



CITY OF BEVERLY HILLS STAFF REPORT

Meeting Date: February 17, 2009

To: Honorable Mayor & City Council

From: David Lightner, Deputy City Manager
Shana Epstein, Environmental Utilities Manager

Subject: Sustainability White Paper

Attachments:

1. Renewable Energy and Distributed Energy Generation Options for Buildings
2. Fleet Fueling
3. Sustainability Options for the Future

INTRODUCTION

The City Council has espoused a positive and forward looking approach to sustainability and has directed staff to focus on sustainability as part of the context for all decision making. Many specific sustainability efforts have been developed and future projects prioritized, but this is such a new and dynamic field that new ideas present themselves all the time. Staff is endeavoring to show the wide range of technologies and products available or soon to be available and to provide a framework and context within which to evaluate sustainability ideas for Beverly Hills.

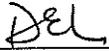
This whitepaper includes, first, a discussion of distributed energy generation technologies for buildings, such as solar panels and small wind turbines, and provides professional consultant advice on how to evaluate the applicability of the various technologies to our City's environment. Navigant Consulting, preparer of the report, has one of the largest dedicated energy practices in the world. John Dalessi of Navigant Consulting will be at the February 17, 2009 Study Session to present their findings. The second component is an analysis prepared by the City's Maintenance Operations Manager, Fred Simonson, outlining the alternative fuel options currently being pursued and on the near horizon. A third component summarizes a range of options for sustainability efforts assembled by the interdepartmental Environmental Sustainability Task Force. These options are organized to include:

1. Energy
2. Potable Water
3. Refuse
4. Stormwater
5. Transportation

Meeting Date: February 17, 2009

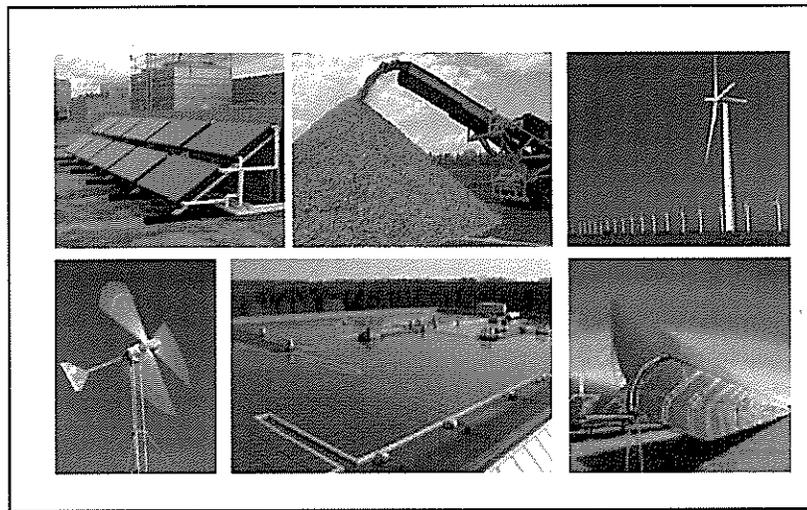
Additionally, the Community Development Department has prepared a Sustainable City Plan as an outgrowth of the General Plan update process. The Sustainable City Plan is forwarded and discussed separately in the City Council packet, however, it is related in that it offers a framework for the City, through the Sustainability Task Force, Departments, Commissions and City Council, to evaluate sustainability initiatives.

No City Council action is being requested at this time. This whitepaper outlines a range of options being studied and the framework within which those options can be evaluated. Similar to the process by which a combination of two different solar panel technologies was ultimately recommended and accepted for incorporation into the City's 331 Foothill Road office building, the options and considerations described in this report can be used to prepare sustainability recommendations as projects are developed for City review.

David Lightner 
Approved By



Renewable Energy and Distributed Generation Options



Prepared for:

THE CITY OF BEVERLY HILLS

February 11, 2009

Presented by

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TABLE OF CONTENTS

PROJECT SUMMARY..... 1

PROJECT SCOPE 1

OBJECTIVES 2

OVERVIEW OF DG OPTIONS EVALUATION PROCESS 3

 Universe of Distributed Generation Technologies..... 4

 Stage 1: Alignment with City Objectives..... 5

 Stage 2: Technology Profiles 6

 Solar Photovoltaic (PV)..... 7

 Small Wind..... 7

 Microturbines Combined Heat and Power..... 8

 Reciprocating Engines Combined Heat and Power 9

 Stage 3: Technical Feasibility..... 9

RECOMMENDED TECHNOLOGIES 10

KEY CONSIDERATIONS FOR A SOLAR PV ROLL OUT STRATEGY..... 11

 PV Purchase and Leasing Options 11

 Purchase vs. Lease Evaluation..... 12

 PV Hedging Value..... 12

CONCLUSION 13

ACRONYMS 15

PROJECT SUMMARY

This report was prepared by Navigant Consulting, Inc. ("NCI") for the City of Beverly Hills ("City") to assist the City in its consideration of clean energy generation technologies that may be suitable for deployment at City facilities. The City is considering incorporating onsite or distributed electrical generation ("DG") in the design of its new facilities as well as potential retrofits of existing facilities. The primary motivations are a desire for greater energy independence and a desire to reduce the City's emissions of greenhouse gasses (GHG).

The City retained NCI to provide an independent view on selected DG and renewable energy (RE) technologies and provide recommendations regarding options to move forward with a DG program. This report provides an overview of the commercially available DG options with an assessment of technological and market maturity for each. A multi-staged filtering process is then used to narrow the universe of DG options to those technologies suitable for facilities in Beverly Hills. The analysis concludes that solar photovoltaic technology is the most suitable option to meet the City's objectives. This report then highlights key considerations to evaluate the relative attractiveness of solar PV deployment options as well as attendant economics.

PROJECT SCOPE

NCI worked with City staff to define the scope of a potential DG program and to develop working assumptions for criteria to be used in evaluating the various DG technologies. In discussions with City staff, NCI defined the scope of this study as providing answers to the following key questions:

1. What is the most effective and efficient way for the City of Beverly Hills to pursue dual objectives related to energy independence of, and lower emissions from, its buildings?
 - a. How do the objectives of energy independence and lower emissions apply to the context of electricity consumption in urban buildings?
 - b. What are the most appropriate technologies that are commercially available to meet these objectives?
 - c. What is the general course of action given this information?

The context for the study is a focus on DG options for the City's facilities. As such, the study only considers the applicability of DG technologies for urban-located buildings

within the boundaries of Beverly Hills – specifically office buildings, retail outlets and parking facilities. These are the types of City facilities likely to be included in the City’s DG program for the foreseeable future. However, the insights derived from this study are not limited to these specific applications; the analytical framework and data presented in this study can be applied more broadly in the formation and application of a more general DG policy for the City.

OBJECTIVES

The options assessment begins with an articulation of the primary objectives motivating a potential City DG program. NCI developed four simplifying assumptions to characterize the objectives of the City’s DG program, which are then used in the evaluation of DG options. The objectives were identified as follows:

Energy Independence

The desire for energy independence is increasingly becoming a high priority for the federal, state and local governments as a means to promote economic and national security. Energy independence often implies a reduction in reliance on energy from foreign sources which is more relevant to the transportation sector than the electric generation sector of the economy. At a local level, energy independence often means a desire for reduced exposure to volatile energy prices and potential supply disruptions. It is this latter meaning of the term that is understood to motivate the City’s exploration of DG.

Implication: Consider technologies that enable the City to insulate itself from volatile fossil fuel costs.

GHG Emissions

The City is also exploring a DG program in order to reduce the City’s GHG emissions or “carbon footprint” from its municipal operations. Electricity currently provided by SCE is derived from a portfolio of resources comprised primarily of fossil fueled (natural gas and coal) generation technologies. Only 16% of SCE’s resource mix is generated by qualified renewable resources.¹ Onsite electricity production from zero-carbon generation technologies can displace electric generation from fossil fueled resources and contribute to a reduction in GHG emissions.

¹ SCE 2008 Power Content Table.

Implication: Consider technologies that enable a reduction of emissions of greenhouse gasses.

Appropriate Feedstock Characteristics

All renewable DG technologies require some form of primary energy or “feedstock” such as solar radiation, wind, hydrogen and methane producing organic material. Location of the City’s facilities in an urban environment makes certain DG technologies infeasible.

Implication: Consider technologies that use readily available feedstocks.

Technology Maturity

DG technologies cover a wide spectrum of technological maturity. Selection of immature technologies would present significant technology and performance risk that is likely to be unacceptable to the City.

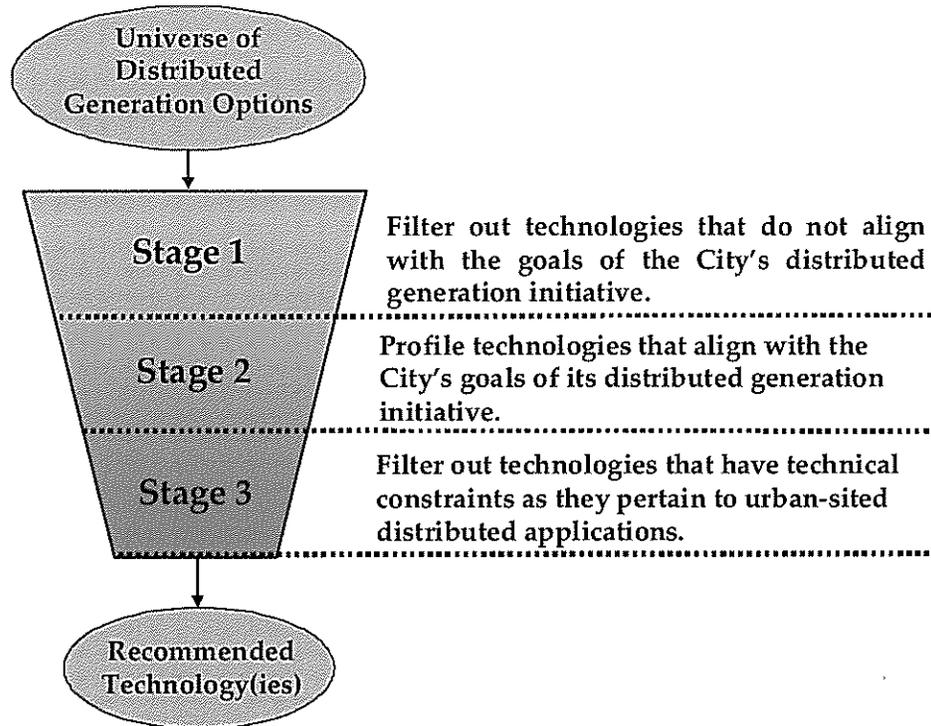
Implication: Consider technologies that are mature today or likely to be in the foreseeable future.

