



# Fact Versus Conjecture in the History of Industrial Waste Utilization

Christine Meisner Rosen<sup>1</sup>

[LINK TO ABSTRACT](#)

Pierre Desrochers attacks my work on waste utilization in the nineteenth-century American slaughtering, meatpacking, and animal waste processing industries in his reply to the critique of his work that Frank Boons published in 2008 in the *Journal of Industrial Ecology*. Desrochers charges that, like his main target, Frank Boons, my research is deeply flawed because I do not agree with him that market forces compelled nineteenth- and early twentieth-century manufacturers to recycle, voluntarily, the vast majority of their wastes. I welcome the opportunity to respond to his criticism of my work and to discuss—with him, Boons, and the readers of this journal—the challenges of uncovering and analyzing the complexities of waste utilization by industry in the late nineteenth and early twentieth centuries.

Desrochers' criticism of my contribution to this discussion focuses on my article "The Role of Pollution Regulation and Litigation in the Development of the U.S. Meatpacking Industry, 1865-1880" (Rosen 2007). Boons uses my findings to bolster his argument that Desrochers over-estimates the importance of market forces in causing manufacturers to utilize their wastes, while under-estimating the role of the state. Boons' argument goes to the heart of what we both find problematic about Desrochers' work on this subject. So does Desrochers' response (2012).

---

1. Haas School of Business, University of California, Berkeley, CA 94720.

Desrochers begins his critique of my article with a non sequitur. He complains that my discussion of waste utilization in the meat, meatpacking, and animal waste processing industry is a “remarkable departure” from an article I published ten years earlier (Rosen 1997), in which, he claims, that I declared “that loop closing was almost nowhere to be observed in the industrial age” (Desrochers 2012, 91). Besides ignoring how an open-minded scholar’s thinking can evolve over time as she learns new things (usually considered a good thing), this is a misreading of what I said in that earlier piece. The article, “Industrial Ecology and the Greening of Business History” (Rosen 1997), was an agenda-setting think piece that I gave at a 1996 conference on “The Future of Business History.” The conference was convened to consider strategies for overcoming the limits of the firm-centric Chandlerian paradigm then dominant in the business history field. My purpose was not only to urge business historians to study the history of the harmful impacts of industrial development and society’s efforts to mitigate them, but also to exhort them to conduct research into the history of the many complicated ways in which business managers dealt with these impacts. I emphasized that such research tasks included uncovering and explaining the positive as well as the negative ways they managed their waste streams. Drawing on my research on the role of reform-minded business leaders in the history of pollution regulation movements (Rosen 1995) and related matters, I argued that business historians needed to recognize that “[b]usinessmen not only resisted reformers’ efforts to regulate pollution, ignored public complaints about pollution, covered up the toxic risks associated with chemicals used in their manufacturing processes, and fought law suits for as long as they could, but also experimented voluntarily with abatement technologies, *recycled wastes in many creative ways*, and spearheaded smoke control movements and other environmental reform movements.” I added that business historians “have an obligation to investigate the wide variety of often *conflicting* responses business managers made to the environmental problems their firms generated and to put these activities in the broader context both of the evolution of the firm and the evolution of the natural environment” (Rosen 1997, 131; italics added).

I said much the same thing in another agenda-setting article (Rosen and Sellers 1999), in which my co-author Christopher Sellers and I urged historians to (among other things) start studying how nineteenth- and early twentieth-century manufacturers abated their pollution as well as how they ignored it and/or resisted efforts to force them to abate it. As Sellers and I put it, business historians have an obligation to investigate the roles that business managers and institutions played in “directing the flow of energy, materials, and wastes, through all the stages of production and consumption in the earth’s industrial system,” including the ways in which they (as well as consumers) have “*shunt[ed] them back into the production and consumption loop by reprocessing and reusing them*” (590; italics added).

## HISTORY OF INDUSTRIAL WASTE UTILIZATION

In contrast to these pieces, the 2007 article that Desrochers targets for most of his criticism is a substantive historical study, based largely on original research. It grew out of the research I am conducting for the book I am writing on the history of the American struggle with industrial pollution between 1840 and 1900. It explains how pollution regulations enacted by urban sanitary reformers in New York City during the 1860s and Chicago during the 1870s served as an important driver behind the meatpacking industry's adoption of improvements in waste utilization and pollution abatement.

