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The Paradox of Multi-Stakeholder Collaborations: Insights from Sustainable Silicon Valley's Regional CO₂ Emissions Reduction Program

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ABSTRACT: Significant progress toward sustainability will require effective collaboration among governments, businesses, non-governmental organizations, and citizens. But research on multi-stakeholder collaborative efforts as tools for achieving environmental results has identified an apparent paradox. Collaborative efforts can be extremely effective in enlisting participation of diverse participants, heightening awareness of critical problems, and catalyzing actions in the absence of clear public policy requirements; however, they may not be effective at achieving specific quantitative objectives.

This paper illustrates this paradox, based on the experiences of the “Sustainable Silicon Valley” (SSV) project in the San Francisco (California) Bay Area. SSV is a multi-stakeholder collaboration among business, government, and environmental organizations. In 2003, SSV declared a goal of reducing Silicon Valley’s CO₂ emissions by 20 percent compared with 1990 levels. Although Silicon Valley did achieve significant reductions in CO₂ emissions compared with predicted increases, SSV did not come close to achieving the goal of 20 percent reductions for the Silicon Valley region as a whole. The experience of Sustainable Silicon Valley suggests that collaborative efforts can achieve significant progress in mobilizing leadership and support for environmental initiatives. But collaborative efforts alone may not be sufficient to achieve specific environmental goals such as a regional CO₂ emissions reduction target.

KEYWORDS

Multi-Stakeholder Collaboration, Climate Change, CO₂ Emissions Reduction, Voluntary Initiatives, Public-Private Partnerships

I. INTRODUCTION

Significant reductions in the climate change contributions from urban regions will require effective cooperation among governments, businesses, non-governmental organizations, and citizens. This cooperation must be developed

at a variety of scales from local communities to international markets and institutions.

Building cooperation at the regional scale is particularly challenging because the stakeholders include multiple city and county governments, firms in multiple industries, non-governmental organizations (NGOs) with diverse interests, and citizens with conflicting perspectives. In addition, participants must address conflicting factors from outside the region, including state and federal regulation, national and international market forces, and rapidly developing influences from civil society.

This paper illustrates the challenges and opportunities in designing and implementing a collaborative, voluntary regional CO₂ emissions reduction initiative, based on the experiences of the “Sustainable Silicon Valley” (SSV) project in the San Francisco Bay Area (California, U.S.). SSV is a multi-stakeholder collaborative group of business, government, and environmental organizations convened in 2000 by the California Environmental Protection Agency, the Silicon Valley Manufacturing Group and the Silicon Valley Environmental Partnership. SSV subsequently became an independent not-for-profit organization.

The first major initiative that SSV conducted was a voluntary program to reduce CO₂ emissions in Silicon Valley by 20 percent by 2010 compared with a 1990 baseline. This voluntary, multi-stakeholder collaboration has achieved significant results, despite limited funding and a regulatory climate that placed little pressure on participants to become involved. By the end of 2008, SSV’s partners had voluntarily reduced their CO₂ emissions by a total of 758,000 tons. In addition, by December 2010 SSV had enlisted participation of 29 of the 56 cities and towns in Santa Clara County and two of its adjacent counties. SSV has enlisted 10 of the largest employers in Silicon Valley, along with more than 60 small- and medium-sized businesses.

However, despite significant success in

engaging Silicon Valley cities, businesses and civic organizations, the CO₂ emissions reduction initiative did not come close to achieving its quantitative target. The estimated 758,000 tons of CO₂ emissions reductions achieved by 2010 is a 2.4 percent reduction in Silicon Valley’s 1990 total CO₂ emissions (32.2 million tons) and a 2.1 percent reduction in the region’s 2000 total CO₂ emissions (36.4 million tons) (SVEP, 1999).

These results reflect a paradox observed in other multistakeholder-collaboration efforts (Turcotte and Pasquero, 2001). Collaborative efforts can be extremely effective in enlisting diverse participants, heightening awareness of critical problems, and catalyzing actions in the absence of clear public policy requirements; however, they may not be effective at achieving specific quantitative objectives.

This paper provides insights on this paradox based on the authors’ active participation in SSV for more than 10 years, on the review of documents from participating organizations, and on semi-structured interviews with representatives from cities and businesses participating in the project.

We begin this paper with an overview of prior research on collaborative environmental efforts. Next we identify four empirical questions based on prior research. We then provide a brief history of Sustainable Silicon Valley and examine the experience of specific participants in the CO₂ emissions reduction program. We conclude with implications for policymakers and business and environmental leaders.

II. THE PARADOX OF MULTI-STAKEHOLDER COLLABORATION

For more than two decades, collaborative approaches have played an increasingly important role in environmental management at the societal level. Multi-stakeholder collaborations such as

the Multistate Working Group (2008) and the California Green Chemistry Initiative (California DTSC, 2008) have made significant progress toward environmental goals where more traditional approaches such as legislation and litigation have failed to produce significant progress.

