communities and their municipal governments can learn from these business success stories in at least two ways. First, municipal government operations resemble business operations in many respects. The strategies for
change and the types of sustainable practices employed are as applicable to municipalities as they are to private companies. So are the financial advantages of those changes: cost savings from reduced energy and fuel use, reduced solid waste disposal, and less hazardous material to manage.

Second, municipal governments play a significant economic development role in their communities. Municipalities influence and guide business location through land use policies and regulation. They regulate water, sewer, solid waste disposal, and, often, utilities. These types of infrastructure strongly affect business operations and location choices. Municipalities make grants and loans available to businesses through local, regional, and state economic development programs. Through these ways, municipalities have the ability to encourage, guide, and assist private business to move in desired directions.

This chapter presents examples of businesses large and small that are using green business practices, building green buildings, and local governments that help them to do so. In this chapter, green development and sustainable development are considered to be the same, defined as development that moves in the direction of the four system conditions of the Natural Step framework.

GreenZone: Big business pilots green development

In the city of Umeå in northern Sweden, a remarkable business park is home to local franchises of three multinational corporations: a Ford Motor Company sales and service dealership; a Statoil gas station, car wash, and convenience store; and a McDonald's fast-food restaurant. Nothing remarkable so far.

Then, the visitor notices that the roofs of the buildings are green. A closer inspection reveals that grass and plants are growing on these roofs. Standing in Ford's parking lot, the visitor looks down at her feet that are resting on, not asphalt, but a grass-and-paver parking surface. Looking up at the Ford building, she notices solar panels on one side. Feeling hunger pangs coming on, the visitor pops into McDonald's and, about to order a Big Mac, sees an interesting addition to the usual
food list on the overhead menu display. A McGarden Burger? What's that? What's going on here?

What's going on is a collaboration among these corporations, together controlling 52,000 facilities throughout the world, that has developed a business park that uses 100 percent renewable energy, reuses 100 percent of its storm water onsite, and reuses or recycles 100 percent of its waste by-products. All the buildings, whose parts can be disassembled after their useful life, are made of either natural or recycled materials. The buildings are so energy-efficient that both their overall energy use and their electricity consumption are 60 percent less than those of a conventional design. Needs for fresh water use throughout the site have been cut by 70 percent.

**How Greenzone Began**

In 1997, the owner of a local Ford dealership, who also owned the land on which Greenzone now sits, got the idea to turn this land into a model eco-business park. This dealer approached the parent Ford Motor Company, who endorsed the idea enthusiastically. The Ford Motor Company and the local dealer then approached two other companies, Statoil and McDonald's, who agreed to take part in the venture. By April 2000, Greenzone was operational.

Greenzone's designers took a holistic, closed-cycle approach to the property's development. This means they followed the principle of nature's cycles where one component of the cycle serves as the "food" for the next. Because of this, natural cycles are said to be closed loops where almost everything is used and reused. Following this principle, virtually all the material and energy used to develop and operate Greenzone is either renewable or recyclable.
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Site planners for GreenZone first carefully studied the appearance and conditions of the existing land. A vacant house on the site was moved to another location and is now a family home. Analysis of the land’s structure and contours reduced excavation and landfill requirements. Grassy or plant areas displaced by construction were replaced elsewhere, for example, on the green roofs of the buildings. The designers and builders left existing pine trees that provided habitat for an endangered species of beetle. The builders transplanted an existing oak tree, rather than felling it.

Electricity for the buildings comes from a coastal windmill about 15 miles away. Statoil uses a wind-powered fan to ventilate its building. In the Ford building, skylights and light-pipes bring in daylight, reducing daytime electricity consumption by 60 to 70 percent. Motion sensors turn off lighting in rooms not in use. No air conditioning is necessary, since the grass-and-sedum roofs keep the buildings cool in summer. These roofs also absorb one-half the rainwater falling on them, thus reducing storm water management needs. The green roofs also provide habitat for birds and insects.

