SUSTAINBLE URBAN ENERGY PLANNING:

A STRATEGIC APPROACH TO MEETING

CALIFORNIA'S CLIMATE AND ENERGY GOALS

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EXECUTIVE SUMMARY

This White Paper evaluates why California's new energy and climate policy priorities and requirements create the need for sustainable energy planning by local and regional authorities. Essentially, attaining these objectives cost-effectively will require integrated technical solutions and innovative asset development and management strategies at the community level. Such strategies will necessitate planning processes that are informed by an understanding of the impacts of the embedded energy costs and operational energy needs of urban infrastructure and urbanization, as well as the benefits to be obtained from distributed energy resource applications. This paper clarifies the benefits of sustainable energy planning; how it would change the traditional role of local and regional governments with respect to strategic growth management and land-use development; and the importance of merging energy smart development within "smart growth" planning.

This White Paper also describes a path forward for sustainable energy planning within California, using the City of Chula Vista, within the San Diego region, as a case study and drawing from the lessons learned in the City's recent research initiatives. The paper examines Chula Vista's current planning processes, especially as they relate to achieving California's energy and climate goals. In this regard, particular attention is given to the ways in which Chula Vista's planning processes have benefited from the research work of the National Energy Center for Sustainable Communities (NECSC). This research applied new types of decision support tools and methods to evaluate alternative options for reducing the carbon footprint and increasing energy reliability and savings arising out of the development of two greenfield sites. An important objective of the paper is to provide guidance, based on this case study, on how sustainable energy planning could be institutionalized overtime within municipal planning processes -- building upon existing local, regional and state planning frameworks. Furthermore, this paper explains why instituting sustainable urban energy planning is critical to creating the context and conditions for generating environmentally sound community-based energy solutions to California's priority goals and, ultimately, for effectuating efficient energy and resource development and management within communities.

INTRODUCTION

California's Climate and Clean Development Challenge and Opportunity

Under the leadership of the City of Chula Vista, the National Energy Center for Sustainable Communities ("NECSC"), a non-profit research organization,[1] completed modeling and analyses for the development of two low carbon communities in this California city, with funding from the California Energy Commission ("CEC") and the U.S. Department of Energy. Using model-based integrated design techniques and strategic site planning, alternative scenarios were evaluated to determine the cost-effectiveness of incorporating into the developments different combinations of energy efficiency, distributed generation and renewable energy technologies. This research was undertaken as a public-private partnership, bringing together representatives of the city's planning, building, economic development and environmental departments with the local electric utility and developers and builders. Upfront in the planning process, they assessed ways in which to reduce costs and enhance performance with regard to deploying the technologies within these major developments, examining integrated technical solutions and complementary land-use and urban design techniques and practices. This work represented a significant new level of involvement by the City in energy planning. In this partnership effort, an array of decision support tools and methods were applied to evaluate the costs and benefits of alternative building and site design options, relative to the use of conventional practices, and to identify market-feasible opportunities for substantially increasing the efficiency, dependability and sustainability of energy use within these greenfield developments.

This initiative and others have garnered the attention of California authorities in Sacramento who, in the recent past, have issued an array of legislation, regulations and directives for reducing greenhouse gas emissions and increasing energy savings and reliability. Most notably, the landmark California Global Warming Solutions Act of 2006 ("AB 32") establishes a first-in-the-world comprehensive program of regulatory and market mechanisms to reduce ultimately California's greenhouse gas emissions ("GHG") to 1990 levels by 2020 (a 25% reduction).[2] Mandatory caps will begin in 2012 for significant stationary and mobile sources and ratchet down to meet the 2020 goals. In addition to the passage of AB 32, Governor Schwarzenegger issued a 2005 Executive Order that set an even more ambitious climate change response program to reduce GHG emissions by 80% by 2050 (which will require a 90% GHG reduction per capita).[3]

These challenging climate targets have galvanized both new thinking as well as the recognition that existing agency-based program "silos," focused upon technology, sector or facility-specific solutions, will not be adequate to meet these goals. Moreover, the State's objectives have prompted considerable re-examination of the traditional roles of private business, non-profit organizations, academia, and state,

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[1] The National Energy Center for Sustainable Communities (NECSC) is dedicated to advancing the development of economically and environmentally healthy communities that are both energy and resource-efficient. The NECSC executes this mission through collaborative initiatives among Federal, State, regional, and local government agencies, companies, utilities and other organizations in California and across the country. These initiatives are intended to accelerate the use of energy efficiency, demand response, energy storage, renewable resources and distributed generation, as well as to promote distributed energy technology systems and smart grid integration, through research, training, and demonstration projects. See, www.necsc.us.

[2] California Assembly Bill No. 32, "Global Warming Solutions Act of 2006," (Nunez, Chapter 488, Statutes of 2006).

[3] Governor's Executive Order S-3-05 (June, 2005) ("Governor's 2005 Executive Order").

regional and local governments. These policy priorities and regulatory targets clearly place a premium upon interdisciplinary, systemic approaches to inform the development of mutually reinforcing strategies that can achieve multiple objectives; a new interactive dynamic between state, regional and local government authorities; and creative public-private partnerships.

In the face of its stringent new targets and timeframes, the State has been calling for local and regional areas to become "testing beds" for new innovative approaches, such as the Chula Vista demonstration, that can help to alter fundamentally the way in which energy is used. California is seeking to have its cities, municipalities and regional authorities play a pivotal role in furthering a new clean energy future. To meet this challenge, this White Paper focuses upon the need to develop the capacity of local and regional authorities to conduct "sustainable energy planning." Sustainable energy planning integrates energy and environmental planning into land-use, transportation and economic development planning to support community sustainability.[4] Through these linkages, sustainable energy planning seeks to promote the efficient production, delivery and use of energy resources in the development of economically, socially and environmentally healthy communities. Moreover, sustainable energy planning can guide the development and use of distributed energy resources[5] within communities to assure responsible resources management "that meets present needs without compromising the ability of future generations to meet their needs."[6]

Developing this capacity would enable local and regional governments to: (1) Shape energy and resource-efficient community development patterns and land-use practices under the discipline of a "sustainable urban form," significantly reducing energy consumption and greenhouse gas emissions, while also enhancing energy reliability and security and economic growth and development; (2) Advance a "systems" approach for integrating and optimizing clean energy technologies within development projects to accelerate the combined use of renewable energy and advanced end-use and smart grid enabling technologies within a community's built-environment and infrastructure; and (3) Help design market-changing public-private partnerships, policies, and business and financial models to overcome technical, market and institutional barriers to clean energy products and services. Most importantly, this paper focuses on the importance of developing this proactive capability to help capture more cost-effectively the economic potential within California for greenhouse gas emissions reductions and energy savings.

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[4]See, "Blueprint for Urban Sustainability: Integrating Sustainable Energy Practices into Metropolitan Planning," Gas Technology Institute (2003) at 2 ("GTI Blueprint").

[5]Id. at 11. Distributed Energy Resources cover distributed generation, combined heat and power, demand response, demand-side management and energy efficiency. Distributed generation refers to generation at or near the point of use that can supply customers or the grid. Combined Heat and Power (CHP) is distributed generation that also captures and uses released heat for heating or cooling purposes (also known as co-generation). Demand Response is distributed generation of electricity to support the grid during supply outages or grid constraints.

[6] Id. at 1 referencing the definition of sustainable development in, "Our Common Future," United Nation's World Commission on Environment and Development (1987). The Commission stated that long-term economic development would require "a change in the content of growth, to make it less material-and energy-intensive and more equitable in its impact." This implies that continued economic growth requires the responsible use of all natural and manufactured resources, particularly energy, and a concern for social equity for all inhabitants of a community. For purposes of this paper, community refers to urban settlements defined by geo-political boundaries, i.e., cities, counties, special districts.

CALIFORNIA'S GOALS CREATE THE NEED FOR SUSTAINABLE URBAN ENERGY PLANNING

California has distinguished itself as a leader in addressing climate change, clean energy and sustainable development through launching a range of significant initiatives targeting stationary and mobile sources of greenhouse gas emissions, air criteria pollution and other adverse environmental impacts. For example, in addition to AB 32 and the Governor's 2005 Executive Order, the State has issued a Renewable Portfolio Standard ("RPS"), California Solar Initiative, Low Carbon Fuel Standard, Bio-energy Action Plan, Long-Term Energy Efficiency Strategic Plan, and a Self-Generation Incentive Program.[7]

Yet, the comprehensive and far-reaching nature of California's climate goals has recast the State's regulatory and policy landscape. The new mandates not only establish minimum initial greenhouse gas emissions reduction (GHG) requirements, but also set the stage for sequential tightening of requirements overtime, pointing towards carbon neutrality and "zero net energy."[8] Without question, the measures are necessitating parallel and coordinated environmental and energy solutions at all governmental levels. But more fundamentally, these climate goals are driving both a "re-visioning" of the potential for energy efficiency and renewable energy across the range of California's environmental and energy policies and programs and a "re-thinking" about programmatic design and delivery.

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[7]California Senate Bill 1078 (Sher, Chapter 516, Statutes of 2002) established a RPS program whose target has since been accelerated; Senate Bill 107 (Simitian, Chapter 464, Statutes of 2006) obligates investor-owned utilities to increase the share of renewable energy to 20 percent of electricity sales by 2010; and Assembly Bill 1585 (Blakeslee, Chapter 579, Statutes of 2005) established a 33 percent goal by 2020; California Senate Bill 1 (Murray, Chapter 12, Statutes of 2006) launched the "California Solar Initiative" which has a target of 3,000 MW of new solar generating systems by 2017; California Assembly Bill 1007 (Pavley, Chapter 371, Statutes of 2005) directs the CEC and CARB to develop and adopt a plan to increase the use of alternative fuels in the transportation sector; Governor's Executive Order S-1-07 (2007) called for CARB to design a Low Carbon Fuel Standard to increase the use of transportation fuels that emit lower quantities of greenhouse gases on a life-cycle basis; Governor's Executive Order S-06-06 (April, 2006) calls for California to produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050, sets a RPS biomass target, and also establishes a Bioenergy Action Plan to develop an integrated and comprehensive state policy on biomass; California Public Utilities Commission, "California Long Term Energy Efficiency Strategic Plan (September, 2008) ("CPUC 2008 EE Strategic Plan"); California Assembly Bill 970 (Ducheny, Chapter 329, Statutes of 2000) directed the CPUC to adopt initiatives to reduce electricity demand, including incentives for distributed generation; CPUC D.01-03-073 created the Self-Generation Incentive Program to promote DG technologies under 5 megawatts (MW).

[8] Zero net energy refers to a building or development with a net energy consumption of zero over a typical year. To cope with fluctuations in demand, zero energy buildings or developments are typically envisioned as connected to the grid, exporting electricity to the grid when there is a surplus, and drawing electricity when not enough electricity is being produced. The amount of energy provided by on-site renewable energy sources is equal to the amount of energy used by the building or development. A ZNE building or development may also consider embodied energy – the quantity of energy required to manufacture and supply to the point of use the materials utilized for its building. The CPUC has defined "Zero Net Energy" at the level of a single "project" seeking development entitlements and building code permits in order to enable a wider range of technologies to be considered and deployed, including district heating and cooling systems, small scale renewable energy projects, clean distributed generation, etc., that serve more than one home or business. California Public Utilities Commission, "California Long Term Energy Efficiency Strategic Plan," (2008) at 13.

Revisioning

This "revisioning" tracks California's "Loading Order" which gives priority within its hierarchy first to energy efficiency and demand response and then to renewable energy and distributed generation in meeting the State's energy needs.[9] In particular, energy efficiency will play a central role in reconciling current climate and energy security challenges that pose significant economic and social risks. As the least-cost, most reliable and most environmentally-sensitive resource, energy efficiency can cost-effectively minimize contributions to climate change, enhance electricity system reliability, defer energy supply investment, increase utilization of existing energy delivery capacity and increase business productivity and competitiveness.[10] This emissions free and low-cost energy resource alternative also can tangibly reduce the pressure on energy demand arising from increasing population growth within California. To meet this accelerating energy demand in an environmentally sound manner, California is scaling up its efforts to increase significantly the efficiency with which energy is generated, delivered and used in the State. Towards this end, the State has begun to promote the development of technically integrated and cost-optimum strategies that combine energy efficiency with demand reduction, energy storage, smart grid enabling technologies, and renewable and clean distributed generation in a community energy system context.

California has been a national leader in the development of renewable resources. This leadership is also being reinforced by the State's recent energy policies that are shifting how the State will meet energy demand in the future, policies that can enable greater choices and lower costs for consumers and businesses. These policies are stimulating new "systems" strategies for increasing renewable energy market penetration. As a means for enhancing the uptake of renewable energy, California has made the development of clean distributed generation and distributed energy resources an explicit policy goal in its Integrated Energy Policy Reports.[11] While this push is intended to increase the effectiveness and economic viability of renewable energy deployment, it will also yield numerous co-benefits that include: reliability considerations, peak demand reduction, transmission congestion relief, reduction of transmission losses, higher fuel-to energy conversion efficiencies resulting from partnering renewable energy technology with combined heat and power systems.

Re-Thinking

In seeking to advance California's new climate agenda through enhanced energy efficiency and renewable energy efforts, policy makers at the State's governmental agencies have been increasingly focusing on <u>three areas</u>:

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[9] California Energy Commission, California Public Utilities Commission and Consumer Power and Conservation Financing Authority, "Energy Action Plan I," (2003) and "Energy Action Plan II" at 2; Public Utilities Code 454.5(b)(9)(C) states that utilities are required to first meet their "unmet resource needs through all available energy efficiency and demand reduction resources that are cost-effective, reliable and feasible."

[10] California Energy Commission and California Public Utilities Commission, "Energy Action Plan II," (2005) declared that, "Cost-effective energy efficiency is the resource of first choice for meeting California's energy needs. Energy efficiency is the least cost, most reliable, and most environmentally-sensitive resource, and minimizes our contribution to climate change."

[11] California Energy Commission, "2007 Integrated Energy Policy Report," Document No. CEC-100-2007-008-CMF (2007) at 201 ("2007 IEPR").

(1) A pro-active role to be taken by local and regional governmental authorities;
(2) Community-scale energy efficiency and renewable energy; and
(3) Land-use planning, design and development.

The unparalleled stringency of the new climate targets and timeframes is driving a fundamental re-thinking about energy and environmental program design and delivery. Policy makers are re-focusing their programmatic approaches to incorporate these three cross-cutting elements in a manner that can contribute to advancing the following policy strategies: (1) Developing all feasible, cost-effective, and reliable energy efficiency, demand reduction and renewable energy resources locally and regionally in a way that works in harmony with larger power and fuel systems, while reducing fossil fuel use and climate change impacts; (2) Increasing the efficiency of electricity and natural gas use and on-site renewable distribution systems; (3) Aligning and coordinating regulations, incentive programs and financing mechanisms in order to support the increased adoption of such energy efficiency, demand response and onsite generation opportunities; and (4) Integrating and optimizing these strategies with the achievement of air quality, water conservation, waste reduction and reuse, and transport and mobility objectives.

The following discusses more specifically how California authorities are addressing these three new focus areas to "re-vision" energy efficiency and renewable energy resource development and "re-think" program design and delivery. This discussion also indicates how policy makers are beginning to embrace the need for sustainable urban energy systems planning as essential to their efforts to transform the market towards technologies and practices that can bring about "zero net energy" results.

Pro-active Role for Local and Regional Governments

Applying the principle of subsidiarity is fast becoming integral to California's efforts to achieve its aggressive climate and energy goals. In the interest of accelerating market transformation, the State already is devolving increasing responsibility to those in the best position to act. In this regard, local and regional authorities are in a unique position to design and implement innovative, long-term, cross-cutting programs promoting energy efficiency, sustainability and reduced carbon emissions. Vested with a broad array of energy-related authorities and responsible for providing a diversity of municipal services, local governments can directly influence energy demand and use through their planning and development policies and activities, not just in terms of addressing individual sources, sectors or technologies, but in terms of addressing the welfare and progress of the community in its entirety.

