

HARNESSING SAN FRANCISCO'S CLEAN-TECH FUTURE

A Progress Report

BY RON PERNICK
AND JOEL MAKOWER

NOVEMBER 2005



SF Environment



CLEAN EDGE

THE CLEAN-TECH MARKET AUTHORITY

CONTENTS

FOREWORD 3

INTRODUCTION..... 4

CLEAN TECH YEAR IN REVIEW 6

SAN FRANCISCO’S PROGRESS 8

THE ROAD FROM HERE 12

FOREWORD

Not long ago, San Francisco made a decision to attract cutting-edge biotechnology firms to the City. Mayor Gavin Newsom created a biotechnology advisory council composed of industry leaders. Working with the Mayor, it not only attracted several biotech firms to the City, it also landed the headquarters of the \$3 billion California Institute for Regenerative Medicine.

Why not something similar for clean technology? With the release of last year's *Harnessing San Francisco's Clean-Tech Future* and this year's progress report, San Francisco is again on the move, launching a comprehensive clean-technology initiative and creating a Clean Technology Advisory Council. The council will work with the Mayor to position the City as a global hub in the creation, adoption, and use of clean technologies and will strive to attract clean-tech businesses and jobs.

The San Francisco Bay region enjoys significant competitive strengths. It is a center of finance and entrepreneurship. Our university and research centers are unsurpassed. And citizens here embrace public initiatives aimed at environmental protection, a core value for most Californians.

None of which obviates the need for San Francisco to help environmental entrepreneurs navigate through the maze of permits, contracting requirements, taxes, and other business hurdles. A more business-friendly environment can be achieved, however, only through the deliberate efforts of the City's leadership to craft and carry out a coherent plan. The Clean Technology Advisory Council can support such a movement and further a new wave of critical business development.

Mayor Newsom's clean-technology initiative recognizes that a healthy, vibrant economy needs constant renewal from business start-ups and expansions. His initiative also recognizes that people the world over are demanding that economic actors deploy resources in more environmentally sound ways. Whether it's energy from renewable sources, more efficient and productive use of natural resources, or less polluting vehicles, the future belongs to those who can provide services and products consumers want through clean, efficient, and responsible modes of production.

This progress report, along with the initial guiding document published in 2004, will be instrumental in building a vibrant clean technology industry cluster here in San Francisco. I am pleased to join in this effort with Mayor Newsom and other civic leaders.

William K. Reilly

*Chair, Mayor Gavin Newsom's Clean Technology Advisory Council
Founding Partner, Aqua International Partners
Former Administrator, U.S. Environmental Protection Agency*

***Mayor Newsom's
clean-technology
initiative recognizes
that a healthy,
vibrant economy
needs constant
renewal from
business start-ups
and expansions.***

INTRODUCTION

Clean technology has become the sixth-largest venture investment category in the U.S. and Canada, behind information technology, software, biotechnology, health care, and telecommunications.

In October, 2004, Clean Edge published a report, *Harnessing San Francisco’s Clean-Tech Future**, outlining how San Francisco could implement programs and strategies to become a municipal leader in the emerging clean-technology sector, with a focus on clean energy and transportation. The report offered a ten-point plan to help the City play a central role in pursuing clean-technology development and attract new industry and business.

In this progress report, we examine the strides the City has made, update the general state of the clean-tech sector, and highlight areas for ongoing improvement.

As noted in last year’s report, clean technology has become the sixth-largest venture investment category in the U.S. and Canada, behind information technology, software, biotechnology, health care, and telecommunications. It is changing the economic landscape and spawning a host of new industries, from hybrid electric vehicles and solar photovoltaics (PV) to green building and wind power. And, in so doing, it is helping address some of society’s pressing environmental, political, and social challenges, from

global warming, to national security, to healthier communities.