In winter, a geothermal pump helps heat the buildings. A heat recycling system captures surplus heat generated in each building and recirculates that heat through a connected system of underground pipes. For example, heat from cooking grills and deep fryers in McDonald’s and heated water from the Statoil mini-mart refrigeration system are piped to a ground source heat pump that in turn redistributes the heat to all buildings in the business park. This system drastically reduces the amount of energy needed to create additional heat. Solar panels on the Ford building heat intake air, further reducing the need for energy.

All storm water is collected on the site. The grass-and-paver parking lot surface and gravel roads instead of asphalt ones absorb rainwater, reducing storm water runoff and maintaining the natural groundwater balance of the land. Small creeks and ponds collect unabsorbed water, channeling it to an onsite water garden that serves as a retention pond. In the gas station pumping area, plastic carpet under the paver surface keeps chemicals and oil from seeping into the ground.
Statoil’s car wash uses the site’s storm water for washing cars. A state-of-the-art filtration system cleans the water first, removing heavy metals and recapturing salt that is in turn dried and reused. The filtration system then refilters and recirculates up to 99 percent of the post-car wash water that is then reused to wash cars. The GreenZone car wash is the first in Sweden, possibly in the world, to receive an eco-label certification, according to the eco-park’s managing director.

GreenZone uses three wastewater systems: one for showers and sink water, one for toilets, and one for water containing contaminants from cars. Vacuum toilets resembling airplane toilets only use 1 1/4 quarts (1.65 liters) of water and are connected to outside tanks. Sewage is converted to purified fertilizer and used for farming.

Building construction design allows for eventual deconstruction. All building parts are screwed or bolted together so these parts can be disassembled and reused. Building designers tried to choose materials with more than one function, for example, wood fiber ceilings that dampen sounds, insulate, and absorb humidity, then release this moisture when interior air is dry. All wires and cables installed in the buildings are free of halogens (chlorine and bromine) and PVC, so these wires and cables, too, can be safely reused and recycled. The wood exterior sheathing for the McDonalds and Statoil buildings are not painted, since most exterior paint contains harmful volatile organic compounds, but rather is treated with tar for waterproofing. The wood used in building construction comes from a nearby forest and timber company that uses sustainable forestry practices.

Instead of mechanical HVAC systems (heating, ventilating, and air conditioning), terrarium air filters clean and cool
the building’s interior air, add oxygen, and absorb carbon dioxide through the natural process of plant photosynthesis. Twice per hour, jets of water spray the leaves in the filter to wash contaminants into the soil where these are naturally decomposed. Fresh air enters the building through a duct buried in the ground that naturally cools the air in summer and heats it in winter. Then, the air circulates naturally through the building as a result of the temperature differential. Roof aspirators ventilate the roof structure, avoiding risk of moisture damage.

Statoil’s gas station sells three types of fuels that are alternatives to petroleum-based gasoline and diesel. Statoil’s mini-mart convenience store is experimenting with bulk sales and plastic packaging systems that can cut packaging waste by 90 percent. The mini-mart’s food refrigeration system uses antifreeze for cooling instead of chlorofluorocarbons (CFCs). Heat from the refrigerators is recaptured and piped to the other buildings. The company has almost eliminated store use of products containing PVC. This mini-mart also uses a terrarium air filter.
instead of an HVAC system. The store sells fresh organic vegetables and other organic and environmentally labeled products.

The McDonald's restaurant also uses a terrarium air filtration system to clean and cool interior air. Clearly marked disposal slots show customers where to recycle their various food containers. As mentioned, the menu board offers the McGarden Burger, a veggie alternative to meat burgers. Frying oil is recycled, cleaned, and reused to make cosmetics.

