Green Seal and SCS

A case study of the first eco-labeling programs in the US

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Summary

Shorter summary

Eco-labels are environmental certifications given to products. The first eco-labels in the US were founded by two rival organizations in 1989, in response to growing environmental concern and distrust of green marketing claims. Both organizations failed to have much impact in the consumer market and pivoted to the institutional market, by creating standards for institutional products and by providing guidance to institutional buyers. Their position as early established eco-labels gave them some influence in the development of other private standards, the procurement practices of private companies and public institutions, and lobbying efforts waged between industry and environmentalists.

Longer summary

- **How Green Seal and SCS certifications work today**
  Green Seal and SCS Global Services (SCS) are two organizations that award environmental certifications (eco-labels) to products. They both work by taking a fee from manufacturers who voluntarily apply for a product certification and by evaluating the product using environmental standards that the programs have developed. Each organization awards eco-labels to products that pass the evaluation and adds them to an online directory of certified products.

  They take different approaches to communicating the environmental impact of a product: Green Seal's logo is a multi-attribute eco-label that is awarded to a product if it meets all of the requirements that Green Seal has specified for the product's category. SCS mostly awards single-attribute eco-labels that each certify an individual environmental claim about a product, such as "10% recycled content" or "biodegradable." SCS also offers a service to create an in-depth report with quantified estimates of a product's environmental impacts.

- **What are the costs of being certified with Green Seal or SCS?**
  There are a few costs for a manufacturer to have a product certified by Green Seal or SCS. (1) Both organizations probably charge certification fees of several thousand USD per product per year. (2) Additionally, there is some cost of time for the manufacturer to complete all necessary paperwork, though this is hard to estimate. (3) In some cases, the manufacturer may have to pay to have their product tested in a lab, which in one example I examined would cost the manufacturer $1000 per product. (4) There are also potential costs from using a manufacturing process that is compliant with the standards. This last cost probably varies widely between standards, being negligible for some standards, and up to 50% more for others.

- **How do Green Seal and SCS create new standards?**
  Green Seal is a nonprofit and creates the standards for its eco-labeling program. SCS

Global Services, a benefit corporation, previously created its own standards but now has an official standards setting body, SCS Standards, which is described as a nonprofit. Both organizations create new standards through processes that follow ISEAL's standard setting code and involve public input, feedback from relevant stakeholders, and a review of the standard every 5 years.

- **Historical background**
  In the late 80s and early 90s, environmental concern was surging globally in response to issues such as acid rain, ozone depletion, and global warming. Marketers responded to this concern by making significantly more environmental claims about their products. Because these claims were difficult to evaluate, and occasionally exposed as false, consumers were distrustful of environmental marketing. Many countries developed government-sponsored eco-labeling programs to address this issue, but the US Government's only mechanism to regulate environmental marketing was litigation from the FTC. Green Seal and SCS, seeking to fill this apparent market niche, became the first eco-labeling programs in the US, in 1989.

- **Early rivalry and public scrutiny**
  The two organizations initially acted as rivals, and most early press coverage of the two organizations focused on this rivalry. The president of SCS criticized Green Seal's methodology and at one point accused Green Seal of acting in bad faith to discredit its competition.

  Life-cycle analysis (LCA) is a framework for evaluating a product's environmental impacts that both organizations used. However, LCA was not well developed or standardized in the early 90s, and marketers damaged its reputation by using it in misleading ways. SCS received some criticism from environmentalists for describing itself as a nonprofit and for partnering with retail companies. Both organizations took efforts that appear to have been aimed at gaining consumer trust, such as partnering with well-established product-testing labs.

- **Fighting against industry lobbying**
  In the mid 90s, a large industry group began a lobbying campaign against eco-labels, with a focus on convincing the World Trade Organization to create restrictive trade rules for the use of eco-labels. In response, Green Seal and other environmentalist organizations formed an organization to fight back with its own lobbying efforts. The latter was mostly successful in blocking the first, but it may have redirected some of Green Seal's efforts away from their other work.

- **Pivoting to the institutional market**
  Despite late 80s and early 90s polls in which consumers said they would pay more for environmentally friendly products, neither organization ever had much success in their missions to impact the consumer market. Possible explanations for this include fickle consumer behavior and the organizations' limited advertising budgets.

  Over the course of the 90s, both organizations instead pivoted towards

influencing the institutional market, where there was a growing trend to buy more environmentally friendly products. Rather than certifying products, Green Seal spent much of its time in the late 90s and early 2000s offering its expertise to companies and government agencies that were developing Environmentally Preferable Purchasing (EPP) policies. Green Seal's certification program didn't really take off until the late 2000s, in response to the demand generated by such policies. In particular, the EPA's EPP Program for the federal government includes both Green Seal and SCS in its list of recommended environmental standards.

Today, Green Seal seems to be mostly focused on public institutions such as governments and schools, and SCS seems to be mostly focused on private institutions. Each organization has certified tens of thousands of products.

- **Impact on other eco-labeling programs**
  Eco-labeling programs are much more common in the US today, and both Green Seal and SCS seem to have had some influence on the development of later programs. They both participated in the development of the ISO 14000 standards, a family of metastandards that guides the development and implementation of most environmental certifications today. Green Seal also played an active role in the creation of the Global Ecollabeling Network, an organization that may have helped to facilitate the development of more environmental certifications.

How Green Seal and SCS certifications work today

Green Seal

Green Seal is a nonprofit organization that designs standards and issues a seal-of-approval for environmentally friendly products within certain categories for which Green Seal has developed standards, such as paper products, cleaning products, and paints. Green Seal seeks to influence the market by creating an incentive for manufacturers to produce more environmentally friendly products than they would otherwise.

If a company has a product in a category for which Green Seal has a certification program, it can begin the certification process by submitting an application to Green Seal and paying a startup evaluation fee. As of 2018, this fee was determined by a sliding scale based on the company's revenue and typically ranged from $3,500 to $10,000, with a discounted fee per product for companies certifying multiple products.

After meeting with Green Seal, the company submits relevant data such as information about the product's manufacturing process, marketing materials, and packaging. For confidential information, such as a product's formula, Green Seal enters into a confidentiality agreement with the company and any relevant suppliers.

In addition to information about the product's environmental impact, Green Seal requests data about the product's functional performance, as measured by specific tests that the company can perform itself or contract outside labs for.

Green Seal conducts a scheduled onsite audit of the manufacturing facility. After a successful audit, and after approving the product's formula, packaging content, and labels, Green Seal awards its label to the product (figure 1), and includes the product in a directory that seems to primarily be used by institutions with policies for environmentally preferable purchasing, but could also be used by consumers. According to Green Seal, the entire process of certification takes 2-3 months after the company has submitted all of the required paperwork.

The company's license for the Green Seal label expires after 12 months. To renew the license, the company must pay an annual monitoring fee and pass an annual review. As of 2018, this monitoring fee tended to range from $3,500 to $10,000. During the annual review, the company receives a questionnaire from Green Seal, and must submit a response describing any changes that have been made to the certified product. Every third year, Green Seal conducts a more thorough review in which it repeats most of the steps involved in the initial certification process, including an onsite audit.

Figure 1: A package of Green World Solutions soap featuring the Green Seal label.

SCS Global Services

SCS Global Services is a benefit corporation that offers several services related to environmental standards, certification, and consulting. This report will focus on their services for product sustainability, of which there are primarily three types.