Clean technology comprises a diverse range of products, services, and processes that harness renewable materials and energy sources, dramatically reduce the use of limited natural resources, and reduce or eliminate pollution and toxic wastes. As a rule, clean technologies are competitive with, if not superior to, their conventional counterparts. And these technologies offer additional benefits such as contributing to energy and national security, stimulating the economy by creating new business opportunities and jobs, and improving quality of life by providing healthier workplaces and neighborhoods.

It is no coincidence that global interest in clean technology is on the rise in the midst of recent headlines, trends, and

Clean Tech’s Categories

Below are the four principal categories of clean technologies, with examples of sub-technologies within each.

<p>ENERGY</p> <ul style="list-style-type: none"> Biofuels Energy efficiency Fuel cells Microturbines Small-scale hydro Solar photovoltaics Wave/tidal power Wind power 	<p>TRANSPORTATION</p> <ul style="list-style-type: none"> Advanced battery storage Alternative-fueled vehicles Electro propulsion Hybrid-electric vehicles Hydrogen refueling stations
<p>MATERIALS</p> <ul style="list-style-type: none"> Biobased materials Biomimetics Green buildings Green chemistry Phytoremediation Recycled materials 	<p>WATER</p> <ul style="list-style-type: none"> Biological water filtration Decentralized filtration systems Small-scale desalination Ultraviolet purification Wetlands restoration

**Harnessing San Francisco’s Clean-Tech Future* may be downloaded at no charge in PDF format from www.cleantech.com/sf-report.

events. Record-setting fuel prices, growing concern about global warming, terrorism threats, and increasingly clogged highways make clean energy and alternative transportation technologies not only desirable, but a necessity. Clean technologies are not merely about a cleaner, healthier planet – they also represent a more vibrant, healthier economy. Much like other recent tech trends – information technology, biotechnology, and telecommunications – clean tech represents a vast potential of innovation and advancements that can spur tremendous growth of businesses and jobs.

San Francisco has demonstrated its commitment to making clean technologies a cornerstone of its development strategy – a natural outgrowth of the City’s technological innovation and environmental leadership. Its tech-savvy business community, enlightened local leaders, and world-class academic institutions make the City an ideal setting for incubating and developing new environmentally friendly technologies.

San Francisco, in many ways, has led by example. It is home to the one of largest alternative-fuel municipal vehicle fleets in the nation. It boasts one of the highest recycling rates for a major U.S. city, with fully two-thirds of trash being diverted from landfills. And it recently became the first city in the nation to enact environmentally friendly purchasing legislation. Named the most sustainable city in the U.S. in 2004 by the Web site *SustainLane.com*, San Francisco has become a magnet for innovative, environmentally minded citizens and businesses. In 2005, it became the first city in United States chosen to host the United Nations’ World Environment Day.

San Francisco is well known for the intellectual and financial capital it brings to cutting-edge technologies, but its natural capital also uniquely positions the City to lead in clean technology. Its strong tides, high winds, constant waves, and abundant sunshine provide a ready supply of renewable resources. The City’s tidal power potential alone is enormous, with more than 400 million gallons of water moving through the Golden Gate each day. According to Jared Blumenfeld, director of San Francisco’s Department of the Environment, “Within 10 years, San Francisco could build enough clean tidal power to meet its daily energy needs, as well as generate surplus energy to sell” – all at prices cost-competitive with electricity from fossil fuels such as coal and natural gas.

