



Appendix C: CHP in Community Planning—CHP Zones

C.1 Overview

What are CHP Zones?

CHP zones are designated areas for CHP development in brownfields (e.g., land previously used for industrial or commercial purpose and slated for redevelopment), greenfields (e.g., new business enterprise zones and research campuses) and areas on the utility distribution grid where it is impractical to upgrade or install new lines. CHP zones are similar to economic development zones, which are present in many states, in that they seek to enhance development in a particular area through beneficial policies or financial incentives. As discussed in this Appendix, state regulators and policymakers can play a pivotal role in the development of CHP in these zones.

Why is CHP Practical in these Zones?

Brownfield and greenfield development integrating infrastructure for transportation, housing, and commercial/industrial businesses can capitalize on energy density needs and the opportunity to install electric and other energy distribution systems coincident with new construction or re-development. District energy with CHP can be a critical element of this infrastructure.²¹² By combining individual user loads, district energy systems using CHP can potentially deliver energy services in a more efficient, economic, and environmentally friendly manner. Properly designed and maintained district energy systems can reduce energy costs and greenhouse gas emissions while freeing up valuable space in customer buildings by centralizing production equipment and, through economies of scale and equipment management, optimizing the use of fuels, power and resources. Since the focus of this guide is state CHP and policy implementation, and the role of the state regulator is secondary to the local government efforts.


Cities are embracing sustainability measures in their planning in order to achieve carbon reduction goals, create/retain jobs, and enhance quality of life. Electric and gas utilities also have prominent roles in the planning process to ensure that the energy needs of redeveloped areas are adequately addressed. State commissions and publicly owned utility boards can drive achievement of clean energy goals by encouraging their regulated utilities to assist in evaluating district energy and CHP energy solutions. Integrated resource planning and long term procurement proceedings are two areas where district energy and CHP can also be addressed. State utility commissions can also set forth the parameters and rules for incentive programs for distributed generation, and research and development programs to include district energy and CHP systems. California is a state with such a program specific to CHP.²¹³

C.2 Benefits of Successful implementation Approaches

District energy and CHP are the energy solutions of choice by many cities. Cities conducting comprehensive planning and construction of energy and water systems, transit, mixed use and recreational space endeavor to achieve long term economic, sustainability and self-sufficiency goals. Integrated systems also facilitate achievement of critical infrastructure and energy security goals. By aggregating the thermal requirements of many different buildings, the district energy system can employ industrial grade equipment designed to utilize multiple fuels and employ technologies that would otherwise simply not be economically or technically feasible for individual buildings, such as deep lake water cooling; direct geothermal or waste wood combustion. The diversity of energy options and fuel flexibility creates a market advantage for district energy/CHP systems and establishes

²¹² District energy systems produce steam, hot water, or chilled water at a central plant. The steam, hot water, or chilled water is then piped underground to individual buildings for space heating, domestic hot water heating, and air conditioning. As a result, individual buildings served by a district energy system don't need their own boilers or furnaces, chillers or air conditioners. To further improve the efficiency, the reject heat can be used to spin turbines and generate electricity, thus making it a district energy CHP system. Source: International District Energy Association. www.districtenergy.org/what-is-district-energy.

²¹³ CPUC. Decision 12-05-037. "Electric Program Investment Charge." May 24, 2012.



the district energy/CHP system as an asset for community energy planning. Additionally, the availability of district energy service can reduce the capital cost of constructing and operating office buildings by eliminating the need to build a boiler and chiller plant as part of the project and can optimize leasable and useful space by reducing mechanical space and vaults in basements, core and rooftops. A corollary benefit is that developers may qualify for energy efficiency and renewable energy incentives that would lessen overall cost impacts. The systems are viewed as cornerstones of smart growth and sustainable cities. Examples from San Francisco and Arlington County, Virginia, are discussed below.

C.3 Successful Implementation Approaches

San Francisco, California

The City of San Francisco is moving forward on a large redevelopment project—termed the Transit Center District Plan.²¹⁴ The Plan identifies district energy and CHP as a priority to take advantage of the dense mixed use development in the Transbay redevelopment area. The Board of Supervisor unanimous approval occurred July 31, 2012, and the Mayor signed the Plan on August 8, 2012.²¹⁵ In the next phase, the city’s planning department will evaluate alternative financing mechanisms that include impact fees, private only and public-private investment structures. Private participation is an important consideration because it preserves eligibility for federal tax treatment and accelerated depreciation.²¹⁶ At the same time, city planning staff will prepare a sustainability paper that integrates energy and water systems with building performance, having earlier studied and found that district energy/CHP systems were feasible.²¹⁷

There is a great opportunity with the Transit Center Plan to establish a highly energy efficient district-scale approach to energy procurement and consumption, including combined heat and power (CHP), setting up the area to be an exemplar low carbon development. This will help the City to achieve its Climate Action Plan, Electricity Resource Plan and carbon reduction goals. With respect to CHP, the strategy could also future-proof the Plan Area to be able to take advantage of local renewable biomass energy sources as, and when, an appropriately scaled plant(s) becomes viable.