Environmental Claims Certification

SCS provides services to certify specific environmental claims based on established standards. Some of these standards were developed by SCS, and some were developed by other organizations or in collaboration with other organizations. Examples of claims for which SCS has developed standards and issues certifications include biodegradability, recycled content, low formaldehyde emissions, and low emissions of volatile organic compounds.

If a company wishes to receive certification from SCS for an environmental claim, it submits an application to SCS. After reviewing the application and requesting additional

information as needed, SCS sends a quote for the service. SCS does not seem to publicly share what a typical quoted amount would be, but a source from 2003 said that the initial certification fee varies from $1500 to $8000, which would be about $2500 to $13000 in today's dollars.

Once SCS has received the required paperwork and a retainer fee, an SCS auditor collects and reviews data from the company which, depending on the certification, might include manufacturing processes, product formulation and previous product testing.

For some certifications, such as those for indoor air quality and formaldehyde emissions, a sample of the product is always sent to an SCS-approved lab for testing. For other certifications such as biodegradable or recycled content, laboratory testing is only required if the data provided by the company is not sufficient to determine whether the product conforms to the standard.

For formaldehyde emissions certification, SCS always performs an on-site audit. For biodegradable and recycled content, an on-site audit is performed only if needed, at the discretion of the auditor. For indoor air quality, there is no mention of on-site auditing in the description of the process.

The auditor drafts a report of the audit's findings, including any non-comformities with the relevant standard. The report is reviewed by a second auditor and sent to the company, which must respond to any non-comformities with a corrective action plan.

SCS conducts a final review of the report and makes a decision about whether to grant certification to the company, based on whether it meets the standard. If certification is granted, the company may use the relevant label on the product and SCS lists the product on its "Green Products Guide."

Certificates are valid for one year. For most SCS certifications, an annual audit is done to confirm that the product continues to conform with the standard. For formaldehyde emissions, a quarterly inspection and laboratory test are required.

Environmental Claims Validation

Environmental Claims Validation (ECV) is a service in which SCS certifies the validity of an environmental claim that does not fit neatly into existing standards. These claims are often more ambiguous. SCS lists several common categories for which they will issue ECV certification, including energy efficiency claims, no added formaldehyde, phthalate-free, and rapidly renewable. SCS also will work with companies to validate custom claims.

Little information is available about the details of how SCS performs evaluations for ECV. SCS says that many claims will be evaluated based on laboratory testing, or the product's formulation.

If SCS decides to validate a claim based on their evaluation, they award the company the right to use the ECV label on the product, which includes a specific description of the claim being validated. SCS also adds the product to its Green Products Guide.

Environmental Product Declarations

An Environmental Product Declaration (EPD) is a report that estimates a product's total environmental impact, based on a Life Cycle Assessment (LCA).

After SCS accepts an application from a company for an EPD, it sends a quote to the company. SCS does not publicly share what a typical price would be, but a source from 2003 claimed that SCS charged between $15,000 and $50,000 for an EDP, which was called an Eco-Profile at the time. That would be about $25,000 to $80,000 in today's dollars.

SCS begins the process of developing the EPD by identifying or developing a Product Category Rule (PCR). A PCR defines the procedure for conducting an LCA in a given category. Because LCA models can produce different results depending on the variables and methods used, standardizing the methodology within a product category is necessary to make it possible to compare the environmental impacts of similar products.

SCS works with the company to find an existing, applicable PCR. The PCR must conform with ISO 14025 and LEO-SCS-002, which are private metastandards that guide the development of PCRs, and may have been developed by SCS, another private organization with a recognized EDP program, or a public committee. If no PCR exists for the product in question, SCS will develop one. Per the requirements of ISO 14025, SCS consults with any interested parties when developing a new PCR, and the PCR is reviewed by a third-party panel of experts.

SCS requests supplier and manufacturer data from the company and uses this to build an LCA model based on the requirements of the PCR. SCS supplements any missing data using the Ecoinvent database, which includes industry averages for relevant environmental data. If an on-site audit was conducted, the findings from that audit are included as well.

Issues with LCA include inconsistency in methodologies and system boundaries. It is not feasible to include every downstream environmental impact of a product. For example, it may be unnecessary and overly complicated to evaluate the carbon emissions created by manufacturing the tire that was on the truck that was used to transport the raw materials to the factory where the product was assembled. Because it is impossible to consider every externality of a manufacturing process, LCA models include 'system boundaries' that define a cutoff for what will be considered and what won't. If the PCR does not specify a cut-off rate for the system boundaries, SCS uses a default cut-off rate of an estimated 1% of the product's environmental impact. If the PCR does not specify a specific methodology for Life Cycle Assessment, SCS uses a default methodology described in ISO 21930:2017. The name of the LCA methodology used is included in the EPD.

SCS puts together an LCA report, which they review for conformance to ISO 14044 by using the review process in ISO 14071.

SCS puts together an EPD based on the LCA report and the requirements of the PCR. The EPD is verified by an expert, who might be from outside of SCS or might be an SCS employee who was not involved with with the development of the EPD. The verifier confirms the quality and accuracy of the EPD, and that the EPD conforms with the PCR, ISO 14020, and ISO 14040.

When the verifier signs off on the EPD, SCS publishes the EPD with the company's permission and adds the product to its Green Products Guide. SCS will annually reassess the information in the EPD to determine if changes are necessary. The PCR will typically state how long the EPD is valid. If the PCR does not specify a period of validity, SCS will consider the EPD valid for 5 years. When the period of validity expires, the company must have the EPD renewed

to continue to use it. The process of renewing the EPD includes analyzing up-to-date information, and in some cases includes on-site audits.

What are the costs of being certified with Green Seal or SCS?

Green Seal

As of 2018, Green Seal charged companies $3,500-$10,000 annually for certification. There is also a cost of time involved with completing paperwork to receive the certification, but this is difficult to estimate. Other costs associated with compliance likely vary between product category. For many product categories, the standard requires tests to evaluate the product's functional performance. I was unable to find how costly these tests are to conduct, or how much third-party labs charge to conduct the tests.

Other costs of compliance involve the costs of manufacturing a product that complies with a Green Seal standard. Many of their standards have too many or too complex criteria for me to evaluate these costs. Here I'll examine just the paper products standard, because it has relatively simple criteria:

1. Must functionally perform well relative to industry standard
2. Restrictions on amount of heavy metal found in the packaging
3. 30% recycled material (optional if meets chlorine free processing criteria)
4. Chlorine free processing (optional if meets 30% recycled material criteria)

I will ignore #1 on the basis that most products probably perform reasonably well by default. I will ignore #2 because this same restriction is already encoded into law in 19 states. I will ignore #4 because it is interchangeable with #3.
5000 sheets of Amazon Basics printer paper costs $49 as of this writing, compared to $61, or roughly 25% more, for 5000 sheets of Amazon Basics 30% recycled printer paper. Factors influencing this difference in price might include customers' willingness to spend more for recycled products, as well as a higher cost for producing recycled goods. Based on this, the expenses involved with producing 30% recycled paper could cost up to 25% more than producing paper without recycled material.

However, the EPA said in 2016 that 33% of papermaking materials in the US came from recycled sources, so paper with recycled content might already be common by default. This standard also only makes up a small proportion of Green Seal's certified products (there are currently 27 products in their directory certified with this standard) and I'm unsure of how representative it is of other Green Seal standards with respect to cost.

SCS

Less information is publicly available about the fees charged for SCS certification, but it seems like the fees for the environmental claims certification program are likely similar to the fees of a Green Seal certification, so in the thousands of USD per certification. As with Green Seal, there is some time cost required to complete the paperwork, but this is hard to estimate. Additional costs of compliance likely vary between standards.

