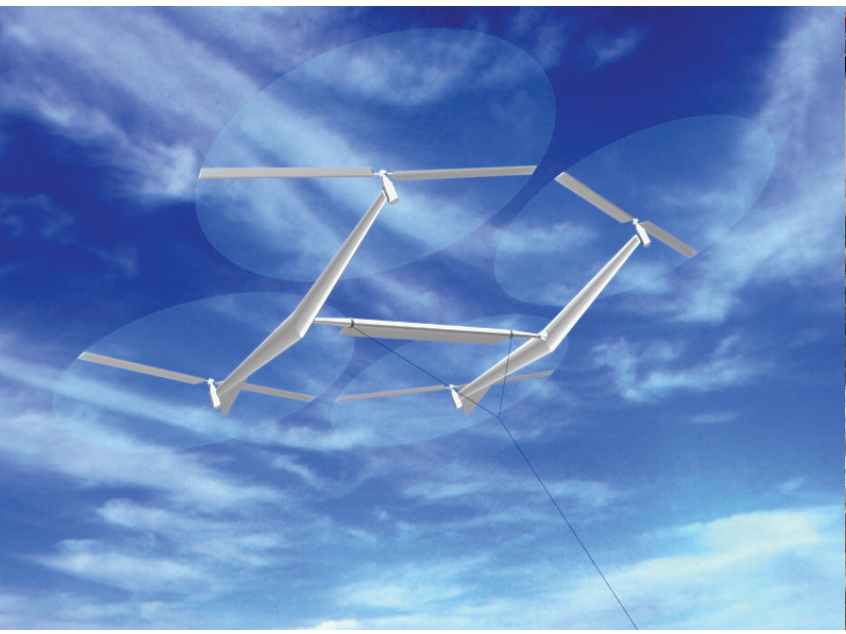
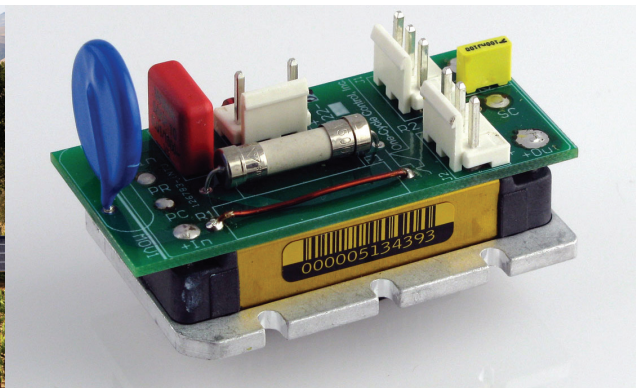
Green, Local, and Growing

Findings from a Survey of Green Businesses in California





CENTER FOR COMMUNITY INNOVATION
at the Institute of Urban and Regional Development

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The Center for Community Innovation (CCI) at UC–Berkeley nurtures effective solutions that expand economic opportunity, diversify housing options, and strengthen connection to place. The Center builds the capacity of nonprofits and government by convening practitioner leaders, providing technical assistance and student interns, interpreting academic research, and developing new research out of practitioner needs.

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Introduction

During periods of severe economic crisis, policy makers and citizens look towards the future to identify and support emerging industries that hold the promise of renewed growth in investments and employment opportunities. As unemployment remains high and as the environmental challenges brought on by global warming mount, the "green economy" has garnered significant attention as a potential solution to both problems. However, as with any new industry, economic growth depends first on the pace of innovation and commercialization, and then on the emergence of markets. In *Green, Local, and Growing*, we present the results of a survey of green businesses in California, focusing specifically on the questions of what makes green businesses different and how they are innovating and growing at the regional scale.

This survey is one component of a larger UC–Berkeley study sponsored by the U.S. Economic Development Administration, *Innovating the Green Economy in California Regions* (available at http://communityinnovation.berkeley.edu). In brief, that study found that the green economy accounts for just 1% of California's jobs, but is growing about 50% faster than the economy overall. *Cleantech* innovation and the green economy have traveled distinct and varied paths among California regions; although innovation is concentrated in just a few regions, job growth is more dispersed. This suggests that the entire state stands to benefit from the growth of the green economy.

At its most basic level, the green economy consists of economic activity that reduces energy use and/or improves environmental quality. It includes the four principal sectors of the clean energy economy: renewable energy and alternative fuels (e.g. solar, wind, geothermal, biofuels); green building and energy efficiency technology; energy-efficient infrastructure and transportation; and recycling and waste-to-energy. The green economy is not just about the ability to produce clean energy, but also the growing market for products that consume less energy, from fluorescent lightbulbs to organic and locally produced food. It also encompasses economic sectors that improve the environment, for instance through remediation of toxic sites or design of more compact cities.

By surveying firms identified as "green," as well as traditional businesses in a range of industries and businesses facing the most serious environmental challenges, we are able to develop a broad understanding of both how green practices are expanding and how green innovation and firms are growing.