As the article makes clear, a wide range of trades made use of slaughterhouse waste long before the 1860s and 70s, including the rendering, soap, candle, glue, and bone boiling industries. What it also shows, however, is that despite their utilization of this waste, all of these industries discharged a great deal of additional, non-utilized waste into the environment. This waste was much feared at the time because it emitted extremely noxious stenches that were believed to contribute to the miasmas that were then assumed to play a role in the spread of yellow fever, cholera, and other epidemic diseases. This pollution resulted from the decay of organic material located not only inside the slaughterhouses, rendering establishments, and soap, glue and bone boiling factories of the day, but also in the gutters into which these businesses discharged a great deal of blood and other liquid and semi-liquid wastes. The noxious stenches of decay also emanated from the overflowing barrels of liquid, solid and semi-solid slaughterhouse waste sitting in the streets, often for many days at a time, awaiting collection and transport to the businesses that would process them into fat, soap, glue, and other useful products, as well as from the barrels of unusable waste placed in the street by slaughterhouses and renderers, glue manufacturers and other animal waste processors awaiting collection by the offal haulers charged with the responsibility of disposing them (Rosen 2007, 298-301, 314-317, 322-325).

The article examines the regulatory movements that sanitary and civic reformers mounted to protect the people of New York and Chicago from what they perceived to be a serious threat to public health. The reformers mobilized to obtain the power they needed to impose technology-based pollution abatement regulation on the slaughtering, packing, and animal waste processing industries. The article describes how this regulation stimulated the modernization of the meatpacking industry, including the promotion of more vertical integration and tighter geographical co-location of slaughtering and animal waste processing, the development of larger, more mechanized independent businesses that focused on processing animal wastes, the movement of many of these dirty businesses out of the older, most densely settled, central parts of New York City and Chicago to more distant locations, the development of new ways of utilizing waste more efficiently, and improvements in stench abatement technologies. The article also

provides an analysis of the role that the New Jersey Chancery court played in shutting down a large packing house that was causing exceptionally noxious pollution problems and discusses how this ruling led to the establishment of a much better designed packing plant in a different New Jersey town that processed waste materials in much cleaner ways (Rosen 2007, 301-330).

In dismissing the validity of my research, Desrochers denigrates the legitimacy of the documentary sources that I use to describe not only the wide array of stench problems the meat industry was generating and the failure of many butchers, packers, and animal waste processors to take steps to abate these problems by improving their waste utilization methods, but also the impact the regulations and the New Jersey court decisions had on waste utilization and stench abatement. Yet Desrochers provides no counter-evidence to disprove any of my findings. He simply asserts that they are “incompatible with much available evidence” and “highly unlikely, based both on theory and evidence” (Desrochers 2012, 92). To bolster this claim, he points to a couple of additional examples of early waste reuse in the meat industry (92). None of these examples, however, impeach the credibility of my findings about the pollution problems associated with slaughtering and animal waste processing and the role that regulation played in forcing the industry to improve the extent and methods by which it utilized the wastes that were responsible for its stench. His cases are simply additional, early examples of waste reuse in the meat industry.

The “theory” on which he bases his claim that my findings are “unlikely” is also flawed. Desrochers assumes that in the supposedly *laissez faire*, regulation-free markets of nineteenth- and early twentieth-century Britain and the U.S., economic self-interest would compel profit-maximizing manufacturers to search for ways to derive economic gain from their wastes and that “over time, wasteful firms would be driven out of business or forced to adapt by their more innovative competitors who created wealth out of industrial waste” (Desrochers 2002, 1047). Ergo, waste utilization, already common in the 1860s and 70s according to his sources, must naturally have become very widespread “in virtually all industries” (Desrochers 2009, 5).

Leaving aside the question of whether pollution regulation was actually as non-existent in this period as Desrochers assumes (a point my article challenges), the problem is that his simple, cost-benefit, logic-of-the-free-market model fails to take into account the high costs of developing, procuring, and installing technologies for separating the materials in factory waste streams and processing them to get them into forms where they could be used as feedstocks for new manufacturing processes. His free-market logic also fails to take into account the low, sometimes practically non-existent, cost of discharging industrial waste into the air and water and depositing it on land in the 1800s and early 1900s. Waste

utilization was far from an inevitably profitable free lunch. While rational cost-benefit analysis clearly led some manufacturers to engage in some kinds waste utilization, in other cases it led rational, profit-maximizing manufacturers to choose the opposite course: waste discharge and pollution, even when technologies for utilizing waste were available, which they often were not. The evidence of this is in the industrial waste that polluted rivers and streams and the factory smoke and toxic fumes that polluted the air (Kirkwood 1876; Barber 1884; Whipple 1908, 153-169; Colten 1985; Hurley 1994; Travis 2002; Stradling 1999; Thorsheim 2006; Maysilles 2011; Tarr 2002).

