

Envision Carlsbad

Existing Conditions and Issues Exploration



1 *Working Paper* **Sustainability**

Working Paper 1

Sustainability

Working Paper 2

The Local Economy, Business Diversity and Tourism

Working Paper 3

Open Space and the Natural Environment; Access to Recreation and Active, Healthy Lifestyles

Working Paper 4

History, the Arts and Cultural Resources; High Quality Education and Community Services

Working Paper 5

Walking, Biking, Public Transportation and Connectivity

Working Paper 6

City Council

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Ann J. Kulchin, *Mayor Pro Tem*
Matt Hall, *Council Member*
Mark Packard, *Council Member*
Keith Blackburn, *Council Member*

City Staff

Lisa Hildabrand, *City Manager*
Gary Barberio, *Community and Economic Development Director*
Don Neu, *Planning Director*
David de Cordova, *Principal Planner (Project Manager)*
Chris DeCerbo, *Principal Planner*
Jennifer Jesser, *Senior Planner (Project Manager)*
Kristina Ray, *Communications Manager*
Rachel McGuire, *Communications Coordinator*
Barbara Nedros, *Administrative Secretary*

Consultants

DYETT & BHATIA

DETT & BIALEK Urban and Regional Planners

Dudek, Environmental Consultants

Fehr & Peers, *Transportation Consultants*

Rosenow Spevacek Group, Inc., Economic and Fiscal Consultants

BW Research Partnership, Inc., *Public Opinion Surveyors*

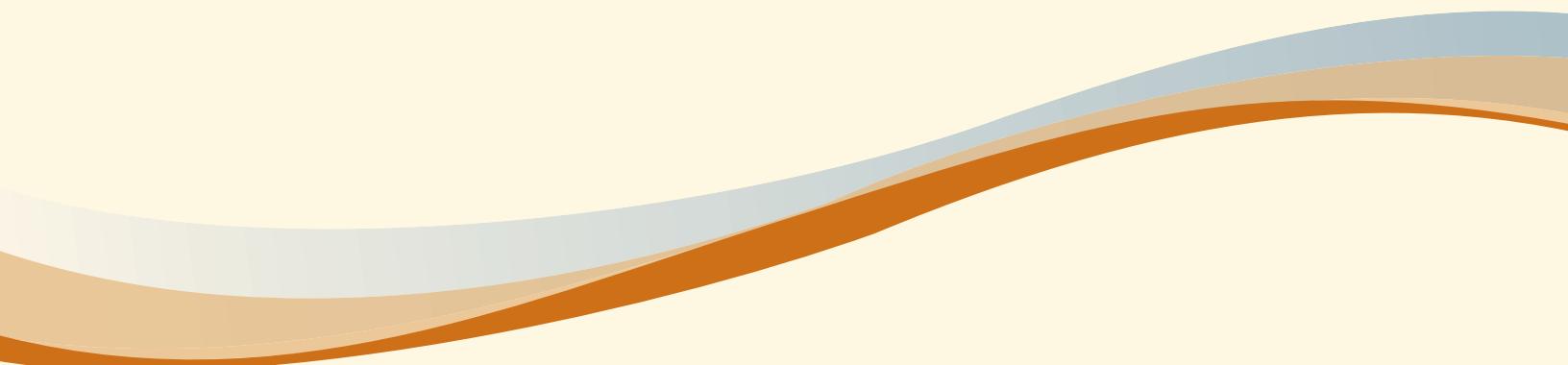
Envision Carlsbad Citizens' Committee

EC³ Primary Member

Mike Howes
Fred Sandquist
Barbara Hamilton
Jim Farley
Jim Comstock
Hap L'Heureux
Gina McBride
Julie Baker
Eric Larson
Allen Sweet
Greg Nelson
Kirk Cowles
Diane Proulx
Robert Gates
Jeff Segall
John O'Reilly
Jeannie Sprague-Bailey

EC³ Alternate Member

Rick Ransburg
—
—
Farrah Douglas
Jack Cumming
Robert Nielsen
—
—
—
—
—
Guy Roney
Glen Etherington
—
—
Jim Bradley
Tina Schmidt
Sean Sexton
Chris Korogi



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Introduction

1.1 Background and Purpose

In January 2010, the Carlsbad City Council adopted the Carlsbad Community Vision (Vision), representing the community's most important values, priorities, and aspirations for the future. The community's vision guides the second phase of the Envision Carlsbad process, which entails an update of the city's General Plan, Local Coastal Program, and Zoning Ordinance.

As the first task in this second phase of Envision Carlsbad, existing conditions and issues are evaluated. This evaluation is presented in six working papers, structured around the core values identified in the Carlsbad Community Vision. The working papers provide background information and technical analysis that will be useful for subsequent tasks, and raise policy issues (presented at the end of each working paper) to help the EC³ brainstorm about conclusions and findings, in terms of how these may shape potential alternatives or policies. Importantly, these working papers are discussion tools, rather than final documents to be critiqued or refined. While the primary review and brainstorming group for the working papers will be the EC³, some papers will be appropriate for review and discussion by the city's various commissions and boards.

The six working papers are:

1. Sustainability
2. The Local Economy, Business Diversity and Tourism
3. Open Space and the Natural Environment; Access to Recreation and Active, Healthy Lifestyles
4. History, the Arts and Cultural Resources; High Quality Education and Community Services

5. Walking, Biking, Public Transportation and Connectivity
6. Small Town Feel, Beach Community Character and Connectedness; Neighborhood Revitalization, Community Design and Livability

1.2 This Working Paper

Working Paper # 1: Sustainability evaluates the environmental, regulatory, technological, and social setting for achieving sustainable development in the City of Carlsbad (economics is covered in more detail in Working Paper #2). It explores the Vision core value Sustainability:

Build on the city's sustainability initiatives to emerge as a leader in green development and sustainability. Pursue public/private partnerships, particularly on sustainable water, energy, recycling, and foods.

The working paper offers explanation of basic concepts of sustainability as they pertain to planning, as well as a focus in more detail on those sustainability issues highlighted during the vision phase. Following this introductory chapter, chapters in the working paper include:

- Defining Sustainability;
- Sustainability Values Identified in the Carlsbad Community Vision;
- Climate Change and Sustainability;
- Measuring Sustainability; and
- Planning Issues and Implications.

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2 Defining Sustainability



2.1 Broad Definitions

The 1970 National Environmental Policy Act formally established as a national goal the creation and maintenance of conditions under which humans and nature “can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of Americans.” A decade later, the concept of “sustainable development” appeared in a 1981 White House Council on Environmental Quality report: “The key concept here is sustainable development. If economic development is to be successful over the long term, it must proceed in a way that protects the natural resource base of developing countries.” Shortly after in 1983, the United Nations World Commission on Environment and Development addressed growing concerns about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development. From this commission came one of the most commonly-accepted definitions of sustainable development: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”¹

Sustainability also has been described as “the doctrine that economic growth and development must take place, and be maintained over time, within the limits set by ecology in the broadest sense – by the interrelations of human beings and their works, the biosphere and the physical and chemical laws that govern it.”² These “limits set by ecology”

suggested the need for a definition that accounts for the finite resources of earth. In 1991, the World Conservation Union, United Nations Environment Programme, and The World Wide Fund for Nature used the term “carrying capacity,” and defined sustainable development as that which “improves the quality of human life while living within the carrying capacity of supporting eco-systems.”

Despite these efforts to define sustainability, however, its meaning, goals, and objectives continue to be open to new interpretations. Importantly, communities, organizations, and individuals continue to refine definitions to be most meaningful and useful to them.

2.2 Organizing Frameworks

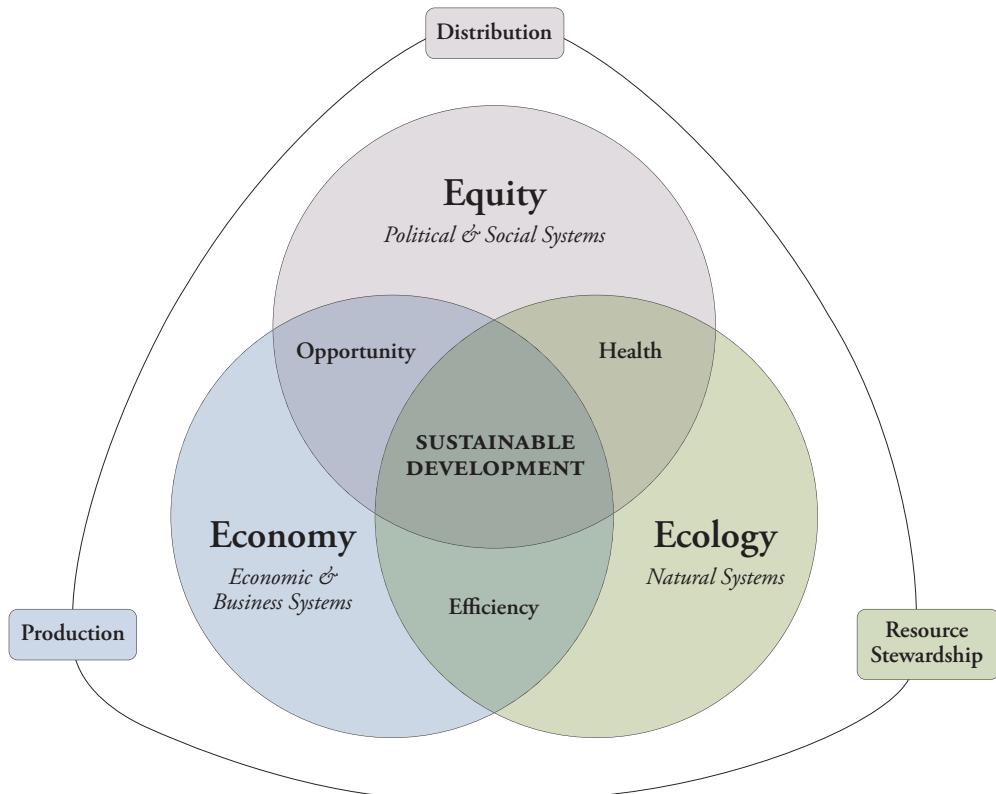
The Three-legged Stool

Since the 1970s, people have been trying to “operationalize” sustainability—to identify a set of actions that will achieve intended sustainability goals. One of the most enduring ideas from the early years of the movement is the “three-legged stool” metaphor. In this simple construct, each leg of a stool needs to be the same size in order to ensure the stool stands up. The premise is that the stool cannot be supported on only one leg, or two legs, or even a series of legs of different size.

As the metaphor goes, this is the case with sustainability. Sustainability cannot be achieved by focusing on one ‘leg’ to the detriment of the others. While educators, cities, and even private companies have adapted the three legs to meet their unique needs (e.g., in the business world, “companies aiming for sustainability need to perform not against a single,

¹ World Commission on Environment and Development, *Our Common Future*, Oxford University Press, 1987.

² William D. Ruckelshaus, “Toward a Sustainable World”, *Scientific American*, September 1989.



financial bottom line but against the triple bottom line³), over time, most definitions of sustainability have come to include some variation of the three spheres of influence model shown above, sometimes called the “three Es of sustainability”: ecology, economy, and equity.

Ecology

Ecological or environmental conservation—including the issue of global warming—is what many people think of first when they hear the term sustainability today. It is the branch of sustainable development that concerns itself with natural systems and natural resources; it proposes that human activity is sustainable when it does not disrupt the ability of natural (living and non-living) systems to function. The ecological perspective is historically known for its concern about endangered species and habitats, contamination of

water bodies and other forms of pollution that damage aquatic ecosystems, the destruction of non-renewable resources, and a generalized environmental conservation approach. The ecological or environmental approach to sustainability attempts to monitor, protect, improve, and enhance the physical health of the natural environment. The ecological aspect of sustainability has evolved, however, to encompass an understanding that protecting these “natural environment” systems often has social or “human” costs and implications.

Economy

Economic sustainability became a concern to environmentalists when organized efforts to preserve habitats and natural resources confronted the competing priorities of communities that needed those same resources to survive. Furthermore, people began to realize that successful conservation efforts often depend on economic motivation; communities protect a natural resource if they know that in the sustainable management of the resource lies their own economic security. Economic

³ Term coined by John Elkington in 1994, used by the World Business Council on Sustainable Development, Sustainable Measures, <http://www.sustainablemeasures.com>

sustainability also became an argument for businesses to change harmful or unfair practices. Although the phrase and concept of “triple bottom line” first evolved as an approach to business management, the concern for economics was never simply about the financial profit of an organization. Rather, the sustainability lens extended “economics” to encompass the ability of an organization, community, or government to improve economic stability and vitality on a local, regional, and even national scale.

Equity

The equity element of sustainability typically refers to the distribution of costs and benefits across all members of society, and speaks to the basic needs of humans for fulfillment—including safety and security as well as access to a community where people feel they belong and can participate. There is both a fundamental human rights argument for equity in development—one that distinguishes these goals from other economic or environmental optimization prerogatives—as well as a procedural argument that true sustainable development cannot be achieved without the participation of all segments of society and the fair distribution of benefits and opportunities. Commonly used terms for this sphere of sustainability are “social justice” or “environmental justice”, names for movements seeking to prevent gentrification, displacement of low income communities, or the unequal negative public health impact of development decisions.

Smart Growth

In the 1980s and 1990s, new frameworks emerged in an attempt to make sustainable development more tangible to planners and communities. “Smart growth” is one of the most enduring of these early concepts, guided by 10 basic principles based on the experience of communities around the nation striving to create and maintain great neighborhoods. These principles are⁴:

- Mix land uses;
- Take advantage of compact building design;
- Create a range of housing opportunities and choices;
- Create walkable neighborhoods;
- Foster distinctive, attractive communities with a strong sense of place;
- Preserve open space, farmland, natural beauty, and critical environmental areas;
- Strengthen and direct development towards existing communities;
- Provide a variety of transportation choices;
- Make development decisions predictable, fair, and cost effective; and
- Encourage community and stakeholder collaboration in development decisions.

Green Development

Concurrent with the rise of smart growth was the evolution of the concept of “green” development. Green development has been somewhat easier to implement than smart growth because it deals with buildings—discrete entities, typically easily measurable in terms of water and energy, and the result of a very quantitative evaluation process (e.g. calculation of square feet, cost, energy loads, and water demands). Green development initially focused on designing and constructing buildings to be more energy and water efficient. Over time, the concept grew to include a broader range of design attributes, such as indoor environmental quality, and gave new attention to other important community values such as natural lands conservation, increasing transit use, and reducing stormwater pollution. Furthermore, green development concerns have extended to lifecycle energy costs, rather than simply ongoing energy needs. Although there are many examples of green development standards today, the most well known in the U.S. is LEED™ – Leadership in Energy and Environmental Design, established and maintained by a private organization. Focused on new building construction when it was first released in 1996, LEED has since gone on to

⁴ From EPA’s Smart Growth Office website.

provide other tools for rating a variety of building types and even whole neighborhoods.

For more discussion of green development regulatory context, LEED, and the new California Green Building Standards, see Chapter 3.

