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# Integrating Equity and Sustainability: Lessons Learned From the Adoption of Safer Degreasers by Small Businesses

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## Abstract

**The Hazardous Waste Management Program in King County, Washington, initiated the Safer Alternative Degreaser Pilot Project to transition local businesses from hazardous degreaser products to safer alternatives, with the aim of reducing toxic exposures and promoting environmental justice. To help overcome economic and other barriers to switching, the initiative provided businesses with technical support, free trial products, and financial incentives via reimbursements to purchase safer degreasers and related equipment. A survey was administered to understand motivations and barriers to switching degreaser products, gather perspectives on safer products, and ensure equitable service provision.**

**Despite implementation challenges due to the COVID-19 pandemic, 50 businesses participated, 34 received trial products, and 32 received financial reimbursements. Moreover, 6 businesses adopted safer products, while 5 expressed interest in being recognized as an environmentally responsible business. The top barriers to switching to safer degreaser products included lack of knowledge, concerns about effectiveness, increased cleaning time, and initial costs. Our case study can inform and serve as a resource for other jurisdictions and communities that are interested in implementing similar programs. Additionally, our findings can provide insights and lessons learned to guide such efforts.**

**Keywords: safer degreaser products, safer product adoption, pollution prevention, small quantity generators, environmental public health, occupational safety, social equity, environmental justice, hazardous waste management**

## Introduction

The Hazardous Waste Management Program (Haz Waste Program) in King County, Washington, is dedicated to promoting safer practices for the use, handling, storage, and disposal of hazardous materials among businesses that are classified as small quantity generators (SQG) of hazardous waste. According to federal and state regulations, SQGs are businesses that generate <220 lb of hazardous waste per month and store <2,200 lb at any given time. To support these businesses, the Haz Waste Program encourages the use of safer alternatives by providing technical support, training, and financial assistance. The Haz Waste Program initiated the Safer Alternative Degreaser Pilot Project in an effort to reduce and eliminate the hazardous exposures associated with traditional degreasers and to assist businesses with transitioning to safer products.

This initiative represents a multifaceted approach to addressing complex issues across a multitude of practice areas, such as pollution prevention, occupational health and safety, waste reduction, and community health. A focus on racial and environmental equity are important components for rectifying systemic barriers that disproportionately affect businesses owned by Black, Indigenous, and other people of color; improving services for priority populations; addressing disparities in access to safer products; mitigating occupational hazards; and ensuring the ability to address community environmental justice concerns (Dorsey et al., 2014; Fiscella et al., 2000; Long, 2021). This project provides an example of integrating various focus areas while leading with a racial equity lens.

Many traditional degreasers used by SQG businesses contain highly toxic chemicals, including chemicals designated by the U.S. Environmental Protection Agency (U.S. EPA, 2002, 2003, 2005a, 2005b, 2022a, 2022b) as hazardous air pollutants (HAPs). These chemicals—including benzene, methylene chloride, *n*-hexane, toluene, trichloroethylene, and xylene—can cause neg-


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TABLE **1**

**Implementation and Evaluation Process**

| Step | Action |
|---|---|
| 1 | Recruit businesses to participate in the program.<br>Discuss with businesses about switching to safer products and applying for reimbursements.<br>Provide guidance on becoming a recognized EnviroStars business. |
| 2 | Ensure surveys are complete to obtain demographic and other data needed for the research.<br>Provide sample products and issue reimbursements.<br>Follow up about becoming a recognized EnviroStars business. |
| 3 | Conduct follow-up visits with participants to assess their experience with the sample products and/or determine if they used the reimbursements. |
| 4 | Assess if participants switched to a safer alternative product or equipment.<br>Confirm if participants applied for reimbursements, applied for EnviroStars, or both.<br>Evaluate if businesses will switch to safer alternatives, become an EnviroStars members, or both in the future. |

TABLE **2**

**Trial Products and Reimbursements Provided to Contacted Businesses**

| | # | % |
|---|---|---|
| Businesses that requested trial products | | |
| Yes | 34 | 68.0 |
| No | 16 | 32.0 |
| Businesses that received a reimbursement | | |
| Yes | 32 | 64.0 |
| No | 18 | 36.0 |
| Incentive type* | | |
| $599 reimbursement | 27 | 71.1 |
| $5,000 reimbursement | 11 | 28.9 |

*Some businesses received both reimbursement incentives.

ative short-term health effects such as skin rashes, slowed reactions, fatigue, dizziness, and headaches.