-Transit Center District Plan, San Francisco Planning Department, p. 60, May 3, 2012

Eight specific policies related to district energy and CHP are included in the Plan²¹⁸.

Objective 6: Streamline Potential Implementation of a District Energy Distribution Network by Phasing Major Streetscape and Utility Works In Line With New Building Development in the Transit Center District and Transbay Redevelopment Area.

- Policy 6.1—Pursue creation of efficient, shared district-scale energy systems in the district.
- Policy 6.2—Pursue a combined heat and power (CHP) system or series of systems for the Transit Center District and the Transbay Redevelopment Area (Zone 1).


²¹⁴ Interconnection of CHP is governed by CPUC Rule 21 and network issues such as backfeed and network system protectors are addressed at the engineering design stage. Such issues need to be studied but is not an insurmountable issue with modern technology and careful evaluation.

²¹⁵ www.sfmayor.org/index.aspx?page=846&recordid=66&returnURL=%2findex.aspx.

²¹⁶ The Energy Improvement and Extension Act (2008) provides a 10% investment tax credit for the costs of the first 15 megawatts of CHP property fulfilling certain eligibility requirements. The Act also provides for a five-year accelerated depreciation for CHP. A CHP facility owned and operated by a for profit company selling the electrical and thermal under an Energy Services Agreement would be able to claim the ITC or five year accelerated depreciation. Tax exempt or non-profit organizations do not pay taxes and therefore, do not qualify for the ITC or accelerated depreciation.

²¹⁷ ICF personal communication with Kate McGee, Lead Planner, SF Planning Department, July 9, 2012.

²¹⁸ Transit Center District Plan Initiation Packet Executive Summary, Hearing Date May 3, 2012.
<http://commissions.sfplanning.org/cpcpackets/2007.0558MTZU.pdf>.

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- Policy 6.3—Require all new buildings to be designed to plug into such a system in the future.
 - Policy 6.4—Require all buildings undergoing major refurbishment (defined as requiring new HVAC plant) to be designed to plug into such a system in the future
 - Policy 6.5—Identify and protect either suitable public sites or major development sites within the plan area for locating renewable or CHP generation facilities.
 - Policy 6.6—Require all major development to demonstrate that proposed heating and cooling systems have been designed in accordance with the following order of diminishing preference:
 - Connection to sources of waste heat or underutilized boiler or CHP plant within the transit center district or adjacent areas
 - Connection to existing district heating, cooling, and/or power plant or distribution networks with excess capacity
 - Site-wide CHP powered by renewable energy
 - Site-wide CHP powered by natural gas
 - Building level communal heating and cooling powered by renewable energy
 - Building level communal heating and cooling powered by natural gas
 - Policy 6.7—Investigate City support for energy service companies to finance, build, operate, and maintain transit center district energy networks; and work with necessary private utilities to facilitate connection of new electricity supply from CHP to the grid
 - Policy 6.8—Require all major development in the plan area to produce a detailed energy strategy document outlining how the design minimizes use of fossil fuel driven heating, cooling and power—through energy efficiency, efficient supply, and no or low carbon generation.

These policies can serve as a model for other city redevelopment efforts.

Arlington County, Virginia


Arlington County declared that it “must find ways to reduce our dependence on the inexpensive fossil fuels that have fueled our progress since the Industrial Revolution in favor of efficiency and cleaner, more sustainable energy sources and systems.”²¹⁹ Arlington formed the Community Energy and Sustainability (CES) Task Force in January 2010 to help identify ways to improve the “economic, energy, and environmental future” in the County and one of the areas of focus is on district energy systems using CHP.

The CES Task Force Report includes a step-wise approach to creating cleaner and more cost-effective energy supply structures that produce fewer emissions. District energy systems, commonly found in other parts of the world, facilitate the efficient use of the heat from local combined heat and power (CHP) generation, greatly reducing the fuel waste normally associated with making electricity. District energy systems can be tailored to the specific needs of each neighborhood and retain flexibility to adapt to changing technologies and future demands.

-Executive Summary, Community Energy and Sustainability Final Draft

The Task Force includes individuals from across the public and private sectors, including the involvement of Washington Gas and Dominion Virginia Power. Regarding district energy, the Task Force concluded that mandatory district energy zoning where “the combination of district energy-ready development, scale project planning, and county sponsorship” can be used as a viable alternative to standard zoning. The Task Force recognized that the

²¹⁹ Arlington County. *Arlington County Community Energy and Sustainability Task Force Report*. Final Draft. March 11, 2011. <http://news.arlingtonva.us/pr/ava/community-energy-plan.aspx>.



“positive involvement of Dominion Virginia Power and Washington Gas, along with major property developers and owners in the evolutionary planning of the County’s district energy strategies, could be a crucial factor in any alternative zoning’s early success.”²²⁰ A new district energy company that wholly or partly owns, and operates and maintains the district energy network is another key policy recommendation.²²¹ Arlington’s Board of Supervisors instructed the County Manager to turn the Task Force’s recommendations into an implementation plan that was presented before the Board in November 2012.