Some of SCS' standards, such as Environmental Product Declarations or the Reycled Content Standard, likely have few costs of compliance outside of the certification fee because they don't actually specify any technical requirements for the product. For example, some of the products with the Recycled Content certification have as low as 5% recycled material.

Other certifications do have technical requirements, such as the Indoor Air Quality standard or the Biodegradable standard. The Biodegradable standard specifies a few different laboratory tests that can be used to demonstrate the biodegradability of the product. Based on one lab's pricing page, these tests likely cost the company around $1000 per product. However, the FTC guidelines for environmental marketing claims says that companies should have "competent and reliable scientific evidence" for biodegradability claims, so it's possible that companies selling biodegradable products would do these tests anyways. If a company would not have made its products biodegradable otherwise, it would likely cost them significantly more to comply with SCS' Biodegradable standard, because biodegradable plastic costs 20-50% more than similar materials.

How do Green Seal and SCS create new standards?

Green Seal

Green Seal refers to three metastandards to guide its standard-setting process:

1. ISEAL's standard setting code, which Green Seal describes as its primary guide since 2019.
2. ANSI's essential requirements, of which Green Seal's process adheres to some of. Specifically: "openness," "lack of dominance," "balance," "consideration of views and objections," and "written procedures."
3. ISO 14024 Standard for Type I Ecolabels, which describes a lifecycle-review framework that Green Seal uses.

Green Seal uses this procedure for creating new standards:

4. Green Seal publicly posts that its beginning to develop a standard
5. They do outreach to get stakeholders involved. Stakeholders are from one of three categories including "producers," "users," and "general interest." The "general interest" category includes people who do not fit into the first two categories but have some kind of relevant knowledge, such as other standard-setting organizations or scientists. Green Seal tries to ensure that no single one of these categories is more than half of the involved stakeholders.

6. Green Seal says that it develops criteria for a product category, in collaboration with stakeholders, and sometimes in collaboration with technical advisers, through these seven phases:
    a. “market review;
    b. lifecycle review;
    c. data quality review;
    d. impacts determination;
    e. drafting criteria;
    f. feasibility assessment; and
    g. intended outcomes determination.”
7. Green Seal posts the standard and accepts public comments for 60 days.
8. Green Seal evaluates the submitted comments and chooses which feedback to incorporate into the standard.
9. If approximately ⅔ or more of the stakeholders support the standard, and there is no sustained opposition to the standard among stakeholders, Green Seal officially publishes the standard and begins accepting applications for certification.
10. Every five years, Green Seal reviews the environmental impact and market uptake of the standard. If revisions are made, a draft of the revisions is posted for public comment for 30 days.[1]

SCS Global Services

In 2020, SCS Global Services launched SCS Standards, which is described as a nonprofit organization and is the official standards-setting body for SCS Global Services. These two organizations have separate websites but share the same physical address. I am unsure of whether SCS Standards is a 501(c)(3). It is accredited by ANSI. Like Green Seal, SCS Standards follows a procedure that aligns with ISEAL’s standard setting code for creating standards:

1. SCS Standards can initiate the development of a new standard. Sometimes an external request is made for a new standard, and the executive director of SCS Standards will decide whether to follow through with it.
2. A “Terms of Reference” for the new standard is published on the SCS Standards website, outlining the scope, goals, justification, risk assessment, and development process for the proposed standard.
3. For some but not all standards, a Standards Development Committee (SDC) is created for the standard. SCS selects members for the SDC that represent producers, users, civil society, and “general.” Depending on the standard, technical experts may also be included.
4. The standard is drafted.
5. A draft of the standard is published for public review for 30-60 days. Stakeholders with expertise or material interest in the standard are invited to provide comments.
6. After reviewing public comments, a decision is made about the standard

[1] 2022. “Standards Manual” https://greenseal.org/wp-content/uploads/Green_Seal_Standards_Development_Manual.pdf *Green Seal*.

    - If the standard is being developed by an SDC, the decision is made by consensus “whenever possible.”
    - If the standard is not being developed by an SDC, the decision is made by the board of directors of SCS Standards
7. Sometimes the SCS Standards board of directors decides to designate the standard for trial use, where they test it out in the field for up to 18 months.
8. The standard is published on the SCS Standards website.
9. The standard is reviewed every 5 years, and is revised if necessary. When revising a standard, a new Terms of Reference is posted and stakeholders are given the option to make suggestions for revisions. “Major revisions” undergo the same public consultation process as new standards.[2]

History

Background

Early origins of the modern environmental movement

The modern environmental movement began in the 1960s. The 1962 book *Silent Spring*, about environmental damage from pesticides, sold more than 500,000 copies in 24 countries. In 1969, an oil spill in California and a polluted river catching fire in Ohio further increased public concern for the environment. In 1970, Harvard Law School student Denis Hayes organized the first Earth Day, a nation-wide event to protest harms to the environment.

American policymakers responded to these concerns with legislation such as the Clean Air Act in 1963, the National Environmental Policy Act in 1970, and the Clean Water Act in 1972. In 1970, Richard Nixon established the Environmental Protection Agency.[3] [4]

Rise in environmental concerns starting in the mid-80s

The second half of the 1980s and the early 1990s saw a sharp increase in public awareness and concern about environmental issues all around the world, driven by media coverage of alarming scientific data, high-profile disasters, and environmental activism.

Science

- **Acid rain:** In 1983, a panel of scientists at the National Academy of Sciences released a report which argued that acid rain was a real problem that could affect public health. The report said that although there is lingering uncertainty about the causes of acid rain,

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[2]2021. “Standards Development and Modification Procedure” https://cdn.scsglobalservices.com/files/program_documents/SCS%20STDS_PRO_StandardDevelopment_V2-0_021221.pdf *SCS Standards.*

[3] Hayes, Amy. 2022."The 20th Century Environmental Movement in the US” https://www.thecollector.com/american-environmental-movement/ *The Collector*

[4] “Our History” https://www.earthday.org/history/ *EarthDay.org*

lawmakers should work to mitigate the problem with measures such as reducing sulfur emissions.

- **Hole in the ozone layer:** In 1985, three scientists from the British Antarctic Society published the paper "Large losses of total ozone in Antarctica reveal seasonal ClOx/NOx interaction" about the discovery of a hole in the ozone layer above Antarctica, and a probable link with emissions of CFCs. In 1986, NASA scientists demonstrated that the ozone hole extended over the entire continent.
- **The greenhouse effect:** In 1988, a scientist from NASA testified to congress that there was enough data to be 99% sure that the then-hypothetical greenhouse effect was taking place, and that it was caused by manmade pollution. The data at the time was limited enough that there was still some disagreement among scientists about how quickly and severely global warming would occur.

Disasters

There were several environmental disasters in the 80s. The one that seems to be the most likely to have influenced public opinion was the 1989 Exxon-Valdez oil spill. According to a 1997 Pew Study, the disaster was one of the top 20 news stories of the 1980s. In 1990, 60% of surveyed Americans named oil spills as a serious problem, up from 38% in 1988.[7]

Activism

In 1990, environmental activists organized another Earth Day event, similar to the one in 1970 but larger and more organized, "mobilizing 200 million people in 141 countries." Denis Hayes, the chief organizer of Earth Day 1970, was also the chairman of Earth Day 1990. Earth Day 1990 had 20 staff members, a board of 115 directors, and a budget of $3 million.[5]

Media

Based on searching for archived news articles and reading secondary descriptions of the time, it seems like the press was actively covering the major scientific findings, environmental disasters, and activism efforts described above. In 1989, TIME made "Endangered Earth" the "Planet of the Year" instead of the usual Person of the Year. A study in the UK found that a selection of newspapers and magazines used the word "green" 3617 times in June 1984 and 30,777 times in June 1989, which is consistent with what seems like an overall rise in media coverage of environmental issues during this time.[6] Google's Ngram Viewer shows that the phrase "environmentalism" was used nearly four times as frequently in books in 1993 than in books in 1985.