Chronic exposure can cause more serious medical issues such as cancer and damage to the kidneys, liver, or nervous system (U.S. EPA, 2002, 2003, 2005a, 2005b, 2022a, 2022b). Industries that commonly rely on these chemical products include automotive maintenance, public transit maintenance, construction, commercial cleaning, boat maintenance, aerospace and aviation, and food processing. Furthermore, the use of such degreasers can harm the environment and the health of workers, their families, customers, and the surrounding communities (Wu & Schaum, 2000).

This case study provides an overview of the implementation of the project and can serve as a resource with insights and lessons to guide the efforts of other communities that are interested in implementing similar programs. Most importantly, the challenges encountered and lessons learned can serve as a catalyst for reimagining the process, which could be adapted to specific communities in similar circumstances.

## Methods

This pilot project had several goals, including assessing the acceptability of safer degreasers and equipment to King County businesses; improving understanding and awareness of effective safer alternatives; addressing economic hurdles encountered by affected businesses; and examining barriers when switching to safer alternatives. More specifically, the initiative aimed to:

- Engage at least 50 businesses in King County to participate.
- Provide trainings for field staff on data collection, safer degreasing products, and appropriate interactions with participating businesses.
- Encourage 20 businesses to sample at least one safer degreaser product.
- Motivate 5 businesses to adopt at least one safer product.
- Strengthen the interest of 6 businesses to begin the process of becoming recognized as an EnviroStars business.

EnviroStars is an environmental recognition program in the state of Washington that helps businesses adopt best practices and gain recognition for reducing hazardous waste generation, conserving resources, protecting the environment, and demonstrating their commitment to sustainability within the community.

The evaluation design used the iterative and systematic Plan-Do-Check-Act (PDCA) cycle, which allows for continuous process improvement and ensures ongoing efforts to improve services (Moyce et al., 2023; Nguyen et al., 2020). The Plan step provides a systematic method to identify the problems. The Do step involves applying various solutions to ameliorate problems. The Check step reviews the results, and the Act step involves strategizing on best solutions.

The pilot project phase allowed the ability to experiment with different approaches, learn from challenges and successes, and select the most efficient and effective options to implement. Table 1 outlines the incremental steps taken by the project as part of the continuous improvement and evaluation processes. The project was also guided by analysis of workforce demographics and occupational exposure data, which helped identify employees at risk from hazardous materials during degreasing activities and the selection of focus industries (Peckham & Stephan-Recaido, 2023).

The process for identifying safer degreasers was guided by the internal framework for safer alternatives of the Haz Waste Program and aligns with the Washington State Department of Ecology's Automotive Degreaser Replacement Program. Initially, the field staff

recommended U.S. EPA Safer Choice-certified products, as these products had undergone rigorous safety vetting and must meet product-class–specific performance standards. If participants found these products to be ineffective or impractical, staff would next recommend water-based degreasers, and lastly, nonaqueous alternatives with less toxic ingredients than products currently in use at the facility.

Additionally, SQG businesses were offered free trials of safer products, including Gunk M709, CRC 05050, ECOS all-purpose cleaner, a reusable metal spray canister, and Simple Green all-purpose degreaser. The free trials of safer alternatives allowed the business employees to experience the products and determine the feasibility of adopting these products for their businesses without committing to an expensive change in work practices.

To help businesses overcome the financial challenges of adopting new products and practices, two levels of reimbursements were available: 1) a $599 reimbursement was provided to businesses for smaller changes or experimentation and 2) a $5,000 reimbursement was issued to businesses that required expensive substantial changes, such as purchasing new equipment that facilitated the use of safer products. Primarily, the reimbursements were used to provide funding for the purchase of safer products and equipment such as parts washers, brake cleaners, bulk cleaning systems, ultrasonic washers, and other safer cleaning products or equipment.

The evaluation process involved the use of a survey instrument that collected data on the degreaser products and equipment used by the businesses, motivations and barriers for businesses to switch to safer alternatives, interest in applying for financial incentive reimbursements, demographic information for equitable service provision, and opinions on safer alternatives. The survey consisted of 18 questions for participants and an additional 8 questions for field staff to document the trial products provided, financial reimbursements issued, and other administrative information.