California is, therefore, seeking to fully engage its local governments in using energy efficiency and renewable energy to reduce demand and greenhouse gas emissions both in their own facilities and throughout their communities.[12] In particular, the State is looking to municipalities and cities to tap their broad authority over planning and development to maximize energy savings and emissions reductions both in public facilities and infrastructure and in privately owned new construction and existing buildings. Local governments are being encouraged to "lead by example" and to showcase, with their own facilities and operations, cost-effective strategies for improving energy efficiency and reducing CO2 emissions, as well as to display promising energy efficiency, demand side management and renewable technologies and practices. Moreover, the State will be engaging the ability of municipalities to interact, through public-private partnerships, with businesses and residents to work towards integrated sustainable communities that support California's challenging climate and energy goals and help make "zero net energy" a reality.

[12] CPUC 2008 EE Strategic Plan, Section 12, "Local Governments," at 90-98.

This agenda is especially evident in the CPUC's "Energy Efficiency Strategic Plan." This long-term plan provides a roadmap for achieving maximum energy savings in California between 2009 and 2020 and beyond. It is intended to advance the CPUC's "Big Bold Energy Efficiency Strategies" to reach zero net energy in residential construction by 2020 and in commercial construction by 2030.[13] Within this framework, local governments are expected to play a pivotal role in leading their communities with innovative programs for energy efficiency, sustainability and climate change. In particular, the CPUC is calling upon municipalities to help transform the marketplace by adopting and implementing, whether on a mandatory or voluntary basis, "reach" codes and standards which exceed the minimum requirements established in Title 24.[14] In this regard, local governments are encouraged to expand the purview of current codes and standards to include development projects in addition to buildings and products. Local governments can use their long-term development authority to identify opportunities for more energy and environmentally integrated development and infrastructure and to incorporate best practices into their land use planning and General Plans.[15]

Community-Scale Energy Efficiency and Renewable Energy

Recent policy pronouncements, such as the California Energy Commission's (CEC) 2007 "Integrated Energy Policy Report," the California Public Utility Commission's (CPUC) 2008 Energy Efficiency Plan and the California Air Resources Board's (CARB) Scoping Plan, recognize the importance of community-scale energy resource development to the achievement of California's climate and energy goals.[16] For this reason, they are promoting the near term integration of energy efficiency and renewable energy products and services in the energy infrastructure of California communities. This new focus on community-scale efforts, in addition to ongoing utility and building scale activities, is supported by a

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[13] CPUC 2008 EE Strategic Plan at 6. The "Big Bold Energy Efficiency Strategies" were established by the CPUC in D.07-10-032 and D.07-12-051. These strategies also include transforming Heating, Ventilation and Air Conditioning to ensure that its energy performance is optimal for California's climate; and providing all eligible low-income customers the opportunity to participate in the low income energy efficiency program by 2020.

[14] Title 24, Cal. Code Regs. Part 6. Title 24 establishes minimum building energy efficiency standards. The Plan envisions that Title 24 will be progressively updated, tightened and extended on a triennial basis based on two tiers of voluntary, beyond-code standards derived from standards developed by local governments or the private sector. Ultimately, the Plan seeks to expand Titles 20 (appliances) and 24 to address all significant energy end uses.

[15] The CPUC 2008 EE Strategic Plan "seeks to move utilities, the CPUC and other stakeholders beyond a focus on short-term energy efficiency activities into a more sustained long-term, market transformation strategic focus" at 4. The Plan requires "coordination of local government building codes and development policies to facilitate common approaches to the adoption and rapid evolution of highly energy efficient technologies and techniques in new construction" at 15. In the case of commercial development, the Plan promotes integrated design solutions that "go beyond individual buildings and consider community-level energy and carbon impacts" at 33. In particular, the Plan aims for the development of standards that better integrate onsite clean distributed generation.

[16] 2007 IEPR at 207, 212; CPUC 2008 EE Strategic Plan at 33, 36, 96; California Air Resources Board, "Climate Change Proposed Scoping Plan: A Framework for Change" (2008) ("CARB Proposed Scoping Plan") at 43; CEC, "2008 Integrate Energy Policy Report Update," Doc. No. CEC-100-2008-008-CTD (September, 2008) at 2, 12, 22-27. ("2008 IEPR Update")

number of trends.[17] Notably, many renewable energy and advanced end-use technologies and products are now mature and cost-competitive due to available incentives. In addition, the global market for these technologies is growing, resulting in substantial cost reductions. Meanwhile, within the recent past, the prices of fossil fuels and the heat, electricity and other energy they generate have experienced dramatic increases and volatility. Moreover, there is a developing market for the environmental attributes of clean energy that can increase the economic return on these assets. Finally, many renewable energy and energy efficiency technologies can now be economically configured, demonstrated and deployed in sizes that fit the demand profile of communities, ranging from residential subdivisions to sizeable cities and including university campuses, business parks, public agency operations and other localized groupings of energy users.[18] Community-scale economics opens up opportunities for innovative technical integration solutions.

In light of these strong trends, localities and regional areas are seeking to find ways to capitalize on the proliferation of new energy supply and end use technology options in order to stabilize their energy costs, increase electricity reliability, create local jobs, reduce environmental impacts, and tap locally available renewable energy sources. However, historically, U.S. communities have not, as a general matter, planned and managed their own energy supply. Those communities within California, therefore, that are seeking to secure their energy supply through increased reliance upon indigenous renewable energy resources and energy efficiency as an alternative resource are facing a significant learning curve and an array of new choices.

Recently, the CEC's Public Interest Energy Research ("PIER") program issued a solicitation to help communities develop, pilot and implement transitioning plans for building their economies on the foundation of stable energy costs and environmental stewardship.[19] These plans would focus upon developing and demonstrating new methods, tools, practices, programs and enabling technologies needed for accelerating cost-beneficial deployment of renewable energy (RE) and energy efficiency (EE) options in a community energy system context. The PIER program seeks to assist communities that wish to become "Renewable-Based Energy Secure Communities" (RESCOs) identify and achieve the best economic solutions by developing a mix of renewable energy resources and combining technologies in an integrated and cost-optimum way, based on complementary attributes.[20]

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[17] CEC Public Interest Energy Research Program (PIER) Solicitation PON-08-004, "Renewable-Based Energy Secure Communities," Research, Development and Demonstration, PIER Renewables Program, (December 8, 2008), Attachment A, RESCO Technical Integration at A-1. ("RESCO Solicitation")

[18] RESCO Solicitation, Application Package at 8.

[19] RESCO Solicitation, Attachment A at A-1.

[20] RESCOs are communities that secure their energy supply (electricity and fuel) through primary (up to 100%) reliance on indigenous renewable energy resources and are, therefore, less vulnerable to interruptions and emergencies affecting the supply of imported energy. RESCO Solicitation, Application Package at 4. Integration solutions promoted by the solicitation include the following: Integrated RE resources mix; Integration of RE electricity with efficiency measures and demand response; Integration of RE resources and energy storage; Integrated inter-sectoral applications (e.g., transportation and electricity); Integration of biopower resources and combined cooling, heating and power (CCHP); Integration of local RE resources and imported RE energy; Integration of RE heating and cooling with energy efficiency, demand response and on-site electricity generation. Attachment at A-3.

The RESCO RD&D strategy embodied in the solicitation is intended to promote orderly and capital efficient development of community-based renewable resources, using PIER funding to anticipate and address the technical issues that arise when energy imports are sought to be reduced at the community level.[21] The technical challenges that the PIER program is focusing upon do not relate primarily to the cost and performance of individual technologies, but instead, to the technologies, tools and strategies that can enable their integrated and symbiotic use. Moreover, the CEC is concerned that addressing these issues through a portfolio of unrelated and uncoordinated projects would likely yield environmentally and economically sub-optimal results, with assets becoming financially constrained by "behind-the-meter" economics.[22] For these reasons, the RESCO PIER initiative urges holistic planning within communities to determine economically and environmentally preferred technical integration solutions that can: (1) enable multiple individual RE technologies to serve a community's energy needs more cost-effectively than would be possible using a single technology and (2) take advantage of competitive energy markets.[23]

Most importantly, the request for proposals (RFP) recognizes that RESCO development will involve sequential and iterative planning, piloting and implementing of capabilities and solutions that: (1) fit the local resource base; (2) offer promise for future integration and expansion toward the goal of eventually achieving full reliance on RE; and (3) undergo continuous adjustment based on experience and adaptation to particular circumstances and changing market conditions.[24] Notably, the RFP emphasizes the need for a framework in which community leaders, RE developers, planners, utilities and other major market players can collaborate and optimize a community's future energy infrastructure.[25] This framework would enable the stakeholders to evaluate and determine ways in which to accelerate the adoption of viable and proven technical integration solutions that can maximize economic value and minimize costs and environmental impacts, while capitalizing on advancements in RE, EE and demand response, energy storage, smart grid integration, combined cooling, heating and power, the co-production of transportation fuels, etc.

Sustainable Land-Use Planning, Design and Development

Recent California initiatives recognize that there is a fundamental linkage between energy and community form. The value proposition for integrating energy planning into urban land-use and design and for taking a systems approach to community development lies in the fact that 70% of a community's energy consumption is influenced by land use allocations, site design, development practices and transportation and utility infrastructure.[26] Indeed, realizing the fuller potential of energy efficiency and renewable energy is dependent to a large extent on the form and parameters of a community's infrastructure and built environment. Notably, the urban sprawl, which has been perpetuated by America's development practices since the 1950's, has contributed to our country's having the highest per capita energy

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[21] RESCO Solicitation, Application Package at 6.

[22] Id. at 6.

[23] Id. at 6.

[24] Id. at 8.

[25] Id. at 6.

[26] "Model for Sustainable Urban Design," Sustainable Energy Planning Office, Gas Technology Institute (2004) at 1. ("GTI Model Design")

consumption in the world. Therefore, to maximize GHG emissions reductions and energy savings, the effects of land use decisions and urbanization need to be addressed and mitigated.

Yet, the opportunity to influence significantly local energy end-use through "how and where" construction and renovation takes place is, nonetheless, quite promising. In the United States, over the next 25 years, over half of the nation's built environment has yet to be constructed or will need to be re-built.[27] Recent studies by Smart Growth America, Urban Land Institute and others have shown that shifting 60% of new population growth to compact development patterns with a range of transport options could save 79 million metric tons of CO2 annually by 2030.[28]

Recognizing this potential, California has explicitly linked climate and land-use planning and development through a number of policy and regulatory actions. Underlying these actions is an understanding that the State's market transformation and integrated design strategies will not be achievable without a new focus upon the context in which California is imposing its requirements and negotiating voluntary commitments with respect to stationary and mobile sources.

Recent California legislation has increased the role of local and regional governmental authorities in facilitating efficiency investments and ensuring sustainable planning and development. Senate Bill 375 posits climate considerations within the context of strategic growth management.[29] SB 375 requires metropolitan planning organizations ("MPOs) to include in their regional transportation plans "Sustainable Communities Strategies" that will meet the region's target for reducing GHG emissions.[30] These strategies are required to balance transportation and regional housing needs and create incentives by tying Federal transportation funds to projects achieving emissions reductions.

Also, in furthering the Governor's Strategic Growth Plan ("SGP"), Senate Bill 732 establishes the Strategic Growth Council to help state agencies allocate SGP funding in ways that best promote efficiency and sustainability, as well as support the Governor's economic and environmental goals.[31]

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[27] "Sustainable Community Energy Planning in California: New Challenges & Roles for Government Agencies, Utilities & the Development Industry," National Energy Center for Sustainable Communities (Sponsored by City of Chula Vista and San Diego Gas and Electric) (2009) at 1. ("Reference Guide")

[28] 2008 IEPR Update at 120.

[29] California Senate Bill 375 (Steinberg, Chapter 728, Statutes of 2008) ("SB 375").

[30] SB 375 requires MPOs to prepare a communities strategy to reach the regional target provided by CARB. MPOs will use the sustainable communities' strategy for the land use pattern underlying the region's transportation plan. If the strategy does not meet the target, the MPO must document the impediments and show how the target could be met with an alternative planning strategy. Integration of the sustainable communities' strategies or alternative planning strategies with local general plans will be vital to achieving the goals.

[31] In January 2006, the Governor launched the Strategic Growth Plan (SGP), a proposed set of new policies to leverage partnerships with the private sector, increase synergy between public agencies, and educate thousands of new engineers to build the California of tomorrow. CEC "2008 Integrated Energy Policy Report Update," Doc. No. CEC-100-2008-008-CMF (Adopted November 20, 2008) at 118, ("Adopted 2008 IEPR Update"); California Senate Bill 732 (Steinberg, Chapter 729, Statutes of 2008). Chaired by the Director, Office of Planning and Research, the Council consists of the Secretaries from the Resources Agency, CalEPA, the California Business, Transportation and Housing Agency, and the California Department of Food and Agriculture.

The Council will coordinate with its member agencies, as they undertake infrastructure and development projects, to encourage sustainable land use, improve air and water quality, protect natural resources, increase the availability of affordable housing, improve transportation, and meet the goals of AB 32. The Council also can support, through grants and loans, the planning and development of sustainable communities, including preparing, adopting and implementing general plans, general plan elements, regional plans and other planning instruments. While the State has little direct say in local land-use planning, the Council will provide leadership and support for local governments.[32]

Moreover, the CEC chairs the Land Use Subgroup of California's "Climate Action Team" (LUSCAT) and is working to advance the recommendations that were made by this group to CARB in connection with the development of its Scoping Plan.[33] In particular, LUSCAT developed a report with recommendations on expanding State technical and financial assistance to local and regional agencies to facilitate climate-friendly and energy-efficient planning and development.[34] CARB's Scoping Plan encourages local governments to develop climate action plans and calls for carbon fees that could be provided to local governments based on GHG savings projected to result from improved land use planning. CARB also recommends a GHG emissions reduction target for local government municipal and community-wide emissions of a 15% reduction from current levels by 2020 to parallel the State's target.[35]

With funding by the CEC, the San Diego Association of Governments (SANDAG) is developing a "how-to" guide on preparing an energy element in General Plans for use by other regional and local governments.[36] A State Advisory Task Force is guiding this project. The CEC also is updating its "Energy-Aware Planning Guide" and assisting municipal utilities in partnering with local governments to incentivize smart growth in their service territories.[37]

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[32] Adopted 2008 IEPR Update at 118. The Council will recommend policies that encourage sustainable development and will collect and provide data to local governments to help them develop and plan sustainable communities.

[33] The Governor's 2005 Executive Order directed the California Environmental Protection Agency to lead a multi-agency Climate Action Team to conduct an analysis of the impacts of climate change on California and to develop strategies to achieve the targets and mitigation and adaptation plans for the State.

[34] Draft "LUSCAT Submission to CARB Scoping Plan on Local Government, Land Use and Transportation," Land Use Subcommittee of Climate Action Team (May 5, 2008). ("LUSCAT Submission")

[35] CARB has adopted a "Local Government Operations Protocol" to provide local governments guidance on how to inventory and report greenhouse gas emissions from government buildings, facilities, vehicles, wastewater and potable water treatment facilities, landfill and composting facilities, and other government operations. See CARB Draft Scoping Plan at 27. CARB also is developing an additional protocol for community-wide emissions. Also, see Adopted IEPR Update at 118. In its Draft Scoping Plan, CARB indicated its intention to pursue strategies to provide stable funding for sustainable local planning and zoning updates.

[36] Adopted IEPR Update at 119. The State Advisory Task Force includes representatives from metropolitan planning organizations, councils of government, and state agencies.

[37] Also see, California Public Utilities Commission Decision 99-08-021, Ordering Para. 11; and D.01-01-060 directing the utilities to increase partnerships with local governments to achieve energy efficiency at the local level. See also, Adopted IEPR Update at 119. The CEC guide will explain the effects of energy policy on GHG emissions,

AB 811 (Levine, 2008) authorizes cities to provide low-interest loans to property owners with long-term repayments added to their annual property tax bills to help finance energy efficiency improvements and distributed generation installations.[38]

Also, the State Attorney General's Office has called upon local governments to use their California Environmental Quality Act ("CEQA") compliance responsibilities to address greenhouse gas impacts and mitigation strategies of local development policies.[39] Energy efficiency and renewable energy policies and initiatives are among the options available to communities.

While the State has taken unprecedented steps in linking climate to land-use and growth management planning processes, especially transportation planning, the State needs to explicitly promote sustainable energy planning and management within these planning processes. Linking sustainable energy planning to growth management planning would encourage communities to explore cost-effective opportunities for distributed energy resource development created by smart growth conditions.