Collaboration is a “process through which parties who see different aspects of the problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible” (Gray, 1989). Collaborative approaches permit “joint ownership of decisions and collective responsibility for outcomes” (Hartman, *et al.*, 1999). Collaboration focuses on “using information, divergent insights and spontaneity to solve problems and develop new understandings” (Lozano, 2007). The large number and variety of collaborative approaches reflect the increasing complexity of environmental problems, the increased number of “self-perceived stakeholders” in environmental conflicts, the interdependence among private, public, and civil society strategies for addressing problems, and the limits of traditional policy instruments for dealing with complex environmental problems (Poncelet, 2001a).

But multi-stakeholder collaborations create an apparent paradox (Turcotte and Pasquero, 2001). Collaborative efforts can be extremely effective in enlisting broad participation of diverse participants and catalyzing actions in the absence of clear public policy requirements; however, they may not be effective at achieving specific quantitative objectives.

Turcotte and Pasquero (2001) describe a paradox they observed in one extended multi-stakeholder collaborative roundtable. While the collaboration appeared to create consensus, agreement “was limited mostly to general statements and weakly defined concepts.” However, Turcotte and Pasquero point out “consensus on ambiguous or weakly defined concepts should not be equated with failure.” While the collaborative effort may not achieve major

breakthroughs, the small wins generated may build significant momentum toward further progress (2001). In this section of the paper, we examine the many factors that contribute to this paradox.

Poncelet (2001a) offers one explanation for this paradox based on observations of several efforts he studied. The desire to achieve consensus in a collaborative effort may create social pressures that cause participants to avoid confrontation. Some participants may avoid confrontation out of fear of damage to their reputations in the community, while others may suppress confrontation in order to keep other parties engaged.

Conflict avoidance may be a double-edged sword. On one hand, a lack of conflict may preserve an existing balance of power more than it promotes successful resolution of an environmental issue. In addition, the positive public-relations benefits of participating in a collaborative effort may encourage some participants to avoid conflict in order to maintain the amity of the process. On the other hand, conflict avoidance may lead the group to avoid critical problems simply because they are contentious.

Advantages of collaboration. According to Meadowcroft (1999), collaborative approaches offer several major advantages compared with conventional approaches to environmental management. First, they provide “a structured framework for encouraging pluralist inputs” (Meadowcroft). The range of inputs provides a wider knowledge base than the knowledge base that would be provided by a more closed process. The structure of the process creates additional opportunities for participants to listen to and learn from each other.

Second, collaborative approaches provide “a mechanism for building consensus and more especially for transforming interests” (Meadowcroft). This provides a process for changing the ways in which problems are defined and an opportunity for participants to alter the conceptions of their interests in the issues.

Third, cooperative efforts provide considerable flexibility concerning the definition of the problem, the scale at which the problem is addressed, and the schedule and resources assigned to the problem. These efforts are particularly valuable where public policy lags behind participants' perceptions of the problems to be addressed.

Fourth, collaborative efforts have the potential to create "more stable and legitimate policy outcomes" (Meadowcroft). These effects are directly related to the credibility of the participants in the process. An outcome endorsed by a coalition of industry, government and civil-society organizations, for example, is likely to be more credible to the public and less likely to generate legal or social challenges to the implemented solution.

Finally, collaborative processes can provide a setting in which participants can share expert scientific and technical knowledge, along with other forms of relevant knowledge. For example, understanding the scientific consequences of an environmental problem is frequently very distinct from understanding the social consequences of the same issue. A collaborative process allows holders of multiple kinds of knowledge to contribute to a shared understanding of the issues. The results can be a process of shared learning that produces new understandings of the issues to be addressed (Meadowcroft).

Other researchers including Randolph and Bauer (1999) have argued that a collaborative management process is more likely to create favorable outcomes and help participants feel that their needs and opinions have been addressed effectively. "Collaboration reflects an attempt to take collective responsibility for actions and outcomes." The collaborative process relies on sustained dialogue between potentially conflicting viewpoints, and promotes "a shared vision of the future" (Randolph and Bauer).

Some forms of collaborative processes

can be viewed as "encounters between competing political or economic interests" (Poncelet, 2001a). In such circumstances, the collaborative process may produce superior outcomes because of the learning process that occurs when participants share information and perspectives with each other. Achievement of these superior outcomes depends in part on the creation of a process that controls conflict sufficiently to allow participants to hear each other's perspectives and come to appreciate the values underlying those perspectives. These efforts create opportunities "for the production and social organization of (new) ways of thinking, talking, and acting with regard to environmental issues" (Poncelet, 2001a).

Trust is both an important precondition and a byproduct of this process. Hood, *et al.* (1993) observe that trust and communication are challenging in multi-stakeholder collaborative efforts because of differences in organizational backgrounds of the participants. The level of trust that does emerge has significant effects both on group process and the long-term viability and effectiveness of the collaborative effort.