The media also reported on some environmental issues in a way that may have been sensationalized and misleading to the public. In 1987, there was a widely-covered story of a garbage barge that sailed for several weeks in search of a landfill that would take its garbage.

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[5] Strom, Stephanie. 1990. "Earth Day Extravaganza Sheds Its Humble Roots" https://www.nytimes.com/1990/04/22/us/earth-day-extravaganza-sheds-its-humble-roots.html *The New York Times*

[6] Lampe, Marc, et al. 1995. "Green Marketing in Europe and the United States: an Evolving Business and Society Interface" 1995, https://www.sciencedirect.com/science/article/abs/pii/096959319500011N

Although this incident seems to have been mostly caused by the poor decisions of a handful of people, it was sometimes framed as part of a nation-wide issue with landfills, and some say it was a major causal factor in the rise of recycling in the US. [7]

The public

The survey results I could find from the time support the idea that in the late 80s and early 90s, the American public was significantly concerned about the environment. Figure 2 shows a breakdown of how concerned respondents were about various individual environmental issues in 1990, and Figure 3 shows how many respondents identified as environmentalists over time.

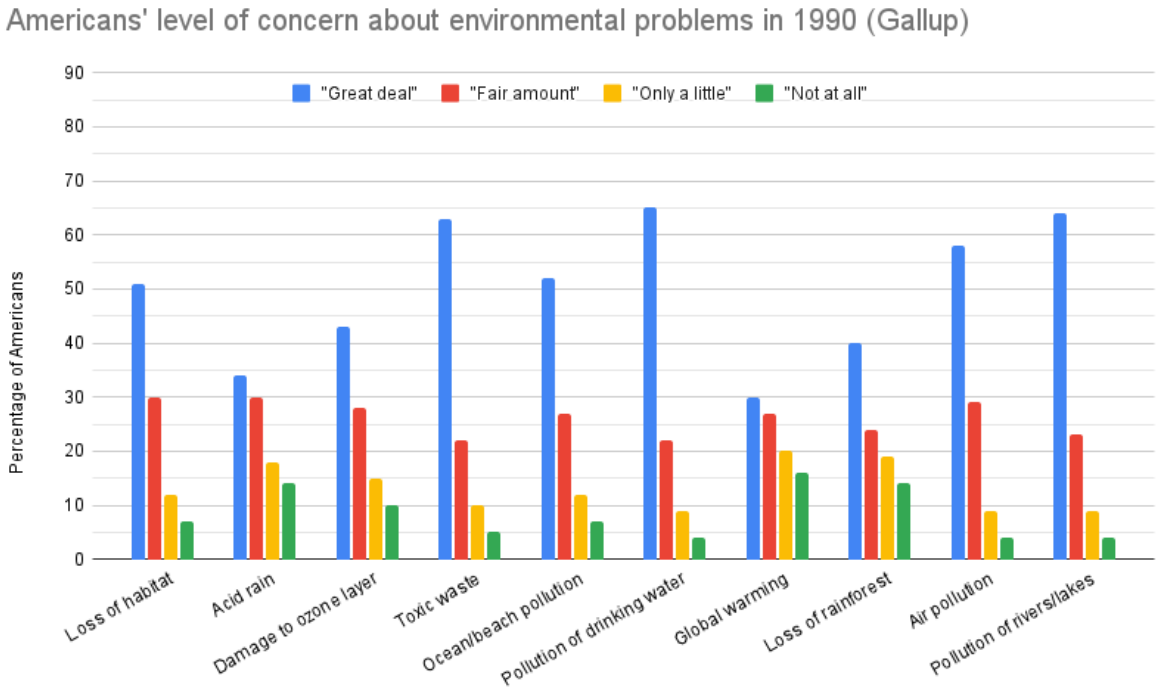

Figure 2: Responses to a 1990 Gallup survey that asked "I'm going to read you a list of environmental problems. As I read each one, please tell me if you personally worry about this problem a great deal, a fair amount, only a little or not at all. First, how much do you personally

[7] 2019. "A Mob Boss, A Garbage Boat and Why We Recycle" https://www.npr.org/transcripts/739893511 *Planet Money.*

worry about:"

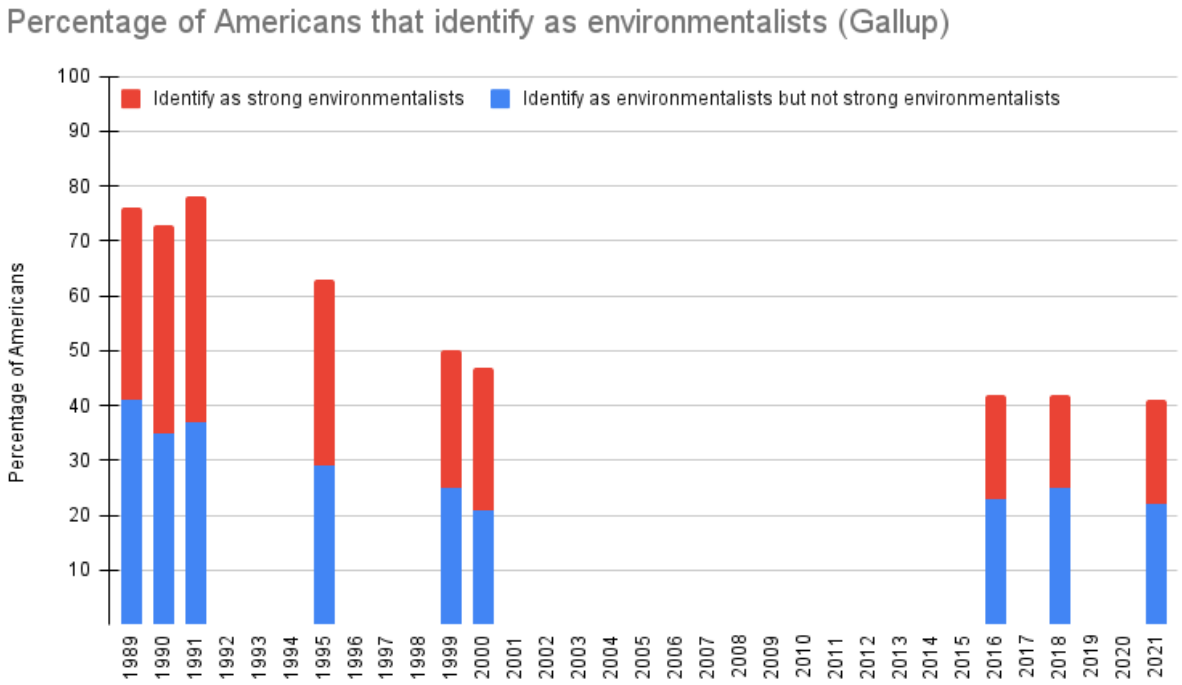

Figure 3: Responses to Gallup polls over time that asked "Do you consider yourself an environmentalist, or not? Would you say you are a strong environmentalist, or not?"

