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Introduction by Christopher F. Jones, Arizona State University

It is a story familiar in environmental history. Polluting industries. Dirty smoke. Unhappy citizens. Petitions for change. Limited results. But look closer, and you realize that William Cavert’s account is far less expected. For this history is not set in the midst of the heavy industrialization of the 19th and 20th centuries; it is a history beginning hundreds of years earlier. The Smoke of London transports us to Britain’s primary metropole from the late 1500s to the 1700s, when smoke from homes, breweries, and other industries began to draw the ire of prominent residents. Fossil fuel pollution, he demonstrates, long predates the contemporary age.

In doing so, Cavert offers a work that deserves attention from environmental historians regardless of the times and places they study. As the book and the roundtable participants argue, the field of environmental history has been biased toward the last two centuries, with questions of industrial pollution and the preservation of wilderness drawing disproportionate attention. Yet even if the environment was not a category of analysis used in the early modern period and the scale of environmental change before the industrial revolution was smaller, this does not mean there are not important stories to tell of the relationships between human societies and the worlds they live in. Engaging with such narratives can only make our field richer, and Cavert offers a compelling example of how to do so.

Mining a wide range of archival sources, he documents opposition to coal smoke in London and the social, legal, and cultural responses to this growing problem. Though Londoners never fully tamed the noxious fumes released by burning coal in homes and businesses, they did file lawsuits, adjudicate cases, debate health effects, and remake urban living patterns as a result.

At the same time, it would be unfair to pigeonhole The Smoke of London as solely a work of environmental history. In addition to deep archival evidence and compelling writing, the book integrates several historical subfields, including urban, economic, political, and legal history. Cavert’s success in accomplishing these goals is illustrated in the wide range of awards the book has won: the 2017 Turku Prize from the European Society for Environmental History and the Rachel Carson Center is the one most readers of this series likely know. But his colleagues in British history have also recognized its merits, awarding him the 2017 Whitfield Prize from the Royal Historical Society and the 2017 John Ben Snow Prize from the North American Conference on British Studies.

Befitting the strength of the book, this roundtable has a comparably accomplished set of commentators. Paul Warde opens the roundtable, praising Cavert for pushing the field of environmental history beyond questions of industrial modernity and wilderness and into the concerns of other periods, while asking more about his approach to coal and his ideas on periodization. Leona Skelton reiterates the value of connecting environmental history to the early modern period and the potential to
rethink standard chronologies; in addition, she queries how we might better understand how actors thought about the relationships between the human and natural worlds at this time. In his remarks, Peter Thorsheim wonders about whether an environmental framing of the narrative detracts from its many contributions to political, urban, and economic history and encourages more attention to comparative analysis. Cavert concludes the roundtable with a generous author response, aimed at thinking through the challenges and opportunities of studying the environment in the early modern period.

Before turning to the first set of comments, I would like to pause here and thank all the roundtable participants for taking part. And for our readers, please remember that as an open-access forum, H-Environment Roundtable Reviews is available to scholars and non-scholars alike, around the world, free of charge. Please circulate.


Comments by Paul Warde, University of Cambridge

William Cavert’s *The smoke of London* transports familiar themes—not just pollution, but London’s smoke itself as a familiar cultural trope—into what for most environmental historians is unfamiliar territory: early modern history. In this he faces a double challenge. First, in addressing historians who habitually frame narratives about environmental change in relation to industrial modernity. Second, in speaking to early modernists, who have had little environmental history to go on at all, and where that which exists is often framed in terms of the history of medicine. In performing both these tasks he gives us pause to reflect on what might be meant by that notion of ‘modernity.’

A clear target for Cavert is thus that environmental history should be primarily a set of narratives about, and responses to, ‘modern industrial capitalism’ (usually portrayed as villain) (p. 6). Neither does his work fit with an established preoccupation with ‘wilderness’, or indeed the largely agrarian interest of much of early modern economic and environmental history where issues such as forestry and drainage have been prominent (p. 10). Cavert is himself part of a generation of scholars that is making the dominance of such themes look dated, and even in the time since the publication of the *Smoke of London* these battles appear less salient as the field widens. European medievalists and early modernists, who have engaged with some of the themes of the book without knowledge of environmental history at all, may see this historiographical segue is of rather less importance (and looking rather American in its concerns). This reflects, however, a virtue of environmental history; it has not yet as a field become narrowed down into regional literatures. As such, this book usefully speaks to many audiences.

Early modern London was not an industrial society in the sense familiar today, with factories, steam engines running belted machines, railways and the onward march of per capita income (or ‘modern growth’) juxtaposed with the resultant casualties and damages. Early modern England was, however, markedly industrial in a ‘pre-industrial’ context, in the sense that manufacturing employment was very widespread, and commerce and the market as a form of organisation were unquestionably coming to dominance. Manufacturing was not however very energy intensive. But London was a coal-fired city; it was at least as large as any other in Europe by the second half of the seventeenth century, and its growth at this time was unparalleled. Smoke characterised the city for residents and visitors alike; also the coughs and catarrhs that came with it. Cavert declares that, ‘The process by which smoky air came to be a fundamental part of the image and experience of London life is the subject of this book’ (p. xvi).

In fact, the book’s real strength seems to me to lie in its multifaceted understanding of the politics of coal, and the wealth of sources brought to that theme. There is less novelty in the examination of coal as a source of economic ‘goods’ and ‘bads’, or precisely how it became so prevalent. Cavert provides a well-executed summary
account of London’s shift towards coal use and away from firewood, especially between around 1570 and 1650, a story previously told by John Nef and John Hatcher, among others. The micro-economics of fuel choice and the development of the infrastructure of supply remains something of a black box, as it is across early modern England at this time; I don’t doubt that if it was easy to trace in London’s sources, Cavert would have been on to it. Tantalisingly a paper on the politics of fuel prices is promised in the footnotes, and one wonders why this crucial but methodologically tricky subject is not addressed head-on here. Cavert has published very useful estimates of major industrial consumption elsewhere.\(^1\) His aim is to treat coal less as ‘an economic factor of production’ as a ‘thing… essential to the emergence of as certain kind of society’ (p.31). I am not quite sure what this distinction is, and would welcome some elaboration. Certainly, treating something as a factor of production is a certain kind of discourse. But what does it mean to examine something as a ‘thing’? In understanding why coal became so pervasive in every sense, the value of the services it provided, and the costs both required and saved (in terms of furnishing hearths or furnaces, in household labour and transport, and so on) are surely essential to understanding. A chapter on the transition to coal is followed by consideration of the scale and intensity of pollution, inevitably difficult to measure even in later ages of monitoring stations and agreed technical standards. London was not yet in the age of ‘smogs’, and it still remains difficult to quantify the benefits and costs of the fuel for the city.