Our survey finds, in sum, that:

- Green businesses are planning to expand faster than traditional firms are;
- Green practices are not limited to green businesses, but span the entire economy;
- Green firms are innovating new green products and services, while traditional firms are innovating new green processes;
- Green businesses are much more committed to staying in California than traditional businesses are;
- Green businesses differ from traditional ones in their greater reliance on local and regional markets and business networks;
- Green businesses view public policy and regulation much more favorably than do other businesses, and see local government actions as particularly important.

After a brief description of the survey methodology, we examine overall location trends for green businesses, the characteristics of green practices and innovation, the role of markets and networks in the green economy, and the types of policies that foster the green economy. We conclude with a summary of the survey findings. For a full summary of the survey findings, see Chapter 5 and Appendix 4 of *Innovating the Green Economy in California Regions.*

Photo: Dave Parker CC

Survey Methodology

The survey sampled three types of firms—those defined as *green* by the product or service offered (n=351), a strategic random sample of firms that do not offer green products or services (n=217, hereafter referred to as *traditional* firms) and, finally, a sample of firms that report their toxic chemical releases and waste management activities to the U.S. Environmental Protection Agency's Toxic Release Inventory due to their high environmental impact (n=72, hereafter referred to as *TRI* firms). We developed the green survey sample from the National Establishment Time Series (Dun & Bradstreet) data combined with the Build It Green database of California green building businesses. For the traditional business survey, we developed a parallel or matched set of businesses not identified as green: for instance, we sampled a variety of regular construction and manufacturing firms, as well as other traditional sectors likely to be affected by environmental regulations, such as transportation and agriculture.

The sample covered firms throughout the state, providing a rich picture of the variations among and within the case-study regions, different green and other industry sectors and among small and large green and non-green firms. Because of an oversampling of metropolitan areas, the survey represents, broadly, California's largest metropolitan areas as well as its inland valley, but likely underrepresents its central coastal areas, mountain regions, and the far northern counties.

A combination of email invitations, postcards and follow-up phone calls were used to maximize the survey response rate. The principal method for survey collection, however, was the same for each of the three distribution types: an online survey tool, Surveymonkey.com. The entire survey took place over the course of three months, from April 15 until July 15, 2009. In total, 7,655 different businesses and organizations were surveyed for their thoughts and experiences regarding their region's green economy, with responses from 649 businesses (a net response rate of about 9%). More detailed information on the survey design is available in Appendix 3, Survey Methodology, in *Innovating the Green Economy in California Regions*.

Overall Location Trends

Location theory increasingly emphasizes how less tangible factors—such as personal preferences of executives, quality of life, or local networks—strongly influence location and relocation decisions. For green businesses, the survey confirms two of these factors, the role of the executive's residence and local quality of life, but adds a third to the list, the *existence of a strong local market*. More specifically, 58% of the companies mentioned "Executives' Residence" as one of the three most relevant factors to locate in a region, followed by "Local Market for Your Product" (56%) and "Quality of Life" (52%). Other relevant factors included the availability and quality of the labor pool in the region (19%) and the availability of space (16%), which was particularly important for recycling, transportation, and manufacturing firms. In comparison, the existence of other similar firms in the area (11%), proximity to a university or research institution (13%), the availability of financial capital (12%), and the existence of suppliers (10%) were minor factors in location decisions across most sectors; only energy-related and environmental service companies tended to emphasize the importance of local research institutions. Other relevant factors included the specific location-dependent character of their activities and the prior existence of the business in the area. For instance, a waste management company located in Los Angeles commented, "treating waste generated in LA County, can't be elsewhere."

Although the initial place of residence and personal preferences of the firm's main executives are important factors in location decisions, 20% of the green companies in the survey said that they had considered other locations outside their home region. Among those, 65% had considered another location within California, 32% another location within the US, and 3% an international location. In contrast, non-green companies in our survey show less affection for California. When asked about places where they would most likely move if relocating, only 32% of traditional companies and 16% of TRI companies would consider other Californian locations, while 59% and 63%, respectively, would consider other places within the country.

Traditional and TRI businesses complain about California as a place to do business. For instance, a non-green natural stone fabrication and installation company in Los Angeles protests the "oppressive California business climate," while a food production and manufacturing company in the Upper San Joaquin Valley points at the "increased cost of regulation compliance" in the state. A traditional manufacturing company in San Diego says, "too many rules on waste and facilities in California and state tax."

In comparison, green companies are less concerned with strict regulations and high taxes in the state. The fact that most green companies stayed in their home region or considered other locations within the state shows how California is in general considered an attractive location for green businesses. As one wind energy company in the Inland Empire puts it, "it was about finding the optimum place, not rejecting other places. It is that California is one of the best states in the nation in promoting renewable energy. It also is leading the way to sustainability."

Despite complaints about California's strict regulation and bad business environment, almost all businesses surveyed plan to stay in California over the short term. In the long term, around 91% of green and traditional companies plan to stay, compared to 88% of TRI companies. By industry, manufacturing firms are the most likely to leave their region, a finding that confirms other research on how "footloose" manufacturing is.

