

Cara New Daggett, *The Birth of Energy: Fossil Fuels, Thermodynamics, and the Politics of Work*, Durham: Duke University Press, 2019. ISBN: 978-1-4780-0632-9 (paper); ISBN: 978-1-4780-0501-8 (cloth)

Discussions about energy – about how to harness or generate it, store or transport it, price or exchange it, use or indeed save it, not to mention how to regulate all of the above practices – have become so inescapable in late capitalist societies that one could be forgiven for dismissing American theoretical physicist Richard Feynman’s famous claim, that “we have no knowledge of what energy *is*”, as a disingenuous but ultimately self-effacing joke. In *The Birth of Energy*, however, Cara New Daggett moves quickly to expose the Greek etymology, cosmic associations, and indeed frequently-fossilised materialities of energy as deceptive distractions, not just from energy’s lack of a tangible “thingness”, but also from the relative novelty of energy as a concept. Energy must be recognised, Daggett argues, as a “thoroughly modern thing that became the linchpin of physics only after it was ‘discovered’ in the 1840s, at the apex of the Industrial Revolution” (p.3), by a group of largely northern British scientists and engineers. In painstakingly assembling a genealogy of energy, this excellent book sets out to demonstrate that almost everything we *do* know about it was shaped indelibly by the concerns of mid- to late-19th century European industrialisation and new imperialism – and in particular by the problems of labour governance that often thwarted these projects, both in the colonies and the metropole. The science of energy, in other words, resulted not from the “discovery” of energy as an apolitical “ability” – most commonly, “to do work” – but was rather “manufactured” in the context of a profound “entanglement with the grand Western imperial project of the period” (p.37), and was oriented ultimately towards the optimisation, intensification, and expansion of work itself.

Perhaps ironically, the explication and buttressing of these arguments itself requires a lot of work – and *The Birth of Energy* is accordingly a composition of numerous rich seams of scholarship, combining detailed archival work with sustained conceptual analysis. Part I of the book concerns itself, across an ambit of four compelling chapters, with charting the emergence of early energy logics, taking in the influence of the steam engine (and its initially-mysterious capacity to convert fossilised lifeforms into motion), the powerful hold of a Protestant ethic of work and asceticism as virtuous, and of the need, above all, to narrate

industrialisation itself as a divinely-sanctioned consequence of a deepening human understanding and command of the natural laws that govern all life on Earth. Part II then offers up three chapters that turn to the question of how this logic of energy, having successfully sutured thermodynamics to Protestantism, functioned as a political rationality in practice – in short, how it operated as what Daggett terms an outright “mode of domination” (p.108) over labour, whether in European or non-European contexts, or indeed over human or more-than-human assemblages. This book is not only a laudable work of historical analysis, however, but also a call to arms for scholars and others seeking to respond more effectively to the various environmental crises of our present time. In a final chapter, therefore, Daggett draws inspiration from feminist critiques of work and labour, embodied most notably in the writing of Kathi Weeks (2011), to advocate a “post-work energy politics”, wherein widespread efforts to decouple economic growth from ecological destruction would ideally be supplanted by more radical attempts instead to detach “energy from work, and productivism from equality and well-being” (p.191).

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Daggett’s genealogy of energy offers a fascinating, multi-layered reconstruction of a Victorian world on the cusp of a great acceleration in human activity, resource exploitation, consumption and – for some – wealth. Despite of the breathlessness of that period, however, it is worth slowing down to properly take in the four chapters which make up Part I of the book. To begin with there is a need to revisit energy’s pre-Victorian, philosophical forebears. While Lucretius may have anticipated much of modern physics as early as the 1st century BC, his *De rerum natura*, rediscovered in the early 15th century, was somewhat at odds – in its insistence on the randomness, and ultimately the senescence, of the Earth – with emergent, enlightenment urges to control and indeed improve upon nature. Initially more influential in shaping the modern science of energy, Daggett contends, were the ideas of Gottfried Leibniz – and in particular his conviction, *contra* Descartes, that the essence of all substance could be found not in its (shifting) spatial or temporal extent, but rather in the magnitude of its life force – or *vis viva*. Life force – and not space or time – was for Leibniz and subsequently many others the true constant of the universe. From this starting point, Daggett suggests,

Western conceptions of energy inherited a moralism “expressing a bias towards dynamism over stasis”; a preference, in short, “for constant motion, action, dynamism, growth” (p.18).

