PLANNING FOR SUSTAINABLE COMMUNITIES:

A Survey of Sustainability Practices Among Twelve Communities in the United States.

CENTER FOR ENERGY AND ENVIRONMENTAL POLICY

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for the
Science, Engineering & Technology Services Program

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Preface

It is a pleasure to present you with this report of the 2001 Science, Engineering & Technology (SET) Services Program. The report is designed to provide the Delaware General Assembly and the citizens of this state with an analysis of the challenges and opportunities that accompany Delaware's efforts to develop sustainable communities throughout the state.

CEEP received valuable assistance in preparing this report from Delaware's Department of Natural Resources and Environmental Control (DNREC), the Delaware Economic Development Office (DEDO), the Delaware Energy Office (DEO), the City of Wilmington's Office of Planning, and the University of Delaware Water Resources Agency. A special thanks is owed to the members of these organizations.

I hope that this report will be useful in your discussions and deliberations on sustainability issues regarding our towns and neighborhoods. With the proper policy context, the communities of our State can be leaders in building a livable future for Delaware.

John Byrne
Director

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Executive Summary

Overview

Communities throughout the United States are implementing strategies, formulated on principles of *sustainable development,* in order to improve quality of life. Many are evaluating how to respond to patterns of development and the associated burdens of traffic congestion, smog, loss of open space, degradation of natural habitats and water scarcity. The ecological imprint of community development is being assessed and policies devised to encourage metropolitan-scale and behavioral-scale changes to reduce the extent of impact. Sustainability has become a common commitment among these initiatives as communities learn from each other how to forge more livable and environmentally sensitive pathways for the future.

Sustainable Communities

Most North American communities were not planned with sustainability in mind. Instead, a conventional model of growth-based development was embraced. There is growing consensus that this pattern of development is the source of contemporary problems of sprawl, congestion, and continuing air and water quality difficulties. Because most community planning historically did not adequately include ecological and social impacts, the results have been disproportionately large ecological 'footprints' (Wackernagel and Rees, 1996). Often, communities now require productive areas many times greater than their actual geographical boundaries. Even then, wastes generated exceed the carrying capacity of their eco-regions. Changes are required in population growth, rates of consumption and the resource intensities of key social and economic activities if we are to recover a basic level of community-environment balance.

Concepts such as 'Smart Growth,' 'New Urbanism' and "Green Communities' are being applied to community development in an attempt to fully integrate the economic, environmental and social needs of urban society, seminal to achieving sustainability. Communities are measuring their sustainability efforts through the use of indicators that differ from traditional economic and social measures. Indicators of sustainability assess the linkages between the three sectors of a community – economic, social and environmental. Examples of indicators used as measures of progress include the level of employer payroll dedicated to continuing training and education, the percentage of wages earned within a community that is also spent within the community, the perceived level of discrimination or racism, the health status of different communities, measured air and water quality, the rate of materials recycling, the percentage of energy provided from renewable sources and the volunteer rate for environmental improvement activities. While communities are using different approaches to measure progress, these initiatives indicate that communities are in agreement about the need to identify new paradigms for the way in which they develop.

Definition of Terms
Sustainable The act of one generation passing to the next generation a healthy community and environment, which passes to the next generation the same condition, and so on.
Community Focuses on the primacy and quality of relationships among the people sharing a particular place and between the people and their environment. A community can be a small rural community, a large metropolitan region or a nation.
Development Collective actions to improve social and environmental quality. It is incompatible with unlimited growth.
Sustainable Development Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Sustainable Communities Cities and towns that prosper because people work together to produce a high quality of life that they want to sustain and that leads to healthy natural environments.
Smart Growth Land use practices intended to create more resource efficient and livable communities, by employing more accessible land use patterns that reduce the amount of mobility required to reach goods and services.
Equity The pursuit of fairness that reflects a common respect for rights and a commitment to equal opportunities and access to all forms of community capital.
Sprawl Low-density development that spreads from the edges of cities and towns. It is poorly planned and often evolves without regard to community or regional needs.

Communities are beginning to conclude that there need to be limits to growth, that technological fixes and innovations alone cannot improve quality of life, and that collective action is required if a sustainable future is to be realized. Achieving such a future will depend upon identifying effective models for community-wide sustainable development.

This report examines the efforts of 12 pioneer communities around the country in order to learn about the possibilities for, and the processes necessary to, build sustainable local futures (see Table ES-1.). In addition to the experiences of these 12 communities, our researchers have drawn from previous studies conducted by the Center for Energy and Environmental Policy (CEEP) with the support of the Science, Engineering and Technology Services Program – a partnership initiative between the Delaware General Assembly and the University of Delaware. Of particular importance were our reports on: land use and transportation planning innovations to improve air quality (1994); the success of growth management strategies in improving community quality of life (1996); the adoption of environmental justice principles in the redevelopment of "brownfields" (1999) and the strategies for sustainable water resource management in the State (2001).

Table ES-1. Comparison of Best Sustainability Practices Among Communities.

Communities	Program Goals	Community Involvement	Land Use Planning	Water Resource Protection	Sustainable Transportation	Green Energy	Green Business	Social Equity	Greening City Operations
Chula-Vista, CA	Development of a sustainable development program.	Smart Community Program Community involvement at all stages of the planning process. Public education program on sustainable development.	Thresholds Standards Policy. Growth Management Oversight Commission.	Urban Water Management Plan.	Transportation program aimed at reducing CO_2 emissions Alternative Fuel Vehicles and clean fuels promotion Housing density of 14-18 dwellings per acre close to transit points.	CO_2 Reduction Plan GreenStar Building Incentive Program Global warming program for 6 graders.	BEST program Promotion of grassroots development of environmentally friendly businesses.	Collaborative effort (private and non-profit sectors) in providing affordable housing Redevelop-ment Agency	
Davis, CA	Core Area strategy (economic vitality, community enrichment, urban design and transportation, circulations and parking).	Community participation core of General Plan.	Promotion of mixed-use development. Greenway Program. Right to Farm and Farmland Preservation Ordinance. Open space program.	Program to reduce per capita water consumption by 20%. Urban Water Management Plan Toilet and Clothes Washer Rebate Program.	Transportation Management System and Transportation Management Plan. Trip Reduction Ordinance. Promotion and use of Alternative Fuel Vehicles. Bikeway Plan	Public Purpose Fund Energy Efficiency Programs. Use of alternative energy sources Solar Pioneers Photovoltaic Program 20% below 1990 GHG emissions reduction target.	Free waste audits for businesses Mandatory curbside recycling. Partners for Cleaner Davis Best Management Practices Program.	A redevelopment agency.	Mandatory recycling in city operations.
Sacramento, CA	Definition of sustainability. Sustainability visions.	Community participation in planning process (e.g. charettes, town meetings, surveys, referenda, workshops, task forces)	Comprehensive Planning approach. Mixed use land use.	Comprehensive Stormwater Management Program.	Bikeway Master Plan Trip Reduction Ordinance to cut vehicle trips by 35%. Transportation Programming Guide Neighborhood Traffic Management Plan. Neighborhood Preservation Transport Program.	Very strong energy conservation, energy efficiency and renewable energy programs (e.g. Greeenergy, E&T Center, Consumer Energy Center, PV Pioneer, etc.)	Curbside recycling Multi-family communities Recycling Program.	Balance and Diversity in Our Communities Program.	

Boulder, CO	Definition of sustainability Indicators of sustainability Principles of sustainability.	Community participation in planning process (e.g. charettes, town meetings, surveys, referenda, workshops, task forces) Public awareness program on environmental issues.	Strong growth management program, well defined growth boundary: Open space acquisition program. Residential growth management system. Mixed-use zoning.	Program to reduce City government's outdoor water use. Water Allotment Program. Long term watershed planning.	Transportation program, includes: Hop, Skip and Jump bus system, Eco-pass' program, preferential cark park fees. City wide bicycle network, free bikes in the CDB, Bike to Work weeks Replacement of city fleet vehicles with EVs.	Energy program reduces energy intensity and non-renewable energy use. Windsource and Solarsource initiatives.	Strong recycling and reuse program e.g. stringent targets set.		Strong environmental purchasing program. Purchase of recycled and environmentally preferred products.
Fort Collins, CO	Principle of sustainability defined in City Plan. Use of indicators of progress.	Public accessibility to sustainability-oriented programs. Community participation in planning process (e.g. charettes, town meetings, surveys, referenda, workshops, task forces).	Development of compact, mixed-use urban villages. Well-defined city growth boundary. Biodiversity and open space program supported by a citizen-approved ¼ cent sales tax.	Water Metering Act. Free installation of water meters.	Transportation Master Plan includes transportation demand management measures, Pedestrian Plan, Bike Plan. SMARTTRIPS program designed to promote the use of alternative transportation.	100% renewable wind power options to utility customers. 30% below 1990 GHG emissions reduction target.	Solid waste management ordinances of 1995 and 1996.	US EPA Brownfields Pilot Grant used for river corridor clean up program.	Use of green products in city office buildings. Affirmative Procurement Plan program for environmentally preferred products
Tampa, FL	Promotion of principles of sustainability. Indicators of progress. Sustainable Communities Demonstration Project	Strong community involvement in planning process (town meetings, surveys, workshops, task forces), particularly on advisory committees	Urban Development Boundary (UDB) established to control growth and protect open space. Mixed-use zoning promoted.	South Tampa Area Reclaimed Project (STAR): recycled wastewater program.	Downtown Commuter Center promotes alternative methods of transportation.		Refuse-to-Energy recycling	Brownfields Redevelopment program.	
Cambridge, MA	Incorporation of sustainability in growth policy plan.	Community involvement in the planning process (e.g. advisory committees, town meetings, public discussions, public reviews, task forces)	Reduction of Lower 'Floor Area Ratio' for all non-residential uses. Promotion of mixed-use development.		Promotion of bike program and pedestrian – friendly streets program, public transit, carpooling and jitney trips. Provision of diverse public transportation options: 'Smartmove' program. CARAVAN for commuters to promote ridesharing Go Green transportation program	Climate Protection Task Force.	Mandatory recycling for all residents, businesses and installations. Go Green Business program Curbside recycling program.	Strong local government support for Brownfields Revitalization program.	Energy conservation program of city operations

Minneapolis/ St. Paul's, MN	Use of 'Smart Growth' principles to Metropolitan Council jurisdiction. Application of sustainable development principles to planning efforts.	Public participation priority in creation of Environmental-Economic Partnership Project.	Promotion of mixed use and mixed income neighborhoods. Creation of Urban Village. Minneapolis Neighborhood Revitalization Program	Strong watershed protection program Water conservation through municipal building retrofits	Use of incentives for carpooling including discount parking and parking subsidies, free parking, and incentives for public transit use. Promotion of AFVs.	Minneapolis Energy Plan Saint Paul's Conservation Improvement Program Upgrade to energy efficient traffic lights.	Curbside recycling program with monetary incentives for participation. Free Market 'waste' exchange program	Phalen Corridor Initiative – comprehensive redevelopment approach.	
Portland, OR	Office of Sustainable Development. Sustainable Portland Commission Sustainability benchmarks.	Public participation in the development and implementation of city's Comprehensive Plan Public access to information through the Sustainable Portland Commission and the 'green pages.'	Compact urban development. Mixed use neighborhoods.	Strong watershed protection program.	Employee Commute Options (ECO) rule Promotion of AFVs in municipal fleets and for public/private use. Strong light rail system (MAX).	Comprehensive Energy Plan including strong public education and participation programs. Promotion of use of renewable energy sources.	Comprehensive curbside and commercial recycling program. Promotion of environmental services industry BEST program.	Brownfields Showcase Program. Brownfields Action Plan Brownfields website	Green buildings initiative.
Burlington, VT	Development of a guide to sustainability: Legacy Project. Use of Sustainability indicators.	Strong community involvement in planning process (e.g. charettes, referenda, task forces, town meetings) Project EMPACT	Legacy Project programs Developing programs to protect open space from sprawl and direct growth towards developed areas.	Legacy Project programs	Provision of diverse public transportation options. Pedestrian- and bicycle-friendly streets.	CO_2 reduction plan Energy efficiency program by referendum.	Intervale Compost: public-private waste-reduction partnership.	Burlington Brownfields Pilot Initiative	
Seattle, WA	Definition of sustainability used a guide in planning. Use of sustainability indicators.	Development of Millennium Project to incorporate community involvement in sustainable development of city.	Open space acquisition program.	Strong water conservation program: Urban Creeks Legacy program utilizes a watershed approach.	Way To Go Seattle: promotes sustainable transportation choices.	Future energy demands to be met with no net increase in GHG emissions: use of renewable and energy conservation. Conserve 10% energy program.	Comprehensive recycling and waste reduction programs Climate Wise program for businesses	Seattle Public Utilities and Environmental Justice training program.	Development of Green Building Team. Green purchasing program.
Madison, WI	Incorporation of sustainability into planning.	Madison Area Sustainable Lifestyle Campaign including the formation of neighborhood 'Eco Teams'	Containment of suburban sprawl through a fixed 'Urban Service Area' designation Promotion of mixed-use neighborhoods and downtown development.	Innovative multimedia public education program to promote water conservation	Aggressive program of alternative modes of transportation: e.g. Bicycle Transportation Plan, Rideshare Program etc. Green Fleet Program to make the municipal fleet more clean and efficient.	Program to reduce fossil fuel and phase out cut nuclear energy use. Use of wind power generation by Metro Transit Service facilities.	Mandatory curbside recycling program		

Sustainability Efforts in Delaware

The State of Delaware has recognized the need to restructure its planning efforts in order to restrict the spread of sprawl. The impact of sprawl has become a major concern in the State, as a greater portion of agriculture and forested lands are being converted to new commercial or housing developments. The concept of sustainable development has been recently incorporated into a policy directive with the release of the Governor's "Livable Delaware" Executive Order 14 (2001). This Order directs planning efforts in Delaware to incorporate principles of sustainability for the purpose of reducing sprawl and effectively managing growth across its communities.

During the past several years Delaware's state government has actively pursued the creation of a sustainable future for its citizens. It endorsed growth management policies with its "Shaping Delaware's Future" report (1995). It recently adopted whole basin management planning in response to the need for a watershed approach to management and vulnerability to drought conditions. In this regard, the Whole Basin Management Program divides Delaware into five water basins and integrates the assessment, management and monitoring of each basin's biological, chemical, and physical environments. This is a sustainable approach to natural resources management and has proven to be a highly effective tool in other regions. In an attempt to move towards sustainable energy use, Delaware has established a Climate Change Action Plan designed to increase awareness about the State's contributions to greenhouse gas emissions and climate change, and the potential emission mitigation measures that are available to its industries and citizens.

Goals of Livable Delaware

- Direct investment in and target future development to existing communities, urban concentrations, and growth areas.
- Protect important farmlands and critical natural resource areas.
- Improve housing quality, variety and affordability for low and moderate income groups.
- Ensure objective measurement of long-term community effects of land use policies and infrastructure investments.
- Streamline regulatory processes and provide incentives to encourage development in desired areas.
- Encourage redevelopment, improve the livability of existing communities and urban areas, and guide new employment into underutilized commercial and industrial sites.
- Provide high quality employment opportunities for citizens with various skill levels to retain and attract a diverse economic base.
- Protect the state's water supplies, open spaces, farmlands and communities by encouraging revitalization of existing water and wastewater systems and the construction of new systems.
- Promote mobility for people and goods through a balanced system of transportation options.
- Improve access to educational opportunities, health care and human services for all Delawareans.
- Coordinate public policy planning and decisions among state, counties and municipalities.

Recycling efforts in the State have yielded some success through the "Recycle Delaware" Program, a voluntary source-separation recycling effort. One of the more innovative developments of the program has been oil-filter recycling, a strategy that has served as a prototype for other states and is an excellent example of the potential economic and environmental benefits of public-private partnerships. In addition, State agencies are encouraged to increase the number of products they purchase with recycled

content. The State promotes recycling and waste reduction among the business and industrial community through its Green Industries Program. The Program provides incentives and technical assistance for the use of recycled materials in manufacturing processes, encourages the collection of materials to be recycled, and a reduces in the quantity and/or toxicity of wastes generated in manufacturing processes.

Social equity is a hallmark of the City of Wilmington's Brownfields Program. Emphasis is placed on the economic development of these areas, with programs designed to focus on increasing jobs, community-based redevelopment and revitalization efforts, and improvement in the delivery of services to these areas. The State has identified over 300 brownfields sites, with a large number located in Wilmington. The Delaware Brownfields Program has successfully cleaned up 22 sites, placing 236 acres of land back into active use.

All of these activities, and others, contribute to a planning and policy strategy that can help Delaware's communities to realize a sustainable future.

Key Findings

In addition to Delaware's policy efforts (which are discussed at length in Section V.), the report examines 12 pioneers in the Sustainable Communities movement: (1) Davis, CA; (2) Sacramento; CA; (3) Chula Vista, CA; (4) Boulder, CO; (5) Fort Collins, CO; (6) Tampa, FL; (7) Cambridge, MA; (8) Minneapolis - St. Paul, MN; (9) Portland, OR; (10) Burlington, VT; (11) Seattle, WA; (12) Madison, WI. The key findings from research on these communities can be summarized below under the following criteria (see also Table ES-1):

- **Program Goals**: Most of the communities have a working definition of sustainability that is being used to guide their planning efforts. They have also devised indicators of progress to measure or gauge where they are in their sustainability efforts, enabling them to make necessary adjustments when required.

- **Community Involvement**: Public participation is a key component in sustainability efforts during all stages of the development process. Most of the 12 communities utilize a variety of measures to ensure participation. These include: charettes, town meetings, surveys, referenda, workshops, task forces and advisory committees. Public education programs are also organized to ensure that the public is informed about sustainable development issues and opportunities.

- **Land Use Planning**: All 12 communities identify land use planning as very important to sustainability efforts. Growth management principles and strategies are in place in these pioneering localities to establish well-defined growth boundaries, encourage compact spatial development, promote mixed use and mixed income neighborhoods, and protect open space and biodiversity.

- **Water Resources**: Most communities are practicing sustainable water resource management. Sustainability efforts have focused on the conservation of water resources, the protection of watersheds, and reductions in water usage. Several communities are using economic incentives, such as rebate programs, to reduce water consumption.

- **Transportation**: Most of the communities studied for this report are devising strategies to address the dependence on automobile use within their boundaries in addition to reducing vehicle miles traveled. Sustainable public transit options, alternative fuel vehicle initiatives (for public and private sector use), and innovative bicycle and pedestrian programs have been pursued to improve the quality of movement within these communities.

- **Energy**: The supply and use of energy have become critical elements in the pursuit of sustainability by the communities under review. Most are implementing sustainable energy plans to reduce pollution and to contribute to a climate-sensitive future. The adoption of significant emission reduction targets by the 12 communities and their participation in the International Council for Local Environmental Initiatives' (ICLEI) Cities for Climate Protection Campaign underscores their commitment to energy sustainability. Most have implemented significant energy efficiency and conservation programs and are promoting the use of renewable energy.

- **Green Business**: The 'greening' of business is being recognized as an integral aspect of sustainability within communities. This is why some of the communities have developed specific purported "green business" programs to assist, attract and develop environmentally sensitive businesses and business practices. These efforts include mandatory recycling of waste material from all sectors of the community and community requirements to buy certain products that meet a minimum recycled/post-consumer waste content standard.

- **Social Equity**: Social equity is being addressed in sustainability efforts through the revitalization of abandoned, underused, and blighted areas within communities. Most of the programs have concentrated on brownfields clean-up and ensuring that affordable housing, job opportunities and adequate socio-economic services are present in the redevelopment of these areas.

- **City Operations**: Local governments in many of the communities are leading by example through the implementation of sustainable practices in city operations. Some of these practices include the development of green buildings, the establishment of an affirmative procurement plan for environmentally preferred products and the use of green products in city offices.

Our study of these 12 pioneers of the Sustainable Communities movement has found two common themes. First, these communities pursue, as the above findings indicate, a *multi-dimensional* strategy. No single activity or sector can lead to community sustainability. A full range of initiatives and participants would appear to be needed. Second, these communities have found it possible and necessary to make significant commitments to sustainability. As is discussed in the body of the report, these communities have challenged their citizens to reach beyond the "low-lying fruit" and confront the difficult challenges of sustainability. Their citizens have energetically responded. Delaware's scale, science and technology acumen, and innovativeness in the environmental arena (e.g., in coastal zone management, solar energy technology development, and water conservation) are assets upon which it can build to attract its citizens' energy and creativity. CEEP's team is confident that Delawareans will respond, if given the opportunity, to work for a sustainable future.

Recommendations

From our in-depth investigation of successful sustainable development strategies, we offer the following recommendations for Delaware's state and local governments.

A. Setting Goals

- The State of Delaware can lead by example and develop a definition of sustainability to be incorporated into the planning and policies of state government agencies. In preparation for this action, state agencies might conduct an audit of current policies to determine which ones facilitate sustainability and which ones impede progress towards a sustainable future.
- Local communities can be assisted in formulating definitions of a sustainable future in their local settings. These efforts can then be inventoried for the purpose of defining a statewide vision of sustainability.
- Communities should be encouraged to develop a comprehensive, integrated approach that includes social and ecological dimensions (e.g., health, income, energy, transport, natural resources, water, etc.). Part of this action includes a community-based assessment of key environmental, social and economic problems.
- Communities in Delaware can develop and use a set of indicators for sustainability that correspond to the generic template suggested in Table ES-2 (drawn from our research).
- Cities in Delaware can be encouraged to join the Cities for Climate Protection Program of the International Council for Local Environmental Initiatives (ICLEI). ICLEI's program offers worldwide experiences of local governments in their efforts to achieve tangible improvements in the global environmental through cumulative local actions.

B. Community Involvement

- Local communities can be encouraged to develop stakeholder alliances involving representatives from all groups within a community (elected officials, neighborhood environmental and business groups, the media, churches and state and local governmental agencies).

- A State Office of Sustainability might be created to function as a facilitator for sustainability programs across the State. This office would serve as a clearinghouse for information and could manage a "Sustainable Communities" website for the exchange of ideas and strategies. It could also develop and implement public education programs focusing on sustainability.

Table ES-2. Suggested Sustainability Indicators for Communities in Delaware

Sector	Indicators
Community Involvement	• Level of public participation in planning processes/ advisory committees/ town meetings/ voluntary activities
Transportation	• Percent of "pedestrian-friendly" streets • Vehicle miles traveled per capita • Air quality (ozone and CO_2 levels) • Mass transit usage • Alternative fuel use
Land Use & Biodiversity	• Percent of impervious cover • Mixed-use zoning • Percent of open space • Protection of historic/cultural sites • Use and availability of public parks • Percentage of new development that reuses or restores existing buildings • Development of underutilized land versus development in open space • Protected/threatened/endangered plant and animal species • Habitat degradation • Change in wetland inventory
Water Resources	• Water quality • Water conservation (residential, commercial and industrial efficiency) • Recycled water usage • Storm water retention and drainage
Energy	• Renewable versus non-renewable energy consumed • "Green energy" pricing and resource development initiatives • Efficiency of energy use • Local actions to reduce climate change impact • Energy conservation program
Green Business	• Growth of "green businesses" • Expansion of "green" business practices and product purchasing
Waste Management	• Recycling within communities • Waste reduction and reuse initiatives
Social Equity	• Mixed-income housing • Brownfields redevelopment projects • Environmental justice projects
Green City and State Operations	• Sustainable practices and education programs • Use of sustainability indicators in major plans and policies • Government green energy and green product purchasing • Use of alternative fuel vehicles • State employee incentive programs for use of public transit

C. Land Use Planning

- Establishing well-defined growth boundaries would be a key step in realizing a "Livable Delaware." This will allow for growth and economic development without the pattern of suburban sprawl that has typified many areas of Delaware.
- A complimentary action would be to prioritize the revitalization of established communities (e.g., downtown areas), and ensure the protection of farmland, open space and biodiversity areas.
- Land use plans are needed that promote the development of mixed-use and mixed-income neighborhoods. This will be particularly helpful in reducing sprawl and traffic congestion while furthering social equity.

D. Water Resources

- A strong water conservation program with a priority on northern Delaware is feasible and needed. (Detailed recommendations concerning water conservation efforts in the state are addressed in CEEP's report *Securing Delaware's Future through Sustainable Water Resource Management: A Survey of State Programs,* published in 2001.)
- Delaware can also learn from other communities in pursuing industrial, commercial and residential water reuse and recycling.
- Delaware established itself as a leader in coastal zone management and it should continue to build upon this success by adopting state-of-the-art marine planning approaches.

E. Transportation

- Development of a light rail system to link communities, as has been used in Portland through its MAX system, should be seriously considered for Delaware.
- Development of pedestrian- and bicycle plans for communities is likewise an important tool for promoting sustainable transportation.
- The use of incentives for carpooling, public transit use and bicycles, and the creation of trip reduction ordinances to reduce vehicle miles traveled (VMTs) are needed for Delaware to empower community pursuit of sustainability goals. These programs will serve to significantly reduce pollution emissions.
- Providing diverse public transportation options (e.g., the Hop, Skip and Jump bus system of Boulder, CO) can pay dividends in curbing sprawl and reducing traffic congestion.
- The State could expand support for its Alternative Fuel Vehicles Program for public and private sector use.

F. Energy

- A State Sustainable Energy Plan is needed to help Delaware take advantage of the sizable low-cost energy efficiency opportunities estimated by the Delaware Climate Change Consortium (see *Delaware Climate Change Action Plan 2000*).

- Alternative energy sources should be promoted within communities through the use of programs similar to Sacramento's PV Pioneers and Boulder's Windsource and Solarsource initiatives. Because Delaware has one of the country's top solar energy manufacturers (AstroPower), there are economic advantages for State action on this score.
- Similarly, the State can offer tax credits and rebates to promote investment in energy efficiency. The *Delaware Climate Change Action Plan* provides sector-by-sector targets and priority measures.
- The development of community-based sustainable energy plans is an essential tool to realize a sustainable future. The State Energy Office should be empowered to assist communities in this task.
- With electricity deregulation, Delaware created an Environmental Incentive Fund to finance "green energy" investments. The State can learn from other communities who have experience with these funds to make best use of this program.

G. Green Business Development

- Delaware and its communities can formulate green/sustainable business programs to attract companies in this rapidly growing market.
- The State has great potential to become a leader in "waste exchange." Our agricultural and manufacturing sectors have the expertise and opportunity to mount such a program.
- A practical step for the State is to develop a "Businesses for an Environmentally Sustainable Tomorrow" program and enlist the support and assistance of the business community in making Delaware a leader in this market.
- Delaware should carefully consider mandatory curbside recycling for all residents, businesses and organizations.

H. Social Equity

- The City of Wilmington should pursue a Brownfields Showcase designation through the U.S. Environmental Protection Agency.
- Community-based Brownfield Action Plans are needed to provide guidance and direction for redevelopment of more than 300 blighted properties throughout Delaware. CEEP's report on *The Brownfields Challenge* (1999) has detailed recommendations on steps to ensure environmental justice in the redevelopment of these properties.
- One key action of the proposed Office of Sustainability could be the creation of a task force to identify major environmental and social risks that disproportionately affect Delaware's communities of color. As these risks become known, a practical plan to address them can then be formulated in coordination with community leaders.
- An Office of Sustainability could also investigate options for green business development in higher risk communities as a means of combating inequity and unsustainability in a synergistic manner.

I. State and City Operations for Sustainable Development

- Implementation of a green buildings initiative would appear to be a logical priority for Delaware. Such an initiative can offer "win-win" benefits as environmental gains are used to attract new businesses seeking to be recognized for their environmental commitments.
- Mandating the use of green products in State and city government operations will demonstrate Delaware's public sector commitment to a sustainable future for its citizens.
- Following the lead of other communities, Delaware can develop an Affirmative Procurement Plan for environmentally preferred products that will help the public sector implement sustainability goals. At the same time, this action can widen the green market for the State and thereby encourage businesses to enter Delaware and promote their services and products.

These recommendations are proposed in the spirit of providing the State and local communities with practical advice drawn from the successes and experiences of cities, counties and states around the country. At the same time, we recognize that an effective agenda for a sustainable future must consider the specific circumstances and strengths of Delaware's communities. It is hoped that an appropriate balance has been struck in this report between our emphasis on national achievements and our attention to Delaware's distinctive opportunities and infrastructure.

I. Purpose of Report

The purpose of this report is to provide recommendations to the Delaware General Assembly regarding the inclusion of sustainability practices and indicators into the State's land use planning efforts. These recommendations are based on an examination of the programs of twelve showcase cities throughout the United States that have concentrated the planning of their communities around the principles of sustainability. The selection of the twelve cities was made on the basis of (i) their participation in the International Council for Local Environmental Initiatives' (ICLEI) Cities for Climate Protection Campaign, (ii) geographic location from varied regions of the continental U.S., (iii) diversity of size, and (iv) some form of sustainability in city planning. As part of their planning efforts, most of these cities have developed indicators of sustainability to assess their progress towards the ultimate goal of a sustainable future. With the recent launching of the "Livable Delaware" agenda, the State will be looking for direction in their pursuit of strategies towards a sustainable future. It is therefore timely that this report has been commissioned so as to provide an alternative path to attain the goal of livable or sustainable communities throughout the State.

The Center for Energy and Environmental Policy is solely responsible for the findings and recommendations of this report.

II. Introduction

There is a growing trend across nations, states, municipalities and neighborhoods to improve the quality of life within communities. Various strategies are being adopted in order to achieve this significant goal. One pathway through which communities are pursuing the concept of sustainability highlights "the quality of the environment, the rate of natural resource consumption and the impact on the global environment" (Alberti, 1999). Communities throughout the United States and abroad are beginning to assert themselves by both questioning conventional growth-centric methods of development and focusing on reducing their ecological imprint on the environment while living within nature's means. The decision to live sustainably necessitates a fundamental shift in the dynamics of how a community develops, the impacts of which will result in radical changes in land use planning, transportation, water resource management, community operations, and energy production and consumption.

Table 2.1. Definition of Terms

Sustainable The act of one generation passing to the next generation a healthy community and environment, which passes to the next generation the same condition, and so on.
Community Focuses on the primacy and quality of relationships among the people sharing a particular place and between the people and their environment. A community can be a small rural community, a large metropolitan region or a nation.
Development Collective actions to improve social and environmental quality. It is incompatible with unlimited growth.
Sustainable Development Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Sustainable Communities Cities and towns that prosper because people work together to produce a high quality of life that they want to sustain and that leads to healthy natural environments.
Smart Growth Land use practices intended to create more resource efficient and livable communities, by employing more accessible land use patterns that reduce the amount of mobility required to reach goods and services.
Equity The pursuit of fairness that reflects a common respect for rights and a commitment to equal opportunities and access to all forms of community capital.
Source: PCSD (1996; 1997); Maser, 1997.

The decision by communities to redefine how they develop is in response to the encumbrances of suburban sprawl. Traffic congestion, smog, loss of open space, the degradation of natural habitats and water scarcity has lead to decay in the quality of life. In response to the myriad of problems that continue to confront them, a number of communities are beginning to reinvent themselves by taking an innovative pathway to a more sustainable future.

Concepts such as "New Urbanism" are being applied throughout communities in the United States to revive a style of development that promotes a greater sense of localism and place. People are migrating from the suburbs back to a revitalized urban core as a result of the problems associated with urban sprawl. A new wave of redevelopment initiatives is being implemented within central cities to make them attractive and

sustainable. Perhaps the best example of this shift in development patterns has been the revitalization of areas designated as "brownfields" to "brightfields" for the benefit of urban communities.

> ***… "generating a crisis of many dimensions: mounting traffic congestion, increasingly unaffordable housing, receding open space, and stressful social patterns. The truth is, we are using planning strategies that are forty years old and no longer relevant to today's culture. Our household makeup has changed dramatically, the work place and work force have been transformed, real wealth has shrunk, and serious environmental concerns have surfaced. But we are still building World War II suburbs as if families were large and had only one breadwinner, as if jobs were all downtown, as if land and energy were endless, and as if another lane on the freeway would end congestion."*** **Calthorpe, (1989).**

Even within suburban areas, communities are beginning to develop self-sustaining principles not seen in traditional planning. Examples of such practices include the integration of mixed income housing, mixed use zoning, mass transit, pedestrian-friendly streets, energy efficiency, water conservation, habitat protection and green areas into their overall development scheme.

