

The Environmental Protection Agency's Brownfields Pilot Program

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Brownfields are former manufacturing and sites that are abandoned or underused and contaminated or perceived as such.¹ The brownfields pilot program, which was begun in 1993 by the US Environmental Protection Agency (EPA), is a good environmental innovation diffusion case study. It links public health, environmental protection, and economic redevelopment, and it involves interactions among federal, state, and local governments and private and nonprofit organizations. The public health benefits of successful brownfields redevelopment are both direct (e.g., elimination of toxins and physical hazards) and indirect (e.g., job creation, tax payments, and income to purchase health care services). Hence, the brownfields pilot program is portrayed by the national government, the National Governors' Association, the National Conference of Mayors, academics, and nonprofits as a worthwhile federalist cooperative program for cleaning up sites, reducing public health risk, and creating jobs and tax-paying land uses.²⁻¹⁴

What is this brownfields pilot innovation? In 1993 and 1994, with continuing substantial losses in manufacturing jobs and the closing of thousands of factories, the EPA created a pilot grant program that distributed up to \$200 000 over 2 years to 31 local governments. These governments then inventoried and assessed their brownfields sites and began to plan the cleanup and reuse of these sites to protect public health, produce jobs, and make poor areas ratable.^{2,4,15} The pilot program funds could not be used to clean up sites. Two years later, the innovation became a national competitive program.

Individual municipal and county local governments were the applicants, although some local governments came together to submit a joint application, and a few states applied to address their state-owned sites. As part of the application to EPA, local governments had to provide (1) a needs

Objective. We studied the diffusion of the US Environmental Protection Agency's national brownfields pilot innovation to more than 300 local governments between 1993 through 2002 to determine why some local governments received grants very early in the process while other awardees received funding later.

Methods. We did an ordinal regression analysis of the characteristics of all local government award recipients, and we conducted interviews with early-award recipients.

Results. The first set of local government awardees had lost much of their manufacturing base, had large concentrations of economically disadvantaged minority residents, and had local capacity to compete for funding. Federal and state officials catalyzed the diffusion of the innovation by working with local governments.

Conclusions. The widely praised program was diffused selectively at first and then more widely later on the basis of local need, local capacity to compete, and networks of contacts among entrepreneurs and local governments. The economic, social, political, and public health impacts must be monitored and reviewed. (*Am J Public Health.* 2006;96:277-281. doi:10.2105/AJPH.2004.054361)

assessment, (2) a community-based plan, including elements about community involvement and environmental justice, (3) an implementation plan, and (4) evidence of long-term benefits and sustainability. EPA was the decisionmaker; the 10 EPA regional offices, congressional representatives, and others could help diffuse the process by providing information and technical assistance.

Estimates of the number of brownfields sites in the United States range from 500 000 to 1 million.^{2,4} By March 2002, the innovative brownfields pilot program had granted 436 awards totaling \$87 million to address this industrial-era legacy.

The research presented here is part of a 4-stage analysis of the federal government's brownfields program. The first stage examined the program at the national, state, and regional levels by studying grant recipients, applicants who did not receive grants, and the geographic distribution of state and regional awards.¹⁶ We found that recipient regions had disproportionately lost manufacturing jobs and businesses during the past 3 decades and had high numbers and proportions of poor and African American residents. Also, not surprisingly,

regions that received many grants had the capacity to compete for grants, such as strong state government organizations, business entrepreneurship, and state environmental programs.

The first study did not address questions about the earliest awardees, which is what we focused on during the second phase. Learning about the first recipients was important, because a great deal of innovation occurred during the early years of a new program. What made the program diffuse so rapidly to some local jurisdictions? The literature about innovation diffusion emphasizes the importance of personal contacts when diffusing innovation.¹⁷⁻²⁰ We wanted to understand the role of federal, state, and other nonlocal entrepreneurs in catalyzing the process.

METHODS

The EPA brownfields' Web site lists all award winners; the EPA brownfields headquarters office in Washington, DC, provided additional files. Our methods included a statistical analysis of all local governments that were awarded grants and interviews with

representatives of jurisdictions that received the first awards. We did not seek EPA funding for this research, because we wanted to avoid the potential for a conflict of interest.