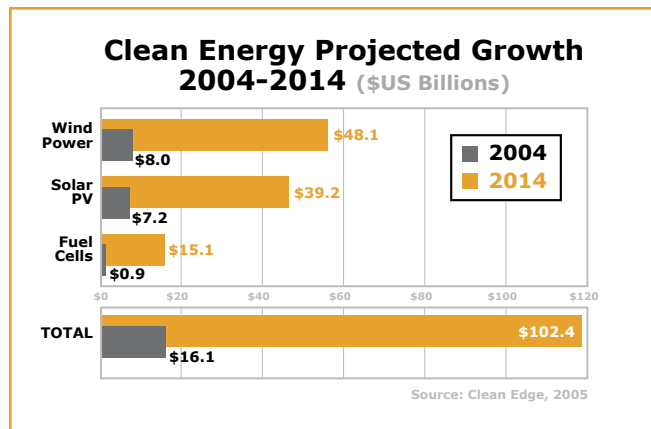
Under the leadership of Mayor Gavin Newsom, San Francisco has begun to forge a clean technology vision for its future. Clean technology is viewed by Mayor Newsom and a growing number of local leaders as both a solution to the City’s energy and economic-development challenges as well as a model for partnerships that can lead to healthier communities and stronger economies around the nation. In his 2005 State of the City speech, Mayor Newsom called clean technology “one of the most significant economic opportunities for San Francisco today.”

In this follow-up report, we highlight the actions San Francisco has taken in support of the ten-point plan recommended by Clean Edge in 2004, and look at additional steps the City can take to continue its pursuit of a thriving clean-tech sector.

San Francisco is well known for the intellectual and financial capital it brings to cutting-edge technologies, but its natural capital also uniquely positions the City to lead in clean technology.

CLEAN TECH YEAR IN REVIEW

Since the publication of *Harnessing San Francisco's Clean-Tech Future* in October 2004, the clean-technology marketplace has continued to develop rapidly. The clean-energy and clean-transportation markets in particular have seen heated growth, with some technologies experiencing greater than 30% annual growth rates. According to Clean Edge research, markets for solar PV (modules, system components, and installation) will grow from \$7.2 billion in 2004 (compared to \$4.7 billion in 2003) to \$39.2 billion



by 2014. New wind power installations are projected to expand from \$8 billion in 2004 to \$48.1 billion in 2014. And fuel cells and distributed hydrogen are projected to grow from \$900 million (primarily for research contracts and demonstration and test units) to \$15.1 billion over the next decade.

Already, these three clean-energy markets have expanded from \$9.5 billion in 2002 to just over \$16 billion in 2004. By 2014, they will grow another sixfold, to more than \$100 billion.

A confluence of forces has conspired to create the “perfect storm” for the advancement of clean energy and clean transportation. These include:

A confluence of forces has conspired to create the “perfect storm” for the advancement of clean energy and clean transportation.

- technological advances and increasing cost-competitiveness of many clean technologies;
- price volatility of conventional energy sources, such as oil and natural gas;
- increased concern over “peak oil” – the notion that the production of oil is peaking and will decline in the near term, sending fuel prices soaring;
- supportive government policies and initiatives, particularly at the state and local levels;
- the growth of corporate and venture capital investments in clean tech;
- increased national and global security issues; and
- the increased awareness of the devastating costs and impacts of catastrophic weather, as exemplified by Hurricanes Katrina and Rita.

Largely as a result, the signs of clean technology’s rapid growth can be seen from Main Street to Wall Street to Pennsylvania Avenue and around the world. Each week brings new developments – investments, government actions, start-ups, and corporate commitments – in the clean-tech arena. Among recent developments:

- **Corporate commitments.** In May, General Electric launched “ecomagination,” a business strategy that emphasizes clean and energy-efficient technologies. The company identified \$10 billion of “ecomagination” products and pledged to double that revenue by 2010, while simultaneously doubling its research-and-development investments in this arena to \$1.5 billion annually. Meanwhile, other companies – including major automobile manufacturers such as Toyota and Ford; electric utilities from Florida to the Pacific Northwest; and oil companies such as BP and ChevronTexaco – have bolstered their commitments to products and services that harness clean energy and transportation technologies.
- **Investor interest.** Venture capital firms have continued to ramp up their investments in clean technology. In the second quarter of 2005, clean-technology investments in North America and Europe totaled \$369 million in 55 deals, marking the fifth straight quarterly increase in clean-tech investment, according to a report by the Cleantech Venture Network. The group expects clean-tech venture investments this year will grow to more than \$1.5 billion in just North America and Europe, up from \$1 billion last year.
- **Hybrid sales.** Steadily rising gasoline prices have caused a tipping point in sales of hybrid-electric automobiles, led by Toyota’s Prius. The company said it plans to sell up to 250,000 hybrids in 2005, nearly double 2004 sales of 130,000 units. Meanwhile, Ford says it will produce 250,000 hybrid vehicles annually by 2010, fully 10 times the 24,000 hybrids it now sells annually. In addition to Ford and Toyota, nearly a dozen other automobile brands now, or soon will, have hybrids in the marketplace, including Chevrolet, Dodge, GMC, Honda, Lexus, Mazda, Mercedes, Mercury, Nissan, Saturn, and Subaru.
- **Local leadership.** State governments continue to demonstrate leadership in implementing clean-energy solutions. In August, Texas created the second-largest new renewable energy market in the country, behind only California, when it increased its commitment from 2,880 megawatts (MW) by 2009 to 5,880 MW by 2015. Several other states – including Minnesota, Nevada, New Jersey, New Mexico, and Pennsylvania – also have increased or accelerated their clean-energy commitments. Delaware, Hawaii, Illinois, Maryland, Montana, New York, Pennsylvania, Rhode Island, and Washington D.C. have enacted minimum renewable electricity standards since the beginning of last year. Such initiatives not only increase energy security, but can provide economic benefits. For example, Pennsylvania’s commitment to clean energy contributed to its ability to land the U.S. headquarters and manufacturing facility for the Spanish wind-energy company Gamesa Corp., creating up to 1,000 new jobs over five years in the state.

Clean-tech venture investments this year will grow to more than \$1.5 billion in just North America and Europe, up from \$1 billion last year.

This past spring, China's top legislature voted to pass its first renewable energy promotion law, expected to kick-start a massive growth of clean energy demand.

- **Emerging markets.** Interest in harnessing clean energy and transportation in fast-growing markets continues to accelerate. This past spring, China's top legislature voted to pass its first renewable energy promotion law. The new law is expected to kick-start a massive growth of clean energy demand. The growth of wind energy in China in 2004 was 35%, even without the new law. China has similarly huge potential for solar, wave, tidal, and biomass power and with energy efficiency could meet a significant portion of its energy needs. Meanwhile, in October 2005, BP CEO John Browne, in his first business visit to India, said that his company's vision for that country centers around a "clean and affordable" household energy source that could reach millions of homes by 2020.

These and other developments continue to demonstrate the almost limitless potential that clean energy and clean transportation have to improve the economies, environment, and lives of billions of people. They also point up the long-term commitments being made to clean technologies, ensuring that they will become, and remain, engines of economic growth and job creation for the foreseeable future.

SAN FRANCISCO'S PROGRESS

The Ten-Point Plan in Brief

1. Communicate and coordinate the vision
2. Remove regulatory barriers
3. Appoint a clean-tech manager for the City
4. Align the City's procurement goals
5. Create a magnet clean-tech institution
6. Create a high-profile project
7. Leverage San Francisco's financial strengths
8. Launch a clean-energy incentives fund
9. Attract the flagship conferences
10. Partner with other regional players

Harnessing San Francisco's Clean-Tech Future outlined a ten-point plan designed to help San Francisco "leverage its assets and overcome its weaknesses to become a world-class center for clean energy and transportation." The recommendations were based on research and interviews by Clean Edge with experts in the clean-tech field.

Since then, the City has implemented, or begun to implement, a number of these recommendations. While San Francisco still has room for improvement and will need to commit both human and financial resources to compete with the many other U.S. cities seeking to become clean-tech hubs, it has made considerable strides over the past year. Following is a summary of actions taken by the City on several of the recommendations:

Recommendation: Establish, communicate, and coordinate the clean-tech vision.

Action: Mayor Newsom convened a Clean Technology Advisory Council in November 2005. The 16-member council (see box on following page) is chaired by William K. Reilly, former Administrator of the U.S. Environmental Protection Agency and founding partner of Aqua International Partners. The council is charged with promoting the City's clean-technology vision and inviting clean-tech businesses to make their homes within San Francisco.