Survey results from the time also showed that consumers were concerned about the environmental impacts of the products they purchased:

- A 1989 survey by Michael Peters Group found that 89% of Americans were concerned about the environmental impact of the products they purchase. Also, 77% said a company's environmental reputation affects what they buy.
- A 1990 survey by Abt Associates Inc found that "slightly more than half of the respondents considered the environmental attributes of a product and/or company (and could name the product and its environmental attributes) when selecting a product in the past six months."[8]
- In a 1990 survey commissioned by S.C. Johnson and Son, Inc. 59% said a major reason for environmental problems was "Companies do not develop and make available environmentally sound products." The highest ranked reason was "Factories and plants cause pollution when manufacturing products we use." [9]

[8] 1993. "Status Report on the Use of Environmental Labels Worldwide" https://nepis.epa.gov/Exe/ZyPDF.cgi/20000XXW.PDF?Dockey=20000XXW.PDF *Environmental Protection Agency*

[9] 2011. "The Environment: Public Attitudes and Individual Behavior — A Twenty-Year Evolution" http://web.archive.org/web/20120614031653/https://www.scjohnson.com/Libraries/Download_Documents/SCJ_and_GfK_Roper_Green_Gauge.sflb.ashx *S.C. Johnson.*

Marketing responses to environmental concerns

Marketers responded to the apparent increase in demand for environmentally-friendly products by making significantly more environmental marketing claims. Between 1989 and 1990, the number of products with environmental claims on their labels doubled and environmental claims in television and print advertisements quadrupled. [11]

These claims were often confusing or misleading, which sometimes led to litigation. Zipatone agreed to stop advertising its spraypaint as “ecologically safe” after an FTC investigation found that it contained an ozone-depleting chemical. American Enviro Products agreed with the FTC to stop advertising its disposable diapers as “biodegradable” after 10 states filed lawsuits alleging that the claim was false. Mobil Corporation paid a $150,000 settlement and agreed to stop advertising Hefty trash bags as biodegradable after a Greenpeace investigation and lawsuits from 6 states.[10]

Regulation of environmental marketing

As companies began to add more environmental claims to their products and consumers grew skeptical of those claims (a 1990 survey said that 47% of customers "dismiss environmental claims as mere gimmickry"[8]), governments around the world implemented different types of policies to regulate and standardize environmental marketing.

The first eco-labeling program, Blue Angel, was created by the German government in 1978 to award seals-of-approval to environmentally friendly products. By 1988, Japan,and Canada also had government-sponsored programs which may have been at least partly modeled after the German program. By 1993, similar programs were established or being developed in Norway, Sweden, France, Austria, Portugal, Finland, and the European Community.

The US Government did not follow the trend of other developed nations by launching its own eco-labeling program. Two bills to regulate environmental marketing were proposed to congress in 1991, but neither passd into law. The primary mechanism for regulating environmental marketing at the time consisted of the FTC prosecuting false advertising on a case-by-case basis. The FTC was called on to develop national guidelines for environmental marketing by the National Association of Attorneys General, which argued that the case-by-case approach to prosecuting environmental claims was too slow, and industry, which argued that they did not know how to be compliant with a case-by-case approach. The FTC held public hearings to address this in 1991, and released a set of guidelines in 1992.[11]

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[10] Schneider, Keith. 1991. “Can Shoppers Tell if Something Is Really Good for the Planet?” https://www.nytimes.com/1991/07/14/weekinreview/the-nation-can-shoppers-tell-if-something-is-really-good-for-the-planet.html *The New York Times.*

[11] Israel, Glenn. 1993. “Taming the Green Marketing Monster: National Standards for Environmental Marketing Claims” https://lira.bc.edu/work/ns/2129768c-9b8e-46e4-a27d-aef2bef55a57 *Boston College Law*

The founding of two private ecolabels

Because it is unusually difficult to evaluate and verify claims about a product's environmental impact, consumers had trouble making informed purchases and companies had trouble gaining consumer trust. Many developed nations addressed this by adopting government-backed environmental certification programs, but the US had no plans to implement such a program. Seeing an opportunity to fill a potentially valuable niche in the market, two private organizations in the US created their own environmental certification programs.

SCS

1. In 1984, the chemist Stanley Rhodes founded the company Scientific Certification Systems (SCS) which had a certification program related to pesticides.
2. In 1989, SCS launched the Green Cross Certification Program, a division of the company that was described as an employee-owned company that would not make profit. Green Cross certified individual environmental claims about a product. (figure 4)
3. By June 1990, Green Cross was working with four retailers, and was preparing to award its first recycling seal in July.

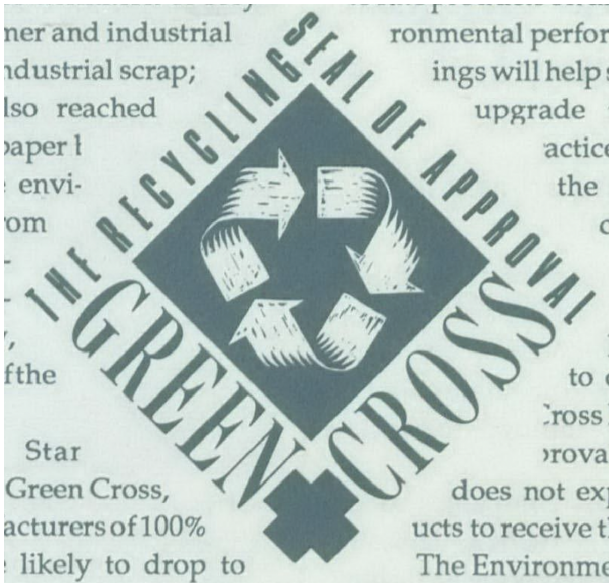

Figure 4: Black-and-white copy of SCS/Green Cross' logo for a "Recycling Seal of Approval" certification from 1990

Green Seal

1. Green Seal is a nonprofit founded by Rena Shulsky, who was the CEO of a realty company. Rena described herself as being a part of the "socially responsible" business movement. Sometime in or before 1988, Rena had an idea for something like the Good Housekeeping Seal of Approval but for environmental friendliness, and discussed this idea with other business leaders in the "socially responsible" movement.

2. Those conversations led to her being interviewed by Ad Age in 1988, which led to her being contacted by a PR firm that agreed to give her pro bono PR work.
3. Rena met computer scientist Alan Kay, who joined the board of Green Seal. They then recruited another business leader and a PBS producer. In 1989 or 1990, they hired activist and Earth Day organizer Denis Hayes.
4. They initially called themselves the "Alliance for Social Responsibility" but then changed to Green Seal in 1990.
5. In June 1990, 2 months after Earth Day, the PR firm put together a press conference to give Green Seal publicity, which led to some news coverage.[12] Much of the press that they received focused on the involvement of Denis Hayes, though it is unclear from my research if Denis was functionally very involved with the organization.
6. Green Seal predicted its standards would be ready in early 1991. They released their first "proposal" for a standard in the first half of 1991, but they didn't publish any finalized standards until early 1992, and didn't award a certificate to a product until early 1993.

Rivalry and public scrutiny

- **1990: The media framed the two organizations as rivals.**

  As early as Green Seal's press conference in 1990, the press was reporting on both Green Seal and SCS/Green Cross, usually framing them as rivals. There is some evidence that the organizations really did view each other as rivals, such as this April 1990 NYT article which quotes a vice president of SCS/Green Cross saying "All we've heard about [Green Seal] is a lot of P.R." and Green Seal's executive director saying "The fact that a number of supermarkets have banded together [to work with SCS/Green Cross] is a different program than a nationally based one like ours."

  According to this article, one of the directors of Green Seal said "We seem to be taking very different approaches, but I think there may be complementary roles for the two systems." He also said that SCS/Green Cross' "mechanical" standards fail to incentivize innovation in product design.