In the Ford car service building, a "liquid bar" recycles waste oil and fluids. The service center orders oil and antifreeze in tanks with tubes that pipe these substances directly into the car engine. Tubes also suck waste oil and fluids out of the engine so workers don't ever see or touch these substances. The service center is seeking ways to reuse the oil after cleaning, for example, as oil for lawn mowers or industrial engines. Vegetable oil, as opposed to petroleum-based oil, lubricates the hydraulic car lifts. Shelving for car parts is made of recycled wood instead of metal. Car servicing is generally considered to be a significant contributor to environmental problems. This service center is showing how it is possible to service cars within a value framework that respects nature.

Contrary to conventional practice in preparing used cars for resale, the Ford service center decided not to wash used car engines. After studying the alternatives, the service center determined that dirty engines were preferable to creating a disposal problem of chemical and oil-contaminated wastewater. This measure, since it eliminates the disposal problem of contaminated wash water, also saves money.

As part of its shift toward sustainable practices, the Ford service center design assures a healthy, pleasant work environment for employees. State-of-the-art air ventilation, lighting, and electrical and magnetic field management systems were designed to create the healthiest possible employee working conditions. Tests reveal that Ford's workplace magnetic field levels are at least five times lower than
the recommended minimum thresholds, according to the manager.

The service center has adopted several innovative management approaches. For example, the company has eliminated service representatives who serve as middlemen between customers and mechanics. Instead, the mechanics take care of everything. Customers walk into the auto workshop and discuss their car needs directly with the mechanics. Each customer gets the same mechanic every time.

To make sure that the design of the GreenZone business park and the shift to sustainable business practices brought about systematic, across-the-board changes, Ford, Statoil, and McDonald’s used the four Natural Step system conditions for sustainability as a guiding framework. The GreenZone architects and company staff applied this framework to all aspects of site design, building design, business operations, and management practices. In doing so, the architects and companies used a whole-systems approach, rather than a one-by-one, single-issue approach to change, for example, installing energy-efficient appliances one year, and recycling more waste by-products the next year.

The three GreenZone businesses provide ongoing environmental education and Natural Step training for their employees to make sure sustainable practices are continuing. This also gives employees the opportunity to continually offer new ideas for additional improvements.

**Market Advantage**

Since occupying its new facility in GreenZone, Ford has experienced how sustainable practices create financial as well as environmental benefits. During the first year of operation in GreenZone, the dealership’s car sales shot up 150 percent from its previous yearly average, and its service business revenues increased by 100 percent. In 2002, 100 percent of Ford cars

Figure 8.11: A “liquid bar” removes waste oils and fluids from cars for recycling, so workers do not need to handle or even see these substances.

Figure 8.12: Vegetable oil instead of petroleum-based oil lubricates the hydraulic car lifts.
sold were flexi-fuel cars that use either conventional or alternative fuels. Before GreenZone, Ford occupied the ninth or tenth market position in its regional market area. Now, Ford is first in its size category. Ford’s GreenZone facility was the first car dealer to receive the environmental ISO 14001 certification.\textsuperscript{7}

"\textbf{THIS IS NOT ENVIRONMENTAL PHILANTHROPY, IT IS SOUND BUSINESS}"

Following upon GreenZone’s success, McDonald’s and Statoil are discussing collaborations in similar eco-ventures internationally. The Ford Motor Company is actively pursuing green projects in both car design and building design. For example, Ford’s new Rouge assembly plant in Dearborn, Michigan, contains state-of-the-art green building features, including a 500,000-square-foot green roof, solar panels, and fuel cells. Describing the Rouge plant, Bill Ford Jr., Chairman of the Board, said, “This is not environmental philanthropy; it is sound business, which, for the first time, balances the business needs of auto manufacturing with ecological and social concerns in the redesign of a brownfield site.”\textsuperscript{98}

\textbf{GREENZONE AND THE CITY OF UMÉÅ}

The city of Umeå worked closely with GreenZone’s designers and the three companies in the development of the eco-business park. Since the park treats and recycles all its own storm water and wastewater, it is not hooked into either the city’s sewer system or storm water system. City planning staff had to review and issue permits for GreenZone’s innovative wastewater and storm water systems. Umeå city planners and designers see GreenZone as a testing ground and learning opportunity for sustainable building and site planning practices. For example, city staffers now want to encourage grass and sedum roofs in future Umeå development projects. GreenZone also is providing an ongoing database of experience with various eco-practices and eco-materials for the project participants, including the city.