Gaining Synergies through Sustainable Energy Systems Planning

As evidenced by these developments, California decision-makers clearly appreciate that the State's climate and energy goals stand to benefit from deploying integrated energy solutions at the community scale, facilitated and guided by regional and local jurisdictions, their public agencies and other local institutions. There also is a clear recognition of the large and long-term consequences that land use planning decisions have on energy consumption and GHG emission levels. But California officials are only beginning to grapple with the need to integrate energy systems planning into local land use planning, design and development processes that have been structured to address other matters such as growth management, public infrastructure development (transportation, water supply and wastewater and solid waste treatment), availability of affordable housing, etc. Among other things, there is a disconnect between land-use planning and urban development of land resources prior to the siting of energy infrastructure that creates significant barriers to building this infrastructure later. Linking energy planning to growth management and land use planning would enable local and regional authorities to address distributed generation and other energy infrastructure needs earlier and to maximize efficiencies within community transport, water, waste and energy systems.

The undertaking of sustainable urban energy planning by local and regional governments in partnership with major stakeholders and the integration of this planning into land use development is crucial to the successful application of California's new policy strategies on-the-ground. Among other things, this integrated planning can help to assure that efforts are carried out with a better understanding about: (1) the impacts of the embedded energy costs and operational energy needs of urban infrastructure and urbanization; (2) the local economic, environmental and equity benefits to be derived from such planning

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prescribe more effective relationships between local and regional planning agencies, and describe recent best practices.

[38] California Assembly Bill 811 (Levine, 2008) Streets and Highway Code, Sections 5898 et seq ("SB 811").

[39] California Environmental Quality Act (CEQA, Public Resources Code Section 21000 et seq. ("CEQA") PRC 21083.05, added to CEQA by Senate Bill 97 (Dutton, Chapter 185, Statutes of 2007), directs the Governor's Office of Planning and Research (OPR) to develop draft CEQA Guidelines "for the mitigation of GHG emissions or the effects of GHG emissions" and transmit those guidelines to the Resources Agency on or before July 1, 2009.

processes, especially with respect to the private sector; and (3) the costs and benefits of alternative planning options, technologies and practices, and development scenarios. In other words, the integration of energy planning into land-use planning processes is essential for municipalities to pursue high performance, low-impact community development under a unifying vision of urban design.

However, there are two significant hurdles to advancing GHG-reducing and energy-efficient growth through the integration of energy planning into land use development. First, California will need to provide not only leadership and oversight, but also, significant financial and technical assistance to develop new energy planning capabilities at the local and regional governmental levels. Second, historically, municipal and regional authorities have not generally ventured into the domain of "sustainable urban energy planning," especially since the establishment of the centralized electricity grid system. But, as discussed, strong market, technology and policy drivers are at play which can, in combination, work to overcome these obstacles. This includes the urgency that California attaches to the achievement of its own climate objectives.

DEFINING SUSTAINABLE URBAN ENERGY PLANNING

Sustainable urban energy planning integrates sustainable energy,[40] clean energy technologies[41] and responsible resources management strategies for the development of economically, socially and environmentally healthy communities. The ultimate aim is to bring about a paradigm shift with respect to energy and resource use within all of the functions of a community and to change infrastructure parameters and development patterns by affecting "how and where we build" and "how we generate, deliver and use energy." Sustainable energy planning seeks to strike a new balance in the dynamics between energy and resource supply and demand, by fusing energy and resource efficiency with "smart growth," "smart grid," intelligent transportation system management" and similar urban strategies within the following framework of community planning and design principles:[42]

Sustainable Use of Energy Resources: Planning and design should maximize the efficient use of energy resources across all end uses, while minimizing direct and indirect adverse impacts on the environment.

Ecological Community Form and Function: Planning and design should emulate nature to maximize the benefit of natural systems and preserve and restore the natural environment. Urban functions should be managed to reinforce natural flows and characteristics, creating a balance and mutually supportive cycle of interaction between built and natural environments.

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[40] "Sustainable energy" is energy saved through efficient end-use practices or derived from non-depleting, "renewable" energy resources such as solar, wind, biomass, geothermal and low-impact hydroelectricity.

[41] "Clean energy technologies" refers to those energy supply or end-use technologies that, compared with conventional technologies currently in commercial use, emit substantially lower levels of GHG and air criteria pollutants over their life cycle and generate substantially smaller or less-toxic volumes of solid, liquid or gaseous wastes. Clean energy technologies include those that allow the production, transport, storage and use of fossil energy resources with relatively high efficiency and relatively low impact on the environment.

[42] "Planning & Design Guidelines for Energy-Efficient Community Development," D. Newman, Gas Technology Institute (2004) at 4-5; GTI Model Design at 15-16.

Environmentally Sound and Energy Efficient Land Use Optimization: Planning and design should seek to minimize the consumption of energy, material and natural resources by restructuring and more efficiently utilizing the existing urban footprint. In addition, compact, mixed-use development, along with the co-location of compatible uses and increasing proximate loads, can enable cost-effective distributed energy resource applications and urban mass transit systems.

Energy and Environmental Technology Integration: Planning and design should integrate cleaner energy systems into development projects, using "whole building" and "community-scale" approaches to maximize energy performance and economic value, while minimizing adverse environmental impacts. Efforts should capitalize upon technology advancements, but promote integrated technical systems needed to expand the use of local renewable and recyclable energy resources, build sustainable local and regional energy networks, secure underground distribution systems for critical urban facilities, develop supply and demand network control systems, and establish more technology-ready infrastructure.

Community Resources Management: Wherever possible, planning and design should engage community residents in the efficient use of energy and material resources by decentralizing resource management systems to the neighborhood level. Neighborhood-based systems should be designed to provide ongoing systemic management of community resources and promote shared energy resources and material and process efficiencies, based on town energy management plans.

Social Equity and Economic Vitality: Energy-efficient planning and design should increase access to affordable housing, public services and employment for lower-income populations and stimulate local economic opportunities.

Sustainable urban energy planning seeks to reconcile environmentally sound energy and resource use with exponential urban growth by taking a "total energy and environmental systems" approach to land-use development and urban design. This approach integrates planning for traditionally disparate sectors such as transport, waste, water and energy in order to better characterize future energy demand and influence supply strategies. This systems methodology enhances individual technology, facility and sector approaches.[43]

Achieving California's energy and climate objectives through market transformation and integrated design will require the capability to better understand, characterize and shape energy demand and use within our built environments. In this regard, local and regional authorities need support to build their capacity to: (1) Understand the environmental, economic and equity impacts of the embedded energy costs and operational energy needs of urban infrastructure systems and urbanization; (2) Identify the local environmental, economic and equity benefits of sustainable urban energy planning, especially with respect to the private sector; (3) Develop information and materials that lead to a better understanding of planning options, particularly the costs and benefits of alternative technologies, practices and

[43]GTI Model Design at 10, 17-24. The CPUC 2008 EE Strategic Plan recognizes the importance of evolving a "total systems" approach. The Plan emphasizes that "it is critical to develop a shared vision and process for regulatory coordination in California to support the energy savings benefits of demand-side management integration [across resources] and to ensure consistent and mutually supportive energy, water, air, and GHG policy and regulations" at 72. Sustainable energy planning would enhance the prospects for achieving DSM integration solutions that support energy and carbon goals in the present, and further water and other resource conservation goals in the future.

development scenarios; and (4) Develop effective decision support tools and methods for community-based energy systems planning.[44]

There are compelling reasons for local governments to become involved in sustainable urban energy planning. Smarter energy use can reduce energy costs, improve public health and safety, enhance economic development and environmental quality, increase social equity and environmental justice, and raise living standards and the overall quality of life.[45] With the increasing availability of energy supply and end-use technologies, local governments also are seeking to achieve a higher level of control and self-sufficiency with respect to their access to energy resources.

However, there also are significant obstacles to sustainable energy planning by local governments. Primary among these are significant financial constraints, competing priorities, lack of knowledge and technical expertise, little incentive to undertake energy-related activities outside of managing their own consumption; lack of control of the resources required to engage in comprehensive energy sustainability planning and regulatory obstacles.[46]

To date, local governments have engaged in sustainable energy planning in three principal ways: (1) Reducing energy consumption within their own facilities and operations; (2) Promoting efficient energy use and alternative resources in the private sector through judicious use of incentives, regulations and demonstration projects; and (3) Shaping local land use and development patterns to reduce per capita energy use and improve environmental quality.[47] Such efforts have largely been undertaken separately rather than in an interrelated and systemic manner. Furthermore, the efforts have been predominantly project-oriented, aimed at addressing the environmental impacts of energy use in stationary and mobile sources by increasing efficiencies within buildings, installing alternative energy in municipal facilities and fleets, and promoting mass transit and alternative mobility strategies. But these efforts have not been guided or prioritized by strategic planning that seeks to address future growth and uncertainties and to assess a broad range of options based upon systemic community evaluations.

To contribute to a future of both population growth and urban sustainability, local and regional governmental officials must better understand: (1) How different development patterns, building and infrastructure design and materials, and clean energy technologies can increase energy and resource efficiency without compromising the quality of life; (2) How decisions regarding private development projects affect long-term energy demand; and (3) How energy smart planning carried out as part of land use development and growth management processes can bring into better balance energy supply with demand, including by facilitating the orderly, capital efficient and environmentally sound application of distributed energy resources.

Oftentimes, "Smart Growth" is viewed as sustainable energy planning. Smart growth is defined by SANDAG as a compact, efficient and environmentally sensitive pattern of development that provides people with additional travel, housing and employment choices by focusing future growth away from

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[44] CEC, "Sustainable Urban Energy Planning: A Roadmap for Research and Funding," Doc. No. CEC-500-2005-102 (June, 2005) at 2-3. ("CEC Roadmap")

[45] CEC Roadmap at 20-24.

[46] CEC Roadmap at 24-26.

[47] Id. at 27.

rural areas and closer to existing and planned job centers and public facilities.[48] Smart growth largely addresses the environmental impacts of energy use, but it promotes development patterns that increase energy efficiency and create conditions for economically viable distributed energy resource development. Its elements include the remediation and reuse of industrial brownfields, redevelopment of outdated structures and vacant properties, mixed-use projects, higher residential densities, diversity in building and housing types, and multi-modal transportation.[49] Smart growth neither focuses on the quality, reliability and efficiency of energy services nor ways to accelerate the deployment of clean energy technologies into a community's infrastructure and built environment to balance supply and demand.

Similarly, "smart grid" efforts have been viewed by some as synonymous with smart energy development. The term "smart grid" refers to an electricity transmission and distribution system that incorporates elements of traditional and cutting-edge power engineering, sophisticated sensing and monitoring technology, information technology and communications to provide better grid performance and to support a wide array of additional services to consumers.[50] Enabling smart grid technology has the potential to further the development of distributed energy resources in a manner that can increase significantly the efficiency and dependability of energy use within communities.

Sustainable energy planning is a long-term oriented, evolutionary process and one that needs to arise from consensus-building among community businesses and residents. Oftentimes, it is undertaken within the context of climate or sustainability planning. A key means of effectuating sustainable energy planning has been through public-partnerships which afford flexibility, are adaptive to different circumstances, and are effective vehicles for addressing "gaps" in the marketplace. These partnerships can provide a means for addressing and managing the risks associated with change and new technologies, including appropriately allocating those risks between the public and private sectors.

Another integral element is the development and application of modeling and analytical tools that can assess what changes are needed to foster energy and resource efficient community development, as well as to inform the structuring of public-private partnership arrangements to evaluate and implement cost-effective options. Effective decision support tools and methods are needed to: (1) Assess systematically the costs and benefits of alternative urban design and site planning scenarios; (2) Enable city officials, development authorities and planners to formulate municipality-wide energy management plans that consider all energy sources and all end-uses; and (3) Structure and fund effective energy and environment-related programs, measures and partnerships to overcome technical, institutional, financial and other barriers to sustainable development.

Analytical tools and energy assessments can assist city officials and planners in better integrating proven clean technologies into community buildings and infrastructure; anticipating future technologies in the design structures; and managing and minimizing adverse impacts from production, consumption and waste disposal. Such analyses can clarify market barriers and inform the design of policies, incentives and market-based mechanisms. Moreover, by helping to gauge the probability and magnitude of risks, as

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[48] City of Chula Vista Council Agenda Statement No. 20, "Resolution Adopting the Carbon Dioxide Reduction Plan and Directing Staff to Continue to Implement the Recommended Measures Within the Plan" (November, 2000) at 1. ("Chula Vista CO2 Reduction Plan")

[49] CEC Roadmap at 54.

[50] Energy Future Coalition, "Report of the Smart Grid Working Group" (2002) at 1.

well as evaluate options for managing risks, decision support tools can facilitate the development of innovative financing schemes and business models by the private sector.

In California, the City of Chula Vista provides a good illustration of a community that began by addressing the environmental impacts of energy use in the context of its climate change and environmental management strategies, but that is increasingly integrating energy resource planning into its land use development and growth management processes.

COMMUNITY LEADERSHIP PROFILE: CITY OF CHULA VISTA, CALIFORNIA

The City of Chula Vista has been a recognized leader in pursuing cost-effective opportunities and creating innovative approaches for improving energy efficiency and increasing the use of renewable energy within its own facilities and throughout its community. Since the early 1990s, the City has undertaken climate, energy and sustainability planning that has shaped its General Plans, development policies and regulatory actions, as well as charted its energy and environmental programs. The City's efforts have significantly reduced energy consumption and greenhouse gas emissions within its own facilities and operations and those of its contractors. The City also has used strategically incentives, regulations and demonstration projects to promote efficient energy use and alternative resources in the private sector. Its green buildings program has been highly successful and, increasingly, alternative energy technologies are being installed in city facilities and fleets and in commercial and residential buildings. Moreover, through its zoning and development authority, the municipality continues to shape land use and development patterns to reduce per capita energy use and improve environmental quality. And through its public education and outreach efforts, as well as its creative policies and initiatives, the City has raised green awareness in and engaged its citizens and businesses.

Current Sustainable Energy Planning

Most recently, the City of Chula Vista has undertaken two planning initiatives that will take these efforts to the next level of energy and environmental management:

Climate Action Plan [51]

To meet the City's 2012 target of reducing greenhouse gas emissions 20% below 1990 levels, the municipality established a Climate Change Working Group, comprising of residential, business and community representatives, to recommend a rigorous agenda. While the City has significantly reduced emissions on a per capita basis and from its own operations by 17% and 18%, respectively, during the period from 1990 to 2005, citywide greenhouse gas emissions have increased by 35% (mainly due to exponential residential growth). On April 1, 2008, the City Council adopted seven measures to reduce the municipality's carbon footprint:

- *100% Clean Vehicle Replacement Policy for City Fleet:* Replace vehicles through the purchase or lease of alternative fuel and hybrid vehicles.
- *100% Clean Vehicle Replacement Policy for City-Contracted Fleet Services:* Work with current and future vendors to include a "Clean Vehicle" replacement policy into the bid and contracting process.

[51] City of Chula Vista, "Climate Change Working Group Measures/Implementation Plans" (Adopted by City Council in July, 2008) at 1-58. ("Chula Vista Climate Action Plan")

- *Business Energy Assessments:* Through a new ordinance, encourage businesses to participate in a no cost assessment as part of the business licensing process.
- *Green Building Standard:* Through a building code revision, require all new and renovated buildings to increase their energy efficiency and meet statewide green building standards.
- *Solar and Energy Efficiency Conversion:* Provide a cost-effective, streamlined mechanism for property owners to implement solar and energy efficiency upgrades and create a municipal code provision requiring pre-wiring for solar electric systems.
- *Smart Growth Around Trolley Stations:* Implement the smart growth design principles outlined in municipal planning documents.
- *Outdoor Water Conservation:* Provide a cost-effective, streamlined mechanism for installing water saving plants at private and public sites and create new municipal landscape regulations.

This Climate Action Plan ("CAP") was guided by the 2005 Greenhouse Gas Emissions Inventory[52] conducted by the City to evaluate its progress in reaching its emissions goals. Also, the results of these measures will be quantified using the City's emissions reporting protocol. Chula Vista will link emissions reductions from its "reach" codes and other programs to CARB's AB 32 program and to its CEQA responsibilities.

San Diego Gas & Electric - Chula Vista Energy Efficiency Partnership Program (2009-2011) [53]

The CPUC has approved a 2009-2011 Energy Efficiency Partnership proposed by the City of Chula Vista and SDG&E ("SDG&E/Chula Vista Partnership or Partnership") that will build upon their current partnership to improve further community and municipal energy efficiency, leading to substantial direct and indirect energy savings.