- **1990-1991: Public debate about LCA methodology**

  Between 1990 and 1991, a public debate formed about the use of Life-Cycle Assessment (LCA), a framework for evaluating environmental impacts that had not yet been developed into a standardized methodology. Marketers sometimes referenced LCA studies, and scientists said that the methods involved with these studies were underdeveloped and not objective. In 1990 the EPA began funding research into developing better methods for LCA.[13]

  When Green Seal launched in 1990, it said that it would use LCA when writing standards for product categories.[8] Later that year, as the public debate about LCA

[12] Shulsky David, Rena. "The Origins of Green Seal" https://web.archive.org/web/20150912094940/https://greenseal.org/Portals/0/Documents/A%20word%20from%20the%20founder.pdf *Green Seal*

[13] Meier, Barry. 1990. "Life-Cycle Studies: Imperfect Science" https://www.nytimes.com/1990/09/22/style/consumer-s-world-life-cycle-studies-imperfect-science.html *The New York Times*

emerged, they said that they hoped to skirt the LCA debate by first focusing on simpler product categories that were easier to evaluate. The organization's president said "Our attitude is that admittedly this approach is in its infancy and as part of our program we will assess not only products but also research methods as they develop."[13] By August 1991, the LA Times reported that Green Seal, along with other organizations such as the EPA, had "recently retreated from using the technique." Green Seal's CEO said that "there are huge disputes," such as two different LCA studies that came to opposite conclusions about disposable vs reusable diapers.[14]

A 1993 report from the EPA also names the high cost of conducting LCA studies as a likely reason that Green Seal distanced themselves from LCA. Green Seal ended up using a method called "Environmental Impact Evaluation" which was a shortened version of LCA and seems to be similar to what they still do today.

SCS/Green Cross did not distance itself from LCA as other organizations did, and actively criticized Green Seal for doing so. SCS/Green Cross maintained that LCA was the best system available to consider the full complexity of a product's environmental impacts, and the president of SCS/Green Cross said that their "big disappointment with Green Seal [was] that they backed out of the only methodology available." SCS/Green Cross held some kind of hearing in 1991 to respond to concerns about LCA.[14]

It's not clear to me how much of Green Seal's reported retreat from LCA or SCS/Green Cross' criticism of that retreat reflected actual disagreements about methodology versus PR considerations and the growing rivalry between the organizations.

- August 1991: both organizations announced partnerships with well-established product-testing labs on the same day, Green Seal partnering with Underwriter Laboratories and SCS/Green Cross with Good Housekeeping.[14] The fact that these partnerships formed might indicate that Green Seal and SCS/Green Cross were both been looking for strategic ways to gain more public credibility, or it may be that they simply needed the expertise of the labs. and the fact that the announcements happened on the same day might be evidence that they considered themselves to be in a race, or that they were coordinating behind the scenes.

- October 1991: The Environmental Defense Fund (EDF) published a report that was critical of SCS/Green Cross. I could not find this report, but it was reported on in the New York Times as well as an op-ed in an environmentalist magazine. According to these sources, the EDF report said that "Green Cross has issued certifications or engaged in practices that we believe are misleading to consumers." Some of the report's criticisms included a challenge of Green Cross' being described as a not-for-profit organization, and accusations that SCS/Green Cross was applying standards inconsistently, not allowing for sufficient public comment on its standards and evaluation process, and

[14] Parrish, Michael. 1991. "Greens' Product-Testing Feud Heats Up : Environment: Consumer-goods rating services, Green Cross and Green Seal, sign up with high-profile organizations for testing." https://www.latimes.com/archives/la-xpm-1991-08-08-fi-479-story.html *Los Angeles Times*

partnering with retailers that may pose conflicts of interest.

The president of SCS denied the accusations and accused the report of being designed to discredit Green Seal's competition. The executive director of EDF at the time did sit on the board of Green Seal, but EDF said that the director was not involved in making the report.

- In 1993, SCS consolidated all of its divisions, including Green Cross, under the name of the parent company, Scientific Certification Systems (SCS) (figure 5). They also applied to become a 501(c)(3) nonprofit this year, but they ever became one.

  An EPA report from 1993 says that both the consolidation, as well as the application to become a 501(c)(3), were "partly in response to criticism over possible conflicts of interest due to the for-profit nature of the parent corporation."[8]

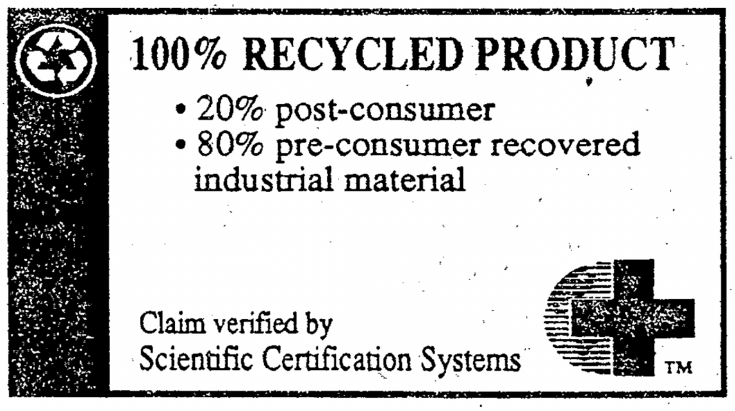

Figure 5: A photocopy of a recycling seal from SCS in 1993, after consolidating Green Cross with Scientific Certification Systems.

- Also in 1993, SCS started their "Environmental Report Card" program, a precursor to today's Environmental Product Declarations which awarded a more expensive label with a logarithmic bar graph of data about a product's environmental impacts (figure 6), based on an LCA. It was often compared to a nutrition label.

  This may have been a response to criticisms of the environmental claims certification for not giving consumers nuanced enough information about a product's environmental claims, and not incentivizing innovation. However, they may have moved too far in the other direction, because the report card received criticism for being too complex for consumers to read and understand.[8]

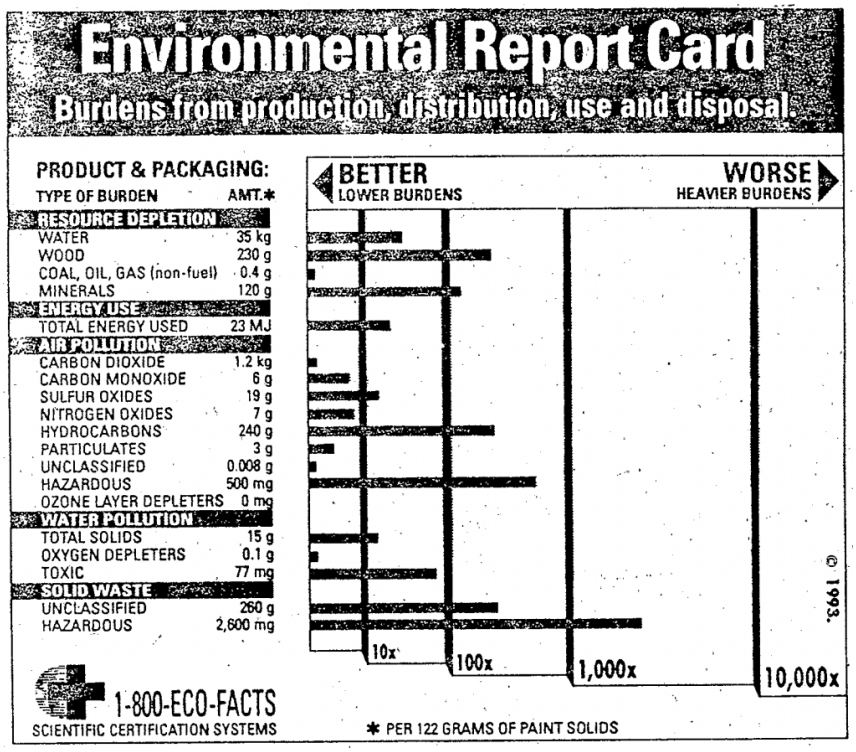

Figure 6: A photocopied example of SCS' Environmental Report Card label

Fighting against industry lobbying

There was some opposition to eco-labels from industry. For example, soon after Green Seal published its first standards in 1992, the national Soap and Detergent Association said the standards for household cleaners were "inconsistent and scientifically invalid."