The book really comes into its own as it moves to the problematisation and politicisation of smoke in the seventeenth century; how ‘smoke’ as an issue became fixed on particular emitter and sufferers – the bodily experience of royalty, so important to the politics of the realm and capital; St. Paul’s cathedral; and the boilers of London’s brewers. Cavert presents an exemplary case of the centrality of personal and discretionary power in early modern governance, as fleeting moments of royal attention to perceived problems brought courtiers and councillors running, and hard on their heels with the prospects of grants of patents and monopolies for new technologies, a queue of chancers with solutions. The politics of smoke certainly has to be interpreted in the context of a world of gung-ho profiteers and aspirations for improvement, rather than as ‘environmentalism’ \textit{avant le mot}. What seems most striking however about Charles I’s interest in smoke and attempts at regulation of brewers is its abject failure and weak legal basis. The common law set strong limits to state authority and possibilities for action even for the most absolutist of English monarchs (an issue that plays an important role in another early modern environmental history, Eric Ash’s \textit{Draining of the Fens}\(^2\)).

However, Cavert also demonstrates importantly that concerns about ‘pollution’ were not just matters of royal decorum, but neighbourliness and nuisance,

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arbitrated in the common law tradition through local institutions. In fact, smoke disputes were quite rare; as in later centuries, Londoners seem to have been remarkably accepting of their peers’ fuel choices and the consequences, which perhaps were not much different from their own. Nevertheless, Cavert shows how a very wide range of arbiters and institutions did bring smoke nuisance within their remit. As he rightly argues, early modern societies were highly attuned to what we might call environmental disturbance. He also demonstrates in discussion of scientific understanding that potential danger from smoke was widely recognised, although perhaps not generating so much literature that we could characterise it as a ‘debate’. Nevertheless, the means to assess the true magnitude of the risk beyond hypothesis was little developed; there was neither data not the institutional means to make it actionable. This was not a society that had a metric of ‘risk’ beyond offence to the person and their property.

Within these discussions there are very significant snippets of information. Inhabitants of the parish of St. Dunstan’s West were presented for burning coal without chimneys, causing nuisance, but economic history literature, on the basis of very little evidence, has claimed that the transition to coal burning was impossible without the great reconstruction of English housing with chimneys. This claim was always suspect to this reviewer, and is evidently untrue. It indicates again how little the switch to coal burning by a majority of the populace has actually been researched.

Cavert’s work on nuisance cases also illustrates the importance of the ordinary populace. Much twenty-first literature on fossil fuels, historical or contemporary, draws an association between fossil fuels and capitalism. Undoubtedly capitalist enterprises had an incentive both to profit from supply (coal would hardly have been supplied were this not the case, and this is true of any other urban fuel), and to minimise their total factor costs in organising production. But most early modern demand came from ordinary households seeking cheaper ways to keep warm, heat water, and cook. Andreas Malm has presented the adoption of steam engines fired by coal in the British cotton industry as paradigmatic of the onset of the age of ‘fossil capital’3. Yet fuel for the cotton mills never accounted for more than 5% of British coal consumption, and the industry arose when over 90% of British energy consumption was already accounted for by coal. Thus any explanation of the emergence of widespread fossil fuel use in early modern Britain (where London itself was only one example among many regions adopting the fuel) must rest squarely on the opportunity costs of using alternative fuels among domestic households. Without doubt, the adoption of steam power was world-changing in developing the capacity for industrialisation. But the development of the engine itself from around 1700 was a response to the capital costs of mining, and partly the demand for coal from fields in wide swathes of Midland and northern England. The choices made within the cotton industry were an epiphenomenon within an

epiphenomenon, and did not fundamentally steer the direction of the energy economy.

This primacy of domestic demand meant that the governance of coal supply was perceived as an issue of satiating the interests and needs of the mass of the population, and less as a matter of economic capacity than as the maintenance of social stability—in fact akin with concerns about wood supply elsewhere, and grain. In truth, as Cavert makes clear, there was very little evidence of actual instability—there was never a fuel riot in London, unlike the numerous occasions when people ‘transgressed’ to maintain common rights to wood. Again, the detailed analysis of the eighteenth-century politics of fuel is exemplary. Debates about the importance of coal to national wealth, which led to the idea being treated as self-evident by Adam Smith, were spurred above all by fiscal issues. It was the taxation of this easily monitored (in the case of London, not elsewhere in Britain) commodity, itself a product of the east coast trade driven by demand in the rapidly expanding city, that led to the emergence of claims about the necessity of the cheapness of coal and its importance to the economy. The argument for the importance of coal to Britain’s long-run development might seem self-evident in retrospect (although some economic historians remain determined to deny it); but again, Cavert shows how the politics of fuel coalesced around the particular set of political expectations and institutions of the day; they are not a simple outgrowth of the importance of the fuel itself.

In the debates and struggles over tax and order, the government was happy to set aside property rights when it came to securing ‘infrastructure’ and fuel supply. As ever, government did not clearly align itself with or against capital, but was constantly choosing to promote or restrain the behaviour of particular capitalists; landowners who did not want minerals moved over their property, shippers who sought combinations to raise prices and reduce the volatility of a commodity prone to glut.

