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DEPARTMENT OF TOXIC SUBSTANCES CONTROL CALIFORNIA GREEN CHEMISTRY INITIATIVE PHASE 2 – KEY ELEMENT TEAMS

EXPAND CALIFORNIA'S POLLUTION PREVENTION PROGRAM

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California can prime the pump for Green Chemistry by growing existing pollution prevention programs. This program, called P2, helps businesses reduce toxic chemicals while increasing profits. But the investment has been modest and limited. Green Chemistry is a long-term solution, but expanding pollution prevention to include more companies and spread technology across industrial sectors would achieve short-term gains.

Executive Summary

The Department of Toxic Substances Control's (DTSC) Office of Pollution Prevention and Green Technology administers a well-regarded collection of programs focused primarily on source reduction for hazardous waste generation, development of alternatives to toxic chemicals and specific toxics in specific consumer products, with some limited participation in support of green technology projects and green business certification. Although these efforts successfully reduce hazardous wastes and set the stage for the shift toward a cradle to cradle approach, they are limited by their emphasis on wastes and narrow scope of programs that support green technologies and businesses.

A number of opportunities exist to improve and expand every element of these programs to detoxify industrial production and consumer products in California. All options identified require a new concept to redefine the role of the P2 Office, from a program defined by its tools – specifically, voluntary programs – to a program defined by the place and time of intervention: at the front of the pipe, *before* toxics are introduced into products and processes. A focus on the point of generation (rather than disposal) in turn necessitates a willingness to consider a greater role for an array of regulatory tools in instances where, despite evidence that green alternatives exist, perform, and are economically feasible, industry fails to embrace them on a broad scale voluntarily.

The recommended options for expanding pollution prevention programs include refocusing the Source Reduction Act on chemical use rather than waste, increasing state funding for development of safer alternatives, expanding voluntary programs and the role of regulation to achieve large-scale safer substitutes, promoting extended producer responsibility for consumer products, making state government a pollution prevention and green technology leader, and increasing state support for local green business programs.

Introduction

DTSC's Office of Pollution Prevention and Green Technology ("P2 Office") has historically worked to reduce the use of toxic chemicals in, and the hazardous waste generated by, California industry. Core programs have: (1) assessed hazardous wastes generated by particular industries, and promoted methods to reduce the quantity and/or toxicity of such wastes; (2) evaluated, or funded development of, promising green technologies or safer substitutes for existing chemicals; and (3) conducted pollution prevention training and outreach to assist small businesses, local hazardous waste enforcement agencies, and local green business programs.

In 2008, the P2 Office doubled in size, and now includes numerous functions related to toxic chemicals in consumer products. A new "Toxics in Consumer Products" branch educates industry and the public about legislative prohibitions on the use of toxic materials in specific applications, such as restrictions on the use of lead in jewelry, and on use of certain heavy metals in electronic devices and in product packaging. Many of these restrictions apply to products manufactured out of state or abroad, requiring DTSC to navigate difficult practical and jurisdictional issues to insure that green-chemistry signals are sent up the supply chain to those who most directly control product composition.

The Toxics in Consumer Products branch also works to ensure safe end-of-life management of products with toxic constituents, such as perchlorate-containing fireworks, and chemically treated wood used in utility poles, railroad ties, and other high-volume applications. The branch additionally works to create adequate recycling infrastructure for, and educate the public about, the everyday wastes generated by California consumers that contain hazardous materials, including batteries, fluorescent bulbs, and personal computers.

As a final program element in the P2 Office that combines aspects of pollution prevention, green technology, and a consumer product focus, a new "Plastics Hazard Reduction Unit" is devoted to promoting research on, and creating markets for, less-toxic plastics and bio-based plastics for uses that include disposable beverage containers.

This Green Chemistry Initiative KEY ELEMENT encompasses recommendations made by many familiar with DTSC's existing P2 Office program, including but not limited to P2 Office staff, DTSC's external Source Reduction Advisory Committee, local green business program representatives, pollution prevention staff of U.S. EPA Region IX, and DTSC contractors working to identify safer substitutes for toxic chemicals in specific applications. These parties were asked (a) how DTSC could improve or expand upon existing program elements in the P2 Office, and (b) how CalEPA could enhance environmental protection in California by applying lessons learned to date in DTSC's P2 Office programs.

The Challenge

The strength of DTSC's Office of Pollution Prevention is its technically competent, environmentally motivated group of professionals, with expertise ranging from engineering to toxicology to green marketing and technical writing. A number of staff

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members hold doctoral degrees, and many have extensive private sector experience in regulated industrial sectors. As such, staff are generally well equipped to evaluate existing practices in technically complex industries, and to identify pollution prevention and green technology opportunities. Staff also have considerable experience in drafting technical reports, peer-reviewed scientific papers, and nontechnical educational outreach materials for a variety of audiences. Nonetheless, in attempting to fulfill DTSC's toxics-reduction mission, there are currently structural limitations or challenges associated with almost every facet of the P2 Office's work. Individually and collectively, these constraints prevent the program from having a transformative (rather than marginal) effect on California businesses.

The P2 Office's bedrock **source-reduction** statute ("SB 14"), innovative when introduced in 1989, is now in part outmoded in its near-exclusive focus on hazardous waste generation as a means of toxics reduction. Specifically, the statute fails to address adequately the large number of toxic chemicals now appearing in the first instance embedded in consumer products, rather than in waste streams, and to prioritize input substitution over other means of reducing hazardous waste generation. In a related vein, a decade's worth of experience with the 1998 amendment to the source-reduction statute ("SB 1916") has revealed that while educational outreach and technical assistance to targeted industrial sectors can induce many businesses to green their practices, voluntary adoption of green chemistry/green technology innovation is slow, and consistently fails to achieve an industry-transformative scale.

In an effort to promote **development of alternatives to toxic chemicals** in specific applications, the P2 Office directs limited contract funding to nongovernmental green-chemistry researchers, or provides staff time as an in-kind match for (also quite limited) U.S. EPA Pollution Prevention grants for alternatives development. The paucity of State and federal government funds directed to targeted applied research on alternatives development is a significant impediment to development of viable substitutes for toxic chemicals in widespread applications.

In addressing **toxics in consumer products** – a welcome new role for the P2 Office – staff are primarily tasked with implementing product- or product-category-specific legislation pertaining to end-of-life product management. Although such legislation addresses legitimate environmental concerns, DTSC's consumer product authorities have been created piecemeal, and lack a coherent overall framework for allocation of responsibility in the product supply chain for end-of-life management of products with toxic constituents.

With respect to **green technology** projects, P2 Office research and analysis frequently demonstrate the feasibility-in-concept of changes in industrial processes or business operations, such as a change from chemical to nonchemical means of controlling scale and corrosion in water cooling towers atop buildings, or the ability to extend motor oil life in fleet vehicles through a program of oil analysis that prevents unnecessary oil changes. In many of these instances, however, staff experience has been that it is harder to induce government agencies to adopt green technologies and practices than it is to persuade the private sector to adopt such innovations, a fact inconsistent with the State's green leadership aspirations.

In collaborative efforts to support the pollution prevention work of local entities, P2

Office staff have observed the **insufficiency of existing green business program infrastructure** to meet the high demand for green business certifications in California. In most counties with green business programs, there are long waiting lists for would-be green businesses to obtain recognition and publicity as such. In many other counties, there is no green business recognition program whatsoever, greatly reducing any potential marketing advantage to those businesses contemplating adoption of greener business practices.

Each of the above-listed challenges presents an opportunity to revisit specific statutory authorities reposed in the Department of Toxic Substances Control, and a broader opportunity for California to reevaluate its voluntary pollution prevention programs, regulatory approaches, funding priorities, and role as green chemistry and technology leader.

Background

1. Source reduction and P2 information dissemination under the Hazardous Source Reduction and Management Act

The P2 Office implements California's Hazardous Waste Source Reduction and Management Review Act of 1989, often referred to by its bill number, "SB 14" (hereafter, "Source Reduction Act"). The Source Reduction Act mandates that large industries systematically examine their opportunities for source reduction of hazardous materials, before they can become hazardous waste. The Act defines "source reduction" as action that causes "a net reduction in the generation of hazardous waste," or "a lessening of the properties which cause it to be classified as a hazardous waste."¹ The statute also requires DTSC to disseminate information regarding pollution-prevention opportunities in specific large industries selected by the Department.