The first two criteria can be considered program objectives while the latter two criteria are the practical constraints of ensuring that a candidate DG option is technically feasible both in terms of available feedstock (e.g., sun, wind, biomass fuel) and in terms of technological maturity.

OVERVIEW OF DG OPTIONS EVALUATION PROCESS

Starting with the universe of DG generation technologies, NCI used a multiple stage filtering process to identify the most appropriate distributed technologies for the City. The process is illustrated in Figure 1.

Figure 1: Multi Stage Screening of DG Options

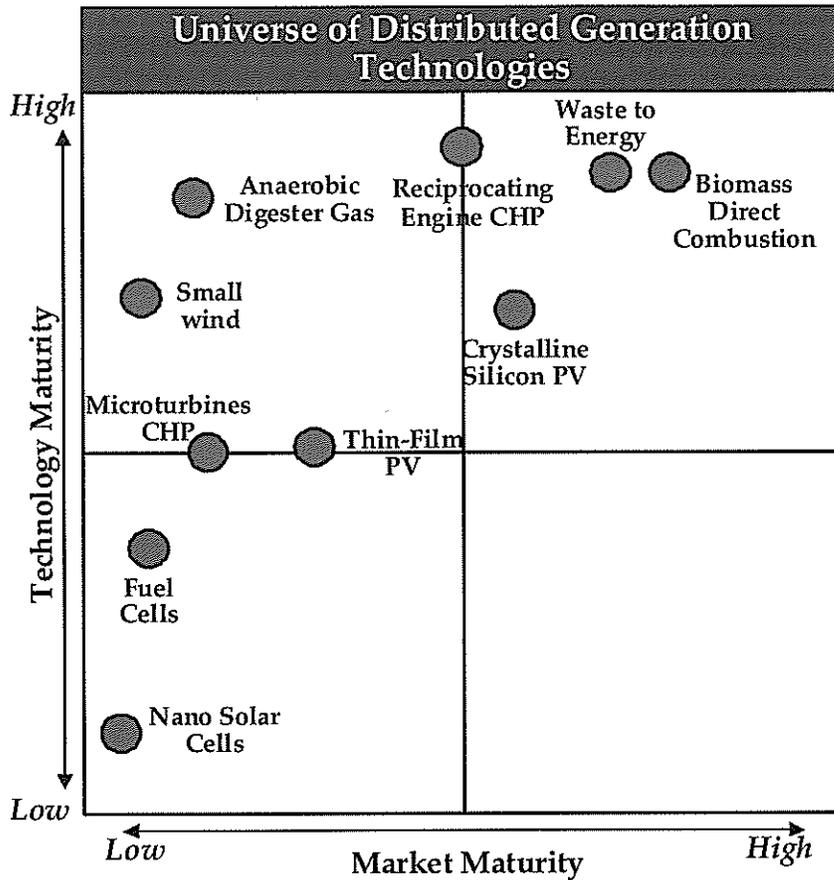


The first stage filters out available DG technologies that do not align with the goals of the City's DG initiative as described above. In the second stage of analysis, profiles are presented for the technologies that appear to align with the City's objectives for the program. Each technology is described in terms of technology characteristics, strengths, weaknesses and market characteristics. The third and final stage filters out the technologies that have technical constraints as they pertain to urban-sited distributed applications typical of the City's municipal buildings.

Universe of Distributed Generation Technologies

NCI identified ten distributed generation technologies for initial evaluation in Stage 1, representing a broad spectrum of DG technologies. The technologies differ in terms of both technological and market maturity.

Figure 2: Distributed Generation Technologies²



Stage 1: Alignment with City Objectives

Five of the ten DG technologies were eliminated as suitable options during Stage 1 due to their misalignment with the City’s objectives for the DG program. Figure 3 contains a brief description of each and their rationale for elimination.

² *Technological maturity* refers to the unique mix of customer demand for the technology, the size of the market and the availability of governmental incentives. *Market maturity* refers to whether there are foreseeable improvements related to the performance of each technology. In other words, “high” technological maturity refers to technologies that are not projected to see significant improvements in terms of energy conversion efficiency.

Figure 3: Technologies Screened Out During Stage 1

Screen Out Rationale	
Waste to Energy	These technologies produce electricity from the combustion of organic material (waste) or the byproduct of the biodegradation of waste (typically methane). These applications require a source of fuel (i.e. waste or methane) to be close to or located on, the site where the electricity is generated. It has been screened out based on criteria C.
Biomass Direct Combustion (BDC)	BDC is a technology for extracting heat energy from biomass and converting it to electricity. Because of their size and how they generate heat, nearly all systems are installed in the industrial/ commercial sector. Distributed BDC systems work best for large loads operating with a substantial year round baseload, such as a process energy demand. It has been screened out based on criteria C.
Anaerobic Digester Gas	Anaerobic digestion is a series of processes in which microorganisms break down biodegradable material in the absence of oxygen to produce methane – which can be combusted to produce electricity. Anaerobic digesters are typically operated using sewage sludge and farm manures. It has been screened out based on criteria C.
Nano Solar Cells	Nano solar cells are essentially small scale solar panels. While many believe this technology represent the “third wave” of the solar industry, the technology is still very much in the R&D phase. It was screen out based on criteria D.
Fuel Cells	There are many different types of fuel cells, most of which are still in the R&D phase. Fuel cells produce electricity through an electrochemical reaction – typically between hydrogen and oxygen. The principal feedstock is hydrogen which present significant cost, availability, and onsite storage issues. Moreover, the production of hydrogen requires significant amounts of electricity, which if not generated from renewable resources, can contribute to an increase in GHG emissions. It was screen out based on criteria B and C.

Screen Out Criteria

A	Energy Independence
B	GHG Emissions
C	Appropriate Feedstock Characteristics
D	Technology Maturity

Stage 2: Technology Profiles

The five remaining technologies that appear to align with the City’s objectives are as follows:

- Solar Photovoltaic (Crystalline Silicon and Thin Film)
- Small Wind
- Reciprocating Engine Combined Heat and Power (CHP)
- Microturbine Combined Heat and Power (CHP)

Profiles for each of these technologies are presented in the next section.

Solar Photovoltaic (PV)



Summary – PV systems convert sunlight directly into energy. PV is an excellent technology for onsite generation, although incentives are necessary to make its deployment financially viable.

Technology Characteristics – Silicon PV technologies are mature and performance risk is minimal; advanced thin-film and concentrated PV technologies are at various phases of research and development (R&D) and commercialization. Installed costs are expected to decrease at ~5%/year.

Market Characteristics - PV markets are growing at a rapid pace but market penetration is still limited. In the early days of the market, PV power was mostly limited to off-grid applications (where it is cost-effective); today the grid-connected market is predominant.

Strengths - Can be deployed on rooftops; Displaces retail (higher priced) electricity; Low O&M requirements; Limited performance risk makes lower return on investment acceptable.

Weaknesses - High capital costs; Generally requires incentives to be a financially attractive investment; Low capacity factors and high area requirements.

Small Wind



Summary – Small wind systems use the force of wind to spin a turbine to generate electricity. Small wind is cost effective where the resource (i.e., strong/steady winds) is available and siting issues do not restrict installations.

Technology Characteristics - Traditional technologies are technically mature and range in size from 2-10kW; Small turbines should be > 25-30 ft above any nearby barriers (trees and buildings) that are within

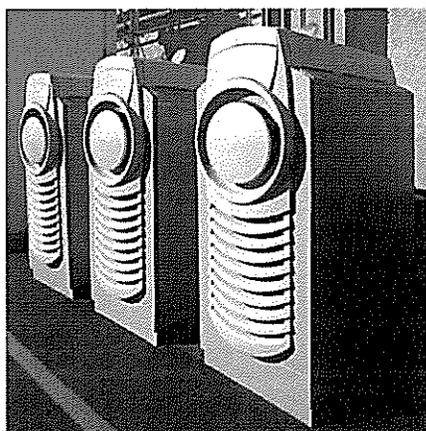
300-500 ft of the tower; Payback period ranges from 6-30 years depending on the wind resource.

Market Characteristics - The technology has not achieved wide scale adoption as the applications are often limited to rural sites with decent wind resources (>12.5mph annual average).

Strengths - No fuel required; Moderate capital cost ~\$3-\$5/W plus installation; For regions with adequate resources, California's net metering, tax incentives, and buydown programs lower payback to <10 yrs.

Weaknesses - Small wind applications are not well suited for urban areas due to wind interference; Poor aesthetics; Siting issues and local zoning height limitations; Small energy output (2-10kW).

Microturbines Combined Heat and Power



Summary – Microturbines combust fuel to spin a turbine to generate electricity. Microturbines with CHP applications have a high electrical conversion efficiency potential, but limited commercial availability.

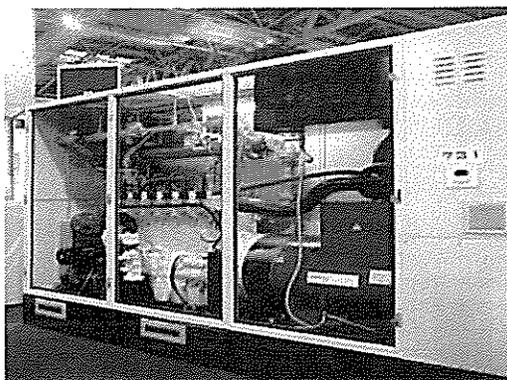
Technology Characteristics - Microturbines can run on a variety of fuels, including natural gas, propane, and diesel and can range in size from 25-500 kW; Capital costs ranges from \$0.8-\$1.4/W in addition to installation costs.