Cavert argues that the intensifying smokiness of London led to the withdrawal of the rich from smoke rather than reform. Reformers were surely few—although physical withdrawal characterised many a European monarch’s reaction to their capital city in the late seventeenth and eighteenth centuries, irrespective of the state of the air. Can the specificities of London be contrasted with a more general cultural move across Europe at this time? Such withdrawals were also more generally mixed with classical narratives of retreat from the tumult of city life in literary representations. Taking a turn in the nearby countryside was well-established by the eighteenth century, but was ‘taking the air’ an escape from smoke, or a quest of quietude and greenery? If this can’t be answered definitely yet, is there any way to really test the hypothesis? Cavert makes a plausible case for ranking smoke high in these concerns, but the question can perhaps only be decided by a more extensive and onerous work of comparison, to see if London really was distinct from other great cities. Indeed, by mid-eighteenth century the problems of the air had become focused on those who had breathing difficulties, and there seems little doubt many did try and
evade London’s smoke, if they were rich enough. In this, Cavert explodes the notion that smoke was only widely seen as a problem in the nineteenth century, and demonstrates that it must be considered in the light of the vulnerabilities of particular groups. Equally, the image of London as the busy and cosmopolitan hive, simultaneously smoky and smelly, in contrast to the inactivity and languor of the country, may have had the effect of normalising smoke in discourse—even making it as attractive as the other virtues of the city. However if everyday behaviour as a guide to value (‘the market decides’), then the housing market also indicates that relatively clear air in the West End of the city was more desirable. Again, given Cavert’s deep knowledge of the sources and topics, it would be useful to hear his views on being able to trace behavioural patterns more clearly as an indicator of attitudes. As the city grew clean air was a moving target but so were industries—brick-making for example, was not ‘urban’ but an industry of the periphery, tracing the very movement of the periphery as it constructed it. Cavert’s perceptive observations in this regard are an invitation to more research in locating and mapping sources of pollution, now that the technology to do so is readily available.

*The Smoke of London* makes a case for doing early modern environmental history; but it also argues there is no clear break between early modern London and that of the Regency and Victorian ages. In this, it joins criticism of a sharp break into modernity and environmental consciousness delivered by historians of Paris such as Thomas Le Roux and Jean-Baptiste Fressoz. Is there any kind of periodisation that might work better? It’s a great burden to lay on a book that it should reshape historiography generally. That many questions remain suggests however that some realignment of perspectives is underway. Never has the smoke of early modern London received such sustained attention, and like all good books, this should draw a host of further studies, some undoubtedly critical, in its wake—that’s a mark of progress. And any reader must also applaud the superb amount of archival work that underpins the study, bringing a depth of understanding to episodes previously understood only superficially. It will be a landmark, shining like the dome of Wren’s cathedral above a city where so much still lies unrevealed.
The popular phrase ‘that’s like carrying coals to Newcastle’, synonymous with ‘selling snow to Eskimos’, continues to remind us of the enormous historical importance of north-east England’s River Tyne as a conduit for the exportation of coal. From the late-medieval period, and taking off increasingly from the late-sixteenth century, the Tyne functioned as a nationally strategic port exporting among other goods very substantial volumes of coal down the east coast to London, around the Baltic Sea and elsewhere on a flotilla of collier sailing ships. By the early seventeenth century, so much of London’s coal was brought down the east coast by collier sailing ships that the fuel was known locally by Londoners as ‘sea coal’. By 1700, almost half of England’s coal came from Northumberland and Durham. In a mere three months of 1699, for example, an incredible 250 ships carried coal away from the Northumberland Durham coalfields, largely into the River Thames to be burned in London’s hearths and furnaces. At this time, carrying coal over land doubled the commodity’s price for every two miles travelled, which meant that shipping was the easiest, cheapest and ultimately the most popular method of transport and navigable rivers functioned as economically valuable liquid highways. In this context, it is unsurprising that in 1651, John Cleveland proudly emphasised the large scale and consequently national importance of Newcastle’s coal exports by comparing it to Peru: ‘England’s a perfect world! Has Indies too!/Correct your maps: Newcastle is Peru’. I have spent a decade studying the environmental history of coal exportation from north-east England and tracking its transportation down the eastern seaboard, and I’m delighted William Cavert was there to meet my coal colliers on the Thames, and to explain eloquently in his *The Smoke of London* the impact of burning Northumbrian and Durham coal in London. And what an important, insightful and influential book it is!

Environmental history has been largely (and mistakenly) pre-occupied with industrial and post-industrial case studies, primarily as a result of the larger scale of environmental damage and overuse of natural resources after 1800, and even more so after 1880. Consequently, the relationships between pre-modern societies and their environments have been, until relatively recently, misunderstood. Continually, I remind social, economic, political and cultural early modernists, as well as my modern environmental history colleagues, that early modern environmental history is not being pursued in an insular bubble, or within a sub-field of historical geography or landscape history. Rather, premodern environmental historians are

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immersing themselves in the complexities of early modern historical development as much as, if not more than, their fellow economic, legal, political, social and cultural historians. Having secured a seat on early modern historiography’s top (round)table, we are now revealing very usefully how socio-environmental interactions with soil, air, water, fire, trees and many other natural resources and systems shaped key issues including local and national governance, nationhood and identity, social interaction and riot and rebellion. Almost a decade ago, in 2009, Sverker Sorlin and Paul Warde lamented, ‘there is a peculiar gap’ between the ‘relatively recent and limited discipline-based historiography and the omnipresence of nature and natural resources as fundamentals of human societies that goes back to the very roots of human existence’. Cavert’s *Smoke of London* is a welcome contribution towards filling this ‘peculiar gap’, and it is currently spearheading a tidal wave of historiography which elucidates premodern, two-way, socio-environmental relationships.