Just as research has found that the green economy is growing faster than the economy overall, green businesses are more inclined to expand than are traditional and TRI businesses, at least in the short-term. While 51% of green businesses said they would grow in the next year, just 39% of traditional and 30% of TRI firms expect to expand. But when looking at a five-year period, the plans of different business types begin to converge; a large majority of all business types have plans to grow over the next five years, though traditional businesses lag the other types.

"California is one of the best states in the nation in promoting renewable energy. It also is leading the way to sustainability."

Inside Green Businesses: Green Practices and Innovation

Green Practices

Until now, little has been understood about how businesses—both green and traditional—incorporate green practices (defined as activities that reduce energy consumption and/or improve environmental quality) into their operations. The survey results indicate that green practices are becoming more widespread across both green and traditional sectors. Moreover, while the majority of green businesses are busy innovating new green products and services, most traditional businesses are changing the way they operate to become more energy efficient or environmentally sensitive.

Not surprisingly, green businesses tend to see green practices as very important in their own operations. Overall, 77% of green businesses rated such practices as "Very Important" compared with only 46% of traditional businesses and TRI businesses. However, when their level of participation in such activities is compared to other firms, green businesses turn out not to be unusually environmentally conscious. Asked if they incorporate green practices such as recycling, reducing energy use, using environmentally friendly energy sources, working in LEED-certified facilities, or purchasing environmentally friendly supplies, just 70% of the green firms answered affirmatively, compared with almost 80% of the other firms. In their operations, green businesses only differ significantly from traditional businesses in their greater use of clean energy sources and greater likelihood of locating in LEED buildings. Among other firms, TRI businesses are generally more aware and up to date on current practices, likely due to the fact that environmental laws and regulations generally most heavily affect their firms.

When asked about the barriers to incorporating green practices, the three business types exhibited relative consensus. The largest issue for all businesses is the cost of incorporating green practices, followed by lack of demand and then lack of information. In referring to both cost and lack of demand as being prohibitive barriers to some green practices, one TRI respondent wrote, "it can be expensive—we have to make persuasive arguments to our customers that it is the right thing to do, but the economy can make that a difficult sell." A traditional business respondent commented, "[it is] not expensive in terms of raw materials, rather in the cost of compliance with the bureaucracies." Information is an obstacle even in the environmentally conscious culture of the East Bay. There, a green business added, "the lack of green supplies on the shelf to purchase [makes it difficult]. The[re is a] lack of … information about alternatives when purchasing." Despite these barriers, most firms (77% of green and 65% of traditional businesses) plan to expand their green practices.

Product versus Process Innovation

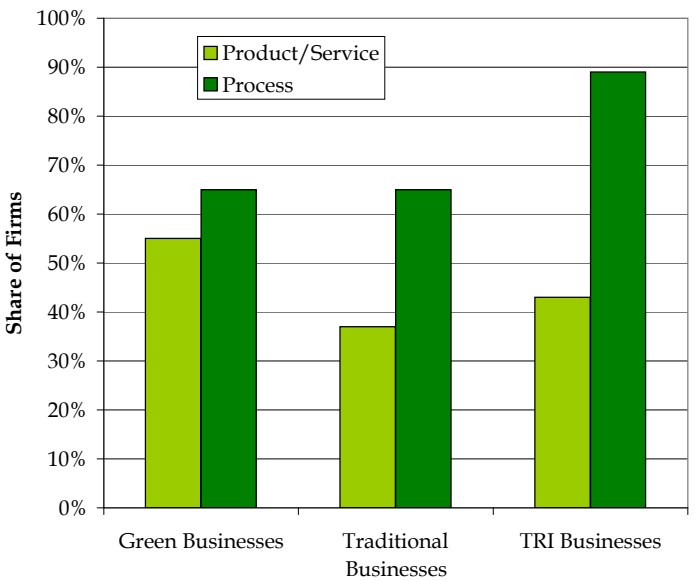
Innovation occurs in various forms, and the survey made a simple distinction between product and process innovation. The survey asked businesses whether they had innovated a new product or service in the last three years, and if so, to describe it. It also asked if they had changed the way they operate in order to reduce environmental impact or meet environmental regulations. Incorporating changes in the production process may mean processes as simple as reducing energy use or as innovative as applying new technologies, recently commercialized.

Green businesses are more likely to innovate by introducing new green products or services than traditional and TRI businesses are (Figure 1). However, the TRI businesses are much more likely to change the way they operate to reduce environmental impact or meet environmental regulations compared to green and traditional companies. The high share of TRI companies implementing greener operational changes in their production processes (89%, versus 65% for green businesses) may indicate the impact of environmental regulations. Green companies, on the other hand, are more likely to have environmentally-friendly production processes already in place and hence are less motivated to change their processes. For instance, when talking about how environmental regulations have affected their business, a green building company located in Silicon Valley says: "Our 'green' direction was implemented and already set a higher goal than those regulations."