Around 1996, P&G, along with the Grocery Manufacturers Association of America, created the Coalition for Truth in Environmental Marketing and Information, an industry group to lobby against environmental certification programs. The coalition was headed by a former EPA general counsel and grew to represent around 3000 companies that annually sold $900 billion of consumer goods. The coalition, which favored the FTC guidelines for environmental marketing and opposed eco-labels, lobbied the US and Canadian governments to challenge the use of eco-labels before the World Trade Organization and create trade rules about the use of eco-labels.

Although the coalition was primarily concerned about the new European eco-label and not smaller organizations such as Green Seal and SCS, Green Seal seems to have considered the Coalition to be a threat. In response to the lobbying efforts, Green Seal and a few other organizations started the Consumers Choice Council in 1997. The Council received $100,000 from the MacArthur Foundation that year to "educate consumers and policymakers about environmental and social product labels." According to the author of *Branded!*, the Coalition for Truth in Environmental Marketing and the Consumers Choice Council "dueled to a draw: neither Clinton's nor Bush's administration pursued the policies demanded by industry, and voluntary

systems of eco-labeling were accepted by the World Trade Organization, but with certain limitations."

Green Seal's former president reflected that Green Seal "had to spend a lot of resources and time in the 1990s fighting [the lobbying efforts of the Coalition for Truth in Environmental Marketing], which we did somewhat successfully. I think it damaged us, to some extent." [15] [16] [17] [18]

Pivoting to the institutional market

Despite polls from the late 80s and early 90s in which consumers said they would pay more for environmentally frindly products, both organizations struggled to gain traction in the consumer market during the 90s, due to issues like limited advertising budgets and fickle consumer behavior. Over the course of the 90s, both organizations pivoted to focus on the institutional market.

As early as 1991, SCS said that only 20% of their certified products were consumer goods. The Environmental Report Card program was too complicated for consumers and by 1998 had been rebranded as "Eco-Profile," with a seemingly stronger focus on institutional buyers. Eco-profile also used a methodology called life-cycle stressor-effects assessment that SCS claimed was a more rigorous and advanced form of LCA than the methodology used for the report card.[19]

In 1994, two years after Green Seal published its first standards, it had only certified products from 9 companies. In an interview, Green Seal's former president attributed their lack of success to fickle consumer behavior that did not match survey data. Another limiting factor was that Green Seal did not have a budget for advertising, and had to rely on free PSAs.[20]

In 1994, Green Seal started the "Environmental Partners Program" which worked with institutional buyers to make their institutional buying more environmentally friendly. To become an Environmental Partner, the institution had to pay a small fee and pledge to buy environmentally-friendly products. In return, the institution could use the Environmental Partner logo (figure 8), and was supplied with the *Choose Green Report*, a catalogue of products recommended (but not necessarily certified) by Green Seal.

Green Seal also got a few contracts in the late 90s and early 2000s to help develop Environmentally Preferable Purchasing (EPP) policies for federal agencies. According to the

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[15] Salzman, Jim. 1998. "Product and Raw Material Eco-Labeling: The Limits for a Transatlantic Approach" https://escholarship.org/content/qt3pz4721g/qt3pz4721g.pdf *UC Berkeley*

[16] Ritchie, Mark. 1997. "Purchasing Power: Consumer Choices and Environmental Protection" https://www.iatp.org/sites/default/files/Purchasing_Power_Consumer_Choices_and_Environm.htm

[17] Conroy, Michael. 2009. "Branded!" https://books.google.com/books?id=BdUg2bAObMcC&printsec=frontcover#v=onepage&q&f=false

[18] Makower, Joel. 2017. "Exit Interview: Arthur Weissman, Green Seal" https://www.greenbiz.com/article/exit-interview-arthur-weissman-green-seal *GreenBiz*

[19] Banerjee, Abhijit, et al. 2003. "Eco-labeling for energy efficiency and sustainability: a meta-evaluation of US programs" https://www.sciencedirect.com/science/article/abs/pii/S0301421502000125

[20] Harris, Jeffrey, et al. "Energy-Efficient Product Labeling: Market Impacts on Buyers and Sellers" https://www.aceee.org/files/proceedings/1996/data/papers/SS96_Panel9_Paper12.pdf *Lawrence Berkeley National Laboratory, Energy & Environment Division*

former president, this type of work “actually became the mainstay of the organization until certification took off in the first decade of the 2000s.” Green Seal did seem to have an increase in certifications in the 2000s, probably due to the rise of EPP policies, and then an even sharper increase in the 2010s, after the EPA’s EPP program issued its ecolabel recommendations for federal purchasing. (figure 7)

For more details about how Green Seal and SCS influenced the institutional market, see Impact on the institutional market.

Figure 7: Number of products certified by Green Seal over time.[19] [21] *Dashed line represents when the EPA issued recommendations for federal purchasing in 2016.*

What impact have these organizations had?

Only a small impact on the consumer market

Both Green Seal and SCS initially set out to influence the consumer market by awarding product labels that environmentally-concerned consumers could use to make purchasing decisions. However, neither organization has ever had much success in influencing the consumer market. Very few of the certified products currently listed on either organization’s directory appear to be consumer products. Arthur Weissman, Green Seal’s former president, said in a 2014 interview that “We have had a number of consumer-oriented product standards and a few service ones as well, right from the beginning, but they haven't had much impact on the market the way our institutional work has.”

[21] 2023. “Green Seal Impact Reports” https://greenseal.org/about/impact-report/ *Green Seal*

Although Green Seal and SCS failed to have much influence on the consumer market, they do both have a handful of certified consumer-oriented products in their directory, such as this Xbox controller certified by SCS and this 16 oz bottle of dish soap certified by Green Seal. Both organizations have also recently formed partnerships with online retailers, which might help with consumer uptake:

- Amazon's "Climate Pledge Friendly" program puts a label on the pages of products that have any certification from a list of 52 environmental ceritifcations. In 2021 Green Seal was added to this list, as well as the Carbon Neutral Certification from SCS. In May of 2023 the Recycled Content Certification for Electrical and Electronic Equipment" from SCS was also added to the program.
- Similarly, in 2021 the online retailer Wayfair launched a "Shop Sustainably" filter for products with certifications from a long list of environmental certifications, including Green Seal, the Indoor Air Quality Certification from SCS, and the Carbon Neutral Certification from SCS.

It's hard to know how beneficial it is for vendors to have the "Climate Pledge Friendly" badge on Amazon or the "Shop Sustainably" tag on Wayfair. In a 2022 interview, Amazon's Global Lead of Sustainable Shopping said that "since becoming certified in September 2020, Seventh Generation shared that its marketing for Climate Pledge Friendly-certified products delivered more than 60 percent higher click-through rates, more than 140 percent higher new-to-brand purchase rates, and a more than 40 percent reduction in cost-per-purchase for its products." However, it seems like these changes could have also been influenced by factors besides the badge. Also, both Amazon and Wayfair's programs include many certifications besides Green Seal and SCS.