The task of investigating early modern environmental attitudes cannot be achieved merely by inspiring modern environmental historians to push their chronologies further back in time to consider the early modern foundations of their modern research topics. Early modernists, with the benefit of crucial expertise in relation to the particular political, economic, religious, cultural, legal and social contexts of the period, are much better placed to conduct this research. William Cavert stands at the centre of a core group of British early modernists, who are successfully raising the profile of premodern socio-environmental relationships. The content of *Smoke of London* is intrinsically interesting, based on impressively rich and wide-ranging research. Cavert deftly combines an illuminating case study of early modern London in its own right, confirming for example that between 1624 and 1640 Charles I deliberately excluded smoky industries from the area around his court in London to improve the quality of the air, with wider historiographical considerations and persuasive arguments about why early modernists should incorporate natural resources and systems more prominently into their own narratives. I use *Smoke of London* extensively, not only when I’m teaching my undergraduate students about the ubiquity of bio-physical flows, non-visual sensory experiences and socio-environmental relationships in daily urban life experiences, but also to demonstrate

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and showcase the applicability and usefulness of environmental history in mainstream early modern British history. Cavert’s *Smoke of London* is important because it breaks down the arbitrary ramparts separating the heartland of traditional early modern history and the relatively new field of environmental history, proving amply that early modern environmental history can and will continue to uncover new insights, useful perspectives and a more grounded appreciation of daily, lived experiences, re-entangled with and reconnected to the nexus of natural flows, materials and processes which shaped, redirected and limited historical discontinuity so forcefully.

Attitudes towards the environment, conservation and sustainability, are misconceived by too many as a modern invention. In his environmental history of the early modern world, John Richards points out that ‘as the term *early modern* suggests’, the ‘long-term trends that accelerated in this period deeply influenced massive and growing human-induced environmental change’ after 1800.\(^1\) And Ronald Zupko and Robert Laures warn that it is misleading to perceive ‘environmental awareness’ as a completely modern movement, ‘arising out of the tumult of a half-century of war and depression like some Venus given birth in the crashing surf of a Mediterranean shore’.\(^2\) However, while the scale of early modern industrial development should not be played down, as it has been, neither should the fact that its scale was significantly smaller be ignored or denied. In 2002, Pierre-Claude Reynard encouraged environmental historians to follow his lead in demonstrating that ‘early modern concerns about industrial effluents were not marginal or nascent, haphazard or weak’.\(^3\) As a result of future research into early modern environmental regulation, in particular, Reynard believed that ‘a solid core’ of continuities will be revealed which connect pre-modern environmental attitudes with modern-day environmental impact assessments.\(^4\) Cavert is right to remind us that overstating such continuities can lead us to ‘miss crucial distinctions and risk lumping together very different types of environmental intervention and stress’.\(^5\)

Indeed Martin Schmid goes as far as to suggest that ‘environmental historians should not take the epochal boundaries too seriously'.\(^6\) I wonder how Cavert would respond to that statement. Cavert’s justification for studying the environmental changes between the sixteenth and eighteenth centuries in detail is persuasive, but I would appreciate deeper consideration and discussion in relation to the pros and

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\(^5\) Cavert, *Smoke of London*, p. xvi.

cons of early modern environmental historians’ uncritical adoption of the chronological book ends of the ‘early modern’ period itself. Is it possible that through an environmental history lens, that other chronological book ends might be more logical? As Dolly Jørgensen highlights in relation to late-medieval and early modern sanitation, for example, the Reformation and the political changes which came as a result of Elizabeth I’s accession ‘did not radically alter the way cities dealt with the physical problems of urban life’. Sanitation systems underwent far more significant changes subsequently, in the seventeenth century. Do socio-environmental relationships also require bespoke chronological boundaries between medieval, early modern and modern?

There are no specific nature essays, written by the men who managed Britain in the early modern period, describing explicitly their attitudes towards and valuation of natural resources and systems and regarding the risks, benefits and adverse effects of altering such systems in order to boost the efficiency of trade, industry and profit. As Barbara Hanawalt and Lisa Kiser observe, ‘for many writing in these early periods, “nature” was arguably not even a discursive category; it simply went without saying’. Perhaps Richard White’s rejection of any separation between the human and the natural would raise few eyebrows in a seventeenth-century coffee house; he would merely be stating a widely acknowledged fact. By labelling, so persuasively, the regulation of coal smoke in early modern London as purposeful, as a fully self-conscious attempt to improve air quality in the city, Cavert is persuading both early modernists and modern environmental historians to consider more seriously premodern conceptions of the environment, what it meant to use or conserve a ‘natural’ resource or to negate the adverse impact of smoky air before the advent of terms such as pollutants. Early modern contemporaries imagined a very clear separation between the spiritual world and the natural, physical world which they inhabited, but the latter’s humans, animals and environments were completely entangled together. Our modern-day conceptualisation of a distinction between the natural and the human, therefore, is anachronistic in an early modern context. Nonetheless, early modern attitudes and values in relation to the environment can still be appreciated as part of the long-term process of developing the character of more recent attitudes. These societies created important political and legal frameworks within which they could and did purposely protect ‘natural’ resources, systems and landscapes from harm, as they perceived it, before in-depth scientific experimentation confirmed exactly what could and could not damage natural systems in the long and short term. Perhaps Cavert could reassure early modernists in relation to how far we can and should go in terms of pushing concepts.

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of sustainability, the finite nature of resources and waste or overuse back to the premodern period.