The perspectives of participants may vary because of differences in "analytics" based on the professional training, personal experiences, and normative beliefs of participants (Weible and Moore, 2010). Overcoming differences in normative beliefs is frequently cited as an advantage of collaborative processes.

Collaborative efforts may produce personal transformations of participants as a result of participation. Actors from different sectors may bring very different information, values, and preconceptions. The process of participation gives those participants opportunities to "experience change in their subjective understandings of and relationships to each other, themselves, and environmental action" (Poncelet, 2001b). These opportunities may arise in particular in situations where participants need to rely

on each other for missing information, interpretations, or potential solutions.

These changes in perspective may lead to new perceptions of the tasks to be accomplished, the participants, and the appropriate modes for interacting across the sectors. Changes in perception may lead to more effective working relationships among organizations, new and innovative solutions, and a greater willingness to address future environmental concerns.

Limitations of Multi-stakeholder Collaborations. Skeptics have raised concerns about the effectiveness of collaborative environmental approaches. These concerns may help explain the paradox described above. Hartman, *et al.* (1999), for example, raise the issue whether specific types of partnerships build in preferences for incremental change rather than more fundamental system change. Lubell (2004) observed that, “there is still hot debate about the ability of collaborative institutions to actually build consensus, encourage cooperative behavior, and improve environmental outcomes.” He continued, “collaborative institutions may actually do more harm than good by creating perceptions of progress in the absence of any real change.” He distinguished between substantive changes, and “symbolic policies” in which programs “fail to produce tangible changes in behavior and resource allocations, and instead consist of symbols connoting the suppression of some threat to the supporters of the policy.” In addition, Lubell (2004) pointed out that, “collaborative institutions thrive on sustained personnel commitment because the policy networks that form during the planning process often fall apart when critical people are replaced.”

Meadowcroft (1999) identified four broad concerns related to collaboration -- power, democratic process, efficiency, and political culture -- that may contribute to the paradox. The concern about power recognizes that there may be significant differences among participants in their abilities to

influence perceptions and outcomes of the process. The concern about democratic process focuses on the legitimacy of the participants to represent the interests of the public. Participants may be chosen based on existing relationships with the process conveners, and they may not represent the full range of interested parties. The concern about efficiency focuses on changes in the roles of participants from their conventional modes of operation. For example, civil-society groups may be more experienced and skillful at acting as watchdogs and litigants than they are as formulators of policy. As a result, they may be co-opted from their watchdog role but not be fully effective in helping craft solutions. The political culture concern addresses the differences in political traditions across nationalities. Where a strong tradition of cooperation and negotiation exists, collaborative efforts may produce more effective results than in cultures such as in the U.S. with more adversarial traditions.

In a similar vein, Fadeeva (2004) identified several key assumptions concerning collaborative approaches that may not be borne out in actual practice. First, collaborative efforts are often assumed to create more efficient outcomes than conventional approaches to environmental policymaking. Collaborative efforts may be inefficient in terms of the time and personnel required to develop and implement solutions. They often lead to changes in behavior that fall short of changes that would be socially optimal.

Second, collaborative efforts have often been praised for generating more innovative outcomes. Fadeeva observed that while these advantages may in fact occur, empirical evidence that they do occur is rather limited.

A related concern focuses on the potential for collaborative approaches to result only in “no regret” or “low-hanging fruit” outcomes. This concern is based on the fears that collaborative processes may produce least common denominator

outcomes because participants are reluctant to address more complex issues that may cause conflict (Fadeeva). In particular, participants may choose to avoid addressing elements of the problem prone to higher complexity or involving decision-makers not represented within the group. Collaborative efforts face a tradeoff between achieving ambitious targets and causing participants to abandon the process if they believe the targets are unrealistic or threatening.

Turcotte and Pasquero (2001) observe that evidence of consensus and learning has been somewhat limited. Similarly, evidence of collaborative problem solving has been mixed. Turcotte and Pasquero point out that collaborative efforts often fall into an “in-between” category, in which their contribution to problem solving is “neither complete nor insignificant.”

Empirical questions. This apparent paradox concerning collaborative processes raises several empirical questions that are relevant for Sustainable Silicon Valley.

First, do collaborative processes increase social capital in ways that increase the collective capacity to act on complex environmental problems? Working together over a period of time can be expected to create social capital in the form of trust and mores of engagement (Coleman, 1988).

Second, do collaborative processes produce demonstrably better outcomes for complex environmental decision processes than the alternatives? The prior research described above provides conflicting predictions.

Third, can collaborative processes produce outcomes that go beyond “no regret” or “low hanging fruit” outcomes?

Finally, can multi-stakeholder efforts muster sufficient resources and management capacity to drive significant change?

This paper examines these aspects of the paradox of multi-stakeholder collaboration in the context of Sustainable Silicon Valley’s experience with

multi-stakeholder collaboration over the past decade.