We considered doing a content analysis of a sample of applications, but we chose not to because the documents did not shed light on why a successful proposal was written early or later in the brownfields pilot program process. Instead, we did a statistical analysis. However, the data set available to measure local government characteristics was limited. The results of the statistical analysis must not be taken at face value. Rather, they show associations between a good data set of the distribution of the awards and proxies, some much better than others, for what we wanted to measure, which was local government need and capacity to compete for a grant.

Five variables were proxies for local environmental factors that should have increased the need for an award (Table 1). Among these 5, the proportion of Latino and African American residents were satisfactory proxies, and homeownership was satisfactory as an indicator of socioeconomic status (income and educational attainment also were good indicators).

Cities with the most brownfields should be able to make a stronger needs-based case. Unfortunately, there is no consistent list of brownfields across the United States. Some local governments have lists prepared by qualified experts, and the sites are classified by size, location, and type and extent of contamination. The worst local lists lump together everything from gasoline stations to abandoned steel mills, and even erroneously include people's homes. Consequently, we used proportion of manufacturing jobs in 1970 as one surrogate of need. The large proportion of manufacturing jobs in 1970, we expected, implied an industrially dependent city that would need a brownfields program 25 years later, after many of the jobs were lost and the factories were abandoned. The number of Superfund sites on EPA's list in 2004 measures a legacy of local contamination in the area and was used as a second possible indicator of need. These 2 indicators were indirect proxies for a nonexistent list of brownfields sites that follows a consistent national definition.

In addition to the proxies for need, 3 variables measured local capacity to apply for and win a grant. One variable was population size, which assumes larger cities have more capability to apply. After testing a variety of indicators, we used 150 000 or more people in 1990 as an overall measure of capacity (population, log of population, and population of 100 000 also were successfully tested). We used the year 1990 for this indicator and other US census variables, because it is the closest US census count before the start of the brownfields pilot program. The other 2 local capacity variables were applicants' status as a state capital and as a city. Single municipal governments, we expected, would have a clear advantage in preparing an application, because only 1 set of local decisionmakers needed to decide that a brownfields application was a priority. By contrast, counties often contain many municipal governments, some of which may not be interested in brownfields. Hence, we expected cities to be able to act more decisively than counties and thus, win the early awards. Being a state capital should be a competitive advantage for a city because of ability to directly access political leaders and information about the national program. We assumed that existing grants per capita would be an excellent proxy for capacity; however, such a database was not available for every local government, albeit

we are collecting these data for case study analyses. Overall, medium to large cities that were state capitals with a disproportionate proportion of minority and poor residents and that were dependent on manufacturing were expected to be more likely to receive an award early in the program.

We wanted to control potential confounding of the local data by state and regional factors. Hence, we added the strongest state/regional indicator from the first study,¹⁶ which was a rating of the state's environmental protection programs, to measure its strength versus the strength of local indicators.²¹ In the statistical analysis, the dependent variable had 13 rounds of awards; because the variable was ordinal, we used ordinal regression.

The quantitative results showed the overall association between early awards, capacity, and need. Only interviews can shed light on a set of issues that could not be measured by the statistical analysis. For example, the literature about innovation diffusion identifies non-applicants who catalyze the process and build a network of contacts, and it also shows a need to unlearn old forms of interacting and thus, learn new forms.¹⁷⁻²⁰ We anticipated that the unlearning/relearning process would be essential in the case of interactions between EPA and some local governments, because EPA has been the regulator, and local governments often were locked in disputes