The fact that industrial air and water pollution emissions are what economists call externalities further undermines Desrochers' contention that the free markets of nineteenth- and early twentieth-century Britain and the U.S. produced extensive, welfare-maximizing amounts of industrial waste utilization. As economists well understand, externalities are market imperfections that prevent prices from capturing accurate information about the cost of production by distributing costs away from the parties to a market exchange (in this case, manufacturers considering the purchase of equipment to separate and convert wastes to useful products) to bystanders, in this case the people, wildlife, and the natural world harmed by exposure their waste discharges. By distorting prices, externalities screw up allocative efficiency, preventing the market's so-called "invisible hand" from producing optimal, welfare maximizing outcomes (Pindyck and Rubinfeld 1989, 617-646).

Desrochers' tendency to let conjecture get in the way of the facts is also evident in the other fault he finds with my article. Complaining that I do not understand the true nature of electoral politics in mid nineteenth-century cities, he argues that the regulations could not have had the impact I argued they did, because, he asserts, the meat packers and other businessmen affected by the pollution regulations I described would have wanted "to avoid coming under the direct control of political figures such as 'Boss Tweed.'" In an attempt to further trivialize the regulations' impact, Desrochers also suggests that "even if saint-like reformers spearheaded public health initiatives, the powers of health officials might have been appropriated in time by individuals of lesser purity who might have then used various means to extract bribes, such as controlling both the access and the size of operations in state-run abattoirs." (Desrochers 2012, 93)

In addition to being pure speculation on Desrochers' part, these contentions are factually wrong. As the article makes clear, the reformers wielded their regulatory power as successfully as they did in large part because they succeeded in embedding the regulations in policies that reduced their cities' political machines' corrupt and incompetent control over public health administration. The New York Metropolitan Board of Health was a state agency created by the New York State

legislature at the behest of the reformers (after years of lobbying) who were as anti-machine as they were pro-sanitary reform. The legislature endowed the new Board with path-breaking independence from Tammany Hall as well as with important new regulatory powers to help them to fight the epidemic diseases ravaging the city. The Governor appointed leading sanitary reformers to leadership positions on the Board, and they in turn appointed a professional staff of physicians to carry out their sanitary regulations. The institution of the Chicago regulations followed years of struggle that led to the enactment of a new municipal charter and other good-government reforms (Rosen 2007).

Equally important, the regulations enacted in New York City and Chicago discussed in this article did not produce even one “state-run” abattoir. Instead, they stimulated the construction of more, large, privately owned pork- and beef-packing plants. To abate stench, these privately owned packing plants not only were generally fitted out with more and better waste processing and stench abatement equipment than the ones they replaced, but also were more vertically integrated, bringing more kinds of animal waste process into close proximity and tighter coordination with the slaughtering of animals to reduce the opportunity for slaughterhouse waste to decay and stink while awaiting processing into useful products. American sanitarians often called the best-designed and equipped of these businesses “abattoirs,” in homage to the large, compulsory, government-operated slaughterhouses instituted in France by sanitary reformers there. They did so, however, to distinguish them from more conventional packing plants, not because they were compulsory or government-owned or -operated. The sanitary abattoir constructed in Harsimus, New Jersey, was also privately owned and operated, as the article plainly states, by a subsidiary of the Pennsylvania Railroad Company (Rosen 2007).

In short, Desrochers’ criticism of this article is characterized by some of the very problems that Boons called out in his critique of Desrochers’ work in his JIE piece (Boons 2008). Desrochers either dismisses the legitimacy of the parts of the historical record that do not fit his preconceptions—doing so on the bases of plausible-sounding but historically incorrect conjecture or ill-conceived reasoning supposedly based in economic theory—or he ignores those parts of the historical record altogether. Let me be clear: Like Boons, I believe Desrochers has made a significant contribution by bringing to light a number of important historical documents that draw attention to the existence of techniques that businesses in a range of industries developed to utilize their wastes long before modern industrial ecologists began discussing the importance of moving our modern industrial system toward more environmentally sustainable, closed-loop production. To my knowledge, he was the first scholar to publish a peer reviewed article on the history of a topic that is not only very central to the field of industrial ecology, but also

interesting to business and environmental historians (Desrochers 2000).<sup>2</sup> The problem with his work as a whole is that he has over-generalized from these sources, extrapolating conclusions about the extent and causation of industrial waste use that are overly simplistic—and that, as his critique of my work indicates, he tends to ignore or dismiss evidence that conflicts, rather than figuring out how to integrate it into his own thinking so as to deepen his analysis.