"Source reduction" is defined by the Source Reduction Act as: (1) input changes in materials or feedstocks; (2) production process changes, such as reusing materials within a given process; (3) product reformulation/substitution, including changes in specifications of end products; and (4) operational improvements to improve site management, such as inventory control and better employee training. Source reduction is defined to exclude actions taken after a hazardous waste is generated, such as concentration to reduce hazardous waste volume, dilution to reduce hazardous characteristics, or displacement of hazardous waste from one environmental medium to another..

The Source Reduction Act requires hazardous waste generators who meet a quantitative threshold of annual waste generation to review any alternative processes, operations, or procedures that would reduce the generation of hazardous waste, and to devise a plan and timetable for implementing and documenting all "technically feasible and economically practicable" source reduction measures. As required by the statute, DTSC has developed a format for generators to review their operations, to plan for source reduction, and every four years, to submit a "hazardous waste management

¹ Health & Saf. Code, Div. 20, Ch. 6.5, Art.11.9, Section 25244.14(e)(1).

performance report” that documents source reduction measures implemented in the preceding four years.

The statute also requires DTSC to select “at least two categories of generators by SIC [Standard Industrial Classification] Code with potential for source reduction” every two years, to review their reports in detail, to identify successful source reduction approaches, and to disseminate information regarding those approaches to other generators in the same industrial category. To date, the P2 Office has examined waste-generation data from, and pollution prevention practices and opportunities in, industry sectors ranging from petroleum refineries to pharmaceuticals manufacture to metal fabrication.

2. Targeted voluntary P2 under Senate Bill 1916

In 1998, DTSC’s source reduction program was enlarged through passage of Senate Bill 1916, in which the legislature expressed its intention to “expand the State’s hazardous waste activities . . . to promote implementation of source reductions measures using education, outreach, and other effective voluntary techniques.”² Key features of this expansion included:

(1) the requirement that DTSC establish a “technical assistance and outreach program to promote implementation of model source reduction measures in priority industry categories,” focusing on at least two priority categories of industries with source-reduction potential every two years, including one category consisting primarily of small businesses;

(2) the requirement that DTSC provide source reduction training and resources to CUPAs [Certified Unified Program Agencies], regional and local governments, and business assistance corporations and centers;

(3) the formation of an external Pollution Prevention Advisory Committee to provide advice on and critical review of the Department’s proposed two-year work plans, review the Department’s source-reduction progress, and make recommendations regarding program activities, funding priorities, and legislative changes;

(4) establishment of two quantitative benchmarks for the Source Reduction program: (a) the instruction that for source reduction projects involving “primarily large or technologically complex businesses,” DTSC communicate with representatives of 80% of the state’s companies in the category (a measure of DTSC effort or “output”); and (b) a requirement that DTSC determine “the extent to which the statewide goal of 5 percent per year reduction of the generation of hazardous wastes . . . has been attained” (a measure of environmental outcome); and

(5) the instruction that DTSC evaluate why the 5% reduction-per-year source reduction had or had not been attained, make “recommendations designed to assure . . . attainment,” and include “recommendations for legislation” in future two-year work plans.

Sectors previously targeted for focused pollution-prevention outreach to encourage voluntary adoption of green practices include, but are not limited to, the vehicle service and repair industry, the chemical industry, and the auto body and paint industry.

3. Green Technology

The P2 Office's Green Technology staff respond to a variety of requests for evaluation of promising environmental technologies, investigate emerging technologies of potential environmental concern, and conduct life cycle analyses of products and processes to inform decisions about toxic chemical use and alternative technologies. Green tech projects stem from the Hazardous Waste Treatment Reform Act of 1995³ and related authorities that authorize DTSC to "coordinate research and study" and "conduct pilot projects" related to technologies that can "ameliorat[e] California's hazardous waste disposal problems."⁴ Green tech projects have ranged from evaluation of technologies for remediating groundwater contaminated with chlorinated solvents, to determining whether drum-top lamp crushers are a viable alternative for disposing of spent mercury-containing fluorescent lamps, to exploring the potential environmental risks associated with emerging nanotechnology applications.

4. Toxics in Consumer Products

In recent years, DTSC's authority to prevent pollution through hazardous waste source reduction has been supplemented by new legislative authority and responsibility for toxic chemicals in consumer products. Some statutes require DTSC to enforce requirements that toxic materials in specified products do not exceed regulatory limits, as in the Toxics in Packaging Prevention Act, the lead-containing jewelry law, and provisions of California's Electronic Waste Recycling Act of 2003 that restrict hazardous substances in electronics ("California RoHS").

Other laws require DTSC to ensure that products containing toxics are properly managed at the end of their useful life. Examples include California's Treated Wood Waste law, the Perchlorate Contamination Act, and the Lighting Efficiency and Toxics Reduction Act (governing end-of-life recycling of mercury-containing lamps). DTSC has also voluntarily participated in multi-party negotiations that led to creation of a National Mercury Vehicle Switch Recovery Program to ensure removal of mercury switches prior to auto shredding. In another voluntary program – the "Take-it-Back Partnership" – DTSC has promoted retail take-back of electronic waste by retailers, particularly waste not eligible for payment to recyclers under the Electronic Waste Recycling Act.

5. Alternatives Development

DTSC is among many government units in California – including U.S. EPA Region IX, the South Coast Air Quality Management District (SCAQMD), and the Port of San Diego – that fund or provide in-kind staff support for contractors conducting targeted research on alternatives to toxic chemicals in widespread applications. DTSC-supported contract research has included research on low-VOC, low toxicity alternatives for: spotting

³ Health & Saf. Code, Div. 20, Ch. 6.5, Art.11.9, section 25179.1 *et seq.*

⁴ Health & Saf. Code, Div. 20, Ch. 6.5, Art.11.9, section 25170 *et seq.*

chemicals used in the garment cleaning industry; automotive aerosol cleaning products; methylene chloride used in consumer product paint strippers; and materials used for cleaning lithographic printing ink from application equipment. Results of such research inform DTSC's implementation of voluntary pollution prevention programs in relevant industry sectors, and in some instances induce other government bodies (such as the SCAQMD) to revise regulations to reflect the availability of viable substitutes.

6. Green Business Support

DTSC's P2 Office conducts numerous activities in furtherance of the Source Reduction Act amendments' instruction that DTSC provide "source-reduction training and resources" to support local pollution prevention activities throughout California.⁵ The P2 Office shares industry-specific fact sheets, provides training programs and technical assistance, and provides various forms of staff support to local government environmental programs, CUPAs, small business development corporations, and local Green Business Programs conducting pollution-prevention activities.

7. Biomonitoring

DTSC's Environmental Chemistry Lab (ECL) provides laboratory support for the P2 Office and other DTSC programs. ECL has for years conducted pioneering biomonitoring studies of tissues and body fluid, such as blood and breast milk, to determine the levels of certain toxic chemicals in humans and wildlife. Chemicals of existing or emerging concern include a variety of persistent organic pollutants that bioaccumulate in the food chain, such as PCB's and brominated flame retardants. ECL will continue and expand its biomonitoring under California's first-in-the nation Environmental Contaminant Biomonitoring Program (established in 2006 by Senate Bill 1379), which will help identify needs for targeted pollution prevention.

The Opportunity

Opportunities exist to improve and expand every element of the P2 Office program so as to detoxify industrial production and consumer products in California. Implicit in all options identified is a reconceptualization of the role of the P2 Office, from a program defined by its tools – specifically, voluntary programs – to a program defined by the place and time of intervention: at the front of the pipe, *before* toxics are introduced into products and processes. A focus on the point of generation (rather than disposal) in turn necessitates a willingness to consider a greater role for regulation in instances where, despite evidence that green alternatives exist, perform, and are economically feasible, industry fails to embrace them on a broad scale voluntarily.

RECOMMENDATION #1:

REFOCUS THE SOURCE REDUCTION ACT ON CHEMICAL USE RATHER THAN WASTE

Pollution prevention planning through the process mandated by the Hazardous Waste Source Reduction and Management Review Act of 1989 ("Source Reduction Act") has

⁵ Health & Saf. Code, Div. 20, Ch. 6.5, Art.11.9, Section 25244.17.2.

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proven a useful tool for individual businesses motivated to improve efficiency and environmental performance. Nevertheless, the statute's waste-oriented approach has not been demonstrated to substantially reduce the use of toxic chemicals in California industry overall. P2 Office staff experienced with the program's operation therefore propose revising and enhancing the statute to focus it exclusively on reducing toxic chemical *use*, rather than its existing goal of reducing the generation of hazardous *waste*.