TABLE 1—Ordinal Regression of Round Brownfields Grant Was Awarded and Correlates

Variable	β	SE	P
CAP: Population, 1990 (1 ≥ 150 000, 0 < 150 000)	-1.083	0.256	.01
CAP: City (1 = yes, 0 = no)	-1.180	0.314	.01
ENV: % Black population, 1990 (1 ≥ 31, 0 < 31)	-0.784	0.255	.01
ENV: % Own home, 1990 (1 ≥ 46, 0 < 46)	0.537	0.245	.03
CAP: City is capital of state (1 = yes, 0 = no)	-0.346	0.390	.38
ENV: Have Superfund site (1 = yes, 0 = no)	-0.160	0.220	.47
ENV: % Latino population, 1990 (1 ≥ 31, 0 < 31)	-0.234	0.368	.52
CAP: Strength of state environmental programs:			
1 = strongest quartile	0.216	0.347	.53
2 = second strongest quartile	0.376	0.367	.31
3 = third strongest quartile	0.824	0.391	.25
ENV: % Manufacturing workers, 1970 (1 ≥ 31, 0 < 31)	0.098	0.222	.66

Note. CAP = capacity; ENV = local environmental factors. Initial award winners had low ranks (first, second, third year). Hence, a negative β value means a positive association with the variable. $P < .01$; $\chi^2 = 69.96$. Variable results presented in order of statistical significance. Cox and Snell pseudo $R^2 = 0.201$; Nagelkerke = .203; McFadden = .047. Spearman rank correlation of actual vs predicted by model = 0.60 ($P < .01$).

with EPA about water quality and supply, Superfund sites, and air quality.^{9,10} We attempted to interview at least 1 representative of each local government that received an award during the first 3 years of the program.

RESULTS

Statistical Analysis

We had complete data for 359 single municipal and county local governments that received an award during 13 rounds. Noting that a negative β coefficient means awards received in earlier rounds, there were 4 significant correlates. Cities picked in the earlier rounds tended to have populations that exceeded 150 000 people ($\beta = -1.083$): half of the awardees during the first 5 years had a population of at least 150 000 compared with only 25% of those that received awards during the last 4 years. Early awardees tended to be cities rather than counties ($\beta = -1.180$). Indeed, 90% of awardees during the first 5 years were cities compared with 77% of later award winners. An early award was associated with a higher proportion of African American residents ($\beta = -0.784$): 40% of early award winners had at least 30% African American residents compared with only 15% of later award recipients. Finally, early-award recipients had lower socioeconomic status, e.g., they had lower rates of home ownership ($\beta = 0.537$). Fifty-seven percent of award winners during the first 5 years had homeownership rates of at least 50% compared with 83% of award winners during the last 4 years.

Additionally, although the results were not statistically significant, a disproportionate number of early-award winners were state capitals, had a Superfund site, had higher proportions of Latino residents, and had stronger state programs. The proportion of manufacturing jobs was the weakest correlate.

Interviews

Whereas the statistical analysis focused on the aggregate local attributes that resulted in an early award, the interviews concentrated on the role of federal, state, and other nonlocal entrepreneurs in diffusing this innovation. Fifty-one interviews were conducted, and we

failed to get satisfactory responses from 23 people who were called; only 3 potential respondents refused to answer our questions. Representatives of the 20 remaining recipients could not be found, although we tried to track down people who had retired or changed jobs. Interviews with officials from Connecticut, Ohio, and Illinois that were conducted between March 24 and May 5, 2004, were included in our analysis. They illustrate the range of interactions among innovators and some of the modifications they made to accommodate local circumstances.

Congressional officials and their staffs and federal EPA regional officials were major players in diffusing the process. The experience in Cuyahoga County, Ohio, one of the first award recipients, exemplifies the role of personal contacts and agendas. Virginia Aveni, manager of environmental programs for the Cuyahoga County Planning Commission, said that in response to the rapid decline of manufacturing in the area during 1991 and 1992, she led the County Planning Commission through a discussion of barriers to redevelopment of industrial properties. A committee composed of representatives of local congressional officials and the Ohio EPA participated and developed 75 recommendations. Congressman Lou Stokes, an influential member of congressional committees that oversaw EPA programs, and the influential Northeast–Midwest Research Institute arranged for a public hearing in Cleveland, which emphasized the need for EPA to address the environmental justice implications of the Superfund program. During this conference, EPA officials and county officials crafted a brownfields grant for Cuyahoga County. According to Aveni,

The guys in Region V [EPA] really cut through all kinds of red tape. They were wonderful to work with. Within four months of us getting our grant, Richmond [Va], Bridgeport [Conn], and others all got their funding, [and] then the larger process unfolded. It was like wildfire. So many have spun off this program. It has been the most productive thing I have worked on in my 30 years.