Initial signs of this movement are currently being seen in the State of Delaware. Delaware's experience reflects that of many other states across the nation. Although growth-centric development practices have benefited the State and its people in the past, current indicators show this orientation has begun to threaten quality of life within the State. This conflict can be seen in the recent situation in the Frederica region of Delaware. A farmer threatened to adopt agricultural practices (pig farming) that were incompatible with proposed residential housing, as part of an overall effort to prevent development activities adjacent to his land (News Journal, 2000). As urban development continues to creep into rural areas, conflicts between urban expansion and land usage will increase in intensity and frequency. In the absence of a transition to a more sustainable pathway, forests and agricultural land will continue to give way to the rising demand for residential and commercial developments.

Delaware has put in place a number of initiatives that indicate the State is positioning itself favorably to become a leader in this movement towards a more sustainable development path. In 1994 the City of Wilmington was awarded a Federal Enterprise Community designation under the Empowerment Zone / Enterprise Community (EZ/EC) Initiative. In 1997 Wilmington was also awarded a National Brownfields Assessment Pilot designation under EPA's Brownfields Economic Redevelopment Initiative. Both of these efforts seek to revitalize Delaware's former industrial core. In 1999 the State also took steps to

> **Brownfields** – "abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination." U.S. EPA (1995). *The Brownfields Initiative: Setting Change in Motion*.
>
> "A **Brightfield**[CM] is an abandoned or contaminated property ("brownfield") that is redeveloped through the incorporation of solar energy." It is a "concept that addresses economic development, environmental cleanup, and air quality challenges by bringing pollution-free solar energy and high-tech solar manufacturing jobs to brownfield sites."
> (US DOE, 2001)

address water issues by creating a water supply coordinating council to oversee operations in that area. As ambitious as these programs were, the State still lacked a comprehensive sustainability strategy.

The release of the "Livable Delaware" Executive Order 14 by Governor Ruth Ann Minner is a landmark step in constructing a comprehensive sustainable strategy for Delaware to meet its future challenges. The Executive Order examines the growth management issues facing the State and offers suggestions for surmounting them. One of the keys to accomplishing this task will be the integration of principles of sustainable communities into Delaware's development framework.

All across the United States, communities are pursuing the goal of sustainable community development in an effort to improve the quality of life for their residents. In doing so, these communities are turning "challenges" confronting their current way of life into "opportunities" to create a far better and sustainable future for present and future residents. The experiences that these communities have had can be a valuable resource for Delaware as it formulates its own plans for the future. It is in this vein that the proceeding reports is offered.

III. Sustainable Communities

Sustainability has been defined by the World Commission on Environment and Development (WCED) as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (WCED, 1987: 43)." There is some ambiguity over what the term means, as many people have focused either on the sustainability part and call for environmental and social equity transformation, while others have concentrated on the development aspect of the term and see it more as an economic growth transformation. As such, it has been interpreted to indicate some form of environmental protection or a commitment to social equity or a process of economic development.

In the U.S. the now defunct President's Council on Sustainable Development (PCSD) has defined sustainability in the context of "economic growth that will benefit present and future generations without detrimentally affecting the resources or biological systems of the planet (*President Clinton's Executive Order No. 12852*)." The PCSD used this definition of sustainability to define what comprises sustainable communities as communities where "people are encouraged to work together to create healthy communities, where natural and historical resources are preserved, jobs are available, sprawl is contained, neighborhoods are secure, education is lifelong, transportation and health care are accessible, and all citizens have opportunities to improve the quality of their lives" (PCSD, 1996). In order to achieve this goal, there are key elements, which must be integrated into the decision-making process. These essential components include health and environmental considerations, economic development, equity issues, conservation of nature and civic engagement. Integration must take place at the community level if a sustainable future is to be achieved, for it is within communities that people are most connected to society, and the problems of congestion, pollution, and crime are not abstract but are real and personal. This is where sustainable development will directly affect resident's daily lives and fundamental needs, such as education, employment, healthcare, affordable housing, clean air and water, and convenient transportation (PCSD, 1997).

Communities are pursuing this goal of sustainability in the context of their own unique settings as they develop a vision of what their sustainable community should become. For example, the City of Seattle, Washington, defines a sustainable community as one that promotes "the long-term social, economic, and environmental health of our community. A sustainable culture thrives without compromising the ability of future generations to meet their needs (City of Seattle, 1994)." In Minnesota, the sustainable community has been defined as "a place where present day decisions about resource use and land development do not impinge on the quality of air, water, land and the economic livelihood of future generations. A community that uses its resources to meet current needs while ensuring that adequate resources are available for future generations. A sustainable community seeks a better quality of life for all of its citizens while maintaining nature's ability to function over time by minimizing waste, preventing pollution, promoting efficiency and developing local resources to revitalize the local economy. Decision-making in a sustainable community stems from a rich civic life and shared information among community members. A sustainable community resembles a living system in which human, natural and economic elements are interdependent and draw strength from each other (Minnesota SEDEPTF 1995)." Thus the concept of a sustainable community is an emerging ideal within a local context as each neighborhood, city, town and region continue to define it.

Most North American communities were not planned with sustainability in mind. Rather, they pursued a conventional unsustainable model of development based on the assumption that abundant and cheap energy and land would be available forever. By focusing primarily on the economic aspects of community development, planners failed to consider the environmental and social impacts of uncontrolled growth. Communities grew inefficiently as they became dependent on lengthy distribution systems, fostered a dependence on the automobile, and increased the distance between workplaces and homes. In addition, the abundance of cheap energy influenced the construction of spacious homes and buildings (Roseland, 1998).

However, communities are not isolated economic entities separated from the other aspects of society. They are integrated social, economic and cultural systems that interact with abiotic and biotic elements. The community system constantly receives resource inputs from nature in the form of food, land, water, energy, building materials etc., which are assimilated into its infrastructure, resulting in employment, housing, health, income, education, leisure activity, accessibility and other services. Concomitantly, there is the release of emissions from the community system into the environment in the form of waste generated from its various activities. Solid and liquid waste is released, together with waste heat, air pollutants and noise. This is not confined to the local geographic area of the community. Pollutants extend beyond physical community boundaries. Their global impact is made evident by the emissions of greenhouse gases into the atmosphere.

The extent to which a community assimilates inputs and releases output is dependent upon a variety of factors, including level of development, population, level of technology, lifestyle and the level and type of planning. Most planning has not adequately included ecological and social impacts, resulting in what is considered to be a disproportionately large ecological imprint of many communities. Alberti (1999) points out that cities (*or communities*) are supported by a socio-economic system that operates on a global scale where the ecological productive area required to support them can be from 100 – 300 times larger than the actual area covered by the urban settlement itself. The basic goal of sustainability is to reduce this ecological coverage or imprint of communities on the landscape (and seascape). The underlying principle governing this position is the concept of a carrying capacity of the environment i.e. there is a limit to which the ecospheres can support a given species population.

In the context of human populations, carrying capacity may be defined as "the maximum load that can be safely and persistently be imposed on the environment by people" (Wakernagel and Rees, 1996). Human load is a function both of population and per capita impact (load = population X per capita consumption). As more people inhabit an area, greater pressure is placed on the environment. Equally important, a stable population will exert great pressure as individuals over time consume larger portions of natural resources. Ultimately, the carrying capacity of the ecosphere is exceeded, resulting in a breakdown of its biophysical elements and processes. Stocks of animal and plant species decline (some to precarious levels and even to extinction), while waste products can no longer be adequately assimilated, increasing the resident time in the environment and resulting in concentrations that are considered to be harmful to human health. Changes are required in population growth rates or reductions in per capita rate of consumption of a population. Throughout the U.S., communities are applying measures that can

reduce their consumption of goods and services from the natural environment to bridge the sustainability gap.

There is a range of methods that have been proposed to measure a community's environmental impact on the ecosphere. Wakernagel and Rees (1996) devised the Ecological Footprint (EF) to quantify a population's ecological imprint. The EF is defined as "the corresponding area of productive land and aquatic ecosystems required to produce the resource used, and to assimilate the wastes produced, by a defined population at a specific material standard of living, wherever on Earth that land may be located." It is a measure of the per capita load imposed on the land (and water) by a community. This load has been steadily increasing over the past few decades. The EF also recognizes that communities have impacts beyond their geographical boundaries. For example, it has been estimated that the EF of Vancouver, Canada is 2.36 million hectares, which is 200 times greater than the City's physical geographic area (Rees and Wackernagel, 1996). In terms of a per capita basis, this translates to 4.3 hectares per person given the 1996 population of Vancouver. The average American's EF in 1996 was 5.1 hectares/person, approximately three times the global average of 1.8 hectares/person. At the same time, the Netherlands and India's EFs were calculated to be 3.32 and 0.4 hectares/person, respectively. These figures are conservative as simplifications concerning the services provided by nature were made. Even so, this calculation demonstrates that many communities, particularly in industrialized countries, are in an ecological deficit.

"**Ecological Footprint** of a population or economy is "the area of ecologically productive land (and water) in various classes – cropland, pasture, forests, - that would be required on a continuous basis (a) to provide all the energy/material resources consumed, and (b) to absorb all the waste discharged by that population with prevailing technology, wherever on Earth that land is located." (Wackernagel and Rees, 1996: 52)

Ecological Deficit – the level of resource consumption and waste discharge by a defined economy or population in excess of locally / regionally sustainable natural production and assimilative capacity

Sustainability gap – a measure of the decrease in consumption (or increase in material and economic efficiency), which is required to eliminate the ecological deficit.

The EF is based on the assumption that every item of material or energy consumed requires a certain amount of land (and sea) for the resource flows and for the release of waste material. Land must be appropriated when communities are built, when a transportation network is required, when energy, particularly fossil and nuclear energy is used, and when food is imported. Communities are implementing strategies that will reduce their ecological footprint, limiting the amount of land that is appropriated for their daily activities.

These strategies are arising from a recognition of how various factors shape communities and influence consumption rates and patterns. These include factors such as urban form, land use, transportation, energy, waste and water resource management, and community involvement. The interaction of these factors is also important in

community development. For example Newman and Kenworthy (1989; 1999) have shown how energy use (in the form of gasoline consumption) is a function of land use and transportation infrastructure, together with economics (prices and income) and technology (vehicle efficiency and type of fuel). They suggest that reducing gas consumption and automobile dependence will require changes in physical planning policies, particularly instituting re-urbanization and a reorientation of transportation priorities. Re-urbanization would involve increasing the intensity of urban activity within the present urban area rather than extending into rural open spaces. These steps would decrease vehicle miles traveled, reduce emissions, reduce fuel use, revitalize urban areas and produce socio-economic benefits. Reorienting transportation priorities would focus on upgrading and extending mass transit systems, increasing pedestrian and bicycle access in urban areas, and planning congestion by placing a limit on the private vehicle movement and increasing the advantages of other modes of transport.

Land use planning has also influenced transportation and energy use as traditional zoning practices lead to rambling, cookie-cutter subdivisions and strip malls. This type of land use creates a dependence upon automobile transportation and necessitates the extension of a centralized fossil-fuel dependent electricity grid infrastructure. The alternative to traditional zoning is the adoption of zoning ordinances, which allow for mixed-use development that permits easy access to a range of facilities while enabling residents to walk to obtain goods and services. These mixed-use, more accessible, transit-oriented communities require less infrastructure by using space more efficiently, conserving open space and decreasing automobile dependence (Table 3.1). This type of compact community is currently being pursued under Smart Growth policies of land use planning and the application of the "New Urbanism" design concept to local communities. These concepts are based on the belief that current development patterns are contributing to the decline of central cities, loss of open space and agricultural land, and the problems of crime, unaffordable housing and social inequity (Silberstein and Maser, 2000).

Calthorpe (1993) describes " New Urbanism" as:

> "Neighborhoods of housing, parks and schools placed within walking distance of shops, civic services, jobs and transit – a modern version of the traditional town. The convenience of the car and the opportunity to walk or use transit can be blended in an environment with local access for all the daily needs of a diverse community. It is a strategy which could preserve open space, support transit, reduce auto traffic and create affordable neighborhoods."

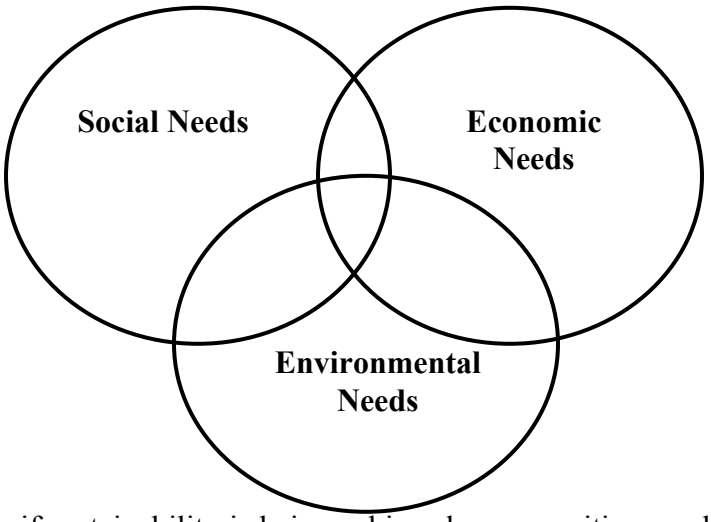
The strategies employed by communities to achieve this type of effect are attempts to fully integrate economic, environmental and social needs (Figure 3.1). This is not a piecemeal approach. Rather, it recognizes the links between the economy, the environment and society. Understanding the three sectors and their linkages is key to understanding sustainability and achieving the balance among these critical pieces of a community.

Table 3.1. Comparing Smart Growth and Sprawl

Smart Growth	Sprawl
• Higher-density, cluster development.	• Low-density development.
• Infill (brownfield) development.	• Urban periphery (greenfield) development.
• Mixed land use.	• Large areas of homogeneous land use.
• Multi-modal transportation and land use patterns that support walking, cycling and public transit.	• Automobile-oriented transportation and land use patterns, poorly suited for walking, cycling and transit.
• Streets designed to accommodate a variety of activities. Traffic calming.	• Streets designed to maximize traffic volume and speed.
• Planned and coordinated between jurisdictions and stakeholders.	• Unplanned

Source: VTPI, (2001).

Figure 3.1. Integration of sustainable development components



To determine if sustainability is being achieved, communities are designing indicators of sustainability that provide information for understanding and enhancing the relationships between the economic, environmental, and social elements inherent in long-term sustainability. Indicators are tools that measure whether a community is getting better or worse at providing all of its members with a productive, enjoyable life, both now and in the future. These indicators are different from the traditional indicators of economic, social and environmental well-being that measure changes in one part of a community as if they were entirely independent or

disconnected from the other parts (Hart, 1999). Indicators of sustainability measure the linkages between the three segments of a community.

The Center of Excellence for Sustainable Development, a project of the U.S. Department of Energy, provides a general list of some of the indicators that are currently in use in the U.S. In terms of Economy, the following are community indicators:

- Income: Distribution of Jobs and Income
- Business: Percentage of wages earned within a community also spent within the community
- Training: Employer payroll dedicated to continuing training/education

With the Environmental sector:

- Air: CO_2 emissions from transportation sources
- Drinking Water: Percentage reduction in drinking water supplies from 1990
- Land Use: Percentage of development occurring annually within an urban area
- Energy: Percentage energy used from renewable sources
- Hazardous Materials: Consumption of pesticides
- Water: Number of gallons of water saved through leak repair

In the realm of Society or culture, some of the indicators used include:

- Abuse: Child abuse/neglect/abandonment
- Diversity: Racism perception
- Volunteerism: Volunteer rate for sustainability activities

(Center of Excellence for Sustainable Development. 2001)

Some of the U.S. communities where these types of indicators are being actively used include:

1. **Jacksonville, Florida** has established nine quality of life elements with a number of indicators for monitoring the quality of life in Jacksonville/Duval County, Florida (Table 3.2).

2. **San Francisco, California** has been in the forefront of the development of indicators of sustainability. In its sustainability plan for the community, the city has devised over fifty indicators, which are grouped in various categories (Table 3.3).

3. In its drive towards sustainability, the city of **Chattanooga, Tennessee**, used a series of goals to measure the community's progress under a program called Vision 2000. Forty goals were developed under the program, which fell under the categories of future alternatives, places, people, work, play and government. The diversity of these goals ranged from the creation of a distribution and transportation center to strengthening the downtown area, to solving existing problems in the area of air, water, toxic waste and noise pollution, to strengthening the day care system and creating after and before school programs. Chattanooga's program is nationally recognized as one of the best commitments to the pursuit of sustainability. (PSCD, 1997).

Table 3.2. Sustainability Indicators Used by Jacksonville, Florida	
Quality of Life element	**Examples of Indicators**
Education – seven indicators	1. Average public-school teacher salary. 2. Percentage of public-school students attending desegregated schools.
Economy – ten indicators	1. Affordability of a single-family home. 2. Income available per person. 3. New housing starts.
Natural Environment – nine indicators	1. Number of days that the Air Quality Index is in the "good" range. 2. Gallons of motor fuels sold per person. 3. Tons per person of solid waste processed for recycling.
Social Environment – eight indicators	1. Percentage of people surveyed who report having volunteered time in the community during the past year. 2. Percentage of people surveyed who report having experienced racism during the past year while shopping, while at work, or while renting or buying housing in Jacksonville.
Culture/Recreation – eleven indicators	1. Public- park acreage per 1,000 people. 2. Attendance at selected cultural facilities and events per 1,000 people. 3. Miles of trails in City public parks per 40,000 people.
Health – ten indicators	1. Disparity in the infant- death rate between people of color and white people. 2. Percentage of people surveyed who report having no health insurance.
Government/Politics – eleven indicators	1. Percentage of people surveyed who report feeling that they have "moderate influence" or "great influence" over local- government decision-making. 2. Percentage of local elected officials who are people of color. 3. Percentage of local elected officials who are female.
Mobility – seven indicators	1. Percentage of working people surveyed who report commuting times of 25 minutes or less. 2. Average weekday ridership on Jacksonville Transportation Authority buses per 1, 000 people. 3. Percentage of JTA bus headways within 30 minutes during peak hours and 60 minutes during non-peak hours.
Public Safety – eight indicators	1. Index crimes per 100,000 people. 2. Reported number of "class three" violations of the public- school code of student conduct. 3. Motor- vehicle accidents per 1,000 people.

Source: Jacksonville Community Council (2000).

Table 3.3. Sustainability Indicators of San Francisco.	
• Air Quality	• Biodiversity
• Energy Climate Change and Ozone Depletion	• Hazardous Materials
• Food and Agriculture	• Parks, Open Spaces, Streetscapes (The Urban Forest)
• Human Health	• Transportation
• Solid Waste	• Water and Wastewater
• Economy and Economic Development	• Municipal Expenditures
• Environmental Justice	• Public Information/Education
• Risk Management (Activities of High Environmental Risk)	

Source: Center of Excellence for Sustainable Development. (2001)

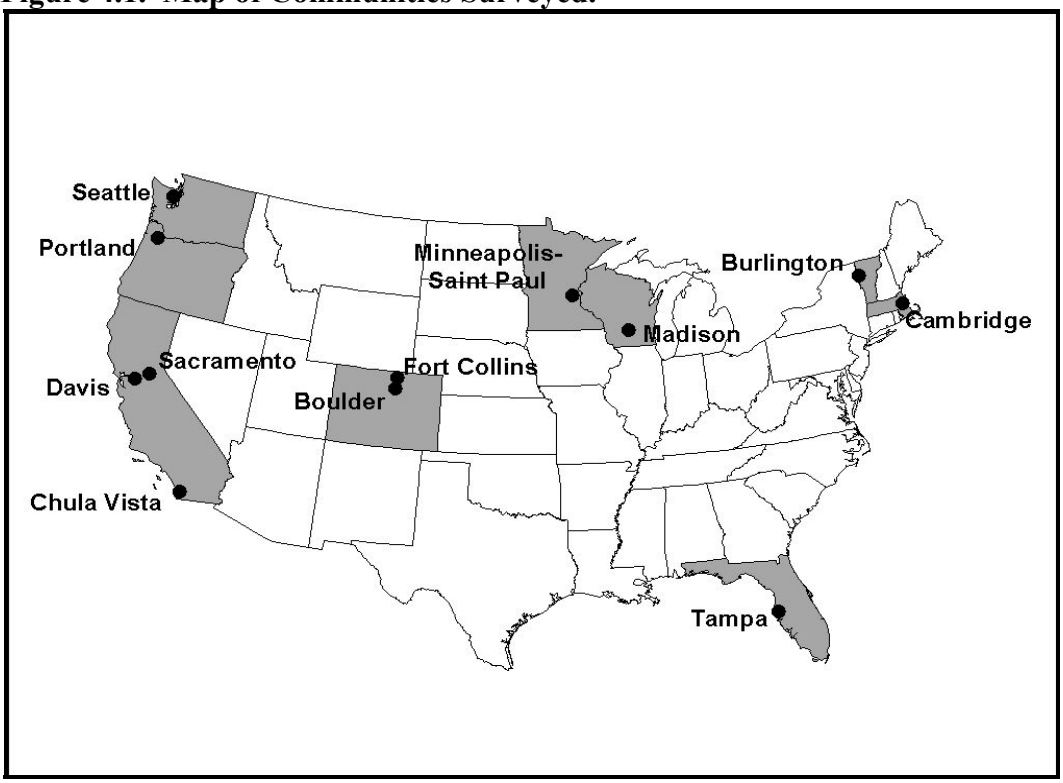
A number of communities are developing and using indicators of sustainability in their efforts to achieve a sustainable future. Other communities have taken an alternative route by devising goals as benchmarks of their progress. Commitment to sustainability in some communities is demonstrated by designating their cities to be "Solar Cities." This is an international collaborative program, geared towards assisting cities in fully integrating renewable energy technologies, as well as energy conservation and efficiency measures, in order to achieve globally sustainable greenhouse gas emission levels and lower reliance on fossil fuel (IEA, 2000). Key elements of this program involve reduction in energy and natural resources consumption, protection and improvement of urban environmental quality, improvement of social equity and access, and overall improvement in the quality of life of the area. The Center for Energy and Environmental Policy at the University of Delaware is the national focal point for the U.S. effort in this program.

In spite of the diversity of approaches to sustainability, these initiatives signify that communities are actively seeking a new paradigm to the way in which they have grown and developed. These communities are beginning to understand that there are limits to growth, that technological fixes and innovations alone cannot improve quality of life or reduce consumption of resources. Instead, they will have to be augmented with fundamental behavioral changes by individuals if present and future communities are to have the ability to meet their needs. As Rees (1996) has indicated, achieving a sustainable future will require that competitive individualism and the consumer lifestyle give way to cooperative mutualism and an economy of sufficiency.

IV. Community-by-Community Reviews of Sustainability Practices in the US.

The practices of twelve communities throughout the US were surveyed for this study - Chula Vista, Davis and Sacramento, California; Boulder and Fort Collins, Colorado; Tampa, Florida; Cambridge, Massachusetts; Minneapolis – Saint Paul, Minnesota; Portland, Oregon; Burlington, Vermont; Seattle, Washington; and Madison, Wisconsin (Figure 4.1). The reviews of current sustainability practices within these communities are based on surveys and telephone interviews of local government and citizen groups involved in community planning efforts, together with literature and web-based searches. Each community description is structured in a similar manner to provide for an efficient comparison across programs. The twelve showcase communities were chosen on the basis of (i) their participation in the International Council for Local Environmental Initiatives' (ICLEI) Cities for Climate Protection Campaign, (ii) geographic location from varied regions of the continental U.S., (iii) diversity of size, and (iv) some form of sustainability in city planning.

Figure 4.1. Map of Communities Surveyed.



These communities were surveyed on the basis of following nine criteria: Program Goals; Community Involvement; Land Use Planning; Water-focused Planning; Transportation Planning; Energy Planning; Attracting Green Businesses; Social and the Urban Environment; City Operations (Table 4.1). In addition, recommendations were made in terms of what were the most important lessons that can be learned by Delaware in its planning for sustainable communities. While each community had innovative approaches that were more effective than others, all are attempting to address the issue of reducing their ecological footprint.

Using the findings from the nine criteria, CEEP researchers were able to prepare an in-depth analysis of the sustainability practices of each community, emphasizing the strengths or

innovative aspects of their programs. Table 4.2 presents a summary of CEEP's investigation, followed by the more comprehensive analysis.

Table 4.1. Criteria Used for Review of Community Sustainability Practices

1. **Program Goals**
   - How does the community's planning incorporate sustainability principles, practices, and guidelines?
   - Have specific indicators of sustainability been identified?
   - What indicators are being used in planning to determine if sustainability is being achieved?
   - How is sustainability defined?
2. **Community Involvement**
   - How is the public involved in city planning processes?
   - At what stage of planning is the public involved?
   - Is there a public education program for promoting sustainability?
   - What access does the public have to information about your sustainability-oriented programs?
3. **Land Use Planning**
   - What access does the public have to information about your sustainability-oriented programs?
   - What growth management policies does the community use?
   - How is mixed-use zoning (residential, commercial, industrial etc.) incorporated in the community's sustainability-oriented planning processes?
   - Is there a public education program for promoting sustainability?
   - What steps are taken to protect public open spaces?
4. **Water-focused Programs**
   - How is water resource management incorporated in the planning processes?
   - What water conservation measures or programs are in place in the community?
5. **Transportation Planning**
   - What access does the public have to information about your sustainability-oriented programs?
   - Has the community developed pedestrian-friendly streets and/or bike lanes?
   - Has the level of ridership on public transportation systems significantly increased over the past 10 years?
   - How has use of public transportation been promoted/encouraged?
   - Has steps been taken to reduce traffic congestion?
6. **Energy Planning**
   - What access does the public have to information about your sustainability-oriented programs?
   - Has the community created specific programs to encourage energy efficiency?
   - Is the use of alternative-energy sources (wind, solar energy or geothermal) encouraged in electricity generation?
   - How are uses of these alternative energy sources encouraged?
   - How is the ICLEI Cities for Climate Protection Program promoted?
7. **Attracting Green Businesses**
   - What access does the public have to information about your sustainability-oriented programs?
   - What steps have been taken to minimize waste production and promote recycling/reuse programs?
   - What kind of approaches to landfill management has your community pursued?
   - Are incentives provided to change the share of materials-intensive businesses?
   - What efforts are being taken by your city to recruit green businesses?
8. **Social Equity and the Urban Environment**
   - What access does the public have to information about your sustainability-oriented programs?
   - Describe proactive redevelopment efforts of contaminated sites in the community?
   - What percentage of brownfields has been or is being redeveloped?
   - How is social equity addressed in your city's redevelopment plans?
9. **Green City Operations**
   - What access does the public have to information about your sustainability-oriented programs?
   - Has the community implemented sustainable practices in its procurement and maintenance activities?
   - Where does the community obtain its composting material?

Table 4-2. Comparison of Best Sustainability Practices Among Communities.

Communities	Program Goals	Community Involvement	Land Use Planning	Water Resource Protection	Sustainable Transportation	Green Energy	Green Business	Social Equity	Greening City Operations
Chula-Vista, CA	Development of a sustainable development program	Smart Community Program Community involvement at all stages of the planning process Public education program on sustainable development.	Thresholds Standards Policy Growth Management Oversight Commission	Urban Water Management Plan	Transportation program aimed at reducing CO_2 emissions Alternative Fuel Vehicles and clean fuels promotion Housing density of 14-18 dwellings per acre close to transit points	CO_2 Reduction Plan GreenStar Building Incentive Program Global warming program for 6 graders	BEST program Promotion of grassroots development of environmentally friendly businesses	Collaborative effort (private and non-profit sectors) in providing affordable housing Redevelop-ment Agency	
Davis, CA	Core Area strategy (economic vitality, community enrichment, urban design and transportation, circulations and parking)	Community participation core of General Plan	Promotion of mixed-use development Greenway Program Right to Farm and Farmland Preservation Ordinance Open space program	Program to reduce per capita water consumption by 20% Urban Water Management Plan Toilet and Clothes Washer Rebate Program	Transportation Management System and Transportation Management Plan Trip Reduction Ordinance Promotion and use of Alternative Fuel Vehicles Bikeway Plan	Public Purpose Fund Energy Efficiency Programs. Use of alternative energy sources Solar Pioneers Photovoltaic Program 20% below 1990 GHG emissions reduction target	Free waste audits for businesses Mandatory curbside recycling. Partners for Cleaner Davis Best Management Practices Program	A redevelopment agency	Mandatory recycling in City operations
Sacramento, CA	Definition of sustainability Sustainability visions	Community participation in planning process (e.g. charettes, town meetings, surveys, referenda, workshops, task forces)	Comprehensive Planning approach. Mixed-use land use	Comprehensive Stormwater Management Program	Bikeway Master Plan Trip Reduction Ordinance to cut vehicle trips by 35% Transportation Programming Guide Neighborhood Traffic Management Plan Neighborhood Preservation Transport Program	Very strong energy conservation, energy efficiency and renewable energy programs (e.g. Greeenergy, E&T Center, Consumer Energy Center, PV Pioneer, etc.)	Curbside recycling Multi-family communities Recycling Program	Balance and Diversity in Our Communities Program	

Boulder, CO	Definition of sustainability Indicators of sustainability Principles of sustainability	Community participation in planning process (e.g. charettes, town meetings, surveys, referenda, workshops, task forces) Public awareness program on environmental issues	Strong growth management program, well defined growth boundary Open space acquisition program Residential growth management system Mixed-use zoning	Program to reduce City government's outdoor water use Water Allotment Program Long term watershed planning	Transportation program, includes: Hop, Skip and Jump bus system, Eco-pass' program, preferential cark park fees City wide bicycle network, free bikes in the CDB, Bike to Work weeks Replacement of City fleet vehicles with EVs	Energy program reduces energy intensity and non-renewable energy use Windsource and Solarsource initiatives	Strong recycling and reuse program e.g. stringent targets set		Strong environmental purchasing program. Purchase of recycled and environmentally preferred products
Fort Collins, CO	Principle of sustainability defined in City Plan Use of indicators of progress	Public accessibility to sustainability-oriented programs Community participation in planning process (e.g. charettes, town meetings, surveys, referenda, workshops, task forces)	Development of compact, mixed-use urban villages Well-defined city growth boundary Biodiversity and open space program supported by a citizen-approved ¼ cent sales tax	Water Metering Act Free installation of water meters	Transportation Master Plan includes transportation demand management measures, Pedestrian Plan, Bike Plan SMARTTRIPS program designed to promote the use of alternative transportation	100% renewable wind power options to utility customers 30% below 1990 GHG emissions reduction target	Solid waste management ordinances of 1995 and 1996	US EPA Brownfields Pilot Grant used for river corridor clean up program	Use of green products in city office buildings Affirmative Procurement Plan program for environmentally preferred products
Tampa, FL	Promotion of principles of sustainability Indicators of progress Sustainable Communities Demonstration Project	Strong community involvement in planning process (town meetings, surveys, workshops, task forces), particularly on advisory committees	Urban Development Boundary (UDB) established to control growth and protect open space Mixed-use zoning promoted.	South Tampa Area Reclaimed Project (STAR): recycled wastewater program	Downtown Commuter Center promotes alternative methods of transportation		Refuse-to-Energy recycling	Brownfields Redevelopment program	
Cambridge, MA	Incorporation of sustainability in growth policy plan	Community involvement in the planning process (e.g. advisory committees, town meetings, public discussions, public reviews, task forces)	Reduction of Lower 'Floor Area Ratio' for all non-residential uses Promotion of mixed-use development.		Promotion of bike program and pedestrian – friendly streets program, public transit, carpooling and jitney trips Provision of diverse public transportation options: 'Smartmove' program CARAVAN for commuters to promote ridesharing Go Green transportation program	Climate Protection Task Force	Mandatory recycling for all residents, businesses and installations Go Green Business program Curbside recycling program	Strong local government support for Brownfields Revitalization program	Energy conservation program of City operations

Minneapolis/ St. Paul's, MN	Use of 'Smart Growth' principles to Metropolitan Council jurisdiction Application of sustainable development principles to planning efforts	Public participation priority in creation of Environmental-Economic Partnership Project	Promotion of mixed use and mixed income neighborhoods Creation of Urban Village Minneapolis Neighborhood Revitalization Program	Strong watershed protection program Water conservation through municipal building retrofits	Use of incentives for carpooling including discount parking and parking subsidies, free parking, and incentives for public transit use. Promotion of AFVs	Minneapolis Energy Plan Saint Paul's Conservation Improvement Program Upgrade to energy efficient traffic lights	Curbside recycling program with monetary incentives for participation Free Market 'waste' exchange program	Phalen Corridor Initiative – comprehensive redevelopment approach	
Portland, OR	Office of Sustainable Development Sustainable Portland Commission Sustainability benchmarks	Public participation in the development and implementation of city's Comprehensive Plan Public access to information through the Sustainable Portland Commission and the 'green pages'	Compact urban development Mixed-use neighborhoods	Strong watershed protection program	Employee Commute Options (ECO) rule Promotion of AFVs in municipal fleets and for public/private use Strong light rail system (MAX)	Comprehensive Energy Plan including strong public education and participation programs Promotion of use of renewable energy sources	Comprehensive curbside and commercial recycling program Promotion of environmental services industry BEST program	Brownfields Showcase Program. Brownfields Action Plan Brownfields website	Green buildings initiative
Burlington, VT	Development of a guide to sustainability: Legacy Project Use of Sustainability indicators	Strong community involvement in planning process (e.g. charettes, referenda, task forces, town meetings) Project EMPACT	Legacy Project programs Developing programs to protect open space from sprawl and direct growth towards developed areas	Legacy Project programs	Provision of diverse public transportation options Pedestrian- and bicycle-friendly streets	CO_2 reduction plan Energy efficiency program by referendum	Intervale Compost: public-private waste-reduction partnership	Burlington Brownfields Pilot Initiative	
Seattle, WA	Definition of sustainability used a guide in planning Use of sustainability indicators	Development of Millennium Project to incorporate community involvement in sustainable development of City	Open space acquisition program	Strong water conservation program: Urban Creeks Legacy program utilizes a watershed approach	Way To Go Seattle: promotes sustainable transportation choices	Future energy demands to be met with no net increase in GHG emissions: use of renewable and energy conservation Conserve 10% energy program	Comprehensive recycling and waste reduction programs Climate Wise program for businesses	Seattle Public Utilities and Environmental Justice training program	Development of Green Building Team Green purchasing program
Madison, WI	Incorporation of sustainability into planning	Madison Area Sustainable Lifestyle Campaign including the formation of neighborhood 'Eco Teams'	Containment of suburban sprawl through a fixed 'Urban Service Area' designation Promotion of mixed-use neighborhoods and downtown development	Innovative multimedia public education program to promote water conservation	Aggressive program of alternative modes of transportation: e.g. Bicycle Transportation Plan, Rideshare Program etc. Green Fleet Program to make the municipal fleet more clean and efficient	Program to reduce fossil fuel and phase out cut nuclear energy use Use of wind power generation by Metro Transit Service facilities	Mandatory curbside recycling program		

A. Chula Vista, California

With a population of over 180,000, Chula Vista is the second most populous city in San Diego County, California. Located near the US-Mexico border, the City harbors a diverse population.