Market Characteristics - Currently being manufactured in small volumes; Utilities, government agencies, and other organizations are involved in collaborative research and field testing of these devices.

Strengths - Compact size and light-weight; Lower maintenance requirement; Good energy conversion efficiencies with cogeneration (up to 85%); Fuel flexibility.

Weaknesses - Air emissions; Low fuel to electricity efficiencies; Technologies perform better in cool air climate and lower elevations.

Reciprocating Engines Combined Heat and Power



Summary – Reciprocating engines with CHP combust fuel to drive a piston for power generation and use waste heat for heating, cooling or steam processes. Reciprocating engines with CHP applications are highly mature, but are limited to applications with sufficient heating and cooling load.

Technology Characteristics - Reciprocating engines are a relatively mature technology;

They range in size from 5 kW – 7 MW and can operate on different fuels including natural gas, diesel, landfill gas, and digester gas.

Market Characteristics - Market is mature with multiple manufacturers and products; Many examples of current installations.

Strengths - Low capital cost ~\$0.8-\$1.2/W (excludes chiller); High efficiency (50-90%) for systems with sufficient thermal loads; Scalable with a quick start-up; High reliability.

Weaknesses - Requires optimization of Coincident electrical and thermal loads; Air emissions; Noisy; Frequent maintenance requirements.

Stage 3: Technical Feasibility

Stage 3 screens out technologies that are not applicable to urban settings or the types of buildings currently anticipated for the City's program. Selection of suitable DG technologies must consider the technical feasibility related to location and type of facilities. Considering these factors for City buildings, the recommended technologies are those applicable to urban-located office buildings, retail outlets or parking facilities.

At this stage, NCI eliminated small wind and CHP from the recommended technologies for the City's DG program based on technical constraints. The rationale for eliminating wind and CHP are as follows:

Small Wind

- Traditional small wind turbines are often not suited for urban sites due to (1) local zoning height limitation and (2) variable terrain and (3) wind interference.

- Costs range from \$3-\$5/W, but a reasonable payback period requires better than average wind resources.
- According to the National Renewable Energy Laboratory, Beverly Hills has poor-wind resources (<12.5 mph average winds measured at 50m) which significantly reduces the technology's energy output.

Wind is screened out because of the low wind resource in Beverly Hills (<12.5mph) and siting issues.

Combined Heat and Power

- CHP requires that sites have both a thermal (or cooling) and electrical load. This ratio must be optimized in order for CHP systems to be cost effective.
- CHP systems are best suited for buildings that require constant heat and power demand for at least 4,500 hours a year with the most cost effective being year-round requirements.
- While installed cost range from \$0.8-\$1.2/W. these typically exclude the cost of the chiller for cooling purposes. This can add roughly 17-30% to the installed costs.

CHP is screened out because city buildings in Beverly Hills are unlikely to have consistent thermal and cooling loads which reduces CHP cost effectiveness.

Although, CHP was screened out based on NCI's understanding of the candidate buildings for the DG program, CHP should be considered if the City has any current or planned future facilities where consistent thermal/cooling loads exist.

RECOMMENDED TECHNOLOGIES

On balance, solar PV technology is best suited for urban-located buildings in Beverly Hills. All other DG technologies were screened out due to misalignment with the City's objectives for the DG program (energy independence, GHG emissions, available feedstocks, and technology maturity) or technical constraints relating to the location and types of facilities likely to be included in the City's DG program.

NCI's recommends PV for the following reasons:

- PV is modular, well suited to customer-sited applications and can be deployed on rooftops.

- It is particularly cost-effective today in California across many off-grid applications.
- No land costs (if building mounted).
- Both Federal and California state incentives firmly in place.
- 25+ years of proven reliability and field performance (crystalline silicon).
- PV output is often a good match with peak demand, thus offsetting more expensive power.
- Provides long term hedge against potentially volatile power prices.
- Minimal O&M costs (no moving parts).
- Capital costs are currently high, but installed costs are expected to decrease at ~5%/year due to scale and technological innovation.

KEY CONSIDERATIONS FOR A SOLAR PV ROLL OUT STRATEGY

If the City decides to pursue PV installations for its buildings, a key decision point will be whether to own or lease the PV systems.

PV Purchase and Leasing Options

Under ownership, the City would purchase, own and maintain the solar PV system. The benefits from owning the asset would mainly stem from reduced monthly electricity costs. The City could also benefit from selling the renewable attributes (revenues are in the 1.5 to 2.0 cents per kWh), although doing so would negate its ability to claim its use of "green" power. The primary disadvantages of ownership are the initial upfront capital cost and the assumption by the City of all technology and performance risk.

Under a lease or power purchase agreement, the City would contract with a third party to provide the power from a PV system located on the City's property. PPA prices can be lower than the cost of grid electricity, which would reduce monthly operating costs. PPAs can also act as a hedge against sharp increases to electricity rates. Leasing has the advantage of the third party taking technology risk. It also allows for capture of the significant tax benefits offered for PV installation, which tends to make leasing the lower cost option relative to City ownership.

Some leases include a transfer or "flip" provision that has the third party install the PV system and then own it for the first six to seven years, taking advantage of tax and depreciation incentives. After the initial period, the City would purchase the system, gaining the benefits of owning the asset. Technology risk in the project lifetime is taken by the third party, while long-term performance risk and system operations and

maintenance would be the responsibility of the City. Such a structure works well with municipalities as it allows for the tax benefits to be realized in the transaction with ultimate acquisition of the asset by the City, possibly financed with low cost, tax-exempt debt.

Purchase vs. Lease Evaluation

In evaluating whether to buy or lease a PV system, the City would make a determination on whether the delivered cost of electricity is cheaper through a PPA or by owning the system. The City's financial evaluation should consider the respective timing for incurrence of costs and realization of benefits under a purchase or lease as well as the relative costs and benefits over the equipment lifecycle, as the timing of cash flows are likely to differ between a purchase and a lease.

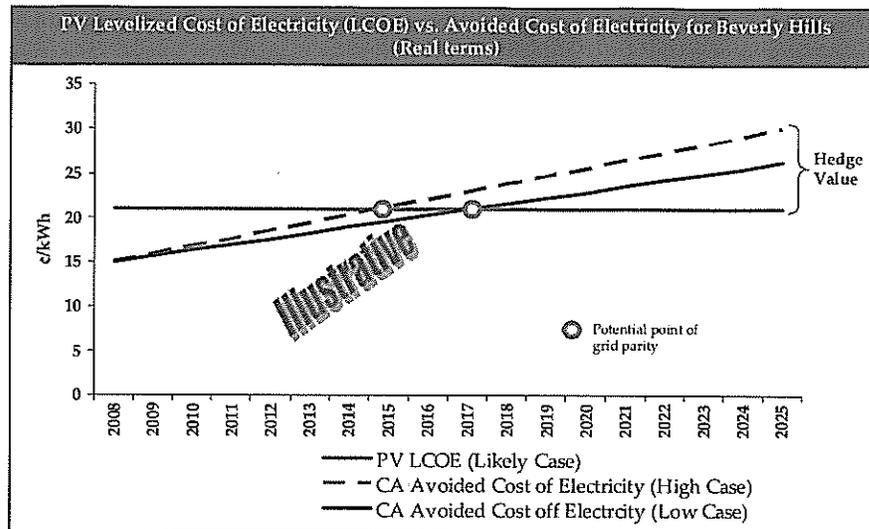
If the City chooses to own the system, then the City would need to consider the costs of the project, including the available Federal and State incentives, module prices and installation costs, based on bids solicited from vendors. The City would likely contract with local integrator/installers to install the system.

If the City chooses to lease the system through a PPA, then the City would need to select a local PPA provider and compare the offered prices with projected electricity rates for the site. PPA prices often include price escalators, which should be evaluated as part of the City's economic determination. The PPA should also clearly define who owns the associated renewable energy credits.

PV Hedging Value

The costs of energy produced by PV systems are largely fixed, providing a hedge against increasing electricity costs. Costs for PV systems are highly dependent upon available incentives and typically range from 15 to 25 cents per kWh on a levelized cost basis. In some cases, particularly during early 2007 with the California Solar Initiative incentives were higher, the installation of PV systems has allowed for immediate bill reductions of as much as 20%. In other cases, the cost of the PV system requires several years before crossing over to parity with the utility's electricity rates. The early year premium can be considered payment for the hedge against future electricity cost increases and volatility.

Figure 4: Hedge Value of PV Systems



PPA/lease structures often contain price escalator clauses that can lower initial year costs below the utility rate and allow for predictable increases in electricity costs. The tradeoff is that future cost reductions are lower than what they would be under ownership or with a PPA containing no escalator clause.

CONCLUSION

NCI evaluated ten commercially available DG technologies for consistency with the City's objectives of promoting greater energy independence and reducing emissions of greenhouse gasses. Five technologies were found to be consistent with these objectives:

- Crystalline Silicon Photovoltaic
- Thin Film Photovoltaic
- Small Wind
- Microturbines Combined Heat and Power
- Reciprocating Engines Combined Heat and Power

Of the five that passed the initial screening, three were eliminated due to technical infeasibility of deployment at City offices, retail and parking lots. Solar PV is recommended as the technology best suited for urban-located buildings in Beverly Hills.

Moving forward with deployment of PV will require the City to obtain proposals from PV installers and PPA/lease providers. Costs should be compared to projected utility

rates, and an evaluation of PPA/lease versus City purchase of the systems should be conducted.