GreenZone is attracting national and world attention as a demonstration of sustainable development in action. Over half-a-million people visit the park every year, including Sweden’s Minister of the Environment and the European Union’s Environment Commissioner.

The three companies and designers of GreenZone are showing how site planning, non-residential building development, and business operations in the automobile and convenience food sectors can preserve and protect
nature’s resources without compromising function and comfort. They also are showing how sustainable business practices and financial gain can go hand in hand.\(^9\)

**Sånga-Säby: Green development is good for business**

Sånga-Säby (Song’-ah Seh’-bih), a hotel and conference center 45 minutes outside of Stockholm, needed to expand its guest facilities to serve a growing clientele attracted to its healthy, ecologically oriented accommodations and dining. A new CEO, Mats Pack (Mahtts Fähck), who had led the company back from the brink of financial disaster using sustainability objectives as a guide, decided that the design and construction of the annex would also follow these sustainability objectives. The objectives were the four system conditions of the Natural Step.

Mats Pack and Sånga-Säby’s board of directors set a goal to build the new annex as ecologically as possible and wrote both this goal and requirements to implement it into the building’s construction specifications. As one example, the construction contract required the builder to forfeit US$12,000 for every tree he cut down.

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The building’s designers located and constructed the building to achieve maximum solar exposure. Solar power heats the buildings from March through October. During the rest of the year, geothermal pumps partially heat the building, supplemented by hydroelectricity to boost the temperature from the geothermal level to room temperature. The designers placed heating pipes under the floor, reducing heat and power needs by two degrees.

Grass-and-sedum roofs also help cool the rooms in summer, eliminating the need for air conditioning. In winter, these roofs provide insulation. Walls are further insulated with recycled glass fiber. All building materials were bought from ISO 14001 environmentally certified companies.\(^10\)
Mats Fack and the Sånga-Säby board of directors set another goal for the annex construction: to make guest rooms that were luxurious as well as healthy. They picked furniture that was labeled acceptable by the Swedish Association of Persons with Allergies. They did not buy IKEA furniture even though some IKEA products are environmentally labeled. IKEA beds last for 3 years; Sånga-Säby’s beds will last for 20 years, according to Mats Fack. These beds are made from all-natural materials; hence they contain no chemicals. Mattresses are stuffed with horsehair carefully washed to remove allergens. Instead of having a polyurethane finish, the wooden floors are oiled once or twice a year, and floor scratches are removed with sandpaper.

EDUCATING THE SUPPLIERS

Mats Fack also used the construction of the Sånga-Säby annex to teach the building and supply companies “how to make hotels in the 21st century.” Often, contractors and suppliers said it would be impossible to provide Sånga-Säby with products that met the hotel’s high standards of sustainability. Also, suppliers often were not aware of the toxic substances used in their product preparation. When Sånga-Säby demanded in its building proposal request that eco-labeled wood be used in building the annex, nine responding construction companies said they didn’t know what this product was. These companies then went to their lumber suppliers and discovered these suppliers didn’t know what the specification meant either. Finally, one contractor returned after doing some research and agreed to provide wood from certified forests, but at a US$10,000 higher price. Sånga-Säby agreed. The considerable publicity in the building industry about this process began to establish provision of eco-labeled wood as a competitive factor for suppliers, according to Mats Fack. Forestry companies began to see that they needed eco-certification in order to meet a growing demand for this product.