The Partnership consists of four program components addressing municipal facility efficiency improvements, strengthened building energy codes and inspections (Sustainable Communities Program), energy saving development planning and design (Energy Efficient Community Development Initiative), and community-based energy conservation education and facility assessment (EmPower Chula Vista).

Established Energy Planning Frameworks

Both the SDG&E/Chula Vista Partnership and CAP build on well-established city planning frameworks that have shaped the municipality's General Plans, Municipal Code and local ordinances, and other planning instruments and regulations:

CO_2 Reduction Plan [54]

Starting in 1996, the City developed a Carbon Dioxide (CO_2) Reduction Plan to reduce the community's greenhouse gas emissions or "carbon footprint" to 20% below 1990 levels by 2012. The comprehensive plan set out 20 measures focused on energy conservation, transportation and land use policy. Specific projects that have been implemented under this plan include LED traffic signal retrofits, municipal

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[52] City of Chula Vista, "2005 Greenhouse Gas Emissions Inventory Report," Michael Meacham , et al. (2005) at 1-9.

[53] City of Chula Vista, "2009-2011 Energy Efficiency Partnership Abstract" (2008) at 1-20. ("Chula Vista/SDG&E Partnership Proposal")

[54] City of Chula Vista CO2 Reduction Plan at 1-8.

building upgrades, energy-efficient landscaping, municipal life-cycle purchasing standards and green building incentive programs. In February, 1997, the City reinforced their efforts relating to land use by laying the groundwork for a Sustainable Development Program and also specifically promoting environmental resources management and education.

Energy Strategy and Action Plan [55]

In 2001, the Chula Vista City Council adopted an Energy Strategy and Action Plan. This plan evaluated a range of options that included pursuing district energy and distributed generation investments, developing an emissions offset program based on mobile sources, becoming a municipal energy "aggregator," forming a municipal utility, expanding municipal and community energy conservation projects, and instituting seasonal energy saving measures.

Municipal Building Energy Efficiency Policy [56]

In 2005, the City Council approved a Municipal Building Energy Efficiency Policy that established energy conservation and renewable energy guidelines for new City buildings and major facility renovations. This policy encourages incorporation of energy-saving measures into the design, construction and operations of new City structures by striving to achieve passive heating and cooling, energy efficiency at least 20% above Title 24 standards, energy-efficient technology upgrades and ENERGY STAR-rated equipment purchases. The policy also requires on-site renewable energy generation to supply 20% of new building energy requirements and up to 100% renewable energy purchases (if equivalent or lower than local utility rates).

Furthering California's Climate and Energy Goals and Strategies

As a result of its planning and ensuing actions overtime and with its recent initiatives, the City of Chula Vista is already well along in advancing California's climate and energy goals and strategies. In particular, the following discussion highlights the ways in which the City's recent energy and environmental planning is leveraging its broad array of authorities and expanding the scope of opportunities to maximize energy savings and greenhouse gas (GHG) emissions reductions cost-effectively, not only in the near term, but also, through a sustained and focused effort, over the longer term.

The City's energy policy and programs are coordinated by the Conservation & Environmental Services Department under the leadership of a Director and Environmental Resource Manager. In addition, support is provided by staff in a variety of City Departments including, Planning & Building, Engineering & General Services, Public Works Operations, Economic Development and Redevelopment.

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[55] City of Chula Vista City Council Agenda Statement No. 16, "Report on the City's Strategic Energy Plan" (May, 200l) at 1-50, including the "Energy Strategy and Action Plan" (Attachment 1) at 10-26. ("Chula Vista Energy Action Plan")

[56] City of Chula Vista Council Agenda Statement No. 6, "Energy Conservation and Renewable Energy Guidelines for City Buildings and Facilities" (February, 2005) at 1-6; City of Chula Vista Building Energy Efficiency Policy Document (2005).

Through its SDG&E/Chula Vista Partnership, CAP and planning frameworks, Chula Vista has been responsive to the key goals and strategies set out in the CPUC's Energy Efficiency Strategic Plan and other State agency agendas:[57]

Adopting and Implementing Beyond-Code "Reach" Standards

Mandatory Green Building Standard.[58] The Chula Vista City Council approved a city-wide, mandatory green building standard for new construction and major renovations that: (1) establishes a minimum energy efficiency (carbon equivalent) requirement of 15% above Title 24 (2005); (2) mandates the early adoption of the new California Green Building Code for all residential and commercial projects; and (3) authorizes a carbon offset fee for non-compliance. This standard also will be re-evaluated once revisions to Title 24 become effective. The standard is intended to complement green building measures at the state and national levels and is the City's initial step towards achieving the State's zero net energy targets for residential and commercial buildings. As part of this initiative, the City also will undertake a Building Carbon Reduction Benchmark Program and a Green Awareness Program for homeowners and building operators to support implementation of its "reach" code.

The Building Carbon Reduction Benchmark Program will establish the goals, objectives and thresholds for carbon reduction from all new construction and major renovations relative to Title 24 requirements. It also will contain an energy savings component to instruct builders on how to accumulate carbon savings through both energy efficiency measures (including onsite renewable energy) and community/site design. In addition, the Chula Vista Carbon Checklist will be revised and supplemented to outline Development Credits for emissions reductions and Energy Efficiency Credits in connection with the issuance of building permits. The inclusion of the community/site design element in this program will extend the coverage of the City's new "reach" standard beyond qualifying individual buildings to developments to take into account energy savings (and the carbon equivalent) on the community level resulting from integrative urban design and strategic site planning. Among other things, these techniques and practices can optimize the potential for economically viable integration of energy-saving distributed energy resource applications (for example, combinations of such technologies as solar photovoltaic, thermal solar, CCHP and district energy, energy efficiency and demand response, energy storage). These savings will be evaluated and quantified using appropriate CEC certified software tools.

Leading By Example

Through its partnership with SDG&E,[59] Chula Vista has set a target for reducing further municipal energy use through coordinated facility retrofits and upgrades. The City plans to organize a "Building Operators Certificate" training program on energy management best practices. These efforts will complement the City's ongoing investments in renewable energy generation. New city facilities must include an option for alternative energy. Retrofitting city facilities with energy efficient lighting, and heating and cooling

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[57] Chula Vista's programs and activities address all of the goals and strategies that the CPUC 2008 EE Strategic Plan sets out for Local Governments at 90-98: (1) Goals – Adopting and Implementing "Reach" Codes; Strong Support for Energy Code Compliance Enforcement; Lead by Example; Lead Communities with Innovative Programs; Community Leadership; and Energy Efficiency Expertise; and (2) Strategies – Using local government authority to maximize energy efficiency in the private sector; Leading by example; and Community Leadership.

[58] Chula Vista Climate Action Plan at 18-26.

[59] Chula Vista/SDG&E Proposed Partnership at 16-17.

systems, and installing LED traffic signal lights has already saved the City 4.7 megawatt-hours per year, reducing energy costs by $400,000 annually. The City has installed one of the largest reflective roof systems to reduce the urban heat island effect at its 26-acre Corp Yard facility and the new Police Department. The Police Department building exceeds Title 24 energy efficiency standards by 21% and the City Hall building exceeds the standard by about 25%.

Community Leadership through Innovative Programs

Bundling Solar with Energy and Water Efficiency. [60] As part of its CAP, the City approved a "Solar and Energy Efficiency Conversion" initiative to facilitate widespread installation of solar photovoltaic (PV) systems, thermal solar (hot water) and other renewable energy technologies in combination with energy efficiency and water conservation measures in upgrading commercial, residential and municipal facilities. By combining energy and water efficiency upgrading options with solar panel (electric) and solar hot water installation, consumers will be able to minimize their total project costs and maximize their monthly savings. Additionally, property owners can structure their payments to have their investment costs offset by the energy and water savings generated by the improvements that they choose. This initiative is designed to provide the average residential and commercial consumer a cost-effective and time-saving means for undertaking an integrated package of retrofits to their homes and businesses, while at the same time creating a sustainable economic stimulus and job growth program for the City. The program will: (1) Identify energy and water upgrades that help reduce ratepayers monthly costs; (2) Execute a competitive bidding process that selects qualified contractors and sets maximum prices and minimum warranty and service standards; (3) Aggregate interested participants geographically to harness their collective purchasing power and maximize the potential for installation efficiency and savings; (4) Establish voluntary special assessment districts (under the authorization of AB 811) to fund the program through local bonds and allow participants to pay back the costs of these improvements through a voluntary fee assessment that will be added to their property tax bills; (5) Link local vocational job training in energy and water efficiency with focused business recruitment; and (6) Update municipal codes to encourage renewable energy and energy efficiency product installations and to remove institutional barriers.

Innovation Center. The City of Chula Vista partnered with the University of California San Diego and San Diego State University to establish the National Energy Center for Sustainable Communities to promote healthier and more productive communities by integrating clean energy systems and energy smart planning and design into development projects. To achieve this mission, the Center undertakes collaborative research, demonstrations and capacity-building to increase understanding about how alternative energy technologies, infrastructure systems and building materials can be combined with performance-enhancing land-use planning to produce low-impact, resource-efficient community development projects. Pilot projects, undertaken with key stakeholders, have explored technical solutions for integrating and optimizing technologies (i.e., energy efficiency, demand response, distributed generation, energy storage and smart grid technologies) that can accelerate the achievement of California's energy and climate goals and, eventually, further the achievement of water and other resource conservation objectives.

[60] Chula Vista Climate Action Plan at 27-32.

Sustainable Land-Use Development and Urban Design

Transit-Oriented Development. [61] The City is undertaking a number of projects to facilitate the "smart growth" envisioned in its General Plan (GP) and Urban Core Specific Plan (UCSP) with respect to certain Transit Focus Areas. The GP and UCSP call for high-intensity, mixed-use and environmentally-sensitive development near transit sites that can substantially reduce carbon emissions through reduction in Vehicle Miles Traveled (VMT). Such compact, efficient and sustainable development will provide a mix of housing, service uses and public facilities close to transit and other modes of alternate transportation, allowing the ability to access uses by walking and/or transit.

Energy-Efficient Community Development. [62] The SDG&E/Chula Vista Partnership contains an "Energy-Efficient Community Development" component. This initiative will build upon the current collaboration between the City of Chula Vista and SDG&E to demonstrate and develop methodologies for cost-effectively integrating energy-efficient and renewable energy technologies into large-scale development projects to increase energy savings and reduce GHG emissions. "Energy-efficient Community Development" (EECD) refers to the development of residential, commercial, institutional and mixed-use complexes and supporting infrastructure that combine renewable and advanced end-use and smart grid enabling technologies with performance-enhancing urban design and development practices to substantially reduce energy consumption and GHG emissions, while also furthering water, air and other resource objectives. This initiative aims to: (1) Develop and demonstrate new methods, tools, and practices to promote EECD in coordination with SDG&E's energy efficiency and emerging technologies programs; (2) Conduct pilots and prepare case studies to demonstrate the value of EECD; (3) Increase the capacity of development practitioners in partnership with area universities and trade organizations, organizing "train the trainer" courses; and (4) Establish the "business case" of EECD to existing and new businesses in the City. Based on this research, demonstration and capacity-building, the partners will develop a set of model EECD site design standards and guidelines and practical evaluation tools for local planning officials; a model municipal EECD policy; and recommendations on appropriate modifications to municipal codes and other planning instruments.

Chula Vista effectuates initiatives that it adopts through modifications to the City's building codes, land use policies, zoning ordinances and site design guidelines (for example, Air Quality Improvement Plan guidelines, Growth Management Ordinance, Design Manual and Guidelines, Municipal Code, Zoning Ordinance). Also, adopted programs and modifications are aligned with California Environmental Quality Act (CEQA) review requirements. Moreover, the City has included within its entitlement, permitting, and planning processes incentives for energy-efficient and renewable energy-based development.

Education, Marketing and Outreach [63]

In support of its initiatives, Chula Vista has always strived to raise consumer and business awareness and spur participation through quite varied and creative Marketing, Education and Outreach (ME&O) activities. Its ME&O efforts have employed techniques such as, Integrated Marketing of products and services and Internet-Based Information dissemination, to create effective "demand pull" for its efficiency

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[61] Chula Vista Climate Action Plan at 33-40.

[62] Chula Vista/SDG&E Proposed Partnership at 14-15.

[63] Chula Vista/SDG&E Proposed Partnership at 10-13.

and renewable energy actions. The EmPower Chula Vista program is designed to complement San Diego's Gas & Electric's residential and commercial energy efficiency programs by providing trained City staff to engage and educate Chula Vista businesses, residents and contractors about energy-saving opportunities. Chula Vista's staff conducts free energy efficiency and solar energy assessments for City businesses and residents using SDG&E's Energy Waves software and educates them on the utility's incentives for undertaking improvements. The City is broadening this program to help participants reduce energy usage by plug-load devices using a "Kill A Watt" device and to allow participants to monitor their energy consumption over a two-week period using a real-time energy monitor. Through the program's peer to peer efforts, the City conducts workshops to assist smaller South Bay communities pursue energy efficiency regulation, facility retrofit projects and community outreach campaigns.

VALUE OF RESEARCH IN ADVANCING SUSTAINABLE ENERGY PLANNING

From April of 2007 to September of 2009, the NECSC collaborated with the City of Chula Vista, San Diego Gas & Electric and local developers to advance the state of sustainable energy planning through a CEC- and U.S. Department of Energy-funded initiative known as the Chula Vista Research Project (CVRP). The project modeled the use of certain building energy technologies and community design features with respect to two large-scale greenfield development sites on the eastern side of Chula Vista, California.[64] One site was planned as a predominantly commercial mixed-use development on 206 acres of land. The other was planned as a predominantly residential mixed-use development on 481 acres of land. The technologies were bundled into the following three development options and modeled for 20 distinct building types planned for the two sites:[65]

- Energy Efficiency (EE) Option: advanced, highly efficient building envelope features, appliances and space conditioning equipment;
- EE – Photovoltaic (PV) Option: the EE option with the addition of solar photovoltaic panels;
- EE – Distributed Generation Option: the EE option with the addition of natural gas-based distributed generation technologies.

The following five alternative community design features were also modeled for each site:[66]

- Moderate-density, mixed-use, smart growth development;
- Stormwater runoff mitigation measures;
- Carbon storage and sequestration measures;
- Urban heat island mitigation measures; and
- Passive solar building orientation.

The findings of the engineering and planning analysis are presented in a guide for development practitioners entitled, "A Building and Site Design Reference Guide for Energy-Efficient Community

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[64] CEC, "Energy-Efficient Community Development in California: Chula Vista Research Project," Doc. No. CEC-500-06-004 (December, 2008), prepared by National Energy Center for Sustainable Communities at San Diego State University, at 5-6. ("PIER Project Report")

[65] Reference Guide at 2.

[66] Reference Guide at 2.

Development in California."[67] These findings indicate that combining advanced building energy technologies with community design features in a large-scale development project can reduce aggregate electric energy consumption (kWh) by approximately 43%; peak demand (kWh) by 45%; and carbon dioxide emissions by 35%, compared to a project designed for minimum compliance with California's Title-24 (2005) energy efficiency standard.[68]

In addition to the technical modeling and analysis, the CVRP researchers also conducted workshops, surveys and interviews with key stakeholders to examine perceived policy, market and institutional barriers, as well as investment risks, impeding adoption of energy-efficient community development in California and to generate recommended solutions. Participants included developers, builders, investors, municipal development officials, utility planners, real estate market experts and members of both environmental and community advocacy organizations. A companion document entitled, "Sustainable Community Energy Planning in California: New Challenges & Roles for Government Agencies, Utilities & the Development Industry," presents the key market and policy analysis findings of the Initiative. Most notably, the analysis found that, before EEDC features could become standard practice in the marketplace, a fundamental market transformation needed to occur, in which:[69]

- "The value of energy-efficient building technologies and community design features is recognized by all entities in the real estate development transaction chain; and that,
- This recognition results in market transactions that enable developers to capture capital investments in energy-efficient design features through real estate sale prices that are acceptable to consumers."

The research indicated that the following seven economic, information, policy and procedural barriers must be addressed in order for these market changes to occur:[70]

- Split Incentive dilemma: a misalignment between investment costs and benefits;
- Lack of consumer willingness to pay for the value of energy efficiency features;
- Investment risks inhibiting the financing of EECD projects;
- Lack of financial incentives for developers and builders;
- Lack of municipal investments in enabling green infrastructure;
- Lack of knowledge among municipal officials inhibiting approval of projects;
- Lack of uniform municipal policies, procedures and incentives.