II. A BRIEF HISTORY OF SUSTAINABLE SILICON VALLEY

Sustainable Silicon Valley began with a concept paper entitled, *Partnership for a Sustainable Silicon Valley*,¹ written by a member of the Board of Directors of the Silicon Valley Environmental Partnership (SVEP) and adapted by two employees of Cal/EPA, California’s environmental regulatory agency. The SSV idea was to develop and implement a regional environmental management system (EMS).² An EMS is a planned approach to managing an organization’s resource use and the environmental consequences of its activities (environmental aspects or pressures) while improving environmental performance.³

Over the first two years of SSV’s EMS effort, participants worked toward two broad objectives.⁴ First, they would develop a partnership of stakeholders representing business, environmental groups, government, private citizens and others in Silicon Valley to create an environmental and resource sustainability management system for the region. Second, these partners would collaborate on projects to significantly reduce specific environmental or resource pressures. The first major project selected by the group focused on energy and CO₂ emissions reductions.

CO₂ Emissions Reduction. To address energy use, SSV created an Energy Subcommittee, later renamed the CO₂ Subcommittee. This committee met in 2002 and 2003. By engaging regularly and consistently, this ideologically diverse group of individuals representing a similarly diverse group of organizations was able to agree on a target and timeline for addressing this first environmental pressure. The target and timeline were publicly announced in April 2003. The participants in SSV adopted the ambitious goal to reduce CO₂ emissions

in Silicon Valley by 20 percent by 2010, using 1990 as a base year.

Significantly, SSV partner organizations were permitted considerable flexibility in how to participate. This included flexibility to:

- Identify their base years of choice (1990 or later);
- Identify their own targets for CO₂ emissions reductions;
- Report on stationary energy use and associated CO₂ emissions only or also include mobile energy use and its related CO₂ emissions; and
- Report for some or all of the organizations' facilities.

SSV considered and rejected more uniform and stringent requirements. The group chose consciously to favor flexibility in order to encourage broader participation.

The SSV goal of reducing CO₂ emissions in Silicon Valley by 20 percent by 2010, using 1990 as a base year, was the goal for SSV, not its individual partners. CO₂ emissions were selected as the metric to measure progress. In its 2008 report, SSV reported that its partner organizations achieved most of their energy and CO₂ reductions through energy conservation, energy efficiency, and onsite use of renewable energy. Most SSV partners had made changes in their lighting systems, and some had begun "harvesting daylight" to reduce the need for artificial lighting. Also, many partners made efficiency improvements to their heating and cooling systems through additional monitoring, controls, or equipment changes. In addition to efficiency gains in lighting and heating/cooling systems, some municipal partners had installed higher efficiency street and traffic lights to reduce energy use and CO₂ emissions and had gained efficiencies in their fleets by retiring old vehicles, and switching to hybrid cars and biodiesel trucks. One regional government

agency had purchased a fleet of bicycles for work-related travel.

With its initial area of emphasis established and its metric, target and timeline for that area of emphasis adopted, SSV publicized its plans. In March 2004, at a press conference in San Jose City Hall, SSV announced the eleven initial pledging organizations, representing eight businesses -- Hewlett-Packard, Oracle, Lockheed Martin Missiles and Space Company, LifeScan, Alza Pharmaceuticals, Calpine, Akeena Solar, and Pacific Gas and Electric Company -- and three government agencies -- the City of San Jose, the Santa Clara Valley Water District, and NASA Ames Research Center.

Organizational Issues. During the implementation of the CO₂ emissions reduction initiative, SSV underwent significant organizational changes. From 2001 to 2004, Cal EPA provided a full-time staff member. With a change of administration, and a significant budget crisis, Cal EPA chose to discontinue funding for that position. To avoid closing down SSV, four participants -- including one representative from Cal EPA, one from SVLG, and two from SVEP -- chose to launch SSV as an independent, nonprofit (501[c][3]) organization in June 2004. The Cal EPA staff member who had been serving as project manager, took a leave of absence from the state agency and became the Executive Director of the newly created organization.

Throughout its life as a nonprofit organization, SSV has been chronically underfunded. The initial executive director served for two years at a minimal and periodically deferred salary. SSV has hired three executive directors since 2006 and experienced a severe mismatch between the workload required and the resources available to staff the program. During the fiscal year that ended in June 2010, the annual budget for the organization had reached approximately \$250,000 and staffing had reached two FTE (SSV, 2010b).

This chronic underfunding limited SSV's ability to implement the CO₂ emissions reduction program and the EMS. However, targeted staff efforts, significant amounts of volunteer staffing, and in-kind contributions permitted SSV to administer a steady stream of programs for participants. SSV coordinated and facilitated monthly meetings where partners gathered to share best practices and network for the purpose of resolving energy and CO₂ emissions-related issues. These monthly meetings were supplemented with education forums held quarterly to share best practices, as well as with periodic special programs, for example, a visit to a new green building or to learn energy management methodologies from a participating firm.

The organization continued through 2009 to track the progress of participating organizations toward the CO₂ reduction goal, but has reduced the intensity of activities focused on energy conservation since then. The current organization focuses on three areas – energy, water and communities of practice.