Prior to ordering leather furniture for the common sitting areas, Mats Fack asked the furniture company whether the leather was tanned with
chromium — the conventional tanning agent that is toxic — or with vegetable oil. The furniture supplier did not know. Mats Fack said, find out. When it turned out chromium was indeed used as the tanning agent, Mats Fack called the furniture supplier’s CEO and said that the leather must be prepared with vegetable oil instead of chromium. The head of the furniture company said this would be much more expensive. Mats Fack proposed that Sånga-Säby would pay a somewhat higher price for the leather furniture, pointing out that, in producing non-toxic, vegetable oil-tanned leather furniture, the furniture supplier would have a product on the market that no other firm offers. The deal was cut.

**Market Advantage of Going Green**

Sånga-Säby’s ecologically sound purchasing and building decisions for the annex construction, as well as changes to more sustainable hotel practices, did cost more — about 20 percent higher than the costs of conventional construction and supplies. Given the dire financial straits of the company when Mats Fack first became the CEO, it is not surprising that some people in the company initially were skeptical about this investment. Today, however, Sånga-Säby is one of the most profitable and successful hotel and conference centers in Sweden. Many organizations that formerly scheduled conferences and retreats elsewhere have switched their locations to Sånga-Säby. The healthy, chemical-free, allergen-free guest rooms have attracted the attention of the growing sector of Swedish society with allergies — about 20 percent of Sweden’s population, according to some estimates. Organizations such as the Swedish Association of Persons with Allergies now gather primarily at Sånga-Säby. High occupancy rates, increased room charges, and lower maintenance and operating costs have more than offset the higher initial costs of buying and building ecologically. Sånga-Säby demonstrates how green development is good for business.\(^\text{11}\) For more about Sånga-Säby’s transformation to sustainable practices, see Chapter 16.
Small businesses do well by doing green

It's not just big businesses that can do well by doing green. Small businesses are springing up to fill eco-niches — market opportunities created by the growing customer base demanding products and services that are benign to the environment and healthy for people. Some businesses, such as the Bölebyn Tannery, have been doing this from the start. This section describes three different types of small businesses in northern Sweden that are doing well by doing green.

THE BÖLEBYNS GARVERI TANNERY: TANNING LEATHER
THE NATURAL WAY

In northern Sweden, in the town of Piteå (Pee-the-aw), a three-generation family business tans leather using a process more than 5,000 years old. Using a combination of spruce bark and water, the Bölebyn Garveri (Beuh'-leh-been Garr veh-ree) company tans cow and ox hides, then fashions attractive bags, shoes, and other products from this leather. These products are as healthy to wear as they are beautiful. In old times, people with skin diseases would come by the tannery and their skin would improve, according to Inger Sandlund, who, together with her husband Jan, owns the Bölebyns Garveri business. Jan is also the granddaughter of Bölebyn's founder. The bark-and-water process was the traditional method used by craftspeople to tan leather until 1920, when chemicals arrived on the scene. As Inger Sandlund says, the old-fashioned way is turning out to be the ecological way.

Currently, almost all the leather in the world is tanned with chromium. Many tannery workers get sick, says Inger Sandlund. For example, she says, in some countries, workers put their feet in chromium tanning vats during the tanning process, and in Italy, tanneries near Florence have destroyed drinking water to a depth of 150 feet. Every time someone throws out shoes, they throw out chromium.
How a natural tanning process works

The Bølebyn's tannery purchases cow and ox hides for less than US$1 apiece from local farmers. First, tannery workers salt the hides to preserve them. When 25 hides are salted, these are placed with water in a large, slowly revolving drum for one month to remove hair and other material. Next, the hides soak in vats of water and bark for four months. Workers stir the vats every day. Tannic acid in the bark is the tanning agent. After two months of soaking, when all the bark's tannic acid is gone, fresh bark replaces the old, and the used bark goes to the compost bin.

Next, hides hang in another vat of water and bark, where they take on the bark's color. Then hides are nailed onto stretching racks for a month.

The tannery uses a rotation schedule as hides go through the tanning process, so there are hides always ready for leather craftspeople to make shoes, bags, and other goods. The tannery needs to use only about 55 pounds of spruce bark every year. Although workers periodically top off vats with water, the vat water hasn't been changed since 1918. This entire operation takes place in a workroom area less than 1,000 square feet.