There are two fundamental means of amending the statute to focus on chemical use: changing applicability standards, and/or revising the statutory definition of P2 approaches qualifying as "source reduction." The current Source Reduction Act reporting and planning universe consists of approximately 1,800 facilities, based on quantity of routinely generated hazardous waste. One option for refocusing applicability is to exchange the existing universe of source reduction planners for a new universe of entities determined by toxic chemical use. The new universe could consist of Toxics Release Inventory (TRI) reporters;⁶ business plan filers (or a subset of those); or chemical users as determined by some other database or reporting requirement (such as chemical purchases, or any new chemical use reporting requirement resulting from the Green Chemistry Initiative). Alternatively, the Source Reduction Act could be amended to add a new universe of facilities to the existing universe via a new chemical use threshold.

An alternative or additional means of reforming the Source Reduction Act and regulations is to focus exclusively on strategies that result in reductions in toxic chemical use. Currently, measures qualifying as "source reduction" for regulatory purposes include input changes, operational improvements, production process changes, product reformulation, and administrative steps taken to reduce hazardous waste generation. "Administrative steps" in turn include, but are not limited to: inventory control, employee award programs, employee training, in-house policies, and corporate or management commitment. P2 Office staff recommend that the statute and regulations: (1) better define "operational improvement" to reflect the goal of toxic use reduction; (2) better define "production process changes" so as to deny pollution-prevention credit for efficiency measures facilities should already be implementing, and to insure that toxic chemicals are not taken out of a waste stream and including instead in consumer products; (3) eliminate pollution-prevention credit for most "administrative steps" (excepting "inventory control"); and (4) add a requirement for materials accounting, modeled after the programs in Massachusetts and New Jersey.⁷ These proposals are applicable to any reporting universe (e.g., hazardous waste generators and/or toxic chemical users).

⁶ Approximately 1,500 facilities in California annually report to the TRI. See State Fact Sheet for California at: www.epa.gov/region09/toxic/tri. Considerable underreporting is assumed (based on extrapolation from the number of TRI filers in much smaller states), and the intersection of California's 1,800 Source Reduction Act filers and the 1,500 TRI reporters is unknown.

⁷ To be most successful, the materials accounting program element should be supported by adequate training and certification of plan preparers. In Massachusetts, for example, individuals must pass a course and then be certified as qualified to prepare the Toxic Use Reduction Plans required by that state's Toxic Use Reduction Act.

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Other staff-generated proposals for improving the Source Reduction Act program include: (1) developing an online reporting function that links chemical use planners to online technical information (such as Design for the Environment program information) and allows online certification of completion;⁸ (2) allowing facilities to use their own Environmental Management System (EMS) as a surrogate for mandatory planning,⁹ provided that they include specified elements, such as public reporting and the establishment of source reduction and/or chemical use reduction as the highest priority; and, most ambitiously, (3) remaking the Source Reduction Act as a comprehensive, multimedia planning program that integrates the various state, and to the extent possible, federal, planning requirements to reduce the regulatory burden on facilities, administrative costs for public agencies, and render the planning exercise both more effective and more consistent with other business planning efforts. This last concept could require significant agency resources to determine which planning programs would be suitable for integration into a single requirement, and is thus an ultimate goal rather than a recommendation for early action.

These proposals, and related means of strengthening and updating the Source Reduction Act, will be further vetted by a recently established subcommittee of the Source Reduction Advisory Committee (“SB 1916 Advisory Committee”). This Committee is tasked by statute with reviewing the effectiveness of DTSC’s source-reduction projects, and making “[r]ecommendations for legislation” to improve California’s source reduction program.¹⁰ After full-Committee input, these recommendations would ultimately yield a legislative proposal to update and strengthen the Source Reduction Act.

RECOMMENDATION #2: INCREASE STATE FUNDING FOR DEVELOPMENT OF SAFER ALTERNATIVES

DTSC has historically funded or co-funded projects to develop alternatives to toxic chemicals in specific applications. These include both “drop-in” less-toxic chemical replacements for existing chemicals, and alternative technologies or methods that reduce or eliminate the need for toxic chemicals. Chemistry Nobel Laureate Jerome Karle has observed that “[s]ocieties whose governments recognize the dependence of the development of successful novel technologies on broadly supported basic research are more likely to be healthier and economically prosperous in the future than those that do not.”¹¹ A core function of government science is to support basic research in areas of high societal need or interest that, for a variety of reasons, have not attracted sufficient private capital, as in the case of green-chemistry investment.

⁸ The state of Texas has such an on-line planning program; see www.tceq.state.tx.us/assistance/P2Recycle/wrpa/instructions.html

⁹ This approach has been demonstrated by the state of Washington, which found that allowing for the “EMS alternative” to mandatory planning resulted in more vigorous and comprehensive planning and results.

¹⁰ Health & Saf. Code, Div. 20, Ch. 6.5, Art. 11.9, section 25244.22 (c)

¹¹ Jerome Karle, *The Role of Science and Technology in Future Design*, June 29, 2000, available at: http://nobelprize.org/nobel_prizes/chemistry/articles/karle/index.html

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At present, worthy applied green-chemistry research projects far outstrip DTSC's capacity to fund basic research on alternatives to toxic chemicals. U.S. EPA has similarly limited funding for basic pollution prevention research on chemical alternatives. The paucity of State and federal government funds directed to targeted applied research on alternatives development is a significant impediment to development of viable substitutes for toxic chemicals in widespread applications.

DTSC's contractors have identified numerous specific green chemistry projects with immediate real-world application that are currently in need of funding. These include development, testing, and in-use demonstration of products as diverse as low-VOC floor wax strippers and graffiti removal chemicals, and nontoxic marine coatings for pleasure boats.

When a guaranteed market for green chemicals is created through some combination of demand by informed consumers (see Key Element # __), government regulation (see Recommendation #3, below), and government leadership as market-participant (see Recommendation #4, below), private capital can be expected to invest in green chemistry to meet market demand. Until such time, there will be a need for significant public investment in development and promotion of least-toxic chemical alternatives.

The magnitude of funding need, and source(s) of additional funding to support alternatives research, have not been determined. However, any tax or fee on chemical production and/or use could be directed to such work.

RECOMMENDATION #3: EXPAND VOLUNTARY PROGRAMS, AND THE ROLE OF REGULATION, TO ACHIEVE LARGE-SCALE SAFER SUBSTITUTIONS

The P2 Office's programs and projects have demonstrated the technical feasibility – and in many instances, cost savings achievable through – input substitutions, process changes, and other methods of reducing the toxicity of products and industrial processes. The program's challenge, however, has been to create *broad-scale* adoption of these methods through voluntary action alone, rather than merely niche application by a small segment of environmentally conscientious businesses. There are multiple sources of this problem, including the small number of sectors that can be targeted with existing staffing, the short statutory time frame for disseminating green innovation, the slow pace of adoption of best practices by small businesses, DTSC's limited ability to affect large industries' behavior, and the "uneven playing field" that can place environmentally superior performers at a competitive disadvantage in the marketplace. Each of these limitations is surmountable, and must be surmounted, if California is to achieve pollution prevention on a meaningful scale.

The small number of sectors that can be addressed concurrently, and the short statutory timeframe for disseminating pollution prevention materials and encouraging adoption of green practices, are both factors limiting the success of the P2 program in effecting industry changes. As amended in 1998, the Source Reduction Act requires that every two years, DTSC select one new large and one new small business sector to target for hazardous waste source reduction education. DTSC's experience