Results of the CO₂ Emissions Reduction Program. SSV continued its efforts to recruit additional organizations to help meet its CO₂ emissions reduction target. In its *Sustainable Silicon Valley 2009 Annual Report*, the fifth annual report on its CO₂ initiative, SSV reported that it had 121 partners involved in its CO₂ emissions reduction initiative at the end of 2008. According to the report, the 87 SSV partners that reported data had reduced their CO₂ emissions by a total of 66,000 tons in 2008 and by 758,000 tons between 1990 and the end of 2008. According to the report, these 758,000 tons of emissions reduction is equivalent to removing almost 126,000 automobiles from the road or removing almost 350,000 homes from the local electricity grid for a year.⁵

These data indicate that despite substantial CO₂ emissions reductions by SSV participants, the Silicon Valley region would not achieve SSV's target emissions reduction of 20 percent by 2010 compared

with a 1990 baseline. While SSV participants had achieved reductions at a rate substantially greater than that of the Valley as a whole, it seems clear that progress toward an agreed-upon goal may not have been possible entirely through voluntary means. Legislation⁶ to create mandatory limits on CO₂ emissions for California was enacted in 2006 (Assembly Bill 32). The legislation required that actions to reduce CO₂ emissions begin to be phased in starting in 2011. Testimonials from elected officials at the state and national levels indicated that voluntary initiatives such as SSV's CO₂ program, helped set the stage for this legislation. In 2004, for example, US Senator Dianne Feinstein (D, CA) in a letter to the President and CEO of Silicon Valley Manufacturing Group, applauded the public-private nature of SSV and noted that its "goal of reducing emissions 20 percent below 1990 levels by 2010 creates an ambitious marker for others to follow."⁷

In 2005, California Governor Arnold Schwarzenegger announced greenhouse gas reductions goals for the state and publicly acknowledged the leadership of SSV business partners to address this issue "even faster than the statewide goals."⁸

Those SSV partners who, for the 2008 SSV report, provided energy use or CO₂ emissions data for their facilities between 2000 and 2007, reported average emissions reductions of 27 percent in that timeframe,⁹ over three times the emissions reductions the United States would have had to achieve under the Kyoto Protocol. In the press release announcing the availability of its 2007 report, the chair of the board of SSV said, "Sustainable Silicon Valley partners are outperforming the Silicon Valley by a three to one margin ... Our partners are saving money, saving energy and helping the environment." In the press release announcing the availability of its 2008 report, the chair of the board of SSV said, "Not only does our 2008 report explain SSV's proven, workable model for environmental quality

and economic vitality, but our partners' results from the CO₂ Emission Reduction Initiative demonstrate that the state's AB32 goals are possible to achieve and can deliver a significant return on investment for businesses, local governments and organizations of all sizes."

These comments highlight the paradox of multi-stakeholder collaboration. SSV participants significantly out-performed non-participants in achieving energy efficiency gains, and collaboration clearly resulted in energy efficiency actions that could not have occurred without the knowledge sharing promoted by the program. The CO₂ reductions that resulted clearly exceeded the levels of reductions that would have occurred in the absence of collaboration. Nonetheless, the program fell significantly short of its goals.

III. LEARNING FROM SSV PARTICIPANTS

Interviews with participants from individual cities and businesses provided insights into the causes and consequences of these apparently paradoxical results. We interviewed project participants from three of the 22 cities that were SSV partner organizations at the time of our field research – Palo Alto, San Jose and Sunnyvale – and two large businesses – LifeScan, a subsidiary of Johnson and Johnson, and Applied Materials. They provided significant insights on both drivers of and barriers to action on CO₂ emissions.

Both the public and private sector participants said that external and public pressure related to climate change was a driving force for their efforts. Public pressure was particularly relevant in the cities,¹⁰ as citizens' involvement was critical for the cities to begin to take action on climate change. City representatives attributed increased public interest and pressure to many causes, including the popularity of the movie, *An Inconvenient Truth*,

as well as the recent increase in media attention to global climate change. Ongoing development and redevelopment in the cities and the interest of the public in seeing adoption of greener practices were also perceived to be contributing factors.

The business participants reported that SSV reporting requirements dovetailed nicely with other data reporting efforts in which they were involved. These participants said that they were already developing data reports on their organizations' basic energy use and CO₂ emissions inventory so they did not have to do any special reporting for SSV. Additionally, they were creating internal reports that highlighted notable projects that reduced energy use and/or CO₂ emissions, so including these project descriptions for SSV reporting was not a burden.

All participants said the flexibility in the SSV reporting requirements was an important asset of the organization. Several participants also cited the reporting requirement itself as a benefit, suggesting that reporting on progress forced the organization to deal more seriously with the issue in order to show progress.

The SSV reporting protocol provided partner organizations with flexibility in several dimensions. However, participants saw reporting flexibility as a double-edged sword. By having this flexibility, there was no firm, clear set of goals that had to be reached. However, even with this caveat, the interviewee who mentioned this agreed that on balance, reporting flexibility was a significant benefit.