The diversity of green businesses, with some more focused on reducing energy consumption and others more on improving environmental quality, means great variation in the types of products or services innovated. In total, 154 businesses responded to an open-ended question asking for a description of their new product. Table 1 provides some examples of new green products.

Photo: Pacific Pulp, compostable wine shipper, www.pacificpulp.com

Figure 1. *New Green Product/Service vs. Process by Survey Sample*



The most common example of process innovation had to do with *reducing resource consumption*. This includes reducing energy and water use, managing stormwater runoff, and reducing waste. Businesses mentioned strategies ranging from installing solar panels or energy curtains to recycling water as ways to reduce their water and energy use. The second most common strategy is the *use of greener materials and energy*. A small share of businesses, mostly green, also identified *reducing their travel and using cleaner transportation methods* as a third, important strategy. A utilities company in the San Diego region wrote, "we are purchasing smaller, more fuel efficient fleet vehicles to reduce (our) gasoline expense and consumption, and are reducing travel miles through use of GPS directed dispatching." Though reducing energy use may not seem terribly innovative, most companies are changing their operations in multiple ways, which arguably adds up to process innovation.

Green product innovation is more concentrated by industry sector than green process innovation is (Figure 2). Manufacturing, architecture/engineering/design, construction, and energy research and utilities are, according to the survey, the most innovative green industries in terms of product innovation, whereas recycling, environmental services, and transportation are the least innovative. Green architecture, construction, and recycling companies are most likely to innovate in the production process, while green transportation companies were least likely. Finally, larger firms are more likely to have introduced a green product or service within the past three years than smaller firms, but firm size makes no difference in process innovation.

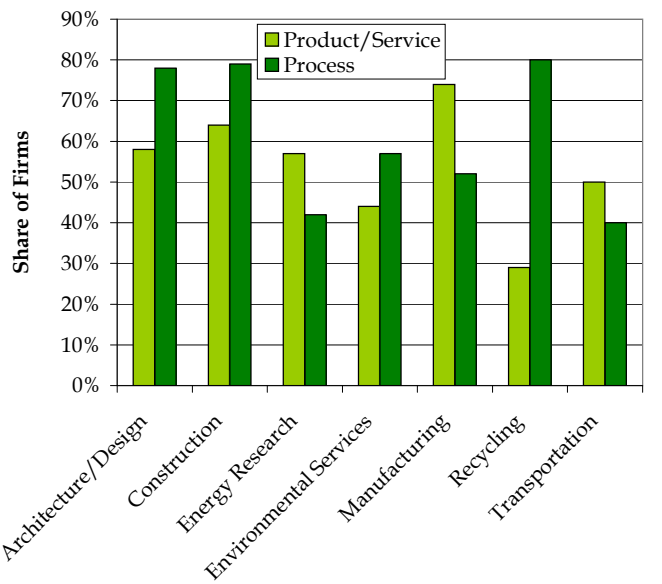
Table 1. *Selected examples of product innovation*

Gas-to-energy facility
Absorbent pads and rolls made from recycled newspapers
Helping a startup to adopt a green supply chain consulting practice.
Columbia forest products
Compostable wine tray and bottle shippers
New calculators to help customers measure and reduce their carbon footprint
Cotton denim insulation
Deconstruction and salvage of remodeling debris
Designing zero energy houses
Direct photoelectrochemical hydrogen generation
Dual flush toilets, low-flow plumbing fixtures, recycled counter-tops
Geothermal reservoir engineering
Green alternative to particleboard: ChloroFill™ board
Green house gas emissions measurement capabilities
Hybrid electric bicycles that encourage transportation alternatives
Improved solar still water purifier, improved solar forced air heaters
Innovative wind blade design, soon to be in production
Installing native gardens to reduce water use and filter runoff
Instrument to measure refrigerant leaks for industrial refrigeration plants
OCC-enabled active power filter to reduce grid pollution and improve efficiency
Onsite recycling of construction debris.
Solar powered AC systems driven by a thermal system
Solar thermal energy combined with high-efficiency water heater, high-efficiency toilets
Mix with recycled concrete as the aggregate
Asset manager that helps commercial office buildings reduce electric energy use
Zero net energy dwellings

Statistical analysis indicates that both manufacturing and architecture, engineering, and design firms are significantly more likely to innovate green products or services than other sectors. There is strong evidence that firms innovating green products and services are more likely to be serving local and regional markets.

The recycling industry as well as TRI businesses are the most likely to generate green process innovation. Older firms appear more likely to innovate new processes. There also appears to be a build-up of knowledge that supports process innovation—membership in Build It Green and incorporation of several green practices raises the likelihood that a business will innovate new processes. Most importantly, firms whose operations are affected by California's Assembly Bill 32 (AB32), which establishes the first comprehensive program of regulatory and market mechanisms to reduce greenhouse gases, also are more likely to innovate new processes.