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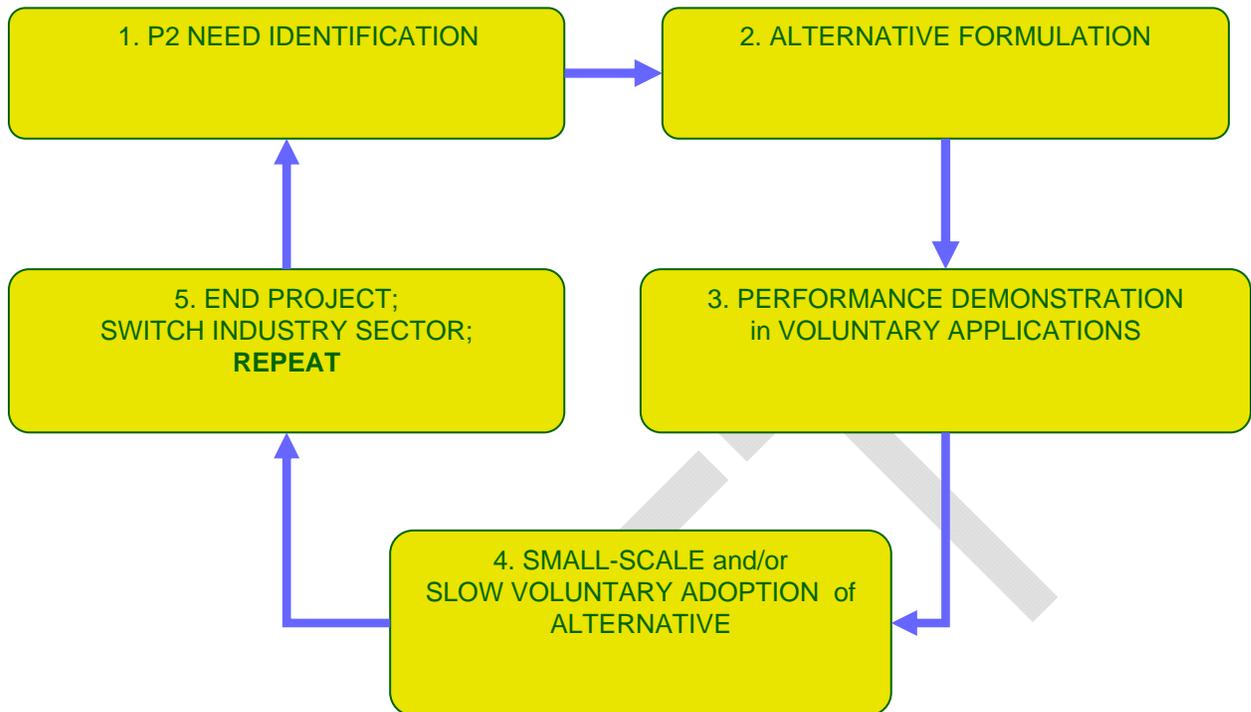
demonstrates that two years is in many instances too short a project cycle, however, particularly given the need to spend the first year gathering sector-specific information and developing outreach materials, and the vast number of businesses that must be reached in a state as large as California. Thus, for example, DTSC has extended its Vehicle Service and Repair project for three project cycles (totaling six years) to meet business demand, and continues to receive requests for program materials. By increasing the number of sectors that could be targeted for P2 efforts concurrently (through increased staffing), and by amending the Source Reduction Act to give DTSC more flexibility as to project duration, DTSC could achieve greater industry penetration in its chosen industrial sectors.

Certain other problems with the wholly voluntary nature of existing P2 source-reduction programs are not so easily overcome. The slow pace of adoption of best practices by small businesses has meant that even in DTSC's highly praised Vehicle Service and Repair (VSR) program, it has taken six years' worth of voluntary program activity to impact the environmental practices of approximately 300 out of California's estimated 30,000 VSR shops, or 1% of the total. Thus, even as the VSR program enters a low-level "maintenance" phase (in preparation for mandatory exploration of a new sector), and despite enthusiasm for the program from participating businesses, the program has failed to have a transformative effect on industry because of the resource-intensiveness of DTSC-to-business and business-by-business education and persuasion.

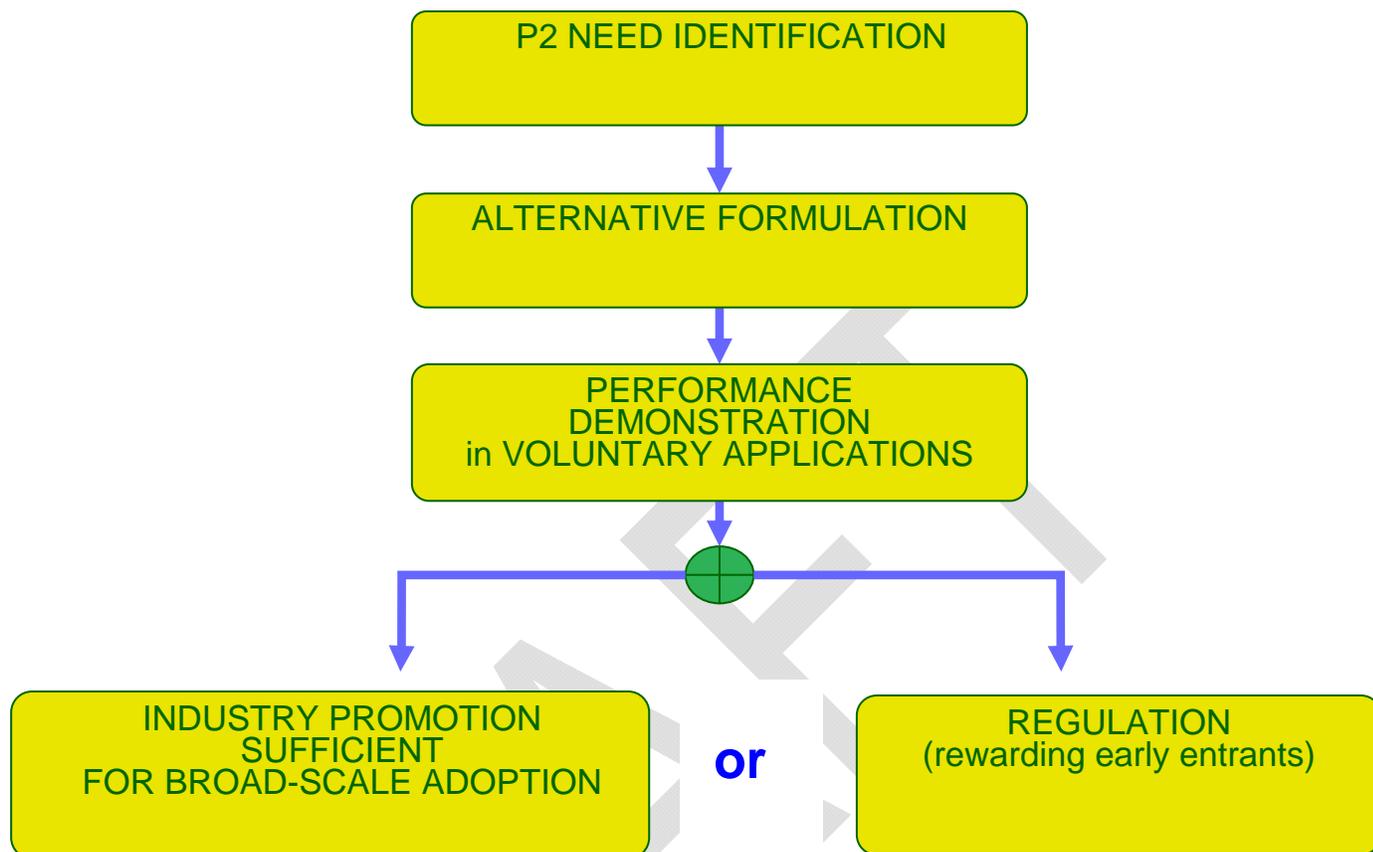
Similarly, DTSC's voluntary pollution prevention programs have had limited ability to affect large-industry behavior. Under the Source Reduction Act, DTSC analyzes hazardous wastes generated by specific large industry sectors, and compiles and disseminates "assessment" reports regarding best practices in these sectors to inspire emulation. DTSC has also initiated a "Chemical Industry Challenge" recognition program to acknowledge businesses in that sector that adopt particularly innovative or significant pollution-reducing technologies or practices. Nonetheless, both DTSC and industry are aware that best-practices reports and recognition events provide insufficient incentive to *drive* large-business decisionmaking, and at best – if well publicized – can alert other businesses to potential opportunities for green innovation.

In the case of both large and small businesses, the competitive disadvantage experienced by businesses opting for environmentally superior, but more costly, inputs and processes is a significant factor limiting voluntary adoption of green practices. Some green methods are costlier than conventional methods. Many others "pay for themselves" over time, but often over long payback periods. Even where green actions pay for themselves in a reasonable time period, however, this fact may be insufficient to motivate adoption by a business intent on maximizing profit. Such a business will not ask only whether an innovation "pays for itself" over time, but also, *e.g.*, whether capital is available to pay for the transition to a new process, and if so, how the return on investment compares to alternative uses of that capital for the same period.