Program Goals

The City of Chula-Vista is credited as the first to promulgate the following innovative environmental programs: the CO_2 Reduction Plan, Smog Buster Alternative Fuel Rebate Program, Telecenters, Innovative Educational Program on Global Warming, and Zero Emission Hydrogen Cell Buses (City of Chula Vista, 2001a). Despite this, the City does not have a comprehensive sustainability program, even though individual programs are tailored toward promoting sustainability. To ensure that sustainability is promoted in and at all levels of planning and implementation of policies, the City has embarked on a process of developing a "Sustainable Development Program" (SDP) to address global warming. Under the SDP, the City's Planning and Building Division and Special Operations Program will have a lead role in defining, designing and implementing sustainable programs.

Community Involvement

Community involvement is encouraged in a myriad of ways with a focus on promoting sustainability. Public participation is encouraged in all stages of planning, from the conceptual design phase to the final development of projects. The City facilitates public participation through education programs, which focus on sustainable practices such as conservation of resources, recycling and reduction of product consumption. These programs improve public input in the planning process. An informed public participated in various City task forces, including a task force to study the CO_2 Reduction Plan. The public, together with the Economic Development Commission, the Resource Conservation Commission, the Growth Management Oversight Commission, the Planning Commission and City Council promulgated ways of reducing CO_2 emissions. The City further promotes community participation through its "Smart Community" program. Smart Community, which uses on-line services (i.e. internet, world wide web, etc.), endeavors to facilitate contact and cooperation between home-based residents, government, business, education and health care so as to reduce vehicular trips and improve efficiency, thereby reducing the costs of government services.

Greening the City: Land Use Planning

All of the land use planning within the City of Chula Vista is guided by two policy documents, the General Plan and the Growth Management Program. The Growth Management Program includes the City's Threshold Standards Policy, developed to maintain Chula Vista's quality of life by applying 11 threshold or performance quality of life standards to development projects. The 11 topics addressed in the City's Threshold Standards Policy represent a variety of different public service and environmental issues. These include the services provided by City departments (police, fire, libraries, parks and recreation, traffic, and drainage facilities), services provided by agencies outside of the City (schools, water and sewer service) and air-quality and fiscal concerns by determining whether growth is having an adverse impact on other measures of quality of life. Some examples of the thresholds are given in Table 4.3.

In addition, the City Council appointed a Growth Management Oversight Commission (GMOC) to administer compliance with the quality of life standards on an annual basis. Where

it is determined that deficiencies are occurring in efforts to meet performance thresholds, adjustments are made to ensure that compliance is being attained in City development.

The principles of sustainability will be incorporated into the General Plan Update, which is currently in process. There are three levels of the proposed "Sustainable Development Program," (citywide, sectional/community planning, and project levels).

Table 4.3. Chula Vista's Threshold Standards

Air Quality	Annual report required from Air Pollution Control District on impact of growth on air quality.
Fiscal	Annual report required evaluating impacts on growth on City operations, capital improvements, and development impact fee revenues and expenditures.
Parks & Recreation	Maintain 3 acres of neighborhood and community parkland with appropriate facilities per 1,000 residents east of Interstate 805.
Water	Annual report from water service agencies on impact of growth and future water availability.
Police	Respond to 84% of the Priority I emergency calls within 7 minutes and maintain average response time of 4.5 minutes. Respond to 62% of Priority II urgency calls within 7 minutes and maintain average response time of 7 minutes.
Traffic	Maintain Level of Service (LOS) "C" or better as measured by observed average travel speed on all signalized arterial streets, except, that during peak hours, an LOS "D" can occur for no more than any 2 hours of the day.

Adapted from City of Chula Vista, 2001b.

Greening the City: Water-Focused Programs

The City of Chula-Vista does not have a water department. Instead, it obtains its water supply from two water authorities, Sweetwater Authority (a state-owned water agency) and Otay Water District (a private organization). These two water agencies regulate water conservation and quality. Both Sweetwater Authority and the Otay Water District have an Urban Water Management Plan (UWMP) that monitors water demand and emphasizes water conservation through wastewater recycling and wastewater disposal conservation (Otay Water District Water Conservation Department, 2000). Other programs provided by the Otay Water District and designed to reduce water consumption and improve water quality include:

- Public education on water conservation.
- Water efficient landscaping, which encourages xeriscape gardening and landscaping and efficient irrigation systems.
- Water conservation vouchers that encourage residents to use water and energy efficient appliances by providing rebates of up to $100.
- High Efficiency Clothes Washer Voucher Program, which provides a $75 discount for purchase of machines that use 40% less water and 60% less energy.

Greening the City: Transportation Planning

The City's CO_2 Reduction Plan identifies a number of measures aimed at reducing emissions from automobiles. These include:

- Providing alternative transportation to reduce pollution and improving air quality. The City has identified at least twenty ways of controlling automobile emissions as part of the CO_2 Reduction Plan. These initiatives include the use of Alternative Fuel Vehicles (AFVs) and a hydrogen fuel cell transit bus, upgrading municipal building lights, trip reduction at all City facilities, and the development and implementation of a Van/Car Pool Program for City employees.
- Facilitating pedestrian access to transit points through the installation of direct, convenient walkways and crossings between bus stops and surrounding land-uses, and integrating bicycles with the transit system by encouraging employers and transit providers to provide bike storage and other facilities at major transit stops and employment areas. There is also an attempt to ensure housing densities of 14-18 dwellings per acre close to transit points.

Greening the City: Energy Planning

The City has a comprehensive energy plan that encapsulates all aspects related to the energy sector, such as energy efficiency, conservation, alternative energy sources and greenhouse gas emissions. The program is formulated within the CO_2 Reduction Plan in an attempt to reduce carbon dioxide emissions level below 1990 levels (City of Chula Vista, 2001c). Under this Program, the City plans to upgrade City-owned facilities, improve the energy efficiency of new residential and commercial construction, purchase or use electricity generated from renewable resources, and promote energy efficient landscaping. An example of the City's energy efficiency program is the comprehensive retrofit program, which seeks to reduce energy consumption through retrofitting over 30 buildings (City of Chula Vista, 2001a). The retrofit program has already started yielding benefits. In particular, Phase I of the program has reduced the City's energy consumption by 1,022,628 kw/year and 1,865,800 lbs CO_2 annually. Phase II has reduced energy consumption by 352,044 kw/year. Phase III of the program, which began in 1996, extends energy conservation to office equipment, such as computers, copiers, faxes, and printers and the City's mechanical systems, including heating, air conditioning.

The City is also in the process of integrating its land use planning into energy planning through the Energy Efficient Building Program (also known as the Chula Vista GreenStar Building Incentive Program (GSBIP) to reduce carbon dioxide emissions by utilizing construction materials and practices, which raise energy efficiency. The GSBIP program extends energy conservation and energy efficiency to the private sector. The City is currently in the process of developing a public education program on energy efficient homes. There is also an innovative public education program on global warming for children. This one-week program for sixth graders aims to enlighten students on the causes and impacts of global warming and instructs them on how global warming can be checked (City of Chula-Vista, 2001d).

Greening the City: Attracting Green Businesses

The City actively engages in attracting environmentally friendly businesses through a number of initiatives. Some of these initiatives are principally City led while others are private, non-profit, voluntary or conjointly funded and administered by the City in collaboration with the State, federal, private, non-profit or voluntary organizations. The City's major greening business initiative is the Businesses for an Environmentally Sustainable Tomorrow (BEST), modeled after Portland's BEST program. Administered by the Environmental Resources Division of the City of Chula Vista, BEST recognizes businesses for their efforts to preserve natural resources and

reduce energy consumption (City of Chula Vista, 2001e). BEST encourages businesses to incorporate environmentally friendly practices into their production processes to cut down on carbon dioxide emissions. Only businesses that show tangible results in energy efficiency, CO_2 reductions, water conservation, waste reduction, recycling, clean and efficient transportation/employee trip reduction and toxic use reduction, as well as overall resource and financial savings, may be recognized under this program.

In addition, the City, in partnership with a local community college, supports grassroots development of businesses that promote and or enhance the environment. Other efforts to attract clean businesses include providing counseling to businesses on environmental regulations (e.g. through the Air Pollution Control District Assistance Program), collaborating with the private sector to promote use of clean technology (through Border Environmental Commercial Alliance), collaborating with the County to provide one-stop programs that assist businesses relocating to the area with recycling (e.g., Recycling Market Development Zone or through Regional Environmental Business Resource/Assistance Center).

Social Equity and the Urban Environment

The City promotes social equity through community development and redevelopment efforts. The City Community Development Department intends to enhance the quality of its residents through physical improvements, economic development and social benefits. The Department houses three Divisions - Development, Housing and Redevelopment. To realize these stated goals, the Department collaborates with the private sector in: (i) developing recreational, cultural, educational, and social amenities; (ii) the financing and preservation of affordable housing opportunities; (iii) providing assistance to local, non-profit organizations who are working to meet diverse community needs; (iv) promoting a business environment conducive to generating local tax revenue, employment opportunities, and a balanced community; and (v) revitalizing blighted or underutilized areas of the City (City of Chula Vista, 2001f). The City, for instance, aspires to attain and maintain affordable housing through its Housing Division within the Department of Community Development, in collaboration with housing organizations and other government agencies.

The City has created a Redevelopment Agency within its Community Development Department to implement the provisions of the California Community Redevelopment Law. Acting pursuant to the Redevelopment Law, the Agency assists in revitalizing the blighted or under utilized land within targeted areas through acquisition and sale of property, borrowing against future revenues, constructing public improvements and entering into development agreements with builders, businesses, and public and non-profit entities. In addition to helping the poor, the redevelopment initiative has been a catalyst for attracting businesses and investment to targeted blighted areas or projects. In general, redevelopment has improved the economic and physical environment of the community's formerly blighted areas.

Recommendations for Delaware

The State of Delaware and communities within the State can consider the following programs from Chula Vista:

- Develop and implement a Threshold Standards Policy program for managing the growth of communities.
- Adoption of a CO_2 reduction plan.
- Develop a 'Businesses for an Environmentally Sustainable Tomorrow' (BEST) program.
- Develop a transportation program that is pedestrian and bicycle friendly, supports the use of AFVs, increases the use of public transit and reduces CO_2 emissions.

B. Davis, California

A small city with a population of around 62,000 people, Davis is located 13 miles west of Sacramento. The City is internationally known for its commitment to implementing innovative and sustainable programs to protect the health of the local citizens and preserving the area's environment. It has been named as one of the healthiest communities to live and retire in the United States (City of Davis, 2001a).

Program Goals

The City formulated a Core Area Strategy and Five-Year Action Plan for the development of its downtown area, which focuses on four issues: economic vitality, community enrichment, urban design and transportation, circulations and parking. These programs aim to maintain the City's small town character, preserve its art cultural, archaeological, historical, and natural resources and to provide a beneficial environment for businesses. A redevelopment plan, administered through the City's Redevelopment Agency, compliments the Core Area Strategy and Five-Year Action Program. Redevelopment efforts have mainly focused on eliminating the influences of urban decay and environmental degradation, improving the suitability and promoting the development of vacant properties, and providing adequate space for parking, businesses and low and moderate-income housing. Although both the development and redevelopment plans are comprehensive, these programs do not specifically reference sustainability. The breath and scope of programs pursued under these plans may, however, be implicitly deemed geared towards promoting sustainability.

Community Involvement

The City Council has actively encouraged public participation in the planning process and residents of Davis strongly believe in community development and participation (City of Davis, 2000). Community participation is the core of Davis' General Plan Update of November 1999 (City of Davis, 1999a). Under this plan, community participation is promoted through two primary means:

1. The public is entitled to review the environmental and social impacts of new projects and development. The City promotes this through appeals or forums where the public is able to express approval or disapproval of proposed City or private projects. The General Plan assures the City's commitment to promote public participation by requiring the City to review its noticing and participation programs annually, through public hearings to ensure they are effective. In addition, the City's outreach/liaison program addresses neighborhood issues.
2. The City encourages volunteerism through the recruitment, training and retention of City and community based volunteers and the expansion of City volunteerism efforts through the creation of non-profit cultural institutions that cater to City residents.

Greening the City: Land Use Planning

The City's General Plan initiated growth management policies with an integrated planning approach. The General Plan created comprehensive, multi-dimensional land use provisions that focus on population density, infill development, creating and maintaining energy efficient housing, accommodation of new structures, supporting efficient public transportation, location of local services, availability and accessibility of local hub or activity node within

walking distance, accessibility to commercial services, prevention of noise, air and other forms of pollution, open space planning, and the preservation of existing agricultural lands (City of Davis, 1999a).

In accordance with these principles, land use initiatives concentrate on:

- Preservation of the historic downtown while planning for reasonable growth and economic development.
- Collaboration with City residents to encourage mixed-use land use planning.
- Encouragement of compact clustered residential housing in new areas and infilling existing neighborhoods while maintaining mixed use.
- Creation of greenbelts to provide safe and secure linear parkways and connectors close to residences as alternatives to biking or walking on streets.
- Preservation of agricultural land and existing wildlife habitats.
- Provision of public open spaces (City of Davis, 1999a).

As part of its growth management efforts, the City of Davis enacted the Right to Farm and Farmland Preservation Ordinance No. 1823 (Chapter 30). This Ordinance preserves agricultural land not otherwise identified in the City's General Plan (CESD, 2001). The City's open space program includes planning, land acquisition, site development, and management activities are managed by the Open Space Commission (OSC). This inter-departmental open space program involves citizen-based planning, habitat and agricultural land conservation, wildlife habitat lands acquisition and site development, development of new vegetation management techniques, and the adaptive use of low maintenance and water conserving native plants to increase community participation and enjoyment of open space (City of Davis, 2001b). The Parks and Community Services Department maintains an extensive network of greenbelts throughout the community for recreational activities. The greenbelts feature bicycle-friendly pathways with tunnel crossings of busy streets. Many greenbelts also have small play areas, picnic areas, lawn space, or exercise par courses.

Greening the City: Water-focused Programs

The City's Public Works Department oversees the maintenance of the water supply and distribution systems for the City. The Department focuses on managing ground water sources to preserve both quantity and quality. In terms of water conservation, the City completed an Urban Water Management Plan in January 1990, to ensure efficient water use. The Plan imposed new construction requirements, a water meter retrofit project, a water shortage contingency plan, customer rebate programs, an upgrade of irrigation systems and new practices for City facilities. The effectiveness of the Plan was demonstrated in 1991 during a multi-year drought. Davis residents reduced per capita water consumption by 10%. The City has continues its conservation efforts, seeking a 20% reduction in per capita consumption by 2010 (City of Davis, 1999a). The City hopes to achieve this target through:

- Installation of new plumbing.
- Metered billing.
- Economic incentives for water efficiency practices – specifically the City has implemented Toilet and Washer Rebate Programs for single-family residents. Under this program, the City gave rebates of $100 for 1.6 gallon per flush toilet purchases

and $150 for clothes washers and other appliances that conserve water purchased before June 2001 (City of Davis, 2001c).

- Economic disincentives for excess use.

The City adopted a Water Supply Master Plan (WSMP) to meet and maintain the quality and quantity of water on a long-term basis. Promulgated in 1996, the WSMP is designed to ensure that water supply and demand is regulated to prevent scarcity. In addition, the City implemented an Urban Water Management Plan (UWMP) in 1990, which reduced per capita water use in the following year by 10% as compared to its historic average (City of Davis, 1999a).

To promote the protection of water resources and biodiversity, the City of Davis Public Works Department created the largest constructed wetland in the United States (City of Davis, 2001d). This 400-acre project manages treated wastewater and stormwater runoff to enhance water quality and restore wildlife habitat.

Greening the City: Transportation Planning

Davis' Transportation Management System (TMS) has focused on reducing peak hour traffic by promoting flexible working hours, the use of carpooling, vanpooling, public transit and bicycles, as well as incentives that encourage alternatives to automobile use (City of Davis, 1996). The City adopted a Bikeway Plan to promote the use of bicycles to reduce automobile use.

In 1992, the City Council adopted a Trip Reduction Ordinance (TRO), requiring employers in downtown Davis to reduce vehicular trips. Employers with fewer than 100 employees and apartment complexes are required to post information on commute alternatives. The City's Transportation Management Plan (TMP required businesses with 100 or more employees to cut the use of individual automobiles to a targeted goal of 1.5 per ridership per vehicle during peak commuting hours by 1999.

In October of 1992, the City Council initiated an alternative fuel test program to experiment with various clean fuel technologies and provide public education. The City purchased three electric vehicles and one fuel-flexible sedan that can operate on any combination of methanol, ethanol and gasoline. In a joint effort with the City, Pacific Gas and Electric Company (PG&E) installed a compressed natural gas fueling station to support the City's electric vehicles. The Police Department furthered the City's alternative fuel objectives through their use of a propane-powered patrol car. The City also plans to purchase two CNG-powered paratransit vehicles (City of Davis, 1996). However, in the past few years, these transportation initiatives have lapsed.

Greening the City: Energy Planning

As part of its climate change program, Davis is committed to reducing its greenhouse gas emissions by at least 20% below 1990 levels by 2010. To achieve this goal, the City adopted energy efficiency policies and has been developing its clean energy potential. The Public Purpose Fund Energy Efficiency Programs promote energy efficiency by encouraging consumers to adopt energy efficient habits. Examples of these measures include:

- State Assistance Fund for Enterprise, Business, and Industrial Development Corporation (SAFE-BIDCO) provides loans to small businesses for retrofits.

- Energy Efficient Clothes Washer Rebate Program and CEE Residential High-Efficiency Clothes Washer Initiative offers $150 to single family residents who purchase energy efficient clothes washers.
- Energy conservation retrofit regulations require existing residential structures to adhere to energy conservation requirements.

The City's alternative energy options focus primarily on renewable energy sources. Renewables have been developed with the ongoing energy crisis in California in mind, and with the idea that energy conservation and small-scale renewable programs are the best short-term strategies for solving California's energy problems. Examples of Davis' renewable energy initiatives include:

- Solar energy workshops are held by the City in collaboration with local businesses and are open to the public. Through these workshops, the public is educated on how to take advantage of the City's programs, including the Solar Pioneers SMUD-City of Davis Photovoltaic program, and how to promote energy conservation (City of Davis, 2001e).
- Renewable programs target four areas: (i) existing utility-scale renewable generation plants, (ii) new utility-scale renewable plants, (iii) emerging technologies, and (iv) consumer subsidy for green power (City of Davis, 1999b).

Greening the City: Attracting Green Businesses

Davis aims to attract businesses in a way that preserves cultural heritage, supports ecotourism and promotes sustainability. The City adopted a number of measures to realize this tripartite goal within the context of sustainability. These measures include:

- Best management practices that advise business on compliance with environmental regulations - Partners for Cleaner Davis.
- How to be an Environment-Friendly Business Program intends to attract environmentally friendly businesses. The program provides business with a regulatory program guide on the generation, transportation, treatment, storage and disposal of hazardous waste, guidelines to meet air and water quality standards, voluntary guide on solid waste, and information on water conservation programs. A number of hotels, retail stores, biotech companies, grocery stores, hospitals, restaurants, and building contractors have taken advantage of these programs (City of Davis, 2001f).
- Regulatory Program Guide for businesses on how to reduce pollution. The City also has a "Clean Start to Better Business-a collaborative effort with the Davis Area Chamber of Commerce.

In addition, the City encourages businesses to seek free waste audits from the City's recycling program. Businesses, which make significant improvements, are recognized through local, state and/or federal programs, such as the Davis Environmental Recognition Award, California's Waste Reduction Awards Program (WRAP) and US EPA's Waste Wise Program. The primary aim of these initiatives is to encourage businesses to reduce waste through recycling

and energy- and water-saving changes. These initiatives have generally resulted in waste reduction.

Green City Operations

The City of Davis has an extensive mandatory recycling program that includes curbside, apartment and business recycling (City of Davis, 2001g). The recycling program requires all levels of government - county, city and state, to participate in recycling materials from their daily operations.

Recommendations for Delaware

The recommendations for Delaware emanating from Davis' experience are as follows:

- Adopt growth management policies with an integrated planning approach.
- Develop Right to Farm and Farmland Preservation ordinances that protect and preserve farmland.
- Develop an Open Space Program with an Open Space Commission.
- Promote a Transportation Management System (TMS) to reduce peak hour traffic and pollution emissions through flexible working hours, carpooling and vanpooling, public transit, bicycles etc.
- Develop a green business program.

C. Sacramento, California

The City of Sacramento, founded 1849, is the oldest incorporated city in California. With a population of 410,000, it is northeast of the San Francisco Bay Area in the north-central California.

Program Goals

Most, if not all programs and initiatives in the City of Sacramento incorporate some measure of sustainable development principles, practices and guidelines. The City defines sustainability as "[t]he efficient use and integration of renewable resources and land use policies to ensure prosperous social and economic living patterns without exhausting [existing] resources" (City of Sacramento Planning and Building Department, 2001a). The City's sustainability initiatives are guided by five visions: sustainable neighborhoods, balance and diversity in communities, human scale to the built environment, preservation, and sustainable economy. Underlying these visions are five values: completeness, identity, diversity, quality and connectivity. The City's sustainability thus revolve around:

- Making neighborhoods sustainable through efficient utilization of resources, promotion of sense of place and belonging, enhancing housing and income diversity, making communities livable, and enhancing internal and external connectivity.
- Promoting balance and diversity in communities through mixed-use land use, businesses and socio-economic diversity, environmental protection and conservation, and transportation.
- Human scale to the built environment through mixed uses and open space preservation.
- Preservation of resources through compact growth, economic viability, preservation of historic buildings and space, preservation of environment and land values.
- Sustaining the economy by attracting stable and diverse businesses.

Community Involvement

The City of Sacramento encourages community participation in planning as well as the implementation of its programs through charrettes, town meetings, surveys, workshops and task forces. Sacramento City Council recently approved a Planning Academy, a public education program that promotes sustainability. The Planning Academy provides training to staff, citizens, decision makers and developers regarding the City's planning process and the benefits of "Smart Growth." The planning division of the Department of Neighborhoods, Planning and Development Services incorporates public participation as a key element of its planning activities. The Office of Environmental Affairs, one of the offices within the City's planning division, strives "to provide information and educate the public to make informed decisions about the environmental quality of life in Sacramento … in a democratic process" (City of Sacramento Planning and Building Department, 2001b). The City's recycling programs (see below) are designed, and their success depends, upon participation by the majority of residents. The strength of the City's public participation initiatives is exhibited in its Neighborhood Traffic Management Program (NTMP). NTMP enhances public safety through the collaborative effort between the City's Department of Public Works and City residents.

Greening the City: Land Use Planning

The City adopted a comprehensive planning approach that incorporated land use, transportation, housing, public facility, and air quality planning, in interrelated projects that avoided conflicts and provided opportunities for mutually supportive efforts. Planning efforts address the environmental implications of proposed projects. The Office of Environmental Affairs reviews environmental assessments and promotes sustainable development through mixed-use land use policies, infill development, area wide economic viability projects, conversion of existing structures to accommodate new uses, business diversity, socio-economic diversity, access to services, revenue neutral or positive developments, distribution of high impact uses and facilities, transportation choices, and street patterns that link "consensus" planning, which involves all stakeholders (City of Sacramento Planning and Building Department, 2001c; 2001d).

The City of Sacramento, in compliance with the California Land Conservation Act of 1965 (CLCA), has incorporated open space protection in its General Plan. The CLCA protects agricultural resources and open space while promoting efficient urban growth patterns (California Department of Conservation, 2001). The CLCA authorizes local governments to enter into contracts with private individuals to restrict land use to agriculture or open space. In so doing, landowners receive tax reductions and local governments obtain a partial of subvention of foregone property revenues from the State via the Open Space Subvention Act of 1971.

On December 4, 2001 Sacramento City Council adopted Smart Growth Principles into the General Plan. The Sacramento Smart Growth Principles focus on changing the "automobile dominated, segregated use and low density land use patterns that are typical of urban development throughout the region and the country" (City of Sacramento Planning and Building Department, 2002). The following Smart Growth Principles were adopted by City Council:

- Mix land uses and support vibrant City centers.
- Take advantage of existing community assets emphasizing joint use of facilities.
- Create a range of housing opportunities and choices.
- Foster walkable, close-knit neighborhoods.
- Promote distinctive, attractive communities with a strong sense of place, including rehabilitation and use of historic buildings.
- Preserve open space, farmland, natural beauty, and critical environmental areas.
- Concentrate new development and target infrastructure investments within the urban core of the region.
- Provide a variety of transportation choices.
- Make development decisions predictable, fair and cost effective.
- Encourage citizen and stakeholder participation in development decisions.
- Promote resource conservation and energy efficiency
- Create a Smart Growth Regional Vision and Plan.
- Support high quality education and quality schools.
- Support land use, transportation management, infrastructure and environmental planning programs that reduce vehicle emissions and improve air quality.
- Policies adopted by regional decision-making bodies should discourage urban sprawl, promote infill development and the concentration of development in the urban core of

the region, and promote the equitable distribution of affordable housing and social services.

Greening the City: Water-Focused Programs

Sacramento's Comprehensive Stormwater Management Program began in 1990 in an effort to protect water quality through sub-programs that target "construction sites, new development, industrial discharge management, illegal discharges, illicit connections, public education and awareness, public agency, and monitoring of stormwater impacts and program effectiveness" (City of Sacramento Stormwater Management Program, 2001). The Public Education and Awareness sub-programs are considered to be critical components in the success of the Management Program. Key elements of these sub-programs are the Clean Water Business Program (CWBP), Community Grant Program (CGP) and Volunteer Stenciling Program (VSP). The CWBP focuses on preventing harmful residential, commercial and industrial wastewater from carpet cleaning activities from being discharged into Sacramento waterways through storm drains. Under the CWBP, participating businesses help educate their customers on stormwater pollution prevention and proper wastewater disposal practices. The CGP provides financial assistance to communities to fund local pollution prevention activities. A $10,000 grant is available annually to communities to help with projects that improve the quality of local creeks, rivers and watersheds within the City. The City's Volunteer Stenciling Program attempts to involve the public in the protection of stormwater quality by urging local communities to create and set up "No Dumping" signs over drains within their area. Participants in the program are provided with stenciling tools and certification of recognition for their participation in the program.

Greening the City: Transportation Planning

The City's transportation program is designed to address air quality, energy conservation, land use planning and social equity issues. It is therefore not surprising that there are a number of overlaps between these related sectors and transportation planning. The City has a network of light rail and buses, yet also works closely with Regional Transit (RT), which operates the transit system, to ensure land use densities and intensities are supportive of existing and future transit operations. Transportation planning involves the City of Sacramento, Sacramento Area Council of Governments (SACOG), Sacramento Transportation Authority (STA) and Sacramento Area Bicycle Advocates (SABA). The City's transportation planning and initiatives include:

- Bikeway Master plans, which were developed to make the City bicycle-friendly.
- Trip Reduction Ordinance or TRO, which requires major developers (over 100 employees), to provide trip reduction measures in their development plans, in order to reduce single occupant vehicle trips by 35%. These trip reduction measures include—transit pass subsidies, bike lockers, car pool spaces, and on-site trip reduction coordinators.
- A scorecard that ranks transportation projects based on the ability of projects to "safely move autos," as well as "by the land uses they connect. The City takes into account, for instance, whether or not projects support infill and redevelopment, or whether they incorporate alternative modes of transportation.
- A Transportation-programming guide to score and rank new public works projects to determine which ones shall be constructed first.

- Neighborhood Traffic Management Program (NTMP), to reduce speeding and traffic congestion. NTMP focuses on stop signs, crosswalks and other measures including public education (City of Sacramento Department of Public Works, 2001a).
- Neighborhood Preservation Transportation Program (NPTP), to reduce speed in residential areas, improve access to downtown and improve vehicle and bicycle safety to restore pedestrian friendly streets in the City (City of Sacramento Department of Public Works, 2001b).

Greening the City: Energy Planning

The City's energy planning, coordinated by the Sacramento Municipal Utility District (SMUD), focuses on energy conservation, energy efficiency and renewable energy. To promote energy conservation and efficiency, the City has established a comprehensive plan to educate the public on energy conservation and efficiency. Under this plan, the City provides conservation tips to both residential and commercial customers and has established an Energy & Technology Center (E & T C) where people or businesses are taught about energy efficiency through seminars and demonstrations on (a) lighting (b) environmental compliance and pollution (c) commercial and industrial processes/productivity improvement (d) power quality (e) ENERGYsmart, an online tool individuals can use to audit their energy use; and (f) Energy Dog (a toy), which teaches children about energy conservation.

In terms of renewable energy, SMUD has initiated a program called Greenenergy, which utilizes renewable resources, such as landfill gases created by decomposition, to create energy. Under this program, SMUD matches up to 100% of residents' electric needs if they convert to green energy. SMUD also encourages use of wind and solar (photovoltaic) power. Part of its solar program involves a solar PV Pioneer program, through which residents are encouraged to switch to solar energy. Each resident buys his/her own rooftop PV system to generate electricity. Customers can participate in the program by paying a small surcharge of 1 cent/kWh extra on their monthly bill to fund the program. It is projected that residents who convert to PV would have almost free electricity in 8-15 years after the costs of equipment and installation are offset. At least 550 PV systems have been installed to date, as a result of an on going partnership between SMUD and residents dating back to 1993. It is also estimated that each solar system decreases the demand for coal by almost 3.7 tons and reduces greenhouse gas emissions by 10,000lbs (SMUD, 2001a).

As part of its commitment to energy efficiency, the City promotes use of efficient products by encouraging people to use products that have the Department of Energy's (DOE) and Environmental Protection Agency's (EPA) Energy Star label. SMUD supports this initiative through its Residential Equipment Efficiency Programs. Products affected range from appliance, office equipment, home electronics, and residential heating and cooling equipment. There is also a Consumer Energy Center (CEC) devoted to energy conservation. CEC offers consumers (businesses and residents) tips on how to conserve energy through transportation, energy use and alternative energy use (SMUD, 2001b). Other energy initiatives include:

- Cool Communities Program administered by the City of Sacramento and the Tree Foundation. This program aims at lowering urban temperature, greenhouse gases, and energy use and air quality. It uses data provided by NASA to learn how different types of trees; natural surface areas and building surfaces contribute to the cooling of ground temperatures and associated heat islands.