The Ecological Footprint

Yet another metric created for understanding sustainability is the ecological footprint. A concept first introduced in 1992⁵ and emerging from theories and discussion about quantifying global biophysical “carrying capacity,” it is generally understood as an estimate of the amount of biologically productive land and sea area needed to regenerate (if possible) the resources a human population consumes and to absorb and render harmless the corresponding waste produced, given prevailing technology and current understanding. Using this measure, it is possible to estimate roughly how many planet Earths it would take to support humanity if everyone on the planet attained a certain standard of living. According to the World Wildlife Fund, if everyone in the world lived as the average American does today, we would require the equivalent of five planet Earths to sustain our way of life. Similarly, if everyone in the world lived as the average European does today, we would still require the equivalent of three planet Earths to sustain our way of life.

2.3 Existing City of Carlsbad Sustainability and Environmental Principles

The following sustainability principles were adopted by Carlsbad City Council in 2007 in order to help to guide city investments, activities, and programs, and are generally consistent with the Vision core values:

Sustainability Guiding Principles

- *Being a model community.* The City of Carlsbad desires to be a model community by creating a sustainable, high quality of life for those who live, work and play in the city.
- *Creating a sustainable system.* Sustainability is based on achieving a long-term balance among social, economic and environmental factors.
- *The participation of city residents is vital to its success.* The city recognizes that it takes the collective efforts of its residents to make its vision a reality. Residents have a responsibility to be informed, involved and engaged in the development of their community.
- *A proactive approach to sustainability guides city policy.* The city is committed to proactively addressing existing and potential community needs without compromising future generations. The city encourages staff to participate in research opportunities that may further its goals of creating a sustainable community.
- *The City of Carlsbad recognizes the local and global impacts of decision making.* Local social, economic and environmental issues cannot be separated from the bigger picture. The City of Carlsbad recognizes the interconnectedness of residents, associations and communities; and the fact that what one community does may have a profound impact on another.
- *Developing a sustainable community is based on employing cost effective programs.* The city recognizes that both financial and staff resources are limited; therefore, those programs and activities providing the highest benefit to the community and representing best-cost solutions should be considered.

⁵ Attributed to William Rees and Mathis Wackernagel

Environmental Guiding Principles

- ***Ethic of conservation.*** The City of Carlsbad supports the ethic of conservation of non-renewable resources. This includes efforts to reduce the use of energy (in any form), greenhouse gas (GHG) emissions (consistent with AB 32) and to find new and more energy efficient methods for delivering services. The city supports the development of building standards that enable the community to design energy saving features such as solar energy systems and water efficient landscaping into both public and private buildings.
- ***Clean air and water.*** The city supports the development and protection from pollution of the City of Carlsbad's air quality, creeks, lagoons, ocean, and other natural water bodies. The city supports programs that will ensure that all water bodies within the city are safe and clean, and where possible, open to the public at all times. Furthermore, the city supports activities that result in clean air for those who live, work, and play in the City of Carlsbad.
- ***Diverse and drought resistant water supply.*** The City of Carlsbad's future depends on being able to provide a sustainable supply of water to the community. The city supports the creation of a diverse water supply, including desalination, recycled and reclaimed sources, water conservation programs, and drought tolerant landscaping.
- ***Protection, preservation, and restoration of the natural and human-made environment.*** The City of Carlsbad is committed to protecting, preserving and restoring its natural and human-made environment. The city recognizes the importance of intact ecosystems as part of a healthy environment and will continue to protect open space and enhance habitats and bio-diversity. The city also supports the creation and maintenance of open spaces that are accessible to the public for both active and passive use.
- ***Waste reduction and recycling.*** The City of Carlsbad supports programs that manage the overall waste stream of the city and that maximize the amount of waste that is recycled by its residents, citizens and businesses. The city promotes the ability to quickly and conveniently dispose of hazardous waste.
- ***Efficient transportation and low emission fuel sources.*** The city believes that effective traffic management is an important element affecting the quality of life within the City of Carlsbad. The city supports programs that optimize the flow of traffic, the use of low-emission alternative fuel vehicles, and the increased availability and use of mass and other non-automotive modes of transportation. The city encourages participation in research programs designed to test and improve alternate fuel vehicles.
- ***Sound procurement decisions.*** The procurement of products and services by the city, its residents, businesses and institutions result in environmental, social and economic impacts both in this region and the country. Where possible, the City of Carlsbad's procurement systems should support the use of recycled materials, products with low carbon footprints (low use of carbon or GHG producing products in the manufacture, installation, maintenance, or disposal of the product).

2.4 The Community Vision as a Framework for Sustainability

Although sustainability is only one of the Vision core values, in a certain sense it underlies almost all of the core values, and can provide a conceptual framework for long-range planning that integrates all of the core values.

For instance, one core value urges the city to “prioritize protection and enhancement of open space and the natural environment,” while another seeks to “promote active lifestyles and community health by furthering access to trails, parks, beaches, and other recreational opportunities.” These core values are environmental and social sustainability priorities.

Another core value seeks to “increase travel options through enhanced walking, bicycling, and public transportation systems,” and to “enhance mobility through increased connectivity and transportation management.” This core value supports social

sustainability by increasing access for people of all incomes and physical abilities, and it supports environmental sustainability by helping the City of Carlsbad to reduce car trips and their associated emissions, and increase trips on foot, by bicycle, and by public transportation.

Still other Vision core values support economic and social sustainability, striving to “build on the city’s culture of civic engagement, volunteerism, and philanthropy” (Small Town Feel, Beach Community Character, and Connectedness), “support quality, comprehensive education and life-long learning opportunities” (High Quality Education and Community Services), and “strengthen the city’s strong and diverse economy and its position as an employment hub in San Diego County” (The Local Economy, Business, Diversity, and Tourism).

This summary only scratches the surface of the sustainability implications contained within Carlsbad’s Community Vision. The Vision core values target priorities of special interest to the Carlsbad community, and these clearly overlap with economic, environmental, and social sustainability prerogatives. While the next section focuses on sustainability priorities highlighted in the Vision, subsequent working papers will explore the other Vision core values.

3 Sustainability Values Identified in the Carlsbad Community Vision

The Vision provides specific guidance on community sustainability priorities. This chapter discusses the Vision sustainability priorities in greater detail, provides examples of what they can mean in practice, outlines the key federal, state, and regional regulatory context, and highlights local city actions to-date.

3.1 Community Value: Green Development

Definition

Green development is a concept centered on the role of the built environment in ensuring sustainability; because of the interconnected nature of sustainability, green building intersects with many different sustainability issues. Most importantly, green development is expected to be more energy-, fuel-, and water-efficient than traditional development, resulting in resource conservation and fewer greenhouse gas emissions. However, green development can also encompass other objectives; for instance it can reduce waste creation by establishing requirements for how building construction is managed, and can conserve and protect habitats by establishing requirements for site design. Furthermore, green development may also target improvements in occupant health and productivity through mechanisms including higher air quality, daylighting, and other benefits.

According to a 2003 report to California's Sustainable Building Task Force, "the benefits of building green include cost savings from reduced energy,

water, and waste; lower operations and maintenance costs; and enhanced occupant productivity and health... analysis of these areas indicates that total financial benefits of green buildings are more than ten times the average initial investment required to design and construct a green building. Energy savings alone exceed the average increased cost associated with building green."⁶ This particular finding shows a relatively large impact from estimated productivity and health gains, but even with data limitations and the need for further study in some areas, the report concludes that green building is cost-effective today. As the Carlsbad community expressed in the Vision, green development is a multifaceted way the city can make progress toward numerous sustainability objectives.

Key Regulatory Context

Building development is highly regulated in the U.S., and particularly in California. There are environmental regulations such as the Clean Air Act and Clean Water Act that impose standards regarding how development interfaces with these environmental resources. But more specifically, there are also building codes or standards adopted locally that govern the design and construction of structures. Some of these standards are mandatory, others voluntary. A few key examples are described below, drawn from the national, state, and regional context.

⁶ Greg Kats, et al., "The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force", October 2003.

California Green Building Standards Code (Title 24, Part 11)

In January 2010, the California Building Standards Commission adopted the first-in-the-nation mandatory Green Building Standards Code (CALGREEN) as a supplement to the 2007 California Building Standards Code. The purpose of the code is to improve public health, safety and general welfare by enhancing the design and construction of buildings in the following categories: 1) planning and design, 2) energy efficiency, 3) water efficiency and conservation, 4) material conservation and resource efficiency, and 5) environmental air quality.

The provisions of this code apply to the planning, design, operation, construction, replacement, use and occupancy, location, maintenance, removal, and demolition of every new building or structure throughout the State of California. CALGREEN requires that every new building constructed in California reduce indoor water use by 20 percent compared to existing standards (with voluntary goal standards for 30, 35 and 40 percent reductions), divert 50 percent of construction waste from landfills, and install low pollutant-emitting materials.

CALGREEN also requires separate water meters for nonresidential buildings' indoor and outdoor water use, with a requirement for moisture-sensing irrigation systems for larger landscape projects and mandatory inspections of energy systems (e.g., heat furnace, air conditioner, and mechanical equipment) for nonresidential buildings of more than 10,000 square feet to ensure that all are working at their maximum capacity and according to their design efficiencies. CALGREEN became effective for voluntary use or local adoption as of August 2009; compliance becomes mandatory in January 2011. The California Air Resources Board estimates that the mandatory provisions will reduce greenhouse gas emissions (CO₂ equivalent) by three million metric tons in 2020. (For more on greenhouse gas emissions, see Chapter 4.)

LEED™

Leadership in Energy and Environmental Design (LEED) is an internationally-recognized rating system for certifying the design, construction, and operation of high performance buildings; one of several in use across the globe, but probably the most popular in the U.S. LEED building certification is available for all building types, including new construction and major renovations, core and shell, educational buildings, retail, commercial interiors, existing buildings, and homes.

GOOD EXAMPLES IN GREEN DEVELOPMENT:

Cities with GreenPoint Rated Building Programs

Build It Green keeps an up-to-date directory of GreenPoint Rated building and educational programs implemented throughout California. According to this directory, at least 70 jurisdictions (cities and counties) in California have voluntary or mandatory programs in place. About 60 of these are in the Bay Area, where Build It Green began. Implementation approaches range from mandatory green building ordinances that incorporate rating system requirements (e.g. Santa Rosa or Davis) to voluntary programs that offer incentives such as accelerated plan approval or waiver of plan check fees for development (e.g. Anaheim or Solana Beach).¹

¹ For more information on Build It Green and local jurisdictions' green building programs, please visit www.builditgreen.org.

The LEED program is a point-based system. Building projects earn points for satisfying green building criteria within specific credit areas. Projects also may earn Regional Priority bonus points for implementing green building strategies that address important local environment issues. Each certification rating system is organized into five environmental categories: Sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. An additional category, innovation in design (or operation), focuses on sustainable building expertise as well as design measures not covered in the other categories.

Some government agencies use LEED as a benchmark for green building. Numerous colleges and universities also have adopted LEED. According to the U.S. Green Building Council, there are more than 28,000 commercial building projects participating in LEED, comprising nearly 7 billion square feet of construction space in the U.S. and in 106 countries worldwide.⁷

Build It Green

Build It Green is a membership supported non-profit organization whose mission is to promote healthy, energy- and resource-efficient homes in California. Build It Green has three strategic objectives: 1) Drive policy development by partnering with government to establish credible and accessible green building policies that promote private sector innovation and provide consistent guidelines statewide; 2) Increase supply of green homes by training building professionals on the latest best practices and connecting green product suppliers with consumers; and 3) Stimulate consumer demand by increasing awareness of the benefits of green building and making “GreenPoint Rated” a trustworthy, recognized brand for green homes. Build It Green offers training for building professionals involved in the design and construction of residential buildings, as well as those who support and develop the market for green building. The GreenPoint Rated program provides an objective, third-party verification



Capstone Advisors Corporate Headquarters, LEED Gold Certification for Existing Buildings. The City of Carlsbad is home to three LEED-certified projects.



Green design features include parking landscape treatments such as this gradual pavement grade draining through an “O” curbface directly to a vegetated swale. The turf-block under the planted grass is a concrete structure with openings to allow vegetation to grow and for drainage filtration of hydrocarbons and other pollutants to be absorbed and treated with the organic plant material. The turfblock system also allows for traffic and vehicle access without failure or damage to the vegetation.

⁷ Air Quality Sciences, Inc., “Building Rating Systems (Certification programs): A Comparison of Key Programs”, 2009.

system for identifying green homes, understanding green benefits, and recognizing green features. Build It Green also provides strategic assistance to local governments for developing, promoting, and implementing their green building programs.

San Diego County Green Building Incentive Program

San Diego County has a Green Building Incentive Program designed to promote the use of resource-efficient construction materials, water conservation, and energy efficiency in new and remodeled residential and commercial buildings in unincorporated areas. The program offers incentives of reduced plan check turnaround time and a 75 percent reduction in plan check and building permit fees for projects meeting program requirements. To qualify for the incentives, the project must comply with one of the resource conservation measures identified by the County.

Local Action

- **The Latest Code.** The city uses the California Building Code and the new CALGREEN Code to review proposed development and renovations.
- **LEED-certified Buildings.** According to the LEED Certified Project Directory, there are three LEED-certified projects in the City of Carlsbad: ViaSat Building 6, Bressi Phase 1, and Capstone Advisors.

3.2 Community Value: Water Conservation, Recycling, and Desalination

Definition

Water is one of the most basic and critical resources for life. Water provides sustenance for humans, and plants and animals; habitats for many species; is necessary for agriculture as well as irrigating landscapes for recreation and aesthetics; is needed for washing everything from dishes to clothes to cars; is used as a coolant in industrial manufacturing processes; fights fires; is used for recreation; and is even an inspiration to art.

In California, as in many other parts of the world, fresh water is becoming scarce as a growing population demands more of it, and new buildings and roads simultaneously reduce its quality (through run-off) and availability (through reduced ground-water infiltration). Water rights and access have been a source of concern in the western United States for centuries. At the same time, the practice of importing drinking water from other regions has become less politically acceptable because of increased scarcity across California, and because of the energy used in transporting water—water-related energy use consumes 19 percent of California's electricity, 30 percent of its natural gas, and 88 billion gallons of diesel fuel every year. A sustainable water supply for the City of Carlsbad is one that can meet the needs of the community without jeopardizing regional wildlife, habitats, agriculture, or other ecosystem functions, or the energy supply, now and in the future.

The Community Vision targets a few specific sustainable water approaches of particular interest to the City of Carlsbad: conservation, recycling, and desalination.

Water conservation typically refers to any beneficial reduction in water loss, use, or waste. A water conservation measure is an action, behavioral change, device, technology, or improved design or process implemented to reduce water loss, use, or waste. Water efficiency is a tool of water conservation that results in more efficient water use and thus reduces water demand. The value and cost-effectiveness of a water efficiency measure must be evaluated in relation to its effects on the use and cost of other natural resources (e.g. energy or chemicals).⁸

Water recycling is reusing treated wastewater for beneficial purposes such as subsurface irrigation, industrial processes, toilet flushing, and replenishing groundwater basins (referred to as groundwater recharge). Water is sometimes recycled and reused onsite; for example, when an industrial facility recycles water used for cooling processes. A common type of recycled water is water that has

⁸ Vickers, Amy (2002). Water Use and Conservation. Amherst, MA: WaterPlow Press.

been reclaimed from municipal wastewater, or sewage. The term water recycling is generally used synonymously with water reclamation and water reuse. In California, recycled water is municipal wastewater that has been treated to meet state regulations for different types of water reuse.