Figure 2. *Product and Process Innovation by Green Industry*



Outside the Firm: The Role of Markets and Networks

Research has long shown that firm innovation and growth depend on business networks with competitors, partners, suppliers, and support organizations such as trade associations within and outside the home region. Some sectors also depend on local markets both to provide feedback about new products and to spur demand. Survey responses indicate that green firms are more embedded in local/regional networks and markets than traditional firms.

Private households constitute the largest market for green businesses, followed by private firms. Private households are much less important to traditional and TRI firms, which instead rely much more heavily on private firms as a customer base.

Green companies are more likely than other types of businesses to serve markets within their cities or regions (Figure 3). TRI companies have a very different customer base, serving world markets and nationwide more than regional or local markets.

For green businesses, competitors, suppliers, and partners are more likely to be located within the home city or region of the firms, with a small subset of green energy research and manufacturing firms also oriented to national-global linkages. When partnering with other firms or organizations, green firms are more likely than other types to choose partners within the local region or within California. Both green and traditional firms tend to rely mostly on local or statewide suppliers. Innovative firms are more likely to rely on local/regional networks and may also be somewhat more likely to use worldwide suppliers and partners. This suggests that green or cleantech innovation may come primarily from companies that know how to leverage the markets, innovation systems, and networks at their home city/region, while also connecting to global production systems—an interesting local-global dynamic.

The survey asked businesses about their interactions with different types of organizations, providing further evidence of the local and regional nature of many green businesses. Almost two-thirds of green businesses reported weekly or monthly interactions with similar businesses in the region.

Green businesses have, in general, more frequent interactions with other organizations than traditional and TRI businesses do (Figure 4), and differ from the other business types in their reliance upon networking forums, such as conventions, for information about their trade.

Green businesses also interact relatively more frequently with local governments and local nonprofits—but not with education and research organizations. Traditional and green businesses have the same level of frequent interactions with similar businesses outside the region, local chambers of commerce, and local trade associations. For innovative green firms, or those that have recently offered a new product or service, connections to local organizations are even stronger (Figure 5). The innovators are more closely connected to local nonprofits, governments, chambers of commerce, and trade associations.

Interactions among organizations vary among different green industries; in general, the larger the green firm, the more interactive it is. Recycling firms are most likely to interact frequently with similar businesses both within and beyond the region. Recycling firms are also among the most likely to interact with local chambers of commerce. Green architecture and design services are most likely to interact with local government, with local trade organizations, and with local nonprofits. Green energy research firms interact less with similar businesses, especially in the region, and more with universities, research organizations and laboratories. Manufacturing firms interact most frequently with similar businesses outside the region.

Figure 3. ***Primary Market Location by Business Type***

Figure 4. *Weekly/Monthly Interactions with Organizations by Business Type*

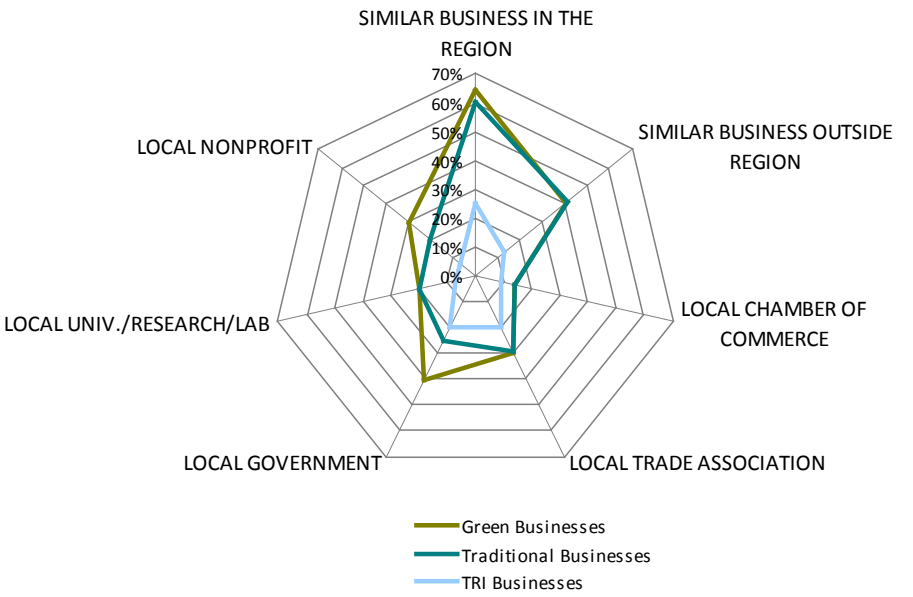
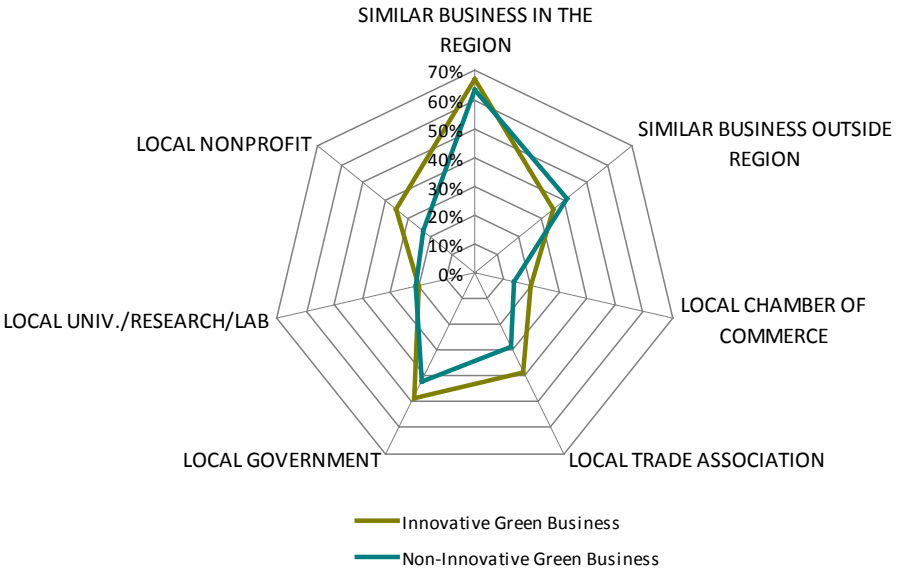