The survey was conducted in person or on the telephone by field staff rather than self-administered to address language barriers; prevent misunderstanding of survey questions; enable relationship-building with business owners and employees; respect cultural norms; and allow participants to ask clarifying questions about the services, trial products, or financial reimbursements. Completion of the survey was optional due to the pandemic, limited field resources, and the need to avoid pressuring participants in ways that might compromise trust and hinder future partnerships. To ensure an inclusive and reliable data collection process, the project used web-based software for collecting, managing, and securing data obtained from participants. The software reduced data entry errors, increased data usability, streamlined multiple data forms and systems, and allowed easy extraction of information from a centralized location (Coleman et al., 2022; Fiscella et al., 2000). Even though the sample size was small, feedback provided by various

TABLE **3**

**Financial Assistance and Vendor Support**

| | Response | % |
|---|---|---|
| Question 4 | | |
| To what extent do you agree or disagree that receiving financial assistance would influence your decision to switch to a safer degreaser product? | Strongly agree | 53.8 |
| | Agree | 30.8 |
| | No opinion | 7.7 |
| | Disagree | 0 |
| | Strongly disagree | 7.7 |
| Question 5 | | |
| To what extent do you agree or disagree that working with a vendor would help you decide to switch to a safer degreaser product? | Strongly agree | 38.5 |
| | Agree | 38.5 |
| | No opinion | 23.0 |
| | Disagree | 0 |
| | Strongly disagree | 0 |

TABLE **4**

**Important Factors for Switching to Safer Products**

| Factor | # of Participant Responses |
|---|---|
| Concerns about health effects | 12 |
| Concerns about the environment | 10 |
| Removes greases and contaminants easily | 9 |
| Readily available from suppliers | 8 |
| Ways to reduce my liability | 7 |
| Product is easy to dispose of | 6 |
| Receive financial assistance from the Hazardous Waste Program | 5 |
| Safety concerns (e.g., flammability) | 5 |
| Advertising to my customers that I use environmentally safe products | 3 |
| Receive technical assistance from the Hazardous Waste Program | 3 |
| Safer alternative costs less | 3 |
| Employee willingness to switch | 2 |

*Note.* Participants could select all applicable answers.

TABLE **5**

**Barriers to Switching to Safer Products**

| Barrier | # of Participant Responses |
|---|---|
| I do not know enough about safer alternatives | 9 |
| Safer product may not remove grease and contaminants to the extent needed | 5 |
| Safer product will take more time to remove grease and contaminants | 4 |
| Switching to safer products costs too much initially | 4 |
| Alternatives are not readily available to purchase | 3 |
| What we use now works well | 3 |
| Alternatives are too expensive | 2 |
| It is difficult to get my employees to change | 2 |
| Uncertainty of financial situation during the pandemic | 2 |
| It takes too much time to switch to a safer product | 1 |
| Staff members would need training | 0 |

*Note.* Participants could select all applicable answers.

TABLE **6**

**Demographic Information of Surveyed Business Owners**

| Demographic | % of Respondents |
|---|---|
| Gender | |
| Male | 76.9 |
| Female | 23.1 |
| Declined to answer | 0 |
| Race or Ethnicity | |
| Black, Indigenous, and other people of color | 53.8 |
| White | 38.5 |
| Declined to answer | 7.7 |
| Preferred language | |
| English | 47.4 |
| Asian language(s) | 15.8 |
| Spanish | 15.8 |
| Other language(s) | 15.8 |
| Declined to answer | 5.3 |

internal and external partners was integral to improving the final data collection approach.

A primary consideration in advancing equity and social justice goals was the rigorous collection of demographic data—particularly information on gender, race, and ethnicity—to inform outreach and improve services for businesses owned by Black, Indigenous, and other people of color (Abdi et al., 2021; Dorsey et al., 2014). The project recognized that aggregating individuals and communities could obscure diverse lived experiences, identities, and cultures (Abdi et al., 2021; Fiscella et al., 2000; Long, 2021), which we addressed by collaborating with racial equity specialists to develop a survey that reflected the population of King County. In particular, the survey adopted the U.S. Office of Management and Budget-recommended single race and ethnicity question approach, allowing for better understanding of within-group differences. These efforts aimed to ensure that the demographic data collected could guide equitable service delivery and identify priority populations (Strmic-Pawl et al., 2018; U.S. Office of Management and Budget, 2024).