Gray water is untreated household wastewater that comes from bathtubs, showers, bathroom washbasins, clothes washing machines, and even kitchen sinks,⁹ and which is re-used for non-potable water applications such as sub-surface irrigation and toilet flushing. As such, it is another form of water recycling, but one without an intermediate treatment process.

The benefits of water conservation, recycling, and gray water re-use measures are diverse and include:

- ***Lower fresh water use.*** Conservation, recycling, and gray water re-use can replace fresh water use in many instances, saving money and protecting the water supply.
- ***Less strain on septic tanks and waste water treatment plants.*** Conservation, recycling, and gray water use greatly extend the useful life and capacity of septic systems. For municipal treatment systems, decreased wastewater flow means higher treatment effectiveness and lower costs.
- ***Less energy and chemical use.*** Less energy and fewer chemicals are necessary when conservation, recycling, and gray water systems are in place due to the reduced amount of both freshwater and wastewater that needs pumping and treatment.
- ***Better treatment.*** Gray water in particular is purified extremely well in the upper, most biologically active region of the soil. This protects the quality of natural surface and ground waters.
- ***Reclamation of otherwise wasted nutrients.*** Loss of nutrients through wastewater disposal in rivers or oceans is a subtle, but significant form

of erosion. Reclaiming nutrients in gray water helps to maintain the fertility of the land.

Yet another water supply alternative considered by coastal communities such as the City of Carlsbad is *desalination*. Desalination refers to any of several processes that remove excess salt and other minerals from water to make it suitable for human consumption or irrigation. Desalination is not a new technology, but rather one of the earliest forms of water treatment. In ancient times, many civilizations used this process on their ships to convert sea water into drinking water. Today, desalination plants are used to convert sea water to drinking water on ships and in many arid regions of the world, and in other areas to treat water that is fouled by natural and unnatural contaminants.¹⁰ Desalination has drawbacks, however. The two most common concerns are 1) that infrastructure and energy can be costly, raising the price of treated water above other sources of drinking water available to communities, and 2) the system can threaten nearby marine species if not designed properly.

Key Regulatory Context

Drought

The 2009 Water Year (October 1, 2008 through September 30, 2009) was the third consecutive year of below average precipitation for the State of California. In February 2009, the Governor declared a state of emergency because of the state's three-year drought and urged urban water users to increase conservation activities to reduce their individual water use by 20 percent as soon as possible.

The San Diego County Water Authority is strengthening its conservation effort by promoting drought measures that shift from conventional metrics such as the cash rebate programs to permanent behavior and water-use changes to ensure sustainable supply. To this end, the agency is planning to implement an extensive regional outreach program designed to change public perception to one that views water

⁹ Though in existing California Code, gray water does not include water from kitchen sinks, photo lab sinks, dishwashers, or laundry water from soiled diapers.

¹⁰ United States Geological Survey, <http://ga.water.usgs.gov/edu/drinkseawater.html>

conservation as a way of life and sees water efficient measures as desirable and cost-effective.

In response to the drought situation, the City of Carlsbad adopted a drought response plan and water conservation program through City Ordinance on January 6, 2009.

Integrated Regional Water Management

The Integrated Regional Water Management program is a local water resources management approach aimed at securing long-term water supply reliability within California by first recognizing the inter-connectivity of water supplies and the environment, and then pursuing projects yielding multiple benefits for water supplies, water quality, and natural resources. The San Diego IRWM program is an interdisciplinary effort by water retailers, wastewater agencies, stormwater and flood managers, watershed groups, the business community, tribes, agriculture, and regulatory agencies to coordinate water resource management efforts and to enable the San Diego region to apply for grants tied to the IRWM program. According to city staff, the City of Carlsbad has participated in the organization of the program locally, and in planning, coordination, and supporting watershed activities related to the IRWM.

California Emergency Gray Water Regulations

In 2009, as part of the Governor's declared state of emergency (described above), Chapter 16A "Nonpotable Water Reuse Systems" was incorporated into the 2007 California Plumbing Code. Chapter 16A establishes minimum requirements for the installation of gray water systems in residential occupancies regulated by the Department of Housing and Community Development, providing guidance and flexibility designed to encourage the use of gray water. The standards allow small gray water systems to be installed in homes without a construction permit, substantially reducing the barriers to installing small residential gray water systems in California. The purpose of the regulations is to conserve water by facilitating greater reuse of laundry, shower, sink, and similar sources

of discharge for irrigation and/or indoor use; to reduce the number of non-compliant gray water systems by making legal compliance easily achievable; to provide guidance for avoiding potentially unhealthful conditions; and to provide an alternative way to relieve stress on private sewage disposal systems.

Local Action

The City of Carlsbad's future depends on being able to provide a sustainable supply of potable water to the community. The city has taken a leadership role in making the most of the water it has and developing new reliable sources of water. In addition to maintaining an Urban Water Management Plan, Water Master Plan, and Recycled Water Plan for long range planning, City of Carlsbad sustainable water activities include:

California Urban Water Conservation Council

All three water districts that serve the City of Carlsbad (the Carlsbad Municipal Water District, the Olivenhain Municipal Water District, and the Vallecitos Water District) are signatories to the California Urban Water Conservation Council Memorandum of Understanding Regarding Urban Water Conservation in California. The CUWCC was created to increase efficient water use statewide through partnerships among urban water agencies, public interest organizations, and private entities. The Council's goal is to integrate urban water conservation Best Management Practices into the planning and management of California's water resources. Those signing the MOU pledge to develop and implement fourteen comprehensive conservation BMPs. These BMPs are designed to be phased in over about a 10-year period, but the Carlsbad Municipal Water District (Water District)—which serves about 85 percent of the city—has only been a signatory since 2006.

Recycled Water

Under the recycled water retrofit project, the city installs recycled water lines to serve existing development in areas of the city where recycled water is available. Commercial and industrial customers are required to convert to recycled water for landscaping use if the Carlsbad Municipal Water District distribution system has been extended to the property. The district does not provide recycled water to residential customers, however, it does provide it to the common landscaped areas of residential developments. The recycled water delivered within the Carlsbad Municipal Water District service area has received an advanced level of treatment known as tertiary treatment, which creates a finished product that is safe for landscape irrigation and other non-drinking uses. However, because it is only used for non-drinking purposes, recycled water must be delivered through a pipeline system separate from the regular water system. These pipes and fixtures are purple to distinguish them from the drinking water system. Recycled water costs customers 15 percent less than potable irrigation water.¹¹

¹¹ City of Carlsbad Web Site: <http://www.carlsbadca.gov/services/departments/water/reclaimed/Pages/default.aspx>; <http://www.carlsbadca.gov/about/news/pages/recycled-water-expanded-use.aspx>

Each year, the Carlsbad Municipal Water District distributes nearly 1.35 billion gallons of recycled water to local irrigation customers. This distribution is the highest per capita use of recycled water in the county, and nearly 20 percent of the total supply of water distributed by the CMWD, largely a result of supplying recycled water to local golf courses. Recycled water is supplied by three different sources: the Meadowlark Treatment Plant, owned and operated by the Vallecitos Water District; the Gafner Treatment Plant, owned and operated by the Leucadia Wastewater District; and the Carlsbad Water Recycling Facility, owned by the Carlsbad Municipal Water District and operated by the Encina Wastewater Authority.

The city distribution system has approximately 77 miles of recycled distribution pipeline, 660 recycled water meters, and currently supplies more than 500 sites. Sites served by recycled water include La Costa Resort and Spa and golf course, Park Hyatt Aviara Resort and golf course, Legoland California, Grand Pacific Palisades Hotel, Karl Strauss Brewery, the Crossings Golf Course, and the Flower Fields, as well as many city parks, median strips, shopping areas, freeway landscaping segments, and “common areas” of many homeowners’ associations.

GOOD EXAMPLES IN WATER CONSERVATION:

“Greywater Action” in California

In 1999, Laura Allen and Cleo Woelfle-Eskine built a gray water system in their backyard out of concern about their household water use. Their backgrounds in environmental science and permaculture design sparked their interest in understanding onsite water reuse and wastewater treatment alternatives. Soon, they were building prototypes, self-publishing “The Guerrillas Greywater Girls Guide to Water,” teaching hands-on workshops in community venues, and researching and refining designs for small-scale urban gray water systems. A few years later they changed their name to the “Greywater Guerrillas”, to reflect the

changing composition of a growing group of collaborators. In 2009, the latest name—Greywater Action - for a Sustainable Water Culture—reflects both the latest improvements in California law, as well as the organization’s emphasis on technology education projects. Through hands-on workshops and presentations, Greywater Action has educated hundreds of people about gray water system design and construction, and built gray water systems at dozens of houses in cities across California and beyond.²

² This description is adapted from the Greywater Action website. For more information on this organization and the extensive educational work they do across California, please visit www.greywateraction.org.



Golf courses (top) and Flower Fields (center) in the City of Carlsbad are major sites for recycled water use.



The City of Carlsbad also reduces water demand by converting city athletic fields to state-of-the-art artificial turf, which incidentally also allows the fields to be used more continuously throughout the year.

Other Conservation Efforts

Some other specific water conservation efforts being implemented in the City of Carlsbad include replacing grass with artificial turf on city athletic fields at Pine Avenue, Poinsettia, Stagecoach, and Aviara community parks, and on the event area at Leo Carrillo Ranch Historic Park, and converting to automated water meters that enable leaks to be detected and fixed more quickly. In early 2010, the city adopted a water-efficient landscape ordinance to promote water conservation through design, installation and maintenance of more efficient landscape and irrigation systems. The city is currently updating its Landscape Design Manual to provide guidance to homeowners, developers, and landscape design and installation professionals on implementing more water-efficient systems in new and rehabilitated landscapes.

New Sources: Carlsbad Desalination Project

The desalination project in the City of Carlsbad is a 50-million gallon a day seawater desalination plant intended to supply the San Diego region with approximately 10 percent of its drinking water needs, and the City of Carlsbad with 90 percent of its drinking water needs.¹² The project will be the first large scale desalination plant on the West Coast and the largest of its kind in the Western Hemisphere. It will be located next to the Encina's power plant at the corner of Carlsbad Boulevard and Cannon Road. Although all required state permits have been issued, environmental groups continue to challenge the coastal development permits, and financing hurdles have pressed the San Diego County Water Authority to enter into negotiations with Poseidon Resources, the developer, on a 30-year water purchase agreement.

¹² The latest developments with regard to this project suggest the city would purchase water blended from the desalination plant and water from other sources.

3.3 Community Value: Water Quality

Definition

Water pollution degrades surface waters making them unsafe for drinking and other activities. The United States Environmental Protection Agency determined that pollutants in runoff from urban areas and construction sites are a leading cause of water quality impairment. Urban point source pollutants such as sewage and industrial waste, as well as pollution from non-point sources such as agricultural runoff and stormwater drainage, contribute to increased levels of pesticides, lead, arsenic and polychlorinated biphenyls in municipal and national water bodies. This is largely a result of impervious urban land surfaces dominated by buildings, pavement, and impaired drainage systems, thereby reducing the amount of rain and snowmelt entering underground aquifers. A typical city block generates five times more runoff than a woodland area of the same size, increasing the risk for flooding in addition to water quality degradation. Runoff pollutants such as sediment, oil, grease, toxic chemicals from motor vehicles, pesticides, lawn nutrients, viruses, bacteria, pet waste, road salts, and heavy metals enter storm drain conveyances in excessive amounts without proper biofiltration systems or natural drainages. These pollutants, coupled with thermal pollution (increased water temperatures caused by dark surfaces such as streets, roof tops and parking lots), can adversely affect native fish and aquatic life, destroy native vegetation communities, contaminate drinking water, and increase health risks in recreational areas.¹³

Key Regulatory Context

Federal Water Pollution Control Act of 1972 (Clean Water Act)

The principle federal law regulating water quality in the United States is the 1972 Federal Water Pollution Control Act, also known as the Clean Water Act. The fundamental purpose of the Clean Water Act is the protection of designated beneficial uses of water resources. The Clean Water Act establishes a system of water quality standards, discharge limitations, and permits, and requires states to adopt water quality standards to protect public health and welfare, enhance the quality of water, and serve the other purposes of the Clean Water Act. The Clean Water Act was amended in 1987 to include urban and stormwater runoff, which required many cities to obtain a National Pollutant Discharge Elimination System permit for stormwater conveyance system discharges. Section 402(p) of the Clean Water Act prohibits discharges of pollutants contained in stormwater runoff, except in compliance with a NPDES permit, as more fully described below.

Under Section 404 of the Clean Water Act, the United States Army Corp of Engineers regulates discharges of dredged or fill material into waters of the U.S., requiring issuance of a Section 404 permit. Under Section 401 of the Clean Water Act, a state water quality certification must be obtained whenever an application for a federal permit for discharge of pollutants into waters of the U.S. is submitted, such as a Section 404 permit. The Section 401 certification requires that any activity affecting waters of the U.S. be in compliance with all applicable water quality standards, limitations and restrictions.

Porter-Cologne Water Quality Act

The Porter-Cologne Water Quality Act is the principal state law enacted to establish requirements for adequate planning, implementation, management, and enforcement of water quality controls. The Porter-Cologne Act, which became Division 7 of the California Water Code, established a regulatory program to protect water quality

¹³ United States Environmental Protection Agency. "Protecting Water Quality From Urban Runoff." (February 2003, updated February 2010).

LOCAL HYDROLOGY

A community's impact on water quality is closely related to the larger hydrologic context of a region. Pollutants that enter the ground from buildings, vehicles, manufacturing process, etc., move into and through the ecosystem in accordance with the soil types, slopes, vegetation, and subsurface characteristics that are present.

The City of Carlsbad is located within the San Diego Hydrologic Region, comprising approximately 3,900 square miles and 11 major watersheds which drain into the Pacific Ocean. The city is within the Carlsbad Watershed and contains a wide range of drainage conditions due to its diverse physical geography and topography, including steep hills and low-lying coastal areas. The entire Carlsbad Watershed occupies about 210 square miles, from Lake Wohlford to the Pacific Ocean, and from the City of Vista to Cardiff-by-the-Sea.

Today, landscape treatments in the City of Carlsbad are being designed to enhance water quality in the watershed. The moat design of this drainage swale allows a substantial amount of drainage to be treated and stored safely without flooding adjacent streets or private property. Rocky elements help reduce the velocity of runoff and the potential for erosion.



and beneficial uses of all state waters, outlined the responsibilities and authorities of the nine Regional Water Quality Control Boards, and established the State Water Resources Control Board. For the San Diego Hydrologic Region, water quality is regulated by the RWQCB, Region 9 of the SWRCB. Each Regional Board is directed to create a water quality control plan, to include three main components: (1) beneficial uses which are to be protected; (2) water quality objectives which protect those uses; and (3) an implementation plan to accomplish those objectives.