- Air Quality Program managed by Sacramento Metropolitan Air Quality Management District (SMAQMD) to promote air quality. SMAQMD uses the Index GIS Planning Tool to identify and evaluate new development projects to ensure they promote livability and sustainability. This will soon be extended to energy efficiency, air quality impacts, jobs and housing balance, trip generation, and infrastructure requirements.

Greening the City: Attracting Green Businesses

The City of Sacramento promotes green businesses through a number of initiatives, which include:

- Offering recycling services to businesses. The City has employed waste reduction coordinators who provide residents and businesses with advice and consultation. Through this program, the City provides businesses or industries with free audits upon request, regardless of whether or not they have subscribed to the program. The City's extensive program covers a number of different types of waste, including waste paper and cardboards. (City of Sacramento Department of Public Works, 2001c).
- Incentives to report illegal dumping and a comprehensive waste tire enforcement program, which regulates the storage and disposal of used tires. The waste tire enforcement program, mandated by California law, applies to waste tire generation and regulates haulers and holding facilities.
- Recycling market business opportunities. Two markets have been developed as a result: the Recycling Market Development Zone (RMDZ), which provides businesses with low cost financing, tax credits, loan packaging, and employment assistance; and Florin-Perkins Enterprise Zone (FPEZ), providing incentives such as, tax credits and business expense deductions.

Social Equity and the Urban Environment

The City established a specific program within its vision statement to promote social equity through its "Balance and Diversity in our Communities" program (City of Sacramento Planning and Building Department, 2001c). Under the "Core Values" principles, this program ensures that the following outcomes are achieved:

1. Mixture of Uses – there has to be a full complement of uses (commercial, business, recreational, housing) within a community.
2. Infilling occurs – maximizes the efficient use of land and avoids urban sprawl.
3. Area Wide Economic Viability – promotes economically feasible projects for the community, which do not adversely impact existing land uses.
4. Sustainable Conversions – conversion of existing structures to accommodate new uses should be considered first to reduce land use change.
5. Business Diversity –ensure a diversity of economic activity within the community and not a dependence on one business segment.
6. Socio-economic Diversity – individual communities should be reflective of the broader community.
7. Environmental Protection and Conservation – sustainable use of natural resources.

8. Access to Services – equitable distribution of services in all communities.
9. Revenue Neutral or Positive Developments – existing development should not subsidize new development.
10. Distribution of High Impact Uses and Facilities – high impact uses and facilities should be carefully sited with community concerns taken into consideration.
11. Transportation Choices - communities should be adequately serviced by all modes of transportation.
12. Street Patterns That Link – streets, pedestrian and bike paths should contribute to an accessible system that is interlinked.

Green City Operations

In an attempt to green the City, Sacramento initiated a comprehensive recycling program operated by the Solid Waste Division of the Department of Public Works. This program provides residents with high quality, environmentally sound, efficient and cost effective services that include waste management, recycling, collection and public education (City of Sacramento Department of Public Works, 2001d). Curbside collection of waste and recyclables is encouraged and virtually all types of waste, including glass, paper products, cans and plastic bottles are covered in the recycling initiatives. In addition, a multi-family Communities Recycling Program, adopted by the Sacramento Regional County Solid Waste Authority (SWA), aims at providing recycling to all City residents by the end of 2001 (City of Sacramento Department of Public Works, 2001e). The multi-family communities recycling programs extends the same recycling opportunities currently available to single-family and duplex homes to multi-family communities.

Recommendations for Delaware

Some initiatives taken by Sacramento that could be considered by Delaware are:

- Develop a definition and vision of sustainability to guide planning efforts.
- Develop a comprehensive land use planning program, which encourages mixed use zoning, infill development and design mechanism to ensure that as land use changes occur, efforts at converting existing structures to accommodate new uses are considered first.
- Promote or encourage energy conservation, energy efficiency and the use of renewable energy programs.
- Transportation Programming Guide (TPG): a comprehensive planning and implementation tool to outline transportation priorities of cities, to identify different ways of improving transportation with the view of reducing use of automobiles.

D. Boulder, Colorado

The City of Boulder is located in the state of Colorado. The City has a population of 96,727 and occupies a land area of 25.36 sq miles.

Program Goals

The City has been active in the promotion of sustainability. Three of the four key strategic goals established by the Boulder City Council address sustainability. These are goals of environmental sustainability, sustainable transportation, and economic sustainability. The environmental goal is "to enact and pursue city policies that cause the Boulder community to become a nationwide environmental leader among communities. The City will be a role model of exemplary environmental practices" (William Toor, Mayor of Boulder). The City staffing and departmental structures support this effort. The City has a deputy City manager for the environment, who oversees all departments with major impacts on the environment, including planning, public works, open space and mountain parks, utilities, parks and recreation, and environmental affairs. These efforts are also supported by a number of council appointed citizen boards. The City hopes to create a model for other organizations by providing services that support human culture in more ecological and economical ways.

The Office of Environmental Affairs (OEA) mission is to prevent pollution, reduce resource consumption and promote environmentally sustainable practices. In addition, the Department of Planning (DOP) plays a key role in sustainable community development. The Department of Open Space and Mountain Parks is responsible for the acquisition of natural lands, using the City's open space sales tax funds, as well as managing the 40,000acres+ of natural lands that the City owns. The Transportation Department has the lead in developing policies and programs designed to meet the goal of no long-term growth in vehicle miles traveled in the Boulder Valley. The Utilities department is responsible for managing City watershed lands to protect water quality, managing streamflows in order to protect riparian habitat, improving the sewage system to improve downstream water quality, and producing green electricity by small scale hydroelectric generators added to the City water delivery system.

The Boulder Valley Comprehensive Plan (BVCP) is the key instrument that defines the City's policies with regard to sustainability issues in community planning (City of Boulder, 2000a). It is a joint plan between the City of Boulder and Boulder County. The Plan determines the direction that growth and development within the City, and the lands just outside City, boundaries would be taken in future. The Plan has been successfully implemented in many areas, especially in compact growth, stopping sprawl, preservation of open lands, intensification of the core area, preservation of important environmental features, provision of housing assistance to lower income households, and improvement in the development of alternative transportation modes. The Plan underwent a process of major update in the period 1999-2001, resulting in the approval of a number of new policy changes, including the incorporation of the concept of sustainability.

Sustainability has been defined in the BVCP from a community perspective as "the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs." The City also uses the principles of sustainability (Table 4.4) to guide and implement the BVCP.

Table 4.4. Principles of Sustainability Used by the City of Boulder
➢ Renewable resources should not be used faster than they are recharged or replenished by the environment ➢ Non-renewable resources should be used with the greatest practical efficiency, and some of those should be used to develop renewable replacements. "Greatest practical efficiency" means a use that is technically and financially feasible ➢ Waste should not be dumped into nature any faster than nature can absorb it ➢ The economy is a subsystem of the environment and depends upon the environment both as a source of raw material inputs and as a sink for waste outputs

Adapted from City of Boulder, (2000).

As a result of this approach, the goals of the various City programs (energy, transport, development, businesses, water resources, community participation) will all have a measure of sustainability in their strategies. In keeping with the policies of the BVCP, the City is using several indicators in its efforts towards achieving sustainability (Table 4.5).

Table 4.5. Selected Sustainability Indicators used by the City of Boulder
➢ **Water**: Total water consumption by City government
➢ **Energy**: Non-renewable energy use in City facilities; percent of energy that is renewable
➢ **Materials**: Total City government trash; recycled or composted materials as a percent of trash; environmentally preferable products as a percent of trash
➢ **Transportation**: City employee commute trips; vehicle miles traveled for work
➢ **Ecosystem health**: Total open space/mountain parks lands; quality of habitat; percentage of permanently affordable housing

Adapted from Sustainability Project 2000:
http://www.ci.boulder.co.us/environmentalaffairs/sustainability/sustainability_mebu.htm

In addition, the Boulder County Healthy Communities Initiative (BCHCI) developed a set of fifty indicators in their 2000 Community Indicators report (Boulder County Civic Forum, 2001). These indicators are arranged under four broad subheadings: people, environment, economy, and culture & society.

Community Involvement

The City has recognized the importance of community involvement in the planning process and has implemented policies that seek the participation of community groups in the decision-making process. It does this through continual efforts to maintain and improve open and public communication and conduct of business. In addition, it aims to support adequate programs and provide opportunities for citizen participation and neighborhood involvement. Currently, the public is typically involved in the planning process through charettes, town meetings, surveys, referendums, workshops and task forces.

Non-profit organizations in particular play an important role in assisting the City in its sustainability efforts and ensuring community involvement. These include:

1. The Boulder Community Network (BCN) maintains a database of community related information for Boulder residents and has an Environment Center containing both local and global environment related information.
2. The Boulder Energy Conservation Center (BECC) works along side the City government in promoting energy efficiency and energy conservation.
3. The Boulder County Healthy Communities Initiative (BCHCI) promotes healthy decision-making in order to sustain environmental quality, livability, and economic vibrancy of the Boulder County region.
4. The Boulder Area Sustainability Information Network (BASIN) offers public access to environmental information.

Greening the City: Land Use Planning

Although land use planning in Boulder is managed by the Boulder Planning Department, major land use changes require approval by 4 bodies: the Boulder City Council, Boulder Planning Board, Boulder County Planning Commission, and the Boulder County Commissioners. Many citizen groups play a major role also, including Plan Boulder County, Sierra Club Indian Peaks Group, and various business and neighborhood groups. The City has devised a growth management program that established a clear growth boundary with the surrounding land held as a publicly owned green belt. A number of very innovative strategies have been instituted to achieve this position including:

- The open space acquisition program, which began in 1967 when Boulder's citizens voted in the first dedicated municipal open space tax in the country. The City has used this tax to protect important natural lands, to maintain agriculture and to create the growth boundary.
- A residential growth management system that limits the number of residential units to a 1% annual rate. Exemptions are made for permanently affordable housing, all housing in developments with 35% or more permanently affordable housing, and housing in mixed-use projects. According to the City's inclusionary zoning ordinance, a minimum of 20% permanently affordable housing is required in all residential development.
- The development of a mixed-use zoning category is applied to shopping malls, industrial areas, and transit centers. Together with changing land use regulations, these strategies will reduce future job growth in office areas, converting them into residential/mixed use zones.

Greening the City: Water-focused Programs

The City Council has committed to water quality protection through the development of a conservation program to reduce water use, especially at peak times. The actions emphasize reducing the City government's outdoor water use, since this represents the bulk of the City government's water consumption. One key facility of this strategy is the Water Allotment Program, which charges departments for the use of large quantities of irrigation water. Other efforts include upgrades of irrigation systems to reduce water use and replacement of traditional

landscaping by low-water landscaping where possible. In addition, the City of Boulder's long term planning for its watershed includes extensive land acquisition efforts to prevent development in the watershed.

The City also promoted the concept of "xeriscaping." This is a method used to carry out landscaping projects with the minimal use of water by such activities as grouping plants with similar needs together, seeking out turf alternatives like patios, decks and mulches, locating grass or turf only where it provides functional use, adding compost and using native plants, watering less often but thoroughly to encourage deep root growth and terracing slopes to prevent runoff (Boulder Energy Conservation Center, 2001).

The City is also developing a Greenways program comprised of a system of corridors along a riparian area, including Boulder Creek and six of its tributaries, in order to integrate the multiple use objectives of riparian, floodplain and wetland protection and restoration; water quality enhancement; storm drainage; alternative transportation routes for pedestrians and bicyclists; recreation; and protection of cultural resources (City of Boulder, 2001).

Greening the City: Transportation Planning

The City, through its transportation planning, is attempting to reduce its dependence on the automobile. Transportation planning is under the aegis of the Transportation Department, within which it has created a separate division called GO BOULDER, whose purpose is to carry out marketing campaigns, coordinate alternative modes of transportation and work on regional traffic demand management strategies (City of Boulder, 1996). A key activity of the Transportation Department is the implementation of the Transportation Master Plan (TMP), a list of objectives that the City of Boulder aims to meet by developing an integrated transportation system. It includes:

- Holding vehicle miles traveled to 1994 levels;
- No growth in long-term vehicle traffic;
- Reduction in single-occupant vehicle traffic to 25% of daily trips;
- Continuing reduction in mobile source emissions of pollutants; and
- No greater than 20% of arterial roadways congested.

A number of strategies have been implemented to achieve these objectives:

- Developing a community transit network, based on a grid network of high frequency, color-coded small buses. Currently, there are 5 routes: the HOP, SKIP, JUMP, BOUND, and LEAP. In fall of 2002 two new routes will be added - the DASH and the STAMPEDE. The JUMP and DASH also serve in- commuters from neighboring towns.
- Developing a strong transit pass program, which currently gives over 60,000 residents and employees free access to the local and regional transit network by showing a photo ID. These are provided through a university bus pass system for all students and university employees, bus passes for downtown employees paid for through parking revenues, a neighborhood bus pass program, an employer based pass program, and discounted transit passes for school age children.
- Extensive traffic calming, including pedestrianizing the City center. The downtown is anchored by a pedestrian mall, and has been very successful for over 25 years. Recent

innovations include many new pedestrian crossings on major arterials, featuring median refuges and in pavement pedestrian activated flashing lights.

- A strong commitment to bicycle infrastructure. This includes approximately 50 grade-separated crossings allowing bicyclists and pedestrians to avoid street crossings, and approximately 200 miles of bicycle facilities. Current plans include approximately 1.5 new underpasses per year; adding on street bike lanes and off street paths along the major auto oriented North-South arterial; and constructing a downtown bike station.
- The City has advocated for rail transit and bus rapid transit between Boulder and Denver, and is currently acquiring land at the planned terminus of the rail service to build a bike/bus/rail station and high density "transit village."

The impact of these programs has been significant. While the TMP goals have not been met, Boulder has been able to achieve a very different mixture of travel modes than other cities in the region, and vehicle miles traveled and traffic counts in the Boulder valley have grown much more slowly than in the rest of the Denver region, despite the fact that Boulder has had one of the highest rates of employment growth in the area. Based on the 2000 travel diary study, the modal breakdown is walking 19.8% (compared to a national average of 5.4%), biking 10% (compared to 4.9%), transit 4.2% (compared to 1.8%). During peak travel times, the transit mode share on some major roads reaches 20%. During the 1990s, employment grew by 36%, while daily vehicles miles traveled grew by only 19%. Meanwhile, in the rest of the region VMT went up by 70%!

Greening the City: Energy Planning

Energy planning and use in the City of Boulder is undertaken as a joint effort by four state and local entities, The Boulder Office of Environmental Affairs, City Council Environmental subcommittee, the Boulder Energy Conservation Center and the City Environmental Advisory Board. Coordination of the energy group is the responsibility of the Office of Environmental Affairs. Under this joint effort, the City has set as a primary objective of its energy program to limit growth in the use of all non-renewable resources and achieve an overall per capita decrease in energy use while accommodating new development. In order to realize this objective, the City Council has established goals related to the use of non-renewable energy on a Citywide scale. Among these, energy use should not increase and new growth should be accommodated by a decrease in per capita use of non-renewable energy. In order to achieve this, the City has been retrofitting government buildings with energy saving devices and has begun a major effort to replace City fleet vehicles with hybrid electrics. The City produces hydropower from its municipal water supply, purchases wind energy for municipal buildings, and is a member of the ICLEI Cities for Climate Protection Program. The City has also proposed the following actions to promote energy efficiency and conservation:

- Prioritize remaining City buildings and perform retrofits.
- Expand education and accountability for energy use in City facilities.
- Expand use of renewable energy (wind and solar power) in City facilities by at least 1 billion BTUs.

- Develop a plan to integrate energy conservation measures into City building retrofits and capital improvement projects.

The OEA, along with the BECC, promotes the use of renewable energy, especially solar and wind power, both of which are available from local companies. Windsource, a public service company that generates wind energy, is able to provide customers with part or all of their energy needs from wind power (PSCO, 1999). The Solarsource program, provided by two companies, Xcel and Altair, enables residents to install photovoltaic panels on their homes and reduce their electricity bills by the process of net metering (Altair Energy, 2001).

The City is now considering additional steps it can take to promote the use of renewable energy, including the solar bonds model created by the City of San Francisco. The City is also considering formally adopting greenhouse gas emission targets based upon the Kyoto Protocol emissions targets.

Greening the City: Attracting Green Businesses

It is a goal of the City to reduce solid waste produced in the Boulder Valley from 1994 level by 42% by the year 2000 and by 50% by 2005, burying or burning waste only as a last resort.

The City, through the Office of Environmental Affairs, has taken extensive efforts to promote recycling and reuse programs. One of the nation's first curbside recycling programs was launched in Boulder in 1970. The City provides information to residents regarding which products can be recycled and appropriate disposal procedures. In addition, the City promotes composting to reduce the total volume of waste by providing composting information Boulder residents. 'Ecocycle', Boulder County's 25-year old community-based non-profit recycling organization, also educates residents about waste reduction (Ecocycle, 2000). A number of businesses that take efforts to recycle and reduce waste are members of this organization.

The major new initiatives in this area are:

- A new county wide recycling facility opened in July 2001, funded by a dedicated sales tax put in place by a citizen vote.
- A new trash ordinance went into effect in November 2001, requiring all private waste haulers to charge a volume based disposal fee in order to provide an economic incentive to reduce waste. All waste haulers must also provide a full range of recycling collection as part of their base fee for trash collection.
- The City charges a tax on all trash disposals, which is used to fund waste reduction and recycling activities. New programs under development are the creation of a hard to recycle center, promotion of recycling in apartments and by businesses, expanded construction and demolition recycling efforts, and expanded composting.
- The BECC operates Resource 2000, an innovative building materials re-use center . The City is working to acquire permanent land and an expanded facility to allow this program to grow.

The 'Green Points' Building Program of the City of Boulder, Office of Environmental Affairs, promotes energy efficiency and energy conservation (City of Boulder, 2000b). This program requires that building permit applicants for new residential construction and additions, which add at least 501 square feet of floor area to existing residential buildings, to earn points according to the schedule specified by the DEA. These green points are relevant to land use,

framing, plumbing, electrical, insulation, heating, ventilation and air conditioning systems, renewable energy and indoor quality aspects of buildings.

The Green Points program was strengthened in the summer of 2001, to require more points, to provide additional incentives for building materials reuse and recycling, use of solar energy, and use of certified wood, to apply the requirement to remodeling, and to require large homes to get more points than smaller homes.

In addition, the City is currently developing green building standards for commercial building, modeled after the LEED standards of the US Green Building Council. The City anticipates that these requirements will be in effect by the end of 2002. The City is currently requiring that building projects by the City government itself meet the LEED silver rating.

Green City Operations

The City of Boulder has a strong environmental purchasing policy (EPP) that provides guidance in purchasing decisions. The City's goal is to encourage and increase the use and procurement of recycled and environmentally preferable products by City Departments. The City has a procurement policy that aims to strengthen the market for such products, maximize diversion from the waste stream and promote human and environmental health. The EPP is being revised. Potential revisions include a requirement for 100% post-consumer recycled paper content (the current requirement is 30%), requirements for recycled content in furniture, and stronger requirements for the use of energy efficient office equipment, including flat screen monitors instead of VDTs.

In 2001, the City adopted a new environmental management system (EMS), piloting it in fleet operations. An environmental audit of parks and recreation was completed in 2001. Based on this audit, a new focus on pesticide reduction and on water conservation has been incorporated into the Park's budget, and is being incorporated into the City integrated pest management Policy. The new IPM policy language under consideration includes a requirement for a review process and demonstration of no effective alternatives before using persistent pesticides or pesticides that meet the EPA classification of level 1 or level 2 toxicity. However, major debates continue on the appropriate use of pesticides to manage noxious weed invasions on naturals lands managed by Open Space and Mountain Parks.

Lessons for Delaware

Some initiatives taken by Boulder that could be instituted in Delaware are:

- The creation of dedicated funds for land acquisition, which can be used to create an edge to the urban area, and redirect development into the existing urban core.
- Development of a comprehensive plan that defines sustainability in all aspects of community planning, including a set of sustainability indicators.
- The residential growth management system, provision of permanently affordable housing and mixed-use zoning.
- A Transportation Master Plan to develop an integrated transportation system.
- Emphasis on the use of renewable energy in meeting electricity needs in an environmentally sustainable manner.
- Strong emphasis and procurement of recycled and environmentally preferable products would be a good option for City governments in Delaware to consider.

E. Fort Collins, Colorado

Fort Collins is located in the Front Range or north central region of Colorado at the foothills of the Rocky Mountains. It has a population of approximately 119,000 residents. The City has been described as a Choice City, as it is considered as one of the best U.S. cities to retire or raise a family (Fort Collins, 2001a).

Program Goals

The principle of sustainability is one of four core community values articulated in Fort Collins City Plan (Fort Collins, 1997a). The City's Comprehensive Land Use Plan was adopted in 1997 when the City scrapped its old Comprehensive Plan and Development Code (City of Fort Collins, 2001b). Sustainability in the new plan is defined as the long-term social, economic, and environmental health of the community. The new City Plan has combined the best practices of comprehensive planning, new urbanism, and community sustainability for the community of Fort Collins. Issues such as compact development form, alternative transportation modes, density, neighborhood preservation, affordable housing, wildlife protection and creating human-scale development have been dealt with in this plan.

Even though the City has embraced the principle of sustainability, it has not set specific indicators of sustainability. Instead, the City has identified indicators for measuring progress towards the goals and visions encouraged by the City Plan (City of Fort Collins, 2001c). These indicators pertain to population, land use, housing, transportation, employment and environment. Some of these indicators include population growth, housing density, single family/multifamily homes split, vehicle miles traveled (VMT), transportation mode and employment (City of Fort Collins, 1999a).

Community Involvement

The public is intensely involved in the planning process through charrettes, surveys, workshops, town meetings, referendums and task forces. Depending on the project, the public is involved at all stages, through a variety of meetings, newsletters, direct mail, newspaper articles, City board and commission hearings, planning & zoning hearings and City Council hearings. Community input reaches its highest levels at the design stages of planning and tapers off at the monitoring stage.

Greening the City: Land Use Planning

The Department of Advanced Planning is responsible for the land use planning in the City of Fort Collins. City aspirations for a compact land use pattern within a well-defined boundary and has led to their adoption of a City Structure Plan, which emphasizes the physical form and development pattern of the City (City of Fort Collins, 1997b). The key principles of this strategy are compact development, interconnected transit system, new activity centers in transit served areas, an interconnected system of open lands, an urban growth boundary and multiple means of travel. The Plan is a provision for the future, one that provides a direction in which Fort Collins should grow and evolve over the next 20 years. Therefore policies directing the plan include:

- Directing future development towards mixed-use neighborhoods and districts in order to facilitate the promotion of a compact urban form, reduce the potential for dispersed growth not compatible with pedestrian and transit use, and cohesive community development.

- Maintaining and enhancing of the character of the City, as well as its sense of place, as defined by its neighborhoods, districts, corridors, and edges.
- Providing for an urban design review process in order to promote new construction and redevelopment that will promote the type of neighborhoods, districts, corridors, and edges that are a key characteristic of the special identity of each area.

The City has set a number of goals for the protection of its biodiversity and open spaces including (i) the establishment of a balanced system of open lands, natural areas, recreation spaces, and parks, including trails and urban streetscapes and (ii) the preservation and protection of all natural areas of importance, by means of acquisition and management. As part of its protection program, the City has acquired over 39 natural areas, comprising of 5,545 acres of foothills, wetlands, prairies, riparian areas and urban sites. The funding for the protection of these areas is supported by the application of a citizen-approved ¼ cents sales tax. Two other county taxes have been approved, which will also partially provide support for the protection of natural areas in the City.

Greening the City: Water-focused Programs

The two main sources of water for the City of Fort Collins are the Cache la Poudre River and the Horsetooth Reservoir. Fort Collins Utilities provide for the protection of the watersheds of both of these sources in collaboration with other entities. A program on the Poudre is in its initial stages, while a Horsetooth protection program was initiated several years ago with the formation of the Big Thompson Watershed Forum (BTWF) (BTWF, 2001). The BTWF, composed mainly of private citizens and government agencies, carries out assessments of water quality and addresses issues of water quantity. Its purpose is to build an effective voluntary watershed management program, address water quality concerns, and deal with existing problems related to water quality with the support and cooperation of all stakeholders.

The Water Metering Act was adopted by the State of Colorado in 1990. According to this law, it is mandatory for all large suppliers of water including Fort Collins Utilities to meter all water taps (City of Fort Collins, 2001d). Water meters are installed free of charge by Fort Collins Utilities. These meters have been found to reduce the demand for water by as much as 20 percent, thus helping to conserve existing supplies of water and delaying the need for new water treatment plants. Metering has also resulted in reduced water bills. Water and wastewater charges are now based upon a metered rate, enabling water use to be monitored and rates based on consumption rather than lot size.

Fort Collins Utilities has always taken the initiative in applying the latest technologies and most effective practices for the treatment of drinking water in the United States (City of Fort Collins, 2001e). Since 1998, it has been a member of the Partnership for Safe Water, a cooperative effort between EPA, American Water Works Association, Association of Metropolitan Water Agencies, National Association of Water Companies and Association of State Drinking Water Administrators. This partnership is a national volunteer initiative, which assists water suppliers in providing superior water quality by helping them to upgrade their water systems in order to control contaminants.

Greening the City: Transportation Planning

The City has adopted numerous programs for transportation that are centered on the principle of sustainability. In this regard, the City has implemented a Pedestrian Plan and a Bike Plan and

also has in place Level of Service for bike and pedestrian facilities, not just roadway capacity. These plans will be supported by the presence of compact, mixed-use urban villages, a number of which the City intends to develop. The primary objective of these urban villages will be to reduce the need for excessive travel, thereby reducing the VMT of the City. In addition, the City has adopted the following principles and policies to reduce VMT and improve air quality:

- Mass transit as an integral part of the City's overall transportation system.
- Support the physical organization of the City by a framework of transportation alternatives in order to allow for maximum access and mobility throughout the City and reduce dependence upon private automobiles.
- Promotion of transportation demand management measures for reducing automobile trips, such as telecommuting and in-home businesses, electronic communications, variable workweeks, and flextime.
- Encouragement of bicycling as a viable alternative to the automobile.
- Providing support for and encouraging pedestrian travel as a viable transportation mode from place of residence to transit, schools, activity centers, work, and public facilities.

The City also participates in a public program called SMARTTRIPS, which aims to reduce automobile dependency and promote the use of alternative modes of transport in Northern Colorado (Smart Trips, 2001). This program aims to reduce VMT by encouraging residents to leave their vehicles home at least once a week, by providing incentives such as free carpooling matching, van pooling services, school pool programs, personalized bus route assistance, bus scheduling and routing, employer transportation programs, regional transit planning, bike trail information and assistance, pedestrian information, bicycling guides and guaranteed ride home information.

Greening the City: Energy Planning

Fort Collins is a member of the ICLEI Cities for Climate Protection and has a local action plan to reduce greenhouse gas emissions (City of Fort Collins, 1999b). After a greenhouse gas inventory for the City was conducted, the City established a target for reducing greenhouse gases by 30% below predicted 2010 levels. To achieve this, the City has outlined a number of measures, some of which were already in existence and others that have been proposed for the near future. The measures outlined range from emissions control, energy efficiency and conservation, promotion of renewable energy systems, reforestation projects, and tighter legislation and incentives for public education and outreach. Part of the action plan involved the development of an internal "Energy Management Team" to make recommendations for a schedule of internal measures contained in the plan as well as to recommend new measures to Council. The Energy Management Team also encourages local businesses to join the Fort Collins Climate Wise program, which focuses on energy efficiency and pollution prevention, waste reduction and transportation (City of Fort Collins, 2001f).

In November 2000, the City Council approved an ordinance to allow for the conversion of all traffic signals except yellow to low maintenance energy efficient light emitting diodes (LEDs). This accomplishment will save the City about $99,000 a year in electricity costs and contribute towards meeting its targets of greenhouse gas emissions reduction. This measure was the first on the list of new measures to be implemented as outlined in the Local Climate Action Plan. Other new actions include the expansion of wind power, climate education and outreach,

optimization of waste water treatment motors or pumps, reduction of energy use from government buildings, increasing awareness about fuel consumption among City departments, implementation of a green buildings program, mandatory contribution by renewable energy in electric deregulation and energy conservation, expansion of tree planting programs, protection of existing trees, and encouragement of electronic means of communication. Fort Collins is among the very few cities that joined the Cities for Climate Protection Campaign in 1997 to have achieved four out of the five campaign goals because of the above proactive efforts.

The City of Fort Collins has also adopted policies that focus on the sustainable use of energy. These include:

- Strategies to encourage the efficient use of energy and promote the use of renewable energy sources (except residential woodburning).
- Promotion of energy efficiency and use of renewable energy resources in both the public and private sector through information and educational services, financial incentive programs (e.g. Zero Interest Loans for residential energy efficiency improvements), requirements and incentives in the planning process, and enforcement of regulations such as the Energy Code. In regard to the use of renewables, the City currently uses wind power to supply a percentage of its electricity and the Fort Collins Utility was the first utility in Colorado to provide 100% renewable wind power to its customers. Under this program, electricity customers have the option of making a one-year commitment to buy wind power at 2.5 cents more per kilowatt-hour (kWh). Residential customers are given the choice of either purchasing the equivalent of their electricity use from wind power or purchasing 400 kWh blocks of wind-generated electricity for $10 per block per month. Businesses have similar options but may purchase larger capacity blocks - 1,000 kWh (City of Fort Collins, 2001g).
- Elimination of barriers to the use of renewable energy sources in new and existing buildings.
- The use of renewable energy resources to be taken into consideration in the layout and construction of new development.

Greening the City: Attracting Green Businesses

The City of Fort Collins promotes the reduction, reuse, recycling, and composting of waste by providing for community recycling drop-off containers for clear glass bottles, food & beverage cans and plastic bottles (City of Fort Collins, 2001h). It also has a recycling resources directory, which contains information about recycling companies and organizations, recycled products, recycling-related web sites and a recycling center's directory with information about different recycling center locations. The City has a composting bin demonstration site and provides information on the process of composting. The City provides for a curbside recycling program and there is a special section for teachers and students on curbside recycling information.

The City of Fort Collins Facilities Department is currently carrying out a demonstration of recycling construction wastes at the new Civic Center (City of Fort Collins, 2001i). Construction debris in Fort Collins contributes to almost 55% of all the waste that goes into landfills. Within the first three months of construction, a complete system for collecting wood, metal, and cardboard was developed and approximately 10.5 tons of materials were diverted

from going into landfill. The recycling of brick and drywall debris is also to be explored and at present about half of the waste stream is currently being recycled or reused.

Social Equity and Urban Environment

The Downtown River Corridor comprises an area of the City along the Cache la Poudre between North College Avenue and East Mulberry Street that is in need of restoration. The Downtown River Corridor Implementation Program (DRCIP) aims to redevelop this area (City of Fort Collins, 2001j). Several areas are suspected of having hazardous contaminants. This project would aid in determining the areas that have actual contamination concerns and provide solutions for cleaning up these sites. Funding for the assessments and mitigation planning phase has been obtained through an EPA Brownfields Pilot grant and the portion of the project addressed by this grant is expected to continue until 2002.

Green City Operations

The City has implemented sustainable practices in its procurement and maintenance activities. The City has an Affirmative Procurement Plan adopted in 1990 that makes it compulsory to conduct and report on one pilot program for purchasing environmentally preferable products annually by the City government. Some of the products under consideration in this program include cleaning products, re-refined motor oil, and low emission and high fuel economy vehicles, such as the Honda hybrid vehicle.

The City is also going ahead with the construction of a new City office building. This facility will be built partially using green products, including the use of solar lighting and other energy saving technologies. The use of a "design/build" process will also be implemented so as to reduce construction waste.

Lessons for Delaware:

From the initiatives taken by Fort Collins, Delaware could take the following helpful suggestions in developing a sustainable approach towards planning in its cities:

- Make sustainability one of the goals of the planning process and develop indicators to measure progress towards achieving sustainability.
- Develop concrete guidelines for sustainable land use planning that emphasize mixed use and compact urban development.
- Promote mass transit, bicycling and pedestrian programs and provide incentives to reduce dependence on the automobile.
- Encourage energy efficiency, energy conservation and the development and use of renewable energy.
- Improve the recycling of waste to reduce landfill and encourage the recycling of construction debris.
- City governments can play a proactive role through environmentally sustainable procurement policies and activities.