The role of the federal entrepreneur was equally important for another one of the first award recipients: Bridgeport, Conn. Kevin Gremme, an economic development specialist for Bridgeport at the time of its brownfields

pilot application, noted that city officials found out about the pilot program from a congressional staff member when they were in Washington, DC, to talk about a Housing and Urban Development grant. Gremme called EPA, and he remembers that the initial reaction was cool, because Bridgeport had a history of corruption. But EPA changed its mind after meeting with city officials. Gremme's view is that EPA issued a "very silent RFP [request for proposal] that not many knew about, but we knew about it." No one else we spoke with mentioned a silent RFP. But clearly during the first 2 years, some local governments knew much more about the innovative program than others did. One EPA official told us that the agency did not want to widely publicize the program until it was sure that the kinks had been ironed out.

Although we found that the federal and state governments were typically the entrepreneurial innovators, sometimes a combination of federal, state, and local governments diffused the innovation. Clark Wilson, zoning administrator for Canton, Ill (population 14 000), was informed by his state's EPA about the grant opportunity. Wilson contacted EPA Region V headquarters, and a consultant, the state, and the federal EPA with helped him prepare his successful application. Because of Canton's small size, other communities contacted Wilson numerous times for help: "It is beyond counting how many people have contacted me to ask how we won the money." He named a long list of cities that had subsequently applied for and won awards after speaking with him. Canton, in short, illustrates the reality that not all the applicants were populous cities. To summarize, before the *Federal Register* posted the program, it was initiated by contacts between elected officials and staff members of the federal and state governments.

A second major finding from the interviews is that the EPA and states found a variety of clever ways to help the local governments, in addition to talking to them about the pilot award program. EPA rejected some applications but offered what could be interpreted as a good door prize. Mark Pellegrini, the planning and economic director for Manchester

Township, Conn, noted that EPA turned down their request for a pilot award. EPA pointed to a lack of many sites and the need to formulate a plan for those sites. EPA suggested that Manchester apply for a brownfields Targeted Site Assessment grant of \$50 000, which the town received. According to Pelligrini,

They didn't feel like we had an extensive enough brownfields problem . . . felt that it was limited to a couple of sites. In retrospect, maybe they were right. Frankly, we don't have a lot of brownfields problems.

His words were echoed by several other cities that received brownfields Targeted Site Assessment grants.

States had different ways of connecting to the EPA program. Julie Gillenwater, brownfields coordinator for the Ohio EPA, observed that the state did not have a specific outreach program, but it did have an unofficial one. In 1994, Ohio initiated a "certified professional" program for the state's voluntary brownfields cleanup program. This program provided training and networking opportunities for professionals, which, in her view, spread the word about the EPA pilot program. Steve Colantino, the brownfields coordinator for the State of Illinois, indicated that the state identified likely candidates, reached out to cities to help them get grants, offered technical assistance, and advocated community proposals to the regional EPA office.

DISCUSSION

There is much to praise and relatively little to criticize about the EPA brownfields pilot program as a diffused innovation. The intended goal was to reach cities that had undergone substantial deindustrialization and that had large concentrations of economically disadvantaged minority residents who potentially were at risk because of the abandoned facilities. The results of the first 2 parts of our 4-part research show that during the course of a decade, these objectives have been met.

Of course, there is room for improvement. Arguably, as the statistical analysis and some interviews noted, the informal network operated to the advantage of larger cities with more personal contacts and capacity to apply,

and the lack of a network of personal contacts disadvantaged some smaller and more needy cities. Yet, the bias toward Northeast and Midwest populous cities during the first 3 years changed. Smaller cities, manufacturing-dependent cities, and cities in states like California and Texas began to apply for and were awarded brownfields pilot grants later in the program.