The result of the foregoing factors is a project cycle that generally begins with identification of the pollution-prevention needs in a given industry sector, proceeds to identification of safer alternatives, demonstrates the performance and economic feasibility of using alternatives, avoids some quantum of pollution, but ultimately fails to achieve anything approaching industry transformation, as follows:



The new model endorsed here is that P2 Office voluntary programs be viewed as leading to *either* of two desired outcomes: large-scale voluntary adoption of safer alternatives by industry, or, failing that, well-informed regulation that relies on the performance testing conducted through voluntary adoption to raise the regulatory floor to an appropriate level. In this view, regulation is neither the intended nor inevitable outcome of the identification of green alternatives to toxic chemicals. Rather, government regulation is a means of *insuring* realization of achievable environmental improvement if and when industry fails to self-regulate on a substantial scale. In such a model, the existence of a viable, field-tested substitute for a toxic chemical would induce a threat of government regulation absent evidence of swift and pervasive industry adoption of that alternative, as follows:



The certainty and predictability of government regulation following any non-diffusion of viable alternatives would serve two critical purposes. First, it would motivate early and broad voluntary adoption of alternatives by industry, in the first instance in an effort to fend off regulation, and as a fallback, to avoid operational interruptions as a result of a mandate to introduce new chemicals or processes. This incentive could be magnified through regulations designed to reward early adopters of safer alternatives, such as by grandfathering operations that represent marked improvements over prior practices, but may not precisely conform to new regulatory standards. Second, and as important, a guarantee of broad voluntary diffusion of alternatives *or* mandatory diffusion through regulation would create precisely the market conditions necessary to motivate significant private investment in green chemistry: a guarantee of a substantial product market, with corresponding return on investment, that would produce the desired “race to the top.”

DTSC is currently working to quantify the scale of adoption or nonadoption of P2 measures, and the resulting environmental benefits, following the promotion of specific P2 actions through voluntary programs. DTSC is also financially supporting similar outcome-measurement efforts by local green business programs (see Recommendation #6, below). These combined data will be extremely useful in determining where further regulation of chemicals in particular industrial applications is warranted, and conversely,

where the success of a particular voluntary program may obviate the need for additional regulation. Any additional regulation could be achieved through a combination of DTSC-sponsored legislation, and issue-specific collaboration with other CalEPA BDO's and local air districts to promote adoption of appropriate policies, rules, and regulations.

RECOMMENDATION #4:

PROMOTE EXTENDED PRODUCER RESPONSIBILITY FOR CONSUMER PRODUCTS

Pursuant to a variety of narrowly drawn statutory directives, DTSC's Toxics in Consumer Products staff are responsible for devising or implementing end-of-life management regimes for certain consumer products containing toxic constituents. DTSC lacks any more general statutory authority (or funding) to analyze and prioritize end-of-life issues across product types, however, or to devise systemic solutions. As the California Integrated Waste Management Board (CIWMB) has recognized, "[addressing] products with problematic end-of-life management issues through a patchwork of product-specific or substance-specific legislation" (CIWMB Resolution 2008-15) delivers insufficient environmental protection, while imposing significant economic and administrative costs on the State and local governments.

Accordingly, CIWMB in 2007 adopted a "Strategic Directive" designed to insure that producers assume logistical and financial responsibility for the safe stewardship of products and their packaging from "cradle to cradle." The Waste Board has since resolved to make the concept of Extended Producer Responsibility (EPR) "an overall policy priority to guide proposals to seek statutory authority" over products and packaging. (CIWMB Resolution 2008-15.) In the near future, CIWMB and the P2 Office will meet to discuss their mutual interest in advancing EPR for consumer products sold in California, and the desirability of a consistent and coherent approach to end-of-life product issues across CalEPA BDO's.

DTSC's P2 Office concurs with the many Green Chemistry Initiative commenters who urged that the time is ripe for adoption of an Agency-wide EPR policy with respect to end-of-life management of products and packages with toxic constituents.

RECOMMENDATION #5:

MAKE STATE GOVERNMENT A P2 AND GREEN TECHNOLOGY LEADER

In its role as market participant rather than regulator, the State of California has a major opportunity to demonstrate green leadership as an early adopter of pollution prevention methods and green technology. The recommendation for the State to adopt green technology processes goes beyond mere purchasing of environmentally preferable products (described in Key Element # ____).

In the green technology area, the P2 Office frequently demonstrates the feasibility of certain toxics reduction measures, such as the use of high efficiency oil filters, long-life oils, and oil analysis programs to extend motor oil life in fleet vehicles, or alternatives to the use of chemical biocides to control fouling and corrosion in cooling tower water. Unfortunately, state agencies have often proven the most difficult to persuade to adopt

such cutting-edge green methods. If the State of California mandated (or more strongly supported) the demonstration and use of such technologies in State operations, it would both attract attention to green-tech innovation, and reassure the private sector regarding the performance of new technologies.

This recommendation could be readily implemented through an “Executive Order on Green Leadership” that directs State agencies to adopt all feasible and cost-effective pollution-prevention and green technology measures. This Order could be publicized through a session at California’s annual Green Government Summit showcasing sector-specific opportunities for California agencies to adopt greener practices and technology.

RECOMMENDATION #6:

INCREASE STATE SUPPORT FOR LOCAL GREEN BUSINESS PROGRAMS

The State should expand not only its role as green leader, but its role as green helper, by greatly increasing its support for local green business programs. Indeed, given the abundant opportunity demonstrated in Figures A through C below, enhancing State support for green business programs may be *the single most effective means of increasing the voluntary adoption of pollution-prevention practices by small and medium-size businesses in California.*

Green business programs have been enormously successful and high-leverage mechanisms for inducing local businesses to go beyond regulatory compliance in the area of environmental performance. Historically, the P2 Office has assisted such programs by creating and sharing fact sheets and other resource materials describing pollution prevention methods applicable to a particular industry sector, analyzing their performance and environmental benefits, and determining investment payback periods. These materials have been abundantly praised by local programs, used in their green-business outreach, and incorporated into industry-specific “checklists” indicating green measures required for certification as a green business. The P2 Office has also provided technical assistance to green business programs in California, and participated in program planning meetings of the California Green Business Network and other coordinating bodies with green-business-related committees, such as the Association of Bay Area Governments. Most recently, DTSC has provided funding for a green business environmental-outcome measurement tool (currently in development) that will quantify the considerable toxics-reduction, greenhouse gas reduction, and other multi-media environmental benefits of existing green business certification programs.

Nonetheless, despite a strong working relationship between DTSC and green business programs, DTSC’s involvement with green businesses has not led to a quantum increase in green business program growth and penetration in California, or a change in the model for delivery of green business certification to California businesses. This is primarily because to date DTSC has had limited staff (less than 2 PY) allocated to local green business support activities, and has not actively worked to identify systemic green business program needs, or strategize regarding statewide expansion possibilities.

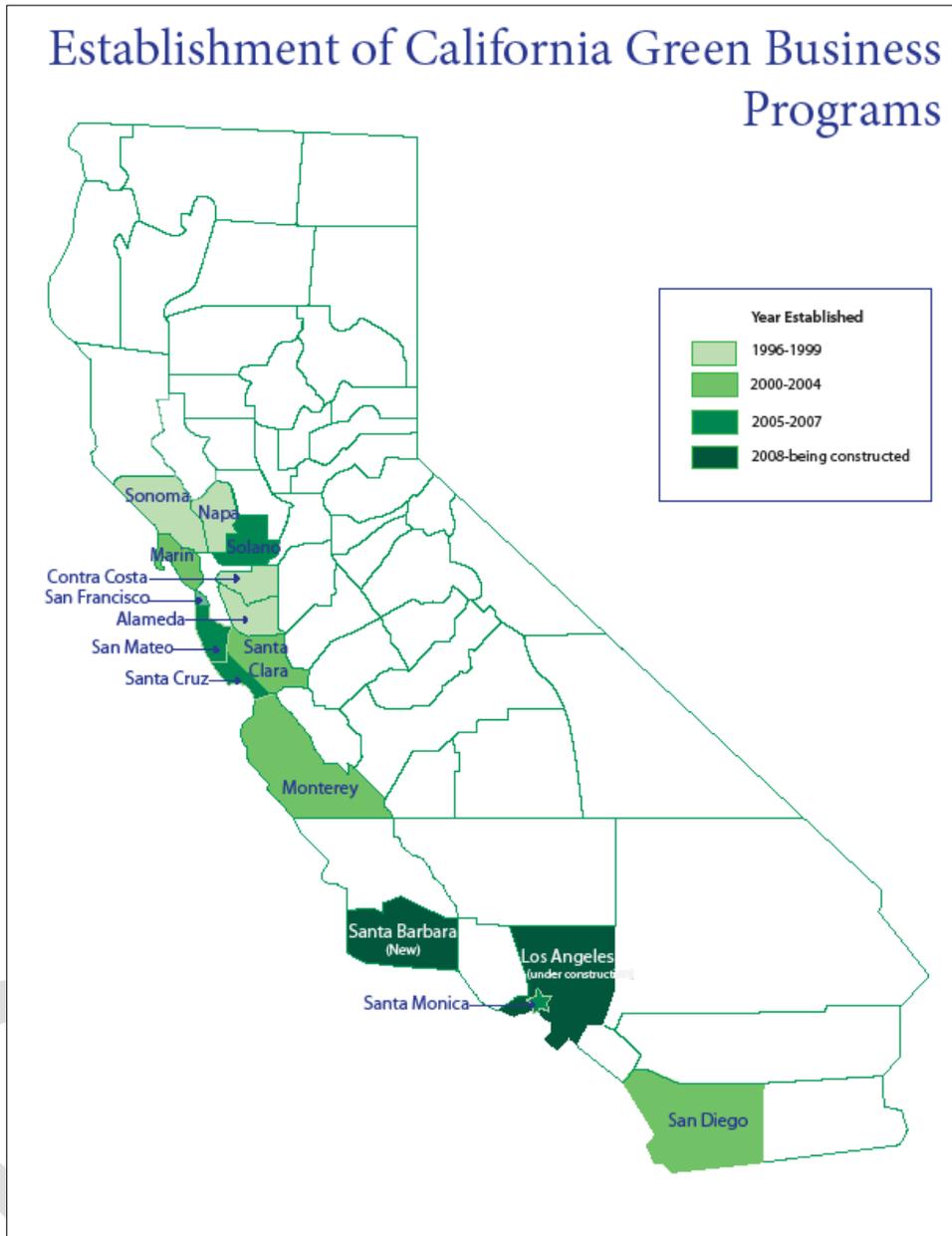
Planning for pollution prevention program expansion through the Green Chemistry Initiative has revealed the significant opportunity represented by California’s major