Impact on the institutional market

Both Green Seal and SCS began pivoting to focus on institutional purchasers in the mid-90s, after initial difficulties with consumer uptake. Both organizations were much more successful with institutions, and today nearly all of the certified products in both organizations' directories seem to be products targeted at institutional buyers.

Institutional purchasers include private institutions, which are companies purchasing commercial products from other companies, and public institutions, which include schools and governments. It's hard to get a complete picture of how much public institutions vs private institutions are buying each organization's certified products, but Green Seal appears to be more focused on public institutions and SCS appears to be more focused on private institutions.

Plausible ways that Green Seal and SCS may have affected the institutional market include (a) leveraging their status as credible experts to persuade institutions to adopt purchasing policies that were more environmentally friendly, and (b) making it cheaper for institutions to adopt purchasing policies that were more environmentally friendly, by specializing in evaluating products.

Private institutions

In 1999, the EPA published a report about the growing trend of private companies adopting policies to buy environmentally friendly products. It named a few possible motivations for a company to make environmentally-friendly purchases:

- Responding to consumer interest in environmentally friendly products.
- Distinguishing the company from its competitors
- Pursuing cost-savings (sometimes sustainable products are more efficient in a way that saves money, such as LED lightbulbs).
- Joining an industry trend

The 1999 report also said "environmental purchasing is a new concept for many companies." This new industry trend may have been influenced by the environmental purchasing policies being adopted by public institutions (examined in the next section).

Green Seal's Environmental Partners program (figure 8) may have also contributed to the growth of the industry trend to buy environmentally friendly products. The 1999 report mentioned above highlights the fact that "more than 368,000 consumers refer to Green Seal's Choose Green Reports" as evidence that environmental purchasing was a rising trend in industry. However, the emphasis on Green Seal was likely influenced by the contributions of Mark Petruzzi, a representative of Green Seal who was acknowledged in the report, along with several representatives from industry. The Environmental Partners program seems to no longer exist, and Green Seal does not currently seem very focused on private institutions, which seems like evidence against Green Seal having a very large impact on the behavior of private institutions.

SCS seems to have much more impact than Green Seal with private institutions currently. Separate from SCS Global Services, SCS Consulting Services helps private institutions achieve sustainability goals.

Figure 8: A logo for Green Seal's Environmental Partners Program, as seen in a 1998 edition of their Choose Green Report.

Public institutions

Public institutions include school districts, public colleges, and federal, state, and local governments. These institutions often adopt "Environmentally Preferable Purchasing" (EPP) policies that make up much of the demand for products certified by SCS and particularly Green Seal.

The EPA began developing an EPP program for the federal government in 1993, initiated by an executive order from Bill Clinton. No such policy had previously existed, and the

federal government spent years conducting pilot programs to iteratively determine how to best implement it.

Several inputs shaped the program over time, including several executive orders and similar programs in other countries (in 1994 the EPA did a study about environmental purchasing programs in OECD member countries). It seems like Green Seal, and SCS to a lesser extent, have also had at least a small influence in the development and implementation of the federal government's EPP program throughout its history:

- Green Seal was one of 25 stakeholders that were consulted with when the EPA and GSA were developing the very first EPP pilot program, which focused on cleaning products and launched in February 1993, the same month that Green Seal first awarded its certification to any products.
- In 1995, the EPA published "Proposed Guidance on Acquisition of Environmentally Preferable Products and Services." Although the proposed guidance did not mention any eco-labels by name, it did acknowledge that such programs existed and that federal agencies could refer to them when necessary.
- In 1999, the EPA published "Final Guidance on Environmentally Preferable Purchasing," which went into more detail about the ways in which federal agencies could rely on third-party certifications for information. The guidance cautioned that agencies should not rely completely on third-party certifications for any purchasing decisions, and said that the EPA was "not currently able to offer an 'approved' list of non-governmental programs best suited to assist the agencies."
- In 1999, Aberdeen Proving Ground (APG), an installation of the Department of Defense, contracted Green Seal to help develop and implement a pilot program for paint. In his 2017 interview, Green Seal's former president Arthur Weissman said that APG came to know about Green Seal because of Green Seal's Environmental Partners program.
- In 1999, the EPA developed a pilot program for photocopier paper. When developing the criteria for the program, it reviewed Green Seal's standards, as well as similar programs in other countries.
- In 2016, the EPA issued Recommendations of Specifications, Standards, and Ecolabels for Federal Purchasing, which included some certifications from both Green Seal and SCS. The EPA continues to include these certifications in its list of recommendations.

In the time since the beginning of the EPA's EPP program, EPP policies have also become commonplace in state governments, local governments, and colleges. Green Seal is specified in over 100 federal, state and local purchasing policies. Most of the demand for products certified by Green Seal seems to come from EPP policies (figure 7).

In 2018, the EPA estimated that the time-saving value of federal agencies using its EPP program's recommended standards (as opposed to agencies implementing EPP without using the EPA's guidance) was between 3.7 and 16.2 million USD. This is a substantial sum, but it is fairly small compared to the 630 billion USD that the EPA says the federal government spends

on products and services each year. It's also unclear how much of these savings can be attributed to Green Seal or SCS versus other standards.

Impact on other eco-labeling programs

Today, there are hundreds of eco-labeling programs in the US. As the first of such programs, Green Seal and SCS had some direct influence over later ones:

- Both Green Seal and SCS were involved with the development of ISO 14000 standards in the 1990s, according to a 1998 EPA report.
- According to the same report, "Green Seal and the Canadian TerraChoice program were the first two ecolabeling programs that urged for the establishment of the Global Ecolabelling Network (GEN). In fact, Green Seal chaired GEN during the first three years GEN was established. Green Seal has encouraged information exchange and harmonizing with other programs through GEN." The report also said "The short-term objectives of GEN are to create an ongoing framework for information exchange, to ensure that the interests of environmental labeling programs are represented, and to provide a forum for regular member meetings. In addition, their long-term goals include moving toward harmonization and offering information to developing programs. To the extent that groups such as GEN are successful in reducing the barriers to entry, the number of labeling programs may continue to grow." Today, GEN consists of 29 ecolabelling organizations.
- The report also said that SCS was "working to harmonize with emerging Type III labeling initiatives being conducted outside of the US, believing in the importance of harmonizing with programs before they are developed. SCS has formed alliances with institutions in Chile, Finland, Sweden, Japan, and Korea to offer LCA and Certified EcoProfile services worldwide. SCS is also collaborating with two Nordic organizations, the Swedish Environmental Research Institute (IVL) and Soil and Water (the environmental division of Jaakko Pöyry, Finland), to write an LCSEA practitioners' manual for Type III labeling."[22] I can't find a copy of this manual, and it doesn't seem like the phrase "LCSEA" became popular, so it seems unlikely that this manual was very influential.

In addition to the above, Green Seal and SCS may have impacted later certification programs in other, less tangible ways. For example, founders of a new program would likely have looked at examples of existing programs.

Although Green Seal and SCS were the first environmental certification programs in the US, there were several other programs in other countries, and those programs probably shared some of the impact.

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[22] 1998. "Environmental Labeling Issues, Policies, and Practices Worldwide" https://19january2017snapshot.epa.gov/sites/production/files/2015-09/documents/wwlabel3.pdf *Environmental Protection Agency*