Figure 5. *Weekly/Monthly Interactions with Organizations by Innovation Level*



"Green or cleantech innovation may come primarily from companies that know how to leverage the markets, innovation systems, and networks at their home city/region, while also connecting to global production systems."

Policies for a Green Economy

Asked what types of policies they value, most businesses will mention a business-friendly climate, with reduced regulation and taxes. But green companies have a particular notion of the factors that make their region more competitive, and a much more positive view of the role of public policy and government regulation in the economy than their traditional counterparts voice.

In response to the question *How could your region be more competitive in attracting businesses in your industry?*, just 22% of green businesses—compared to 48% of TRI companies and 40% of traditional businesses—said that lower costs of doing business (including lower taxes) would make the region more competitive (Table 2). Instead, green businesses ask for more government incentives, not only for businesses (financial incentives) but also to increase the demand for green products among consumers (market incentives/market education). For instance, a soil remediation and restoration company based in Silicon Valley says, "there needs to be significantly more education on sustainable landscaping and soil management practices," while a green construction company in the East Bay suggests: "offer incentives to be a green business that are tangible. While it is becoming mainstream, green business is still as much a personal ethical choice of the management, as it may be market driven." A green architecture firm with more than 100 employees located in Silicon Valley suggests, "provide more energy conservation financial incentives for lower to middle income families and businesses." Other types of incentives mentioned include tax credits for buying "green," utility rebates, subsidies for energy-efficient equipment installation, low-cost loans for home improvement, and fast-track permitting for green projects.

Photo: Envitech, high-efficiency Entrainment Separator, www.envitechinc.com

Green businesses also assign more importance than traditional and TRI companies do to issues such as quality of life and public transportation/infrastructure. In order to improve regional competitiveness, a San Diego-based environmental consulting company suggests: "moving towards developing and implementing a vision of sustainability (public transit, green spaces, walkable communities, energy and water self-sufficiency)." Fourteen percent of green businesses (compared to 10% of traditional and 2% of TRI businesses) mentioned in open-ended responses that improving quality of life with, for instance, better public schools, lower housing costs, less crime, or more affordable housing, would make the region more competitive for companies and more attractive for workers. Improving public transportation and infrastructure was also mentioned by 12% of green companies, compared to 7% of traditional companies and 4% of TRI firms.

Table 2. ***How to Improve Regional Competitiveness by Business Type***

	Green Businesses	Traditional Businesses	TRI Businesses
n =	204	112	48
Lower Cost of Doing Business (esp. labor-related costs or taxes)	22%	40%	48%
Financial Incentives/Tax breaks/Loans	17%	9%	13%
Improve Quality of Life	14%	10%	2%
Improve Public Transportation and Infrastructure	12%	7%	4%
Permit Streamlining/Business-Friendly Services	11%	5%	17%
Environmental Market Incentives / Market Education	10%	0%	0%
Less Regulation	10%	16%	38%
Improve Government and Economy	8%	15%	13%
Improve Labor Pool	5%	5%	8%
Environmentally Friendly Regulation	4%	2%	4%
Do Nothing	7%	7%	0%
Other	9%	9%	6%

Note: This was an open-ended question in which answers were coded into one or more categories. This is why the total of percentages could sum up to more than 100%. The sample size is the number of companies that gave at least one answer.

There are significant differences regarding the perception of regulation between green and non-green companies. Overall, 38% of TRI and 16% of traditional companies ask for less regulation to make the region more competitive compared to only 10% of green companies. In particular, green businesses reaffirmed the importance of land use and green building regulations.