San Diego Basin—Region 9, Water Quality Control Plan

In accordance with the criteria in the California Porter-Cologne Water Quality Control Act, and other pertinent state and federal rules and regulations, each RWQCB is responsible for water quality control planning within their region, often in the form of a basin plan. San Diego County falls within the jurisdiction of the Region 9 of the RWQCB. The San Diego Basin—Region 9, Water Quality Control Plan establishes standards for compliance in the San Diego Basin. The RWQCB is also responsible for implementing the provisions of the General Permit, including reviewing Storm Water Pollution Prevention Plans and monitoring reports, conducting compliance inspections, and taking enforcement actions.

San Diego Region Municipal Stormwater Permit (MS4 Permit)

The Clean Water Act amendments of 1987 established a framework for regulating stormwater discharges from municipal, industrial, and construction activities under the NPDES program. The NPDES permit program, as authorized by Section 402 of the Clean Water Act, was established to control water pollution by regulating point sources that discharge pollutants into waters of the United States. In California, the SWRCB administers the NPDES municipal storm water permitting program through the nine Regional Boards.

Pursuant to the Municipal Permit issued by the San Diego RWQCB, co-permittees are required

to develop and implement construction and permanent storm water BMP regulations addressing storm water pollution associated with private and public development projects. Development projects are also required to include BMPs to reduce pollutant discharges from the project site in the permanent design. The Municipal Stormwater Permit outlines the individual responsibilities of the co-permittees including, but not limited to, the implementation of management programs, BMPs, and monitoring programs, within their jurisdiction and their watershed(s). BMPs associated with the final design are described in the Model Standard Urban Stormwater Mitigation Plan. The County of San Diego requires a storm water management plan to describe potential construction and post-construction pollutants and identify BMPs to protect water resources.

In addition, the RWQCB's Municipal Separate Storm Sewer Systems permit requires control of hydromodification, or changes in the natural flow pattern (surface flow or groundwater) of an area due to development. Hydromodification can be managed by reducing runoff flow and volume, along with including BMPs that reduce volume.

City of Carlsbad Environmentally Sensitive Areas

The potential for pollutant transport to sensitive receiving water bodies is evaluated by determining the proximity and sensitivity of receiving water bodies using the environmentally sensitive area definitions described in the Municipal Permit. Pursuant to the definitions provided in Section F of the Municipal Permit, the City of Carlsbad contains the following ESAs:

- Buena Vista Lagoon
- Buena Vista Creek
- Agua Hedionda Lagoon
- Agua Hedionda Creek
- Encinas Creek
- Batiquitos Lagoon
- San Marcos Creek

- Encinitas Creek
- Multiple Habitat Conservation Program Biological Core and Linkage Areas
- Sensitive Vegetation Buffers as determined by the City of Carlsbad
- Areas within 200 feet of the Pacific Ocean

Local Action

The City of Carlsbad currently employs a number of measures, including Best Management Practices, to prevent pollutants and hazardous materials from entering municipal stormwater conveyance systems. As storm drains are not connected to sanitary sewer infrastructure, water conveyed to these drains are not treated prior to discharging into creeks, lagoons and the ocean. Therefore, pollutants must be reduced and/or removed before entering urban conveyance systems. The city's Storm Water Protection Program conducts inspections, monitoring, and education and outreach to the public. Through this program, the city informs residents and businesses how to prevent pollutants and other hazardous materials from entering storm drains. Preventative measures and residential BMPs include:

- Minimizing the use of lawn and garden care products such as pesticides, insecticides, weed killers, fertilizers, herbicides and other chemicals.
- Avoiding over-irrigation, which washes fertilizers and pesticides from lawns and gardens into the gutter and storm drains.
- Sweeping up yard waste and debris and dumping it in a trash receptacle. Avoid using a hose to wash off sidewalks, parking areas and garages.
- When washing a car at home, use soap sparingly and pour soapy water down the sink, not in the street.
- Taking a bag when walking pets and be sure to always clean up after them. Flush pet waste down the toilet or dispose of it in a sealed plastic bag and throw it in the trash.
- Using non-toxic products for household cleaning.

GOOD EXAMPLES IN WATER QUALITY:

Low Impact Development

Low Impact Development technologies and designs mimic natural watershed processes by replicating pre-existing hydrologic conditions on-site. Low Impact Development usually directs storm water runoff to natural vegetated systems—such as landscaped planters, swales and gardens—that reduce, filter or slow the runoff before it makes its way into the storm drainage system.

The benefits of Low Impact Development include improving treatment plant efficiency by reducing peak volumes of runoff entering the system; reducing discharge volumes; removing pollutants closer to their source; and increasing vegetation in urban environments.¹

Low Impact Development design approaches include reducing impervious surfaces (e.g., rooftop gardens, narrower streets, pervious pavement); conserving open space/maintaining groundwater recharge areas, buffer zones, and drainage courses; storing water on-site (infiltration swales, grading strategies, and open drainage systems (e.g., bioretention); and reducing and removing channelization (pipes, curbs and gutters).

Putting LID into Practice in Santa Monica, California²

In Santa Monica the objective was to reduce runoff volume and contamination from both existing properties and future developments.



To do this, Santa Monica requires all new developments and substantial remodels to submit an "Urban Runoff Mitigation Plan", and to reduce projected runoff for a project site by twenty percent. The city provides a list of recommended design elements, including, but not limited to:

- Maximize infiltration using: biofilters, green strips, swales, permeable materials in lieu of hardscapes.
- Maximize amount of runoff directed to permeable areas: Orient roof runoff toward permeable surfaces or structural BMPs; Modify grading to divert flow to permeable areas; Design curbs to minimize isolation of permeable or landscaped areas.
- Maximize storm water reuse: Use cisterns, retention structures or green rooftops to store runoff for reuse; Install BMPs to remove pollutants from runoff.
- Urban Runoff Mitigation Plan must include maintenance plan and applicant's signed statement accepting responsibility for all BMP maintenance.
- Downspouts and subsurface pipes directing storm water to the curb must be fitted with a French drain system of perforated pipe and gravel.

1 Overview adapted from material on the San Francisco Public Utilities Commission website.

2 Anne Guillette, "Achieving Sustainable Site Design through Low Impact Development Practices," Whole Building Design Guide.

The city has also developed a Jurisdictional Urban Runoff Management Program to comply with Municipal Permit Order No. R9-2007-0001 issued by the San Diego RWQCB. The JURMP serves to implement programs to reduce pollution in urban runoff, including programs to regulate new public and private land development during each of the three major phases of urban development: planning, construction, and existing development (or use) phases. BMPs are required for every land development project within the city in order to control the sources of pollutants, as well as effectively capture, filter, and treat runoff as necessary.



NRG Energy Inc. operates the Encina Power Station on the coast in the City of Carlsbad. The company wants to build a new 558-megawatt power plant along Interstate-5 near the current plant. Though the new facility is supposed to produce enough power for 400,000 homes, many city residents question whether it is an appropriate use of land at this location.

3.4 Community Value: Energy Security

Definition

In 2007, the world total primary, marketed energy consumption was 484 Quadrillion British thermal units¹⁴ (Btu) while the U.S. primary energy consumption was 102 Quadrillion Btu, about 21 percent of the world total.¹⁵ In comparison, the U.S. population—about 310 million people—represents less than 5 percent of the world population.¹⁶ Among states, California is the second largest consumer of energy, second only to Texas. However, California's per capita energy consumption is relatively low, in part due to mild weather that reduces energy demand for heating and cooling, and in part due to the government's energy-efficiency programs and standards. Petroleum and natural gas currently supply most of the energy consumed in California.

The concept of energy security is based on sensitivity to limited supplies, uneven distribution, and rising costs of fossil fuels such as petroleum and gas. Energy insecurity is most frequently described, usually in terms of U.S. vulnerability to the political or social upheaval in energy-producing countries,



New federal fuel efficiency and emission regulations will help to reduce the carbon and air quality impacts of cars in the City of Carlsbad – but they will not help with traffic.

¹⁴ A traditional unit of energy measurement; approximately the amount of energy needed to heat one pound of water 1°F.

¹⁵ U.S. Energy Information Administration: http://www.eia.doe.gov/ask/generalenergy_faqs.asp#energy_use_US

¹⁶ U.S. Department of the Census: <http://www.census.gov/population/www/popclockus.html>



Investments in new energy-efficient street lights will reduce the city's carbon footprint, and electric bill.



The City of Carlsbad is looking to solar technology to reduce energy demand from city facilities, and eventually, from households and businesses, too.

as well as U.S. vulnerability to attacks on energy distribution infrastructure, accidents, and natural disasters. Increasing energy security usually means efforts to decrease demand for energy overall, decrease demand for energy that is supplied by less politically stable nations, increase the resiliency of our national infrastructure, and increase supply of more sustainable and stable energy sources. Sustainable energy sources usually include all renewable sources, such as plant matter, solar power, wind power, wave power, geothermal power, and tidal power. It usually also includes technologies that improve energy efficiency. Energy conservation refers to efforts made to reduce energy consumption in order to preserve resources for the future and reduce pollution. Energy conservation can be achieved through increased efficient energy use, in conjunction with decreased energy consumption and/or reduced consumption from conventional energy sources.

The Community Vision targets a few specific sustainable energy approaches of particular interest to the City of Carlsbad: renewable resources, energy efficiency, conservation, and technological and business partnerships that would contribute to greater energy self-sufficiency in the region.

Key Regulatory Context

Federal Transportation Fuel Regulations

Recent federal actions have focused on transportation fuels and fuel efficiency as a way to address both energy security and climate change (See Chapter 4 for more information on climate change). New changes to Corporate Average Fuel Economy standards and greenhouse gas emission standards aim to improve technology for fuel efficiency. The standards apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards are designed to achieve a national vehicle fleet whose emissions and fuel economy performance improves year over year. The goal is to reduce CO₂ emissions by 960 million metric tons and save 1.8 billion barrels of oil over the lifetime of the vehicles sold in model years 2012 through 2016.

In a related effort, changes to the Renewable Fuel Standard program are being implemented as required by the Energy Independence and Security Act of 2007. The revised statutory requirements establish new specific volume standards for cellulosic biofuel, biomass-based diesel, advanced biofuel, and total renewable fuel that must be used in transportation fuel each year. The revised statutory requirements also include new definitions and criteria for both renewable fuels and the feedstocks used to produce them, including new greenhouse gas emission thresholds for renewable fuels.

These are examples of ways that federal action will change the energy demands in the City of Carlsbad, and they will complement efforts at the state and local level to conserve energy and transition to more renewable fuels.

Energy Star Program

Energy Star is a joint program of the U.S. Environmental Protection Agency and the Department of Energy. The program establishes criteria for energy efficiency for household products and labels energy efficient products with the Energy Star seal. Homes can be qualified as “Energy Star Homes” if they meet efficiency standards. In California, Energy Star Homes must use at least 15 percent less energy than standards set by Title 24 (whose standards are now more stringent than ever, see below), pass the California Energy Star Homes Quality Insulation Installation and Thermal Bypass Checklist Procedures, have Energy Star windows, and have minimal duct leakage.

State of California Building Energy Efficiency Standards (Title 24, Part 6)

The California Energy Commission adopted new 2008 Building Energy Efficiency Standards (Standards) effective January 1, 2010. The standards were updated for a number of reasons, including:

- To respond to Assembly Bill 32, the Global Warming Solutions Act of 2006 (See Section 4 for more on AB 32);
- To pursue California energy policy that will establish energy efficiency as the resource of first choice for meeting California’s energy needs;

GOOD EXAMPLES IN ENERGY SECURITY:

Southern California Clean Cities Coalition

The Clean Cities Program was established by the U.S. Department of Energy and designed to support locally based government/industry partnerships in the expanded use of vehicles operating on alternative fuels. The mission of the Clean Cities Program is to advance the nation’s economic, environmental, and energy security by supporting local decisions to adopt practices that contribute to the reduction of petroleum consumption. Clean Cities carries out this mission through a network of more than 80 volunteer coalitions across the country, which develop public/private partnerships to promote alternative fuels and vehicles, fuel blends, fuel economy, hybrid vehicles, and idle reduction.

An independent, non-profit corporation called The Partnership administers the Southern California Clean Cities Coalition on behalf of the Southern California Association of Governments and the South Coast Air Quality Management District. Through public/private collaboration, Southern California now has the most extensive infrastructure for electric and natural gas vehicles in the country; Smart Shuttle Transit systems are fine-tuning their operations and are running profitably in many parts of the region; Advanced Traveler Information is becoming increasingly available to everyday commuters; and more and more employers are accepting the merits of telecommuting employees.¹

¹ This description is adapted from materials on The Partnership’s Clean Cities website. For more information about the Southern California Clean Cities Coalition, please visit www.the-partnership.org/ccities.

- To act on the findings of California's Integrated Energy Policy Report that indicate Standards in general (as opposed to incentives or other mechanisms) are the most cost-effective means to achieve energy efficiency;
- To meet California's commitment to include aggressive energy efficiency measures in updates of state building codes; and
- To meet California's commitment to improve the energy efficiency of nonresidential buildings through aggressive standards.

Furthermore, Public Resources Code Section 25402.1(h)2 and Section 10-106 of the Building Energy Efficiency Standards (Standards) establish a process which allows local adoption of energy standards that are even more stringent than the statewide Standards. This process allows local governments to adopt and enforce energy standards before the statewide Standards effective date, require additional energy conservation measures, and/or set more stringent energy budgets. Local governments are required to apply to the Energy Commission for approval, documenting the supporting analysis for how the local government has determined that their proposed Standards will save more energy than the current statewide Standards and the basis of the local government's determination that the local standards are cost-effective.

Go Solar... San Diego County

"Go Solar...San Diego County" is a public-private partnership between San Diego County and the commercial banking industry that offers loans to qualified property owners at attractive rates and terms to help access financing for making energy efficient and/or solar energy improvements to homes or businesses, such as installing solar systems. Loan programs will vary based on the participating bank and the property owner's qualifications, but are generally offered in support of energy efficient improvements and/or installing solar systems to promote regional energy independence.

Local Action

The city's current energy security efforts include:

- ***Pre-Plumb for Solar Water Heating.*** The City of Carlsbad requires all new residential units to include plumbing specifically designed to allow the later installation of a system which utilizes solar energy as the primary means of heating domestic potable water. (City of Carlsbad Building Code 18.30.020)
- ***Efficient Street Lights.*** The Carlsbad City Council recently approved a project to replace more than 7,000 high-pressure sodium street-lights throughout the city with high-efficiency induction lights. The city received a \$938,900 grant from the U.S. Department of Energy, almost one-third of the total cost of the planned replacements. The project is anticipated to save nearly \$400,000 a year in energy and maintenance costs and reduce greenhouse gas emissions from city operations.
- ***Hydroelectric Power.*** The city is developing a hydroelectric power project at Maerkle Reservoir that will generate about 2 million kilowatt hours of electricity per year—or 125 percent of the Carlsbad Municipal Water District's annual consumption of electricity.
- ***Solar Power.*** The city is investigating the use of solar energy at Maerkle Reservoir and the use of solar heating at the proposed Alga Norte Pool.
- ***Hybrid Vehicles.*** Hybrid vehicles are used for 15 percent of the city's fleet. In recent years, the city has procured several hybrid vehicles as new or replacement units for the fleet. The current fleet includes Toyota Prius, Honda Civic, and Ford Escape hybrid vehicles. Procurement of hybrid vehicles is recommended in those cases where it makes economic and operational sense for the city.
- ***Favorable Financing for Energy Improvements.*** The City of Carlsbad joined the CaliforniaFIRST program to allow residents and business owners to obtain low-interest financing for energy related improvements and repay the loans through an assessment on their property tax bills. The program is voluntary, and the owners

of residential, commercial, and industrial properties in the City of Carlsbad are eligible. Along with solar electric and water-heating systems, energy efficient improvements such as dual-paned windows, tankless water heaters, and insulation are also eligible for funding under the program.¹⁷ This program is a variation on Pay as You Save projects tested elsewhere in the country, and relies on Federal Property Assessed Clean Energy financing for support. To-date, the program is actually on hold because of problems with the PACE federal financing component, but it is included here for the sake of a thorough description of city efforts.