Richard Grove, arguably the pioneer of research into early modern environmental attitudes, argued in 1995 that while ‘the origins and early history of contemporary western environmental concern and concomitant attempts at conservationist intervention lie far back in time’, nevertheless the development of these attitudes was driven by the particular circumstances in which early colonists found themselves in the sixteenth, seventeenth and eighteenth centuries, when resources in the colonies were often scarce and therefore had to be used sparingly. Where Grove’s argument excels is in its emphasis on resource scarcity as a catalyst for the development of environmentally sensitive attitudes. He elaborates that before colonial expansion, ‘at the core of the developing economic system in metropolitan Europe, environmental anxieties were for a long time confined almost entirely to the prospect of a timber shortage – with the notable exception of the Venetian colonial state’. With this in mind, Cavert might have said more about London’s Elizabethan timber supply crisis which drove the demand for increasing volumes of coal, and in particular to how the timber crisis changed environmental values of both governors and the governed. Chapter Two, ‘London’s Turn to Coal, 1575-1755’ focuses primarily on the introduction of coal, and the benefits and disadvantages of the new fuel, somewhat neglecting the phasing out of timber, the pros and cons of that fuel in terms of daily life, cooking and industry and how people felt about the timber shortage. There is some discussion of the timber fuel shortage in Chapter Four, Section II, and three references to wood as a sub-field of fuel in the index, yet the word ‘timber’, curiously, is omitted from the index. I wonder why Cavert chose not to explore the timber crisis in more depth. While Cavert’s explanation of what the transition from wood to coal meant economically, technologically and in terms of smoky air, I wonder if he might elaborate on what the transition from wood to coal meant in terms of material culture, new and different cooking equipment and daily life, especially for women and domestic servants.

Cavert’s attention to detail, and his mastery of multiple sub-disciplinary historical contexts in relation to which his socio-environmental relations with coal were played out, confirms that we need more experienced early modernists fully versed in the complex contexts of the sixteenth, seventeenth and eighteenth centuries rather than modern environmental historians willing to push their chronologies back into the pre-modern period. The Smoke of London is really about the reception, sensation and meaning of coal in people’s lives, livelihoods and bodies, and unlike many similarly chronologically ambitious monographs, it pays impressively sensitive attention to change over time. Cavert rightly brings to the fore the physicality of touching, hauling and burning coal, and the daily experiences of living within and inhaling smoky air in variously distinct zones of the city: public and

21 Grove, Green Imperialism, pp. 7, 95.
private, poor and wealthy, industrial and residential. The key to this book’s success is that Cavert chose not to write in an environmental history silo. This work usefully draws together urban, economic, sensory, social, cultural, political history and the history of technology. I, for one, look forward to reflecting on this seminal book’s impact on the field of premodern environmental history with the benefit of hindsight, in say 2030, still admiring how it shaped, inspired and underpinned the proceeding generation of scholarship.
n parallel with other recent scholarship that integrates economic, cultural, and environmental history, William Cavert’s prodigiously researched and elegantly written study makes the case that many of the changes that we associate with modernity in fact originated during the early modern age. London is at the epicenter of these developments, at least in respect to energy use and environmental degradation. The transition from renewable sources of energy to fossil fuels happened in London around 1600, two or more centuries earlier than practically everywhere else on the planet. In consequence, he argues that early modern England should be considered the “first modern society” (xviii), and he promises to reveal the “rich story of environmental change and environmental concern to be told about London before the industrial revolution” (7).

Although London was not the world’s largest city in the early modern period, Cavert observes that “no other city burned nearly as much dirty coal” (xvi). Drawing on the archival research he conducted with records of coal duties, he tells us that coal consumption in London expanded from 15,000 tons in the mid sixteenth century to half a million tons by the 1680s. This enormous increase resulted chiefly from growing per capita consumption, but in the decades and centuries that followed, the rise in coal use mirrored the growing population of London (24). Throughout the rest of the early modern period, Londoners burned an average of about a ton of coal per person each year.

One of the most impressive aspects of this book is its deep grounding in primary sources. Cavert’s research took him to numerous archives on both sides of the Atlantic, and he seems equally comfortable drawing insights from economic data, parliamentary debates, and literary sources. He also provides a frank and thoughtful discussion of the difficulties historians inevitably face in deriving accurate conclusions from the fragmentary records at their disposal. In addition to discussing historical understandings and perceptions of coal use, he surveys the state of twenty-first century scientific and medical knowledge about coal smoke and its effects.

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23 Other historians have found roughly similar figures for coal use in London during the eighteenth century, but they often fail to provide data for earlier periods. See B. R. Mitchell, British Historical Statistics (New York: Cambridge University Press, 1988), 244-45.

24 Over the course of the nineteenth century, per capita coal combustion in London doubled, to an average of two tons each year. See Peter Thorsheim, Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800, rev. ed. (Athens: Ohio University Press, 2018), 1, 5.
In their efforts to revise our understanding of industrialization, some historians point out that coal-fired steam engines played a relatively minor role in British manufacturing before the middle of the nineteenth century, and they maintain that water power, animal power, and even human muscle power deserve greater recognition for the important roles that they played during the industrial revolution. Cavert agrees with the substance of this point, but he persuasively argues that coal played a crucial role in Britain long before it became home to legions of steam engines.

Cavert also rejects the claims of economic historians who have engaged in counterfactual speculation with the aim of suggesting that Britain could have achieved an identical level of economic growth by burning imported Baltic timber instead of domestic coal. Instead, he insists that the costs of acquiring this wood, and the demands upon shipping that its transport would have entailed, mean that it would have provided a poor substitute for the subterranean fuel upon which Britons came to depend. In wartime, such a reliance would have posed additional burdens and strategic risks. This is precisely what occurred during both world wars, when attacks by U-boats and other vessels threatened to isolate Britain from its global supply chain.²⁵

Cavert’s central claim is that Londoners identified coal smoke as a serious problem long before the advent of “modern industrial capitalism” (6), but despite this recognition, efforts to ameliorate smoke long remained “limited, local, sporadic, and rearguard” (190). Although many early modern Londoners believed that coal smoke was ugly, unpleasant, and unhealthy (at least for some), they accepted it as the price to pay for the cheap and plentiful energy that coal provided. “Neither law nor science,” he avers, “offered straightforward support for claims that smoke was dangerous, an ambivalence that made it difficult for smoke’s enemies to overcome the increasingly confident claims for the importance of coal” (99).