In addition to creating the council, the City's leaders – including the Mayor, Board of Supervisors, Department of the Environment (DOE), and Public Utilities Commission – have developed a three-part shared vision for clean technology in San Francisco: to create high-skilled, high-wage clean-tech jobs; to promote a cleaner and healthier environment; and to reduce the City's dependence on fossil fuels by investing in clean energy research and development. To achieve these goals, the City is pursuing four broad strategies: 1) investing in the industries of the future, 2) promoting the construction and renovation of high-performance, energy-efficient buildings, 3) improving the environmental aspects of its landscape, and 4) diversifying its energy sources.

Recommendation: Remove regulatory barriers.

Action: The City is working to create a range of incentives and regulatory changes to make it easier for clean-technology companies to do business in San Francisco. These include:

■ **Supporting a clean-energy payroll tax exemption.** This would allow qualified companies doing business in San Francisco that engage in “the development, manufacture, or application of scientific advances that produce or contribute to the production of clean energy, including energy produced by wind, solar energy, landfill gas, geothermal resources, ocean thermal energy conversion, tidal energy, wave energy, biomass, biofuels, or hydrogen fuels derived from renewable energy” to receive a payroll tax exemption for eligible employees. **Status:** The legislation was approved by the Board of Supervisors in October 2005.

■ **Creating a fast-track program** for new commercial construction that meets LEED Standards. Developed by the U.S. Green Building Council and the building industry, the LEED (Leadership in Energy and Environmental Design) Green Building Rating System is a national standard for developing high-performance, sustainable buildings. The City's Department of Building Inspection (DBI), Planning Department, and DOE will develop a matrix to establish scaled permit streamlining based on the level of LEED performance. **Status:** the Mayor's Office of Economic and Workforce Development, the Planning Department, DBI, Department of Public Works, and DOE are working together to establish the parameters of a fast-track program, and to redeploy existing DBI and Planning Staff.

Mayor's Clean Technology Advisory Council

- **William K. Reilly** (Chair), Founding Partner, Aqua International Partners, former Administrator, U.S. Environmental Protection Agency
- **Dan Adler**, Director of Technology and Policy Development, CalCEF
- **Eric Bowen**, Vice President, Energy, and Director, Biofuels at Sigma Capital Group
- **Nancy C. Floyd**, Co-founder and Managing Director, Nth Power
- **David Gottfried**, President, WorldBuild
- **Robert Hambrecht**, Managing Director, WR Hambrecht + Company
- **Daniel M. Kammen**, Director, Renewable and Appropriate Energy Laboratory, U.C. Berkeley
- **Nicole Lederer**, Co-founder, Environmental Entrepreneurs (E2)
- **Paul Liotshkis**, Associate Director, SF Community Power Cooperative
- **Joel Makower**, Co-founder and Principal, Clean Edge, Inc.
- **Jennifer McFarlane**, CEO, Women's Technology Cluster
- **Tyler Palmer**, Founder and President, GreenMountain Engineering
- **Mike Sangiacomo**, President and CEO, Norcal
- **Bill Shireman**, President and CEO, Future 500
- **Daniel Shugar**, President, PowerLight, Inc.
- **Nancy Skinner**, U.S. Director, The Climate Group
- **Jon W. Slangerup**, CEO, Solar Integrated Technologies
- **Adam Werbach**, Commissioner, SF PUC

San Francisco is becoming a major venue for clean-tech-related conferences, hosting a number of marquee events over the past year.

■ **Creating incentives for new downtown residential buildings** to meet LEED and other resource-efficiency standards. There currently are 11,000 new housing units in the downtown development pipeline as part of the Mayor's "HOME 15/5" initiative. Working with the private development community, the City plans to create an incentive program for projects that meet LEED standards and integrate other resource-efficiency standards. **Status:** the Mayor's Greening Director is working with DOE, DBI, and community organizations on an incentive program for consideration in the first quarter of 2006 using existing DBI and Planning Staff.