The researchers concluded that state and local government and utility interventions will be necessary to overcome these barriers and risks to the adoption of EECD practices in the marketplace. Moreover, they found that it would take a combination of the following types of market "push and pull" efforts to transform the market to the point where EECD could be sustained without public or utility intervention:[71]

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[67] Id. at 2.

[68] Id. at 3.

[69] Id. at 3.

[70] Id. at 3.

[71] Id. at 3-4.

- Research to further estimate the economic and environmental costs and benefits of alternative energy technologies and community design features in large scale development projects;
- California-specific site development standards based on energy efficiency and carbon emissions reduction performance;
- Tiered and performance-based direct and indirect incentives for developers and builders;
- Product Labeling based on standardized ratings of energy and other resource use in individual structures and whole planned community development sites;
- Educational campaigns to inform the lending, investment, and real estate appraisal and brokerage industries about the value of energy and resource efficient buildings and community development;
- Development of real-time resource monitoring technologies and energy pricing; and
- Workforce training initiatives for municipal authorities.

By providing the CVRP's technical findings and policy guidance, the two guides will serve as valuable resources to public and private planning and development practitioners. In addition, the CVRP has made a valued contribution to institutionalizing sustainable energy planning within municipalities by applying and testing a toolkit of essential decision support tools and methods; evaluating the costs and benefits of alternative integrated energy solutions within the city's planning processes for site development; and clarifying critical ways in which such planning can be improved to help shape more effective policy measures, incentives and market-mechanisms that can overcome barriers to high performance, low impact community development.

Technical Value of the CVRP

Tools and Methods

The CVRP used state-of-the-art modeling and analytical tools to assess the cost-effectiveness of combining different energy technologies and practices in California's loading order with performance-enhancing community design options to improve energy delivery, energy efficiency and air quality in the greenfield developments and elsewhere in California. Using these tools and methods, planning officials and developers can compare the energy and environmental impacts and economic costs of alternative development scenarios and various growth patterns against a "business as usual" reference case.

In the CVRP, a "toolkit" of modeling software was used to evaluate different scenarios for optimizing energy performance, environmental quality and economic value. This toolkit consisted of six building and district energy technology and urban design modeling tools.[72] The "Building Energy Analyzer" and "Energy 10" tools analyzed and determined an optimal mix of energy-efficient building materials and advanced energy technologies for selected residential, commercial and institutional building types based on criteria of maximum energy savings and reasonable payback on investment. With these tools, building-scale evaluations were performed of the economic costs and emissions-related environmental and energy efficiency impacts of the following technologies: building envelope; operating equipment, appliance and plug loads; HVAC; lighting; control systems; DG with CHP; solar PV; solar thermal; and thermal storage. Subsequently, a "community-scale" analysis was performed to evaluate the aggregated

[72] PIER Project Report at 6.

economic, energy and environmental impacts of implementing each of the three building technology packages (EE, EE-PV and EE-DG options).[73]

"Termis," a hydraulic modeling tool, was used to evaluate the technical and economic feasibility of incorporating a district cooling system into the mixed-use commercial site.[74]

Finally, the tools, "City Green," "Mitigation Impact Screening Tool (MIST), and "CommunityViz," were used to model the energy and environmental impacts of the various community design options relating to land-use, infrastructure and transportation patterns and configurations. CommunityViz also was used to synthesize data impacts from the other software tools and to produce 360-degree visualizations and real-time impact simulations for stakeholder meetings in which alternative design options were evaluated.[75]

The further development of these types of tools and methodologies is critical for optimizing technical integration solutions within site development. Evolving the capabilities of these tools and methods will provide a clearer understanding of the environmental, economic and equity impacts of embedded energy costs and operational energy needs of urban infrastructure and urbanization. Based on this understanding, planning officials, utilities and developers will be able to better characterize and influence demand growth and also to shape energy supply investment decisions within communities. Moreover, planners, utilities, and developers will be able to take a more systems-oriented and holistic planning and development approach. Towards these ends, the CVRP made a notable contribution by focusing on applying and testing, through an open source and peer distributed process, interoperating software capable of assessing multi-faceted spatial design and technology elements in connection with the sustainable development of the greenfield sites.

Systems Assessment of Costs and Benefits

The CVRP makes clear the importance of conducting research to evaluate the integration of different technical options, combined with performance-enhancing community design and development patterns, within large-scale development projects. "Community-scale" research projects, such as the CVRP, provide the opportunity to explore distributed energy combinations and configurations on the building and site levels within the framework of energy distribution and transportation loads. The CVRP applied and tested new tools, methods, and practices to assess ways in which Chula Vista and other communities can capture the benefits of energy efficiency and clean energy supply without incurring undue technology risks and costs. The Chula Vista research project not only assessed the energy efficiency and climate change impacts of community development practices, but also examined the feasibility of achieving greater efficiencies through the use of alternative integrated energy solutions, clean energy supply and end-use technologies and community design options. With the objective of identifying cost-effective master plan options for "high-efficiency, low-impact community development, the project evaluated:[76]

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[73] "GTI Approach to Analysis of Selected Community Energy Efficiency Options," M. Czachorski (November, 2008).

[74] PIER Project Report at 21.

[75] Id. at 33-56.

[76] PIER Project Report at 157-176.

- Energy supply, demand and control technologies and strategies for residential, commercial and institutional structures and water and wastewater management;
- Energy strategies to incorporate renewable energy sources and clean energy co-generation and district energy systems into existing energy utility networks;
- Land-use allocations, densities, building orientations, landscaping and other design elements to maximize passive-heating, cooling and lighting for structures, increase storm-water runoff control and reduce urban heat island effect; and
- Transportation infrastructure strategies and mobility patterns that promote community walkability, reduce petroleum consumption, and reduce the emission of criteria air pollutants and greenhouse gases.

Basically, the CVRP introduced into the development planning processes for the two greenfield sites assessments of market feasible combinations of alternative energy technology options with enabling spatial design elements, with the objective of improving cost-effectively the overall energy performance and environmental quality of the developments. Projects such as the CVRP allow planning officials, developers, utilities and other stakeholders to take a "systems approach" to increasing substantially the efficiency, dependability, and sustainability of their community's energy infrastructure and built-environment. In such projects, the performance capabilities of different combinations of technologies with complementary attributes can be assessed within a full-scale community-based setting. For example, combining renewable energy heating and cooling with energy efficiency measures, demand response, and building-integrated solar electricity solutions could potentially enable "zero net energy" use in residential and commercial buildings within developments.

The CVRP modeled simulations suggest that significant benefits can flow from capitalizing on "smart growth" design elements that enable use of distributed energy resources, more efficient water use and waste management practices and more effective multi-modal transport options, including:[77]

- Reduced energy consumption and peak load demand;
- Deferred transmission and distribution expansions or upgrades;
- Increased utilization of existing utility infrastructure;
- Reduced electricity costs;
- Improved power quality and reliability;
- Increased gray water use and recovery;
- Reduced environmental impacts, including air and greenhouse gas emissions;
- Reduced risks in adopting energy efficient and renewable energy technologies;
- Reduced fuel demand and resulting emissions;
- Enhanced asset value and land use;
- Load following and dispatching capabilities;
- Reduced capital and operating costs for RE deployment;
- New value-added products and services; and
- Innovative transport and mobility strategies.

Alternative Planning Scenarios

Model-based integrated community design can create cost-effective opportunities for developing energy-efficient and renewable energy-based infrastructure within communities. As the CVRP demonstrated,

[77] Id.

these techniques can optimize the economic potential for distributed energy resource applications by creating the spatial conditions and load density needed for their economical use. The CVRP showed how "smart growth" development (mixed-use, greater densities, transit-oriented) can support more efficient community and building-scale technology options than would be possible using conventional development patterns and practices. For example, the CVRP illustrated how smart growth practices can make possible the development of district energy systems that provide heating and cooling services. These systems can contribute to maximizing the efficient use of a variety of fuels to co-generate and deliver electricity and thermal energy locally. Because district energy thermal networks can aggregate and link the heating and cooling requirements of dozens or hundreds of buildings, they create a greater scale of thermal energy use in a community that can facilitate fuel flexible solutions at a central plant or plants and allow for thermal storage applications that would not otherwise be functionally or economically feasible on an individual building basis. District energy systems can make economically and environmentally attractive the use of locally available renewable resources such as municipal solid waste, landfill gas, biomass, geothermal and solar energy.[78]

The CVRP findings also reveal the potential for integrated land-use planning and design to facilitate the development of energy smart networks within communities, including novel interfacing between power, transport and communications systems through enabling smart grid technologies. Using integrated systems modeling, alternative options could be assessed for smart grid ready distribution and interconnections between electric vehicles, buildings and the electricity grid. Charging plug-in electric vehicles on a home energy storage system could be coupled with renewable energy heating or cooling, combined heat and power ground source heat pumps and communication and control systems to enable peak shaving or load following capabilities. Using tools and methods such as those applied in the CVRP, communities can explore the inter-dynamics between urban systems planning and design, distributed energy resource applications and smart energy network development.

Performance Measures, Metrics and Model Site Design Standards

"True cost pricing" for energy-efficient and renewable energy-based community development will not be possible without the development of standardized methodologies for calculating the operational and embedded cost savings resulting from sustainability approaches and for monetizing the public and market benefits of integrated community and building energy systems solutions combined with smart growth design. Standardized measurement methodologies are necessary to assure real, verifiable and permanent GHG emissions reductions and energy savings. Specific performance measures, methodologies and reporting systems are also needed to manage resources as programs are developed and to measure the effectiveness of the programs in moving a community towards its sustainability goals and objectives.

The CVRP has contributed to the development of performance measurements by explaining and quantifying the effect land use has on energy and environmental systems, including impacts on energy consumption, grid utilization, peak demand, and greenhouse gas emissions. It is important that modeling and decision support tools continue to be developed to improve the integration of energy considerations into future planning and development efforts.

Under Chula Vista's Building Carbon Reduction Benchmarking program, carbon savings can be achieved either through energy efficiency efforts or community/site design. While there are established measurement protocols for quantifying energy savings and converting those savings into carbon-

[78] "Community – District Energy Systems: Preliminary Planning & Design Standards," National Energy Center for Sustainable Development and the International District Energy Association (2007) at 1.

equivalent emissions reductions, there are no accepted protocols for establishing baselines and quantifying energy savings and GHG emissions reductions resulting from integrated community design measures. Based on the findings of the CVRP and other inputs, the City will be supporting efforts to develop carbon benchmarks for community/site design features and then to convert the benchmarks into standards and measures for energy-efficient and low carbon community development. As part of this undertaking, practical evaluation methods and tools will be compiled for public and private planning practitioners.

Recently, the CEC funded the development of GHG protocols for energy efficiency and associated GHG emissions quantification and reporting with respect to buildings, land use development activities and the construction and operation of infrastructure.[79] These protocols will take into account the indirect effects that the location, design and operation of the surrounding built environment have on GHG emissions and energy use. These protocols aim to promote energy-efficient and GHG-reducing design, construction and operation of built environments. If these protocols are adopted by CARB, they will play a key role in ensuring that energy strategies that are adopted at the local level can be appropriately quantified and credited toward California's efforts to reduce GHG emissions.

Finally, standardized performance measurement and verification will be necessary for quantifying and valuing multiple resource benefits arising from integrated design solutions and integrated demand-side management (DSM) programs that cross resources, including energy, transport, water, waste, and air quality. With respect to overall sustainable community resources management, the CVRP highlighted the need to quantify and value the embedded energy costs and operational energy needs of urban infrastructure and urbanization as essential for crafting market-changing policies and business and financial models.

Institutional Value of the CVRP

A Framework for Energy Planning and Collaboration

Need for a Collaborative Framework. In its "RESCO" solicitation, the CEC indicated that "optimizing" a community's future energy infrastructure to rely more heavily upon local renewable energy sources and energy efficiency will require a "framework" in which community leaders, developers, planners, utilities and other stakeholders can plan and collaborate. Indeed, such a framework for sustainable energy planning is needed to evaluate alternative technical options and development scenarios in order to more effectively influence demand characteristics and shape supply strategies within a community context. Moreover, this framework needs to be an integral part of municipal and regional planning and development processes to facilitate integrated energy and environmental systems solutions for meeting community energy needs more cost-effectively than is possible using individual technologies or focusing upon individual sectors, buildings or development projects. This framework also needs to stress the importance of sequential and iterative planning of capabilities and solutions, informed by lessons learned from initiatives such as the CVRP.

As discussed previously, a variety of market and policy drivers, relating to increasing energy demand arising from population and economic growth, high and volatile energy prices, California's new climate and energy requirements, and advancements in energy supply and end-use technologies, are motivating

[79] CTG Energetics, "Scope of Work" in response to CEC Solicitation, "Technology Innovation in Buildings and Communities," RFP No. 500-07-503 (2008).

localities and regional areas within the State to consider ways to plan and manage their energy supply, in addition to creating a more energy-efficient and environmentally sound built-environment. To promote investments in clean energy supply and energy efficiency on a community-scale, localities will need to establish a governance mechanism for energy planning and consensus building. In this way, the locality and its stakeholders can address and balance the public and private interests that come into play in developing community energy infrastructure that can deliver higher quality, and more cost-competitive and reliable energy services for all users within a community, while also minimizing costs and environmental impacts.

The municipality of Chula Vista has laid a solid foundation over the years for stakeholder engagement in energy and resource planning through its climate, energy security, municipal energy efficiency, water control, air quality improvement and "smart growth" planning. Each of these planning efforts has involved open, participatory processes and has shaped the City's General Plan, Municipal Code and local ordinances and other planning documents, as well as programmatic actions.

Towards A Comprehensive Framework for Sustainable Land Use and Growth Management

In approving and hosting the CVRP, the City took a significant first step towards creating conditions in which stakeholders could one day interact with the City not only to assess more systematically the impacts of land-use and growth management decisions with respect to each of the above-mentioned planning areas, but also to assess holistically how to manage and minimize adverse impacts from production, consumption and waste disposal and how to integrate clean technologies into community buildings and infrastructure. Lessons learned from initiatives such as the CVRP can assist the City in establishing, ultimately, a more comprehensive development framework in which the City and its stakeholders can take fully into account considerations relating to all of the interdependent community systems that need to be addressed to evolve sustainable urban design: natural systems (land, climate, water, habitat), land use systems (urban, agricultural, forests, wetlands, barren), mobility systems, energy systems (distributed energy resources), environmental management systems (municipal solid waste and wastewater treatment) and building systems.[80] Within such a broader framework for sustainable development, energy supply and demand planning would be undertaken in a manner that is fully compatible with the management of all resources within the community, as well as within the San Diego region in which the City is located. This, however, will involve a long-term evolutionary process.

Economic, Environmental and Social Value of the CVRP

In the shorter term, the CVRP suggests the benefits that could be obtained from establishing a framework for sustainable energy planning and collaboration. In the CVRP, the City brought together major stakeholders to model and consider alternative scenarios for developing two greenfield sites. The City provided these stakeholders the opportunity to evaluate upfront alternative energy supply and end-use options during the master-planning stage of the development process. The findings of the research helped to increase understanding about more environmentally and economically preferred outcomes with respect to the development projects, consistent with advancing the sustainability of the community at large. This type of stakeholder participation could be formalized as part of a planning and collaborative process that builds upon and consolidates the City's CO_2 Reduction Plan and Climate Change Working Group measures, Energy Strategy and Action Plan, Municipal Building Energy Efficiency Policy, Water Control Management Plan, Air Quality Improvements Plan and Partnership with SDG&E. Initially, the

[80] GTI Model Design at 17-25.

process could focus on public works and municipal facilities projects, as well as voluntary private development projects at greenfield, infill and brownfields sites.

Putting into place such a governance mechanism would allow the City to engage with major stakeholders to systematically assess and document the economic, environmental and social value of sustainable urban development, using energy as a key measure.[81] It also would foster collaboration on integrated energy and environmental solutions, based on a more accurate understanding of the impacts, risks, benefits and costs associated with developing distributed energy resources within "smart growth" urban design and site planning scenarios. The understanding gained would increase the capability of City officials to structure more effective programs, measures and partnerships to overcome technical, market, regulatory and other barriers to energy efficient and renewable energy-based community development. Furthermore, building a consensus among major stakeholders on the business case for sustainable community-based energy resource development would help to mobilize both public and private investment in infrastructure that can accommodate advanced and emerging technologies.