Both green and non-green businesses emphasize the necessity of removing barriers and streamlining permit processes in order to develop standards and best practices. Standardized processes in different cities and regions would allow companies to scale up their business and have easier access to a larger market. The building and solar manufacturing industries are especially insistent that this will improve regional competitiveness. An East Bay green architectural design company suggests: "more efficient permitting processes at the city level; more consistency from city to city; higher level of service and competency from permitting authorities; greater support for creative/innovative/green design." A waste management company located in Los Angeles says: "streamlined environmental permitting from a system that looks at the whole picture, not just single issue agencies for air, water, etc." Streamlined permitting seems especially relevant for green building and solar manufacturing companies. For the case of solar, in addition to state and national level organizations such the Solar Energy Industry Association, region-specific industry organizations like SolarTech in Silicon Valley have emerged recently to accelerate the process of permit streamlining and gains associated with economies of scale.

Figure 6. ***Perceived Positive/Negative Impact of Policies by Business Type***

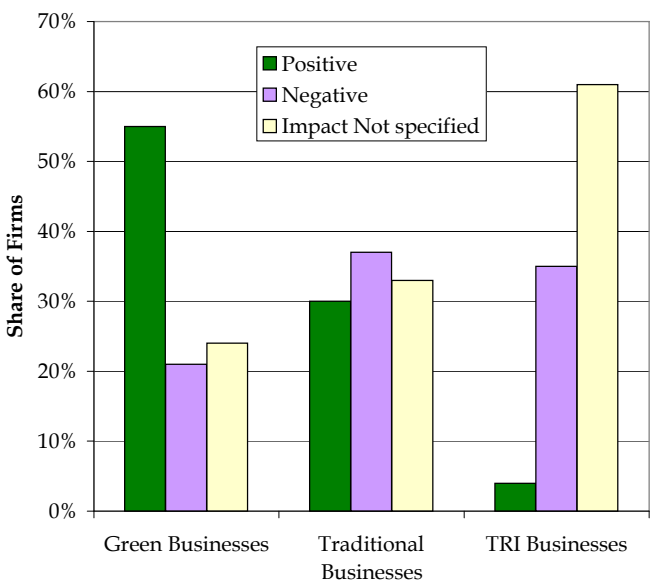
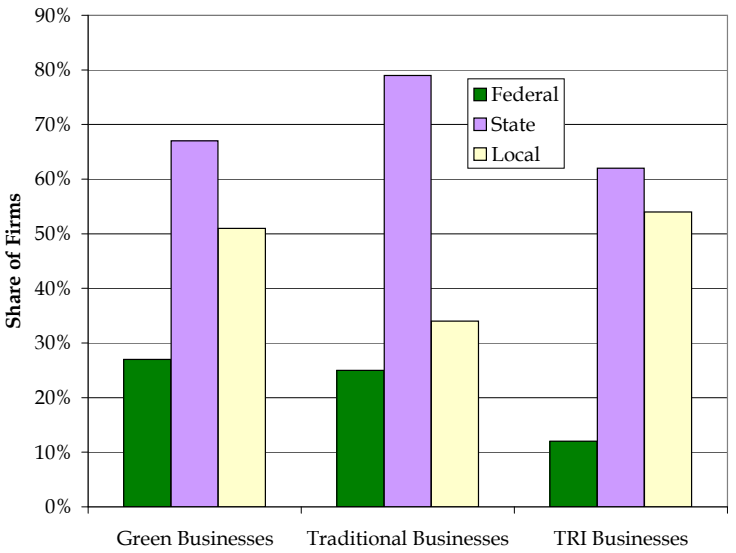


Photo: Tire Disposal & Recycling, Inc., www.tiredisposal-recycling.com

To the open-ended question *Which city, county, or state policies have had a direct impact on your business?*, both green and TRI firms prioritized environmental regulation, while traditional firms highlighted the role of high business taxes and costs of doing business. Notably, green companies were almost twice as likely as traditional ones to describe policies as having a positive impact (Figure 6). On this topic a solar installation firm from Berkeley says, "city solar programs like [those in] Berkeley and San Francisco have increased business. State incentives also directly impact our business."

"City solar programs like [those in] Berkeley and San Francisco have increased business. State incentives also directly impact our business."

Figure 7. ***Policy Impact by Level of Policy by Business Type***



Note: This was an open-ended question and therefore there could be two or more coded answers per company. Since the sample size is the number of companies that answered the question, percentages may sum up to more than 100%.

For all types of businesses, state policies are relevant to more firms than are local or federal policies. Green companies seem to be relatively more affected by local policies and less by state policies than traditional companies (Figure 7). Green companies perceived policies at all levels as having a much more positive impact in their business than traditional companies did; TRI companies had largely negative perceptions of both local and state actions. Some respondents from green companies saw opportunities in regulations. For instance, a green architecture company from the East Bay states, "zoning, building codes, energy efficiency standards, difficult city approval processes create a demand for our services."