But it is the steam engine that is the real star of this show. In converting coal into motion, steam engines brought Victorians almost magically into contact with the life force of a long-lost world, “converting planetary deep time into industrial quick time, as the lives of hundreds of plants and animals become a thrust of pistons” (p.69). The irreversibility of this process, however, was vexing; coal could be turned into motion, but motion could not reconstitute coal out of ash, and this undermined the idea of life force as a universal constant. In seeking to explain the heat transformations which animated steam engines, therefore, key scientific figures in mid-19th century northern Britain – including William Thomson (later Lord Kelvin), William John Macquorn Rankine, and Peter Guthrie Tait – were compelled to accommodate, alongside a longstanding commitment to the mechanical principles of balance and conservation, an acknowledgement as well of the inevitability of energy loss, waste and decay. Under the guise of entropy, Lucretius was quietly smuggled back in. Moreover, in these efforts, waste was never interpreted merely as a practical concern. Instead, many of the leading figures of energy science, as Scottish Presbyterians, ultimately made sense of what became the first two laws of thermodynamics – the law of energy conservation and the law of energy dissipation – by putting them into dialogue with the Protestant work ethic, and indeed wider theological concerns with the eradication of indolence and sin.

In the end, therefore, unravelling the mysteries of the steam engine in the 19th century was “both a practical and a spiritual concern whose solutions touched upon the larger relationship between Christianity, industrialism, and the Earth” (p.50). The new laws of thermodynamics, in suggesting that “energy was constantly running down beyond the grasp of humans” (p.70), lent scientific legitimacy to the idea that the Earth itself not only could, but *should*, be managed as an engine. The ethos here was simple – maximise work and minimize waste. From this perspective, making the most of the providential gifts of coal, water and other natural resources was not simply an engineering challenge, but a moral responsibility; an act by which humans could prove themselves worthy of having received those gifts in the first place. And even as Daggett assiduously points out that this northern British, “geo-theology” of energy was only one among several branches of thermodynamics, she argues convincingly for its status as a key motor, in the late 19th and early 20th centuries,

of industrial capitalist, Christian and imperialist drives to solve, once and for all, the age-old, thorny problems of labour governance.

Thus, while work had long been framed, through a Protestant lens, as a virtuous act, the new Victorian science of energy insisted that it was also a “physical activity that could be perfected through natural law” (p.85). Energy rapidly became the universal unit for measuring work – one applicable to humans and to more-than-human, machinic assemblages alike – as well as a framework for enhancing its efficiency and productivity. Labouring bodies or other working entities deemed devoid of alacrity could now be rendered fit for capitalism through a scientific study, and subsequent overhaul, of their energy accounts. Though Daggett does not make the link directly, energy science here emerges as perhaps the principal mechanism – at least in the Victorian period – for achieving what Marx (1976) terms the “real subsumption” of labour; its laws and principles serving as the basis upon which both humans and more-than-human assemblages (imbricating amongst other things machines, forests, animals or rivers) could be made to work “harder, faster, and better” for capital (Boyd et al. 2001: 564). Daggett’s studied indifference to the question of where (human) labour ends and (the work of) nature begins is a welcome one, particularly in an era of rapidly intensifying interest in “nature-based solutions” to environmental problems (Hobbie and Grimm 2020). But the more fundamental and powerful insight here is simply that in rendering work itself an *energetic* process, Victorians sowed the seeds for a society that is today at best uninterested, and at worst incapable, of asking itself what dynamism, change, growth, efficiency or productivity are ultimately for.