An established process for planning and consensus building would also assure further development of decision support tools and methodologies. The CVRP tools and methods helped the City and the participating stakeholders appreciate more fully the impacts that land-use and growth management decisions can have over the long term and the difference that alternative planning approaches can make. As a result of the CVRP, officials and stakeholders achieved a better understanding of the direct and embedded energy consumption and emissions impacts of alternative building and site design options and their costs and benefits relative to the use of conventional practices. The CVRP tools and methods also generated information crucial to designing strategies for the integrated use of renewable energy and advanced end-use technologies within "smart growth" development scenarios that take into account the basic systems of urban sustainability.

In addition, as the CVRP clarified, "community energy systems" development needs a framework in which stakeholders can address the vital issues raised in connection with changing a community's energy infrastructure. Energy systems solutions could potentially alter dramatically the balance of primary and secondary energy delivered to communities with quite considerable implications for current electricity and gas markets and infrastructure. Resolution of these issues, albeit outside the legal authority of municipalities, would, nonetheless, benefit from deliberations by major stakeholders within an open and established municipal participatory planning process. In the case of a CEC "RESCO," for example, onsite generation of electricity would reduce significantly or even eliminate electricity imports from the centralized grid. Similarly, onsite generation of building heating and domestic hot water would reduce demand for retail deliveries of natural gas and conversion of air-conditioning loads to thermal-based technologies would eliminate the need for retail electricity deliveries. On the other hand, integrated technology solutions could enable the delivery of ancillary services to the grid or even peak generation and dispatchability. Moreover, the establishment of distributed energy systems, including district energy and renewable energy systems and networks, would entail changes in the legal, regulatory and operating frameworks developed to support current centralized power and fuel infrastructure.

Finally, a framework for sustainable energy planning would also afford municipalities and their stakeholders the opportunity to address more comprehensively the different levels of risks and benefits associated with various energy efficiency and energy supply investments within a community's built-environment and infrastructure. During California's energy crisis, the City of Chula Vista evaluated a

[81] Id. at 25; GTI Blueprint at 6.

portfolio of energy planning options to gain more control over the City's energy demand and supply.[82] At that time, however, many of the smaller scale and modular energy supply and end-use technology options that are now in the marketplace were not commercially available. These new technologies have redefined small-scale generation, distribution and efficiency opportunities at the urban scale. Within an established structure for sustainable energy planning and consensus-building, communities could examine a range of options to determine what types of actions would best address local energy needs, given the particular circumstances, economic constraints and energy resources; and, also to determine how to structure and fund appropriate partnerships, programs and measures that could contribute both to achieving California's climate and energy goals and to furthering the community's own resource management and economic development objectives. Energy planning options cover a broad range of choices, starting with those options having low or manageable risk and relatively short-term payoffs (i.e., energy efficiency and climate action programs); continuing with those with significant benefits, but also increased risk and medium-term payoffs (i.e., distributed generation opportunities for City facilities and economic development); and, finally extending to those options that require large capital outlays and carry significant risks and longer-term payoffs (i.e., forming a municipal utility or becoming a municipal community choice "aggregator").[83]

However, irrespective of the level of planning that a community chooses to pursue, it would help in charting an effective path towards sustainability to establish an open and participatory process for energy planning that is integrated into the community's land-use planning and development processes. As to certain specified categories of development, this planning process could afford the opportunity for major stakeholders to consider upfront the costs and benefits of using alternative market-feasible combinations of distributed energy technologies in smart growth development scenarios. Such planning would seek to promote technical integration solutions that can maximize economic value and energy performance, while minimizing costs and environmental impacts. Screening criteria could be defined for selecting specific development projects for stakeholder participation among pre-established categories. The criteria could be based on, for example, the potential GHG and energy savings that could result from energy-integrated, land-use planning and the contribution of the project to the overall sustainability of the community.

"Strategic Vision" and Sustainability Criteria. To benefit more fully from projects such as the CVRP, communities need to establish a "vision" of a sustainable future, along with sustainability criteria or performance indicators and specific objectives and tactical approaches for achieving the vision over a reasonable period of time.[84] While the CVRP evaluated alternative development scenarios against a "business as usual" reference case, it would be beneficial to compare alternative technology and community design options against agreed upon sustainability criteria intended to progress a community's vision and its tactical strategies for achieving that vision. In particular, it would aid in identifying knowledge and technical gaps that could be addressed through further research. Moreover, a community's vision and tactical strategies could help define, in the first instance, project design principles and sustainability objectives.

This vision of a sustainable future should reflect a balance between the community's means of continued growth and development and the maintenance of local and global environmental quality. The vision and

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[82] See, Chula Vista Energy Action Plan.

[83] "MRW Assessment of Chula Vista's Energy Management Options," Executive Summary, MRW (April, 2001) at 1-2.

[84] GTI Model Design at 58.

sustainability criteria should be the products of a consensus reached among representative interests for each sector of the community and major segments within each sector, as well as special interest groups that represent cross-segment concerns. Knowledge gained from initiatives such as the CVRP can help to inform this vision and the development of the sustainability criteria, particularly with respect to the energy and environmental elements. Once the sustainability vision and criteria have received broad public comment and have been finally revised, they should be adopted in a municipal policy statement that would not only guide the community's strategic planning, but also, the community's development policies and planning processes, general governance, public services and operations.[85] The sustainability criteria or performance metrics will provide a means for assessing progress and for prioritizing and selecting strategies and tactics to pursue.

In the case of Chula Vista, a sustainability vision and performance indicators would guide the City's development planning along three different tiers: (1) Citywide Level – Smart Growth principles have been effectuated through the City's General Plan and Updates; (2) Sectional/Community Planning Level – The City has developed and implemented planning concepts in new SPA Plans and Community Plans; and (3) Project Level – Energy efficiency and carbon dioxide reduction are promoted in individual residential and non-residential construction projects.[86]

INSTITUTIONALIZING SUSTAINABLE URBAN ENERGY PLANNING: *Aligning Strategic Growth Policies and Planning Frameworks at all Governmental Levels*

LUSCAT's Long-Term Vision for Land Use Planning in California

In its recommendations to CARB, the Land Use Subgroup of California's Climate Action Team (LUSCAT) outlined a vision for State policies on land use planning to advance the State's climate agenda.[87] The Subgroup advised that California's 2020 and 2050 climate goals will require the incorporation of GHG emission reduction strategies into statewide long-term land-use planning. It also found that these goals would benefit from an integrated approach to land-use planning that aligns federal, state, regional and local growth management planning processes, methods and tools. LUSCAT recommended that GHG strategies be integrated into land-use planning in a manner that also supports and furthers the State's land-use, economic development, transportation, housing and resource planning goals.[88] Because it cross-cuts all sectors that use energy and seeks to shape fundamentally urban growth and development, sustainable urban energy systems planning needs to be built into this framework and linked to all of these growth management planning processes.

Recognizing the large and long-term consequences that land use decisions can have on energy consumption and GHG emission levels, the Subgroup set out a vision of an integrated and aligned long-term land-use planning process that incorporates the following guiding principles:[89]

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[85] Id. at 58-61.

[86] Chula Vista CO2 Reduction Plan at 2.

[87] LUSCAT Submission at 5.

[88] LUSCAT Submission at 6.

[89] Id. at 6-8.

- **"Reducing GHG Emissions:** The State should strengthen and coordinate existing and potential planning strategies and processes to assist not only in reducing GHG emissions associated with land use decision making, but also in furthering co-benefits such as resource conservation, affordable housing, etc;
- **Comprehensive Yet Flexible Planning:** An integrated and comprehensive land use planning policy should be developed by the State to coordinate the goals and requirements of Federal, State, Regional and Local government agencies and be flexible enough to be responsive to the needs of each;
- **Coordination of Planning Efforts:** A statewide policy will facilitate the coordination of planning efforts at all governmental levels through information exchange, training, education and outreach to promote efficient use of existing planning resources and control costs of infrastructure extension and maintenance;
- **Land Use Planning Incentives:** A coordinated statewide policy will address existing financial disincentives to GHG-related local and regional planning, recommend incentives, embrace life cycle costs and life cycle assessment in planning evaluations, and explore links with federal transportation and other funding;
- **Building Upon Existing Planning Models:** Integrated planning will build upon existing planning models for regional development as outlined in the "Regional Blueprint" project;
- **Inclusion of Utilities in Infrastructure Planning:** Comprehensive planning will address the distribution of water and power, including electricity generation, along with other future infrastructure needs; and
- **Planning Decision Impacts on Population Growth and Distribution:** The impacts of planning decisions on efficiently accommodating population growth and distribution will be addressed, including restrictive land use practices that limit infill and an adequate housing supply."[90]

These principles already are manifested in SB 375 which directs California communities to account for climate change impacts of development in regional planning efforts. California is the first in the nation to embrace comprehensive efforts to link land use planning, transportation and greenhouse gas emission reductions as a way to reduce Vehicle Miles Traveled (VMT).

While the LUSCAT recommendations to CARB primarily focus upon reducing GHG emissions from the transportation sector through smart growth and the development of transportation demand management and alternative mobility options, the Subgroup's principles and recommended strategies create a framework in which sustainable community energy systems planning should be integrated to contribute to the State's climate objectives. The LUSCAT has focused on developing new cross-cutting land use planning strategies, recognizing that land use decisions impact many sectors, including energy infrastructure.[91] However, in its treatment of the electricity sector, the entire focus is upon central power plant and transmission infrastructure planning and siting.[92] Although LUSCAT recognizes that GHG emissions can be substantially reduced by using alternative energy and on-site generation for water and wastewater treatment,[93] the Subgroup did not address the potential efficiencies and GHG emissions reductions that could be captured by combining onsite-renewable generation and distributed energy

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[90] Id.

[91] Id. at 13.

[92] Id. at 44-46.

[93] Id. at 43.

resources with smart growth at the community level. This is an area, therefore, for further development, but one that would not only complement, but also enhance the LUSCAT long-term land use planning vision. At the same time, the institutionalization of sustainable energy planning would be significantly advanced by being explicitly folded into this envisioned integrated land use planning process. Successful institutionalization of energy smart development requires support from both State programs and regional planning capabilities.

State Leadership

Addressing Energy Planning in State-Wide Land Use Policies to Achieve GHG Emission Reductions. The California Constitution gives local governments the authority to make land use decisions within their municipal boundaries. However, in order to ensure that State-wide policy objectives are also met, California's legislature and Governors have vested various state agencies with influence over certain land use decisions.[94] Senate Bill 375 represents such a policy action. It aims to address the GHG impacts of land use decisions through a collaborative effort between CARB and regional and local governments, in which CARB sets regional GHG emission reduction targets and the regions develop with local governments "Sustainable Communities Strategies" to achieve the targets. In addition, the State Attorney General has called upon local governments to use their CEQA compliance requirements to address GHG impacts and mitigation strategies of local development policies. The Governor's Office of Planning and Research (OPR) already has identified a variety of ways to include energy considerations into overall land development planning in its General Plan Guidelines and is revising State land use policy objectives to include GHG mitigation. In an update of its General Plan Guidelines and CEQA Guidelines, OPR will provide information about how to address climate change issues in general plans and CEQA evaluations through policies, objectives and implementation measures.[95]

These developments open up an opportunity to garner State support for including sustainable community energy planning (energy smart development) as a vital component of the state-wide integrated land use planning strategies. This inclusion would significantly leverage smart growth to maximize energy savings and GHG emission reductions within communities and regional areas. In this regard, State support is critical for emphasizing the need for sustainable energy planning in order to accelerate GHG-reducing and energy-efficient growth in a manner that furthers the State's land use policy objectives relating to transportation, housing, water conservation, natural resources protection, air quality and energy infrastructure. Community energy infrastructure planning needs to be addressed as part of land use strategies for the energy sector (which currently focus principally upon utility-scale energy supply) and interrelated with the policy objectives for all of the sectors subject to growth management planning. Doing so would help to advance the distributed energy priorities set out in California's Energy Action Plan and Integrated Energy Policy Reports. As mentioned at the outset of this paper, sustainable energy planning that guides the use and development of distributed energy resources within local land use processes can assure responsible resources management "that meets present needs without compromising the ability of future generations to meet their needs." It is especially important that such energy planning

[94] Id. at 8. Local governments hold the majority of land use authority in California and express their legally enforceable policies through general plans and zoning codes that are required by the State. General Plans set forth objectives, principles, standards and proposals for development. State law requires these general plans to address land use, circulation, housing, open space, conservation, safety and noise. There is no requirement that a general plan include an energy element and only about 10 percent of California's general plans include an energy component. See, 2007 IEPR at 268.

[95] Adopted 2008 IEPR Update at 119. See also, CEC Roadmap at 54.

be promoted by the Governor's Strategic Growth Council in its efforts to coordinate and support sustainable infrastructure and development planning. Also, the OPR GHG Guidelines for CEQA, as well as for General Plans, should stress the benefits of sustainable local energy planning in holistically addressing and mitigating the cross-sectoral GHG impacts of land use development policies.

Promoting sustainable urban energy planning within the context of state-wide integrated land use planning strategies would provide meaningful direction to initiatives such as AB 811 and "Community Choice Aggregation."[96] In particular, placing the planning and development of community energy infrastructure within this larger context would, in turn, shape the manner in which these types of initiatives are undertaken and their effect on the development of clean and distributed energy resources within communities. Among other things, the inclusion would assure the incorporation of more strategically aligned energy and environmental goals and performance objectives in urban planning and economic development. The systems approach taken in sustainable energy planning matches the integrated approach to land use planning that California is seeking to take to mitigate the long-term risks that climate change poses in urban environments. In this regard, sustainable energy planning would amplify the effects of smart growth strategies with respect to each of the sectors that land use decisions impact the most: expanding transportation choices; conserving green spaces and natural systems; improving air quality; increasing the efficiency of water and wastewater management; furthering urban systems solutions that combine a mix of local renewable energy sources with community-based energy efficiency, smart grid, energy storage, CCHP, district energy or demand response capabilities to improve overall performance and efficiency, while lowering costs and environmental impacts; and promoting energy efficient community and housing designs that advance transit-oriented development, encourage infill and mixed-use development, and reduce energy use and promote renewable energy integration into commercial, institutional and residential buildings and complexes.

By combining sustainable energy planning with smart growth as the basis for integrated state-wide land use planning to address GHG emissions, the California State Government would not only be able to provide better guidance on overall growth, but also on transportation and non-transportation infrastructure investments.[97] Inclusion of such planning within this integrated framework would provide the bridge necessary to connect community infrastructure development with efficient electric utility resource planning, a connection that could not be made with a focus solely upon smart growth development within the boundaries of a municipality. As a result, efforts to influence infrastructure and land use planning and development in support of the State's climate policies would not be limited to reducing or limiting the growth in vehicle trips or vehicle miles traveled.

Alignment of State Policies and Criteria Based on a "Shared Vision" with Regional and Local Authorities. Linking sustainable energy planning to the State's policy objectives for each of the sectors for which growth management planning is undertaken, would allow the State to create criteria for both energy smart and smart growth development within integrated state-wide land use strategies for attaining GHG emissions

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[96]California Assembly Bill 117 (Migden, Chapter 838, Statutes of 2002). The purpose of the Community Choice Aggregation ("CCA") is to allow local governments to pool the electricity demand of their residents and businesses in order to lower prices and promote cleaner sources of power. This allows cities to have local control of electricity supply and energy efficiency programs, giving city councils decision-making power over resource planning and rate-setting.

[97] Also, the State could build upon the Governor's Strategic Growth Plan by requiring that all state financing for infrastructure incorporate energy use reduction strategies and climate considerations.

reductions. This, in turn, would provide a basis upon which the State could provide targeted financial and technical assistance through the direct and indirect ways in which its agencies affect growth and infrastructure development within California, consistent with the principles outlined in the LUSCAT's vision.

In light of California's climate and energy goals, it is important that the State provide overall direction and guidance to regional and local government agencies by adopting policies to address land use decisions directed at reducing GHG emissions. However, the State government should do so in a collaborative manner that preserves the authority of local governments to make the land use and local infrastructure decisions and that promotes partnerships with major stakeholders. In the case of SB 375, CARB is charged with defining regional GHG emission reduction targets for land use and transportation related GHGs, but regional and local authorities are given the flexibility to design sustainable community strategies to meet the targets.