ACRONYMS

CHP – Combined Heat and Power
DG – Distributed Generation
GHG – Greenhouse Gas
RE – Renewable Energy
PPA – Power Purchase Agreement
PV - Photovoltaic
W – Watt
kW – Kilowatt



CITY OF BEVERLY HILLS

PUBLIC WORKS

MEMORANDUM

TO: Honorable Mayor and City Councilmembers

FROM: Fred Simonson, Maintenance Operations Manager

DATE: January 29, 2009

SUBJECT: Fleet Alternative Fuels and Sustainability

The City of Beverly Hills has put forth eight GUIDING PRINCIPLES providing the foundation for sustainability as noted in the SUSTAINABILITY MASTER PLAN. Fueling the City's fleet now and in the future will both impact and be impacted by many of the core principles, including compatible policy decisions, leadership by example, environmental preservation, economic benefits, regional partnerships, and social responsibility. The City has already positioned itself as a leader in alternative fuels for fleet operations with a pilot electric vehicle program, biodiesel utilization, and a state of the art vehicle facility to maintain the next generation of "clean and green" vehicle technologies.

The recent oil crunch and hyper-price fluctuations of gas and diesel leave the nation and all municipalities, including Beverly Hills, at risk and at an energy crossroads. Powering the City's fleet is critical to the services provided to its citizens, business community and visitors. Currently, the fuel budget for the City's transportation needs is approximately \$900,000, or about 30% of the City of Beverly Hill's total energy costs. Securing the energy needs for the fleet while reducing the impact to the environment is one of the great challenges of this decade and will surely be an on-going challenge for the foreseeable future. Fortunately, the challenge we face with fueling the fleet may be transformed into an opportunity to solve our energy needs through the use of alternative fuel technologies and Best Management Practices (BMPs). Gasoline and diesel are now and will continue to be a significant, yet decreasing factor in meeting our fleet energy needs (Table A). Economic and environmental factors will drive the transition to alternative fuels and the pace in which the transition occurs. So, it is no longer a question of if we want to utilize alternative fuel technology, but how quickly can we afford to make the transition.

The transformation of the fleet to alternative fuels should be phased to reduce risk for operational needs and address the higher cost of procurement for new technologies. Phasing will allow sufficient time to upgrade the City's infrastructure to accommodate new technologies with the ultimate goal of energy independence for the City of Beverly Hills. The initial phase of "mixed fleet" utilizing different fuels for various equipment has begun on a limited basis and is poised to

NUMBER OF VEHICLES FUELED BY ALTERNATIVES (20 Years)

City Fleet	2009	2014	2019	2024	2029
Gasoline	192	165	112	80	40
Diesel	37	22	7	7	6
Electric	1	10	20	30	50
Hybrid	7	15	30	23	15
CNG	0	20	50	60	75
Fuel Cell	0	2	10	30	40
Dev Tech	0	0	1	5	15
Totals	237	234	230	235	240

expand quickly as fuels and equipment are tested for satisfactory operation. As technologies prove their viability, the “alternative” fleet will expand and the traditional gas/diesel fleet will decline. There is another factor driving the decision process - equipment purchases are already impacted by regulatory agencies such as the South Coast Air Quality Management District (SCAQMD), California Air Resources Board (CARB), and the Environmental Protection Agency (EPA) along with a host of regional regulators. To comply with the SCAQMD rules 1186, 1196, and 1193, the City is required to reduce its diesel fleet of heavy-duty on-road vehicles and street sweepers to 15 vehicles or less under current rules. The City will meet compliance once the current replacement of street sweepers is completed. The street sweepers will be the first units affected by the rules and will be fueled by an alternative fuel. The interim energy source available and proven for street sweepers is compressed natural gas (CNG). The City of Beverly Hills must evaluate alternative fuels based on “well-to-wheel” impacts to the environment. This concept recognizes that all vehicle options and fuel technologies result from manufacturing and distribution networks that impact the environment from extraction to end use.

Transforming the fleet to alternative fuels is not the only strategy available to the City to meet its goals. An interim step that can be accomplished with minimal effort is a Fuel Conservation Program. Every City operation should review its fleet usage and find the savings that are available through procedural changes and vehicle use policies. “Fleet balancing” or “right sizing”, reducing fleet size to actual need, can add to the economic benefits of conservation. An interim to longer term step available to the City is the conversion to Compressed Natural Gas (CNG). This alternative will be discussed in greater detail further in this report. Hybrid technology is gaining wide acceptance for small to mid-size vehicles and can be an effective addition to fleet operations. Electric power generation is one factor in the over-all “well-to-wheel” benefit analysis for hybrid and the power generation source can have a significant impact on over-all benefits. Rechargeable Electric Vehicles fall into the same category, although the practice of off-peak charging reduces the power grid impact. Electric vehicles currently have a limited role in many municipal operations because of range and capacity issues but this will no doubt change with improving battery storage technology. Solar-assisted electric technologies with improved battery performance may ultimately solidify electric vehicles as a viable option for fleet service in the next few decades.

Fuel Cells are another potential longer range solution to fleet energy requirements. Fuel cells produce electricity through an electrochemical reaction. No electricity is stored but can produce a continuous current within the cell. The Federal Government has sponsored several initiatives to advance the Hydrogen Fuel Cell technology with a goal of cost-effective production by 2020. Infrastructure for fueling centers remains a primary challenge for the technology. Futurists have an eye on some form of nuclear propulsion available in the distant future that could ultimately free us from fossil fuels, and many believe nuclear fusion may be the next game changing energy technology and is already under development in university and energy research laboratories. Energy storage technology is advancing rapidly and could have a huge impact in the near future. Given all the alternatives on the horizon, a bridging technology makes sense. CNG is the one alternative fuel that is abundant, available through current infrastructure, adaptable to large and small vehicles, and reduces greatly the impact on the environment. So, what is CNG?

CNG is a fossil fuel substitute for gasoline, diesel, or propane. Sixty percent of households in the United States have natural gas connections provided by their local utility company, and the Gas Company supplies natural gas to virtually all residents of Beverly Hills and surrounding communities. There is currently a known 200 year supply of domestic natural gas removing the issue of foreign dependence and price stability. Combustion of CNG does produce greenhouse gasses, but at a significantly lower rate (approx. 30% reduction in hydrocarbon emissions) and eliminates other pollutants by 95%. Natural gas is compressed to approximately 1% of its volume and stored and dispensed from pressure vessels. Conversion from gasoline or diesel to CNG requires the replacement of the fuel tank with a larger pressure vessel and a modified fuel injection system. Manufacturers are now producing fleet vehicles CNG ready and this trend is growing. Several government entities in the West Los Angeles region are currently utilizing CNG and are expanding their programs. Neighbors to the South and West, Culver City and Santa Monica, have aggressive CNG programs for their fleets as well as local school bus and public transit operations. The capability of CNG to power larger vehicles traditionally fueled with diesel makes this alternative fuel especially attractive for fueling trash trucks, street sweepers, heavy-duty on-road and off-road vehicles. Commercial fueling stations are located at UCLA, Santa Monica and West Los Angeles and additional government only stations are available in Culver City, West Los Angeles and West Hollywood.

How is CNG dispensed? For fleet services, the most cost-effective solution is to build the infrastructure for on-site fueling of vehicles. Vehicles may be refueled with a "slow-fill" installation that allows for over-night refueling at a reduced rate that requires a smaller compressor and no large on-site storage vessel. A slow-fill system can be installed for approximately \$400,000 less the substantial grants and off-sets that are available. The net cost for a fifteen station slow fill operation could cost between \$200,000 to \$250,000 after exercising all the grant opportunities available. For heavier demand and rapid refueling, a "fast-fill" or "commercial" filling system is required. A fast-fill operation may cost an additional \$200,000 (total of \$600,000) to install and requires a little more space. A fast-fill operation becomes much more cost-effective with substantial conversion of the fleet to CNG or a commercial operation allowing other agencies or public fueling. Grant opportunities for a commercial operation can reduce the outlay to as little as 25% of Capital costs. A fast-fill or on-demand facility is similar to a gas station taking 5 to 10 minutes to fill a large vehicle and no assistance is needed. "Slow-fill" home refueling is also becoming more common and there are currently over 90 public CNG

refueling stations in Southern California. Construction costs for CNG fueling stations, particularly fast-fill operations, have been a deterrent to some Organizations. However, there are many State and Federal grants as well as local agency grants that are off-setting significant portions of the capital costs and when combined with available tax credits/fuel rebates for CNG (currently \$0.50/gallon equivalent), the payback is much quicker which can be critical in this period of public budget constraint.

The Public Works & Transportation Department has a consultant proposal prepared for Adrianus Resources to guide the Maintenance Division's pursuit of a slow-fill CNG fueling facility including the securing of all grants available. The CNG facility will be incorporated in the Corporation Yard Master Plan at a location that will maximize fueling operations and allow for the addition of a fast-fill site. At this time, with technologies that are proven and resources that are available, CNG is the most cost-effective alternative and also addresses the environmental principles in the City of Beverly Hills Sustainability Master Plan.

Sustainability

Now and the Future

The Environmental Sustainability Task Force, a staff committee from multiple departments, meets monthly to discuss different programs and initiatives going on in the City that reflect the Sustainability Guiding Principles as reviewed by the City Council in August of 2008. This committee formed at the conclusion of the topic committee reports being delivered to City Council regarding the General Plan. Much of the Environmental Sustainability Topic Committee recommendations if implemented were operational matters so that is why staff began looking at those recommendations and implementing.

The “laundry list” of projects attached reflects some of those programs that were already implemented in the course of business and others that may be considered for the future. The Task Force divided the projects into the following categories:

1. Energy – The focus of this paper is energy efficiency and how the City currently operates and may improve efficiency for the future.
2. Potable Water – Water use efficiency is vital in the current state of this region’s water supply. Systemic changes will also position the City and its community members for the future.
3. Refuse – The City’s current solid waste operation has surpassed the state mandates of diverting materials from the landfills. These suggestions encourage the City to maintain that course.
4. Stormwater – Reducing stormwater runoff and improving the water quality of streams, rivers and ocean are lofty goals that the City has begun embarking. These suggested programs may be largest challenge for us to implement.
5. Transportation – Reducing the City’s carbon footprint will be a collective effort in changing how Southern Californians move throughout their neighborhoods and commute to work and recreation. This report gives a flavor of the various programs available.