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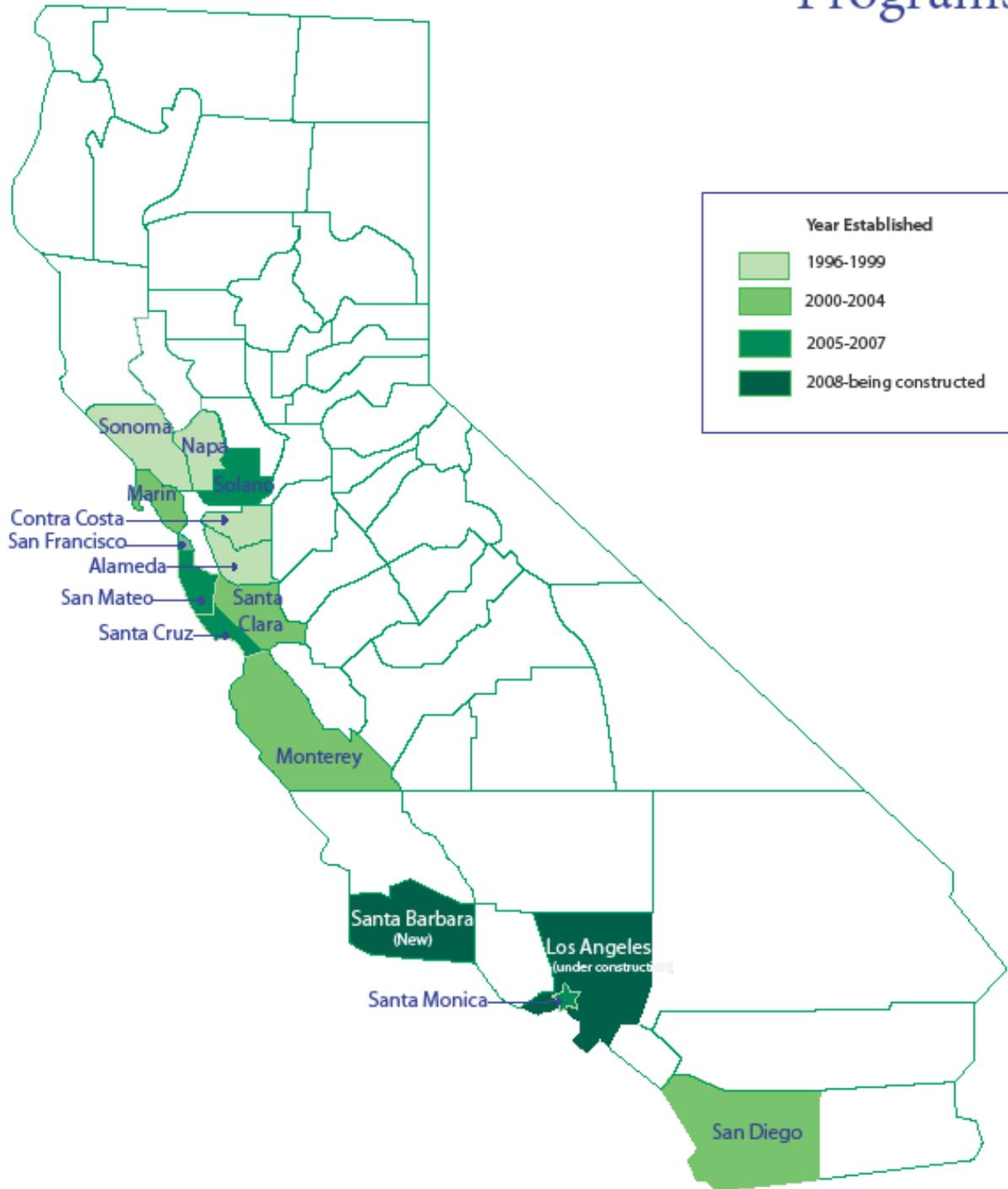
geographic gaps in green business program coverage (Figure A); the high return on program investment, as demonstrated by staff-to-outcome ratios (Figure B); and existing programs' inability to service those *eager* to engage in voluntary pollution prevention activities, as demonstrated by the significant backlog of businesses awaiting certification (Figure C).

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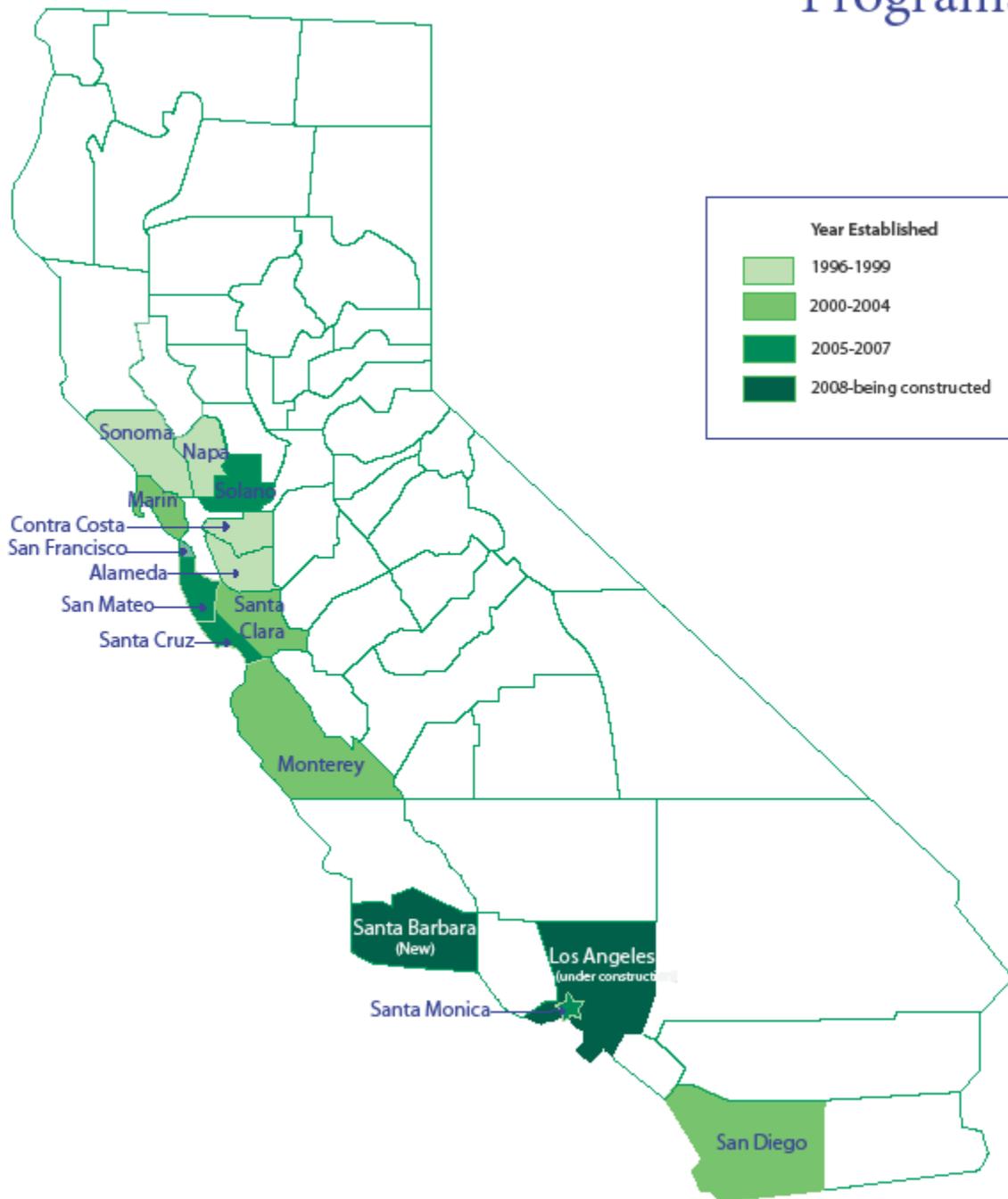
FIGURE A: Geographic gaps in Green Business Program coverage