Jan and Inger Sundland took over the business in 1987 and now work with two employees. When Inger's grandfather founded the tannery in 1900, the business used the leather only to make shoes. Now, Bølebyn's Garveri makes briefcases and 200 other leather products. Briefcases carry a fifteen-year guarantee.

Healthy for people; healthy for business

The bark-and-water process can tan between 150 to 170 hides per year. A modern factory using chemicals can tan several hundred thousand hides per year, since chromium tans hides in only 24 hours. While the ecological tanning process is unlikely to become a mass production process, there is growing customer demand for higher quality leather products that are free of
toxins and that breathe. Naturally tanned leather shoes cost about US$40 to $50 more than conventional, chemically tanned leather shoes, but these shoes can last for 20 years, says Inger Sandlund. Two other tanneries in Sweden tan leather with vegetable oil.

With a leather goods boutique now flourishing in a fashionable section of Stockholm, Bölebys Garveri shows that an old-fashioned way of doing business and an ecological way of doing business can also be a profitable way of doing business.14

**NATURVÄRME: GREEN HOME HEATING IS GOOD BUSINESS**

In the small village of Junosuando (Ye-uh-nuh-suh-ahn’-do) in the town of Pajala, a local citizen won the Swedish lottery. While some winners might have pocketed their earnings and headed for a South Sea island, this citizen, who was also the village school’s gym teacher, quit his job and invested those earnings in starting a local eco-enterprise. This business, called NaturVärme, builds and sells home heat pumps that use geothermal heat to reduce home energy requirements. A home heat pump system costs about US$7,000. According to NaturVärme’s owner, a heat pump installed in a 2,100-square-foot home can pay for itself in three or four years.

NaturVärme now sells its heat pumps to customers in Norway and Finland as well as Sweden. The company runs an education center to train local youth, prospective assembly workers, and salespeople. The company also plans to expand this facility as an energy education center. Here, local residents and business people can view different types of renewable energy technology such as solar panels and subfloor heating design, also reducing home energy needs.

NaturVärme now employs 12 local workers. In a village of 450 people, this is a big boost to the local economy. The NaturVärme company is one of many eco-enterprises that blossomed during the eco-revitalization journeys of villages in Pajala and Kalix. For more about Pajala and Kalix village eco-revitalization, see Chapter 9.
Environmental Action Värmland: A county boosts regional green business

About 150 miles west of Stockholm, a county government is helping businesses and municipalities to go green. Värmland (Vehrm’lahnd) County, home to Alfred Nobel, founder of the Nobel Prize, has set a goal to become a sustainable county. Its slogan is “Sustainable development through the market.”

One County sustainable development initiative is called GreenMarket. Through GreenMarket, the County helps businesses and organizations in three ways: developing, buying, and selling environmentally friendly products, making buildings and operations more energy-efficient, and educating businesses about the global importance, as well as benefits, of sustainable business practices.

Värmland County also provides targeted business assistance in material technology, marketing, environmental management, patents, database searches, and eco-design of new or existing products. The County helps companies understand and apply life cycle analyses to product design. This in turn helps qualify company products for environmental certification and labeling, providing a greater market advantage. For more information about life cycle analysis, see Chapter 7.

To inform municipalities about available environmentally friendly products, and to help develop markets for those products, the County has developed a green purchasing manual for all municipalities within its jurisdiction. The County put together a green product development program for small businesses, inviting these enterprises to participate in a training and technical assistance program. The first phase of this program was an orientation session about sustainable business for the new millenium. Next, working as facilitators, county staffers helped these companies envision future sustainable possibilities for their business. Next, the County provided funding, through a combination of grants, enabling businesses to hire technical consultants to evaluate specific ideas generated in the brainstorming sessions. Through this program’s assistance, the first seventeen participating businesses were able to significantly reduce their energy and materials use that in turn reduced costs. Participating businesses in the county program included a linen manufacturer, a pen and marker manufacturer, a heat pump company, a hardwood processing company, a battery regeneration business, and an electric sign manufacturer.