Having charted the “birth” of energy as a modern concept, Part II of the book shifts its attention to the pathways through which energy science reinforced “already circulating hierarchies of race, gender, and class” (p.108) in British efforts to govern labour, both in the colonies and in the metropole, in the late 19th and early 20th centuries. Unlike other new sciences of the period – including notably evolution, neoclassical economics, and geopolitics – thermodynamics has rarely been acknowledged as part of the imperialist toolkit. But Daggett suggests that it has been hiding in plain sight – pulling strings through the “reigning metaphor of the organism and its metabolism, a metaphor according to which colonial flora, fauna and peoples could be researched and governed” (p.110). From this perspective, the sciences of evolution and, later on, ecology can both be seen as unwitting hosts which

quickly succumbed to a deeper-seated appetite for maximising work and minimizing waste; to such an extent, indeed, that work rapidly became not merely a means for securing the health of an organism, but “evidence that proved the organism’s health” in the first place (p.110). There are important implications here for wider theories of (imperial) power–knowledge, not least because the goal of maximising *work* targets humans “in a milieu that includes not just populations”, à la Foucault’s (2008) biopower, but also “nonhuman energy exchanges” (p.127). Daggett thus prefers Boyer’s (2019) concept of “energopolitics” to biopolitics – both for its recognition that (imperial) governance tactics targeted (and were indeed shaped by) the living non-human world as well as human populations, but also for its concomitant ability to pinpoint the ultimate object of governance as the life not strictly of human populations, but of industrialisation, the economy, and indeed the empire itself, understood as an organism in its own right.

In the remaining two chapters of Part II of the book, Daggett explores some of the forms of resistance encountered by colonial administrators and industrial capitalists seeking to transfer European knowledge of energy science from the imperial core to the periphery, as well as some of the techniques through which that resistance was counteracted. Perhaps the overriding theme of Chapter 6 is one of concealment – not just of the immediate woes of industrialisation (such as pollution, disease, and unemployment), but also of alternative economic cultures and ways of relating to work itself. Under the rubric of modern energopolitics, anything that “clogged the arteries of industry and slowed productive work” (p.155) could be considered a form of waste, whether manifesting as urban smog, tropical climates, indolent Africans, or outdated machinery. Human indolence and indeed leisure thus came to be seen as forms of waste that could be minimized, much like industrial pollution itself, through scientific management. Yet, drawing on McClintock (2013), Daggett questions whether idleness was ever strictly a form of waste at all, so much as an active rejection of Protestant–European interpretations of the virtuousness of work. The project of eradicating idleness – as embodied for example in the work of technical schools for Black and Native American students in the post-civil war United States (examples of which are skilfully unpacked in Chapter 7) – might from this perspective be interpreted just as reasonably as a ploy to distract from the fact that for many ostensibly diligent and productive labourers, the “promise of work ... had proven empty” (p.155). What was being concealed here, ultimately,

was therefore “the great weakness of the industrial project” (p.98) – the fact that the needs of life and the needs of industry were more often than not discordant, and the possibility that those refusing to participate in work – especially if seen to enjoy a life outside of the exploitative clutches of capital – might give the whole game away.

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The Birth of Energy may be a superb work of socio-historical analysis, but its relevance for contemporary debates – about work, energy, and the Anthropocene more broadly – is easy to spot. As Daggett herself points out on numerous occasions, a thermodynamic–Protestant logic of energy contains within itself an awareness of the inevitability of waste, loss, and decay; Victorians were thus all too aware of the dark underbelly of industrialism and imperialism, in both its social and its environmental guises. Moreover, when brought into contact with organicism, a thermodynamic commitment to rendering metabolism as efficient and productive a process as possible only made sense as long as one could be sure of a discrete “outside” realm into which the organism’s waste could be excreted and kept at bay. But what if the organism in question was not a body, a country, or even an empire, but the planet itself? The unsettling nature of this last thought has hardly diminished in the 180 years which have passed since the “discovery” of energy in the 1840s – for Daggett, therefore, the provenance of the idea of the Anthropocene itself should properly be understood as Victorian.