F. Tampa, Florida

The City of Tampa, Florida, is located on the west coast of the State, in Hillsborough County and has a population of around 300,000 people. The City has recognized the need for sustainable practices and through its Sustainable Communities Demonstration Project, Tampa has made great strides in becoming a sustainable community. Its most significant steps have come through its land use policies and its energy management strategies. It has also demonstrated that progress need not take many years to be achieved and the outcome of effective planning and political efforts will be early accomplishments with lasting results.

Program Goals

The City and County are joint members of Florida's Sustainable Communities Demonstration Project (SCDP). The SCDP, Section 163.3244 of the Florida Statutes, was adopted by the Legislature in 1996 and is administered by the Department of Community Affairs (DCA). The project arose from the Governor's Commission for a Sustainable South Florida. The project currently has five member communities, who have signed five-year contracts (DCA, 2000). The SCDP promotes six broad principles of sustainability:

1. Restore key ecosystems
2. Achieve a cleaner, healthier environment
3. Limit urban sprawl
4. Protect wildlife and natural areas
5. Advance the efficient use of land and other resources
6. Create quality communities and jobs

Although Tampa's sustainable communities designation with the State has expired. In principle, majority of departments are still implementing the plans in the sustainable designation. The Tampa/Hillsborough joint venture signed its contract in 1997 and is responsible for submitting annual reports to demonstrate progress that has been made (Hillsborough County, 2000).

As a measure of success, a group of indicators was developed as part of the Tampa/Hillsborough project. Twelve indicators were devised, which included measures of development trends, the natural environment, transportation, economic development and affordable housing. All indicators are analyzed annually in the project's yearly report. Although the demonstration project is relatively new, some progress has already been observed. Several measures have indicated success in areas such as the dollars allocated to alternative mobility options (which increased 155.6% between 97/98 and 98/99) and net business startups (which increased 138% between 97/98 and 98/99). Nevertheless, other indicators, such as crime and poverty, have seen little change in the first few years of the program (City of Tampa. 1999).

In addition, the City and County created a twenty-two member Advisory Council that included various business, educational, environmental, civic, and neighborhood interests. The Committee agreed to meet monthly for the duration of the five-year project. However, due to low attendance and lack of clear mandate, the Council was disbanded in March 2000. The City and County also created a Technical Committee to link various agencies and departments and increase the flow of information between them.

Community Involvement

Public involvement in the planning process is incorporated through surveys, workshops, task forces and town meetings. Internet web pages are also used for public education. The City and the County have both created a Sustainable Community webpage. Advisory committees have also been developed to provide community input on the City's planning practices.

Greening the City: Land Use Planning

Growth management in Tampa is guided by the City's Comprehensive Plan and is the responsibility of the Department of Planning and Management. To control development in the City and the County, an Urban Development Boundary (UDB) was established. The area inside the boundary is broken down into two sectors: an urban service area, which will accommodate growth for the next 20 years, and an urban expansion area, which will accommodate growth beyond the 20 year time period.

Development in the urban service area will be directed towards utilizing existing infrastructure whenever possible. The area outside the UDB is rural. This land is designated to remain as agriculture, mining operations or large lot residential development. Planned villages will also be permitted in the rural area. These developments will be designed to be self-supportive through mixed-use development that will include residential, commercial, and employment centers. This will allow residents to meet all their needs within their community, thereby reducing trips to more populated areas and avoiding traffic congestion problems in the area (City of Tampa, 1999).

In an attempt to lessen the need for landfill space and save valuable land around the City, Tampa operates the McKay Bay Refuse-to-Energy Facility. The facility has the capacity to burn approximately 1000 tons of waste per day and produce energy as a by-product to be used in the City of Tampa. Approximately 88% of the waste collected by the Solid Waste Department is processed at the McKay Bay facility. The facility is currently being retrofitted to comply with recently approved Clean Air Act requirements (City of Tampa, 2000a).

Curbside recycling is currently available only in some sections of the City. The service is available to approximately 30,000 homes. The Solid Waste Department also maintains 23 recycling drop-off locations throughout the City. Yard waste pick-up is available periodically to certain sections of the City.

Greening the City: Water-Focused Programs

With Tampa's close proximity to several important water bodies, including Tampa Bay and the Gulf of Mexico, water resources play an important role in the City. Water resource management is the responsibility of the Tampa Bay Water Authority and the Southwest Florida Water Management District (SWFWMD). The SWFWMD is one of five districts in Florida created to protect water resources throughout the State.

The protection of Tampa Bay is carried out through a multi-faceted partnership, consisting of 3 counties (including Hillsborough), 3 cities (including Tampa), the SWFWMD, the Florida Department of Environmental Protection and the U.S. Environmental Protection Agency. In 1997, the group released a Comprehensive Plan for the Bay entitled, "Charting the Course" to guide policies protecting the Bay. In 1999, the program won a leadership Award from the Sustainable Florida Awards for its protection efforts.

To reduce Tampa's reliance on potable water, the City began its South Tampa Area Reclaimed Project (STAR) in 1999. When completed, the system will allocate high-quality

reclaimed water to large waters users for irrigation purposes. Within four months of the start of the project, over 4,500 homeowners and businesses signed up for the program. It is estimated that these customers will save 1.7 million gallons of potable water per day (City of Tampa, 2000b).

Greening the City: Transportation Planning

The Metropolitan Planning Organization (MPO) carries out transportation planning in Tampa and throughout Hillsborough County. The MPO is comprised of local officials from various cities including Tampa and is currently in the process of developing a Long-Range Transportation Plan that will guide transportation policies until 2015. The Plan will look at several factors, such as the reduction of congestion and the protection of the environment, particularly in regard to air quality. The MPO also recently developed plans for a trolley service between the downtown area of the City and the Ybor City section. Federal, State and local funding supported the project. Overhead electric lines power the trolley, which is reminiscent of historic trolley cars and is considered to be environmentally friendly (City of Tampa, 1999).

The City of Tampa and Hillsborough County are both participating in programs sponsored by the International Council for Local Environmental Initiatives (ICLEI) in an attempt to reduce energy use and its contributions to global warming. As a member of ICLEI's Cities for Climate Protection program, Tampa has pledged to reduce greenhouse gas emissions. One strategy has been to reduce transportation emissions and congestion problems in the City. With the help of funding from the Florida Department of Transportation, Tampa has built the Downtown Commuter Center to promote alternative methods of transportation. The Center is strategically located near the City's main bus terminal and provides several services. Ticket sales, route information, and assistance are available to bus riders. Reserved parking spaces are available for vanpools; lockers and repair facilities are available for bicyclists. The Center also provides lockers and showers for everyone for a small monthly fee (ICLEI, 2000).

Greening the City: Energy Planning

Energy planning and production in Tampa is carried out by Tampa Electric Company, an investor-owned energy utility - its parent company is TECO Energy. All of the power generated by Tampa Electric is produced through the burning of fossil fuels, with only 11MW generated through the use of cleaner-burning natural gas (see Table 4.6). Nevertheless, Tampa Electric is taking steps to produce cleaner energy for the citizens of Tampa, primarily through the use of fuel switching and pollution prevention technologies. It was recently announced that the Bayside Power Station, formerly the Gannon Station, would switch from coal to natural gas (Tampa Electric, 2001).

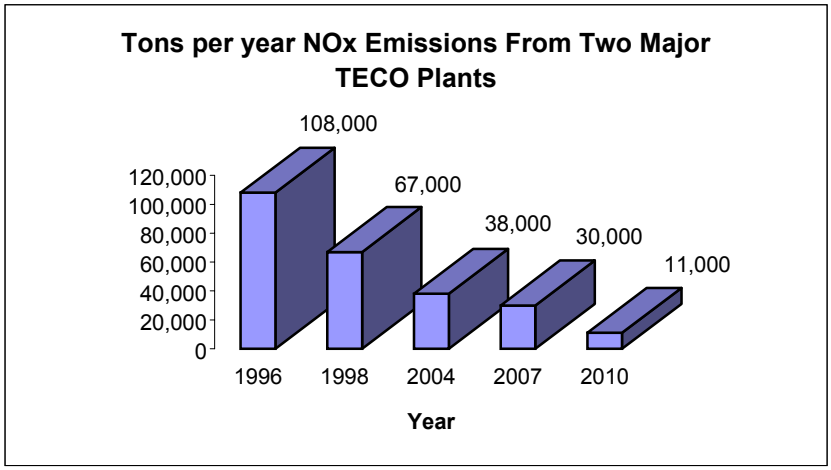
In 1999, TECO also signed an agreement with the State of Florida to form a partnership working towards reducing TECO's nitrogen oxide (NO_x) emissions. The agreement could dramatically improve air quality in the region. Under the plan, TECO's NO_x emissions will be cut in half in five years using scrubber technology in every boiler that the company owns, with continued net reductions in subsequent years (Figure 4.2). Some power plants will be shut down or retrofitted by 2010 to ensure compliance is reached. The agreement between the State and TECO will support a study conducted by both entities to look at the effect of air pollution on the waters of Tampa Bay. The State will also contribute $2 million in financial support (DEP, 1999).

Table 4.6. Energy Production by Tampa Electric

Power Plant	Energy Source	MW
Big Bend	Coal	1,742
Gannon	Coal	1,170
Hookers Point	Oil	204
Dinner Lake	Natural Gas	11
Polk	Coal	250
Phillips	Oil	37
Peaking Units	Oil	194
System Total		**3,608**

Source: Tampa Electric 2001

Figure 4.2: NO_x Reductions through TECO/DEP Agreement



Adapted from DEP, 1999.

Social Equity and the Urban Environment

Social equity programs in Tampa include a county brownfields program initiated in 1999. The project began in 1998 when the City applied for a grant from the EPA through its Federal Brownfields Economic Revitalization Initiative. In 1999, the City was awarded a Brownfield Revitalization Grant from the EPA, which was used to create a 2-year Brownfields Assessment Pilot project. The project, entitled the Brownfield Redevelopment Program, was created out of the Mayor's Strategic Initiatives released in 1999. It is designed to provide a process, definition, and incentives for brownfields redevelopment. The program is in its early stages. The City is currently identifying brownfields throughout its boundary area and will soon begin redevelopment plans. With adequate funding, the overdue program could have a lasting impact on the environmental, social and economic health of the City and the County.

The City has also targeted specific communities in the City for revitalization. The City selects specific declining areas for redevelopment and the projects are organized by the Community Redevelopment Agency. These efforts attempt to restore the areas through various initiatives including housing rehabilitation projects and job-skills training to area residents. The projects are supported through various loans and grants from groups such as Housing and Urban Development (HUD) (City of Tampa, 1999).

Lessons for Delaware

Some initiatives taken by Tampa that could be instituted in Delaware are:

- Florida's Sustainable Communities Demonstration Project could be duplicated by the State of Delaware in an attempt to create sustainable communities throughout Delaware.
- Tampa and Hillsborough County's use of an Urban Development Boundary could be an effective tool in controlling Delaware's growth.
- The partnership between the State of Florida and TECO in an attempt to reduce emissions could be equally effective in Delaware.
- The creation of Downtown Commuter Center's in Delaware cities could promote the use of mass transit and bicycles, thereby lessening their reliance on automobiles.
- ICLEI participation for major urban centers in Delaware could be an effective tool in decreasing the State's greenhouse gas emissions.

G. Cambridge, Massachusetts

The City of Cambridge is located on the lower reaches of Charles River, across from the City of Boston. It is considered to be one of the more historic settlements in the United States and has a population of over 100,000 people. It is highly regarded for its cultural diversity, entrepreneurial business community, and education institutions.

Program Goals

The City of Cambridge incorporated the principle of sustainability in its planning as early as 1993, through its Growth Policy Document entitled "Towards a Sustainable Future." This document was not officially adopted. However it has served to guide policy and program activities pertaining to land use, transportation, housing, economic development, institutional growth, urban design and environment, and open space. The document lays out 70 policies in these areas, including:

1. Develop a national model for community energy production, pollution prevention and recycling.
2. Establish cooperation between grass-root organizations and universities, churches and other institutions on sustainable forms of transportation, heating, waste reduction and food production and distribution.
3. Develop accessible parks and open spaces, and strengthen and stabilize neighborhoods connected by open spaces.
4. Encourage volunteer groups to ensure clean and safe parks and develop a model for effective citywide design review.
5. Expand shared responsibility for growth between local government and non-profit and private sectors.

The responsibility of the implementation of the growth policy goals is that of the Community Development Department, the City's chief planning and development agency. As is expected, the department administers economic development, environmental and transportation planning, housing, community planning and urban development. The ultimate goal of the department is to enhance the physical environment of the City, improve the quality of life in Cambridge, and support the diversity of the City's population.

Community Involvement

The community is actively involved in the City planning process through a variety of mechanisms such as workshops (e.g. Citywide re-zoning workshops), taskforces (including a Climate Protection Task Force), project advisory committees, standing advisory committees, public meetings and hearings, public discussions (e.g. public discussion on "Future of Cambridge: Rate The Growth Policy Goals"), public review of development projects, and information dissemination by the local government and other community involvement programs (City of Cambridge, 2001a). In addition, a tremendous amount of information in the form of reports, meeting agendas, meeting proceedings and proposals is made available to the public through the City's website. Certain City agencies also make handouts, reports and data books containing relevant information available to the public.

Greening the City: Land Use Planning

The City is actively working to improve the quality of Cambridge's built environment and preserve the human scale of the City's neighborhoods and commercial districts. Land use planning is the responsibility of the Zoning Staff and Planning Board, Community Planning Division, Community Development Department. Part of this responsibility is the promotion of mixed-use development. For example, the Cambridge Center Mixed Use Development District (MXD) guides development in the area known as the Kendall Square Urban Renewal Area. Within the MXD, light industrial, office, retail, institutional and residential uses are allowed. Further control over City planning is accomplished through the Cambridge Zoning Ordinance, which governs how land and buildings in the City may be used. Part of the objective of the ordinance is to lower the 'Floor Area Ratio' (FAR) for all non-residential uses by one third percent (City of Cambridge, 2001b). Deeper FAR cuts are applied where a one third reduction would still leave FARs greatly inconsistent with traffic concerns or other instances resulting in a substantial inconsistency with the overall pattern being sought. The City Council adopted comprehensive revisions to the Zoning Ordinance in February 2001 which are intended to preserve the City's urban diversity and economic health, promote the creation of more housing (including affordable housing), impose limits on future density and traffic growth, and provide opportunities for public review of significant projects.

Greening the City: Water-focused Programs

The Cambridge Conservation Commission helps to protect water resources in the City through the administration of the Massachusetts Wetlands Protection Act regulations. Projects in or near rivers, streams, ponds, vegetated wetlands, and floodplains are subject to a permitting process.

In addition, under the regulations pertaining to the Overlay District of the Cambridge Zoning Guide, a Flood Plain Overlay District is developed to protect the health, safety, general welfare, human life and property from dangers of flooding, and to preserve the natural flood control characteristics and the flood storage capaCity of the flood plain and ground water recharge areas.

The Water Department is responsible for providing and protecting Cambridge's water supply. The public water supply is provided by a reservoir system that is largely located outside Cambridge. The Water Department's Watershed Division monitors development activities in the watershed, participates in permitting processes, and promotes the use of stormwater best management practices. The City has also acquired open space in the watershed to protect the reservoir system.

Greening the City: Transportation Planning

The City's transportation planning is under the aegis of the Environment and Transportation Planning Division. The division works in close cooperation with other divisions of the Community Development Department, the Department of Traffic, Parking and Transportation and the Department of Public Works to design and construct its projects. In order to improve mobility and protect the environment in the City, pedestrian-focused programs have been established to develop pedestrian friendly streets (intersections have been made safer for pedestrians, sidewalks have been improved and regularly repaired), walking is promoted and proposed developments are reviewed to ensure that they are as pedestrian friendly as possible. Bicycling is actively endorsed as a healthy, environmentally friendly way of getting around the area. Cambridge is very suitable for bicycling and more people are using their bikes for their

day-to-day activities (City of Cambridge. 2001d). Bicycle programs, such as the installation of bike lanes and other bicycle improvements as streets are repaved, bicycle safety campaigns in schools and other places to teach safe cycling to both children and adults, and the installation of bicycle parking throughout the City have been introduced. City employees have access to City-owned bicycles available at most major City buildings to use during the course of their work. These programs have led the League of American Bicyclists to designate Cambridge as an official Bicycle Friendly Community.

The City also promotes public transportation in the form of buses, subway, commuter and heavy rail and shuttle services. The City currently has in place a public transit pass subsidy program for all eligible City employees as a part of its 'Smartmove' program to encourage use of alternative modes of transport and reduce single occupancy travel (City of Cambridge, 2001e). In addition, new programs and incentives are under development to further encourage use of alternative modes of transport by the City's employees. The City recently started the EZ Ride shuttle service in the eastern part of Cambridge to provide a needed connection from Boston to the City. Other City transportation programs include general commuter services, the use of parking spaces in municipal parking lots to facilitate the operation of car sharing programs, and a Vehicle Trip Reduction Ordinance. The Parking and Transportation Demand Management Ordinance was established to reduce congestion and improve air quality by requiring private developers and other property owners to implement programs that reduce single occupancy vehicle trips, including transit subsidies, provision of bicycle facilities, and limitations on parking. The City also works with CARAVAN, a state program providing ridesharing services (carpooling and van pooling).

Greening the City: Energy Planning

The City is a participant in the Cities for Climate Protection campaign sponsored by the International Council for Local Environmental Initiatives (ICLEI). The City has established a Climate Protection Task Force, which is advising the City on the preparation of a Local Action Plan to reduce the emission of greenhouse gases from Cambridge (City of Cambridge, 2001f). The plan is expected to select a target emissions reduction level as well as a target year, and identify possible actions that can be implemented to achieve the reduction limit. Actions like energy efficiency improvements, application of renewable energy technologies, purchasing green power, measures that reduce vehicle miles traveled, use of alternative fuel vehicles and increased recycling of solid waste are among those under consideration. The plan would take into account emission reduction targets and target timelines, emission reduction measures, education and outreach activities, resources to implement the plan and monitoring its implementation. The Climate Protection Task Force includes citizens, City staff, and representatives from businesses, institutions, and public interest organizations and has been appointed by the City Manager. The Task Force is expected to serve until the Local Action Plan is presented to the City Manager.

Energy conservation is also a priority for the City. It has become a participant in the EPA's Energy Star Buildings/ Green Lights Partnership. Under this program, the City attempts to make its municipal buildings and schools more energy efficient. In addition, it can also realize substantial financial savings, improve air quality and reduce its contribution to global climate change.

The City is engaged in planning for a green power consumer aggregation. With grants from the Massachusetts Renewable Energy Trust and the Merck Foundation, the planning effort led by the Massachusetts Energy Consumers Alliance is working to establish an option for

electricity consumers to buy their power from renewable energy sources such as wind, solar, biomass, and other alternatives to fossil fuels and nuclear energy. This is possible under the State's electric utility deregulation law passed in 1997.

Greening the City: Attracting Green Businesses

The City of Cambridge Department of Public Works has a Recycling Division that looks after the implementation of recycling programs. The City's mandatory recycling ordinance requires all residents, businesses and institutions to recycle. Recycling containers and pick up service is provided to all residents at no charge, including those that live in buildings with more than 13 units (City of Cambridge, 2000). All businesses need to complete a waste audit/recycling plan and landlords/management companies that coordinate garbage disposal for more than one tenant in a building need to file a plan on behalf of the building. Commercial recycling staff are designated to assist in completing the forms, conducting onsite evaluations and answering queries. The City is also working to provide convenient and affordable curbside recycling to small and medium sized businesses.

The City's Community Development and Public Works Departments annually recognize businesses for outstanding environmental efforts with a "GoGreen" Business Award. These awards are presented in the two categories of transportation and recycling. The recycling awards are given to those businesses that demonstrate leadership in recycling through the procurement of supplies with recycled content and waste prevention. The transportation awards are given to businesses who have proved their leadership in promoting transportation by adopting options like subsidizing MBTA passes, operation of shuttle buses to nearby train stops, provision of secure parking for bicycles, and allowance of employees to telecommute.

Social Equity and the Urban Environment

Brownfields are regulated under the Massachusetts Contingency Plan, which are the regulations of the state Department of Environmental Protection (DEP). The plan relies on a privatized system of Licensed Site Professionals, under DEP oversight, to identify and remediate contaminated properties. The City, primarily through the Public Health Department and the Community Development Department, monitors these sites and participates in public participation processes. The Massachusetts Brownfields Act, signed into law in 1998, provides some incentives to property owners to cleanup their contaminated sites. These incentives include grants, liability relief, and tax credits. Various State offices are involved in administering these provisions including the Governor's Office for Brownfields Revitalization, Mass Development, and the DEP.

Lessons for Delaware

From the initiatives taken by the City of Cambridge towards achieving sustainability in its City planning process, Delaware could take the following lessons:

- Incorporate sustainability into community planning.
- Promote mixed use development and implement other zoning regulation where they may be necessary for the protection of the environment.
- Introduce bicycle and pedestrian programs to promote walking and bicycling and encourage the use of public transit options.
- Make recycling mandatory for all residents and businesses.
- Provide incentives to businesses for adopting environmentally friendly practices.
- Offer strong support for the redevelopment of Brownfield sites.

H. Minneapolis – Saint Paul (Twin Cities), Minnesota

The twin cities of Minneapolis – Saint Paul are located in the east southeastern corner of the state of Minnesota, in the upper Mississippi River Valley. The two cities, with a combined population of approximately 700,000 (Minneapolis' population is 360,000 and St. Paul's is 270,000), are situated adjacent to each other with the Mississippi River bisecting them. As a result of their close proximity, many environmental and urban initiatives have been undertaken as combined efforts by both cities, but this has not precluded each municipality from developing and undertaking individual plans and actions, that address the uniqueness of their respective environments and circumstances.

Program Goals

One of the unique initiatives taken by Minneapolis and Saint Paul is in their effort to address both environmental and economic issues simultaneously in order to ensure a sustained vitality of the City. An Environmental-Economic Partnership Project was initiated in 1993 as a mode for the implementation of the Twin Cities' Urban CO_2 Reduction Plan (City of St. Paul, 1999). The stated goals of the Environmental-Economic Partnership Project were to promote activities that were both economically and environmentally beneficial to the Saint Paul area and that further the goals of sustainable development. This was addressed by examining municipal efficiency, transportation, urban reforestation, energy efficiency, energy supply, and waste management. These goals are realized through a cooperative effort with the City of Saint Paul, the Saint Paul Neighborhood Consortium (a coalition of community-based organizations that provide information, services and programs on recycling, energy conservation, water quality and alternative transportation), District Energy Saint Paul, Inc. (operates a large hot water district heating system), District Cooling Saint Paul, Inc. (provides water cooling service to downtown), and Xcel Energy.

Another unique program within the Twin Cities area that could be very applicable to Delaware is their Metropolitan Council. The Council is a governmental body that operates the bus system, wastewater collection and cleaning, housing and community development, and parks and trails within a seven county region around the Twin Cities (Metropolitan Council, 2001). The Council also creates long-term plans for metropolitan area service development, as well as a comprehensive plan for the region's future growth. An integral part of the Council's planning process is adherence to their three principles of smart growth: promotion of economic growth, environmental preservation and fiscal efficiency. Smart growth principles are applied to all areas within the Council's jurisdiction, including transportation, water, housing and the environment, in an effort to create a metropolitan area that has a strong and efficient infrastructure, a quality workforce, and a high quality of life for local residents.

Community Involvement

Community involvement was an integral part of the Minneapolis Comprehensive Plan from its inception. The Plan was created as a way to identify the needs of the City's citizens and devise strategies for meeting those needs (City of Minneapolis, 2000). Creation of the Plan was managed by the Minneapolis Planning Department and involved a four-step process: 1) three open workshops were held during which participants (including citizens, business and development representatives, special interests, advisory commissions, government officials, department heads, and staff of other City agencies) identified likes and dislikes about the City, important issues and trends, and potential actions to address these items; 2) the formation of

eight working groups (titled: The New Economy; Lifelong Learning, Arts, Culture and Recreation; Moving People, Goods and Information; Community Form and Land Use; Neighborhood Quality and Variety; Neighborhood Commercial and Density; Neighborhood Design and Preservation; and Natural Systems and Resource Use) to research, analyze and resolve issues identified earlier; 3) the collaboration of information from each working group into one, cohesive and comprehensive City plan; and 4) the preparation of a draft plan to be reviewed by the Mayor, City Council, Department Heads, and other City boards and commissions. The draft plan was also presented to the public in the form of "The Minneapolis Plan: A Workbook for Citizen Comment," allowing citizens to comment and make suggestions for change before the final Plan was adopted.

As a part of Saint Paul's Environmental-Economic Partnership Project, the community is encouraged to participate through a variety of channels, including public hearings and meetings, a number of citizen task forces and advisory councils and open communications of project happenings (e.g. internet postings). In addition, District energy and District Cooling have both City Council appointed and customer elected representatives serving on their Board.

Greening the City: Land Use Planning

The City of St. Paul is composed of many multi-use and multi-income neighborhoods with a growing concentration of housing and businesses. These neighborhoods are generally located near transit corridors, public transit, bicycles and walkways in order to reduce the need for new road construction, make commuting easier, and provide easily accessible alternative transportation options.

The City is in the process of further expanding the multi-use, multi-income neighborhood concept through the creation of an "Urban Village" in the Upper Landing area of St. Paul. The main purpose of this development will be to eliminate blighted and contaminated land from Saint Paul's downtown riverfront by creating a matrix of housing, commercial services, parks and other amenities. The project will create an area with "pedestrian-friendly grid streets, mixed income and exceptional architectural design" (City of St. Paul, 2001a).

In Minneapolis, the Minneapolis Neighborhood Revitalization Program (NRP) was created as a strategy for reserving the decline of neighborhoods. The City provided $20 million a year to neighborhoods. Although the amount of expenditure is being scaled back now, the NRP demonstrates the City's commitment to community building. The NRP is a neighborhood-based planning and priority setting process which identifies and meets the housing, safety, economic development, recreation, health, social service, environment and transportation needs of neighborhoods in Minneapolis (NRP, 1997). Neighborhoods are assisted in the development of action plans for their areas, with the goals of:

1. Building neighborhood capacity
2. Redesigning public services
3. Increasing government capacity
4. Creating a sense of community

As of 1995, 79 of the City's 81 neighborhoods were involved in the NRP and in 2000 the United Nations listed the program on of its elite Global 100 Best Practices List for its initiatives that made outstanding contributions to improving the quality of life in communities (NRP, 2000).

Greening the City: Water-focused Programs

Part of the Minneapolis Comprehensive Plan addresses the need to protect the water resources of the area. This has been through: 1) the creation of a municipal Water Plan in association with local watershed groups and regional, state and federal agencies; 2) encouraging practices that result in a reduction of impervious cover or at least provide disconnects; 3) preserve and restore wetland areas; 4) adoption of regulations that encourage stabilization and re-vegetation of slopes and riverbanks; 5) keeping sanitary sewers and structures cleaned and well-maintained. Measures have also been taken to encourage water conservation through municipal building retrofits and the exploration of water usage surcharges for both City and suburban customers.

Greening the City: Transportation Planning

In June of 1991 the Minneapolis City Council established a Transportation Management Organization (TMO), whose aim is to promote efficient and environmentally sound transportation networks. The TMO is partial coordinator for the Downtown Transportation Management Plan, implemented in 1993. The Plan includes a number of strategies:

- Public education efforts through the Metropolitan Transit Education Committee.
- Improvements in the City bus system, including more bus lanes, greater bus capacity, and dedicated transit funding to keep bus fares low.
- Increased incentives for carpooling, such as designated HOV lanes, discount parking rates for carpoolers, encourage local employers to provide free parking to carpoolers and reduced parking subsidies to single occupancy vehicles.
- Encourage bicycling through bike route/lane system and bike park facility improvements.
- Increase energy efficiency in City fleets and non-passenger vehicles.

The Plan also includes strategies to increase the percentage of alternative fuel vehicles (AFVs) used in Minneapolis. To this end, and as a part of the Clean Fuels Minnesota Program, Minneapolis is working towards the integration of AFVs into their municipal fleet. With regard to St. Paul, the City initiated City Employees Metro Pass program in 1998. The purpose of the program was to increase the use of public transportation by City employees and assist in alleviating the City's parking problems. The program provides bus pass subsidies to the City's employers, enabling them to offer free or reduced rate bus passes to their employees.

Greening the City: Energy Planning

In 1996 the Minneapolis City Council passed the Minneapolis Energy Plan, an initiative created through the combined efforts of multiple City departments and agencies, nonprofit organizations, and utilities (City of Minneapolis, 1996). The aim of the plan was to integrate energy conservation initiatives into the municipal, residential, commercial/industrial, and transportation sectors of the economic community in a manner that was flexible, economically feasible, and consistent with other City policies and projects. The implementation of the plan consisted of the involvement of the mayor and City Council, the Environmental Coordinating Team, the Citizens Environmental Advisory Committee, the Energy Plan Working Group, and Energy Plan Committees.

Municipal energy efficiency was the first task of the Minneapolis Energy Plan, with strategies geared toward greater efficiency in both City buildings and operations in an effort to reduce the City's energy costs and to serve as an example for other sectors. The actions under this program include:

- Continuation of energy retrofit projects.
- Performance of energy audits and retrofit cost estimates through Minnegasco's Conservation Improvement Program.
- Creation of an energy reinvestment fund from municipal energy savings to finance further municipal building retrofits.
- Designation, construction and implementation of municipal purchasing guidelines that promote energy conservation investments.
- Creation of a purchasing guide for municipal purchasing units that identifies low energy intensity products.
- Requirement of all municipal construction projects to meet stringent building energy efficiency standards.
- Holding energy efficiency competitions between municipal buildings.
- Increase of strategic tree planting around municipal buildings to provide shade.
- Increase of efficiency of City's street lights.

The City of Saint Paul initiated a Conservation Improvement Program (CIP) in 1992 to target energy efficiency in municipal buildings and equipment, using a comprehensive approach and the latest available technologies. "All told, the city saves more than $277,000 annually and reduces carbon dioxide emissions by 9300 tons per year, and saving 7000 MWHs of electricity usage. Program costs are paid for entirely with money earned through energy savings. No taxpayer dollars are used." (EPA, 1997). The City has also undertaken a pilot project in which numerous red lamps in traffic signals have been replaced with LEDs (light emitting diodes), which have been found to be more durable and affordable than conventional lighting. The projected savings for replacing just 200 conventional lamps with the red LEDs is $136,841 per year, with a CO_2 emissions reduction of 1,248 tons of carbon per year.

As mentioned previously, Minneapolis and Saint Paul are participating jointly in the International Urban CO_2 Reduction Project in order reduce their emissions of greenhouse gases (ICLEI, 2001). The plan proposes to reduce CO_2 emissions by 20% from 1988 levels by 2005, through six strategies being implemented in both cities. These strategies are: (i). development of a Municipal Action Plan; (ii) diversification of Minneapolis - Saint Paul transportation sector; (iii) expansion of urban reforestation efforts; (iv) implementation of energy efficiency measures; (v) use of energy supply strategies; and (vi) pre-recycling and recycling

Social Equity and the Urban Environment

Over 60 businesses, community groups, non-profit organizations and governmental agencies are working together to revitalize the economic, environmental and social prosperity of Saint Paul's East Side through the Phalen Corridor Initiative. The Phalen Corridor is a 100-acre site northeast of Saint Paul's downtown and is the home of two old industrial railroads, three parks, four retail areas and twelve neighborhoods. Efforts of the Initiative include: improvements in public transportation to the area, the creation of a new industrial park that could provide as many as 500 new jobs to local residents, redevelopment of the old rail lines into new

park lands, and the demolition of an old shopping center to return the site to its original state as a wetlands area.

Greening the City: Attracting Green Businesses

The City of Minneapolis has an exemplary curbside recycling program that has won high acclaim over the last decade for its excellence. The City offers a monetary incentive to encourage residents to participate by adding a $7 monthly credit to the utility bills of those dwellings that registered and participate in the recycling program.

The City of Saint Paul also has a curbside and multi-family recycling program that was mandated by the Minnesota Waste Management Act, the Metropolitan Council Policy Plan, and the Ramsey County Solid Waste Master Plan. The program is operated by the Neighborhood Energy Consortium (NEC), a local non-profit organization (City of St. Paul, 2001b). The NEC also sponsors The Free Market, a 'waste' exchange program that offers residents an alternative place to deposit their reusable or repairable waste items (rather than the landfill) and where local residents can come and shop for these items for free.