Värmland County teamed up with the University of Lund to help spur entirely new green product development. A basic premise was to design
products from a problem-solving starting point. County and University project leaders realized that many inventors have ideas for new products, but they often are not clear what problem their invention is trying to solve. In this program, project facilitators identified some problems, then presented these to three groups of inventors. Over the next three weeks, the inventors generated almost 1,000 product ideas to solve those problems. Next, the program examined ways to connect problems with people eager to solve those problems. The County and University organized forums that brought organizations with problems — companies, manufacturers, policy-makers — together with inventors eager to find solutions.

As one result of the county’s GreenMarket initiative, regional market sales of high-efficiency, environmentally friendly appliances shot up 25 percent in three months and have since increased steadily.

Värmland County also sponsors eco-product competitions. The most eco-friendly product wins orders from companies who band together for joint purchasing, issuing a single product specification. In another effort, the County worked with a group of businesses that use insulation in their operations, helping these enterprises write up specifications for environmentally benign insulation, then prepare advertisements and a request for proposals to supply the most eco-friendly product. The County ran a similar competition for solar heating systems that involved demonstrating and testing different household solar energy systems. The best-running system was then marketed as a well-tested and demonstrated home heating product.

Environmental Action Värmland is a partnership among the Värmland County Council, the County Administrative Board, the regional Chamber of Commerce, the Swedish Association of Local Authorities, and a private company called ALMI. This County initiative receives funding from the municipality association and the European Union.15
One Värmland County business that has found an eco-niche is the paint store, shown in Figures 8.22 and 8.23, located in the city of Degerfors. This enterprise has developed a line of interior house paints derived from eggs instead of petroleum. These paints, emitting no VOCs (volatile organic compounds), are healthier than conventional petroleum-based paint that does emit these toxic off-gases. The market for egg-based paint is growing steadily, as consumers come to understand the importance of alternatives to VOC-emitting paint products. The paint store occupies space in a former mill building acquired and renovated by the city of Degerfors as part of the town’s economic development program.

For more about the town of Degerfors, see Chapter 5.

“A timeless way of building”

In the municipality of Eksjö (Eh’k-shu), in the Highland region of southern Sweden, a non-profit organization is working to safeguard the knowledge of traditional Swedish building techniques. Eksjö helped to found the Center for Building Preservation in 1995 to show how to better care for historic buildings, and to make sure that traditional Swedish building practices, formerly passed down from generation to generation, are not lost to future generations.

The Center offers training programs in historic wooden building techniques, such as the corner timber construction method. Most of the Swedish artisans who understand and use this building technique are now in their 80s. Through preserving and reteaching this building technique, the Center helps assure that young artisans will understand and carry on this construction approach that creates particularly strong, stable, and lasting building frames. The Center’s courses also combine modern building techniques with historic building and construction approaches.
The Center's training for architecture students and craftspeople combines theory and practice. Carpenters with 30 years' experience study and work alongside high school girls and boys. A learning objective is to see, rather than memorize, building techniques. Students learn how to balance traditional building methods with modern needs, combining the new and the old to achieve the best of both.

A Center slogan is: "Looking for the forgotten past in the development of the future." Building design and construction in Sweden has deteriorated, says the Center's director. He believes historic preservation can be a source for the rebirth and development of quality and ecological practices in contemporary building. He describes a new trend of intimate architecture where new buildings are influenced by the culture of the old. He gives an example of how the historical way was a sustainable way: Swedish homebuilders in times past would plant trees so that their children would have enough wood to build their houses when they were ready to start families.