But Daggett is bullish about the prospects of reinventing energy – of freeing it from the shackles of the work ethic and a continuing obsession with dynamism for the sake of dynamism. In seeking to hammer home the pervasiveness of the latter ideal across conservative *and* progressive political camps, she excoriates ecomodernism – arguing persuasively that in viewing high energy consumption as “integral to escaping poverty”, and in investing faith in the capacity of technological innovation to decouple economic growth from environmental destruction, the movement might just as well be labelled “accelerationism” (p.191). Far better, she says, to decouple energy from work altogether. For this more radical purpose, Daggett here proposes a marriage between post-carbon and feminist post-work projects, drawing especially on the work of Kathi Weeks (2011) to endorse what she terms a “hopeful politics”, in which the downbeat asceticism so often

chastised by environmentalism's critics would be shunned in favour of "other pleasurable, desire-based visions for the future" (p.204). Many have already latched on to Weeks' ideas to question the necessity of continued *human* toil in a post-carbon society, of course – Daggett identifies Srnicek and Williams (2015) as particularly important protagonists of this view. But if human work is simply replaced, in the Anthropocene, with that of automated machines and "the work of nature" (Besky and Blanchette 2019), Daggett insists that the real battle – that of unshackling dominant cultures of energy from the work ethic and the promise of "plentiful production" (p.196) – will still have been lost. In this sense she directly echoes Battistoni's (2017: 22) call to explore the possibilities of an "expanded we" of labour; one which encompasses the nonhuman, and which would equip critiques of capitalism to stake their claims around the protection of "not just human life, but Earthly life" as well (p.196).

Insisting on the more-than-human scope of "the problem of work" is a major strength of the book's concluding chapter, and one entirely commensurate with the gaze of energopolitics itself. Yet it is also unavoidably the case that imaginaries of work have shifted seismically since the 1970s, and – while Daggett does acknowledge these transformations (of "neoliberalism, automation, and the prominence of service-sector jobs" [p.194]) – she perhaps underplays the extent to which they centre precisely on the production and fulfilment of new kinds of desires that increasingly blur the boundary between work and leisure. At one level therefore, one wonders if there may not be new (sub)cultures of energy emerging today, no doubt unbidden but potentially enrapturing all the same, as a result of the prodigious growth of diverse new assemblages of human and machinic labour which undergird "the cloud" and its promise of access to infinite stream-able content, or indeed the "gig" economy and its promise of limitless conjurable convenience, to name but two admittedly obvious examples. Are these energy cultures animated by a commitment to efficient and productive work per se, or rather by logics of overabundance, excess, and potentially even of waste itself?

More fundamentally, perhaps, while the call for a "pleasure-based politics" (p.204) is entirely admirable, the elephant in the room may be that we simply do not always know what we want from our lives, or at least that our capacities to imagine, and indeed desire, forms of pleasure derived precisely from a withdrawal from the realm of consumption might have succumbed, irreversibly, to an entropy of their own. Daggett of course recognises that leisure

is all too often reduced to consumption, but in echoing Weeks' faith in the capacity of a "utopian hope" to "[feel] its way toward other modes of work and leisure" (p.201), she arguably overlooks the need for collective deliberation around radically different visions and possibilities of life – such as those that might be opened up by ostensibly pragmatic demands for a Universal Basic Income, or shorter working hours – to be paired also with a collective acknowledgement of the need (indeed, the inevitably) for life to have *limits*.

In his recent book on limits, Giorgos Kallis (2019) in effect calls for (yet) another decoupling move, this time neither of economic growth from ecological devastation, nor of energy from work, but of the idea of limits from the perception of human suffering at the hands of an external force (call it "nature" if you will). For Kallis, no limit, however apparently objective or unremittingly biophysical, can be said to exist outside of a particular presumed end goal or objective – thus limits always come not from outside, but from within ourselves. Similarly, the "usefulness" of energy might be said ultimately *not* to be defined by the second law of thermodynamics (dissipation, or entropy), but by our own socioeconomic and cultural ideas about what energy is *for* (a point that Daggett is at pains to make herself). Yet, to return to the idea of a Universal Basic Income, while this proposal is one that I personally support (and, indeed, I accept that it could well contain the seeds of more radical post-work imaginaries), in the absence of collective efforts to agree as well upon a Universal *Maximum* Income, I also suspect that it could very easily act merely to grease the wheels of economic activity and consumption while leaving entirely unexamined the deeper question of what the limits of our consumption – and hence, the reasonable limits of our energy use – should be.