Upon the adoption of the Sustainability City Plan, the staff will now have a tool to assist in prioritizing the variety of projects that are available to ensure that the City continues on the path of “green” decision making.

The City of Beverly Hills Energy Management Program:

Energy conservation is a major global issue with many challenges and opportunities. The benefits of implementing energy saving measures by City Staff extend beyond City Hall. The City is in a unique position to lead by example and can pass along best practices to the community to amplify energy savings.

Previous Energy Related Measures and Their Related Impact

The City has already made some strides in energy conservation beginning in 2002 with a lighting retrofit project that saved the City almost 1 million kwh and \$100,000 annually at that time. Below are some other projects that the City has recently completed:

In the summer of 2008, City chillers were replaced which resulted in significant energy savings. This savings is projected to save \$35,000 annually. In addition, the City received a \$56,000 rebate for this instillation.

The front glass of the Public Works building was tinted in 2008 at a cost of \$46,000. This savings is projected to save \$35,000 annually. In addition, the City received an energy rebate of \$6,500 from Edison as the tinting qualified for an energy reduction rebate program. Portions of the Library and Fire headquarters are tinted and have been for several years.

The HVAC and lighting system at City Hall is controlled by a program that after hours (beginning at 6pm) turns off the lights. The lights stay off unless a person swipes their keycard which gives 1.5 hours of light and HVAC before they must swipe their card again. On weekends and holidays the system is off all day unless a keycard is swiped for that area.

This report will discuss proposed energy projects that can help the City be sustainable in its energy use and decrease the City's expenses. To accomplish this Staff has investigated the following projects:

1. Buy Energy Star appliance/equipment;
 2. Use daylight harvest lighting ballasts;
 3. Use solar film on windows;
 4. Implement a voluntary office 5% reduction in energy consumption;
 5. And, implement solar photovoltaic technologies.
1. Use Energy Star or Comparable Energy Efficiency Standard Appliances/Equipment:

“Energy Star” is a voluntary energy efficiency labeling program derived from a partnership between the U.S. Environmental Protection Agency and the U.S. Department of Energy. All products displaying the Energy Star label meet Federal Energy

Management Program standards. Typically, this means that labeled products are in the top 25 percent of all similar products when ranked by energy efficiency, and use 25 to 50 percent less energy than their traditional counterparts. See www.energystar.gov/.

The City of Beverly Hills currently owns and operates many major appliances such as refrigerators, dishwashers, and a few clothes washers and dryers. Staff proposes that these appliances be replaced with Energy Star appliances at the end of the useful life of our current appliances. All current appliances will be evaluated to determine the remaining useful life and cost benefit ratio of replacing that unit with a new Energy Star appliance.

2. Use Daylight Harvest Lighting Ballasts:

The United States Department of Energy estimates that lighting accounts for one-quarter of the total energy consumed by U.S. commercial businesses. In addition, in a typical office lighting often accounts for up to 50 percent of the total electric bill.

One way to reduce energy usage and decrease costs is to add daylight harvest lighting ballasts to existing lighting equipment. The daylight harvest lighting ballasts eliminates wasted or unwanted electric light by sensing when sufficient daylight is available to take the place of electric light, and then responds by turning off the fixture. When daylight decreases, the device turns the light back on.

A built-in microcontroller automatically calibrates the device, allowing for self-commissioning and easy installation and maintenance.

According to research, commercial customers can expect a two- to five-year payback in retrofit applications and a one- to three-year payback when device is built into fixtures installed in new construction.

Savings from reduced lighting power vary from application to application, but typically range from 30 to 70 percent. In addition, daylight harvesting can significantly reduce power use during peak demand periods, saving on peak load demand costs.

Local utility efficiency rebates are available in most areas for retrofits or remodels. New installations may also qualify for design efficiency rebates. Efficiency Rebates may also be available from other local, state, and federal agencies.

The use of this type of product will not reduce the life of the lamp. It may, in some applications, actually increase lamp life. In addition the use of ballasts does not invalidate the lamp manufacturer's warranty.

Staff recommends a pilot program that will retrofit a small number of existing ballasts to test this technology to gauge the level effectiveness and efficiency. Based on the results of this pilot program this effort could be expanded.

3. Use Solar Film on Windows:

The use of window film, generally placed on the inside of windows, produces a wide range of important benefits.

Using window film reduces solar heat in the space 50% to 80% depending on the window film. The window film can also add comfort, typically 4 to 10 degrees F reduction in the space.

The use of window film can lead to a reallocation in energy costs up to \$2.00 sq. ft. of window film installed, reduce air conditioning maintenance requirements and extend air conditioning equipment life.

The typical window film choices in the past, while very effective at reducing heat, were limited to dark tinted or reflective/mirrored film. These films changed building appearance, restricted light into the space; and reduced the quality of view for building occupants.

The latest generation of visually clear film does not change building appearance. It is generally not noticeable from inside or outside the space and there is no appearance that anything has been placed on the windows. This type film is particularly useful for a building that has a problem area with solar heat and wishes to use window film in only a limited area(s) of a building. A dark tint film could not be used, since it would change the appearance of the building in the area installed. The clear film, not being detectable, enables a building to use the film where it is needed without having to use film on the entire building, or accepting a likely unsightly change of appearance of the building.

Staff recommends that the City initiate the process to having the City's windows reviewed for window film and work with vendors to obtain costs and make a recommendation based on a cost analysis. Staff cautions the use of window film in areas that would be negatively impacted during the cooler times of the year. Since window film reduces heat a space by 50% to 80%, it is strongly recommended that consideration be given to the increase in heating cost required in cooler times of the year.

4. Implement a Voluntary Office 5% Reduction in Energy Consumption:

Set up voluntary office 5% reduction in energy consumption based on last year's number by using checklist provided by sustainability committee.

- a. Be sure to turn off lights in offices and conference rooms when they are not in use. Install automatic room lighting controls.
- b. Turn off office equipment when it is not needed at night or on the weekends. About 30 to 40% of office equipment is left on at night and on weekends. If you can't shut your computers off at night, be sure to turn off your monitor. When counted together, computer monitors use more energy than any other piece of office equipment.

- c. Temperature control
- i. In winter, set office thermostat offices between 65 and 68 during the day/business hours, and 60 to 65 degrees during unoccupied times.
 - ii. In summer, set thermostats between 78 and 80 degrees during the day/business hours and above 80 degrees during unoccupied hours.
 - iii. Adjust thermostats higher when cooling and lower when heating an occupied building or unoccupied areas within a building, e.g., during weekends and non-working hours.
 - iv. During summer months, adjust your thermostat by setting it one degree typically can save 2-3% on cooling costs.
 - v. Consider installing locking devices on thermostats to maintain desired temperature settings.
 - vi. Install programmable thermostats that automatically adjust temperature settings based on the time of day and day of the week. If you have multiple HVAC units, set thermostats to return to the occupied temperature a half an hour apart.
 - vii. In larger facilities with energy management systems (EMS), verify that temperature set points and operating schedules are correct for the controlled equipment. For EMS systems that no longer operate as initially designed, consider a retro commissioning project to restore the system's functionality.

Staff recommends designating "responsible party" to be responsible for and to promote good energy practices for the organization and/or facility. This individual should work with management to facilitate energy savings ideas and strategies - optimizing energy use and costs minimizes overhead and operation costs.

5. Implement Solar Photovoltaic Technologies:

Recently a comprehensive study was completed on distributive generation by a City Consultant. The questions that were asked were:

What are the technologies available for distributed applications in an urban context
 What are the most appropriate technologies to meet the City's objectives?
 What is a general course of action given this information?

The study's concluded that Solar PV is the best suited for urban-located buildings in Beverly Hills. Solar photovoltaic (Solar PV) technology is the application of solar cells for energy by converting sunlight directly into electricity. The benefits of solar PV are:

- PV is modular, well suited to customer-sited applications and can be deployed on rooftops.
- No land costs (if building mounted).
- Both Federal and California state incentives firmly in place.
- 25+ years of proven reliability and field performance (crystalline silicon).
- PV output is often a good match with peak demand, thus offsetting expensive power.
- Provides long term potential hedge against higher power prices.

- Capital costs are currently high, but installed costs are expected to decrease at ~5%/year due to scale and technological innovation.

Cost Assumptions for Solar PV Commercial Installation (2008)

	Likely Scenario in 2008	Likely Scenario in 2015
Installed Cost (\$/WDC)	\$6.51	\$3.90
Module (\$/WpDC)	\$3.55	\$1.92
Inverter (\$/WpDC)	\$0.40	\$0.22
Installation (\$/WpDC)	\$0.92	\$0.58
Other BOS (\$/WpDC)	\$0.55	\$0.50
Gross Margin (%)	25% - 15%	
Non-Inverter O&M (\$/kW-yr)	\$13	\$10

Resources:

1. Saving Electricity and Saving Money (Science Daily). May 1, 2007
2. www.energystar.gov
3. <http://www.energyinnovation.net>

The City of Beverly Hills Water Conservation Program:

Due to prolonged dry conditions, on June 4, 2008, Governor Schwarzenegger declared the State of California in a drought, ordering immediate action be taken to help in the crisis. In response to the orders, the Metropolitan Water District issued a Water Supply Alert requesting local jurisdictions to adopt and implement water conservation ordinances and to significantly increase efforts and programs to conserve water.

In July 2008, City Council declared a Stage A Emergency Water Conservation alert. Stage A in the Emergency Water Conservation Ordinance is a voluntary declaration to encourage the community to conserve 5% of water and make behavioral changes.

Prior to these calls, the City of Beverly Hills is actively participating in a rebate program for toilets, clothes washers, and weather-based irrigation systems resulting over 500,000 of annual water savings.