Lessons for Delaware

Delaware can learn the following from the Twin Cities initiatives:

- By creating a municipal action plan (like the Minneapolis-Saint Paul Urban CO_2 Reduction Plan), Delaware local governments could take the lead in promoting more environmentally sensible operations, setting a good example for, and thus encouraging other sectors to act.
- Creation of curbside recycling programs in Delaware communities, using similar guidelines to the Minneapolis program and offering financial incentives to participants, could help reduce the solid waste load of the State.
- Transportation systems within Delaware could be developed using guidelines of efficiency and environmentally sound principles, alleviating air pollution and reducing fuel expenditures by citizens, businesses and municipalities.
- Encourage the development and implementation of neighborhood revitalization programs.

I. Portland, Oregon

The City of Portland is located in the northwestern corner of the State of Oregon, approximately 80 miles inland from the Pacific coast. The City has a population of 503,000 and occupies 130 square miles.

Program Goals

Portland has made sustainable development a central theme of its intra- and inter-agency coordination. Evidence of a sustainability-focused municipality can be found in the City's creation of an Office of Sustainable Development, whose purpose is to direct and guide the City's sustainability efforts through programs addressing solid waste and recycling, as well as multi-sector energy services and conservation. Within the Office of Sustainable Development, s the Sustainable Portland Commission (SPC) addresses the multitude of issues involved in maintaining the City's vitality and ecological integrity. In addition, in 1994 the City adopted a number of sustainable City principles with the expressed goals of: supporting a stable, diverse and equitable economy; protecting the quality of the City's natural resources; conserving native ecosystems; and minimizing human impacts on local and global ecosystems (POSD, 2001a). The SPC is also measuring the progress of the City's sustainability efforts by using sustainability benchmarks under the areas of air quality, global warming, transportation, congestion, toxic releases, tree canopy, recycling rate, poverty rate, home ownership, central City employment and central City housing (POSD, 2001b).

Portland has also made great strides of incorporating sustainability in its planning effort through a large number of collaborative projects and initiatives. One such example is the City of Portland's Green Buildings Initiative, a multi-departmental City effort geared towards promoting resource efficient building and sustainable site design practices (POSD, 2001c). City bureaus involved in the effort include Energy, Environmental Services, General Services, Planning and Development Review, Portland Development Commission, and Water. Together these bureaus provide comprehensive information and services to the development and building community, homeowners, businesses and City project and facilities managers.

Greening the City: Community Involvement

The City of Portland Comprehensive Plan promotes citizen involvement in the on-going land use decision-making process and provides opportunities for citizen participation in the implementation, review and amendment of the adopted Comprehensive Plan. One activity of the Sustainable Portland Commission (SPC) is to link City bureaus and community partners in order to craft public outreach strategies. The SPC serves as an information center to aid in locating local resources and a partnership formation tool for assisting in sustainable living practices. The City bureaus also work together to publish a 'green pages handbook' featuring local issues, trends, a household worksheet and community resources.

Greening the City: Land Use Planning

As a means of promoting energy efficiency, Portland has created land use regulations that promote patterns of development that limit VMT. The approach used by the City is to promote:

- Commercial service centers and central industrial areas near major arterial and transit lines.

- Medium and high density residential zones in and near downtown and major transit routes (done through limited ten-year property tax exemptions in select areas).
- Housing near employment centers.
- Mixed-use neighborhoods (i.e., creation of neighborhoods that contain both residential properties and commercial amenities, thus reducing the length and frequency of vehicle trips required to meet daily needs).
- Work with other governments in the region to promote mass transit systems and compact urban growth.

Greening the City: Water-focused Programs

Portland's primary water supply is surface water from the Bull Run Watershed, a source that is kept clean through restricted access to the watershed and through a nationally recognized watershed protection program that allows the Water Bureau to meet federal and state water quality regulations without filtering the water. Water conservation is also encouraged in the Portland business community through the Businesses for an Environmentally Sustainable Tomorrow (BEST) program.

Greening the City: Transportation Planning

In an effort to reduce Portland area employee commute trips by 10-15 percent, the State of Oregon has created the Employee Commute Options (ECO) rule. In 1993, the Oregon Legislature passed HB 2214, a law created by the Oregon Department of Environmental Quality to help protect the health of Portland-area residents from air pollution and to ensure the City of Portland complies with the federal Clean Air Act. The ECO rule was a part of HB2214 and requires employers in the Portland area with 50 or more employees to develop strategies to reduce the number of single occupancy commute trips by their employees. One strategy suggested to employers when developing their plans for complying with the ECO rules has been a telecommuting program for their employees. The program involves creating work plans for employees who are able to do work from home and still maintain communications with their employers via telecommunications. Such an arrangement decreases traffic congestion on City roads by decreasing the number of people who commute to work each day. The City has its own telecommuting program called Telework. Other means of decreasing VMT in Portland have included the development and promotion of public transit, including an expansion of the light rail system called MAX. The MAX light rail system has proven to be highly successful as it has doubled ridership over the bus system it replaced and increased off-peak use, particularly on weekends (Newman and Kenworthy, 1999). The success of the system has resulted in part to the revitalization of the Portland downtown area.

In 1994, Portland was designated as a 'Clean City' by the U.S. Department of Energy (USDOE) for its efforts (along with 14 local public and private partners) in encouraging the wider use of alternative fuel vehicles (AFVs) for government and commercial fleets. Presently over 300 AFVs are operated locally, with five compressed natural gas fueling stations and two free electric car recharging stations available within the City. To encourage participation in the AFV program, tax credits are available for businesses investing in AFVs.

Greening the City: Energy Planning

The City of Portland first adopted an energy plan in 1979 that focused mainly on residential weatherization and the collection of City energy use data. In 1990 a more

comprehensive energy plan was written, and updated in 2000, to address energy use in City operations, efficiency in residential, commercial and industrial facilities, transportation, telecommunications, energy supply, waste reduction and recycling (City of Portland, 2000). The initial focus of the Energy Plan was to increase energy efficiency in all sectors of the City by 10 percent by the year 2000 in an effort to significantly reduce the City's energy bill. By 1999, the City was able to reduce its energy costs by $1.1 million annually, for a total reduction of over $7 million from 1990-1999. Progress was made through:

- Education of City employees on how to conserve energy both at work and at home.
- Conversion of City street and park lighting from mercury vapor to high-pressure sodium lamps.
- Use of Energy Star certified products.
- Encouragement of passive solar lighting in new construction and renovation of City buildings.
- The creation of the City Energy Challenge program which provides free energy audits, technical consultations and support to assist bureau project managers in identifying opportunities to conserve energy.

Additional actions by the City have included an aggressive public education and participation program, in collaboration with local utilities, to make residents aware of the steps they can take to conserve energy in their homes and transportation practices. Supply-side energy policy initiatives have included a commitment by the City of Portland to support the development of renewable energy resources including solar, wind, hydroelectric, geothermal, biomass, cogeneration and district heating and cooling.

Greening the City: Attracting Green Businesses

The City of Portland's Energy, Water, and Environmental Services Bureaus are working together to provide assistance to area businesses to help them become more 'green'. The City's program "Businesses for an Environmentally Sustainable Tomorrow (BEST)" helps businesses to learn the latest on pollution prevention, energy efficiency, waste reduction and water efficiency, and recognizes those businesses that have shown exceptional efforts and accomplishments with annual BEST Business Awards (POSD, 2001d).

Beyond promoting sustainable practices in City businesses, Portland is interested in attracting more environmental industries into the area as a part of their economic sustainability strategy. In 1999 the SPC, the Portland Development Commission, and Worksystems Inc. (establishes workforce development plans/programs in the county) released a report entitled "Growing Portland's Environmental Industry", which looked at the current state of the environmental services & technology industry (companies involved in pollution control, waste management, site remediation, environmental consulting, environmental monitoring, recycling, and clean process technology) in the Portland metropolitan area and its interaction with other businesses/industries in the area and what can be done to facilitate growth. The goals of the project were to: 1) estimate the economic contribution of the environmental services & technology industry to Portland's regional economy; 2) identify future market and job opportunities; and 3) recommend strategies to enhance business and workforce development.

In terms of waste reduction, in 1999 the overall recovery rate of Portland's City and Metro recycling programs was 53.6 percent, due to their comprehensive residential curbside recycling program and the commercial recycling requirements that were adopted in 1996.

Social Equity and the Urban Environment

The City has initiated the Portland Brownfield Showcase Program with support from the EPA. Arising out of this program and because of the City's commitment to brownfields redevelopment, Portland was selected in 1998 to be one of the 16 Brownfield Showcase Communities located throughout the United States. Public participation has been an important component in the City's program, particularly in the development of Brownfields Action Plans. Three community-based action plans were developed by the City between 1997 and 1998 and were developed for:

1. Partnerships strategies, which were designed to cultivate community participation and input in revitalization efforts.
2. Land Use and Growth Management strategies for brownfields, so as to utilize all available land within Portland's urban growth boundary, thereby alleviating urban sprawl into sensitive areas, agriculture and farmlands.
3. Regulatory Enhancement strategies to remove barriers to the redevelopment of brownfields sites.

The City has also established a website for its Brownfields program, providing vital information on issues relating to brownfields (history of brownfields, environmental laws, sustainability, environmental justice, funding and financing).

Green City Operations

A significant effort to green the operations of the City of Portland has been the development and adoption of the green building policy. According to its policy statement, the aim of the program is to "incorporate green building principles and practices into the design, construction, and operations of all City facilities, City-funded projects, and infrastructure projects to the fullest extent possible" (POSD, 2001e). The policy involves the adoption of Portland's LEED Green Building Rating System, which has been formulated from the Leadership in Energy and Environmental Design (LEED) rating system developed by the U.S. Green Building Council (USGBC). The policy also applies to the purchase of land for future development by evaluating these purchases "on the basis of reducing environmental impacts that include but are not limited to transit and bicycle accessibility, urban and brownfields redevelopment, solar access, on-site stormwater mitigation capacity, and vegetation and habitat restoration." An integral part of the policy also involves promoting green building practices in private sector building design, construction, and operations.

Lessons for Delaware

Delaware can learn from the following Portland initiatives:

- By creating an alternative fuel vehicle (AFV) program, the State of Delaware could replace its existing fleet of State owned vehicles with more efficient and cleaner operating vehicles.
- The creation of an Office for Sustainable Development would enable municipal bureaus within Delaware to coordinate their efforts in ensuring the long-term viability of the State.
- Development of sustainability benchmarks.
- Encouraging local businesses to participate in a "Businesses for an Environmentally Sustainable Tomorrow" (BEST) would be an easy way to get local businesses and industries to voluntarily reduce their environmental impacts by reducing their energy use and waste production.
- Creation of an Employees Commute Options (ECO) rule would help alleviate some of the traffic congestion on Delaware roads as well as improve air quality throughout the State.
- Creation of a light rail system similar to the MAX system would be particularly useful in the revitalization of downtown areas.
- Develop a green building initiative using LEED as a standard for promoting green buildings in the State.

J. Burlington, Vermont

The City of Burlington is located on the eastern shores of Lake Champlain in the central northwestern sector of Vermont. Its population is approximately 39,000 people.

Program Goals

The City of Burlington has been in the forefront in the pursuit of sustainable development in the U.S. and recently renewed its commitment to the concept of a sustainable City. In June 2000, the City released an action plan that was developed to guide the City's growth in a sustainable manner, which promotes economic, environmental, social, and cultural well-being of the City. Community leaders from the business, low-income, environment, academic, youth, and social service sectors developed the plan entitled "Burlington Legacy Project: Becoming a Sustainable Community" (City of Burlington, 2000). The Project outlines a common vision (e.g. improving the quality of life in neighborhoods, increasing participation in community decision-making) for the City and future actions to be taken throughout the City in promoting sustainable development and lists indicators to be used as benchmarks to track the Project's progress (Table 4.7). The City hopes to reach its goals set forth in the Project by the year 2030. The project is a multi-agency responsibility in collaboration with the Mayor's Office and the City Council.

Table 4.7 Examples of sustainability indicators used by Burlington

Area	Indicator
Economy	Number of full-time Burlington workers earning above the livable wage Rate of low birth-weight babies Percent of population receiving food stamps Number of Burlington business start-ups and closings Annual public transit ridership per capita
Neighborhood	Percent of population spending more than 30% of income on housing costs Number of permanent affordable housing units in the City versus the county
Governance	Diversity (minorities and youths) of elected and appointed officials Community service hours by students
Youth and Life Skills	High school attendance and grades Adult literacy rate
Environment	Vermont Agency of Natural Resources Ambient air quality data for ozone and carbon monoxide/dioxide Lake Champlain Basin Project ecological indicators
Energy and Resource Conservation	Total and per capita energy consumption, residential and commercial Kilowatt hours produced with renewable energy sources versus non-renewable Total solid waste versus total recycled waste

Source: City of Burlington, 2000.

Community Involvement

Public involvement in the planning process is achieved through a variety of surveys, town meetings, charrettes, referenda, workshops and task forces. Success of public participation programs is measured by attendance, dialogue, and stakeholder commitments. The importance

of community input was evident in the development of Burlington's Legacy Project. The project began with the dissemination of thousands of surveys asking residents to share their hopes and dreams for the City. Focus groups were then developed, followed by the addition of subject-specific focus groups to discuss topics such as the economy, environment, and transportation. The City also reached out to community organizations. The final stage of the process involved a town meeting. Over 300 members of the community attended, gave final comments and voted on the priority actions of the plan. By the end of the process, more than 60 organizations had participated. From there the City developed a first draft of the project plan, which was followed by four public hearings to receive citizen comments. Once the comments were received and changes were made, a rough draft was sent to over 900 residents and community groups. Once comments were received, a final version of the project was developed.

Burlington has also begun a web-based environmental monitoring project, "Burlington Eco Information Project" (BEIP), which was developed to institutionalize a process for engaging citizens in the collection of environmental information that will be available for all members of the public. BEIP was started as part of the U.S. Environmental Protection Agency's Project EMPACT (Environmental Monitoring for Public Access and Community Tracking). Currently there are 156 EMPACT projects in metropolitan areas across the U.S. Burlington's BEIP will provide the means, methodology, and structure for a community-based environmental monitoring, processing and delivery system. The information collected will also be used for educating elected officials on the area's future environmental policy needs. Topics that were initially examined included urban air quality issues and water quality issues affecting Lake Champlain and City beaches (EPA, 1999).

Greening the City: Land Use Planning

Land use planning in Burlington is the responsibility of the Planning Office and the Community and Economic Development Office. In October of 2000, the City Council adopted the Burlington Open Space Protection Plan to preserve natural areas throughout the City. The Plan is comprised of three components: conservation education, land acquisition and stewardship, management and enhancement. Two specific land designations will be targeted, Significant Natural Areas, such as lands surrounding Lake Champlain, and Urban Greenspaces, which include City parks. Funding will come from a voter-approved Land Conservation Fund, which will receive at least partial funding from the City government (Department of Planning and Zoning, 2001).

Greening the City: Water-focused Programs

The majority of water resources management in Burlington is centered on Lake Champlain. This tourist attraction and recreational area is also the source of the City's water supply. Water from the Lake is pumped from 4,000 feet off shore to a treatment plant where it is treated before being distributed throughout the City. The Legacy Plan lists the protection of Lake Champlain as a high priority. As a result, it is likely that improved protection programs will be initiated in the near future. Stormwater quality is another high priority in the City. Unlike many communities, the majority of stormwater is collected and treated before it is discharged into local waterways. This reduces the amount of pollutants that reach water-bodies such as Lake Champlain.

Greening the City: Transportation Planning

The Public Works Department along with the Chittenden County Metropolitan Planning Organization and the Chittenden County Transportation Authority are responsible for transportation planning in Burlington and throughout the County. Burlington's public transportation system includes bus transport, a commuter rail service, and a trolley bus system. Unfortunately, for the past three years transit ridership has declined, while VMT has increased. The City and County have begun to take steps to reverse this trend, but it could be several years before significant changes are seen. In an attempt to reduce traffic congestion in and around the City, public transportation and carpooling are strongly encouraged through public education campaigns. The City is in the process of constructing a multi-modal transportation center downtown funded in large part with federal support.

An initiative has also been developed to make the streets of Burlington more bicycle- and pedestrian-friendly. The development of traffic circles and other mechanisms are being implemented to slow traffic and reduce the dangers of speeding vehicles on the streets.

Greening the City: Energy Planning

The municipality-owned Burlington Electricity Department (BED) carries out energy planning in Burlington. To reduce air pollution and promote innovative responses to climate change, BED has joined the EVermont Consortium, an organization started in 1993 by the Governor of Vermont to demonstrate the reliability of electric vehicles. Through a three-year lease agreement, BED has access to two electric vehicles that are utilized by its and other City employees. These vehicles can also be taken for test-drives by BED customers. Through the EVermont Consortium, BED is experimenting with two models of electric bikes for use throughout the City as an alternative to cars (BED, 1998a).

In March 2000, the Burlington Climate Protection Task Force released its Climate Change Action Plan (Burlington Climate Protection Task Force, 2000). The process began in 1996 when the Burlington City Council voted to participate in the Cities for Climate Protection campaign, sponsored by the International Council for Local Environmental Initiatives (ICLEI). In 1998 the City Council passed a resolution to reduce the City's greenhouse gas emissions by 2005 to 10 percent below 1990 levels. Following the resolution, the mayor formed the Climate Protection Task Force to develop the City's climate protection action plan.

BED also promotes a strong energy-efficiency program. In 1990, the people of Burlington voted to create an $11.3 million bond to fund energy-savings programs for homeowners. In the past 10 years, BED has made more than 14,950 energy-savings installations, which save customers $4.3 million annually on their energy bills. The programs have also avoided the release of 32,439 tons of carbon dioxide into the air each year. BED also assists businesses in the City to become more energy efficient through several programs. The Top Ten program works with the City's largest businesses and industries in an attempt to lower their energy costs. The cooperation includes the development of an energy savings plan to show the businesses possible savings if energy-efficiency improvements are made. BED has also developed the Energy Advantage program to help smaller businesses improve their energy-efficiency (BED, 1998b).

Burlington has initiated a new climate protection program, the Alliance for Climate Action (ACA), which includes a coalition of stakeholders. In April 2002 the ACA is launching a 10% Challenge Campaign to reduce greenhouse gas emissions among all sectors of the community. Businesses, organizations and individuals can sign up to participate and make a

commitment. The campaign will provide the means to recognize individual action and track the community's progress.

The use of renewable resources for energy production is being promoted in Burlington as the City plans to discontinue the use of nuclear power by 2003. Solar energy use is promoted through Burlington's SunWise Program, which is administered by BED. The program takes advantage of Vermont's recently approved "met metering" legislation which encourages the use of small-scale solar and wind power projects by allowing customers to sell back any excess power they generate to the local utility. Through the SunWise program, BED provides technical assistance, project management, and bill-based financing to residents, businesses, and institutions willing to develop small PV and wind systems. Partial funding for the SunWise program comes from a $30,000 grant from ICLEI and the potential energy savings from the program is estimated to be between 372 and 2,978 kilowatt hours per year.

Greening the City: Attracting Green Businesses

It is estimated that Burlington's curbside recycling program diverts about 20% of the City's waste away from the landfill. Through its composting, commercial recycling, and hazardous waste depot programs, the City recycles more than 40% of its waste, which is a goal the State of Vermont set for each of its cities.

Social Equity and the Urban Environment

With support from the EPA, the City has begun the Burlington Brownfields Pilot Initiative. The program has been developed to improve the environment, increase the tax base, create and retain jobs, and curb sprawl. The program is administered by CEDO, who works in cooperation with non-profit partners, other City Departments, commercial brokers, developers, and State of Vermont Department of Environmental Conservation. Several redevelopment projects have been completed, including the development of an apartment complex on the site of a former gas station and the development of a VT Transit passenger terminal on the former site of a bulk petroleum facility (CEDO, 2001).

Lessons for Delaware

Delaware can learn from the following Burlington initiatives:

- Burlington's Legacy Project has proven to be a successful way to incorporate public participation into the planning process. Similar projects could see similar success in Delaware cities.
- Burlington's energy-saving fund, created through a voter referendum, has been successful in increasing energy efficiency throughout the City. The program quickly paid for itself and continues to save the people of Burlington millions of dollars.
- ICLEI participation for major urban centers in Delaware could substantially reduce their greenhouse gas emissions and their impact on global warming.

K. Seattle, Washington

The City of Seattle, Washington is located on the Puget Sound and has a population of 540,500 people. It has long been recognized as a leader in sustainable planning in the United States. Political leaders and community leaders alike have embraced the idea of sustainable development, giving the concept credibility throughout the City (PCSD, 1997: 103). The Seattle City Government, along with cooperation from the King County Government and several nonprofit organizations in the area, has developed long-term strategies aimed at ensuring the City of Seattle grows in a sustainable manner.

Program Goals

Its twenty-year Comprehensive Plan entitled "Toward a Sustainable Seattle," which was borne out of the Washington State Growth Management Act, guides planning in Seattle. According to the Act, every county in the State is required to submit and follow their locality's plan in accordance with State goals for managing growth. The Comprehensive Plan states, "sustainability refers to the long-term social, economic, and environmental health of our community. A sustainable culture thrives without compromising the ability of future generations to meet their needs" (City of Seattle, 1994a). There are four core values to the plan: community, environmental stewardship, economic opportunity and security, and social equity. Seattle's Strategic Planning Office has the lead role in planning activities throughout the City, with virtually all other agencies involved in carrying out the Comprehensive Plan.

To show its commitment to sustainability, the City of Seattle has established the Office of Sustainability and Environment as part of the Mayor's office). OSE's mission is to provide leadership, tools, and information to help City government use natural resources efficiently, prevent pollution, and improve economic, environmental, and social well being for current and future generations. The City has made an aggressive commitment to sustainable building, guided by the Green Building Team. In 2000 the team developed the City of Seattle Sustainable Building Policy. The policy calls for new City projects and renovations with over 5000ft^2 of occupied space to achieve a Silver Rating using the US Green Building Council's (USGBC) LEED Rating System^{TM} Seattle has passed the Energy and Water Conservation Policy to improve the management of water and energy in City facilities and on City property. The policy requires that all departments design, construct, and operate City facilities in an efficient manner (City of Seattle, 2000b). The Pesticide Reduction Program has eliminated the use of the most hazardous pesticides from City landscaping and reduced overall pesticide use by 46% since 1999.

Community Involvement

Community involvement is encouraged throughout the City planning process through the use of special programs, task forces, town meetings, surveys, referendums, focus groups, and workshops. Public involvement plays a key role in the development of Seattle's policies through input received from residents, businesses, community groups and leaders, environmental groups, service providers, and outside experts. Citizen feedback about draft plans of policies is received via newspapers, a web page, distribution of a summary pamphlet and questionnaire, and public meetings.

Special programs have also been initiated to incorporate public participation into the sustainable development of Seattle. In 1999 the City sponsored the Millennium Project. The goal of the project was to bring residents together to protect the City's natural environment. The Millennium Project had many accomplishments, including the planting of 25,798 trees and the

cleaning of four miles of urban creek habitat that more than doubled the amount of available salmon spawning habitat in Seattle's urban streams (City of Seattle, 2000c).

The involvement of the public in City planning has been aided by nonprofit organizations such as Sustainable Seattle, a civic organization working to improve the City's environmental, cultural, economic and social health. The organization has developed several publications, including Indicators of Sustainable Community, released in 1993. The report outlines 40 indicators designed to measure progress made by the City in sustainability planning (Sustainable Seattle, 1995). The City of Seattle acknowledges these indicators and considers them in their planning processes. The interaction between the nonprofit organization and the local government is a unique situation. The great detail of the indicators is also rarely seen in indicators created by other cities.

Public education on sustainability has been stressed to all age groups in Seattle. The Seattle Public Library and A+ Alliance for Education have joined efforts and created the Teaching Resources for Environmental Education (TREE) Database to provide teachers with educational materials about the local environment (Seattle Environmental Education Homepage, 1999). In 1994 the City completed its Model Conservation Home Project. The home was built as a public education tool and used all recycled material and included state-of-the-art technologies, including energy- and water-efficient appliances. The Home was opened to the public for tours before it was sold to a low-income family (Office of Management and Planning, 1994).

Greening the City: Land Use Planning

The Department of Design, Construction, and Land Use and the Strategic Planning Office share land use planning responsibilities in the City. Washington's 1990 Growth Management Act guides Seattle's growth management policies. Seattle has taken some steps to promote open space preservation and protect biodiversity in and around the City. Despite its reliance on dams to provide electricity, the City has often expressed its commitment to protecting salmon in the area. Several programs are run, concentrating on water conservation and education programs. The Seattle City Light program (described in "Greening the City: Energy Planning" section) also purchases valuable parcels of land to protect critical habitats for salmon, bald eagles, and other wildlife in the area. In 1998 the City Light program received a public service award from the Nature Conservancy for its actions to help conserve sensitive lands around the City.

Seattle currently spends an estimated $2.3 million on tree management and maintenance in neighborhood parks and open spaces within the City. The Department of Neighborhoods Tree Fund Program budgets $100,000 annually to provide trees to community organizations and groups of neighbors interested in planting trees. (Cascadia Consulting Group et al, 2000)

In 1988 Seattle began its curbside recycling program. As of 1995, 60% of all waste was recycled, reduced or composted through the use of a public education program and a variable rate structure. The City also has a program to collect and compost yard waste throughout the City.

Greening the City: Water-Focused Programs

The critical role of water quality in salmon recovery and human quality of life make sustainable management of Seattle's water resources imperative. As part of the City's Millennium Project, Seattle Public Utilities began its Urban Creeks Legacy program in 1999. The program is working to restore portions of Seattle's four largest creeks using a watershed approach. The project improves water quality and quantity through various projects, which help

to improve drainage, prevent soil erosion and flooding, restore habitat and improve community open space and trails. Volunteers from throughout the City undertake much of the work (Seattle Public Utilities, 2000). In addition to incorporating citizen involvement into the protection of water resources, Seattle Public Utilities has a Creeks, Drainage and Wastewater Advisory Committee that was developed in 1988. The committee meets every month to discuss water resource issues relevant to the citizens of Seattle and reports to SPU.

Water consumption in Seattle has leveled off over the past two decades, despite a rising population. This can be attributed to several factors, including higher water rates, conservation programs, and more efficient operations (Seattle Public Utilities, 1999).

Greening the City: Transportation Planning

The majority of transportation planning and coordination in Seattle is the responsibility of Seattle Transportation (SEATRAN). King County Metro Transit operates the public bus system. Seattle released its Transportation Strategic Plan in 1999. The Plan was designed to guide the City's transportation practices in a sustainable direction. The 1999 annual report included the "Big Nine," nine strategies key to making Seattle transportation sustainable (SEATRAN, 1999). The Big Nine strategies are as follows:

1. Mark and maintain crosswalks
2. Use Pedestrian push buttons appropriately
3. Simple system for designating key pedestrian streets
4. Complete and expand City's urban trail system
5. Develop a trip reduction initiative
6. Develop and encourage parking cash-out programs
7. Unbundled parking spaces from building leases
8. Encourage car sharing
9. Allow 72-hour on-street parking

To help the citizens of Seattle make informed transportation decisions, the City has started a public education program called "Way To Go Seattle." The program promotes car sharing, bicycling, bus riding, and walking as sustainable transportation choices. Families who sign up for the program agree not to use their extra car, and keep a diary of their transportation behavior, including barriers and incentives to reducing their dependence on cars. Related to the Way To Go Seattle program, individuals or groups who organize projects to reduce car trips can receive grants for as much as $1000 from the City through the Car Smart Communities program. Bicycling has always been a popular alternative to driving in Seattle, which has consistently been ranked as one of the most bicycle-friendly cities in the Untied States. It is estimated that about 36% of the City's population engages in recreational bicycling, and between 4,000 and 8,000 citizens regularly bicycle to work. The City has achieved this high level of bicycle use by maintaining 28 miles of urban bike trails, 14 miles of on-street bike paths, and 90 miles of signed bike routes (SEATRAN, 2000).

Several other programs are available throughout the City to reduce traffic. SEATRAN sponsors discounted parking in specially designated areas throughout the City for registered carpoolers. They also have a Neighborhood Traffic Control Program, which installs traffic circles in neighborhoods to reduce speeding and increase safety for pedestrians and bicyclists.

Greening the City: Energy Planning

Seattle City Light coordinates energy planning in the City. The vast majority of energy used in Seattle is produced by hydro sources. In recent years, the City has demonstrated a strong commitment to reducing its impact on climate change. Since 1995, City Light has voluntarily reported progress the City has been making in reducing their impact on climate change through their annual Climate Challenge Report. The 1998 report outlined ways the City could reduce its impact on climate change through CO_2 reductions, continued investment of financial resources to offer conservation programs and forestry initiatives such as urban tree replacements and land preservation (Seattle City Light, 1998). Under the City Light's Climate Wise program, area businesses are encouraged to voluntarily reduce their greenhouse gas emissions. - Seattle is a member of the International Center for Local Environmental Initiatives's Cities for Climate Protection Campaign.

In 2000, the City of Seattle adopted a resolution to meet all future energy demands with no net increase in greenhouse gas emissions. The City plans on meeting this goal through energy conservation and the development of new renewables, such as wind, geothermal, solar and landfill gas. If fossil fuel use is necessary, the City will offset the emissions through other measures such as forest protection (City of Seattle, 2000d). Seattle has also joined in a Green Power Partnership with Los Angeles. In the winter, Seattle will import surplus energy from Los Angeles, which is produced through green technologies such as solar and geothermal sources, to help support the increase in energy used for heating. In the summer the reverse occurs, with Seattle exporting its surplus energy to Los Angeles to reduce deficits in that City caused by increased air conditioning use.

Seattle City Light has developed the Conserve 10% program, aimed at educating the public on how to conserve electricity at home and at work. The program provides tips on how to save electricity through proper construction and through everyday activities. City Light offers incentive bonuses to medium and large businesses that improve energy efficiency through retrofitting existing buildings. To improve energy-efficiency in low-income homes and apartments, grants are available at no cost to eligible homeowners and landlords through several programs, including the REACH Weatherization Program. The City conducts energy audits of candidate homes and apartments to determine what improvements can be made, which are carried out by a licensed, bonded contractor, followed by inspection by the City (Office of Housing, 1999).

To educate residents of Seattle about making their homes more energy efficient, City Light runs an Energy Conservation Hotline. Through the hotline, staff is available to answer questions about home insulation, weatherization, and energy efficient lighting (Office of Housing, 1999).

Social Equity and the Urban Environment

Social equity and environmental justice issues have received increased attention in recent years with the help of EPA funding. The money received was used to create a partnership between Seattle Public Utilities and two community organizations to run a community-based training and outreach program about environmental justice. Residents who complete the programs receive various financial incentives.

Green City Operations

The City has instituted a green purchasing program through an "Environmentally Responsible Purchasing Policy," which directs City employees to acquire and promote the use of environmentally preferable products and services. According to the policy, the purchase of goods and services must take into consideration the environmental factors of pollutant releases, waste generation, recycled content, energy consumption, depletion of natural resources and potential impact on human health and the environment (City of Seattle, 2001). An integral part of this practice is the use of life cycle analysis of products to determine their long-term environmental and economic effects. In addition, all departments and offices are encouraged to use reusable products, recycled-content products, and recyclable products.

Lessons for Delaware

Delaware can learn from the following Seattle initiatives:

- The Washington State Growth Management Act has proven to be an effective tool in managing growth in fast-growing cities.
- Special projects such as the Millennium Project are essential in promoting public participation in the City's sustainable development.
- The Urban Creeks Legacy program could be duplicated in Delaware cities to protect their valuable water resources.
- Seattle's commitment to meet all future energy demands without increasing greenhouse gas emissions through conservation, efficiency and renewables could be followed by urban centers in Delaware.

L. Madison, Wisconsin

The City of Madison is located in south central Wisconsin, with a population of 202,000 and a land area of 67.5 square miles. The center of the City, including the State capital building, is unique in its location on an isthmus between Lake Mendota to the north and Lake Monona to the south.

Program Goals

Sustainability is a priority in the Madison City government, as evident by the presence of the Madison Area Sustainable Lifestyle Campaign. Operating as a partnership effort among Dane County Department of Recycling & Solid Waste, City of Madison Streets Division, Madison Metropolitan Sewerage District, Madison Metropolitan Transit Authority, and Madison Gas & Electric, the Sustainable Lifestyle Campaign entails the formation of neighborhood 'Eco Teams' that promote local citizen involvement in reducing human impacts on the environment (City of Madison, 2001a). Matters addressed by Eco Teams include energy efficiency, water conservation, waste reduction and alternative transportation.