Recommendation: Appoint a clean-tech manager for the City.

Action: Mayor Newsom has appointed a clean-tech manager, Jennifer Entine-Matz, within the Office of Economic and Workforce Development to coordinate citywide clean-tech initiatives; market and execute the City's clean-tech business attraction strategy; ensure workforce development opportunities in the clean-tech industry; and act as a liaison to the Mayor's Clean Technology Advisory Council.

Recommendation: Align the City's procurement goals.

Action: Mayor Newsom recently signed the Precautionary Purchasing Ordinance, which creates a comprehensive system for the City to identify, purchase, and use environmentally preferable products. The ordinance aims to reduce occupational health hazards and exposure to potentially toxic chemicals, reduce contributions to global climate change, improve air quality, protect ground and surface water quality, and preserve resources locally and globally. San Francisco is the first city in the U.S. to adopt an ordinance of this kind.

Recommendation: Attract flagship clean-tech conferences.

Action: San Francisco is becoming a major venue for clean-tech-related conferences, hosting a number of marquee events over the past year, including the United Nations World Environment Day, the Sierra Club's first annual Sierra Summit, the Cleantech Venture Forum, the Green Festival, and others. The U.S. Energy Department's National Renewable Energy Laboratory Industry Growth Forum will take place in the City this year beginning November 7. Because this is a competitive arena, the City will need to continue to market itself and build relationships with conference organizers to continue to attract clean-tech conferences and events.

Works in Progress

Some of our other recommendations that are in progress include:

Recommendation: Create a magnet clean-tech institution.

Update: There is strong support for creating a Clean Technology Park on Parcel D of the Hunter's Point Shipyard dedicated to the research, development, and manufacture

of clean industries. Such a complex can serve as an incubator for early-stage companies, a showcase for the technologies themselves, and a learning and training facility that provides workforce development for future clean-technology workers. While there are many hurdles to work through, we commend the city for its continued pursuit of such a major magnet institution.

Recommendation: Create a high-profile project.

Update: The City has implemented a number of noteworthy projects, though not yet on the grand scale outlined in our initial report. For example, the DOE plans to issue a Request for Proposal to use the animal fat produced at a Bayview tallow rendering facility to manufacture biodiesel in San Francisco. The RFP calls for the production of five million gallon of biodiesel a year. The DOE is working with Muni (which uses seven million gallons of diesel fuel annually) the Port, the San Francisco Unified School District, the Office of Emergency Services, NorCal, and the S.F. Fire Department to arrange for the purchase and use of the biodiesel. The City will soon be converting about 150 of Muni's oldest and dirtiest-running buses to run on biodiesel as a means of significantly reducing their air emissions; these buses will be phased out and replaced altogether by 2007 with the latest, most-efficient models.

The DOE is currently preparing an RFP to use the animal fat produced at a local tallow rendering facility to manufacture biodiesel in San Francisco.

The Mayor also is ready to flip the switch on the City's second significant solar installation, after the Moscone Center: a 250-kilowatt array at the Southeast Water Pollution Control Plant. Also in the works are plans for solar installations on six public schools, Moscone West, Pier 50, San Francisco General Hospital, and other City facilities.

Still to Be Done

Among Clean Edge's ten original recommendations, three remain to be addressed:

Recommendation: Leverage San Francisco's financial strengths.

Update: The City is home to some of the leading financial players in the clean-tech arena, including Aqua International Partners, Expansion Capital Partners, and Nth Power, as well as a handful of venture-capital powerhouses along U.S. 101 south of the City. More recently, Renewable Ventures LLC, a renewable energy investment and management company that finances and operates solar power plants, has made San Francisco its home. To fully harness its potential as a clean-technology magnet, San Francisco will need to leverage this financial base with its own initiatives.

Recommendation: Launch a clean-energy incentives fund.