## Results

Despite the challenges associated with COVID-19 pandemic restrictions and limited resources, the Haz Waste Program field staff conducted 50 site visits to relevant SQG businesses. The participating businesses were from several sectors, including automotive, boats, maintenance, machine shops, truck repair, and pet care. A total of 34 businesses received sample trial products and 38 reimbursements were issued to 32 businesses. Of the 38 reimbursements, 27 were for up to $599 and 11 were for up to $5,000. Some businesses obtained both reimbursement incentives because they were planning to implement substantial changes that were more costly (Table 2).

The efforts of the field staff led to the long-term adoption of at least one safer product by 6 businesses and 5 businesses expressing interest in the EnviroStars recognition program. Overall, the project achieved all the quantitative participation benchmarks, which indicated strong engagement despite the challenges posed by the pandemic.

Among the participating businesses, 26% completed the detailed survey. A majority (85%) of the survey participants strongly agreed or agreed that receiving financial assistance would influence their decision to switch to a safer degreaser product. Similarly, approximately 77% of participants strongly agreed or agreed that working with a vendor would help them decide to switch to safer degreaser products. These findings suggest that financial assistance and vendor support are important factors in the decision-making process for adopting safer products (Table 3).

When asked about the importance of switching to a safer degreaser, the top concerns were health effects, environmental impact, easy grease and contaminant removal, and product availability from suppliers (Table 4). Businesses reported the fol-

lowing main reasons as preventing them from switching to safer degreaser products: insufficient knowledge about safer alternatives, concerns about product effectiveness, longer time required to remove grease and contaminants, and high initial costs (Table 5).

Table 6 presents the demographic information voluntarily provided by the participants. The data indicate that the participants self-identified as predominantly male (77%) and as Black, Indigenous, or other person of color (54%). Participants reported that English was the most common preferred language (47%), but more than one half of the participants (53%) preferred a language other than English, including Spanish, Korean, Vietnamese, Russian, and Ukrainian. Although detailed race and ethnicity information was collected, an aggregated category for "Black, Indigenous, and other people of color" was reported due to the small sample size. Nevertheless, our survey findings align with previous studies that have indicated that workers who identify as Black, Indigenous, or other people of color are overrepresented in industries where degreasers are commonly used (Peckham & Stephan-Recaido, 2023; Stephan-Recaido et al., 2024) and highlights the importance of outreach and training to protect affected workers.

The Haz Waste Program is committed to equity and social justice because social structures of racism multiply the effects of hazardous exposures (Gao et al., 2023; Kaufman & Hajat, 2021). Therefore, our project focused on equity through a collaborative effort with various internal and external partners to leverage diverse expertise and resources. The collaboration with different partners led to creative solutions that enhanced the services provided to businesses by:

- strengthening connections;
- planning, designing, and implementing the evaluation process;
- implementing an equitable data collection process to reach workers who identify as Black, Indigenous, or other people of color and any communities at risk of hazardous chemical exposures;
- implementing data collection procedures and management coordination;
- providing technical trainings;
- designing the survey instrument;
- conducting product testing and analytics;
- collecting demographic information;
- implementing change management strategies; and
- developing legal language.

The Haz Waste Program envisions a future where race is not a determinant of worker exposure to hazardous materials, and every person experiences positive health outcomes regardless of their race, community, or geography. The project ensured the integration of environmental justice principles throughout the relationship-building process and the collection of demographic information, which is considered essential for providing equitable governmental services.

The availability of reliable data enables a better understanding of the diverse communities being served, ensures agency resources are allocated equitably, and helps community partners receive the support they need. Despite initial concerns about the unintended consequences of collecting comprehensive demographic data, the majority of participants were willing to share their information, as indicated by the high response rate and lack of concerns during the interviews. Participants reported being comfortable sharing their demographic information as long as they had the option to decline to answer any question.

## Discussion

This study had the goal of increasing the use of safer degreaser products from local businesses, fostering sustainable partnerships, and promoting environmental justice principles in the services provided to the community. The project provided business owners and their employees an opportunity to learn about available resources such as trainings on U.S. EPA Safer Choice products and associated online materials; financial assistance; identification of hazardous products; and best practices for managing, disposing, and storing hazardous wastes.