Additional conservation mandates are imminent. In the short-term, it is essential that the City continue to do its share in conservation efforts. The following are proposed projects:

1. Landscape Ordinance
2. Alternate Watering Dates
3. Water Audits (household)
4. Partnership
5. Incentives
6. Other Programs

1. Landscape Ordinance

More than half of the outdoor water is used for watering lawns and gardens. Nationwide landscape irrigation is estimated to account for almost one-third of all residential water use, totaling more than 7 billion gallons per day.

In order to reduce the percentage of outdoor water usage, staff proposes that a landscape ordinance be prepared by the Planning Department to include such topics as design standards, maintenance, landscape planning and approval, alternative compliance, permit procedures, enforcement, and effective date. Although the Planning Department would take the lead, staff further proposes that a workgroup be created to discuss goals, expectations and priorities in completing this task.

Zoning

Another aspect in water conservation is to ensure that based on the type of plant material that the irrigation system is properly zoned. Some material may require less water and more sun and vice-a-versa; therefore, Parks staff is reviewing the material types to see if additional irrigation heads are needed to program the weather based irrigation systems appropriately.

Design

Landscape design is an important factor, similar to zoning. Proper landscape design avoids overwatering and dry spots.

2. Alternate Watering Dates

Stage A of the Beverly Hills Municipal Code Section 9-4-301 (b – IV) communicates to residents, visitors and businesses irrigation reductions between dusk and dawn or 8pm to 8am. Staff proposes amending the Municipal Code to include a residential policy of an alternate water schedule. An alternate water schedule would help to reduce the demand of local water resources and reduce the likelihood of overwatering. This could be achieved in Stage B of the Municipal Code in which the declaration is mandatory as oppose to a voluntary option. The recommended days are to be coordinated through Water Operations.

3. Water Audits

The City of Beverly Hills through Metropolitan Water District received free indoor and outdoor water audits. Based on the audit recommendations, the City can potentially save approximately 9,275,256 gallons of water annually. The report has been a useful tool in preparing for upgrades on water devices and irrigation systems within the city facilities, parks and landscapes. With that in mind, staff proposes that water audits be made available to residents.

Option 1 – the City could hire a contractor to perform water audits and prepare a recommendation summary of potential savings. This service could be made available to all residents or restricted to those that have exceeded the basic water usage allotment and are currently in Tier III or beyond for water usage.

Option 2 – the City could have the contractor on retainer and residents would be responsible financially for their own audit, based on the terms and services agreed upon by the City and vendor; including cost.

4. Partnership

There is a wealth of water conservation information currently available; staff proposes considering partnering with WaterSense to obtain continual updates on water issues, with a variety of other tools and resources. The cities of Palmdale, Santa Barbara, Santa Clarita, Santa Cruz, Metropolitan Water District and the Environmental Protection Agency are current partners.

Additionally, staff proposes considering securing a contractor for residential Weather-Based Irrigation Controller installs at a discounted rate. Residents would be responsible financially for the cost.

5. Incentives

The City currently offers rebates through Metropolitan Water District and WaterSmart for clothes washers, toilets and irrigation systems. The City may want to consider offering an additional \$20 to \$25 discount from local retailers for approved water saving appliances to help patronize local businesses.

6. Other Programs

Capture water savings options for homes and commercial buildings (Community Development)

A Plumbing Fixture Standard and Water Efficient Landscape Ordinance No. 09-O-2561 was recently adopted January 9, 2009. This ordinance requires upon change of ownership or resale a residential or commercial property plumbing fixtures be retrofitted with water efficient fixtures in accordance with stated ordinance. Additionally, all new landscaping of a new residential or commercial properties, require new installations of irrigation systems or redesign of 50 percent or more install smart irrigation controllers in accordance with the ordinance.

Irrigation Inventory

Community Services, Parks division also received the free water audit and recommendations through the Metropolitan Water District (MWD). In addition the recommendation report provided by MWD, Parks staff needed additional information to fully analysis all the locations city-wide and is performing an irrigation inventory. There are approximately 28,000 irrigation head; staff anticipates completion of the inventory by June 2009.

The purpose of this process is to make sure the irrigation valves and heads are spaced, positioned correctly and that the correct nozzles are installed.

Daily water savings tips

In an ongoing effort to improve the content of the City's new website, staff proposes including 365 water savings tips on the main page of the site automatically updating the tip from day to day. This can be performed within a short period of time, once staff has compiled a list of 365 tips and the webmaster confirms this function is available.

Resources:

Environmental Protection Agency
Metropolitan Water District

The City of Beverly Hills Refuse Program:

Over the years refuse sustainability in Beverly Hills has increased from 40 to 60 percent. What this means is that currently, 60 percent of the trash collected is diverted from the landfill. This is attributable in part by the way in which we recycle trash. In 2004 Beverly Hills switched from three waste stream collection to a two stream refuse collection, also known as “mixed waste”. Mixed waste is considered more efficient in capturing recyclables; refuse collected is taken to the material recovery facility (MRF) and sorted from the disposed refuse. This system was selected to help increase the rate of recovery, everything disposed of is sorted and disposed of properly. Beverly Hills does indeed recycle.

As a partner in environmental protection, this segment of the report describes potential projects that focus on further reducing refuse headed for the land fill and limit adverse environmental impacts. The following are proposed projects:

1. Plastic bag reduction
2. Battery collection
3. Zero Waste/Elimination of Polysyfoam
4. Composting
5. Tire reuse

1. Plastic bag reduction

AB2449 requires grocery stores and pharmacies with larger than 10,000 square feet to provide a recycling program for plastic carryout bags. Between 500 billion and one trillion bags are disposed of each year. Of that amount an estimated 10 percent end up in the ocean and coastlines, and only five percent are recycled. This improper disposal negatively impacts the marine life and is unsightly. Sadly, nationwide approximately 25 infant deaths are reported to the United States Consumer Product Commission annually from plastic bags, 90% are children under the age of one.

In March 2007, the City of San Francisco banned plastic bags with a number of cities; Oakland, Manhattan Beach, Malibu, Santa Monica following suit in one form or another.

In August 2008 the Beverly Hills Farmers’ Market kicked off a “ D.I.G. BH!” campaign to “Do It Green Beverly Hills” at the Market. A brochure was created to educate vendors and consumers about the harmful uses of plastic bags and containers and polystyrene containers. Signs were placed in the Market to remind consumers to B.Y.O.B – Bring your own bag! (It is expected by April the transition to biodegradable and recyclable materials distributed by vendors at the Market will be complete for the Earth Day celebration.

Staff proposes integrating a mandatory plastic bag ban through the following steps. First, continue the tradition for another year of distributing reusable bags as community events and as a part of outreach efforts. During the second year, ask specified retailers to participate in a voluntary ban. After evaluating the voluntary ban, then staff would offer

a recommendation either to continue the voluntary ban or request a mandatory ban. The criteria for a retailer to be asked to participate would relate to the physical size and annual revenue of the business as not to hinder smaller “mom and pop” purveyors.

In Europe, instead of plastic bag bans merchants are allowed to charge for the distribution of a plastic bag. So far this seems to actually be the most effective method to minimize disposable bag usage. This policy is not an option in California due to AB 2449.

2. Battery collection

Under California’s Universal Waste Rule, it is illegal to dispose of household batteries (dry cell batteries – AA, AAA, C, D, 9-Volt, rechargeable batteries - for cell phones and power tools, and button cell). Depending on the type of battery, it contains corrosive materials; such as silver, lithium, zinc, lead, mercury, nickel, cadmium and electrolytes that can burn, explode or leak. These toxins can also seep into the groundwater and eventually into the food chain. These same toxins contaminate the municipal solid waste stream. In 1989, 621 tons of household batteries were disposed of in the United States; double the amount disposed of in 1970. In 1986, 138,000 tons were discarded.

Los Angeles County in conjunction with County libraries has piloted a program to recycle batteries for proper disposal. In an effort to make proper disposal convenient for the Beverly Hills community and encourage proper disposal, containers will be purchased and strategically placed throughout City Hall, the Library and Recreation Centers as well as the Farmers’ Market. A pickup service will pick up deposited batteries as needed until a regular schedule is determined. Materials to publicize program is currently underway, and expected to be complete by Earth Day, which is April 19, 2009.

3. Zero Waste/Elimination of Polystyrafoam (Styrofoam)

Staff proposes to incorporate Zero Waste practices and actions into all aspects of City sponsored events. This is to minimize packaging, toxic content or chemicals hazard potential and eliminate the City’s potential environmental liability. Styrofoam is commonly used in packaging, and is one of the largest offenders in creating hazardous waste. It takes decades for Styrofoam to decompose. Therefore, staff further proposes to encourage the use of products and materials that can be recycled or reused such as post-consumer recycle paper, bamboo, corn plastic which are easily renewable resources.

Once the city as incorporated this policy successfully at the Farmers’ Market, staff proposes expanding this policy to restaurant take out. Giving the restaurants a transition period to comply (the date to be determine).

Additionally, initiated by student representatives of Beverly Hills High School, a pilot program in conjunction with the City’s waste hauler was developed to reduce the amount of food waste at the high school. Once all the issues are defined, and the program is in full swing, staff supports this program be expanded and introduced to the elementary schools gradually until target is met.

4. Composting

Compost is a combination of yard trimmings and food residuals, constituting 24 percent of the U.S. municipal solid waste stream. Composting is currently performed by the City's waste hauler, and provided in minimum quantities at special events. The previous recommendation is to implement a zero waste component; composting is the bi-product of zero food waste.

Compost is available to residents to purchase, however, due to the hauler location, it is not feasible that many residents would travel such a distance. Staff recommends that the City provide one or two events annually for residents to pick up compost within the community locally in larger quantities, thereby benefiting from the food waste collected in their community. The 1st pilot of the proposal may be at Earth Day, April 19th.

Further, it is recommended that the Department of Community Services, Parks Division use the amended soil in planter beds and when creating landscape(s). Instead of purchasing soil from outside vendors, it is recommended that Parks use compost cultivated from the community where appropriate. This should be the first consideration before the purchase of alternative soil.