California State agencies are "leading by example" in incorporating GHG emission reduction as a fundamental element of planning, designing, siting, developing and operating state-owned or leased facilities.[98] This is, for example, reflected in the Governor's Green Building Initiative.[99] Such leadership also needs to be directed at state-assisted infrastructure, land use planning and development to assure that GHG considerations are taken into account in appropriate fiscal, technical and regulatory land use programs, guidelines, standards and criteria.[100] As mentioned, these efforts should explicitly encourage energy smart development patterns and practices in combination with smart growth strategies.

As the LUSCAT recommended and as embodied in SB 375, the State should build upon existing planning models for regional development, such as strengthening and expanding the Regional Blueprint Planning process (discussed below) to improve land use and mobility planning and implementation.[101] In particular, the State should include into this model emphasis upon sustainable community energy system development as an efficient and GHG-reducing way to improve land use and mobility planning and implementation.

The policies and programs that the State adopts should reflect both the responsibility that all government agencies (from federal to local to special districts) share for improving land use decision-making and a commitment to collaborate at all levels.[102] This should be re-affirmed through the establishment of a State liaison entity and a cross-cutting advisory structure, in which representatives of local and regional authorities, and relevant local institutions and advocacy organizations, could participate to provide input

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[98] LUSCAT Submission at 55.

[99] Governor's Green Building Initiative (Executive Order S-20-04) requires that the state implement all cost effective energy conservation measures in its own buildings to reduce energy consumption by 20 percent by 2015. The CEC developed a report, "AB 2160 Green Building Report," setting forth findings and recommendations on financial and other project delivery mechanisms for promoting energy and resource-efficient projects in the state's own buildings. California Assembly Bill 2160 (Lieu, Chapter 742, Statutes of 2006) directed the CEC to submit the report to the Governor's Green Action Team.

[100] LUSCAT Submission at 9.

[101] Id. at 7.

[102] Id. at 9.

to State agencies on the development of policies, incentives and market-based mechanisms. Establishing these structures would enable a partnership process that could, in coordination with the Strategic Growth Council, OPR, the Business, Transportation and Housing Department, CARB and other agencies, examine ways to improve land use planning and growth management and offer recommendations to the Governor and Legislature.[103] Such a process could give consideration to requiring an energy element in General Plans, as well as elaborating on the energy content to be included in CEQA evaluations, Regional Housing Needs Plans, Urban Water Management Plans, Regional Transportation Plans and the like. This partnership process also would provide a means through which public and private stakeholders could identify barriers to efficient land use development and prioritize key policies and strategies that need to be addressed to meet regional targets. Furthermore, these mechanisms could provide a means for designing supportive measures for energy-efficient and renewable-energy based community design and development, including establishing a municipal sustainable energy infrastructure fund.

State authorities need to work in partnership with stakeholders and representatives of regional and local governments in developing clear guidance in the form of guidelines, information, methodologies, and technical resources. It is vital that the necessary financial and technical assistance and training be provided to assure that the California planning community has the requisite tools, resources and capabilities to implement new climate-related land use policies issued by the State. Working closely with local and regional authorities and stakeholders, State agencies should design policies and programs that provide legal and technical assistance to guide decision-making and build capacity at all governmental levels, while allowing for local implementation flexibility.[104]

In particular, the State needs to standardize methodologies for measuring and estimating future expected GHG emissions within municipalities and regional areas.[105] The State should enlist local governments, such as Chula Vista, that have implemented successful climate, clean energy or sustainability plans to assist in the development of protocols for measuring emissions and accounting for reductions, as well as in the development of modeling tools to support emission quantification at the local level. Measurement tools should allow local governments to evaluate and compare the GHG emissions and energy savings of alternative land use planning decisions. It also will be important to establish procedures for certifying software tools to be used in quantifying emissions and energy savings. Furthermore, the State should engage local and regional authorities in setting up a centralized information database of case studies and best practices for reducing GHG emissions, especially measures for reducing emissions from sources that are directly affected by local governments such as municipal operations and discretionary land use practices.[106] Data compilation, such as inventories of GHG emissions of regional areas, also will be necessary to track progress towards goals and to assess the effectiveness of measures implemented.[107]

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[103] Id. at 10-11.

[104] Id. at 9.

[105] Id. at 10-11.

[106] Id. at 54.

[107] Id. at 11.

Expansion of Regional Blueprint Planning

In developing a statewide land-use planning framework for furthering its climate objectives, California is keying into regional planning efforts throughout the State that have been enabled by a federal mandate for regional transportation planning, state devolution of transportation planning decisions to countywide authorities, and statewide mandates for regional fair-share housing needs allocations.[108] There is a clear recognition that isolated local smart growth initiatives would be insufficient for affecting sustainable regional form without complementary coordination and investment through regional growth planning. An array of regional authorities in the most urbanized areas of California have been using these planning frameworks as a means of addressing smart growth and sustainability, spurred by fiscal constraints and the quality of life impacts of sprawling urbanization.[109]

However, "energy" has only recently been addressed in such regional planning efforts as a result of California's focus upon dealing with the risks of climate change. The San Diego Association of Governments (SANDAG) was the first to develop a "San Diego Regional Comprehensive Plan" (SDRCP) in which SANDAG treated energy as a fundamental component of its infrastructure strategy and set out targets for indigenous regional production, deployment of renewable energy resources, energy efficiency and imported supplies.[110] These targets were the product of an extensive public input process that resulted in a Regional Energy Strategy, a detailed "Energy Infrastructure Study" and, ultimately, the formation of an Energy Working Group through SANDAG.[111] Such efforts of SANDAG and other Councils of Governments need to be drawn upon by State authorities, both with respect to developing integrated state-wide land use policies for addressing GHG emission reductions and expanding regional "Blueprint Planning" processes to go beyond a focus upon transportation and housing to include also community energy infrastructure.

The CEC has funded a partnership with SANDAG to develop model General Plan, Regional Comprehensive Plan and Regional Climate Plan materials, with a focus on transferability to other regional and local bodies. All of these model materials will incorporate energy and GHG emission considerations. Moreover, as LUSCAT pointed out, these plans can be developed in concert with long-term growth planning by using the available Blueprint database and planning outcomes as the baseline and future growth quantification.[112] If planning is coordinated in this way, LUSCAT noted that then energy cost, emissions and alternative scenario information will become a meaningful component of regional and local economic and environmental policy.[113]

Indeed, Regional Blueprint Planning provides a means for coordinating multiple planning activities for more efficient and effective results.[114] Key goals of the State Blueprint Planning Program are to: (1)

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[108] CEC Roadmap at 56.

[109] CEC Roadmap at 55.

[110] Id. at 56.

[111] Id.

[112] LUSCAT Submission at 21.

[113] Id.

[114] Id. at 23.

Foster a more efficient land use pattern that (a) supports improved mobility and reduced dependency on vehicle travel, (b) accommodates an adequate supply of housing for all incomes, (c) reduces impacts on valuable habitat, productive farmland and air quality, (d) increases resource use efficiency, and (e) results in safe and vibrant neighborhoods; and (2) Provide consumers more housing and transportation choices.[115]

Blueprint plans are the joint product of Metropolitan Planning Organization ("MPO") and local government collaboration and feed into Regional Transportation Plans and Regional Housing Needs Plans.[116] The MPO, whose Board of Directors is comprised of elected officials from cities and counties, provides an ideal forum for consensus-building among regional agencies, local governments, State agencies and stakeholders and for marshalling funding to implement sustainable land use, transportation, housing and energy and resource plans.[117] LUSCAT recommended that the State invest in the Blueprint Planning program to serve as the analytical regional and local government backbone of the State's efforts to affect sustainable energy use and GHG emissions reductions across multiple sectors.[118] However, the Blueprint Planning program needs to be connected to a State liaison entity that could deliver various and interrelated planning services to regional and local governments including: mentoring planners, officials and modelers; training public and private planning professionals in the use of modeling and analytical tools and methods and land use planning and forecasting software; providing grant funding and oversight of the effectiveness of planning efforts; establishing on-line access to planning software and training and model Blueprint products; assisting regions in developing data collectives using standardized databases and models that allow for comparative analysis and that facilitate collaboration among municipalities within each region; establishing a mechanism for identifying appropriate private sector partners; identifying technical and information gap areas for research and development, etc.[119]

However, under current limitations, Blueprint Plans can only direct funding support to transportation-related activities.[120] There is also a lack of funding or alternative financing mechanisms to support the implementation activities of local governments to reduce GHG emissions, particularly related to infrastructure and transit. The State, therefore, should work with regional and local governments to broaden the scope of Blueprint Planning support and to develop funding mechanisms to support strategic planning, plan implementation and community design evaluations, so that the funding of these activities is not solely dependent on sales tax revenues, new development or transportation funds.[121]

Major metropolitan areas in California have been actively pursuing "Blueprint Planning" processes that encourage the type of land use development and transportation infrastructure that will improve air quality,

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[115] Id. at 30.

[116] Id.

[117] Id.

[118] Id.

[119] Id. at 59. The Blueprint Learning Network currently coordinates with state and regional agencies to share experiences and best practices in making better infrastructure investment decisions.

[120] Id. at 32.

[121] LUSCAT Submission at 23.

reduce vehicle trips and trip lengths and provide more transportation and housing options.[122] As a result of SB 375, MPOs are now working collaboratively with local governments to create regional visions for sustainable community development and then to map out strategies for attaining regional land use-related GHG targets. State-level policies and reforms need to enhance further these regional actions, both within the near-term as well as over the longer-term, by expressly fostering sustainable energy planning in combination with smart growth strategies as integral to addressing GHG emissions. Moving energy and GHG considerations into regional "Blueprint Planning" frameworks and processes will help overtime to close the gap created by the current lack of appropriate local government planning structures and requisite analytical capabilities to address these matters.

Moreover, the relationship between Regional Transportation Plans and local municipality General Plans provides an opportunity to link GHG reduction and energy saving assistance, mandates and incentives with federal investment in transportation infrastructure, transit planning, land use and economic development planning.[123] Similarly, another nexus that LUSCAT identified that could be established is with the planning activities of Air Quality Management Districts ("AQMDs") to increase adoption of "Indirect Source Rules."[124] These rules require developers to reduce or mitigate emissions growth from new residential, commercial, institutional and industrial development and redevelopment projects caused by impacts on traffic, site planning and land use patterns. LUSCAT pointed out that, if adopted by all ACMDs or required by CARB, indirect source rules could serve as the basis for establishing a market mechanism for reducing GHG emissions from new development or the redevelopment of properties.[125]

Within these new planning frameworks, partnerships need to be promoted between regional and local authorities and electric utilities (investment-owned utilities and municipal-owned utilities) and energy service providers. In particular, these partnerships need to be encouraged at the regional scale to increase understanding about the planning contexts for local municipalities and electricity planners, improve decision support tools, and link the use of these tools to both utility and community needs.[126] Sustainable community energy planning should be better aligned with long-term electric utility resource planning processes that are undertaken under the auspices of the CPUC and guided by the CEC's Integrated Energy Policy Report proceedings.[127] These Partnerships, which could be formed through Councils of Governments ("COGs"), could help to develop effective tools and methods for incorporating energy supply and demand and infrastructure analysis into existing regional housing, land use, water supply and wastewater, and transportation planning processes. These tools and methodologies are needed to integrate energy analyses of emerging alternative sustainability and resource planning efforts into existing regional growth planning frameworks and processes. Utilities and regional agencies also could partner on designing and funding regional community energy smart planning grants to public and private entities to support the integration of energy efficiency and renewable energy technologies into smart growth development in furtherance of regional planning objectives.

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[122] LUSCAT Submission at 10.

[123] Id. at 27.

[124] Id. at 48.

[125] Id.

[126] 2007 IEPR at 272.

[127] This recommendation is consistent with the longer-term objective stated in the CPUC 2008 EE Strategic Plan of investigating "the integration of utility infrastructure planning with potential community-based codes" at 71.

Proactive Cities and Communities

A New Role for Communities in Energy Planning. The long-term reach and comprehensive nature of California's climate and energy goals has led to a "re-visioning" of the State's strategies for developing energy efficiency and renewable energy resources. In particular, California is now promoting technically integrated and cost optimum solutions in a community energy system context, as well as supporting "Renewable-Based Energy Secure Community" planning. In this way, the State is tapping into community-scale economics to develop all feasible, cost-effective and reliable energy efficiency, demand reduction and locally available renewable energy resources. To further this strategy, the State is looking to municipalities to address the GHG impacts of their development policies and to exercise their broad authority over land use planning to maximize energy savings and emissions reductions. This new approach focuses on changing the energy infrastructure and built-environment within communities to increase sustainability. It, therefore, introduces a quite different dynamic for purposes of local government involvement in energy planning than in the case of increasing efficiencies and improving environmental quality under current energy system and infrastructure parameters. It is a new course of action that necessitates the undertaking of local sustainable energy planning, as an integral part of land use development processes, in order to identify and capture in an orderly and capital efficient manner the potential economic, environmental and equity benefits of community-based energy efficiency and renewable energy. Attaining low impact, high performance "community" development will not be achievable without integrating community energy systems planning and design into land use development processes. Holistic, long-term planning will be required to achieve a highly efficient energy supply infrastructure combined with energy-efficient buildings and other distributed energy resource applications. Also, integral to this process is the establishment of a framework within which community leaders, developers, planners, utilities and other major market players can collaborate. Such an established governance mechanism will enable municipalities and their stakeholders to address the risks and barriers impeding efficient and sustainable development, and, through the formation of innovative public-private partnerships, to craft integrated technical, market and policy solutions that fit the local demand profile and resources.

Without a doubt, California's new strategies raise a range of new choices for localities and regional areas that are seeking to stabilize their energy costs, increase electricity reliability, reduce environmental impacts and tap locally available renewable energy sources. But regardless of the extent to which any particular locality chooses to become involved in energy planning, these developments are poised not only to affect significantly the role of local governments in energy planning, but also the direct benefits that could accrue to municipalities from such involvement. In particular, California's new focus upon community-scale energy efficiency and renewable energy will spur local governments to shift to more holistic and strategic planning to assure continuous improvement towards the State's zero net energy objectives. In addition, California's new focus on the effects of land use decisions and development practices on energy consumption and GHG emissions will create unique opportunities for municipalities to use their broad and cross-cutting planning and development authority as a means for facilitating integrated technical, market and policy solutions that can attract investment in clean energy products and services within their areas.

Holistic and Strategic Planning. The CVRP clarified how the integration of energy systems planning into land-use development and urban design can enable a community to address urban sustainability in a more holistic and strategic manner, based on a better understanding of the energy needs of its urban environment. Using modeling and analytical tools, the City of Chula Vista and participating stakeholders profiled the direct and embedded energy consumption and emissions impacts of alternative urban design and site planning scenarios and their costs and benefits relative to the use of conventional practices. With the benefit of this information, the City and its stakeholders will be able to more accurately assess the impacts of planning and policy choices and to shape more effective local responses and programs to

address the energy-related effects of urbanization. Based on a better understanding of the energy, environmental and economic impacts of land use decisions, as well as alternative options and practices, the City and its stakeholders also will be able to realize tangible benefits from sustainable urban energy planning activities. Such benefits will result from heightened energy efficiency and increased deployment of distributed energy systems within the public realm; accelerated efficient energy and alternative resource use in the private sector; and more sustainable long-term development and land use patterns.

As the CVRP showed, if energy planning is part of a City's land use planning, design and development processes, the City can draw on its increased understanding about the effects of land use to facilitate energy strategies within the public and private sectors that contribute to long-term community sustainability. This integration will also provide the context for strategy development based on planning and design principles for energy-efficient community development (Sustainable Use of Energy Resources; Ecological Community Form and Function; Community-Based Resources Management; Land Use Optimization; Energy and Environmental Technology Integration, see earlier discussion). Recognizing this, the City included energy-efficient community development as a component in its Climate Action Plan and SDG&E Partnership.

Moreover, with increased understanding about the impacts of embedded and operational energy costs of urban infrastructure systems and urbanization, municipalities will be better able to evaluate the life-cycle energy intensity of alternative systemic approaches to the development of the community's infrastructure and built environment. Effective land use planning that incorporates sustainable energy planning, therefore, creates an institutional structure within which efficiencies can be maximized for transport, energy, water and waste systems and the deployment of clean energy technologies can be accelerated. Institutionalization of community design, land use and zoning planning that promote energy-efficient smart growth and the adoption of sustainable urban energy systems can result in more effective utilization of energy and water resources, significant GHG emission reductions, more effective waste disposal and improved air quality.