Despite its title, this book is about much more than just smoke. Fundamentally, it is a cultural, political, economic, and environmental history of the first city in the world to become entirely dependent on fossil fuel consumption. Cavert suggests that Londoners viewed smoke both as a symbol of urban life and a pointed reminder of the city’s social and moral, as well as environmental, distance from an ostensibly undefiled countryside. He thus enhances our understanding of the deeply anti-urbanist strain of thought that has long pervaded British culture. Possessing a sharp eye for detail and a delight in contradiction, he enlivens the text with pointed observations, such as his remark about the paradoxical phenomenon of “Londoners writing poems about the impossibility of poetry in London” (204).

The *Smoke of London* provides a deep and detailed explication of early modern nuisance law, and it shows how the legal system provided much more relief to wealthy plaintiffs who complained of damage to their property than to those who suffered personal discomfort or ill health as a result of other people’s actions. Cavert comments that Charles I adopted a dual approach in his campaign against smoke. As an individual, he had the right to sue others for committing a private nuisance against him; as the head of state, he (or agents acting on his behalf) could bring charges of public nuisance against offenders (56). Predating twentieth-century “smokeless zones” by hundreds of years, early modern monarchs also sought to ban smoke emissions from their vicinity. But in an interesting contrast to the phenomenon of pollution displacement explicated by the environmental historian Joel A. Tarr, Cavert observes that starting around 1700 English monarchs abandoned the goal of removing smoke from cities and instead sought to remove themselves from the smoke.26

This is an extremely well-researched and compelling book. It does, however, raise several questions that I hope the author might comment on in his response. First, Cavert’s determination to make his overall argument fit under the umbrella of environmental history feels at odds with the more nuanced arguments and wider scope that he takes within many of its chapters. Is there a risk that the environmental framing of this book underplays its findings in other areas? I was struck by the book’s potential contributions to economic and political history and wonder whether he might have done more with them.

Second, what might be gained from a more extensive comparative perspective? Cavert is quite right to see London as unique in its level of coal consumption during this period, but other contemporary cities suffered from smoke—including Edinburgh (long known as “Auld Reekie”) and Newcastle (the smoke of which is addressed only cursorily here). How did people’s experiences with and understandings of coal smoke differ between London and early modern cities elsewhere in Britain, in Europe, and in Asia?

Third, I wonder about the claim that the scientific revolution played a central role in this story. Complaints about smoke, after all, date as far back as the thirteenth century, long before the rise of modern science.27 Although he suggests that few historians realize that significant environmental changes and concerns predated the modern era, this claim seems somewhat of a straw man. Most recognize the existence of these phenomena in earlier periods, while also concluding that they differed both qualitatively and quantitatively from those that came later.

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Fourth, I would like the author to grapple more fully with the range of ideas that early modern Londoners expressed about the substances in the air that they breathed. Cavert shows that some contemporaries, including the anonymous author of *Orvietan* (ca. 1680s), rejected the notion that smoke was the sole cause of impure air. Instead, dust and manure from dirty streets were the primary problems. Another topic of contemporary interest was miasma. Although the author concedes that concerns about it may have provided a justification for coal smoke as a disinfectant during much of the eighteenth and nineteenth centuries, he suggests that such beliefs had no significant role during the period of his study. Yet as Paul Slack showed three decades ago, people in seventeenth-century England often attributed the plague to miasma, and they often relied on fires to “dispel infected air.” The association between decay and disease was nothing new; Galen, notes Slack, warned that dead bodies and stagnant water poisoned the air and caused disease.\textsuperscript{28} Cavert himself notes that the studies of mortality in London by the respected seventeenth-century demographer John Graunt remained “somewhat ambiguous regarding the overall importance of London’s unique dirty air.” In fact, he notes that Graunt believed coal smoke “somehow shielded the capital from the worst effects of the plague” (94).

Fifth, I would like to ask the author to reflect more fully on the interplay between medical and moral concerns. He notes that the hostility toward smoke that some people expressed in seventeenth-century London stemmed as much or more from concerns about decorum and beauty as about health. This was true even of John Evelyn, arguably the most prominent early modern voice against coal smoke. As Cavert observes of Evelyn, smoke “mattered primarily because it sullied royal honour.” (178). In seeking to explain the diminished birth rate in London relative to other places, early modern experts such as John Graunt and Charles Davenant saw coal smoke as but one factor; other potential contributors included such things as “adultery, luxury, and business” (95-96). Cavert goes even further in quoting from another contemporary demographer, Thomas Short, who believed that “coal smoke had no special power to explain London’s divergent health statistics; it was merely one among many dirty aspects of urban life that were themselves not nearly as important as other explanations, in particular marital customs and sexual behavior” (98).

Cavert concludes with a nuanced assessment: “There were strong reasons for disliking smoke—aesthetic, political, and medical,” but he argues that these were no match for “the powerful and positive associations that coal consumption” entailed in early modern London (215). Londoners’ long accommodation to smoky air sprang from a resignation to put up with coal in exchange for its “undeniable commercial, industrial, fiscal, and strategic benefits” (235). This book thus offers a prescient cautionary tale about the risks inherent in failing to recognize environmental

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problems and the related danger of a complacent hope that technology will save us from problems of our own creation. Today, the search for a way out of this Faustian bargain is crucial not only to Londoners, but to all of humankind.
Response by William M. Cavert, University of St. Thomas

I would like to thank Leona Skelton, Peter Thorsheim, and Paul Warde for their thoughtful and perceptive comments on my book, and I welcome their collective suggestion that its story opens up new questions. I hope I can address some of the specific issues that they raise, but in other cases I can only join them in hoping that further work continues to explore the problems that their comments raise.