- ***Construction of Energy-efficient Civic Facilities.*** Carlsbad City Council Policy 71 declares that the city's goal is that, "whenever practicable, and within a reasonable cost/benefit ratio, new facilities will be designed to be at least 25 percent more energy efficient than required by the State of California, Title 24 Energy Regulations". The policy calls for new city facilities to strive for LEED "Silver" certification or its equivalent and to generate a minimum of 10 percent of its energy demand onsite, whenever practicable and within a reasonable cost/benefit ratio.
- ***Energy Management.*** The city is participating in the Sustainable Region Program with the San Diego Association of Governments, California Center for Sustainable Energy, and San Diego Gas & Electric to develop energy management plans and implement cost-saving energy measures for municipal facilities.

3.5 Community Value: Recycling, Composting, and Waste Reduction

Definition

Waste is generally understood to be unwanted materials or substances, usually byproducts of a productive process. However, defining waste is not that simple. Items that some people discard have value to others. In nature there is no waste; "waste" produced by one species is invariably used as food, fuel, or shelter by another. The paradigm "cradle to cradle"¹⁸ contends that in natural systems, waste is "food." In cradle to cradle production, every element that goes into the process can be retrieved at the end of its use and become a healthy input (a "nutrient" or "food") into another production process. These material inputs and outputs are seen either as technical or biological nutrients. Technical nutrients can be recycled or reused, and biological nutrients can be composted or consumed. In the cradle to cradle model, all waste is "food" for other processes.

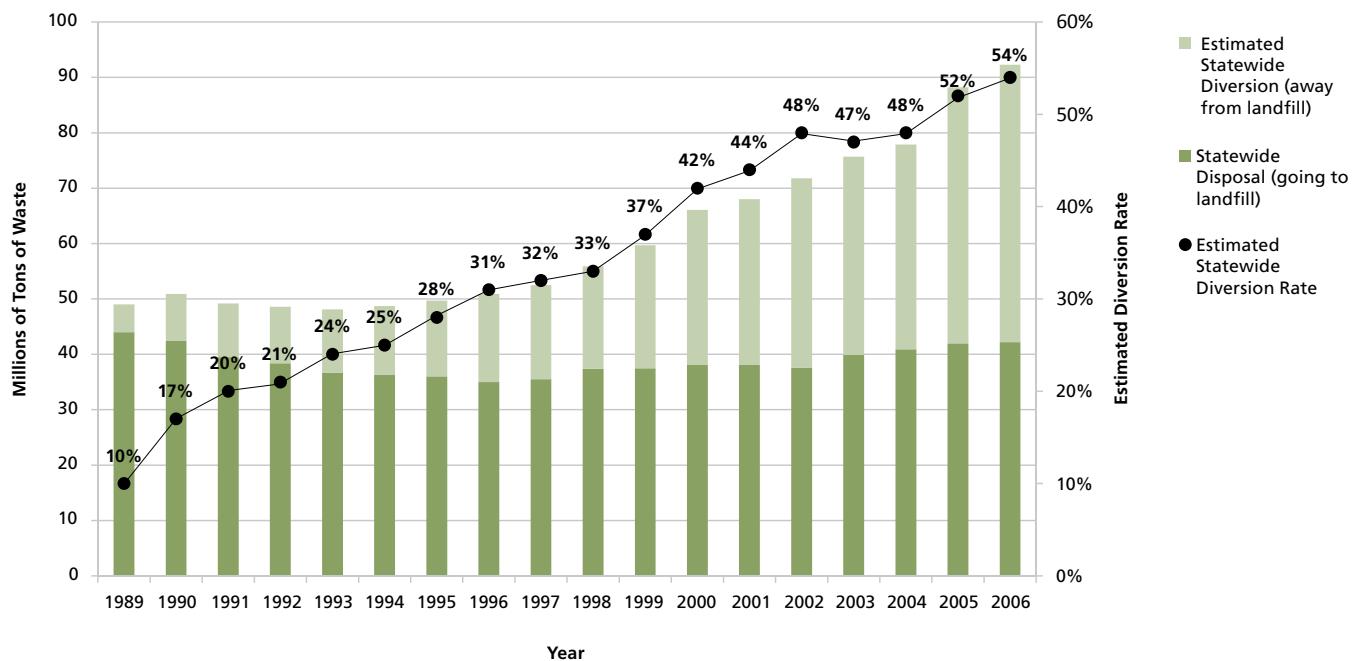
While it has been customary to use landfilling and incineration to dispose of waste, it is possible for humans to reduce, reuse, or recycle the vast majority, if not all, of our waste. Recycling and waste prevention programs reduce the energy needed to manufacture and ship resource-intensive products and packaging. Composting food and yard waste reduces the amount of methane—a greenhouse gas—produced in landfills. Communities near landfills increasingly face health consequences from air and water contamination, particularly from landfills that are poorly constructed and operated. We are finding waste and its negative effects even in places where we don't intend it to go, such as the middle of the ocean.¹⁹ As our population increases, we are simply running out of land in which to place

¹⁸ According to L. Hunter Lovins in his essay "Rethinking Production" (State of the World 2008: Innovations for a Sustainable Economy), the phrase was coined by Walter R. Stahel in the 1970s and popularized by William McDonough and Michael Braungart in their 2002 book Cradle to Cradle: Remaking the Way We Make Things.

¹⁹ Bongiorno, Lori. "New Garbage Patch Discovered in Indian Ocean," July 27, 2010: <http://tinyurl.com/27ex89z>

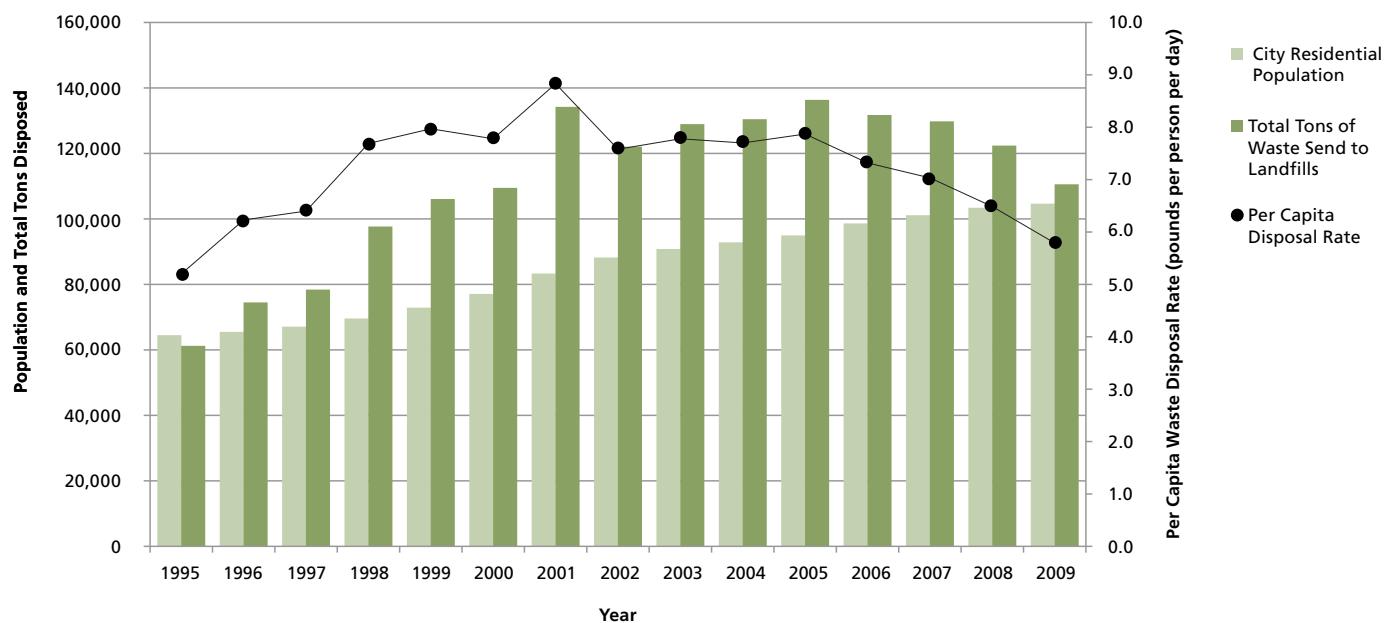
17 More information available at: <http://www.carlsbadca.gov/about/news/Pages/energy-improvements-financing.aspx>

Figure 3-1. State of California Waste Statistics, 1989-2006



Source: CalRecycle, "Statewide Waste Generated, Diverted and Disposed", historical data from statewide goal measurement prior to 2007.

Figure 3-2. City of Carlsbad Waste Statistics, 1995-2009



Source: City of Carlsbad Public Works Department, 2010.

new landfills at the same time that we are generating more waste.

Statewide, increases in the rate of recycling over the past 20 years have been largely offset by significant increases in per capita waste generation. According to the California Department of Resources Recycling and Recovery, between 1990 and 2000, waste generation increased from 51 million to 66 million tons a year in California, a 30 percent increase. At the same time, the Census Bureau only shows a 14 percent increase in population, from 29.8 million to 33.8 million. By 2006, annual waste generation had grown to 92 million tons of waste, 50 of which were being diverted and 42 sent to landfills. In 2008, Californians were sending more than 35 million tons of waste to landfills, representing a per capita disposal rate of 5.1 pounds per person per day, and an estimated diversion rate of 59 percent.²⁰

According to CalRecycle, in 2008, the City of Carlsbad sent more than 122,000 tons of garbage to nine different landfill facilities across southern and central California.²¹ That is more than a ton of garbage landfilled per person, or about 6.4 pounds of garbage per person per day, down from a high of almost 9 pounds per person per day in 2001.²² In 2009, both the City of Carlsbad and the state saw a steep decline in waste disposal. According to CalRecycle, “Effective waste management programs and economic conditions helped Californians throw away less trash than ever before in 2009. The per capita disposal rate of 4.5 pounds of trash per person per day is the lowest on record since the department began tracking statewide waste disposal in 1995. However, drops in personal income and consumption suggest the recession is the primary driver of the reduced numbers.”²³

²⁰ CalRecycle “California’s 2008 Per Capita Disposal Rate.”

²¹ CalRecycle Jurisdiction Profiles.

²² Uses California Department of Finance 2009 revised population estimate for 2008.

²³ CalRecycle Press Release, “California Trash Disposal Reached Record Low in 2009: Economic Factors, Effective Waste Management Programs Credited With Decline” July 2010.

Key Regulatory Context

Integrated Waste Management Act

In 1989, California enacted the Integrated Waste Management Act, which required all cities and counties to implement programs to reduce landfill tonnage by 25 percent by the end of 1995, and 50 percent by the end of 2000. The City of Carlsbad met the 50 percent requirement nine out of 12 years from 1995-2006. A proposed amendment to the Integrated Waste Management Act would require CalRecycle to adopt programs to increase statewide diversion to 75 percent by 2020.

Per Capita Disposal Measurement System (Chapter 343, Statutes of 2008)

The purpose of the new per capita disposal measurement system is to make goal measurement as established by the Integrated Waste Management Act simpler, more timely, and more accurate. The new disposal-based indicator—the per capita disposal rate—uses only two factors: a jurisdiction’s population (or in some cases employment) and its disposal as reported by disposal facilities.

Local Action

The city’s current recycling, composting, and waste reduction efforts include:

- **Subsidized Compost Bins.** The city offers to households subsidized compost bins through the Solana Center for Environmental Innovation.
- **Green Purchasing.** The city is increasing its use of environmentally friendly materials, such as 30 percent recycled content paper and more environmentally friendly cleaning products. The city also recycles office products, such as ink cartridges, reuses motor oil, and purchases building materials containing recycled asphalt, recycled concrete, and rubberized asphalt.
- **Fleet Operations.** Fleet operations procures recycled oil and other automotive fluids, and recycles fluids, metals, and other fleet materials to reduce waste.

- **Other Waste Reduction Programs.** The city has several programs that promote recycling and proper disposal of bulky items and hazardous waste, for residents and city employees. These programs include:
 - Curbside recycling and green yard waste pick up for residents.
 - Clean up events at city trails, parks, beaches, and lagoons.
- Collection events that make it convenient for residents to properly dispose of household hazardous waste.
- Bulky item pick-up services.
- Door-to-door hazardous material pick-up service.
- Using reusable water bottles, double siding copies, single-stream recycling, and composting at city facilities.

GOOD EXAMPLES IN WASTE REDUCTION:

Waste Conversion Technology Development in Southern California

The Southern California Conversion Technology Demonstration Project aims to educate Californians about solid waste challenges; support organizations working toward a zero-waste future; evaluate and promote the development of the most promising conversion technologies; and work with communities in Southern California to create a demonstration conversion technology facility.¹ The Los Angeles County Department of Public Works has for a decade been actively developing environmentally-sound alternatives to landfilling and waste-to-energy that would convert post-recycled residual solid waste into useful products, green fuels, and clean, renewable energy. Technologies explored include biological, thermal, chemical, and mechanical processes, but not waste-to-energy (combustion). Public agencies and universities have studied air emissions from these non-combustion conversion technologies and concluded that they are capable of operating within regulatory limits.² More than 130 commercial facilities, processing a wide variety of waste streams, operate in Europe and Asia as a safe and clean alternative to traditional waste management practices such as landfilling or waste-to-energy.³

Furthermore, in a 2007 staff report, the California Integrated Waste Management Board described several hypothetical waste management scenarios for a projected amount of waste generated in the year 2010, and found that compared to alternative management scenarios, conversion technology scenario ranged from two times lower net energy consumption compared to waste-to-energy, to 11 times lower net energy consumption compared to landfill without energy recovery.⁴

¹ For more information about the Southern California Conversion Technology Demonstration Project, please visit www.socalconversion.org.

² University of California Riverside, "Evaluation of Emissions from Thermal Conversion Technologies Processing Municipal Solid Waste and Biomass", June 21, 2009.

³ Southern California Conversion Project, Conversion Technology Environmental Factsheet.

⁴ California Integrated Waste Management Board, Staff Report to the Board: "New and Emerging Conversion Technologies", 2007.

3.6 Community Value: Healthy and Sustainable Food

Community leaders and residents recognize that the City of Carlsbad will likely never be food-self-sufficient, however, this working paper acknowledges the importance community members place on having access to local, healthy foods, supporting local and regional food production, and “cultivating” a food system that in turn supports other social, economic, and environmental community values.