One participant observed that reporting flexibility became a collective liability for SSV as a whole. Reporting flexibility led to inconsistencies between partners that became apparent in the third year of reporting as the number of reporting partners increased, and SSV staff had to deal with organizations choosing different baselines and measuring different things.

As participants discussed the barriers they faced, it became clear that dealing with climate

change was a difficult challenge for all of them. Cities reported, for example, that getting traction with city staff and city council was a difficult barrier; there was also the need to get money to pursue the activities related to climate change.

Cities also reported a lack of continuing leadership at the highest levels (for example, the mayor or city manager) as other priorities took precedence, for example, public safety, infrastructure needs, etc. As a result, in addition to a lack of funding there was a lack of direction to city staff. City leaders did not say to department heads, “We want this to happen” so it did not happen. One interviewee suggested that it is critical to have a climate change champion (not necessarily an expert) at the top. The interviewee went on to say that in a city that champion must be the mayor, not a councilmember.

One participant indicated that current city approaches were not adequate. She said that elected officials needed to be made aware that addressing climate change is not the job of one city councilmember. It is the job of all of them and all of the departments within the city. Such local lobbying of city and business leaders by SSV is important, as is bringing in private sector champions to meet with city officials and business leaders. For example, at a city-hosted meeting in San Jose, a representative from Adobe Systems Inc. said, “We saved over \$1 million by using LEED¹¹ for existing buildings.” This statement got the city council members wondering if the city too might save money by following LEED guidelines.

One business participant criticized his colleagues in the private sector. “None of the companies has a comprehensive program to address energy efficiency and climate change. They are doing individual things as they hear about new technologies, but there is no systematic approach. This is not only about energy; it is about water, it is about cars on the road used by the sales force, it is about the company’s complete environmental footprint.”

Participants suggested that the urgency of dealing with climate change needs to be better communicated to other municipalities and companies to get them more involved and get them started on comprehensive programs to increase energy efficiency and reduce greenhouse gas emissions. Over time, SSV participants came to realize that collaboration across sectoral boundaries could be an important success factor.

One business participant reported that his organization, along with the SSV Executive Director, met with officials in the city in which the participant’s business is located, to try to get the city to develop its own comprehensive energy efficiency program and to encourage businesses within its jurisdiction to do likewise. Although the city officials seemed interested during the meeting, a significant amount of time had passed at the time of the interview and the participant reported that he had yet to see any action by the city.

Business participants’ criticisms were not limited to this single city. They suggested that cities throughout Silicon Valley needed to get involved with SSV and they needed to encourage their businesses to get involved as well. They suggested that the cities should help get the message out that there are ways of addressing climate change. “Cities have a lot of pull with businesses and they should use it,” said one interviewee.

As these interviews indicate, there is strong evidence that SSV participants came to think of climate change as an issue to be addressed collaboratively and not just to be addressed within their own organizations or sectors. Participants came to realize that they shared problems such as organizational inertia, insufficient leadership, and inadequate resources with colleagues in other organizations and other sectors. Sustainable Silicon Valley appears to have contributed significantly to raising awareness of climate change issues, to have created significant sharing of best practices

among participating organizations, and to have built significant trust and cooperation among participants who did not initially see themselves as allies. However, the failure to achieve the CO₂ emissions reduction goal illustrates the paradox of collaborative efforts – while collaboration can launch significant action toward achieving environmental objectives in ways that traditional public policies may not be effective, they may not be sufficient to achieve significant goals such as stopping and reversing climate change.

IV. CONCLUSIONS

SSV is a positive example of a regional, multi-stakeholder collaborative initiative addressing a problem despite the lack of state and federal government leadership and action on the issue. Such grassroots efforts can build significant progress toward solving complex problems if leaders from local government and the business and environmental communities come together and focus on their commonalities rather than their differences. The results of the program and the insights from participant interviews permit some preliminary answers to the empirical questions identified above concerning creation of social capital, ability to create better outcomes relative to alternatives, ability to create outcomes beyond “no regrets” levels, and the ability to generate sufficient resources and management capacity to succeed.

Social Capital. First, we asked whether collaborative processes increase social capital in ways that increase the collective capacity to act on complex environmental problems? Anecdotal evidence strongly suggests that participants learned from each other, provided valuable tools and insights to each other, and developed strong mutual respect for each other.

This development of social capital was evident in the early workings of the SSV

collaboration, as interested stakeholders came together to address the serious issue of global climate change. For example, the Silicon Valley Toxics Coalition, a local environmental group that has long been a thorn in the side of many high-tech and other companies in Silicon Valley, was a key representative of the environmental community in the early days of SSV. Notwithstanding the longstanding adversarial relationship of the Toxics Coalition with these firms, representatives from this organization and those from some major Silicon Valley firms were able to put aside their longstanding differences and work together to shape what would become SSV. Rather than focusing on the differences between the organizations, the representatives agreed to focus on the common goal as defined by SSV. The implications of this social capital go well beyond the SSV collaboration if the parties choose to continue to engage with one another.