The City also has a Commission on the Environment, composed of members of the City Council, Board of Public Works, Public Health Commission, Water Commission, and mayor-appointed citizens. The function of the Commission is to advise the mayor and City Council in making studies and recommendations relative to water, land and air quality; noise abatement; lake, river, stream and shoreland management; environmental health; and wildlife protection (City of Madison, 2001b).

Community Involvement

In March 1999, the Madison Area Sustainable Lifestyles Campaign began full participation in EcoTeams, a program developed by the non-profit organization Global Action Plans for the Earth (Madison Area Ecoteams, 2001). EcoTeams consist of a group of households in a neighborhood that meet regularly over a four-month period developing and implementing local action plans for the following areas: garbage, water, energy, transportation and consumption.

Greening the City: Land Use Planning

In order to contain suburban sprawl, the City of Madison uses an "Urban Service Area" approach, which is a part of their Regional Water Quality Sewer Service Area planning effort. Sanitary sewer serves areas that are inside the Urban Service Area, while those outside are excluded. The City also controls the location and mix of development through its Peripheral Area Development plans, Commercial Zoning Districts and Neighborhood Development plans. Mixed-use is promoted through these plans, along with City financing tools that affect downtown development.

Greening the City: Water-focused Programs

In order to receive a development permit from the City of Madison, developers must submit a stormwater management plan, which is approved by City engineers. Water conservation is promoted in Madison through a multimedia public education program, most heavily pushed during the summer maximums. Since 1930, the Madison Nine Springs Wastewater Treatment Plant has captured and fully utilized the methane generated during decomposition of waste. Methane gas is used in boilers to heat water, the anaerobic digester, and buildings, as well as fuel

for aeration blowers and engines, which generate electricity. Waste heat from the generators and blowers is also captured and re-used for building heat and the digester (co-generation).

Greening the City: Transportation Planning

The City of Madison is aggressive in their promotion of alternative modes of transportation within the City. The City has an extensive bike path (over 100 miles) and bike lane systems supported by the Bicycle Transportation Plan. This Plan serves to identify areas of improvement in bicycle routes and facilities both within the City as well as connecting lines to surrounding communities. It is also a framework for cooperation among state, county and City governmental agencies. The Plan is also a tool for educating citizens and policy makers on bicycle transportation (City of Madison, 2000). One of the innovative elements of Madison's bicycling system is their 'red bike' program. Bicycles painted all in red can be found in numerous places around the City and are available for use by citizens free of charge.

Another transportation initiative being taken by Madison is in their Rideshare Program (City of Madison, 2001c). The program provides assistance to City employees who are interested in learning more about commuting in one of the alternative means of transportation; via carpools, vanpools, mass transit, bicycling or walking. The program provides interested participants with a personalized Ride-Options Report, free of charge, that identifies others in their area that are interested in ride-sharing, as well as other alternative services. Options identified include 63 Madison Metro routes, 78 routes of the State Vanpool Program and 1500 commuter carpools. The Program also offers a "guaranteed ride home" service, which provides a taxi voucher in case of emergencies when poolers are at work without a vehicle.

In January 2001 the Madison Common Council adopted a resolution instituting a Green Fleet Program for the City's municipal fleet (City of Madison, 2001d). The resolution calls for a comprehensive fleet inventory and analysis, including the identification of ways to replace existing vehicles with smaller and more efficient ones, the introduction of alternative fuel vehicles (AFVs) into the fleet, and 'driving for efficiency' training for fleet operators. Currently the fleet contains two Ford Focus vehicles, has tested one flex-fuel vehicle (ethanol), has ordered three hybrid electric vehicles, and has held an alternative fuel vehicle conference targeting public and private fleets as well as alternative fuel infrastructure in Madison. One part of the municipal fleet that has been investigated as a candidate for the integration of AFVs is the Metro Transit system (City buses). The City did look into using compressed natural gas (CNG) for buses, but determined the cost for vehicle purchase, maintenance and fueling stations would be prohibitive when looked at over a 15-year life cycle.

Greening the City: Energy Planning

Madison currently receives the bulk of its power generation from fossil fuel combustion and 25% from nuclear power generation, which will be phased out by 2005 and replaced with natural gas-fired combined cycle generation. Madison Gas & Electric, the local private utility, installed 17 wind turbines (11 MW) in 1999, making theirs the largest wind project in the eastern United States. The wind-generated electricity was sold under a voluntary green power purchase program and sold out in 9 months, faster than any utility green power program in the United States.

Madison has recently become a new participant in the EPA's Energy Star Buildings program. The City of Madison, along with Dane County and the Madison Metropolitan School District, are working to implement Energy Star Buildings upgrades into Madison area schools

through the installation of energy-efficient lighting, ventilation, heating and cooling technologies in their buildings. Expected energy related cost savings due to the efficiency efforts are expected to be 25 to 30 percent on average. Further measures to improve energy efficiency within City operations include the upgrade of 95% of Madison streetlights (6,505 streetlights) from mercury vapor and incandescent to high-pressure sodium, for an expected energy savings of 3,981,060 kWh/yr. In addition, red bulbs in City traffic signals are gradually being converted to light-emitting diodes (LEDs), which are more energy efficient than traditional bulbs, and are most cost-effective due to their smaller up front cost and longer durability.

In 1999, the City of Madison announced that Metro Transit would become the first City agency to use a clean fuel alternative. In partnership with Madison Gas & Electric (MGE), 25% of Metro Maintenance & Administration Facility's electricity is now being supplied by wind power. In addition, Metro has signed up with MGE as an interruptible customer, saving the City $15,000 annually and enabling MGE to use power from Metro's generator during critical power situations.

Greening the City: Attracting Green Businesses

Madison was the first City in the nation to begin curbside recycling when in 1968 it began collecting newspapers (City of Madison, 2001e). Since then recycling in Madison has become a mandatory activity, and the curbside recycling program has expanded its collection to include yard waste, appliances and scrap metal, waste oil, glass, plastic and metal household containers, magazines and catalogs, and corrugated cardboard. The Madison recycling program boasts a 97% participation rate with 256 tons of material collected each week.

Lessons For Delaware

Delaware can learn from the following Madison initiatives:

- The creation of rideshare programs could help City and state employees to reduce their vehicle miles traveled.
- Phasing out of conventional fuel sources for electricity generation and switching to alternatives, particularly for municipal operations, similar to that undertaken by Metro Transit, could help improve air quality and reduce municipal energy bills.
- The creation of Eco Teams can foster public participation in environmental improvement.
- Adoption of a Sustainable Lifestyle Campaign program.

V. Sustainable Planning Efforts in Delaware

This section examines sustainability planning efforts that are occurring in Delaware. Recently, the Governor of Delaware released the "Livable Delaware" Executive Order, whose goals are to guide the planning strategies of the State (Table 5.1). Delaware has recognized the need to restructure its planning efforts in order to restrict the spread of urban sprawl. Urban areas are quickly replacing many acres of farmland and natural areas as new developments are being established. This increasing trend also brings with it associated social economic and environmental problems, such as traffic congestion, air and water pollution, soil erosion, biodiversity loss, increased stormwater runoff and increased investment in the establishment and maintenance of new infrastructure for energy, transport and water. Planning efforts in Delaware will have to begin to reflect the principles of sustainability in an effort to reverse this trend. The following section is a review of what is occurring in Delaware in this regard, so as to determine where further policies or initiatives need to be taken in order to improve its sustainability efforts.

A. Land Use Planning

Land use planning based on growth management is essential to the achievement of sustainability in Delaware. This is because sprawl affects not only the quality of the physical environment (through pollution, congestion on the highways, health, decline in open spaces and strain on natural resources), but also on the quality of life through the stresses that the affected physical environment imposes on people's ability to enjoy their surroundings. Checking sprawl, therefore, is one of the prerequisites to achieving sustainable growth in Delaware. According to the Managing Growth in the 21st Century Report, there already exists ample evidence of environmental deterioration resulting from sprawl (Delaware Office of State Planning Coordination, 1999). The report, for instance, notes that Delaware's population rose by nearly 67% between 1967 and 1998 with "a greater percentage of this occurring in unincorporated areas where population almost doubled." Similarly, land use increased both

Table 5.1 Goals of Livable Delaware

- Direct investment and future development to existing communities, urban concentrations, and growth areas.
- Protect important farmlands and critical natural resource areas.
- Improve housing quality, variety and affordability for all income groups.
- Ensure objective measurement of long-term community effects of land use policies and infrastructure investments.
- Streamline regulatory processes and provide flexible incentives and disincentives to encourage development in desired areas.
- Encourage redevelopment and improve the livability of existing communities and urban areas, and guide new employment into underutilized commercial and industrial sites.
- Provide high quality employment opportunities for citizens with various skill levels to retain and attract a diverse economic base.
- Protect the state's water supplies, open spaces, farmlands and communities by encouraging revitalization of existing water and wastewater systems and the construction of new systems.
- Promote mobility for people and goods through a balanced system of transportation options.
- Improve access to educational opportunities, health care and human services for all Delawareans
- Coordinate public policy planning and decisions among state, counties and municipalities.

geographically (across Delaware's three counties: New Castle, Sussex and Kent) and cross-sectorally (residential, commercial and natural habitats).

Because of existing evidence of sprawl and the rapid expansion of the population, Delaware has adopted growth management policies. The Delaware Office of State Planning and Coordination, in conjunction with State, county, and local planners and policy makers, has formulated a number of growth management strategies with the guidance of the "Shaping Delaware's Future Report." Based on eleven principles and goals, the "Shaping Delaware's Future Report" advocates for a growth management sensitive land use system, which not only meets both the individual and collective needs (housing, transportation, employment, service delivery, healthcare and education, service delivery, etc.) of Delawareans, but also minimizes the negative consequences of economic activity, as well as enhances participation in community affairs. Broadly speaking, the report's development model can be summarized in the following way: development in Delaware needs to focus on developing "existing communities and clearly defined 'growth areas' of the State, with limited development occurring outside of these areas" as well as redeveloping blighted neighborhoods and preserving agricultural lands and critical ecological habitats.

Delaware's goals, pursuant to the report are to:

1. Invest and develop existing urban regions and heavily concentrated areas
2. Protect agricultural lands and critical habitat areas
3. Enhance the affordability and diversity of housing across social economic groups
4. Encourage or discourage growth in certain areas using regulatory mechanisms
5. Enhance community welfare through redevelopment and expansion of employment opportunities
6. Integrate land use planning with water, transportation and other policies such as healthcare education, etc.

These goals are similar to the recommendations made by the Cabinet on State Planning (the Committee), which is in charge of making growth and development recommendations and in overseeing statewide planning on farm preservation; open space retention; re-use of aging industrial sites; and developing Delaware's transportation, water and waster water systems.

It should be noted that land use decisions in Delaware are made both at the county and municipal levels. The State, however, does have legitimate authority to influence land use planning through spending and management policies and the facilities and services (such as transportation, health and social services, public safety, environmental protection, parks and services and education) it provides. The American Planning Association (APA) has commended Delaware for substantially revising its planning legislation and for its strong involvement in planning. The APA also points out that Delaware's statutes contain moderate details in areas, for example, land use, housing, economic development, agricultural, forestland, open space preservation, critical and sensitive areas, local coordination and mass transit; and little detail in redevelopment, transportation, community facilities, community design, historic preservation and implementation. The APA, however, has not ranked Delaware on urban growth limits, natural hazards, recreation, energy, air quality, human services, policy, and public participation.

There is no doubt that Delaware on average fares relatively well at the regulatory level. This is not the case, however, at the implementation level. Historical statewide land use patterns demonstrate that Delaware has not managed to contain growth, despite its commendable

regulatory framework. Although efforts are made at the agency level, as reflected in the "*Shaping Delaware Future Report,"* there has been and continues to be an overall trend towards greater urbanization of land use in Delaware. John Mackenzie and Kevin McCullough, in *Delaware Land Use/Land Cover Transitions 1984-1992,* point out that the overall trend since 1984 has been toward urbanization in all three Delaware counties. Evidence of suburban sprawl are readily visible and include, but are not limited to, the emergence of new regional malls in northern New Castle County, strip shopping centers along U.S. 13 from Dover to Seaford and south, new office buildings in downtown Wilmington, and offices in suburban parks (1997 Annual Assessment Report to the Cabinet Committee on State Planning Issues). One of the effects of this trend is the tremendous growth of traffic congestion in both major and secondary highways.

The 1997 annual report, using data obtained from the Delaware Land-Use/Land Cover Transitions Project, directed by Dr. John Mackenzie of the Spatial Analysis Lab at the University of Delaware, also confirms that developed land in Delaware grew by 50% between 1984 and 1992 while the population grew by 14% during the same period. This increase was reflected in all three types of developmental use: residential (49.2%), commercial (60.2%) and recreation (9.5%). As expected, natural resources suffered loss (-9.2%) with forestry losing almost twice as much land than agriculture (-13.4% and –6.4% respectively). Despite this negative feedback, however, environmental uses had a net positive gain of 18.7%. The report also indicates that prior land use trends are continuing unabated with large lot, low-density growth patterns away from existing centers, although the rate seems to be slower when compared to the late 1980s and early 1990s. The report further states that the prevalence of single family homes, the expansion of cities and housing market, based on size and type of housing, have not responded to demographic changes and continued to suffer in the down town areas.

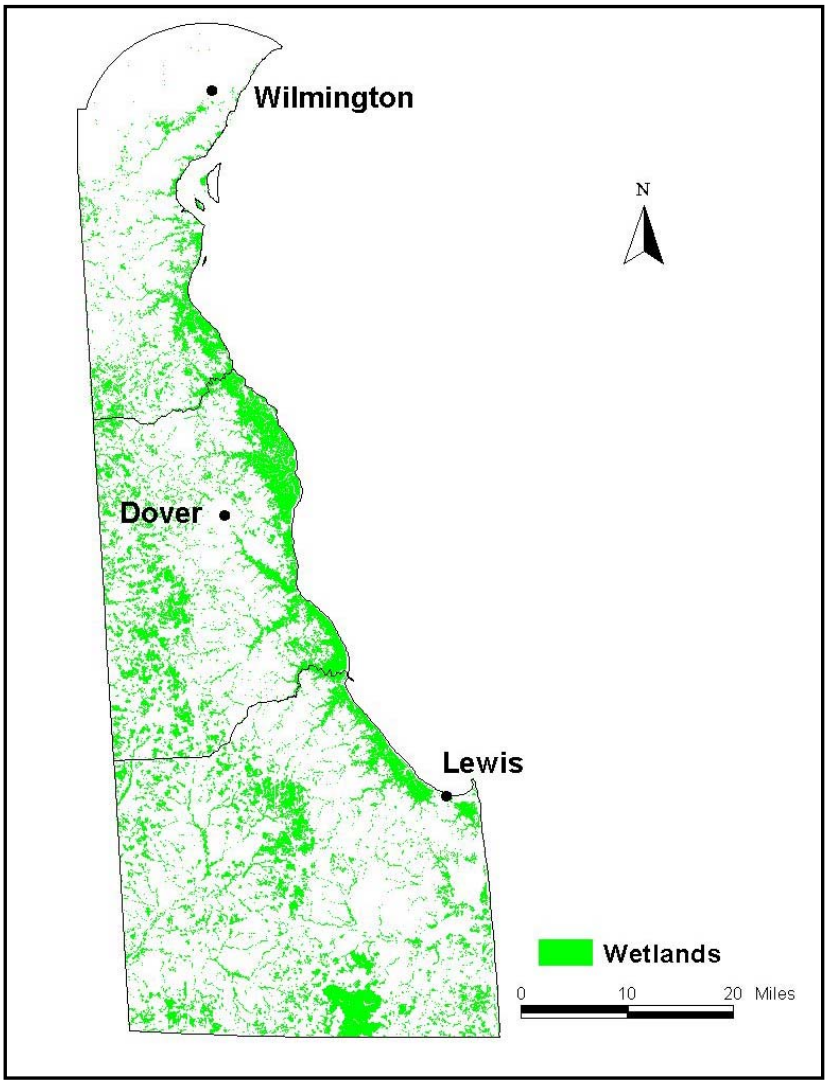
Data provided by the Delaware Office of State Planning Coordination also indicate that Delaware continued to lose agricultural and forest land between 1992 and 1997. Overall, the State had a net gain of almost 14% in the developed uses (residential, urban, commercial, industrial, transportation, government and utility). Data for the same period also shows a net gain of about 3% for water while almost 1% of the wetlands were lost. It should be noted that although Delaware continued to lose agricultural and forestland to other uses, overall agricultural and forestland remained the largest part of the State's land use followed by wetlands. It is evident from the foregoing analysis that although Delaware's existing regulatory framework is commendable, as the APA has pointed out, the State has a long way to go in controlling sprawl. It is suggested here that while legislation may be an initial step towards controlling sprawl, Delaware needs to do much more than just legislate. We believe that the State has legitimate authority to regulate land use, but yet feel its efforts will be more effective and better-served if the State collaborates with local communities (at the county, municipal and neighborhood levels). In so doing, Delaware can learn from what other local communities studied in this report have either done or are currently doing to contain sprawl, as well as improve livelihoods.

B. Biodiversity

Delaware's native plant and animal populations have shown steady decline within recent years. Delaware has supposedly lost a higher percentage of biodiversity than any other state in the United States (ELI, 1999). According to the Delaware Division of Fish and Wildlife, an alarmingly high percent of Delaware's native plants and animals are now at risk of being entirely eliminated from the State – a direct result of the loss of, or alterations to, critical habitat. Of

Delaware's more than 1,600 native plant species, more than 10 percent are believed to be extinct, another 10 percent are extremely rare; and a further 20 percent are uncommon. Statistics from the Division of Fish and Wildlife show that 84 percent of native freshwater mussel species are either extinct or extremely rare; 50 percent of native reptiles and amphibians are extremely rare; 31 percent of native fish species are uncommon; and nearly 20 percent of the 379 bird species naturally nesting in Delaware are considered rare or extinct. Delaware lost 42,000 acres of wetlands between 1951 and 1981, according to the October 1986 report, "Status and Recent Trends of Wetlands in Five Mid-Atlantic States," published by the U.S. Fish and Wildlife Service. Figure 5.1 shows the 1997 location of wetlands in the State of Delaware. Another 2,000 acres of vegetated wetlands (most of which were forested wetlands) were destroyed between 1981 and 1992, according to an updated U.S. Fish and Wildlife Service inventory. In addition, according to Mackenzie and McCullough of the University of Delaware, 73,814 acres of deciduous, coniferous and mixed forest were lost between 1974 and 1997 (Mackenzie et al, 2000). Figure 5.2 illustrates the location of deciduous, coniferous and mixed forest in 1997.

Figure 5.1 Wetlands in Delaware



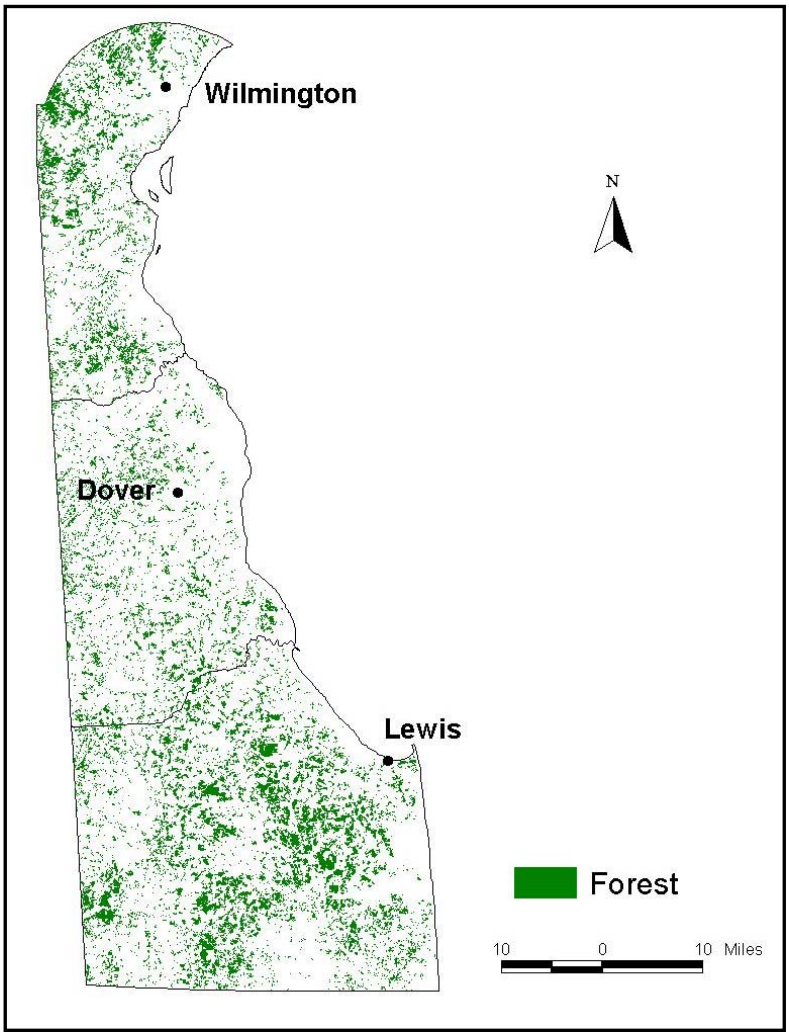
The factors responsible for the reduction in biodiversity have primarily been attributed to habitat destruction and degradation, as well as induction of exotic species. This has been readily seen in aquatic systems, where the loss of biodiversity in aquatic ecosystems has been caused by physical habitat alteration, chemical pollution, hybridization, over-harvesting and the introduction of exotic species. At present, about 62% of the State's rivers and streams currently are unable to effectively support fish and wildlife, and 79% of the rivers and streams are not suitable for swimming (ELI, 1999.). In addition, resource exploitation, fire suppression, recreation and the introduction of environmental toxins are other significant threats to the environment.

Some reforestation has taken place. As of 1999, Delaware's Forestry Service

reforested 1,324 acres of forest, mainly on private lands. In spite of this effort, Delaware has the smallest percentage of forestland along the Atlantic coast but the largest percentage of cultivated lands. The largest forest complex in the State, measuring 27,000 acres, is in Sussex County. The Great Cypress Swamp forest is the least fragmented forest in Delaware and on the Delmarva Peninsula. This originally measured 55,000 acres but has now been reduced to 14,000 acres, with 10,000 acres privately owned by Delaware Wild Lands, Inc.

In an attempt to mitigate the impacts of development on the biodiversity, the State of Delaware began acquiring environmentally unique lands in 1984 and the Delaware General Assembly established the Open Space Program in 1990, with the members to the Open Space Council appointed by the governor. This council has since spent $130 million protecting almost 30,000 acres with about 50% of the council's purchases attributed to natural areas and the rest to open space purchased either as protective buffers or for the purpose of maintaining the landscape's character. The Open Space Council often works in collaboration with conservation organizations such as The Nature Conservancy (TNC), Delaware Wild Lands, the Delaware Nature Society (DNS), the Nanticoke Watershed Conservancy and the Brandywine Conservancy. State agencies, other states and the federal government are others with whom the council partners.

Figure 5.2 Forested Land in Delaware



The State also developed a biodiversity initiative for protecting its natural heritage. In 1999, the Department of Natural Resources and Environmental Control (DNREC) conducted a review of laws, policies and institutions for the protection of the State's natural resources, in collaboration with the DNS and the TNC Delaware Chapter, with support from the Environmental Law Institute (ELI). The final report, entitled 'Protecting Delaware's Natural Heritage: Tools for Biodiversity Conservation' was released in December 1999. It contained recommendations for the use of and modification to existing policies, programs and laws for the

conservation of biodiversity. These recommendations have been reviewed and developed by the Biodiversity Implementation Strategy Workgroup (BISWG), a committee formed of key leaders in Delaware's State and county governments and private sector.

In addition, the Governor's Council of Environmental Control is implementing a new program for the purpose of assisting not-for-profit organizations with projects to improve Delaware's environment. It is also establishing an Environmental Improvement Project Bank in conjunction with the Department of Natural Resources and Environmental Control (DNREC). The program is expected to lead to improvements in Delaware's natural resources that may not otherwise take place. Attention has also been focused on the protection of biodiversity within the State's water bodies and a series of steps have been taken to accomplish this goal, such as:

- Delaware became the first state among the Chesapeake Watershed states to pledge cooperative efforts in helping to restore the Chesapeake Bay and its tidal tributaries (DNREC, 2000a). As per this agreement, Delaware, along with five other states in the Chesapeake Watershed, the District of Columbia and the U.S. Environmental Protection Agency (EPA) are expected to work cooperatively towards achieving nutrient and sediment reductions by 2010.

- DNREC has already adopted targets for the reduction of nitrogen and phosphorus loadings into the Nanticoke River and Broad Creek. A strategy to meet these goals is presently being developed. In addition, the Delaware Nutrient Management Commission is also developing a statewide program for the management of nutrient use in agricultural, commercial and residential sectors.

- DNREC has also developed the Northern Delaware Wetlands Rehabilitation Program to restore nearly 10,000 acres of wetlands at thirty-one sites along the Christiana and Delaware rivers in New Castle County with the cooperation of civic and business leaders, scientists, resource managers, and property owners (DNREC, 2000b). The program aims to improve water quality, increase wildlife populations, and control nuisance plants. Planning has already begun for the rehabilitation of the Gambacorta and Broad Dyke marshes in New Castle, Augustine Marsh near Port Penn and Old Wilmington Marsh.

- Amendments have been made to Delaware's Wildlife and Non-Tidal Fishing regulations for the purpose of providing additional protection to endangered species in the State and for better management of small-mouth bass populations (DNREC, 2000c). These updated regulations address the collection of non-game wildlife, such as reptiles and amphibians. An administrative list of endangered species has been maintained by the DNREC since the early 1970s. However, as per this amendment, endangered species in Delaware will now be established by regulation. Some species were added to the list while others were removed. Those removed include species on the federal list not likely to be found in Delaware.

- The State of Delaware established The Non-game and Endangered Species Program in 1984 to monitor and protect non-game and endangered wildlife in Delaware (DNREC, 2000d). Long-term studies are aimed at determining the status of some those species that

are most at risk and work is carried out in cooperation with other government agencies, private organizations, landowners and the public.

- The Division of Fish and Wildlife may list native wildlife species that are in danger of becoming extinct or endangered. The Federal Endangered Species Act protects threatened and endangered species. The U.S. Fish and Wildlife Service maintains this list of protected species. Other native wildlife is prevented from becoming endangered in the future by State and federal laws and regulations. Wildlife species that are native to Delaware are also protected from collection for commercial sale, and reptiles and amphibians are protected from over-collection.

- The construction of a Stormwater Forebay at Silver Lake to improve the water quality and habitat and manage storm water runoff has begun. This project will provide the first forebay structure in the Silver Lake area (DNREC, 2000e).

- DNREC is also working in collaboration with New Jersey on developing a management plan for the blue crab.

- Open space and habitat protection are taken into consideration in the New Castle County's Unified Development Code, adopted after its 1997 Comprehensive Plan. This code regulates activities in natural areas, including steep slopes, riparian buffers, and forest resources.

Another key initiative aimed at the protection of biodiversity has been the development of the Governor of Delaware's Livable Delaware Agenda, for the implementation of 'Strategies for State Policies and Spending' for the State (Livable Delaware, 2001). The strategies specifically related to the protection of Delaware's natural resources include:

- For environmentally sensitive developing areas, i.e. areas surrounding the Inland Bays, the State will seek a balance between resource protection and sustainable growth.

- The State aims to develop and maintain recreational and open space facilities to serve community needs, including urban parks and recreational areas, waterfronts, and links between uses and throughways (e.g. greenways, bikeways). Critical natural resources, greenways and other green areas will be protected and wise use of land and water resources, as well as protection of habitat, will be promoted.

- In urban centers like Wilmington, Newark and Dover, the State aims to promote wise use of water and land resources, protection of habitat, pollution reduction, support conservation design, and enhance aesthetic and environmental conditions. Urban open spaces will provide resource protection, recreation and improved quality of life for residents, workers and visitors.

- In developing areas, the State aims to protect critical waterways and other natural resources, promote the establishment of greenways, and maintain "green" separators between more intensely developed areas. The State also aims to establish a baseline inventory of natural

resources and open space in order to maintain sustainable natural resources in developing areas and provide transition zones between developing and rural areas. Forest protection and urban forestry programs in such developing areas are expected to provide recreational and environmental benefits.

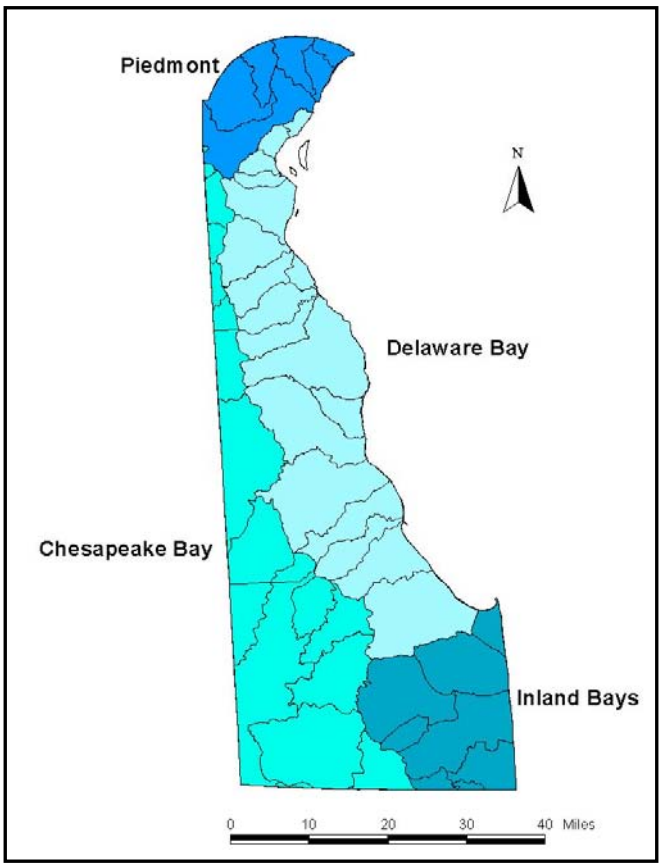
- For environmentally sensitive developing areas, cooperation between the State, county and local governments would be necessary to provide water quality protection, safe and efficient transportation, protection and enhancement of natural resources and retaining the character and integrity of such areas. Ordinances that promote environmentally sensitive development to ensure environmentally sound land use are also important. The State aims to protect areas that are particularly critical or valuable natural resources or habitats.

In rural areas, the State intends to preserve a critical mass of agricultural land to ensure the health of the agriculture industry. This would also ensure permanent green edges around development areas by targeting farmlands at risk for development, promoting agribusiness, and preserving historic farmsteads and archeological sites. The State emphasizes the protection of critical natural habitat and wildlife, aquifer recharge, sustainable agriculture and forestry activities, and increased acquisition of State forest lands.

C. Water Resources

Despite the small size of Delaware, the State has a significant impact on several important waterbodies. Portions of the State lie in the Chesapeake Bay, the Delaware Bay, the Piedmont, and the Inland Bays Watersheds (see Figure 5.3). The State also has 3,158 miles of streams and rivers and 4,500 acres of lakes, reservoirs, and ponds. As a result of the abundance of water resources, the State has relatively strong and successful water quality programs (DNREC, 2000f). The majority of water quality programs were initiated after the passing of the Clean Water Act of 1972.

Figure 5.3 Delaware's Watersheds



Water resources policies in Delaware are the responsibility of several agencies and organizations, including DNREC, the interstate Delaware River Basin Commission (DRBC), the State's Public Service Commission (PSC), and Delaware's Water Resources Agency (WRA). DNREC is the principal agency in water resources management in Delaware and has three internal divisions sharing this

responsibility:

1. The Division of Water Resources
2. The Division of Soil and Water Conservation, and
3. The Division of Fish and Wildlife (DNREC, 2000f).

The duties of each division are outlined in Table 5.2.

Recognizing the interrelationships that shape the natural environment, DNREC has recently begun a Whole Basin Management Program. The program divides the State into five basins: the Piedmont; Chesapeake Bay; Delaware Bay; Delaware Estuary; and Inland Bays/Atlantic Ocean. Whole Basin management teams are developed to direct activities within the respective basins. The teams consist of representatives from the three water divisions of DNREC's, together with two additional divisions, the Division of Air and Waste Management, and the Division of Parks and Recreation. The Whole Basin Program integrates the assessment, management and monitoring of each basin's biological, chemical, and physical environments. This is a sustainable approach to natural resources management and has proven to be a highly effective tool in other regions and will be very beneficial to the State of Delaware.