The project experienced unforeseen challenges due to the COVID-19 pandemic, as well as staffing and resource limitations. These factors highlight the need for flexibility, modification, transparent communication with all partners, and internal and external change management support when implementing a project of this scope. Despite the challenges, the project successfully increased the use and adoption of safer products by leveraging trialability, one of the five key attributes in sociologist Everett M. Rogers' Diffusion of Innovations Theory. Trialability is the degree to which an innovation can be tested experimentally before making a full commitment, which means the innovation can be tested without full commitment, thereby reducing uncertainty and increasing perceived viability among potential adopters (Rogers, 1995). Previous studies have found that practical product trials improve the adoption of green products and practices (Ashley et al., 2016; Barbarossa & Pastore, 2015; Choshaly, 2019).

The project made advances in improving environmental justice outcomes and addressing disparities in hazardous waste exposure by collecting demographic data to enhance services and provide outreach to historically affected groups. Moreover, an emphasis on establishing long-term relationships with businesses demonstrates that consistent follow-up visits can enhance the likelihood of companies becoming interested in transitioning to safer products and seizing opportunities for pollution prevention. The implementation of our web-based collaborative data entry tool, instead of the traditional pen-and-paper method, made the processes of data collection, quality control, and monitoring of outcomes more efficient (Coleman et al., 2022). The tool enhanced data collection by increasing accuracy, improving oversight, streamlining collaboration, and centralizing information, which facilitated easier data analysis.

The evaluation of the project's outreach methods revealed opportunities to further integrate environmental justice principles and develop equitable services. Even though a flyer was created in multiple languages, the information was provided during contacts by field staff and was not distributed in an organized way that could have reached more businesses. This project also could have benefited from increased advertising and marketing efforts (e.g., radio, commercials, trade journals) to raise awareness and reach more businesses. The lack of coordination with communication specialists might have limited the ability to reach businesses that could have benefited from switching to safer degreaser alternatives (Massawe et al., 2014).

Degreasers are commonly used in a wide variety of industries, and research findings suggest they are among the most common chemical hazards encountered by workers (Stephan-Recaido et al., 2024). The risk

might be heightened in small business settings, because formal workplace health and safety systems and knowledge are often lacking, leading to scenarios such as insufficient ventilation or inadequate access to personal protective equipment (MacEachen et al., 2008).

Although transitioning to safer degreaser products inherently reduces workplace hazards, future studies should empirically assess if these product-level changes translate into lower exposures to volatile organic compounds (VOCs) and their associated health impacts. A comprehensive exposure assessment could involve collecting environmental (e.g., air) and biological (e.g., personal breath, blood, urine) samples from workers using both traditional and safer degreasers, as well as on-site observations of workplace practices and protective measures. Additionally, qualitative data should be collected to explore worker experience with product use, potential toxic chemical exposures outside the workplace, and self-reported health symptoms. This mixed-methods approach can rigorously evaluate if adopting safer degreasers results in measurable reductions in harmful exposures and promotes healthier working conditions.

## Conclusion

Our study documents an effort to engage SQGs of hazardous waste in the adoption of safer degreaser products. The project demonstrated the feasibility of combining technical assistance, financial incentives, and on-site engagement to promote safer chemical use among small businesses. The results we obtained during the Plan-Do-Check-Act evaluation process indicated that participants in this initiative were encouraged by the experience. The majority of businesses either tried safer products, expressed interest in safer alternatives to improve health or environmental conditions, requested additional information about other agency services, transitioned to safer alternatives, or participated in a combination of these services.

The project also facilitated key learning experiences for the business owners and employees, such as understanding the importance of reading product labels and identifying hazardous chemicals in degreaser products. These experiences have led to the participating businesses making informed decisions and adopting safer practices in their operations, ultimately benefiting the health of the community and helping the environment.

The project effectively engaged local businesses and demonstrated progress in generating positive impacts in pollution prevention, fostering healthier communities, and enhancing the environment quality via long-term strategies to eliminate hazardous exposure to harmful chemicals in degreaser products. This case study can serve as a resource for other jurisdictions and communities that are interested in implementing similar programs. The insights and lessons learned can allow others to adapt and modify these approaches to address the distinct needs of their communities, because a standardized approach is not suitable for all community-engaged initiatives.

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*continued on page 14*

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