Research initiatives such as the CVRP help to generate a knowledge base upon which municipalities can develop strategic energy plans and incorporate them into their overall comprehensive or general plans, which guide decision-making at the community level. Development of a sustainable energy plan would not only improve transport and mobility strategies, enhance residential and commercial energy efficiency and increase the use of alternative energy resources, but it would also integrate urban systems technology programs and management practices across all sectors of energy use within a community.[128] Such an energy plan would include a "strategic vision" of a sustainable future, along with sustainability criteria, milestone objectives and tactical strategies for achieving the vision over a reasonable period of time (see discussion above).

Initially, this energy plan could set out such objectives and tactical strategies in broad terms. As the community expands its knowledge base and increases its expertise, the local government, in partnership with major stakeholders, could perform a baseline assessment of the community's current level of sustainability, including the community's energy consumption rates by market sector; the energy and environmental impacts of technologies currently being used to meet energy demand; waste streams produced by energy production, transmission and distribution processes; and energy impacts on sensitive environmental resources and habitats.[129] Based on this sustainability profile, the community could

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[128] GTI Blueprint at 5.

[129] GTI Model Design at 59-60.

evaluate, in consultation with experts, the costs and benefits of tactical alternatives, covering the short, medium and long-term, for closing the gap between the community's strategic vision and its current condition. Tactics should be evaluated with respect to their economic, social and technological feasibility and structured based on the community's sustainability metrics and growth management factors. As to those proposed tactical actions that are selected for implementation, the local government can engage stakeholders within an open participatory process to develop integrated policies, management programs, budgets and deployment schedules.[130]

All of the foregoing activities could be undertaken in an incremental and iterative manner within an established framework for planning and collaboration with stakeholders and informed by alternative analyses and scenario-building conducted in pilot demonstrations or major development or redevelopment projects. This energy "roadmap" would be driven by "market pull;" that is, tactical strategies would be designed to address future growth and energy demand projections and provide a route from "business as usual" to achieving the community's strategic vision. In this way, the energy roadmap would chart consensus-based, critical enabling strategies to close the gap between what exists and what is needed in order to reconcile future population and demand growth with urban sustainability.

Holistic and Strategic Processes. Because sustainable energy planning cross-cuts all sectors that use energy, it needs to engage the participation of departments across a municipality's organizational structure. Thus, while planning efforts may be housed within a particular municipal department or agency, there is a need for cooperation and coordination across departments, including economic development, planning and building, engineering and general services, environmental and conservation services, etc.[131] The Mayor and City Manager and the City Council should provide leadership on energy planning, especially in connection with determining budget priorities and funding for programs. It also is recommended that a framework be established within which the municipality can collaborate with utilities, developers, non-governmental organizations and institutions, industry and citizens on energy planning. Overall, to achieve effective design and delivery of sustainable energy solutions, an institutional framework needs to include: (1) Clearly delineated, transparent and participatory planning and coordination processes and mechanisms; (2) Well-defined organizational lines and departmental roles; (3) Specified staffing and resource allocation priorities; and (4) Established management and monitoring protocols.

The City of Chula Vista has structured its Climate initiative and SDG&E Partnership to combine and leverage the resources of multiple city departments to deliver cost-effective, holistic opportunities for promoting energy efficiency and reducing GHG emissions within the community. The programs, therefore, serve as a mechanism for inter-departmental cooperation on energy issues. The initiatives also are designed to complement utility programs.[132] Chula Vista representatives actively participate in relevant regional and state forums, as for example, SANDAG's Energy Working Group. The City engages in considerable peer to peer efforts with its neighboring South Bay communities, offering them expertise and training on energy efficiency regulation, facility retrofit projects, community outreach

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[130] GTI Model Design at 58, 60-61.

[131] GTI Blueprint at 68, 87.

[132] California utilities should play an active role in regional and local government planning and development efforts at both the plan and project level to encourage climate friendly and energy efficient development in their service areas. Also, the CPUC should allow utility-incentives and technical assistance programs with longer lead times to enable greater collaboration by utilities with local governments and developers. See, 2007 IEPR at 277.

campaigns and other matters. Moreover, based on the building codes, land use policies, zoning ordinances, site design guidelines and other planning instruments that the City has drafted, Chula Vista can be an excellent resource for State and Regional authorities in drafting model provisions for standards and codes for other local governments in California.

Attention needs to be given by State agencies to helping develop more effective organizational and funding structures for energy planning activities within municipalities and to removing public financial/fiscal barriers that impede effective efforts.[133] The State's promotion of partnerships between utilities and local and regional authorities has been very beneficial and should be bolstered by supporting public benefits funding for energy-efficient and renewable energy-based community development projects. In connection with its "Solar and Energy Efficiency Conversion" project, Chula Vista will be establishing a voluntary special assessment district under AB 811 to fund the program through local bonds and participants will pay back the cost of installations through a voluntary fee assessment that will be added to their property tax bills. The City also may be using carbon offset fees exacted under its Green Building Standard program to subsidize upgrades at municipal facilities or low-income occupied buildings and service institutions.

Integrated Technical, Policy and Market Solutions. The development of effective institutional structures within municipalities for sustainable energy planning can significantly contribute to shaping more integrated technical, policy and market solutions for increasing energy efficiency and renewable energy within communities. An institutional framework that involves holistic, iterative and sequential planning, piloting and implementing of capabilities and solutions will generate information and resources that can help to design more effective technology deployment strategies, policy measures and incentives, and market-based delivery mechanisms. Based on the knowledge base and expertise developed through such an institutional framework, solutions can be crafted that differentiate the barriers and risks associated with different scales of development activity (building, site, district, community-wide) and with different types of energy-related investments. Upon such an institutional foundation, innovative public-private partnership arrangements can be structured to address market gaps and minimize, allocate and manage risks, based on more accurate assessments of the costs and benefits of alternative options. Very importantly, effective institutional structures can help to develop decision-support tools and valuation methodologies that are needed for designing performance-based, and market-oriented policies, standards and incentives.

Institutional platforms also can help to inform the development of creative government procurement, licensing, permitting and contracting practices that can build market demand and foster the provision of new energy services. For example, local support could enable Community Benefits Agreements between developers and community leaders, under which developers agree to provide certain benefits to communities in return for community support of development as it travels through the process from entitlement to build-out. Planning activities can guide local governments on ways to aggregate demand, pool resources and bundle projects with different investment profiles and risks to attract affordable financing for energy efficiency and renewable energy. Mechanisms such as Clean Energy Development companies might provide the means for procuring technologies for new development and redevelopment through third party providers. Institutional processes for sustainable energy planning will give impetus to new forms of governmental collaboration, mechanisms to quantify and value multiple resource benefits,

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[133] LUSCAT Submission at 16-17, indicating that one of the largest impediments to local governments' embracing of climate-friendly and energy efficient growth patterns is the structure of local-government finance. Proposition 13 and Proposition 218 reduced the role of property-based taxation as a local government revenue source and increased reliance on other sources. Also see, 2007 IEPR at 266.

and fundamental changes in the business and service delivery practices of utilities, energy service companies and building contractors.[134] Finally, a solid institutional base will create innovative opportunities for integrating energy and water efficiency into community design and development activities.

By example, Chula Vista, through its Climate Change Working Group, generated a "Solar and Energy Efficiency Conversion" initiative that integrated technical, policy and market solutions for facilitating the widespread installation of solar-PV, thermal solar and other renewable energy technologies in combination with energy efficiency and water conservation measures in upgrading commercial, residential and municipal facilities.

CONCLUSIONS AND RECOMMENDATIONS

California's climate and energy goals and strategies necessitate sustainable energy planning by local and regional authorities:

- These goals and strategies cannot be met cost-effectively without developing integrated energy solutions and innovative energy asset development and management strategies for increasing energy efficiency and renewable energy at the community level.

- These strategies will require sustainable urban energy planning to take into account the direct and embedded energy consumption and emissions impacts of land use and urban design in order to identify cost-effective opportunities for the development of community-based renewable and energy efficiency resources.

- Policy, market and technology drivers are causing a "re-visioning" of the potential for energy efficiency and renewable energy across California's environmental and energy policies and programs and a "re-thinking about programmatic design and delivery. There is a new focus upon local and regional government activism; community-scale energy efficiency and renewable energy; and land use planning, design and development, with the objective of developing all feasible, cost-effective and reliable energy efficiency, demand reduction and renewable energy resources locally and regionally in a way that works in harmony with larger power and fuels systems, while reducing fossil fuel use and climate change impacts. Sustainable energy planning is essential to California's efforts to transform the market, through integrated technical, market and policy design, to bring about "zero net energy" results, while also furthering other resource planning objectives relating to air quality, water conservation, waste reduction and reuse, and transport and mobility.

Local Governments need to develop the capacity for Sustainable Energy Planning:

- Local governments need to integrate sustainable energy planning into their land use, growth management, transportation and economic development planning in order to identify strategic opportunities for community-based energy resource development and to plan, build and optimize, in an orderly and capital efficient manner, energy infrastructure that can deliver high quality, cost-competitive and reliable, and environmentally responsible energy services for all users.

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[134] CPUC 2008 EE Strategic Plan at 74.

- Sustainable energy planning can provide a strategic vision for energy resource development and management; and, guided by the "market pull" of future growth and energy demand projections, give holistic direction to consensus-based strategies for closing the gap overtime between what exists and what is needed to attain urban sustainability.

- Local governments need to establish a framework for energy planning in which community leaders, developers, utilities, and other market players can collaborate to optimize a community's future energy infrastructure and built-environment according to energy and resource efficient planning and design principles: (1) Sustainable use of energy resources; (2) Ecological community form and function; (3) Environmentally sound and energy efficient land use optimization; (4) Energy and environmental technology integration; (5) Community-based resources management; and (6) Social equity and economic vitality.

- The establishment of an open and participatory framework for planning and collaboration will enable the evaluation and development of integrated energy solutions that: (1) Fit a local resource base; (2) Maximize economic value and minimize costs and environmental impacts; (3) Capitalize on advancements in renewable energy, energy efficiency and demand response, energy storage, smart grid integration, combined cooling, heating and power, and other technologies; (4) Take advantage of competitive energy markets; and (5) Promise future integration and expansion towards sustainability. Such a framework will build the business case for systematic energy-efficient and renewable energy-based development as a means for stabilizing local energy costs, increasing electricity reliability, creating local jobs and reducing environmental impacts.

- Holistic, long-term and iterative energy planning, integrated into land use development, is necessary for achieving low impact, high performance communities. Such holistic planning needs to be guided by a "vision" of a sustainable future, along with sustainability criteria and specific objectives and tactical approaches for achieving that vision over a set period of time. The sustainability vision and criteria need to be adopted in a municipal policy statement that guides community strategic planning, development policies and processes, general governance, public services and operations. Community design, land use and zoning that promote energy-efficient smart growth and the development of sustainable urban energy systems should be institutionalized in local government general plans and land use development processes. Lessons learned from research and pilot demonstrations should inform planning and policy choices and shape more effective local responses and programs to address the energy-related effects of urbanization.

- Sustainable energy planning needs to engage the participation of departments across a municipality's organizational structure. Effective planning, design and delivery of sustainable energy solutions will require: (1) Clearly delineated, transparent and participatory planning and coordination processes and mechanisms; (2) Well-defined organizational lines and departmental roles; (3) Specified staffing and resource allocation priorities; and (4) Established management and monitoring protocols. State assistance is needed for developing more effective organizational and funding structures for energy planning activities within municipalities and for minimizing or removing public financial and fiscal barriers that impede effective efforts.

- Sustainable energy planning can provide the institutional structure within which market-changing public-private partnerships, policies, and business and financial models can be designed to overcome technical, market and regulatory barriers to energy-efficient and renewable energy-based community development and to mobilize private investment in new and advanced technologies. Such planning can support "communities of practice."

Sustainable Energy Planning needs to be integrated into and aligned with strategic growth management policies and planning at all governmental levels:

State Leadership:

- Sustainable energy planning combined with smart growth needs to be linked to growth management planning processes and incorporated into state-wide integrated land use policies to address and mitigate GHG emissions. State planning, financing, infrastructure and regulatory policies and programs relating to land use should be aligned with regional and local growth management planning that includes sustainable energy and smart growth planning.

- Sustainable energy planning needs to be promoted by the Governor's Strategic Growth Council and OPR needs to stress the benefits of such planning in its GHG Guidelines for CEQA and Guidelines for General Plans.

- The State Government should provide overall direction and guidance on energy-efficient and GHG-reducing land use policies, but work in partnership with regional and local government representatives and stakeholders in developing the appropriate guidelines, information, methodologies and technical resources. State agencies should design policies and programs that provide legal and technical assistance to guide decision-making and build capacity at all governmental levels, while allowing for local implementation flexibility. The State should develop standardized methods for measuring and estimating future expected GHG emissions and accounting for reductions in connection with land use decisions and strategic growth management.

- General Plans should be required to include an Energy element. The State should expand its efforts to provide technical and financial assistance to regional agencies and local governments to facilitate climate-friendly and energy efficient planning and development. The State should support financing mechanisms, such as a municipal sustainable energy infrastructure fund, to advance energy-efficient and renewable energy-based community planning, design and development.

- A partnership structure and processes should be established consisting of a State liaison entity and a cross-cutting advisory task force in which local and regional governmental representatives can participate to provide input to State agencies such as, the Strategic Growth Council, CARB, OPR, CEC, CPUC and others, on ways to improve land use planning and growth management and to make recommendations to the Governor and Legislature. This process is needed to identify barriers to efficient land use development and prioritize key policies and strategies needed to meet regional targets.

Regional Planning:

- Regional Growth Management Planning needs to incorporate both GHG emissions and energy considerations. Regional Blueprint Planning should serve as the analytical and local government backbone of the State's efforts to affect sustainable energy use and GHG emissions reductions across multiple sectors. The Blueprint Planning program should be connected to a State liaison entity that delivers various and inter-related planning services to regional and local governments.

- The scope of Blueprint Planning support needs to be broadened to encompass non-transportation related activities and funding mechanisms need to be developed to support strategic planning,

plan implementation and community design evaluations, so that the funding of these activities is not solely dependent on sales tax revenues, new development or transportation funds.

Partnerships with Utilities and Energy Service Providers:

- Sustainable energy planning should be better aligned with long-term electric utility resource planning processes. The State needs to continue to promote partnerships between regional and local authorities and electric utilities and energy service providers. These partnerships are needed to develop effective tools and methods for incorporating energy supply and demand and infrastructure analyses into existing regional housing, land use, water supply and wastewater, and transportation planning processes. The partners can help to integrate energy analyses of alternative sustainability and resource planning efforts into existing regional growth planning frameworks.

Cities such as Chula Vista can serve as models for other localities; and research initiatives such as the CVRP, can expand the knowledge base and increase capabilities for sustainable energy planning.

- The City of Chula Vista has developed transferable resources and replicable models to guide other local governments in undertaking sustainable energy planning with respect to: (1) Reducing energy consumption within their own facilities and operations; (2) Promoting efficient energy use and alternative resources in the private sector through judicious use of incentives, regulations and demonstration projects; and (3) Shaping local land use and development patterns to reduce per capita energy use and improve environmental quality.

- Cities such as Chula Vista should play an active role in State processes for the development of protocols for measuring and estimating GHG emissions with respect to land use, buildings and infrastructure and accounting for reductions from sustainable development practices, as well as the development of modeling tools to support emissions quantification at the local level. Also, cities should work with the State in setting up a centralized information database of case studies and best practices for reducing GHG emissions.

- Research and pilot demonstrations can validate the tangible benefits of combining clean energy supply and advanced end-use and smart grid-enabling technologies with community design features, including reducing energy consumption, peak demand, and GHG emissions.

- Research such as the CVRP help to build the capacity of local and regional authorities to: (1) Understand the environmental, economic and equity impacts of embedded energy costs and operational energy needs of urban infrastructure and urbanization; (2) Identify the local environmental, economic and equity benefits of sustainable energy planning, especially with respect to the private sector; (3) Develop information and materials that lead to a better understanding of planning options and the costs and benefits of alternative technologies, practices and development scenarios; and (4) Develop effective decision support tools and methods and performance metrics for community energy systems planning.

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See, **www.globalenergynetwork.org** and **www.necsc.us**