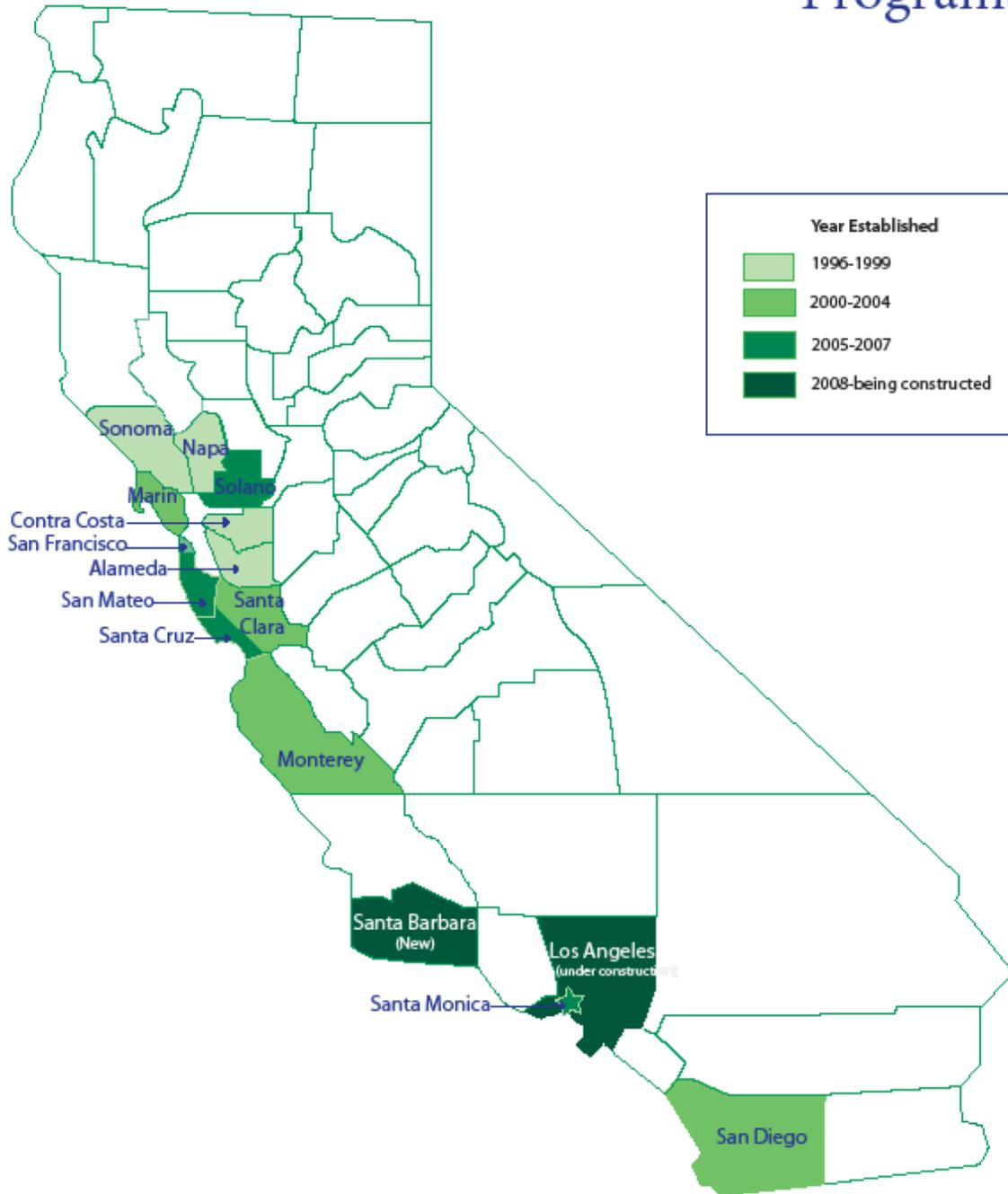
Establishment of California Green Business Programs