Definition

Much like green development, the concept of a sustainable food system crosses over many different sustainability issues. For example, in the U.S., obesity and diet-related chronic disease rates are escalating; public health is threatened by rising antibiotic resistance; chemicals and pathogens contaminate food, air, soil, and water; and natural resources such as fresh water and prime farmland are being depleted. These threats have human, social, and economic costs that are growing, cumulative, and unequally distributed. Interestingly, these issues all relate to the food system—what we eat and how it is produced.²⁴

In some communities, healthy food access is a big issue, particularly where there are challenges to both physical proximity and affordability. Residents in communities with a more “imbalanced food environment” (where fast food restaurants and corner stores are more convenient than grocery stores) have more health problems and higher mortality than residents of areas with a higher proportion of grocery stores, other factors held constant.²⁵ On the other side of that coin, the presence of a supermarket in a neighborhood is linked to higher fruit and vegetable consumption and a reduced prevalence of



The City of Carlsbad has numerous existing resources to support a healthy, sustainable food system, including farmers' markets (top), local agricultural businesses (center), and a community garden (bottom).

²⁴ American Public Health Association Policy Statement, "Toward a Healthy, Sustainable Food System", 2007, paraphrased.

²⁵ Mari Gallagher Research and Consulting Group, Examining the Impact of Food Deserts on Public Health in Chicago (July 2006).

overweight and obesity.^{26,27} In low-income neighborhoods, each additional supermarket has been found to increase residents' likelihood of meeting nutritional guidelines by one-third.²⁸

In terms of local nutrition, the San Diego county-wide average percent of children overweight for their age was only 8.8 percent, compared to a California average of 11.2 percent.²⁹ In other similar indicators (e.g. adult overweight, prevalence of breastfeeding), San Diego County generally performs better than the state overall, though local city data are not always available.

Notably, the Community Vision for sustainable food does not focus on nutrition per se, but rather support of local agriculture, farmers' markets, and eating local. These objectives touch on community concerns about other issues such as environmental quality, local economic development, neighborhood revitalization, and community connectedness. A sustainable food system perspective is particularly suited to approach "food" from all these angles, by looking at the wider picture and targeting several areas of influence, encompassing direct food access and quality, but also touching on production (farms and gardens), procurement (markets, stores, and city policies), transport (shipping methods and fuels, packaging, and other factors), and both consumer and business decision-making.

Key Regulatory Context

Federal Child Nutrition Legislation

In August 2010, the U.S. Senate passed the Healthy, Hunger-Free Kids Act. If signed into law, the bill will

²⁶ Inagami, S., et al., "You Are Where You Shop: Grocery Store Locations, Weight, and Neighborhoods", Vol. 31, Issue 1, American Journal of Preventative Medicine, at 10-17 (2006). See also K. Morland et al., "Supermarkets, Other Food Stores, and Obesity: The Atherosclerosis Risk in Communities Study", Vol. 30, Issue 4, American Journal of Preventative Medicine, at 333-339 (2006).

²⁷ Sturm, R., and A. Datar, "Body Mass Index in Elementary School Children, Metropolitan Area Food Prices, and Food Outlet Density", Vol. 119, Public Health, at 1059-1068 (2005).

²⁸ Morland, K., et al., "The Contextual Effect of the Local Food Environment on Residents' Diet", Vol. 92, Issue 11, American Journal of Public Health, at 1761-1768 (November 2002).

²⁹ California Food Policy Advocates, "2010 County Nutrition and Food Insecurity Profiles."

provide \$4.5 billion over ten years to federal child nutrition programs, namely, school lunches. The bill aims to reform school lunch through two main changes: increasing the number of kids who can receive free or reduced-cost meals, and improving the quality of the food served. Next, the U.S. House of Representatives must vote on its version, the Improving Nutrition for America's Children Act.

San Diego County 10-Year Health Strategy Agenda

In July 2010, San Diego County launched a 10-year Health Strategy Agenda.³⁰ Part of the Health Strategy Agenda is the "3-4-50" concept. Throughout the nation and locally, three behaviors—poor nutrition, lack of exercise, and tobacco use—are the three main causes that lead to four diseases: heart disease/stroke, cancer, type 2 diabetes and respiratory conditions, such as asthma, which account for more than half of the deaths in San Diego County.

The County Plan focuses on four major strategies:

- **Building a Better System** focuses on how the County delivers services and how it can further strengthen partnerships to support health. An example is putting physical and mental health together so that they are easier to access.
- **Supporting Healthy Choices** provides information and educates residents so they are aware of how choices they make affect their health. The plan highlights chronic diseases because these are largely preventable and we can make a difference through awareness and education.
- **Pursuing Policy Changes for a Healthy Environment** is about creating policies to support recommended healthy choices.
- **Improving the Culture from Within.** The County has a responsibility to educate and support its workforce so employees "walk the talk." Simply said, change starts with the County.

³⁰ http://www.sdcounty.ca.gov/hhsa/programs/sd/health_strategy_agenda/index.html

GOOD EXAMPLES IN SUSTAINABLE FOOD:

Diverse Approaches to Urban and Sustainable Food

Community Supported Kitchens. Community Supported Kitchens are the next evolution of Community Supported Agriculture—transforming local, healthy, sustainable foods into meals or meal supplements that are “ready for the table.” CSKs can offer a weekly pick-up box of prepared foods; often the prepared foods are not necessarily meals but rather a variety of sides or meal supplements. Examples of CSKs include Three Stone Hearth (Berkeley), Salt, Fire & Time (Portland, OR), and Local Sprouts Cooperative (Portland, ME). The Local Sprouts Cooperative, the first CSK on the East Coast, recently opened a community supported café, in addition to classes and catering. Paying and working members receive credits and discounts towards café and catered food, classes, and other purchases. By opening a cafe that serves breakfast, lunch, and dinner, Local Sprouts increases their kitchen’s role as a community meeting place and helps to build relationships between local farmers, food producers, and local food consumers.¹

Urban Foraging. Another emerging trend in urban sustainable food systems is urban foraging. In this model, city residents look around at the plants that make up the “green space” throughout the community, identify edible plants (usually fruit-bearing trees), and harvest their fruit as a local, healthy food source. Featured in a 2009 article in the New York Times, these productive partnerships and networks are growing all over the country. Websites such as neighborhoodfruit.com and veggietrader.com are designed specifically to help connect community members to sources of fruit and vegetables in their neighborhoods, either through databases of trees on public lands, or co-ordinated “swaps” between households with produce to share. Local food foraging resources, such as those mapped by www.fallenfruit.org (Los Angeles), can be a way to support community connections as well as healthful eating habits.²

1 Sabina, Ellen, “Sustainable Food in Action: Community Supported Kitchens”, JustMeans, accessed August 30, 2010.

2 Severson, Kim, “Neighbor, Can You Spare a Plum?” New York Times, June 9, 2009.

Local Action

The city's current sustainable food activities include:

- The Carlsbad Village Business Association holds a farmers' market every Wednesday and Saturday.
- The City of Carlsbad has a community garden.
- The Agricultural Conversion Mitigation Fee Grant Program provides funding to support local agriculture.
- Underutilized city-owned land is leased to farmers as an interim use.
- The city permits agricultural roadside stands.
- Other city policies and ordinances that support local agriculture include Proposition D, and various existing General Plan and Local Coastal Program policies.

4 Climate Change and Sustainability



While not explicitly emphasized in the Vision, the issue of climate change is closely related to other sustainability priorities (e.g. energy security, water conservation, green development), and much of the wider state and national legal and funding framework is couched in terms of efforts to both mitigate and adapt to climate change. This working paper introduces some of the main concepts underpinning climate change, and connects those to other sustainability issues of concern to the City of Carlsbad.

4.1 Climate Change

Climate change refers to a change in the average global climate that may be measured by wind patterns, storms, precipitation, and temperature. The term climate change is often used interchangeably with the term global warming. Global warming refers to an average increase in the temperature of the atmosphere near the Earth's surface, which can contribute to changes in global climate patterns. However, rising temperatures are just one aspect of climate change.³¹

Among scientists, global climate change is now a widely accepted phenomenon. National and international science academies and scientific societies have assessed the available evidence and largely followed or endorsed the Intergovernmental Panel on Climate Change position of January 2001 which states: "An increasing body of observations gives a collective picture of a warming world and other changes in the climate system... There is new and stronger evidence that most of the warming

observed over the last 50 years is attributable to human activities." To-date, no scientific body of national or international standing has maintained a dissenting opinion; the last was the American Association of Petroleum Geologists, which in 2007 updated its 1999 statement rejecting the likelihood of human influence on recent climate with its current non-committal position.

While scientists are certain that human activities are changing the composition of the atmosphere and that increasing concentrations of greenhouse gases (defined on next page) will change the planet's climate, they are less certain about how much the climate will change, at what rate it will change, precisely how much of the change is related to human activities, or what the exact global, or even regional, effects will be. Considering available evidence, the IPCC³² reached consensus that global climate change is "very likely" caused by humans, and that hotter temperatures and rising sea levels will continue for centuries no matter how much humans control their future emissions. In particular, human influences have:

- *very likely* contributed to sea level rise and increased storm surge during the latter half of the 20th century;
- *likely* contributed to changes in wind patterns, affecting extra-tropical storm tracks and temperature patterns;

³² The Intergovernmental Panel on Climate Change (IPCC) is a scientific intergovernmental body set up by the World Meteorological Organization (WMO) and by the United Nations Environment Programme (UNEP). Its role is to assess on a comprehensive, objective, open and transparent basis the latest scientific, technical and socio-economic literature produced worldwide relevant to the understanding of the risk of human-induced climate change, its observed and projected impacts, and options for adaptation and mitigation.

³¹ U.S. Environmental Protection Agency, Climate Change Indicators in the United States, April 2010.

- *likely* increased temperatures of extreme hot nights, cold nights and cold days;
- *more likely* than not increased risk of heat waves, area affected by drought since the 1970s, and frequency of heavy precipitation events.³³

As the above statements suggest, scientific knowledge is about probabilities rather than certainties. Scientists are aware that new data may overturn old theories and that human knowledge is constantly evolving. Whether resulting from natural factors, natural processes, and/or human activities, climate changes have the potential to impact both human and ecological systems.

4.2 Potential Climate Change Effects

Many components of society and ecosystems are sensitive to climatic variability, including human health, agriculture, coastal zones, and the natural environment. Scientists acknowledge that some parts of the globe would benefit, at least in the short-term, from climate change. Some high northern latitudes could experience less extreme cold and a longer growing season for crops. In addition, the higher concentrations of carbon dioxide in the atmosphere will boost growth of some important crops, and given adequate water and nutrients, will bring higher yields. The U.S. Environmental Protection Agency recently published a report summarizing indicators presenting evidence that the composition of the atmosphere is being altered as a result of human activities and that the climate is changing. They also illustrate a number of effects on society and ecosystems related to these changes, as well as those areas where uncertainty remains about the causes and the magnitude of effects. The EPA's indicators of climate change include:

Greenhouse gases: the amount of greenhouse gases emitted into the atmosphere through human activities, the concentrations of these gases in the

atmosphere, and how emissions and concentrations have changed over time.

Weather and Climate: frequency of heat waves; increased drought conditions; increased average precipitation and shifting weather patterns; and the intensity of tropical storms.

Oceans: increased ocean heat affecting water temperature, sea level, and currents; changes in sea level; increased ocean acidity affecting marine organisms.

Snow and Ice: reduced Arctic sea ice; diminished glaciers; decreased time that lakes stay frozen; decreased snow cover and snowpack.

Society and Ecosystems: heat-related illnesses; increased length of growing season reflecting earlier spring warming and later fall/winter frosts; shifts in plant hardiness zones reflecting higher winter temperatures; changes in bird migration patterns as a result of temperature variability.³⁴

Research has also been done specific to California. Along the California coast, sea levels have risen by as much as seven inches over the last century, resulting in eroded shorelines, deterioration of infrastructure, and depletion of natural resources.³⁵ California's water supply is threatened due to prolonged drought and increased demands from growth. Less precipitation, premature runoff of snowpack and rainwater, and restrictions on the Colorado River and the Bay-Delta in Northern California have increased the pressure on the state's water supplies.

In 2009, the California Natural Resources Agency published an adaptation strategy to assess the state's vulnerability to climate change and identify possible solutions that can be implemented to minimize these threats. Similarly, the State of California Lands Commission released a report related to sea level preparedness in California, which summarized the efforts of California, federal agencies, and other coastal states to address sea level rise and

³³ Intergovernmental Panel on Climate Change. Summary for Policy-makers. In: Climate Change 2007: Synthesis Report. Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, November 2007.

³⁴ Supra note 31.

³⁵ California Natural Resources Agency, 2009 California Climate Adaptation Strategy.

provided recommendations to reduce the impacts of sea level rise on California's communities. The San Diego Association of Governments has prepared climate change adaptation white papers and a regional climate action strategy to both outline strategies for adaptation and mitigation of climate change effects.

A regional issue in the news recently concerns several sustainability issues, including water supply, energy security, and climate change effects. In the North County Times on September 11, 2010, Eric Wolff reported that falling water levels in Lake Mead might threaten the hydroelectric power supply coming from Hoover Dam, which currently provides cheap electricity for the Metropolitan Water District of Southern California (60 percent of its portfolio) and Southern California Edison (less than 1 percent of its portfolio). According to the article, experts disagree as to whether the falling water level is the result of a short-term drought or rather longer-term variation that may return the lake to an historic, lower water level. Climate change, while not the cause, was described as having the potential to exacerbate the problem, particularly under the latter scenario. With such a valuable resource, however, government agencies are actively developing solutions, including replacing the turbine with ones that work with lower water levels, and reducing water and electricity demand on the system.

4.3 Greenhouse Gases

Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs). Global temperatures are regulated by the accumulation of naturally occurring GHGs, which include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and water vapor. While human activities also produce these naturally-occurring gases, other GHGs such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6) are created and emitted solely through human activities.

Human activities have elevated atmospheric GHG concentrations beyond naturally-occurring levels. CO_2 , CH_4 , and N_2O are the most common GHGs

that result from human activity, although fluorinated gases—less common—have a much more powerful greenhouse effect, also known as global warming potential. The global warming potential of GHGs is expressed in terms of CO_2 equivalents (CO_2e) and is typically quantified in metric tons (MT) or millions of metric tons (MMT).

Energy-related activities account for three-fourths of human-generated GHG emissions, and include electricity production, transportation, the treatment and transportation of water, and industrial processes such as producing construction materials and managing waste, to name a few. The EPA finds that electricity generation is the largest source of GHG emissions in the United States, followed by transportation.

According to the EPA, the U.S. produced almost 7,000 MMT CO_2e GHG emissions in 2008, an increase of approximately 14 percent from 1990 levels. Between 1990 and 2000, the U.S population increased by about 1.2 percent a year on average, while GHG emissions rates increase by 1.4 percent per year.³⁶ According to the Energy Information Administration, the U.S was responsible for about 20 percent of the world's energy-related GHG emissions in 2006 (about 19 tons per capita), while China's was 21 percent (about 5 tons per capita).³⁷ Figure 4-1 illustrates U.S. GHG emissions in 2008 by economic sector as a percentage of total GHG emissions.