SSV has been a very open process throughout its existence. Cal EPA and the Silicon Valley Manufacturing Group (SVMG) convened the initial meetings and sent broad invitations to potential participants. While there was an informal core group that showed up for a majority of the early meetings, that core group evolved continually over time. Many individuals made significant contributions over short periods and then faded into the background. A small group, which formed the core of the 501(C)(3) organization, stayed engaged for most of the organization’s first decade. Other dedicated volunteers managed the quarterly forum events and other special events without actively engaging in other aspects of SSV’s work.

This openness has been a mixed blessing, but on balance it has widened community support for addressing climate change, and it has led to a wide range of actions not actively coordinated by SSV. Unlike many of the collaborative processes discussed in the literature, for example, Turcotte and Pasquero (2001) or Poncelet (2001a), the participants

in the selection of the CO₂ emissions reduction target did not form a close-knit community. However, this loosely coupled community created broad support for learning and action to address climate change in Silicon Valley. Annual conferences created a forum that attracted a broad cross-section of organizations in the region and provided a platform for deeper discussions of climate change issues and for exploration of other environmental issues such as water conservation.

Over time several other organizations convened competing CO₂ emission reduction programs, as factors inside and outside of Silicon Valley increased support for action to address climate change. When SSV started its CO₂ program in 2004, participants reported little involvement in other voluntary climate programs. By 2009, many participants reported that they had to choose among several voluntary CO₂ emissions reductions programs; these programs had varying reporting requirements, varying participation costs, and varying levels of public credibility.

As national and international attention on climate change has increased, other organizations, including Joint Venture Silicon Valley (JVSV) and Silicon Valley Leadership Group (SVLG), have launched voluntary CO₂ emissions reduction efforts of their own in the same or in overlapping geographic regions. This cooperation and competition has broadened the constituency for actions to address climate change but has slowed SSV's momentum in attracting participants to its CO₂ emissions reduction program. We believe this growing competition indicates that SSV contributed to the growth of social capital to be used to address climate change. However, SSV was less effective at appropriating that social capital to achieve its own objectives.

Better outcomes. Next, we asked whether collaborative processes produce demonstrably better outcomes for complex environmental decision processes than the alternatives. The

evidence provided above indicates that SSV participants achieved significant CO₂ reductions in the absence of any effective public policies at the federal or state level to require or encourage such reductions. Participants specifically identified SSV programs that contributed substantially to those efforts. These quantitative and qualitative results suggest that SSV's efforts produced demonstrably better outcomes than would have occurred without the multi-stakeholder collaboration.

Collaborative efforts face clear trade-offs between providing flexibility to encourage broad participation and stringent requirements required to achieve ambitious goals. SSV made a conscious choice to provide maximum flexibility in order to encourage broader participation. That flexibility clearly permitted participation by some organizations, both in business and in government, that would not have chosen to participate in a program with more stringent requirements. This allowed SSV to broaden the conversation within Silicon Valley and to avoid an adversarial relationship between these participants and environmental groups.

Flexibility in target setting and choice of baseline enabled broader participation in SSV than would have occurred otherwise. This flexibility conflicted with some of the insights from the economic literature on voluntary environmental initiatives. Segerson (1999), for example, argues that voluntary initiatives can be economically efficient provided that the initiative specifies the target to be reached but allows participants the flexibility to decide how to reach the targets. SSV chose consciously to sacrifice efficiency in the short run in order to encourage the widest possible participation. The subsequent growth of the participant list (and corresponding growth in CO₂ emissions reductions) suggests that, on balance the potential loss in efficiency was compensated for by the increase in participation.

However, this flexibility gave SSV little chance to achieve its ambitious CO₂ reduction goals.

While SSV participants showed significantly greater CO₂ reductions than the Valley as a whole, little collective attention was given to the gap between the stated goal and the collective performance of Silicon Valley.

Beyond no regret outcomes? Next, we asked whether collaborative processes could produce outcomes that go beyond “no regret” or “low hanging fruit” outcomes? The reporting protocol for SSV’s CO₂ reduction program provided considerable flexibility in the choice of baselines, which facilities to include, and the targets to set. This flexibility created sufficient ambiguity to prevent us from concluding that participants achieved CO₂ reductions beyond what would be expected in a “no regret” scenario.

A related issue concerns the lingering question whether collaborative efforts can produce results that go beyond the efforts that organizations would have taken in the absence of the program.¹² Interview data and anecdotal evidence suggest that the results reported in the SSV CO₂ reduction program include both emissions reductions that would have occurred anyway and emissions reductions that can be directly attributed to best-practice sharing programs administered by SSV.

Resources and management capacity. Finally, we asked whether multi-stakeholder collaborations could generate sufficient resources and management capacity to generate change, in the absence of strong public policy mandates. The SSV example does not permit us to give a definitive answer. SSV was limited by lack of financial resources and management capacity throughout its first decade. While the organization attracted extensive organizational participation, it did not attract sufficient funding to provide adequate staffing. This chronic understaffing contributed to the burnout that led the organization to have four executive directors in five years.