A second criticism is that there are many more thousands of local governments that can use this assistance. At the national level, Presidents Clinton¹³ and Bush¹⁴ have supported brownfields programs. In addition to the pilot program, EPA has deepened its program by instituting a showcase program that rewards the most successful local brownfields sites. In other words, if you received a brownfields pilot grant, you should then receive special attention with other federal programs. The Clinton administration created a task force composed of 15 federal agencies that provided additional funding and coordination of their programs to support the brownfields pilot program.^{4,7} The Bush administration has expanded the program and added funds. Overall, despite the wars in Iraq and on terror and a national economic performance that is hotly debated, the federal government continues to be supportive, but local governments would welcome more resources.

As an innovation, 3 attributes of the pilot program are particularly praiseworthy. The first is flexibility: innovators could be federal, state, local, for-profit, and nonprofit employees. Also, EPA developed a series of adjustments to accommodate local needs, including smaller grants for those with less need and larger grants for those who had the need and the capacity to do more, technical assistance, and educational seminars. After requests from local governments, EPA accepted parks, community facilities, and housing on cleaned up brownfields sites as possibilities. Second, the program undeniably has stimulated a lot of creative thinking by state and local governments and for-profits and nonprofits about how to turn brownfields into assets. Third, so few respondents complained about bureaucratic red tape that this has been an advantage to this innovation compared with many others. Overall, we consider the brownfields

pilot program to date to be a successful environmental innovation.

However, it also will be judged on other measures of success. Will it produce more jobs and more local taxes? Will it help control sprawl? Will the benefits accrue to residents of neighborhoods with brownfields? Or will brownfields redevelopment lead to eviction of current residents, gentrification, and political arrangements for local officials and their clients who will be given property at low cost and have few taxes to pay? Much data are being collected that make us believe these questions will be answerable, and we believe that in the aggregate, the answers will show far more positive than negative impacts.

Most important, from the public health perspective, will the process be done with sufficient care to avoid exposures to workers who clean up these sites and those who will live and work on them? This last question is the most important for public health professionals and also poses the greatest threat to this innovation. A failure to protect public health would, in our judgment, put great pressure on EPA and its state counterparts to change the innovative thrust of this program and to adopt a much more formal and rigid process for brownfields redevelopment, inevitably curtailing the entrepreneurs' ability to innovate. Yet, despite the importance of answering the public health questions, we are not sanguine about future analysts' ability to answer them. To our knowledge, risk analyses of brownfields sites are not being done. Instead, the working assumption is that cleanup to a "residential standard" or engineered and institutional controls will protect public health. Public health benefits are being inferred rather than being estimated. That approach may speed up remediation and redevelopment in the short run. But our fear is that inevitably some brownfields remediations will fail, and actual exposures will occur or be alleged. When that occurs, proponents of brownfields redevelopment will wish that some proportion of brownfields cleanups had been accompanied by formal risk analyses so that the aggregate of public health benefits could be estimated in the same way that job- and tax-related benefits are being estimated.

As an instrument of federal policy, the brownfields pilot program carries a heavy burden. It was conceived during the 1990s, when programs that benefitted residents of cities were reduced and when globalization deindustrialized cities and industrial suburbs. We did not address the spectrum of urban redevelopment issues, but we believe the diffusion of this federalist brownfields pilot program has spurred some cities to work on converting contaminated eyesores into productive new businesses, homes, and community facilities. We also believe this program has removed some actual and perceived public health threats. ■

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This article was accepted November 17, 2004.

Contributors

Michael Greenberg designed the study, did the statistical analyses, and prepared the draft of the paper. Justin Hollander gathered some of the data and conducted the interviews.

Acknowledgments

We appreciate comments from 2 anonymous referees and from our colleagues Dona Schneider and Frank Popper. The analyses and interpretations are solely the responsibility of the authors.

Human Participant Protection

The research did not require human subjects review.

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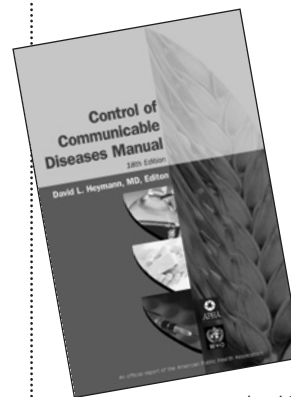
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