How the Criteria are Addressed

Policy Intent. Cities and other local governments are seeking ways to promote economic development while meeting their environmental targets. To meet these goals, while also providing development zones with low cost energy, planning agencies have begun to incorporate district energy and CHP and other efficiency measures as a priority in new redevelopment projects. Utilities are important stakeholders at the infrastructure planning stage.²²² State utility commissions and municipal utility boards can play a pivotal role by working with their utilities to support greater district energy and CHP as key tools to help draw in commercial development through easy access to energy infrastructure, as well as achieving local government sustainable energy and environmental goals. When conducting integrated resource planning and long term procurement proceedings, utility commissions can investigate district energy and CHP utility planning efforts with local governments in their service territory. In addition, State utility commissions that approve energy efficiency programs that promote clean energy technologies and can specify the consideration and/or the inclusion of district energy and CHP systems in such programs.²²³ These efforts will help meet the intent of a redevelopment effort that also meets related state and city goals.

Market Signals. Including district energy and CHP as a priority in city planning activities can greatly incentivize development of this resource by market participants. Additionally, having the infrastructure for CHP included in the initial guidance (zoning/building codes) for a new site development can accelerate CHP project deployment, and importantly provide the flexibility for future installation of advanced technologies when they become cost-effective.

- Both Arlington County’s Community Energy Plan and San Francisco’s Transit Plan reflect a comprehensive and long-term vision. Both plans capitalize on community scale energy solutions—district energy and CHP—on a district rather than individual building basis.
- San Francisco’s district energy center housing the primary energy systems would be “future proofed” or capable of being modified to allow changes in fuel sources or advancements in technology “should biomass gasifiers and fuel cells (or other new technology) become cost-effective.” Further, bulk fuel buying would help stabilize price volatility and operation and maintenance tasks would be streamlined for building operators. Collectively, San Francisco endeavors to reduce their energy use and carbon footprint.²²⁴ The city was one of the first American cities to take action against climate change, publishing a climate action plan in 2004 with short, mid, and long-term GHG reduction targets, with a final goal of reducing emissions 80% below 1990 levels by 2050. CHP and district energy systems have been identified as a way to help meet this emissions goal and other objectives. Notably, the planning department’s education and outreach of the plan and future study of financing mechanisms for energy projects manifest a commitment to the consideration of private only ownership as well as public-private


²²⁰ Ibid, p. 55.

²²¹ Ibid, p. 31.

²²² Pacific Gas & Electric has involved many San Francisco Bay Area cities in its Local Government Partnership proposal as well as with the Bay Area Regional Energy Network (BayREN). For example, the City of Oakland is confident that the partnership and BayREN “can collectively achieve deeper energy savings and greenhouse gas reductions than would otherwise be possible.” Response Comments, City of Oakland on the Motion for Consideration of the San Francisco Bay Area Regional Energy Network. CPUC Application A.12-07-11. Aug. 3, 2012. <http://docs.cpuc.ca.gov/efile/RESP/172268.pdf>.

²²³ CPUC Decision 11-09-015. Sept. 8, 2011. Findings of Facts 3-6. In addition, California’s Self-Generation Incentive Program which already includes CHP on renewable and non-renewable fuel could be evaluated and modified to include district energy systems.

²²⁴ Transit Center District Plan, p 61.



partnerships. While district energy and CHP systems could be built on either mechanism, the federal CHP tax incentive applies to third parties but not to tax exempt state and local governments. In fact, some private developers set up CHP project financing on a build, own and operate basis to secure the tax incentive to lower total project costs. This reduction is reflected in the cost of the electricity and thermal energy they sell to consumers.

Ratepayer Impacts. The costs associated with incorporating district energy with CHP into city development projects should be evaluated by each city to ensure they are lower cost than alternatives. If it is determined to be cost-effective, there is a strong history of economically sound district energy systems, with more than 40 urban district energy systems in the country currently utilizing CHP that can be looked to for lessons learned.²²⁵ Both San Francisco and Arlington County will be evaluating all financial funding options as alternatives to traditional development impact fees to determine the best role for local government, private enterprise and public-private partnerships. Policymakers, including utility regulators, could formulate similar objectives requiring utilities to consider district energy with CHP as a way of meeting future demand at a benefit to ratepayers. Synergistic efforts by cities and utility regulators could result in achievement of energy, environmental, fiscal, and other objectives through the use of CHP and other forms of clean energy.

C.4 Conclusions

Arlington County and San Francisco are showcase urban areas, melding energy, environmental, transit, housing, and lifestyle goals into their planning. Each expended considerable time and effort, involving stakeholders from across the spectrum to fashion smart growth and sustainability plans. District energy and CHP are their solutions of choice for their energy infrastructure. State utility commissions can support these decisions and ensure that state ratepayers benefit.

²²⁵ "CHP Installation Database." Maintained by ICF International for Oak Ridge National Laboratory. 2012. www.eea-inc.com/chpdata/index.html.