According to the California Air Resources Board, California produced about 478 MMT of CO_2e GHG emissions in 2008, an increase of approximately 10 percent from 1990 levels, which is less than the U.S. average increase over the same period. A history of strong emissions regulations mean that California produces only about 7 percent of total U.S. GHG emissions even though the state has about 12 percent of the U.S. population. Figure 4-2 illustrates California's 2008 GHG emissions by economic sector as a percentage of total GHG emissions.

³⁶ Congressional Research Service Report for Congress: Greenhouse Gas Emission Drivers: Population, Economic Development and Growth, and Energy Use, Updated February 13, 2008.

³⁷ U.S. Energy Information Administration, Emissions of Greenhouse Gases Report, Report #: DOE/EIA-0573(2008).

Figure 4-1. U.S. GHG Emissions (2008) by Economic Sector

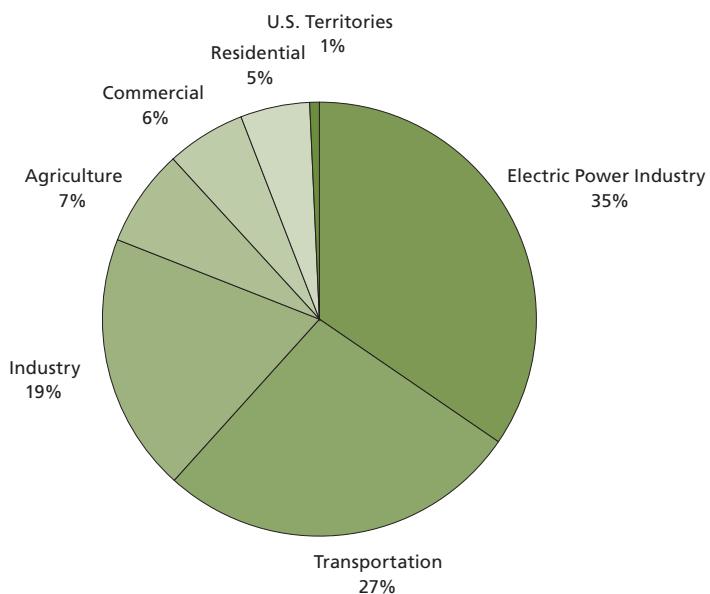
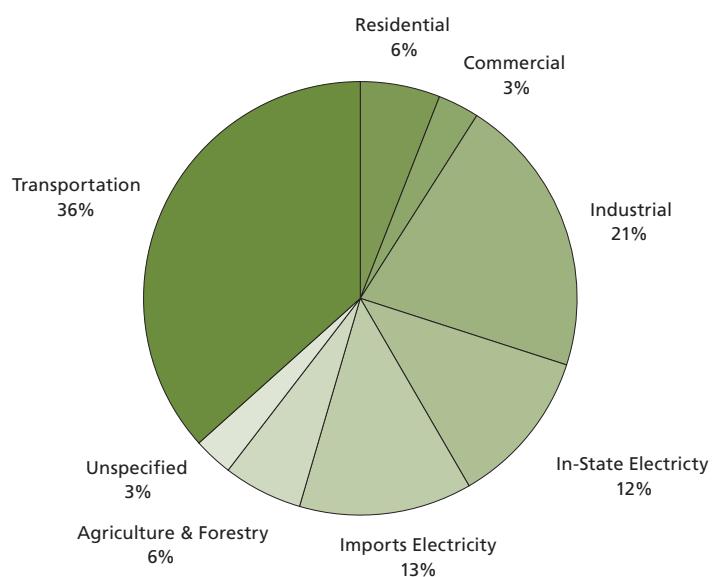


Figure 4-2. California GHG Emissions (2008) by Economic Sector



4.4 Key Regulatory Context

Federal Regulations

The EPA has issued regulatory actions under the Clean Air Act, Energy Policy Act, Energy Independence and Security Act, and other statutory authorities to address issues related to climate change. In the 2008 U.S. Supreme Court decision Massachusetts v. EPA, the Court found that the Clean Air Act authorized the EPA to regulate tailpipe GHG emissions if EPA determined they caused or contributed to air pollution that endangered public health or welfare. Since then, the EPA has developed and implemented regulations to reduce GHG emissions by using renewable fuels through the Renewable Fuels Standard program created under the Energy Policy Act of 2005; issued several rulings related to motor vehicles emissions and GHG emissions reporting; and even granted a waiver of Clean Air Act preemption to California for the State's GHG emission standards for motor vehicles beginning with the 2009 model year.

On April 1, 2010, the EPA and the National Highway Traffic Safety Administration announced a final joint ruling to establish a national program to reduce GHG emissions and improve fuel economy for new cars and light-duty trucks sold in the U.S. The standards are designed to achieve a national vehicle fleet whose emissions and fuel economy performance improves year over year. The goal is to reduce CO₂ emissions by 960 MMT and save 1.8 billion barrels of oil over the lifetime of the vehicles sold in model years 2012 through 2016. The EPA and NHTSA are expected to expand upon this by developing fuel efficiency and GHG emissions standards for commercial trucks and light-duty vehicles. More recently, on May 13, 2010, the EPA issued a final rule establishing thresholds for GHG emissions that define when certain permits are required for new and existing industrial facilities. This ruling affects the nation's largest GHG emitters (i.e., power plants, refineries, and cement production facilities).

State of California Regulations

California has enacted a set of executive orders, legislation, policies, and programs intended to work together to reduce the state's contribution to global emissions of GHGs. These efforts set forth goals for reductions of GHG emissions, increasing the Renewable Portfolio Standard for the state's electric utilities, requiring state agencies to develop adaptation plans to prepare for the future impacts of global climate change on California's resources, and facilitating development of alternative energy sources. Key state actions are described below.

California's GHG Emissions Reduction Targets

Executive Order S-3-05 (Gov. Schwarzenegger, June 2005) recognizes California's vulnerability to climate change, noting that increasing temperatures could potentially reduce snow pack in the Sierra Nevada, which is a primary source of the state's water supply. Additionally, this Order acknowledges that climate change could influence human health, coastal habitats, microclimates, and agricultural yield. The Governor thus set greenhouse gas emissions reduction targets for California, as follows:

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels;
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

California Global Warming Solutions Act of 2006

The California Global Warming Solutions Act of 2006 (Chapter 488, Statutes of 2006, also known as Assembly Bill (AB) 32) directed the California Air Resources Board to perform numerous tasks aimed at achieving the state's reduction targets, including approving a statewide GHG emissions estimate that is equivalent to the 1990 GHG emissions level to be achieved by 2020. As the roadmap for achieving AB 32's reduction goals, the CARB Scoping Plan outlined the combination of policies, programs, and measures necessary to reduce statewide GHG

emissions to 1990 levels by 2020, the equivalent of reducing emissions by 15 percent below current levels and 30 percent below projected business-as-usual levels in 2020. Many of the measures would, when implemented, contribute to emission reductions statewide as well as in local communities.

Since the Scoping Plan was adopted in December 2008, CARB has published early action GHG emission reduction measures that could be implemented prior to the adoption of statewide GHG limits and other measures necessary to achieve the state's established limits. CARB has also adopted regulations to implement the early action reduction measures. CARB continues to adopt measures outlined in the Scoping Plan and is in the process of preparing rules to implement these measures. CARB is expected to complete this task by January 1, 2011, with all resulting regulations becoming effective no later than January 1, 2012.

Proposition 23, which would suspend AB 32, is a ballot initiative on the November 2010 ballot in California. If passed, the initiative would require the state to abandon the implementation of AB 32 until California's unemployment drops to 5.5 percent or less for four consecutive quarters. The suspension would include abandoning state GHG reduction programs related to increased renewable energy and cleaner fuel requirements, as well as mandatory emission reporting and fee requirements for major polluters such as power plants and oil refineries. Should the voters pass Proposition 23, the city could continue to make GHG reductions; however, the timeframe to achieve targets would not be required as currently proposed by AB 32.

Sustainable Communities and Climate Protection Act of 2008

The Sustainable Communities and Climate Protection Act of 2008 (Chapter 728, Statutes of 2008, also known as Senate Bill (SB) 375) promotes better integration of transportation and land use planning throughout California. The statute was intended to complement efforts under AB 32 by requiring CARB to develop regional GHG emission reduction targets for passenger vehicles. CARB was tasked with establishing targets for the years 2020 and 2035 for

each region covered by the state's 18 federally-designated metropolitan planning organizations, which in turn would be required to meet that target by considering the impacts of land use and transportation on GHG emissions. CARB recently released its proposed regional GHG emission reduction targets for cars and light trucks in August 2010. The targets are anticipated to be adopted on September 23, 2010.

Pursuant to SB 375, each of California's MPOs must prepare a Sustainable Communities Strategy outlining how the region will meet its GHG reduction target by integrating land use planning, transportation planning and funding, and housing needs. The SCS will be incorporated into the regional transportation plan, typically prepared by each MPO every 4 to 5 years. CARB is required to review each SCS to determine whether it would achieve the necessary GHG emission reduction for each region. SB 375 sets new requirements for coordinating the RTP process with the regional housing needs allocation and housing element update processes, and also provides incentives for implementation by establishing new California Environmental Quality Act streamlining opportunities. SANDAG, as the MPO for the San Diego region, is responsible for the San Diego region SCS, and is currently developing its first RTP to include a SCS pursuant to SB 375.

California Environmental Quality Act and Guidelines Amendments

Senate Bill 97 (Chapter 185, Statutes of 2007) amends the California Environmental Quality Act statute to say GHG emissions and the effects of GHG emissions are appropriately analyzed under CEQA. Pursuant to SB 97, the Governor's Office of Planning and Research prepared amendments to the CEQA Guidelines in a public process, and the California Natural Resources Agency adopted the proposed amendments in December 2009. The amendments became effective March 18, 2010.

Other Key California Regulations and Executive Orders

Global Climate Impacts and Sea Level Rise Executive Order (2008). Executive Order S-13-08 (Gov. Schwarzenegger, November 2008) directs state agencies to take specified actions to assess and plan for global climate change impacts, particularly sea level rise.

Renewable Energy Executive Order (2008). Executive Order S-14-08 (Gov. Schwarzenegger, November 2008) requires that all retail suppliers of electricity in California serve 33 percent of their load with renewable energy by 2020. Furthermore, the order directs state agencies to take appropriate actions to facilitate reaching this target. Pursuant to a Memorandum of Understanding between the CEC and Department of Fish and Game creating the Renewable Energy Action Team, these agencies will create a "one-stop" process for permitting renewable energy power plants.

Low Carbon Fuel Standard Executive Order (2007). Executive Order S-1-07 (Gov. Schwarzenegger, January 2007) set a declining Low Carbon Fuel Standard for GHG emissions measured in CO₂e grams per unit of fuel energy sold in California. The target of the standard is to reduce the carbon intensity of California passenger vehicle fuels by at least 10 percent by 2020.

Local Electric Utilities Emission Standards (2006). Senate Bill 1368 (Chapter 598, Statutes of 2006) requires the California Energy Commission to develop and adopt regulations for GHG emissions performance standards for the long-term procurement of electricity by local publicly-owned utilities.

California Renewables Portfolio Standard Program (2002). Senate Bill 1078 (Chapter 516, Statutes of 2002) established the Renewables Portfolio Standard program, which requires an annual increase in renewable generation by the utilities equivalent to at least 1 percent of sales, with an aggregate goal of 20 percent by 2017. This goal was subsequently accelerated, requiring utilities to obtain 20 percent of their power from renewable sources by 2010.

4.5 City of Carlsbad Climate Change Initiatives

The City of Carlsbad recognizes that government operations and community activities contribute to GHG emissions, which may adversely affect city businesses and residents. The city also understands that local government plays a key role in both reducing GHG emissions, as well as adapting to the potential effects of climate change.

The city has taken a proactive approach to creating a sustainable and healthy quality of life in the City of Carlsbad by balancing social, economic, and environmental needs of the community. The city's efforts toward environmental sustainability include, but are not limited to, the efficient use of non-renewable resources, stewardship of natural and constructed open spaces, development of drought resistant water supplies, reduction in the city's waste stream, and clean air and water. Specific examples of the city's efforts are as follows:

- ***Vehicle Fleet Operations.*** Hybrid vehicle purchases (described in Section 3.3).
- ***Renewable Energy.*** The hydroelectric power project at Maerkle Reservoir (described in Section 3.3).
- ***Water Conservation.*** Conservation programs to reduce water demand and dependency on imported water supplies and adoption of a drought response plan and water conservation program through city Ordinance No. 44 on January 6, 2009 (described in Section 3.2).
- ***High Efficiency Streetlights.*** Replacement of more than 7,000 high-pressure sodium streetlights throughout the City of Carlsbad with high-efficiency induction lights that would use half the electricity of the existing lights (described in Section 3.3).
- ***Energy Management.*** Participation in the Sustainable Region Program with the SANDAG, California Center for Sustainable Energy, and San Diego Gas & Electric to develop energy management plans and implement cost-saving energy measures for municipal facilities. The city was the initial agency collaborating

TECHNIQUES FOR REDUCING GHGs IN THE CITY OF CARLSBAD:

Measures that the city can implement to reduce GHG emissions from government operations include increasing energy efficiency in buildings and facilities, improving the efficiency of vehicle fleets, expanding renewable energy sources, reducing government-generated waste, and addressing land use and transportation planning in terms of "smart growth" concepts. Local government actions can also have broad influence over community activities that generate GHGs, including new construction and building retrofits, alternative transportation and parking options, utilization of renewable energy, water conservation and demand reduction, and citywide waste management programs.

GOOD EXAMPLES IN CLIMATE CHANGE PLANNING:

Southern California Climate Action Plans

Other Southern California communities are working on climate action planning efforts, including: the City of Chula Vista, which developed a Carbon Dioxide Reduction Plan in 2000, identified measures to mitigate climate change impacts by reducing GHG emissions in 2008, and is currently drafting a climate adaptation plan; and the City of San Diego which is working to implement a 2005 climate action plan and update its sustainability policies. Other Southern California agencies that have or are in the process of developing mitigation and adaptation plans include, but are not limited to, the City of Santa Monica, City of Irvine, City of Encinitas, County of San Diego, County of Santa Barbara, Port of Long Beach, Port of Los Angeles, and Port of San Diego.

with SANDAG, CCSE, and SDG&E when the Sustainable Region Program Pilot launched in 2005. Today, the city is one of five member agencies involved in the program to identify energy management roadmaps and implement cost-saving energy measures for their particular agencies. Since the pilot program, the city has saved 489,571 kilowatt-hour (kWh) in energy consumption through local energy efficiency programs like the CCSE Tax Exempt Customer program.³⁸ City Council Policy 71 became effective July 1, 2006, to implement the city's Energy Conservation and Management Program.