The Center also works with recent immigrants to Sweden who bring knowledge and skills in traditional building design and construction techniques from their own countries. The Center also works with builders in other countries. For example, a Center course on corner timber construction will take place in Russia, where upkeep and restoration of historic houses has been neglected for many years. Russian people are proud of their heritage even though it has been neglected, says the Center's director. To solve this problem, he observes, one must combine appropriate modernization techniques with the traditional approach. The Center will teach Russian builders how to merge appropriate modernizing methods with historic techniques such as corner timbering.

Eksjö's Center for Building Preservation works cooperatively with the Royal Stockholm School of Architecture and the Chalmers National Technical School in Göteborg to teach courses in traditional building, design, and preservation techniques. One such course involved architecture students in an exercise where they designed and constructed interior spaces for eating, sleeping, and bathing, using natural building materials, all within a giant box of about 300 square feet.

The Center itself is situated in a historic Palladian-style house and farm formerly owned by an 18th-century Eksjö mayor. Visitors and students can study exhibits of historic wallpaper and view and purchase items at the Center's historic building materials shop. For more about Eksjö and its sustainable development work, see Chapter 12.
North American examples

Businesses large and small throughout North America also are switching to ecological practices and green building development. Ford’s new Rouge assembly plant in Dearborn, Michigan, mentioned earlier, will feature an ecological roof of 500,000 square feet that will absorb several inches of rainfall and cut down on a corresponding amount of storm water. Storm water will be reduced further through using porous paving for parking lot surfaces. A conventionally designed storm water system for the site would cost US$48 million to develop, according to Rouge’s architect, Bill McDonough. Instead, he describes a plant-based storm water system costing US$13 million that will save the company US$35 million in development costs. Solar panels and fuel cells will reduce the Rouge plant’s fossil fuel energy use. Plants will help shade and cool the building, further cutting down on energy needs for air conditioning. Ford has taken steps to reduce hazardous substances in its car production process, eliminating chromium from car paint and removing mercury switches and PCB transformers. Ford also has begun a waste reduction initiative that has cut in half the waste stream of at least one of its plants three years after the program start. At Ford’s St. Thomas assembly plant in Ontario, the company has replaced disposable packaging with returnable containers, has increased metal scrap recovery, and has installed recycling stations along the assembly line.\(^{19}\)

As another example, Guilford of Maine and its parent company, Interface, Inc., have systematically overhauled production and buildings in ecological directions. Guilford, the largest producer of interior office fabrics in North America, has switched the fuel source of its entire Maine plant heating system from oil to wood chips. The wood chips come from a nearby tongue depressor manufacturing company, which otherwise would send hundreds of tons of wood by-products to the municipal landfill. Interface, which used the Natural Step system conditions to guide its transition to sustainable practices, has declared its intent to become a zero-waste producer. As one of the largest carpet manufacturers in the world, Interface’s goal is to lease carpets, not sell them, to its customers. Interface will replace worn-out carpets, and recycle and reuse the worn-out material.\(^{20}\)

Small U.S. businesses also are switching to ecological practices. For example, a tiny dry-cleaning business in Arlington, Massachusetts, offers its customers an alternative to the conventional dry-cleaning method using perchloroethylene, a known carcinogen. Utopia Cleaners, assisted through the Massachusetts Toxics Reduction Institute, cleans clothes effectively through a natural enzyme-based wet dry-cleaning method using no hazardous substances.
Municipalities and states across North America also are encouraging businesses and developers, as well as their own public buildings, to adopt green building practices. New York, Pennsylvania, and California have adopted incentive programs such as tax credits for green building, or green building requirements for all new state buildings and facilities. New York City has developed green high performance building guidelines for all new capital construction in the city. Scottsdale, Arizona, encourages green building through a package of strategies that include fast-track permit review for green design proposals, green building certification by independent inspections, and promotion of green builders and designers. Scottsdale also uses a systematic approach to encouraging development of green building standards through applying a life cycle analysis approach to construction, energy, and resource use in the city. Arlington County, Virginia, offers density incentives for green buildings that are certified to standards developed by the U.S. Green Building Council.