The obvious rebuttal to these ideas is that they take us back to a repellent, ascetic environmentalism, entirely devoid of pleasure. But this is to miss the most critical point that Kallis is trying to make – that we would stand to lose none of our dignity by admitting that our wants and desires are not in fact limitless in the first place; it is only capitalism that compels us to act *as if* they are. If we could only learn to see limits (including that of death) not as manifestations of a failure of human progress to "overcome" nature, but rather as boundaries of our own making, we might quickly realise that "capitalism's imaginary of a permanent transgression of a constantly expanding frontier ... is not only self-destructive; it is not fun" (Kallis 2019: 114-115). Instead, Kallis contends that real fun – and thus I would

argue the only feasible basis for a genuinely pleasure-based politics – resides in “Dionysian” moments of exuberant excess where the transgression of limits is exhilarating precisely *because* of its fleeting nature.

The implications of these ideas for contemporary environmentalism are profoundly different, then, from asceticism. Instead, what they entail is arguably both a more open acknowledgement of our fears about the probable limits of our capabilities in the Anthropocene (whether to stop climate change, to curtail Earthly suffering in the face of other environmental challenges, or simply to stay alive at all), and, at the same time, a recognition that the occasional transgression of limits upon which we have all agreed – at least when it comes to energy and resource use – is not wrong, but merely human. Such an environmentalism, crucially, would free us not just from the shackles of the work ethic, but also from what Gerlach (2016: 337) calls the “stifling ... duty to be hopeful”, recognising instead that hope needs “always to be tethered to fear” (2016: 338). In so doing, it might also give birth to an Anthropocene discourse in which fears of death, or failure, are not taboo subjects to be warded off at all costs (on the presumption that they can lead only to petrified torpor), but themselves taken as potential starting points for a radical reappraisal of what life, and indeed energy – while we still have them at our disposal – are really for (cf. Bringham and Zwicky 2018). Insisting on hope without acknowledging fear is, after all, probably as unsustainable as seeking to maximize work while minimizing waste.

As a final aside, and in the (yes, hypocritical) hope of ending on a less morbid note, since the target audience for Daggett’s book is principally academic, its overarching arguments also raise awkward questions about our own working practices as scholars. After all, academics in British (and other) universities have of late increasingly found themselves involved in industrial disputes that revolve in no small part (though of course not exclusively) around the question of what our work is financially worth. Extrapolating from Daggett, however, perhaps one might also discern a responsibility on us to reflect more carefully on the *broader* worth of our work, as but one component of contemporary academic life – and, in so doing, to lead by example in more actively resisting those all-too-familiar logics of efficiency and productivity. In an academic sector marked by rising levels of (gendered, racialised, and classed) precarity and remunerative injustice, does the hyper-productive academic’s frenetic rate of “REF-able” metabolism not also generate its own forms of toxic

waste, not least by further extending and normalizing the already daunting expectations that are subsequently foisted upon everybody else in the sector? Make no mistake – this is not a call for a new “Research Indolence Framework”, or anything similarly drastic. But a little more critical introspection (and humility) about the ultimate purpose of some of our current working practices – and yes, why not, perhaps even a conscious decision to limit our outputs in some way – might nonetheless bring benefits to the health of the academic “organism” as a whole. So, while *The Birth of Energy* is without doubt a landmark contribution to energy humanities and political theory, and one that greatly enriches and advances conceptual debates about energy and work in the Anthropocene, I still find myself hoping that scholars will not be *too* hasty in their efforts to do full justice to the many brilliant ideas that it sets out.

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James Palmer

School of Geographical Sciences

University of Bristol

james.palmer@bristol.ac.uk

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