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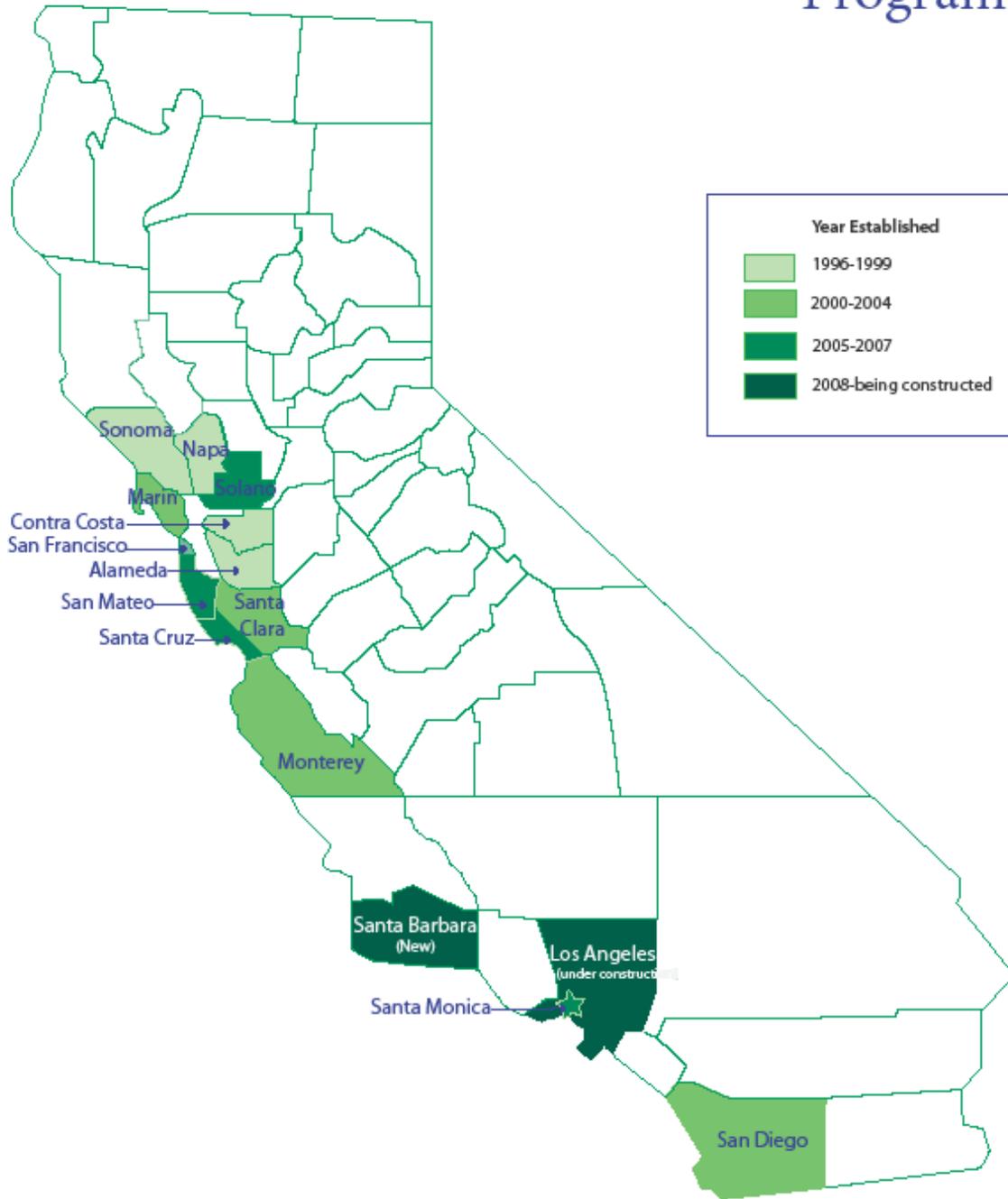
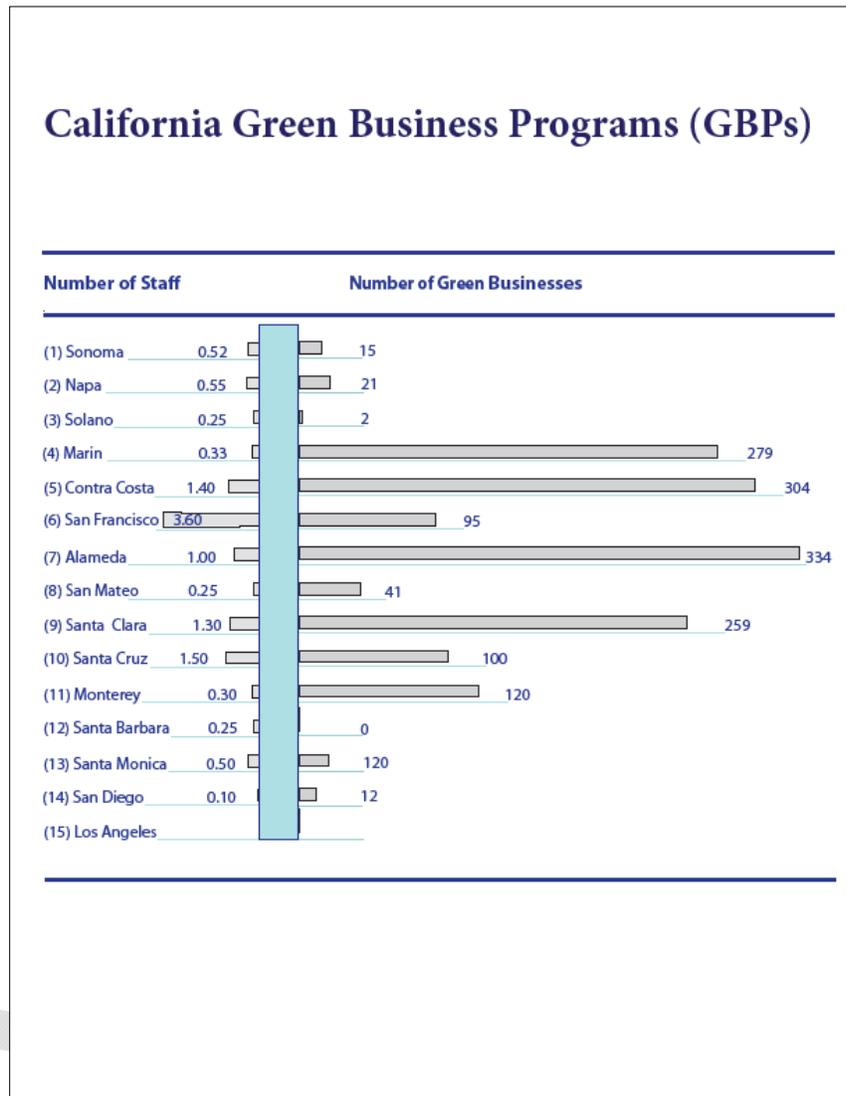
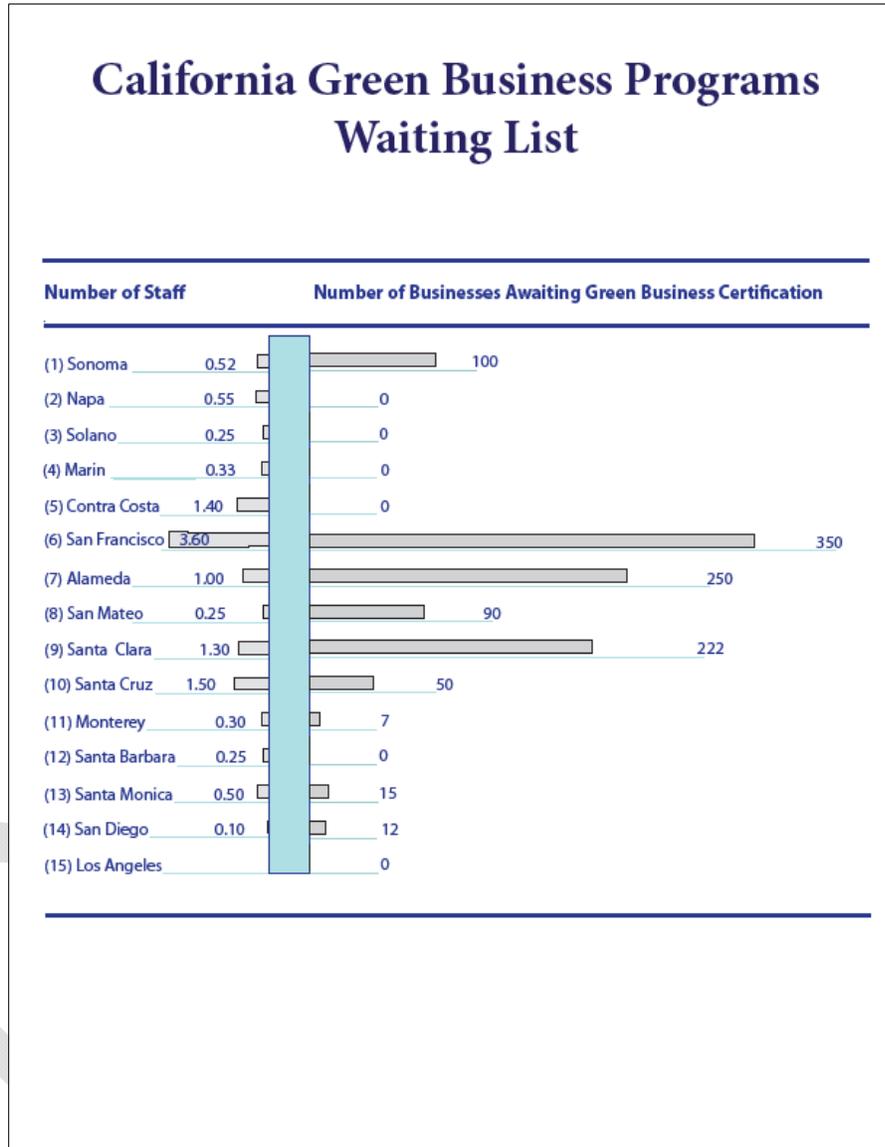


FIGURE B: Staffing levels and green business enrollment¹²



¹² Variable staffing-level-to-outcome ratios should be viewed in light of the date of each program's establishment (Figure A), among other factors, and should not be used to gauge individual programs' comparative levels of effectiveness.

Figure C: Businesses awaiting green certification



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DTSC can greatly increase harvest of this low-hanging fruit -- eager potential green businesses in areas with waiting lists for certification, and potentially eager businesses in areas unserved by any existing green business program -- by designing an enhanced funding and staffing mechanism for green business programs. With additional State resources, DTSC and green business program leaders could collaborate in pursuit of federal Green Jobs Act or other funding to create a green-business job corp program. Such a program would generate a pool of inspectors/certifiers to increase existing local programs' capacity, and ultimately, provide statewide green business program coverage.

In a parallel effort, DTSC has already begun to work with existing green business programs to conduct a needs assessment that would enable DTSC technical staff to develop pollution-prevention and green tech educational materials responsive to the needs of businesses seeking certification. The existence of a robust statewide network of green business programs would in turn directly benefit the P2 Office's source reduction work, as green business program coordinators are among the best agents for dissemination of DTSC-generated pollution prevention materials and messages to relevant sectors.

This recommendation could be implemented through slightly increased DTSC staffing (2 PY) to work with green business coordinators on conceptual design of the green job corps program and curriculum, coupled with Agency support for inclusion of this element in a California proposal for federal Green Job Act grant monies.