The question we cannot answer is whether

more experienced non-profit managers could have produced a different outcome. The challenge of producing huge results with inadequate funding is common among non-profit organizations. But, finding managers with sufficient environmental expertise as well as expertise in non-profit management and fund-raising is an ongoing problem.

The public good nature of the expected benefits may lead systematically to underinvestment by the collaborating parties. None of the parties will be able to claim full credit for the results, or to capture the benefits. The inability of any of the parties to capture the full benefits from the program may lead each participant to underinvest in the desired outcomes. The lack of public consensus about the issues to be addressed may decrease the willingness of participants to invest in the collaborative effort even further.

We do believe that this problem may be endemic to multi-stakeholder collaborations launched without explicit public policy mandates. SSV addressed concerns over CO₂ emissions long before a policy consensus began to emerge in California. This lack of consensus appeared to make participation and financial investment in a regional effort optional for key players. SSV would have not been able to succeed at all without the forward-looking contributions from leading Silicon Valley firms and city governments.

Charitable foundations were particularly missing from the SSV process. One leading foundation inadvertently summarized the paradox, when it declined to participate in what it characterized as an admirable effort, because it did not want to pay for programs it believed that the government should be funding. But as we have described above, the lack of a policy mandate to address an important environmental problem contributed to the initial motivation for starting this multi-stakeholder collaborative effort.

V. LINGERING QUESTIONS

The experience of Sustainable Silicon Valley illustrates the paradox of multi-sector voluntary collaboration at the regional scale to address environmental problems and opportunities such as climate change. The SSV experience illustrates that, with patience and persistence, leaders from industry, government and non-government organizations can help mobilize necessary change, even in the absence of clear policy direction at the state or national level.

However, collaborative efforts alone may not be sufficient to achieve specific environmental goals such as a regional CO₂ emissions reduction target. Collaborative efforts may be most effective at building broad mandates, creating social capital and building momentum to achieve progress in advance of public policy mandates. The experience of Sustainable Silicon Valley suggests that collaborative efforts can achieve significant progress in mobilizing leadership and support for environmental initiatives, but achieving specific and ambitious goals may require other approaches with greater power to compel or incent action by all participants in a region.

The experience of Sustainable Silicon Valley does not provide clear answers to the question whether the paradox of multi-stakeholder collaboration is an inherent feature of these efforts, or merely a reflection of limited resources, and a need for improved management effectiveness. We believe comparative studies of other multi-stakeholder collaborations may provide useful insights into this question.

The SSV experience does illustrate the broad power of multi-stakeholder collaborations to bridge the gaps between participants with strongly diverging views and to generate momentum toward solutions to complex problems. We believe that such collaborations can become a powerful tool for addressing emerging issues if we can more fully

understand the paradox of collaboration and identify management practices to help overcome the effects of the paradox.

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VII. ENDNOTES

1. Wise, John C., Robert D. Stephens and Keith Smith, Unpublished document dated February 22, 2000.
2. Source: SVEP.org .
3. See, for example, <http://www.epa.gov/EMS/>
4. Meeting minutes, Sustainable Silicon Valley, November 10, 2000; Attachment entitled Sustainable Silicon Valley Project.
5. Source: Sustainable Silicon Valley 2009 Annual Report
6. California Assembly Bill 32, signed into law in 2006, requires that the state reduce its greenhouse gas emissions to 1990 levels by 2020, a roughly 25 percent reduction under business as usual estimates. AB32 address the same greenhouse gases as in the Kyoto Protocol. The California Air Resources Board is preparing plans to achieve the law’s objectives.
7. Senator Dianne Feinstein letter dated April 15, 2004 to Carl Guardino, President and CEO of SLVG.
8. Pérez Henríquez, Blas. Sustainable Silicon Valley: A Model Regional Partnership in Enhancing the Effectiveness of Sustainability Partnerships: Summary of a Workshop. 2009. Vollmer Derek, Science and Technology for Sustainability Program; National Research Council
9. Source: Sustainable Silicon Valley 2008 Annual Report
10. The cities of Palo Alto, San Jose and Sunnyvale are all located in Santa Clara County in the southern part of the San Francisco Bay Area of California. All three cities, like many others in the Bay Area, are making efforts to “green” themselves and to address global climate change. These cities have populations of 61,200, 974,000 and 132,000 respectively.
11. LEED (Leadership in Energy and Environmental Design) is a voluntary, consensus-based national rating system for developing high-performance, sustainable buildings. The system was developed by the non-profit U.S. Green Building Council.
12. This phenomenon was explored in research concerning the US EPA’s 33/50 program, which asked businesses to make voluntary reductions in their use of 17 toxic, volatile organic chemicals. Researchers concluded that a great deal of the reported reductions were actions that companies would have taken without the program. (Arora and Casson, 1996).