Table 5.2: DNREC Specific Water Resource Duties.
Division of Water Resources ◄ Provides technical and education services ◄ Regulates water uses, including wells and water allocations ◄ Regulates wastewater systems, including municipal, industrial and septic systems ◄ Provides loans and grants for water pollution control projects ◄ Regulates underwater lands and tidal wetlands ◄ Monitors seafood and swimming areas for unhealthy conditions ◄ Operates as EPA certified laboratory, which provides scientific testing and analytical services
Division of Soil and Water Conservation ◄ Provides planning and organizational assistance for the development and maintenance of tax ditches to ensure the conservation of both agricultural and urban areas through improved drainage and water management ◄ Provides for the development and implementation of the State's recently mandated Sediment and Stormwater and Nonpoint Source Pollution Programs
Division of Fish and Wildlife ◄ Protects and manages fish and wildlife resources ◄ Protects and manages the habitats of fish and wildlife resources
Adapted from CEEP, 2001

There are specific waters in Delaware that are recognized as having special natural assets. These areas are designated as Waters of Exceptional Recreational or Ecological Significance, or ERES Waters. This program is also administered through DNREC and the department must adopt a pollution control strategy for each designated stream basin. The program develops a

more comprehensive layer of protection to ensure these valuable waters are not harmed by pollution or mismanagement (DNREC, 1999).

Both water quantity and water quality are vulnerable throughout the State of Delaware. According to *Shaping Delaware's Future*, groundwater and surface water resources are threatened by over-use, the elimination of recharge areas, saltwater intrusion and contamination from a variety of sources. The report outlined seven strategies for nurturing communities throughout the State. One strategy is centered around the protection of water and wastewater systems and suggests that the State:

> "direct maximum assistance to upgrades, reconstruction, treatment improvements, and system expansions within communities. Priority will be for investments in existing water and wastewater systems for improved efficiency, enhanced water quality management, and additional capacity for redevelopment, infill, and for new community development that supports efficient and orderly land use patterns" (Delaware Office of State Planning Coordination, 1999).

Recent events, such as the drought of 1999, have demonstrated to many Delawareans the vulnerability of their water supply. Total water withdrawals throughout Delaware have been declining recently, despite an increasing population (see Table 5.3). This decline can be attributed to more efficient industrial and agricultural practices and conservation programs promoted by the State.

Table 5.3: Water Withdrawals in Delaware by County.

County	Use	Water Withdrawals in Millions of Gallons						
		1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**
Kent	Utilities	3,3765	3,421.1	3,260.0	3,683.2	3,404.9	3.089.1	2,888.8
New Castle	Utilities	24,473.3	24,478.9	23,855.9	23,814.7	22,987.3	23,646.0	21,820.6
Sussex	Utilities	837.0	759.3	753.4	899.4	932.2	720.0	675.2

Adapted from DNREC Water Consumption Database

Despite these decreases, areas north of the Chesapeake & Delaware (C & D) canal were hit particularly hard by the drought. This has led the State to evaluate their water supply plans over the past couple of years. In late 1999 the Governor's Water Supply Task Force released its final report detailing steps that should be taken to augment the region's water supply. Both supply-side and demand-side options were suggested. The implementation of these recommendations is ongoing and once completed they will have a significant impact on stabilizing the regions water supply.

Conservation efforts throughout the State have proven to be successful over the past several years. They have been a main contributor to the decrease in water withdrawals throughout the State. The water conservation roles of State agencies are outlined in Table 5.4. The main water quality issues in the State include high nutrient loads, bacteria counts, degraded physical habitat, and low dissolved oxygen levels. Water quality protection in the State of Delaware is achieved through the use of Pollution Control Strategies (PCSs), which have been developed by DNREC's Division of Water Resources. The goal of the PCSs is to achieve load reductions set by Total Maximum Daily Loads (TMDL). The TMDLs are required for the waters within a State under the Clean Water Act. TMDLs have been completed for the

Nanticoke and Broad Creek and for the Inland Bays, they are currently being created for the Red Clay and White Clay Creeks and the Christina River Basin (DNREC, 2001). This new approach using PCSs will be utilized throughout the State to protect the integrity of Delaware's water resources. Upon completion, the PCS should prove to be an effective tool in protecting the quality of Delaware's water resources in a sustainable manner.

Recent accomplishments in water resources protection in the State of Delaware are steps in the right direction for the State. Activities such as the Whole Basin Management Program and the Pollution Control Strategies will be important water quality protection tools as increasing population puts pressure on the Delaware's water resources. Water supplies of Delaware must also be handled in a sustainable manner to protect the natural environment and the citizens of Delaware from a recurrence of the problems associated with the drought of 1999.

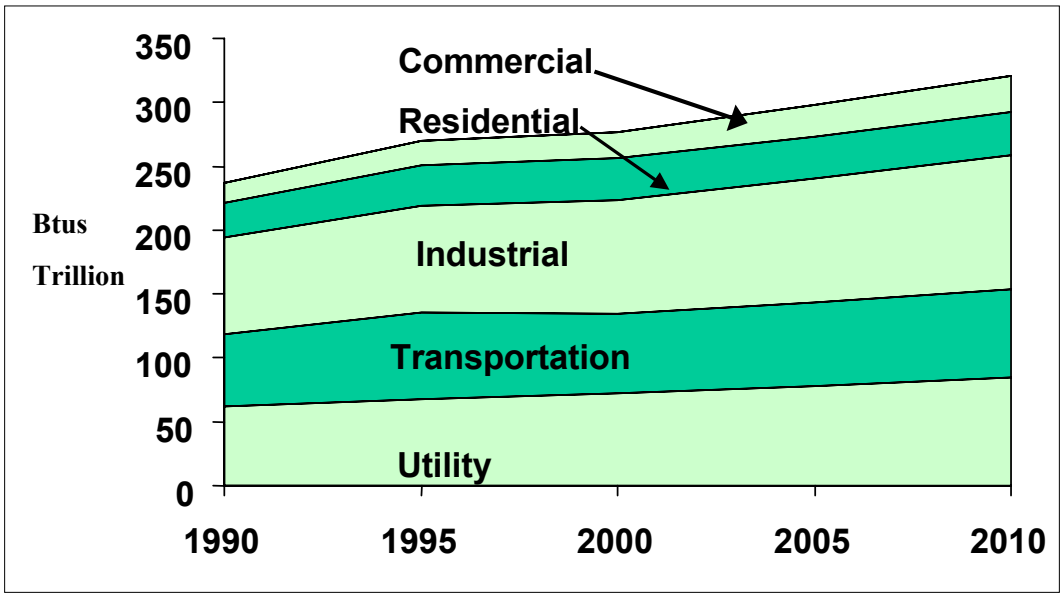
Table 5.4: Water Conservation Roles and Responsibilities in Delaware
DNREC ➢ Devises water conservation policy measures. ➢ Implements and enforces regulations that require mandatory water conservation measures. ➢ Finances water conservation projects according to the water supply budget allocation. Conducts public information and awareness campaigns, especially during emergency periods. ➢ Leads and coordinates water conservation measures taken by other water-related entities in the State.
DBRC ➢ Manages and conserves water within the entire Delaware River Basin. ➢ Recommends new water conservation practices to state enforcement agencies, such as DNREC. ➢ Increases water conservation awareness among concerned stakeholders. ➢ Monitors and evaluates the effectiveness of water conservation measures.
PSC ➢ Recommends and approves water conservation rate structures for investor-owned utilities. ➢ Recommends utilities consider demand side management activities in their water supply plans.
WRA ➢ Initiates public information programs that stress the benefits of water conservation. ➢ Devises programs that seek to modify the behavior of end-users to accord with conservation goals. ➢ Works with water purveyors to endorse adoption of a water conservation-oriented pricing structure.
Adapted from CEEP, 2001

D. Energy Production

As the population of Delaware has grown in recent years, the use of energy in the State has also increased. The majority of the energy produced in Delaware is used by the industrial and utility sectors, followed by the transportation, residential and commercial sectors, (see Figure 5.4). As part of the Division of Facilities Management, the State Energy Office is responsible for energy management and monitoring in the State of Delaware in cooperation with the Delaware Public Service Commission.

The production of energy in the State of Delaware comes completely from fossil fuels. Delaware has substantial potential for the development of solar, wind, biomass and geothermal power in the State (EREN, 1999). In 1999 Delaware deregulated its energy industry with the passing of House Bill 10, "The Electric Utility Restructuring Act of 1999." This legislation gives Delawareans greater choices in selecting an energy supplier. The legislation also supports energy efficiency and conservation programs through the creation of the Energy Incentive Fund. Up to $1,000,000 of the money deposited in the Fund can be used for renewable energy property grants. The Delaware Economic Development Office, through the Energy Alternatives Program, will administer the grants.

Figure 5.4: Energy Use by Sector in Delaware 1990-2010.



Adapted from CEEP, 2000**.**

With the restructuring of Delaware's electric industry and the ever-decreasing cost of these environmentally friendly resources, Delaware now has a significant opportunity to move toward a cleaner energy market. In an attempt to move towards sustainable energy use, the State has begun the Delaware Climate Change Action Program. The Program has been established to increase awareness about Delaware's contributions to greenhouse gas emissions and climate change, and the potential emission mitigation measures that are available to the State.

The University of Delaware's Center for Energy and Environmental Policy, with funding from the Delaware Energy Office and the U.S. Environmental Protection Agency's State and Local Climate Change Program, and input from the Delaware Climate Change Consortium, has prepared a Climate Change Action Plan that details measures which Delaware can implement to reduce its emissions to 7% below 1990 levels (CEEP 2000). The Action Plan is contingent on conservation efforts from all sectors of Delaware. Some progress has been made in energy conservation throughout the State, but much more progress is still needed. For the Action Plan to be successful, it has to be adopted by the State, thereby ensuring that major commitments to reducing Delaware's impact on climate change will be by both State and local governments.

The State Energy Office supports several conservation programs to reduce usage throughout the State. The Office participates in Rebuild America, a U.S. DOE program to improve the energy efficiency of commercial and multifamily residential buildings (DOE 1999). Through the Rebuild America program, the Energy Office will promote the latest technology and retrofit practices in order to help businesspeople, school districts, housing authorities, arts and culture organizations, and public agencies save 20-30% on their energy bills. The State Facilities Energy Efficiency program is borne out of the U.S. DOE's Stripper Well Exemption Litigation. The Energy Office allocates money from this fund to the Department of Administrative Services (DAS) for energy efficiency improvements in the State's health, correctional and administrative facilities. The Energy Office selects projects on the basis of their estimated energy savings and payback periods. All of these energy savings projects achieve paybacks in 1-15 years. Programs are also offered to improve energy efficiency in the industrial sector, the State's largest energy user (see Table 5.5).

Table 5.5: Business As Usual (BAU) Energy Use by Sector, 1990-2010.			
Sectors	1990 Energy Usage (Trillion Btus)	2000 Energy Usage (Trillion Btus)	2010 Energy Usage (Trillion Btus)
Industrial	75.5 (32%)	89.7 (32%)	105.0 (33%)
Utilities	61.7 (26%)	72.1 (26%)	85.0 (26%)
Transportation	55.6 (24%)	62.0 (22%)	68.6 (21%)
Residential	26.7 (11%)	31.8 (11%)	33.4 (10%)
Commercial	16.3 (7%)	21.3 (8%)	28.9 (9%)
Total	235.8	276.9	320.9
Source: CEEP 2000.			

As the population of Delaware continues to grow, the State's energy use is expected to grow as well. Through proper energy planning and management, Delaware has great potential for reaching sustainability in energy production and use. For the State to achieve a sustainable energy future, continued conservation efforts, along with the promotion of renewable energy resources and adherence to the Climate Change Action Plan must be pursued.

E. Recycling, Waste Management and Green Business

Delaware Solid Waste Authority (DSWA) is working to promote recycling throughout the State through public education programs, in schools and within local communities, to teach citizens how they can reduce waste production and handle waste safely. The DSWA also runs the "Recycle Delaware" Program, a voluntary source-separation recycling program that began at the Southern Solid Waste Management Center in 1990 (DSWA, 2001). The program now involves over 145 recycling centers throughout Delaware with collection bins for:

- newspapers, magazines, and phonebooks
- narrow-neck plastic bottles
- aluminum and steel cans
- clear glass containers
- corrugated cardboard
- used motor, hydraulic and diesel oil and oil filters
- small household batteries

To date, over 300 million pounds of materials have been collected at Recycle Delaware Centers with over 96% of the materials recycled into new products (DSWA). One innovative example of recycling and reuse by DWSA is their oil filter recycling program. DSWA and two Delaware-based companies, CitiSteel of Claymont and Motiva Enterprises of Wilmington, run a recycling operation that turns used oil filters collected from auto body shops and Recycle Delaware collection centers into clean scrap metal that is melted and mixed with other scrap metal and formed into new sheet metal. In addition, used oil is squeezed out of the oil filters, mixed with other collected used oil, and refined for use as gasoline, home heating oil, and diesel fuel. Delaware's oil filter recycling program has served as a prototype for other states and is an excellent example of the potential economic and environmental benefits of public-private partnerships.

The DSWA is also working to create more modern and environmentally benign landfills by ensuring their design and construction help to protect the area's groundwater and control noxious odors. DSWA landfills are recognized internationally for their innovative technology and research projects. In addition, methane gas is recovered from the Cherry Island landfill through a system of over 50 gas wells and a pumping system designed and installed by Cerza Energy. The collected methane is sent to Conectiv Power Delivery's Edgemoor Power Generating Station where it is burned with other fossil fuels to produce electrical power for local homes and businesses.

The Delaware Recycled Product Procurement Law (SB 395) challenges all State agencies to significantly increase the number of products they purchase with recycled content. Agencies are encouraged to purchase cost-competitive recycled products when they are available, and remove procurement barriers affecting recycled content products. Types of recycled products that are to be purchased include paper, vehicle transportation, parks and recreation, landscaping, non-paper office, and miscellaneous products. Companies that sell recycled products are encouraged to sign up to be included on the Division of Purchasing vendor list.

One State initiative that is actively being used to promote recycling and waste reduction is the Green Industries Program, a collaborative effort between the Delaware Economic Development Office (DEDO) and DNREC (DEDO, 2001a). The program works with Delaware's business and industrial community, providing incentives and technical assistance for the use of recycled materials in manufacturing processes, encouraging the collection of materials to be recycled, and decreasing the quantity and/or toxicity of wastes generated in manufacturing processes. A product of the Green Industries Program is the Reuse Guide, a publication created for businesses and consumers to inform them on ways to buy, rent and repair reusable products, thus reducing waste generation (DEDO, 2001b). The Reuse Guide states that Delaware has a thriving reuse economy employing over 4400 people in 900 businesses, which was confirmed by the Northeast Recycling Council's Recycling Economic Information Study which looked at the direct and indirect economic impacts of recycling and reuse businesses and their employees in Delaware and other states (Northeast Recycling Council Recycling Council, 2000).

Another project of DEDO, in collaboration with COMPUSA-Wilmington and the Delaware Solid Waste Authority (DSWA), was the Delaware Citizens Computer Recycling Pilot Project (Center for Solid Waste Research, 2001). The project was a one-day event, held in October of 2000, which allowed citizens and small businesses to drop off old computer equipment for recycling; equipment that would otherwise have been thrown away. Computer recyclers received a $50 certificate towards the purchase of new computer equipment at COMPUSA during their Customer Appreciation Day. The program was funded by a grant from the United States Environmental Protection Agency (EPA) Region III, and netted over 13,000 pounds of obsolete computer equipment in just six hours.

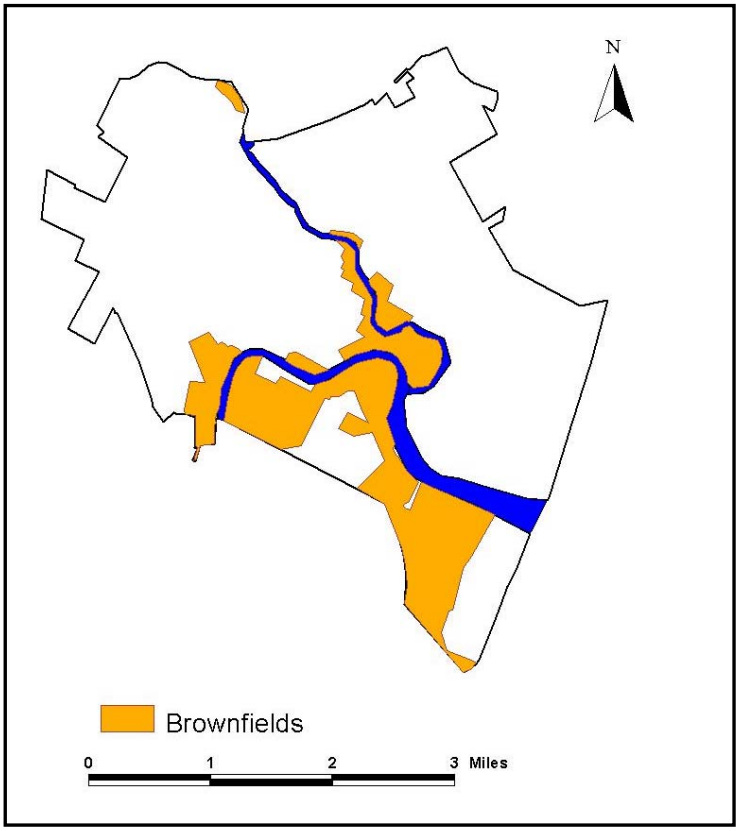
In addition to its recycling and waste reduction efforts, DEDO offers a booklet on their web site, "Local Waste Reduction Efforts Can Turn Down the Heat on Global Warming", which reviews the relationship between solid waste and climate change (R.W. Beck, Inc. 2000). The publication outlines the WARM Model, a way to analyze greenhouse gas emissions associated with solid waste management. Delaware and the U.S. EPA have worked jointly to use the WARM Model as a demonstration for other states.

Currently there are no city recycling programs in Dover, Newark or Wilmington. A pilot curbside recycling program was run in the City of Newark, but was discontinued due to its high cost and low participation rate (City of Newark, Conservation Advisory Commission, 1999).

F. Brownfields

The recently released Livable Delaware Agenda by Governor of Delaware attempts to address the issue of brownfields within the various communities and urban centers of the State. Emphasis in the agenda is placed on the economic development of these areas, with programs designed to focus on increasing jobs, community-based redevelopment and revitalization efforts, and improvement in the delivery of State services to these areas.

Figure 5.5 Wilmington's Brownfields



The main urban centers of Wilmington, Newark and Dover have been singled out for aggressive redevelopment efforts. As the principle center of economic and industrial activity, the majority of Delaware's brownfields are located within Wilmington. In a report on brownfields in the Wilmington area done by the Center for Energy and Environmental Policy, it was found that industrial development which has been concentrated in the greater Wilmington area, has affected the eastern and southern portions of the city through which the Brandywine and the Christiana rivers flow (see Figure 5.5). Approximately 1,750 acres or over 24% of Wilmington's useable land area, are likely to be environmentally contaminated and major contaminated areas include Cherry Island, East Seventh Street Peninsula, the Port of Wilmington vicinity, South Madison Street, Bell Alley, Browntown and Todds lane. Wilmington's residents therefore face disproportionate environmental risks and the presence of such areas is also not economically viable because they present a barrier to the optimum use of land for tax-generating revenue and employment. The high percentage of brownfields also gives rise to urban sprawl by encouraging migration of both industries and residents away from the brownfields sites.

The State has identified over 300 brownfields sites with suspected hazardous substance releases, which require some form of clean up. About 120 have been determined to pose some sort of risk to public health and the environment and the Federal Superfund program is addressing 19 of these sites. The remaining sites will have to be addressed through some sort of state initiated brownfields program. Delaware has established such a program, which is managed by the Delaware Department of Natural Resources and Environmental Control (DNREC) Division of Air and Waste Management's Site Investigation and Restoration Branch (SIRB). As of 1997, the Delaware Brownfield Program has successfully cleaned up 22 sites throughout Delaware, placing 236 acres back into active use. The brownfields program had its

origins in 1990 when the State enacted its Hazardous Substance Cleanup Act (HSCA) to deal with other potentially harmful sites that did not receive the attention of the federal government. In July 1995, HSCA was amended to encourage voluntary cleanup of sites and restoration of abandoned areas known as brownfields. Further amendments occurred with Senate Bill 40, which attempted to entice more parties to enter into voluntary agreements with DNREC for recycling Brownfield sites. It eliminated liability concerns of prospective purchasers and developers who would undertake the cleanup of brownfields sites with DNREC oversight, provided streamlined cleanup agreements and created greater flexibility to aid in the cleanup of these sites. In addition, another Senate Bill, SB 41 provided new corporate tax credits to businesses for cleanup and redevelopment of brownfields and provided a reduction in the gross receipts tax for qualified business engaged in Brownfield redevelopment. Under the administration of the Delaware Economic Development Office (DEDO) a grant was also established to offset a part of the costs associated with the investigation of these properties. Under the Brownfields Assistance Program, matching grants would be made available for the purpose of conducting investigations of properties that meet certain criteria, i.e. vacant, unoccupied or underutilized sites, suspected of contamination due to prior commercial or industrial use.

DEDO also maintains a database of post-commercial and industrial sites that require redevelopment and assists companies in identifying sites for the purpose of relocation or expansion. It offers developers, commercial real estate firms and property owners, a number of economic incentives for the remediation of these sites. The HSCA, FIRST fund, Program Loans for Underground Storage Tank Systems (PLUS), Brownfields Assistance Matching Grants, Loans from the private sector, Federal and State Grant and Loan programs, the DNREC's voluntary cleanup program (VCP), and state and federal tax credit programs are some examples of funding opportunities for the purpose of brownfields revitalization. Recently an amendment has been made to the Delaware Code by means of Senate Bill 183 which seeks to authorize the secretary of the DNREC to certify real property as a brownfield and also authorize the DEDO to make grants from the Delaware Strategic Fund in order to offset a portion of the costs for the environmental assessment and redevelopment of brownfields. This bill is expected to come into effect by December 31, 2001.

VI. Recommendations

The following recommendations to the State of Delaware derive from the research conducted by CEEP, of "best practice" sustainability models among the 12 showcase communities investigated in the United States.

A. Program Goals

A common element of many of the communities surveyed by CEEP is the adoption of a definition of sustainability and associated goals. This has proved to be a key component of the 12 communities' efforts, providing the foundation for pursuing the sustainable outcome those communities envisioned. CEEP suggests for consideration the following programmatic goals:

- State government can lead by example and develop a definition of sustainability to be incorporated into the planning and policies of State government agencies. An audit of current policies would be appropriate to determine which ones facilitate sustainability and which ones impede progress to a sustainable future.
- Local communities should be encouraged and assisted in formulating definitions of a sustainable community within their local settings that parallels the definition of sustainability developed by the State.
- Local communities can be assisted in formulating definitions of a sustainable future in their local settings. These efforts can then be inventoried for the purpose of defining a statewide vision of sustainability.
- Communities should be encouraged to develop a comprehensive, integrated approach that includes social and ecological dimensions (e.g., health, income, energy, transport, natural resources, water etc.). Part of this action would be a community-based assessment of key environmental, social and economic problems.
- Communities in Delaware can develop and use a set of indicators of sustainability corresponding to the generic template suggested in Table 6.1 (drawn from our research).
- Cities in Delaware can be encouraged to join the Cities for Climate Protection Program of the International Council for Local Environmental Initiatives (ICLEI). ICLEI's program offers worldwide experiences of local governments in their efforts to achieve tangible improvements in the global environmental through cumulative local actions.

Table 6.1. Suggested Sustainability Indicators for communities in Delaware

Sector	Indicators
Community Involvement	• Level of public participation in planning processes/ advisory committees/ town meetings / voluntary activities
Transportation	• Percent of "pedestrian-friendly" streets • Vehicle miles traveled per capita • Air quality (ozone and CO_2 levels) • Mass transit usage • Alternative fuel use
Land use & Biodiversity	• Percent of impervious cover • Mixed-use zoning • Percent of open space • Protection of historic/cultural sites • Use and availability of public parks • Percentage of new development that reuses or restores existing buildings • Development of underutilized land versus development in open space • Protected/threatened/endangered plant and animal species • Habitat degradation • Change in wetland inventory
Water Resources	• Water quality • Water conservation (residential, commercial and industrial efficiency) • Recycled water usage • Storm water retention and drainage
Energy	• Renewable versus non-renewable energy consumed • "Green energy" pricing and resource development initiatives • Efficiency of energy use • Local actions to reduce climate change impact • Energy conservation program
Green Business	• Growth of "green businesses" • Expansion of "green" business practices and product purchasing
Waste Management	• Recycling within communities • Waste reduction and reuse initiatives
Social Equity	• Mixed-income housing • Brownfields redevelopment projects • Environmental justice projects
Green City and State Operations	• Sustainable practices and education programs • Use of sustainability indicators in major plans and policies • Government green energy and green product purchasing • Use of alternative fuel vehicles • State employee incentive programs for use of public transit

B. Community Involvement

The involvement of local residents in sustainable community development planning is a key element to long-term success of the initiative. With community support, advocacy for change can be expected. Involvement at all stages of the decision-making process, from initiation to evaluation of sustainability policies is needed. To enable informed participation initiatives to educate communities should be launched. CEEP proposes the following initiatives for the State of Delaware to consider:

- Local communities can be encouraged to develop stakeholder alliances involving elected officials, neighborhood environmental and business groups, the media, churches and State and local governmental agencies. Such alliances are often well suited to define a consensus-based agenda for community action.
- A State Office of Sustainability might be created to function as a facilitator for sustainability programs across the State. This office would serve as a clearinghouse for information and could manage a "Sustainable Communities" website for the exchange of ideas and strategies. It could also develop and implement public education programs focusing on sustainability.

C. Land Use Planning

A principle of sustainable development is incorporated in land use planning as it is practiced among the 12 showcase communities. A revised land use planning model is anticipated in the Governor's recent "Livable Delaware" report. An effective *growth management* strategy is needed in Delaware's case in order to affect growth form in ways that improve quality of life by decreasing congestion and pollution. In order to ensure that these benefits are realized, CEEP encourages the State of Delaware and local communities to consider the following reforms:

- Establishing well-defined growth boundaries would be a key step in realizing a "Livable Delaware." This will allow for growth and economic development without the pattern of suburban sprawl, which has typified many areas of Delaware.
- A complimentary action would be to prioritize the revitalization of established communities (e.g., downtown areas), and ensure the protection of farmland, open space and biodiversity areas.
- Land use plans are needed that promote the development of mixed-use and mixed-income neighborhoods, which will be particularly helpful in reducing sprawl and traffic congestion, while furthering social equity.

D. Water Resources

The management of water resources is a critical component of sustainable communities, especially as climate change is expected to alter rainfall patterns and temperature regimes. Communities will be challenged to adjust their use of water and to implement methods of conserving water in order to have adequate and accessible reserves over the long run. Responses to drought conditions may be a common occurrence and measures will be needed to alleviate their impact if sustainability is to be achieved. Toward this end, CEEP recommends the following for the State of Delaware to consider:

- Develop a strong water conservation program with a near-term priority for northern Delaware, which can lead to a conservation ethic among all Delawareans. Detailed recommendations concerning water conservation efforts in the State are addressed in CEEP's report *Securing Delaware's Future through Sustainable Water Resource Management: A* S*urvey of State Programs*" (2001).
- Delaware can also learn from other communities in pursuing industrial, commercial and residential water reuse and recycling.
- Delaware established itself as a leader in coastal zone management and it should continue to build upon its success by adopting state-of-the-art marine planning approaches.

E. Transportation

The transportation strategies implemented by the 12 pioneer communities can be very instructive for Delaware as it seeks to comply with national air quality standards. The following are recommendations, which the State and its communities can consider for implementation:

- Development of a light rail system to link communities, as has been used in Portland through its MAX system, should be seriously considered for Delaware.
- Development of pedestrian- and bicycle plans for communities is likewise an important tool for promoting sustainable transportation.
- The use of incentives for carpooling, public transit use and bicycles, and the creation of trip reduction ordinances to reduce vehicle miles traveled (VMTs) are needed for Delaware to empower community pursuit of sustainability goals. These programs will serve to significantly reduce pollution emissions.
- Providing diverse public transportation options (e.g., the Hop, Skip and Jump bus system of Boulder, CO) can pay dividends in curbing sprawl and reducing traffic congestion.
- The State could expand support for its Alternative Fuel Vehicles Program for public and private sector use.

F. Energy

A community's approach to the supply and use of energy is critical to the pursuit of sustainability. In several cases, the showcase communities have earned national recognition because of their innovative energy policies. The adoption of a sustainable energy strategy can be highly beneficial to Delaware and its residents. The State's ability to meet air quality standards will depend on a new direction in energy use. Because Delaware has a leading solar energy manufacturer in the State, a green energy strategy can have economic benefits, as well. CEEP recommends the following options for consideration:

- A State Sustainable Energy Plan is needed to help Delaware to take advantage of the sizable low-cost energy efficiency opportunities estimated by the Delaware Climate Change Consortium (see *Delaware Climate Change Action Plan 2000*).
- Alternative energy sources are promoted within communities, using programs similar to Sacramento's PV Pioneers and Boulder's Windsource and Solarsource initiatives. Because Delaware has one of the country's top solar energy manufacturers (AstroPower), there are economic advantages for State action on this score.

- Similarly, the State can offer tax credits and rebates to promote investment in energy efficiency. The *Delaware Climate Change Action Plan* provides sector-by-sector targets and priority measures.
- The development of community-based sustainable energy plans is an essential tool to realize a sustainable future. The State Energy Office should be empowered to assist communities in this task.
- With electricity deregulation, Delaware created an Environmental Incentive Fund to finance "green energy" investments. The State can learn from other communities who have experience with these funds, in order to make best use of this program.

G. Green Business Development

The greening of business is being recognized as an integral aspect of community sustainability planning. While many efforts in this area are in the formative stages of development, there are valuable programs and practices, which can be instructive to communities in Delaware. These are:

- Delaware and its communities can formulate green/sustainable business programs to attract companies in this rapidly growing market.
- The State has great potential to become a leader in "waste exchange." Our agricultural and manufacturing sectors have the expertise and opportunity to mount such a program.
- A practical step is for the State to develop a "Businesses for an Environmentally Sustainable Tomorrow" program and enlist the support and assistance of the business community in making Delaware a leader in this market.
- Delaware should consider carefully mandatory curbside recycling for all residents, businesses and organizations.

H. Social Equity

Sustainable communities must be equitable communities, as well. The 12 pioneers chosen for investigation have worked hard to link environmental and social goals. These efforts include attempts to revitalize blighted areas and address environmental justice issues. Brownfields redevelopment offers valuable opportunities to pursue sustainability and equity goals. The City of Wilmington has initiated a promising program to convert its contaminated properties to socially, economically and ecologically healthy places. The following recommendations to Delaware can be helpful to communities as they seek to address equity concerns:

- The City of Wilmington has the expertise to win a Brownfields Showcase designation by the U.S. Environmental Protection Agency.
- Community-based Brownfield Action Plans are needed to provide guidance and direction for redevelopment of more than 300 blighted properties throughout Delaware. CEEP's report on *The Brownfields Challenge* (1999) has detailed recommendations on steps to ensure environmental justice in the redevelopment of these properties.
- One key action of the proposed Office of Sustainability could be the creation of a task force to identify major environmental and social risks that disproportionately affect Delaware's communities of color. As these risks become known, a

practical plan to address them can then be formulated in coordination with community leaders.

- An Office of Sustainability could also investigate options for green business development in higher risk communities as a means of combating inequity and unsustainability in a synergistic manner.

I. State and City Operations for Sustainable Development

State and local governments should be expected to be in the forefront of sustainability initiatives. Several of the pioneer communities examined for this report have developed innovative programs to "green" their governments' activities, purchasing patterns, etc. CEEP proposes the following actions for consideration by Delaware's governments:

- Implementation of a green buildings initiative would appear to be a logical priority for Delaware. Such an initiative can offer "win-win" benefits as environmental gains are used to attract new businesses seeking to be recognized for their environmental commitments.
- Mandating the use of green products in State and city government operations will demonstrate Delaware's public sector commitment to a sustainable future for its citizens.
- Following the lead of other communities, Delaware can develop an Affirmative Procurement Plan for environmentally preferred products that will help the public sector to implement sustainability goals. At the same time, this action can widen the green market for the State and thereby encourage businesses to enter Delaware and promote their services and products.

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