As Boons pointed out in his JIE article, several of Desrochers' own sources recognized that waste re-use was far from universal in Great Britain, despite its free market. This includes Simmonds, the title of whose 1862 book, "Waste Products and Undeveloped Substances; or *Hints for Enterprise in Neglected Fields*" (Boons' emphasis) is a clear sign that Simmonds was concerned about this failing, as well as Talbot (1919) who discussed British reluctance to profit from the exploitation of waste in the chemical and slaughterhouse industries. It also includes Kershaw (1928) who discussed how waste utilization boomed in Britain during World War I only to fall off drastically after the war ended (Boons 2008, 149-152). Desrochers tries to diminish the significance of Boons' analysis of Talbot's writings by discussing the most appropriate way to interpret Talbot's treatment of German waste utilization during World War I, concluding that Talbot's discussion of the role of the state reflected the "increasingly dominant mistaken perspectives of his time and cannot be used as evidence that governmental planning is a more desirable way to coordinate inter-firm recovery linkages" (Desrochers 2012, 91). However, he fails to respond to the substance of Boons' criticism: that Talbot expressed concern about the failure of many British manufacturers to maximize profit by installing the state-of-the-art waste recovery technologies in use elsewhere. And he does not even attempt to respond to Boons' observations regarding Simmons and Kershaw.

Like Talbot and Kershaw, American commentators in this period often expressed concern about American manufacturers' lack of interest in exploiting what Francis Hall called the "MONEY IN THE JUNK PILE" (Hall 1919, 327; capitalization in original). C. B. Auel, for example, started a 1917 article on the subject in *Industrial Management* by observing: "It is a fact that in manufacturing industries, more especially among the smaller ones, considerable quantities of materials of one kind and another find their premature way to the scrap pile" (Auel 1917, 75). In a 1919 article in the same journal, H. E. Howe suggested some of the reasons companies were not utilizing these wastes. These included "industries so prosperous, so well established that they can ignore wastes," businesses that refused to "employ competent chemists and engineers to show the way," as well as managers

---

2. Indeed, I would have cited this piece in my early agenda-setting articles had I been aware of it, but it was not published till long after they were written.

who “look upon waste utilization as a new field so far from their experience that they dare not enter.” Significantly, from the viewpoint of Desrochers’ insistence on the role of the market’s invisible hand, Howe included economic factors in his list of barriers: “Many wastes do not occur in sufficient quantity at any one spot to make their use possible, or the cost of collection and storage defeats the project” (Howe 1919, 93). In his 1919 article in *Chemical and Metallurgical Engineering*, Hall suggested yet another reason manufacturers did not reuse their wastes, also economic in nature: “At all times, in America particular, the general slogan has been ‘production,’ ‘get out the product.’ With works’ executives, superintendents, foremen and leaders all constantly absorbed in getting greater production, it is not strange that the humble but highly profitable task of utilizing any accruing wastes to the same degree of efficiency should be neglected” (Hall 1919, 326).

In conclusion, I want to emphasize the complexity of this issue. As the evidence Boons and I have uncovered suggest, historians still have a great deal to learn about the history of industrial waste reuse. To do justice to this important subject, we will need to investigate the barriers that discouraged manufacturers from using their wastes, as well as the full range of drivers stimulating and encouraging them to do so, including regulatory and other public policies, as well as economic self-interest. As Hall’s and Howe’s comments regarding the barriers indicate, the cultural and personal beliefs of managers also influenced management decisions regarding waste utilization. Historians need to examine their impacts as well. We should investigate the interactions and tensions between these factors, rather than getting hung up arguing which were more important. They were all important. And perhaps most important, as Sellers and I pointed out over ten years ago, we need to “be sensitive to the fact that individual managers at different companies typically exhibited a range of attitudes toward environmental issues. Management attitudes and practices also varied across different industries. We need to try to understand the reasons for these differences as well analyze their consequences—for the development of business, as well as the evolution of the natural world” (Rosen and Sellers 1999, 593).

## References

- Auel, C. B.** 1917. Utilization of Factory Waste. *Industrial Management* 54(1) (Oct): 75-79.
- Barber, Dana C.** 1884. Report of a Sanitary Survey of the Schuylkill Valley. *Annual Report of the Chief Engineer of the Water Department of the City of Philadelphia*: 247-314.