5. Tire Reuse

Tire reuse could be incorporated in the Engineering and Recreation divisions. Depending on the project, tire reuse should be considered first before the purchase of alternative materials when appropriate. Possible uses include sub grade fill and embankment backfill for walls, playground surface, natural gravel substitute, groundcover under playground equipment (available in various colors), ground tire rubber blend with asphalt. However, it is not often used because it is not recyclable once used unlike asphalt and cement, although it does last longer.

Fleet Services currently has a tire recycling program in place.

6. Electronic Waste

The City's electronic waste program was started approximately three years ago, and has steadily grown from events every six months to monthly at the Farmers' Market. In the upcoming months, staff will prepare a Request for Proposal for more sustainable disposable and recycling alternatives. Last year, the City collected over 7,000 pounds of electronic waste.

Possible consideration will include business E-waste collection one or two times a year on a smaller scale because restrictions vary on the amount that can be disposed off and documentation requirements and an internal energy efficient light collection program.

7. Other Programs

Internally, staff recommends that the coffee mug policy in which employees bring their personal coffee mugs in to the office to use instead of paper cups be reintroduced. Also, making double-sided copies should be included in a source reduction reminder.

Lastly, staff poses that a requirement should be introduced that each school participate in at least two of the events offered as part of the City's conservation efforts in educating the students on an annual basis.

Resources:

1. United States Environmental Protection Agency
2. California Integrated Municipal Waste Board
3. Los Angeles County, Department of Public Works

The City of Beverly Hills Stormwater Sustainability Program:

Stormwater quality has become a major regional issue as it has been identified as a major source of pollution to the watershed such as beaches, marshlands, and rivers. The pollution in the watersheds have reduced the beneficial use of them that has affected recreation and businesses in these watersheds. The Regional Water Quality Control Board- Los Angeles Region has adopted regulations that have put numerical limits on pollutants that enter the tributary waters to these watersheds. With the current regional infrastructure and incomplete understanding of research performed, it is a monumental task in a very short period of time to meet these numerical limits.

The City of Beverly Hills is dedicated to make sure that our future generations can still use these watersheds for beneficial use. The City proposed several methods at which storm water can be treated and concurrently be used to supplement water demand.

This report will discuss potential stormwater projects that can help the City be sustainable in stormwater and help improve stormwater quality. Staff has investigated the following projects:

1. Collection system through natural hydrology by infiltration or cistern systems.
 2. Pervious concrete pavement where applicable and allowed by soil types.
 3. Public and private building sustainability – pavement and vegetation.
 4. Rain water and planter box collection system on site for landscaping and plumbing fixture use.
 5. Smart Irrigation System to reduce excessive irrigation that produces stormwater runoff.
 6. Downspout filters for storm water treatment prior to connection to storm water system.
 7. Catch basin trash gates (trash excluders) to reduce trash from entering the storm drain system.
 8. Using bio-swale on public and private property to reduce storm water runoff and mimic groundwater infiltration to recharge the groundwater aquifer.
-
1. Collection system through natural hydrology by infiltration or cistern and treatment systems.

The City of Beverly Hills storm water runoff drains to the Benedict Canyon storm water channel which eventually drains out to Ballona Creek. Currently, there is no flow record on how much the City drains to Benedict Canyon channel; however, it has been observed by staff and long time residents that shallow groundwater flows in the storm drain channels in north Beverly Hills. Similarly, staff and residents have observed moderate to high volume runoff from residential irrigation draining to the storm drain water systems. These runoffs are contributors to pollution in the watershed.

A potential strategy to collect stormwater runoff is to install infiltration basins or cisterns in the City's recreational parks. Will Rogers and Roxbury Parks are ideal locations for these types of projects.

Will Rogers Park and Roxbury Park meet open space requirements and ideal locations to collect significant runoff volume in the north and south Beverly Hills, respectively. An infiltration basin can be used to collect and treat the runoff for groundwater replenishment. The infiltration basin will be designed based on estimated flows and more importantly, permissibility due to soil type. Non permeable soil types such as clay will not allow infiltration unless the infiltration basin is deeper than the clay level. Consequently, the cost estimates will be more than presented below.

An infiltration basin will cost the City \$0.65 M per acre of water collected and treated in the basin. The Operations and Maintenance (O&M) will cost approximately \$3,000 per acre of water treated per year.

Cisterns can also be installed in these locations. However, several cisterns have to be installed based on the estimated flow capture from the regions. It is estimated that a cistern can cost up to \$1 per gallon captured. This estimate is based on 10,000 gallons design. It is also advised that sand filters be used to treat the captured runoff. Estimated cost would around \$1600 per cistern and O&M cost of \$70 per cistern per year. In addition, the energy cost to the City would be \$4 per cistern per year.

A third project is to build a small water treatment plant at Reservoir 3B (Coldwater and Cabrillo) that treats the shallow groundwater in this area; this project was researched by an outside consultant and presented to the City Council in January of 2007. At that time staff's recommendation which was accepted by the City Council was to not pursue the project and list the land as surplus. It was estimated that 323 acre-ft/year of shallow groundwater flows through this reservoir. It is estimated that it will cost the City \$280/acre-ft. This estimated cost includes the distribution system where this water is used for park irrigation and non-potable uses. It is good to note that an Environmental Impact Report may be required if this option is considered.

An alternative to treating shallow groundwater for irrigation purpose is to build a small water treatment plant or collection system at the location of Reservoir 3B to collect stormwater runoff coming down from the Coldwater Canon Dr. Similar to the previous proposal, the waters collected from this site will be used for irrigation for parks facilities. Currently, there is no flow data to how much stormwater runoff is generated from the area during the dry and wet season. The water treatment plant or collection system will be designed according to the flow data. If a water treatment plant option is considered, a CREST report estimated that a 1 MGD plant may cost the City up to \$86M for the infrastructure; and the O&M is estimated at \$90,000 per year to operate the plant. If a collection system option is considered, then a consultant will be hired to estimate the construction and the pumping cost for the collection system.

A monitoring program is essential for the options described above. The monitoring program will consist of laboratory analyses, modeling, data management, and reporting. The cost is currently unknown as there are an array of tests and labor needed to complete sufficient monitoring

2. Pervious concrete pavement where applicable and permissible by soil types.

Pervious pavement is a BMP method that infiltrates stormwater runoff from roads. It has been used in several cities in the United States and has received positive reviews on improving stormwater quality and reducing volume runoff. Pervious pavement also requires vacuuming to remove materials that block the pores of the pavement.

The City of Beverly Hills has a variety of soil types in its boundaries. Currently, the City does not have an inventory of soil types where pervious pavement would be suitable. However, staff has observed that most of the City lies upon clay, which is an impervious soil. With this knowledge, portions of the City that lies on clay soil cannot have pervious pavement. Collected water will be “sandwiched” between clay and the pervious pavement which shortens the lifecycle of the pavement. In addition, the City also has to invest in staff and vacuuming trucks for pervious pavement maintenance.

3. Public and private building sustainability – pavement and vegetation.

Public education is a key to implement public and private building sustainability for pavement and vegetation. It will require staff to provide comments on all proposed development and redevelopment projects in the City. Staff time, educational materials, and training will be the costs to implement this program continuously. It is estimated that \$8,800 per year will be spent on educational materials and outreach program. Cable TV programs or public service announcements will cost more per year. Currently, the City does not have dedicated staff to create educational materials for training and outreach to developers.

4. Rain water and planter box collection system on site for landscaping and plumbing fixture use.

Similar to proposed option #3, public education will be the key to implement this task.

The City cost is estimated at \$8,800 for producing public education materials. This cost does not include staff time or additional outreach methods.

On the other hand, rainwater collection system will be a cost directed to private developers. The cost is currently unknown as it is dependent upon the plumbing, pumping, and maintenance cost of using rain water for vegetation. The lifetime cost for rain water is yearly maintenance.

In addition, planter box collection system will be at no cost for the City. But, private developers will need to install these boxes to capture roof drain runoffs and for irrigation. The owner’s water consumption may be reduced in this option. However, property line to property line beneficial use for commercial development will be reduced by this option. Planter box collection systems are usually installed around the perimeter of the property. The size of these planter boxes depend upon the calculated runoff volume of the property.

The cost of this option is dependent upon the size of the planter boxes; and the maintenance of the planter and plumbing associated with its construction.

Currently, planter box installation on commercial and residential properties are options used to meet the Standard Urban Stormwater Mitigation Plan requirement by the Los Angeles MS4 permit¹.

5. Smart Irrigation System to reduce excessive irrigation that produces stormwater runoff.

Excessive irrigation has contributed to the stormwater quality problem. Irrigation runoff carries pollutants down the storm drain and onto the watershed. Installing smart irrigation system on City or privately owned facilities can reduce stormwater runoff problems. Currently, smart irrigation system costs \$175 per device. It requires a \$4 per device per month subscription to a provider which automates your irrigation system to turn on or off based on the moisture content of the ground or expected precipitation. Likewise, the O&M cost would be \$46.5 per device per year. Proper installation of this device requires a thorough water audit.

6. Downspout filters for storm water treatment prior to connection to storm water system.

Roof materials contain pollutants that contribute to stormwater quality problems. Downspout filters have been recommended and, at times, required in developments to treat stormwater runoff. The Regional Water Quality Control Board has suggested this option to meet the requirements of the Standard Urban Stormwater Mitigation Plan (SUSMP).

The costs of these are dependent upon the size and number of filters installed in the property. The O&M cost is also dependent upon the type of filter and labor for maintenance.