Update: In *Harnessing San Francisco's Clean-Tech Future*, we suggested that the City could create its own version of the State's Green Wave technology initiative, perhaps by committing a tiny fraction of the City's managed pension fund assets to clean-tech projects. Such a fund could make financial awards to clean-tech projects. Awards could

go to architects, designers, businesses, residences, and others that offer unique and cutting-edge clean-energy or clean-transportation ideas for their businesses or homes to fully cover or help offset their project's costs. Such a fund could be created with the help of the City's new Clean Technology Advisory Council, which is being charged with considering establishing "a financial mechanism modeled after California's state pension fund's Environmental Technology Initiative, to invest in San Francisco-based clean-technology programs."

In October, Mayor Newsom issued an Executive Order asking City departments to "lead the way by installing photovoltaic projects and other renewable energy on their buildings."

Recommendation: Partner with other regional players.

Update: Working jointly with Berkeley, Oakland, and Silicon Valley – all of which have visions of luring clean-tech companies and institutions – San Francisco could lead the effort to leverage each jurisdiction's strengths. A coordinated effort could be synergistic – and San Francisco could benefit by being the crown jewel. It also would avoid duplication of efforts, with neighboring cities making similar pitches. It may be desirable to position the entire region as a clean-tech hub, thereby allowing all players to leverage one another's prime assets.

Additional City Efforts

In recent months, the City has taken other actions outside the scope of the original ten recommendations that will support its clean-tech ambitions and further burnish its reputation as a sustainability leader:

- **Green Business Program:** The Mayor has introduced legislation that will amend the Environment Code to authorize DOE to "develop and implement a City-wide Green Business program to encourage and recognize businesses that conserve the use of natural resources, such as electricity, water and fuel; reduce, reuse, recycle, and compost materials; reduce the use and generation of hazardous materials and hazardous waste; and take affirmative steps to prevent pollution." Such a program will publicly recognize businesses that have gone beyond regulatory compliance to embrace a range of sustainability practices. And it will help to ensure that the City's clean-tech businesses not only produce environmentally preferable products, but do so with exemplary environmental standards.
- **City Government Solar Commitment:** In October, Mayor Newsom issued an Executive Order asking City departments to "lead the way by installing photovoltaic projects and other renewable energy on their buildings." The Mayor also asked the City's PUC to investigate ways to implement an electricity rate incentive package that would enable City agencies to continue paying the same electricity rates they currently pay while using clean, renewable energy. This commitment could be instrumental in luring solar and other clean-energy manufacturers to the City.

THE ROAD FROM HERE

As the preceding pages suggest, San Francisco already has made impressive strides in less than a year toward the goal of making the City a clean-technology magnet. But to a large extent, the City's efforts to date represent the low-hanging fruit – the relatively short-term, low-cost initiatives that the City can do on its own. Some of these – such as efforts to streamline the City's bureaucracy and to enact a payroll tax deduction – will no doubt pay rich dividends over the long term.

This is not to say that the City's leadership hasn't done enough, or done the right things. But to achieve the goal of harnessing San Francisco's potential to create new jobs and economic activity through clean technology will require a sustained and deeper commitment, high levels of coordination, and deep partnerships with a range of players. It will also require the City to examine some deeper structural challenges.

For example, toward the goal of implementing the City's groundbreaking solar initiatives, could San Francisco lure a solar company to set up a manufacturing facility within its borders? Doing so would no doubt require a coordinated, full-court press by the Mayor and many of the City's agencies. But such a high-profile success story could send a strong signal about San Francisco's commitment that could encourage other firms to make the City their home.

In a similar vein, many of the other initiatives now in place or being considered by the City's leaders – including, for example, a “Brownfields to Brightfields” initiative that would encourage siting solar panels on otherwise nonproductive and polluted former industrial sites within the City; or an ordinance that would require all construction and demolition waste to be brought to a certified recycling facility – represent opportunities for the City to attract, partner with, invest in, finance, or perhaps even launch clean-tech ventures.