One theme that emerges in each of the comments in some way is periodization, in particular how a story of environmental change fits within other ways of bounding and defining early modernity. Thorsheim asks for more clarity on what, exactly, was new during the early modern period, considering that there were medieval precedents for concern about coal smoke. Warde points out that my story joins other recent work on France to question a sharp break between the early modern and modern periods, and Skelton asks whether “early modern” is a useful term at all. I think it is useful, both as a term of art and as a chronological bounding of this story. For while there were indeed a few instances of protest against coal smoke during the 13th and 14th centuries, they were not of the persistent kind described in this book. There was royal complaint against lime burning near a castle in the 1250s, and a small cluster of royal pronouncements against using coal smoke in London within a few years of 1300. As Derek Keene has suggested, at about that date London’s population reached a level not obtained again until Elizabeth’s reign, producing a series of strains that parallel, in some ways, the related demographic, economic, and social dislocations of the late 16th century. But this was limited in both scale and duration, and the 14th century produced a few isolated references to coal burning and smoke, rather than the ongoing and escalating conversations of the early modern period. London’s switch to coal, occurring during the last third of the sixteenth century, really does mark a new departure in its environmental and economic history.

As Warde stresses it is harder to mark the end of this early modern period, especially as it fits well within a literature that sees a gradual, rather than sudden, transition to industrialization. While London boomed in the 17th and 18th centuries, burning coal in innumerable small hearths as well as industrial-scale breweries and new smoke-belching steam pumps, most of England’s thousands of villages changed

31 Warde regrets that this transition remains a “black box.” I did not find material describing how exactly the wood shortage occurred, but do refer on p. 21 to surveys of wood supplies carried out in the 1570s and 80s by the Court of Aldermen, who find worryingly low fuel supplies at wharfs along the Thames, Lea, and Medway. This material does not illuminate the ecological strains on existing forests, but it does clearly show the perception that supplies were limited and that this was an issue for civic governmental attention.
much less. Indeed, this uneven pace of change—innovation juxtaposed with continuity—is arguably part of the particularity of early modernity as a period. The claim made in the book’s Epilogue is that there is indeed more continuity than disruption in London during the years around 1800, but that the capital’s place within England as a whole was profoundly altered when manufacturing towns, and rural industry, altered the face of so much of England. The period offered here, then, is marked by London’s unique status within England as its only great city, in which a unique relationship between energy and environment was both prevalent and evident. Before about 1575 this relationship did not exist, and after about 1820 it was no longer unique to London.

A number of more specific questions arise from how problems like pollution, more usually located as part of industrial modernity, can be assessed during this period. Skelton asks to what extent sustainability can be located in this pre-modern context. If we are talking about using the techniques of modern science to estimate how past societies may have encountered natural limits, then certainly this is essential work for any and all periods. But if we are talking about an actor category, I would not label the kinds of concerns described in the book as being about “sustainability,” at least not in the ways that term has been used in recent decades. As Warde has shown, that concept builds on a number of important early modern strands of thought that were not synthesized until the 19th century.32

There were, however, ways in which early modern people did worry about future environmental harms. As Warde points out there was not yet the capacity of states to incorporate such concerns into centralized planning processes, but there were other ways in which state machinery allowed for the articulation of concerns that harming the natural or built environments could hinder future prosperity. The early modern law doctrine of private nuisance, examined in chapter 5, involves claims about how interventions in natural or built systems—smoky air pumped into one’s garden, watercourses diverted from one’s mill, new posts blocking one’s access to public roads—produced economic damage.33 Such cases might involve one-off claims of loss, but could also include open-ended changes to landscapes that reduced the ability of plaintiffs to make a living from them. Public (as opposed to private) nuisance involved the magistrate’s duty to prevent anything that wrought such damage to the public in general, and involved a kind of informal zoning in which “fit” activities were to be allowed. Fitness, of course, was socially and politically determined, changed over time, and involved estimates of economic benefit and harm, all of which were filtered by differentials of power. Nuisance, then, was a capacious concept in the early modern period, both a legal term of art and also a vague description for anything bothersome – with substantial overlap possible.

33 Nuisance law principles and precedent are summarized in textbooks like Giles Jacob, A new law dictionary (1756), sub. “nusance” [sic]. One case of blocking a public road in London in 1653 is found at The National Archives of the United Kingdom, KB 27/1755, r. 708-708v, digitized at http://aalt.law.uh.edu/AALT7/Com/KB27no1755/aKB27no1755fronts/IMG_0218.htm.
between these two applications. At a moment (autumn of 2019) when a series of lawsuits in American courts assert that climate change violates a range of protections against nuisance, perhaps this is one early modern concept deserving of further consideration. My discussion of it in chapter 5 is based on examining thousands of cases, both in print and manuscript, but that is only a small tip of a largely undiscovered archival iceberg.

Thorsheim asks about medical and natural philosophical understandings of air, and in particular about “miasma” and coal smoke’s relationships with other kinds of bad air. The broader historiographical claim made in chapter 6 is that historians of modern environmental pollution claim that early modern medicine was uninterested in smoke, that it was seen as beneficial and was therefore used to fumigate against plague. Thorsheim’s excellent book on the period after 1800 makes this claim explicitly. In contrast, I argue that during the 17th and 18th centuries coal smoke was assessed through the range of approaches available at the time, including (al)chemical and physical approaches that continually reformulated conceptions of the body. Coal smoke was assessed, by many physicians, through the categories and languages of the scientific revolution. Of course smoke was not the only kind of bad air, and there was never resolution about what exactly bad air was, nor how it worked. Some did not consider smoke a problem, though my discussion focuses on those who did. The fact that coal was burned to fight plague does not, I think, mean that it was considered innocuous. Yes, coal smoke was less dangerous than plague - but what wasn’t? More broadly, ”miasma” is a term that I found less often in the sources than existing literature would lead one to expect. It does not appear at all, for example, either in Evelyn’s *Fumifugium* (1661) or in Arbuthnot’s *Essay concerning the Effects of Air on Human Bodies* (1733). It is also entirely absent from the Short Title Catalogue and from EEBO’s list of keywords. Of course the concept certainly did exist and was discussed by physicians, but often as a near synonym for “poison” or other unhealthy element in, or arrangement of, the air. In this sense there was not “a miasmatic theory” any more than there was a single theory of disease. Miasma was more a category of question—what made air bad? How did bad airs work on the body?—than it was an answer. Additionally, my impression is that concern over miasmas became far more important by about 1800 than it had been during the 17th century, perhaps as a result of new approaches to measuring the effluvia produced by decaying animals and vegetables, or by developments in tropical medicine. In sum, the book suggests that belief in “miasmas” has been taken to explain more than it does, but I would like to add a caveat here that addressing this issue adequately would require much more sustained and detailed research in the medical sources.