7. Catch basin trash gates (trash excluders) to reduce trash from entering the storm drain system.

Staff proposes that developers be required to install catch basin trash gates on new or nearby catch basins. These catch basin trash gates have been essential on excluding trash from entering the storm drain system. The Regional Water Quality Control Board- Los Angeles will be requiring all cities to install these devices in their catch basin. The cost is estimated to be less than \$1,500 per device. With out these devices, the City is estimated to spend more than \$1.1 M per year for enhanced catch basin cleaning. Currently, the City has installed 119 trash gates units out of 686 City-owned basins. Public Works Engineering Department will continually install more throughout the City as funding

¹ NPDES Permit No. CAS004001 Waste Discharge Requirements for Municipal Storm Water and Urban Runoff Dischargers within County of Los Angeles, and the incorporated cities within, are required to implement practices that will reduce storm water pollutant loadings to the waters of the United States. Standard Urban Stormwater Mitigation Plan (SUSMP) are one of the practices required on development and redevelopment projects.

becomes available.

8. Using bio-swale on public and private property to reduce storm water runoff and mimic groundwater infiltration to recharge the groundwater aquifer.

Bioswales are landscape elements designed to remove silt and pollution from surface runoff water. They consist of swaled drainage course with gently sloped sides and filled with vegetation, compost and or riprap. Bioswales are feasible in permeable soils. Bioswales are used as part of the Low Impact Development (LID) concept that captures stormwater runoff from streets and consequently treating stormwater and infiltrate through the groundwater aquifer.

Bioswales are usually constructed in sidewalks, center median, and parking lots. These are locations where the most pollutants have been identified affecting the stormwater quality and have not been known to be a trip hazards.

The life cycle of a bioswale is approximately 25 years. Afterwards, the bioswale has to be removed and replaced. In 2008, a 900ft² bioswale was estimated at \$10,300. The installation includes excavating, grading, bioretention media, filter fabric, gravel for underdrain trench, perforated underdrain pipes for infiltration and seeding. There are also annual maintenance cost for bioswales. The estimated costs for mowin, reseeding, and replacement are estimated at \$203 per year for a 900ft² bioswale. This maintenance cost does not include performance inspection.

In the City, bioswales are ideal in center medians, sidewalks, public parks, and private property. Burton Way and Sunset Blvd center medians are locations of interest, but a soil study needs to be performed for feasibility. The maintenance of these bioswales will need to be discussed with Parks and Recreational Department.

Resources:

1. Ballona Creek Bacteria TMDL Technical Memo Draft: CREST (Cleaner Rivers Through Effective Stakeholders TMDLs). Dec. 14, 2005.
2. Fairfax County- LID BMP fact sheet. Feb. 28, 2005
3. Wikipedia- Bioswales. <http://en.wikipedia.org/wiki/Bioswale>

Transportation Sustainability for Beverly Hills

Even before the middle of the last century, the infrastructure for the automobile has dominated the landscape of Southern California. Compared to other forms of transportation, automobiles demand considerable land for circulation, parking, and service, utilize considerable non-renewable resources for energy, manufacture, and infrastructure, and are a predominant source of carbon and other waste products. Among the strategies toward greater sustainability in Southern California transportation are 1) making automobiles operate more sustainably, 2) transferring travel demand from automobiles to other more sustainable modes of transportation, 3) managing travel demand in a manner that most effectively utilize the systems currently in place, and 4) planning development that maximizes opportunities for sustainable transportation. It is not a coincidence that these strategies are generally the ones cited in improving air quality in the South Coast Basin. It is a reflection of how automobile use substantially impacts the environment.

1. Promote use of more sustainable automobiles.

Beverly Hills currently operates a fleet of vehicles that includes an electric vehicle, six hybrids, and several vehicles that operate on biodiesel. As the global automobile industry responds to a growing movement toward more efficient vehicles, the City will monitor new developments in the industry. Among the companies developing all-electric vehicles are Mini (BMW), Tesla, Daimler Benz (Smart), Nissan, Mitsubishi, and Subaru. As part of an effort to engage the community in advancing toward sustainability, the City can include news of developments in electric and alternative fuel vehicles. The City could also explore charging stations in public garages. City may also consider expanded use CNG fueling and other lower emission fuels.



2. Alternative Modes of Transportation.

Metro subway extension

The City of Beverly Hills daytime populations more than doubles in size as commuters from all over Los Angeles county come to work, shop, dine or visit the City. Even more commuters simply pass through the City. Improvements to the existing roadways and transit systems will not likely improve traffic congestion or air quality. Recognizing a need for alternative transportation, in 2005 the Los Angeles Metropolitan Transportation Authority (Metro) Board approved funding to study for a subway system that could possibly extend from downtown Los Angeles through Beverly Hills to Santa Monica.

In late 2006, the Beverly Hills Mass Transit Committee (MTC) was formed to provide input to the Beverly Hills City Council to assist the Council in formulating its position a pre-

ferred route alignment and station locations for Beverly Hills. The MTC committee unanimously recommended a subway alignment extending along Wilshire Boulevard with stations located at the intersections of La Cienega Boulevard and Beverly Drive.

The continued City support for a subway rail extension will be a significant component to reducing traffic congestion and pollution.

Nonmotorized Transportation

There are many reasons to plan for nonmotorized transportation. Walking and cycling are increasingly popular for transport. Safe and convenient nonmotorized travel provides a many benefits, including reduced traffic congestion, user savings, road and parking facility savings, economic development and a better environment.

Nonmotorized modes are important transport choices, for trips made entirely by walking or cycling, and to support public transport. In urban areas, walking and cycling are often the fastest and most efficient way to perform short trips. A built environment that is hostile to non-motorized transport reduces everybody's travel choices. The result of this "automobile dependency" is increased traffic congestion, higher road and parking facility costs, increased consumer costs, and greater environmental degradation. Adequate pedestrian and cycling conditions are essential to guarantee everybody a minimal level of mobility.

The City currently has no continuous dedicated bikeway throughout the City. As a first step the City may create a bicycle master plan to determine desired improvements to the City's bicycle network including exploring opportunities where dedicated bikeway may be required to connect to commercial destinations.

In 2007 Paris France launched a expansive bicycle renting program where people can rent a bicycle at low costs at several locations throughout the city and return them at specified locations when done. This was to reduce the use of cars, taxis and transit for short trips that are normally too long to walk. Bicycle rentals locations are strategically located at major transit points like a subway stop, so riders can arrive to Paris by train and rent a bicycle for short local trips.

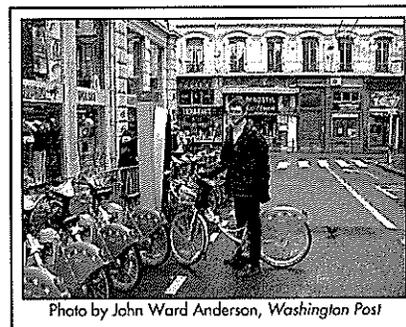


Photo by John Ward Anderson, Washington Post

To encourage people to return bikes more quickly, rental rates rise the longer the bikes are out. In Paris, for instance, renting a bike will be free for the first 30 minutes, \$1.30 for the next 30 minutes.

3. Traffic and Travel Demand Management

Intelligent motorist information systems improves operations of existing and future facilities through advances technologies, such as adaptive signal controls, real-time parking availability and real-time transit information.

Transportation Demand Management is the reduction of single-occupant motor vehicles that travel through the City. The City could create programs that encourage both large and small employers to reduce trip generation and incentives to use alternative travel modes. Encourage employers to provide transit subsidies, bicycle facilities, alternative work schedules, ridesharing, telecommuting, work-at-home programs, employee education and preferential parking for carpools and vanpools.

4. Planning & Development

The City could institute standards and guidelines that encourage integrated site designs and on-site amenities that support alternative modes of transportation, accommodate office, retail, residential, mixed use, and live/work development and facilitates access to and by public transit and reduce automobile trips, pollution, and energy consumption. Mixed-use and live/work developments are intended to enable residents to live close to commercial uses, employment, restaurants, entertainment, and public services, thereby improving sustainability while increasing opportunities for resident activity and local shopping.

Pedestrian-friendly conditions can improve the commercial and cultural vibrancy of communities. Increased pedestrian traffic helps create a safer and more pleasant environment. Once visitors arrive in a community they often explore it by walking, cycling and skating. A good walking environment can enhance quality of life in the City. Recently, upgrades in urban design and pedestrian amenities have been completed in the Business Triangle, including mid-block signalized crosswalks and widened sidewalks.

Among the goals of the City's Housing Element is to provide a diverse range of housing opportunities. One possible consideration might be cohousing. Cohousing is usually designed as clustered multifamily housing where each home is self sufficient, with private living, dining, and kitchen areas. Unlike conventional housing built by a developer, a single cohousing project may have many unit types, ranging from studios to four or five bedrooms. Cohousing is often designed with more compact and efficient living units in order to leave as much open space for natural areas, gardens and recreation as possible. This can provide an opportunity for development of affordable housing. There can be "shared" vehicles to be used amongst all occupants for the co-housing development, thus reducing the need for each household to have a vehicle or multiple vehicles per household.

Resources:

1. Global Development Research Center: <http://www.gdrc.org/uem/sustran/sustran.html>
2. Institute for Transportation and Development Policy: <http://www.itdp.org/>
3. The World Resources Institute Center for Transport and the Environment:
<http://www.embarq.org/en/about/about-embarq>
4. European Federation for Transport and Environment:
<http://www.transportenvironment.org/>
5. The World Bank:
<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTTRANSPORT/0,,menuPK:337122~pagePK:149018~piPK:149093~theSitePK:337116,00.html>
6. Sustainable Urban Transport Project: <http://www.sutp.org/>
7. Organization for Economic Co-Operation and Development:
http://www.oecd.org/departement/0,2688,en_2649_34363_1_1_1_1_1,00.html
8. World Business Council for Sustainable Development:
<http://www.wbcsd.org/templates/TemplateWBCSD5/layout.asp?type=p&MenuId=ODE&doOpen=1&ClickMenu=LeftMenu>
9. The New Mobility Agenda: http://www.ecoplan.org/wtpp/wt_index.htm
10. Northeast Sustainable Energy Association: <http://nesea.org/transportation/>
11. Green Fuels Forecast: <http://www.greenfuelsforecast.com/>