- **Waste Reduction and Recycling.** Development of a green purchasing policy (described in Section 3.4).
- **Energy Partnerships.** At the state level, working with the Attorney General's office to effect legislation that would advance the California Solar Initiative and other solar financing options. At the local level, partnering with SDG&E to assist residents in energy audits and participating in demand response programs that commit the city to reducing its electric use during periods of peak demand such as hot summer days.
- **Environmental Resources Management Team.** Created in January 2007 and comprised of city staff, this team coordinates management of several city environmental initiatives, including preparing a list of reduction measures for the desalination project to incorporate into its carbon mitigation plan, analyzing solar opportunities in the city, researching regarding hydroelectric benefits, and working to develop the local government protocol.
- **Climate Action Planning.** Conducted a 2005 GHG emissions baseline inventory for municipal operations (of which the city has direct control) and community activities (excluding the airport and powerplant). The city utilized this baseline to identify GHG emission sources and opportunities to improve operations not only to reduce GHG emissions, but also to invest in more energy efficient programs and partnerships.

³⁸ SANDAG, SANDAG Sustainable Region Program Action Plan—Consultant Report. December, 2009.

Examples of the city's actions to reduce energy consumption include installing complete HVAC systems in all city-owned buildings (occupied by at least 15 people) in order to establish automatic and manual climate controls and rezone the control center and measuring energy consumption by use in order to monitor energy spikes at city facilities and adjust energy load settings.

- ***Climate Adaptation Planning.*** The city identified three primary effects of a changing climate that are particular threats to the City of Carlsbad: drought, fire, and rising sea level. Some of the city's current efforts to adapt to these effects of climate change include, but are not limited to, actively pursuing desalination opportunities, investing in a recycled water system that provides 20 percent of the city's water supply, requiring Class I fire-resistant roofs, enforcing a strict fire code and 100-foot setbacks on fire breaks, resisting development within the 100-year floodplain, and modeling the effects of inundation up to 18 feet to identify areas of the city that could be threatened by sea level rise.

The city is currently considering next steps in climate action planning for the City of Carlsbad. The 2005 GHG emissions baseline inventory would serve as a point of reference and comparison for evaluating "business as usual" against the performance of measures to reduce GHG emissions in the future. Beyond the inventory, climate action planning would likely include quantitative GHG reduction goals related to government and community emissions, energy efficiency and renewable energy targets, GHG emission reduction policies and measures, and recommendations for integrating emission reductions strategies and climate change adaptation strategies into the General Plan, Local Coastal Program, and Zoning Ordinance updates.

Although existing efforts will help to reduce the City of Carlsbad's GHG emissions, additional opportunities exist for the community to increase efficiency, conserve valuable natural resources, and reduce its environmental footprint. The city is best positioned if it continues to take a proactive approach to environmental sustainability by employing both reduction/conservation and adaptation strategies.

Challenges facing the city in this pursuit include how to manage growth and major energy users while simultaneously decreasing the amount of energy used in city operations and community activities and implementing cost-saving energy reduction programs.

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5 Measuring Sustainability

In conjunction with the Vision, this working paper begins to set out the basic framework within which the City of Carlsbad will work to achieve its broader sustainability objectives. Once this framework is in place, a next critical step is to choose a system or systems for measuring progress toward the city's sustainability objectives.

5.1 Existing Metrics

There are several existing metrics for measuring community-wide sustainability; several popular ones are described briefly below. It should be noted that unlike measuring building energy use or sustainability, quantifying citywide sustainability is inherently much more complex, and the metrics listed below rely to a large extent on assumptions that may not be as valid from community to community compared to those for buildings, for example.

LEED™ for Neighborhood Development

As LEED's building certification program gained momentum, it became apparent that a need existed to look at more than just buildings and evaluate entire neighborhoods for their level of sustainability. This came from the recognition that a green building in the wrong location or on an unsustainable site is not really very green. As a result, LEED for Neighborhood Development (LEED-ND), developed by the private U.S. Green Building Council, is now available for use in evaluating and certifying new development that includes tracts of land and multiple buildings. It is composed of four main sections including Smart Location and

Linkage, Neighborhood Pattern and Design, Green Infrastructure and Buildings and Innovation and Design Process.

One Planet Living

One Planet Living is a certification program designed to guide development that creates communities with a one-planet ecological footprint. In other words, if all humans on the earth were to live according to this standard, we would all be able to do so without exhausting non-renewable resources and without requiring some people to live at a lower standard of living than others. Originating in the U.K., the One Planet Living framework consists of 10 guiding principles—zero carbon, zero waste, sustainable transport, local and sustainable materials, local and sustainable food, sustainable water, natural habitats and wildlife, culture and heritage, equity and fair trade, and health and happiness.

STAR Community Index

The STAR Community Index is a new rating method being developed jointly by ICLEI-Local Governments for Sustainability USA, the USGBC, and the Center for American Progress. Using a similar methodology to LEED, the program provides communities a consistent tool for evaluating progress and success relative to peer communities in the sustainability arena. It will also provide a recognizable award where leadership can receive recognition for their accomplishments in creating more sustainable communities. The model follows the 'triple bottom line' structure of Environment, Economy, and Society, with each major group containing several sub-sections for evaluation.

5.2 Using Indicators to Measure Sustainability

While the city may wish to explore the possibilities of applying one or more existing metrics, even without adhering to a particular system, Envision Carlsbad could still advance a set of sustainability indicators—key measurements and benchmarks that can be regularly assessed and monitored as a way to determine how well the city is progressing in achieving its sustainability goals. For purposes of Envision Carlsbad, indicators could first and foremost inform the development and prioritization of General Plan policies—evaluating existing policies as well as proposed new ones. Indicators could also play a role in ranking the performance of alternative plans and in the development of a preferred plan alternative. Subsequent to the development of the updated General Plan, Local Coastal Program, and Zoning Ordinance, indicators and the data collected through monitoring could highlight which adopteded policies or programs are making a difference and which are not, so that useful adjustments may be made. Some of the indicators may be designed to be incorporated into the community satisfaction survey that the City of Carlsbad conducts every year. Examples of sustainability indicators that could be monitored from year to year include per capita energy or water consumption, per capita waste disposal, or school district base academic performance index scores. As subsequent working papers are completed, a list of proposed indicators addressing all the Vision core values can be developed.

6 Planning Issues and Implications

This chapter provides key planning issues and implications for EC³ discussion in the context of Vision sustainability priorities. Other sustainability issues as they relate to land use, transportation, economics, etc., will be examined in forthcoming working papers dedicated to those subjects.

1. Effectively reducing energy use and GHG emissions means asking people (city staff, businesses, and residents) to change the way they do things. How should the city balance mandatory standards with measures driven by education, incentives, and demand management?

Cities can take various approaches to increasing sustainability of government and community activities, including adopting regulations (e.g., mandatory building standards or energy audits and retrofits) and altering behavior by providing incentives or disincentives (e.g., charging a fee for single-use containers or plastic bags, reducing parking requirements in transit-oriented areas, or providing preferential parking for alternative fuel vehicles). In preparing the General Plan, the city will need to strike a balance between regulation and incentives in order to maintain resident and business support for sustainability.

In a tight economic climate, sometimes incentives are harder to come by. New financing tools are worth considering within the portfolio of options the city has available, and these could complement existing programs such as the CaliforniaFirst financing program, now in its pilot phase. Recently, however, CaliforniaFirst has shown vulnerability to federal financing

challenges and is now stalled, highlighting the importance of local alternatives and diverse incentive options for residents and businesses.³⁹

An innovative example of a local funding mechanism is El Cerrito's environmental improvement revolving fund, which sets aside money for small investments in city government energy or water efficiency that would pay for themselves over time through cost savings. In this fund structure, cost savings are allocated back to the revolving fund to a certain level, after which remaining savings are allocated to the General Fund.

Still other potential incentives do not have to cost the city money, but can save money for businesses and households, such as expedited permit processing for improvements that achieve certain community energy or environmental goals.

The City of Carlsbad is also home to some large, energy-intensive manufacturing and technology companies. Reducing the energy inputs required for these businesses, or transitioning to renewables such as wind or solar, could help the businesses' financial bottom line as well as local energy security. Opportunities may exist for the city to partner with these businesses on energy and technological investments.

³⁹ Report on the CaliforniaFirst website. Other energy improvement financing programs that rely on federal PACE funds, such as Sonoma County's Energy Independence Program, are also struggling with this challenge.

2. Are the California Title 24 (CALGREEN) building standards sufficient for the City of Carlsbad, or should the city develop green building measures more stringent than the State of California's?

By January 2011, CALGREEN will be mandatory across the state. However, the City of Carlsbad could decide to adopt to achieve local sustainability and GHG reduction objectives and stronger standards. For example, CALGREEN only applies to new construction, so a stronger local ordinance could, upon making necessary findings, apply CALGREEN standards or some variation to existing buildings. Another example of stricter standards would be to require application of both CALGREEN and other green standards such as those of LEED or BuildItGreen. While CALGREEN contains some requirements that are not included in LEED, LEED also offers many more measures, which are not mandated in CALGREEN. Certain kinds of existing stricter local standards automatically apply, such as stricter stormwater pollution management, waste management, and recycling provisions. Regardless of whether the city chooses to develop new stricter standards, all existing ordinances, such as local building, grading and drainage, subdivisions, zoning, and historic preservation codes should be reviewed for consistency with CALGREEN, and any redundant mandatory or weaker provisions removed from local ordinances.

3. What are the critical opportunities for water conservation in the City of Carlsbad, in terms of cost-effectiveness and need?

There are several opportunities for the City of Carlsbad to conserve water in the future. One possibility is expanding the use of recycled water. The city currently meets almost 20 percent of water demand through recycled water, and has procedures in place for expanding the recycled water system. However, some stakeholders are concerned that expanding the distribution system would be costly in comparison to the benefit received. While the city uses recycled water efficiently, a great deal is being

used on landscaping for golf courses. Another approach would be to adapt course design and management to better mimic local ecology and environmental systems, thereby reducing the need for external inputs such as water and chemicals. For instance, Audubon International awards certification to recognize golf courses that protect the environment, conserve natural resources, and provide wildlife habitats. Achieving certification demonstrates a course's leadership, commitment, and high standards of environmental management. The Audubon Cooperative Sanctuary Program for Golf Courses is open to golf courses in the United States and internationally, including private clubs, public and municipal courses, PGA sites, 9-hole facilities, resort courses, and golf residential communities. A golf course must develop and implement an environmental management plan and document its results to become certified. Environmental management practices in six key areas are assessed: environmental planning, wildlife and habitat management, chemical use reduction and safety, water conservation, water quality management, and outreach and education.⁴⁰ There are over 850 certified cooperative sanctuaries currently registered and listed on the Audubon International website for the program, including 59 across California.

Another potential conservation opportunity relates to implementing new management/billing approaches such as residential sub-metering. Utility costs have historically been one of the highest monthly expenditures for multifamily housing property owners. While today most renters pay their own electricity bills, water sub-metering has not been implemented as widely. With sub-metering water use is measured separately for each unit in an apartment building, and residents may then be charged according to their actual consumption. Sub-metering for water, as for electricity and gas, gives residents both personal control and incentive to save water. According to a

⁴⁰ Audubon Cooperative Sanctuary Program for Golf Courses, Certification Overview, 2009.

March 2010 report from the San Diego Office of the Independent Budget Analyst, studies have shown that water sub-meters are associated with decreased water usage. A 2004 study showed water savings of over 15 percent when comparing sub-metered properties with rental properties that do not bill water separately from rent (“in-rent” properties). Another comparative study showed water usage in sub-metered properties to be 18 percent to 39 percent less than in-rent properties.⁴¹ Sub-metered systems also have the added benefits of making it easier to locate leaks and of reducing the energy used for, and associated costs of, heating water.

Yet another potential water conservation approach with potential is gray water and rain water catchment systems. With new state regulations in place, it is now much easier for the city of homeowners to implement these on-site systems, and they would have the added benefit of reducing pressure on the wider city water supply, recycled or otherwise. The City of Carlsbad could explore ways to promote and expedite installation of such systems.

4. How should the City of Carlsbad continue to reduce the waste stream?

Waste is a challenging problem with many factors outside local government control, and the challenge is obscured by the fact that waste in the City of Carlsbad—as in many communities—is exported to other places, and is therefore unseen. Nonetheless, there are approaches that The City of Carlsbad could explore (only voluntary or in pilot phases now), such as increasing the cost of traditional waste disposal (“Pay-As-You-Throw” or variable rate pricing program, which is not currently offered for residential development), implementing “single-bin” recycling curbside pick-up, requiring recycling for commercial and industrial business customers, updating city procurement policies (work already underway), adopting ordinances that take a stronger stance related to

construction and demolition debris (happening in part through mandatory CALGREEN provisions), and expanding education on waste issues (including working with school districts on curricula). One potential area for public-private partnership in waste reduction would be partnering with regional farms on the collection and use of residential or business food waste compost.

5. In line with San Diego County’s Health Strategy Agenda, how can the City of Carlsbad improve the local food system through supporting healthy choices, pursuing policy changes, and improve the culture from within?

City government may not be able to tell people which foods to buy or eat, but land use and zoning classifications and definitions, economic development programs, and even open space and coastal management strategies could all play a part in making fresh, local, and healthy foods more available.

Opportunities exist for the City of Carlsbad to emphasize sustainable food marketing and businesses in revitalization plans for the Barrio neighborhood and the Village. The update of the Local Coastal Program, with the Coastal Commission’s emphasis on coastal visitor-serving facilities, provides another opportunity for incorporating local and sustainable food system components into the LCP which mutually support other coastal management aims. While many residents feel strongly that local agriculture operations such as the strawberry growing fields ought to remain in agricultural use, the business model must be viable and may benefit from offering complementary, profitable visitor services.

The city can also provide a good example by examining the food culture within city government, from food vendor expectations to events management decisions. Work on the green purchasing policy should take into account healthy,

⁴¹ “Submetering, RUBS, and Water Conservation,” prepared by Industrial Economics, Inc., June 1999.

local, and sustainable food access. The city can also examine zoning regulations to allow urban farming.

6. What potential effects of climate change are the most relevant to the City of Carlsbad? How can the city best prepare and adapt to these potential threats?

In addition to reducing the city's contribution to climate change resulting from government operations and community activities, the city may need to form strategies for adapting to the future effects of global climate changes, such as changes in weather patterns and water availability, sea level rise, increased temperatures, and climatic variability. Given the potential global warming hazards applicable to the City of Carlsbad, including beach/cliff/bluff erosion, coastal inundation, sea level rise, wave events, saltwater intrusion into coastal water bodies, and diminished water quality, the city may need to take steps to better understand the implications of climate change and implement measures to minimize the city's vulnerabilities to these potential threats. Coastal areas are a particular challenge because the City of Carlsbad must plan for greater access and services while simultaneously reducing vulnerability.

The city can leverage the current Envision Carlsbad process to coordinate climate action planning with the General Plan update to respond to regional and state expectations, and help prepare the community for the possibility of climate changes in the future. It is important that the goals established regarding GHG emissions and strategies to mitigate and adapt to the effects of climate change, are fully consistent with the policies and programs developed as part of the General Plan update. The city can incorporate climate action planning into the Envision Carlsbad process in various ways, such as:

- Shared meetings/workshops in which GHGs and climate change issues are discussed with the public from the General Plan and climate action planning perspectives;

- Incorporation of preliminary climate action planning data and policy ideas into the alternatives development process; and
- Notifying responsible agencies such as the California Coastal Commission and San Diego Air Pollution Control District of the city's climate action planning efforts so that they provide timely and informed input on the General Plan, Local Coastal Program, and Zoning Ordinance relative to climate change issues.