The survey asked green, traditional, and TRI companies about the specific impact of AB32. Although it is early to measure its impact, the variety of responses to AB32 emphasizes different perceptions among firms. Green firms see it as an opportunity for increased demand, while the others view it mostly as a new set of requirements. A green construction firm in the East Bay commented on the increased demand associated with AB 32 by writing, "people have become more interested in installing solar panels not only for the savings but also for environmental reasons." Meanwhile, a traditional construction firm from the Upper San Joaquin Valley says, "the processing time for environmental impacts has been lengthened. Future neighborhoods have additional requirements, which translates into cost to the home buyer."

The questions on policy preferences elicited few responses about labor and job training. Just 5% of green businesses mentioned improving the labor pool as the key to regional competitiveness—similar to or lower than the share of traditional and TRI businesses. No businesses offered workforce development as a policy that has had a direct impact on their work. This lack of interest may stem in part from the economic downturn, but also from the nature of training needs in many green firms: asked about their requirements, most said they rely on in-house training. In terms of external training, most frequently mentioned is the need for technical/scientific degrees (including engineering), specific environmental training or environmental certificates, and green building skills and certification. Survey results indicate that green companies rely slightly more on external programs and organizations for their training needs; 30% use external organizations, as compared to 19% of traditional and 24% of TRI businesses. For instance, a number of solar installation firms mentioned their reliance on solar installation workshops/programs; many green building companies mentioned Build It Green and the PG&E Pacific Energy Center. A solar panel installation company located in the East Bay suggests, "it would be great to have a statewide solar training program that focuses on the solar specific skill set."

"Green businesses, and particularly innovative businesses, are largely oriented to serve local and regional markets, and voice enthusiasm for more incentives geared toward local households and firms."

Summary: Green Businesses in California

The survey results show how broadly the green economy—and innovation in it—is spread throughout the economy. The findings also suggest that growing the green economy is good for businesses and the cities and regions where they are located.

Green practices are growing more prevalent not only in firms that are part of green industries but also within large traditional firms and as part of the adaptation to environmental requirements by firms being monitored for toxic releases. Statistical analysis shows that new green products and services are more likely to come from green companies, especially those in manufacturing and in architecture, engineering, and design. In contrast, process innovation is more likely to occur in recycling firms, but also in TRI firms. Cost, lack of demand from customers, and lack of information are, in that order, the main barriers to incorporating green practices, but firms that have made the investment in green practices are more likely to develop new green processes as well.

One strong finding from both the statistical models and the broader questions is the local embeddedness of green businesses. Green businesses, and particularly innovative businesses, are largely oriented to serve local and regional markets, and voice enthusiasm for more incentives geared toward local households and firms. The local market orientation is also an important factor in innovation of green products and services. Green businesses also report making greater use of several types of local networks compared to other firms, including local nonprofits, local government, and similar businesses in the local area.

Responses among all firms regarding location preferences are consistent with findings from earlier research. The three primary factors mentioned, across firms, were the local market for the firm's product or service, the executive's place of residence (of particular importance for small firms), and the quality of life. The distinction between small and large green firms is significant and should be considered in planning any local economic development or support strategy. Smaller firms are characterized by a focus on the local market, and many choose a location close to the executive's residence, while larger firms are more focused on the labor market and on access to financial capital in making a location choice. Green firms show slightly more interest in using outside training, particularly certificate programs, than do other types of firms, another opportunity for economic development strategies. The survey results also highlight potential new policy directions for encouraging the growth of green businesses. Because of the local nature of many firms, there is wide agreement among respondents that standardization of policies across localities could ease the growth of the industry.

Distinctions between green firms and other types of firms are most striking in terms of the attitude towards a California location and towards public policy questions. Some respondents emphasized the California focus on environmental quality as a benefit to operating a green business in the area. Of the firms responding to the question of location choice should they move, two-thirds of green firms would maintain a California location, as compared to one-third of traditional firms and one-sixth of TRI firms. When specific policies were discussed, green firms were much more likely to see new regulations and the taxation system (through incentives) as an opportunity, while traditional and TRI firms focused on the regulatory impacts of these policies on firm operations. This was reflected in the attitude towards AB32 as well.

The survey findings and statistical analysis indicate that regions matter to the green economy, but which region a firm is in does not seem to matter as much as traditionally thought. In other words, the innovation and growth of the green economy are more about being embedded in the local market and responding to local regulation than about relationships with a traditional university-centered regional innovation system. Along with the finding that green firms are relatively "captive" in California, this suggests that the state's most distressed metropolitan regions, such as the Inland Empire, may be able to boost their own green economies through carefully crafted regulations that incentivize the growth of local green markets. This, in turn, can build the capacity of local firms to compete in global markets. But if the green economy is to be the panacea promised by many, it will require the focused and coordinated action of governments, firms, and communities.

Photo: ClearDome Solar Still Water Purifier/Pasteurizer, www.solarpurewater.com