It is also important to note that some of the weaknesses and challenges we outlined in last year's report need to be effectively addressed. One of those challenges – the lack of utility cooperation in implementing clean-energy projects – could be a stumbling block on the pathway to further progress. For example, it will be critical to work closely with Pacific Gas & Electric Co., the City's principal investor-owned utility, as well as the state's Public Utilities Commission, to make net metering (which allows homes and businesses with solar panels to sell “excess” energy back into the grid) far less restrictive and complicated than at present. Failure to do so will retard other efforts by the City to grow clean-energy markets.

Another challenge to competitiveness is the high cost of electricity in the U.S. in general and California in particular. This represents another significant barrier to attracting businesses of all types, and manufacturing businesses in particular (though high electricity rates do accelerate the payback of investments in renewable energy).

Many initiatives now in place or being considered represent opportunities for the City to attract, partner with, invest in, or perhaps even launch clean-tech ventures.

If energy rates do prove to be a barrier to attracting manufacturers, San Francisco's clean-technology strategy might be better targeted toward growing its base of clean-tech companies by leveraging intellectual capital, such as those in financial services (Aqua International, Nth Power, Renewable Ventures); engineering and design (Green Mountain Engineering, Occidental Solar Power); advocacy and thought leadership (Environmental Entrepreneurs, Green-e, Vote Solar); and consulting, marketing, legal, and public relations services (Antenna Group, Heller Ehrman, Navigant Consulting).

Of course, having set the stage over the past year through its myriad initiatives and plans, the City's leadership has positioned San Francisco to attract any and all of these entities – a solid foundation upon which to aggressively build a robust clean-tech future.

ABOUT CLEAN EDGE, INC.

Clean Edge, Inc. with offices in the San Francisco Bay Area and Portland, Ore., is a leading research and publishing firm that helps companies, investors, and policymakers understand and profit from clean technologies. Through its research and reports, strategic marketing services, online publications, and conferences and events, Clean Edge tracks and analyzes clean-tech markets, trends, and opportunities. Founded in 2000 by environmental and high-tech business pioneers Ron Pernick and Joel Makower, Clean Edge and its network of partners and affiliates offer unparalleled insight and intelligence. For more information visit www.cleandedge.com, e-mail info@cleandedge.com, or call 503.493.8681

AUTHORS

Ron Pernick, co-founder and principal of Clean Edge, is an accomplished market research, communications, and business development entrepreneur with two decades of high-tech experience. At Clean Edge he has co-authored more than a dozen reports on emerging clean technologies and has worked with a range of clients including multinationals, start-ups, government agencies, and investors. Prior to founding Clean Edge, he ran his own environmental web consulting practice and earlier helped build the brands of such Internet pioneers as Internet In A Box, Preview Travel, The WELL, and Yahoo! During his career, he has worked in the U.S. and Japan, serving both emerging and established companies. He has been an instructor and adjunct faculty at UC Berkeley Extension and New College's Green MBA program and sits on a number of corporate and nonprofit advisory boards.

Joel Makower, co-founder and principal of Clean Edge, is a well-respected business writer and analyst, and a leading voice on business, technology, and the environment. Prior to founding Clean Edge, he was founder and editor of *The Green Business Letter*, an award-winning newsletter on corporate environmental strategy, and founder of GreenBiz.com. He has consulted to a wide range of companies on environmental and clean-tech strategy, including General Electric, General Motors, Hewlett Packard, and Nike. He is a former nationally syndicated columnist, a bestselling author or co-author of more than a dozen books, including *The E-Factor: The Bottom-Line Approach to Environmentally Responsible Business*, and a frequent lecturer to companies, associations, and business schools on clean technology and sustainable business strategy. He is a co-founder of the California Sustainable Business Council and an advisor to a range of companies and organizations, including The Climate Trust, GreenOrder, The Green Guide Institute, the *Journal of Industrial Ecology*, and the San Francisco Clean Technology Advisory Council.