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34 Peter Thorsheim, *Inventing Pollution: Coal, Smoke and Culture in Britain since 1800* (Athens, OH: Ohio University Press, 2006), 5-6, 16-17.

Thorsheim, and also Warde, raise the question of comparisons, of London’s place within the urban and environmental histories of Britain, Europe, and the world. The book argues that London was unique, both in the material facts of its air pollution and in the attention devoted to smoke. It suggests—but certainly does not demonstrate—that by the 18th century London provided a model for smaller British cities who were expanding and industrializing, a series of Little Londons that entered the industrial revolution with an already-existing language for assessing the relationship between their booming economic life and their deteriorating environment. This influence is a hypothesis, one that needs further work to be confirmed, rejected, or nuanced. There are, however, a few centers where I suspect the picture is probably more complicated than I present in the book. Newcastle was, of course, dependent on the coal trade, and it burned a large amount itself, both within the town and in the salt pans along the Tyne estuary. Similarly Dublin in the eighteenth century was growing and burning increasing amounts of coal. Both cities must have reckoned with the legal, medical, and political significance of such combustion, and may well have done so in ways that were less derivative of London’s experience than my book suggests. The obvious European comparison for London is probably Paris, which was of comparable size throughout the period, but the case that strikes me as more interesting is Amsterdam. During the 17th century the Dutch entrepôt boomed and expanded, a center of global trade that also, like London, had an energy-intensive economy, based on peat rather than coal. Beyond Europe there is the case of Beijing, which had some nearby coal sources in the western hills that were exploited long before and long after the period covered in my book. Robert Hartwell’s studies from the 1960s, much cited in the Anglophone literature, argued that a booming coal-fueled iron industry during the Song period declined dramatically after about 1200. This thesis has been critiqued by scholars who find evidence of coal-fired industry during the Ming and Qing periods, but I am not aware of any work investigating the place of fuel in early modern Chinese cities.36 In sum, addressing the comparative question adequately would require secondary work on these and other cities, work which would be very welcome. I suspect that there is a great deal to learn about environmental perceptions in these contexts, that their stories are richer than is yet known, but I would be surprised if any of them witnessed the kind of large-scale and long-lasting accommodation with serious smoke pollution that my book describes.

Lastly, I would like to turn to Warde’s comments. His reading is sensitive and perceptive, unsurprising from a scholar who has written authoritatively on the issues raised here from a variety of perspectives. But I want to push back slightly on a few places in his review where he presents dichotomies where I see transitions. That is, he stresses the politics of urban coal supply as about “less as a matter of

economic capacity than as the maintenance of social stability.” That it is true for the period in general, but the book also tries to stress a transition from the focus on attention to social stability found in the period before about 1660, to the increasing awareness of coal’s role as, in Warde’s words, “a matter of economic capacity,” which is increasingly evident from the late 17th century onwards. Similarly, Warde’s summary of my discussion of nuisance law and its negotiation finds that this was “not a society with a metric of risk beyond offence.” That is certainly true before the mid-17th century, but again I argue that such a metric emerges—gradually and imperfectly, with limited effects, to be sure—from about 1660. Statistical methods, in particular, engaged with the Hippocratic idea that bad air caused disease, seeking to quantify the role of coal smoke in London’s public health. In both cases the book argues that the early modern period sees the emergence of some key ways to approach the relationship between fossil fuels and social life, such as its role in the economy, its health impacts, and the perhaps above all the relationship between the two.

This stress on the relationship between energy use and the social, cultural, and political constructions to urban life more broadly leads Warde to ask, in a few places, for more rigorous investigations of the precise role of key variables. He asks how, for example, one could test my suggestion that smoky air contributed to the withdrawal of elites from central London, especially considering that similar develops are found in other cities and other royal courts. Here, again, further work would be very welcome. But my assertion, developed primarily in chapter 12, is that this messy fusion of categories is the point, that a classical discourse of otium and the beatus vir became, in London, also (but not only) a critique of worsening pollution. This messiness is perhaps also at the heart of the distinction the book makes between coal as a factor of production and as a “thing.” This intends to get at an awareness of the necessity of coal in which its price matters alongside of all the other possible impediments to its use: size and bulk, transport and security, ugly smoke and sulphurous taste. It was a thing that was stored, distributed, piled up and dole out, looked at and smelled. Of course cost was central, but that isn’t the end of the story.

Finally, I would like to conclude with a question raised by Thorsheim: does this book really “fit under the umbrella of environmental history”? Is it perhaps at least as much part of other sub-fields, such as economic or political history? One of the book’s main goals was to go some ways towards erasing such distinctions. Skelton generously praises it precisely for not remaining “in an environmental history silo,” and Warde suggests that some American definitions of that field are not only dated but somewhat parochial. Escaping existing narratives (such as the decline of wilderness) and writing across boundaries between sub-disciplines (such as economic, urban, and social history) were indeed goals of the book. But they were instrumental goals, pursued not for their own sake but because they were necessary to tell this story. This is because “the environment” had not emerged as a coherent
and stable category during the early modern period.37 (Indeed, perhaps it is not even one today.) Early modern environmental history therefore must also be political, social, economic, or urban. Environmental change during this period cannot be isolated from other spheres of life, nor can it be ignored.

About the Contributors

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**Paul Warde** is a Professor in Environmental History at the University of Cambridge. His interests focus on natural resource use and its role in shaping societies and economic development, and particularly energy and fuel; and the history of environmental and economic thought. Recent books include *The Invention of Sustainability: Nature and Destiny 1500-1870* (Cambridge, 2018) and *The Environment: a History of the Idea* (Johns Hopkins, 2018), the latter written with Libby Robin and Sverker Sörlin.

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