- Boons, Frank.** 2008. History's Lessons: A Critical Assessment of the Desrochers Papers. *Journal of Industrial Ecology* 12(2): 148-158. [Link](#)
- Colten, Craig E.** 1985. *Industrial Wastes in the Calumet Area, 1869-1970*. Waste Management and Research Center, Illinois Department of Natural Resources. Champaign, IL: WMRC.
- Desrochers, Pierre.** 2000. Market Processes and the Closing of "Industrial Loops." *Journal of Industrial Ecology* 4(1): 29-43.
- Desrochers, Pierre.** 2002. Industrial Ecology and the Rediscovery of Inter-firm Recycling Linkages: Historical Evidence and Policy Implications. *Industrial and Corporate Change* 11(5): 1031-1057.
- Desrochers, Pierre.** 2009. Does the Invisible Hand Have a Green Thumb? Incentives, Linkages, and the Creation of Wealth Out of Industrial Waste in Victorian England. *Geographical Journal* 175(1): 3-16.
- Desrochers, Pierre.** 2012. Freedom Versus Coercion in Industrial Ecology: A Reply to Boons. *Econ Journal Watch* 9(2): 78-99. [Link](#)
- Hall, Francis.** 1919. Reclaiming Steel Works and Industrial Wastes. *Chemical and Metallurgical Engineering* 20(7): 326-327.
- Howe, H. E.** 1919. Possibilities in Saving and Utilizing Industrial Waste. *Industrial Management* 57 (Feb.): 225-229.
- Hurley, Andrew.** 1994. Creating Ecological Wastelands: Oil Pollution in New York City, 1870-1900. *Journal of Urban History* 20 (May): 340-364.
- Kershaw, J. B.** 1928. *The Recovery and Use of Industrial and Other Waste*. London: Ernest Benn.
- Kirkwood, James P.** 1876. Special Report on the Pollution of Rivers. In *Seventh Annual Report*, Massachusetts State Board of Health. Boston: Wright and Potter, 23-174.
- Maysilles, Duncan.** 2011. *Ducktown Smoke: The Fight over One of the South's Greatest Environmental Disasters*. Chapel Hill: University of North Carolina Press.
- Pindyck, Robert S. and Daniel L. Rubinfeld.** 1989. *Microeconomics*. New York: Macmillan Publishing Company.
- Rosen, Christine Meisner.** 1995. Businessmen Against Pollution in Late Nineteenth Century Chicago. *Business History Review* 69 (Autumn): 351-397.
- Rosen, Christine Meisner.** 1997. Industrial Ecology and the Greening of Business History. *Business and Economic History* 26(1): 123-137.
- Rosen, Christine Meisner.** 2007. The Role of Pollution Regulation and Litigation in the Development of the U.S. Meatpacking Industry, 1865-1880. *Enterprise and Society: The International Journal of Business History* 8(2): 297-347.
- Rosen, Christine Meisner and Christopher Sellers.** 1999. The Nature of the Firm: Towards an Ecocultural History of Business. *Business History Review* 73 (Winter): 577-600.

- Simmonds, P. L.** 1862. *Waste Products and Undeveloped Substances; or, Hints for Enterprise in Neglected Fields*. London: Robert Hartwicke.
- Stradling, David.** 1999. *Smokestacks and Progressives: Environmentalists, Engineers, and Air Quality in America, 1881-1951*. Baltimore and London: The Johns Hopkins University Press.
- Talbot, F. A.** 1919. *Millions from Waste*. London: Fisher Unwin.
- Tarr, Joel A.** 2002. Industrial Waste Disposal in the United States as a Historical Problem. *Ambix* 49(1): 4-20.
- Thorsheim, Peter.** 2006. *Inventing Pollution: Coal, Smoke, and Culture in Britain Since 1800*. Athens, Ohio: Ohio University Press.
- Travis, Anthony S.** 2002. Contaminated Earth and Water: A Legacy of the Synthetic Dyestuffs Industry. *Ambix* 49(1): 21-50.
- Whipple, George C.** 1908. Gas Wastes. In *Report of the State Sewerage Commission to the Legislature of 1908*, New Jersey State Sewerage Commission. Somerville, N. J.: Unionist-Gazette Association.

## About the Author



**Christine Meisner Rosen** is an Associate Professor at the Haas School of Business at the University of California, Berkeley and Associate Director for Business and Economy at the Berkeley Center for Green Chemistry. Her research focuses on the history of American beliefs about pollution, pollution regulation movements, and pollution abatement in the nineteenth century. She is hard at work finishing a book on these topics. Her email is [crosen@haas.berkeley.edu](mailto:crosen@haas.berkeley.edu).

[Go to Archive of Comments section](#)  
[Go to May 2012 issue](#)



Discuss this article at Journaltalk:  
<http://journaltalk.net/articles/5759>